C) TEKSTUALNA DOKUMENTACIJA

1.TEHNIČKI OPIS

Glavni projekat termotehničkih instalacija za rekonstrukciju i dogradnju objekta ARHITEKTONSKOG FAKULTETA u Podgorici na lokaciji: UP14 DUP „Univerzitetski centar" u Podgorici urađen je u skladu sa Projektnim zadatkom i Glavnim arhitektonsko građevinskim projektom. Za objekat su predviđene sledeće instalacije:

1.Instalacija za grijanje i hlađenje u objektu

2. Instalacija za grijanje i hladjenja amfiteatra i kluba/kafe-a

3. Instalacija ventilacije prostorija

4. Instalacija ventilacije toaleta

1. Instalacija za grijanje i hlađenje u objektu

Za grijanje/hlađenje objekta predviđeno je sedam nezavisnih VRV sistema, i tri spoljasnje VRV jedinice koje su priključene na dvije klima komore. Za sve sisteme zbog orjentacije objekta predviđen je 3-cijevni VRV sistem. Za suteren je predvidjen SISTEM 1, za prizemlje SISTEM 3 i SISTEM 4, za prvi sprat SISTEM 5 i SISTEM 6 i za drugi sprat SISTEM 7 i SISTEM 8. SISTEM 2 je spoljašnja VRV jedinica priključena na klima komoru (KLIMA KOMORA KLUB) koja služi za grijanje/hladjenje kafe kluba u suterenu objekta. SISTEM 9-1 i SISTEM 9-2 su spoljašnje VRV jedinice priključene na klima komoru (K.K. AMFITEATAR) koja služi za grijanje/hladjenje amfiteatra koji se nalazi na drugom spratu. Ovi sistemi rade sa promjenljivom količinom rashladnog fluida. Kao rashladni fluid predviđen je R 410-A, koji nije štetan po ozonski omotač. Kompresorom upravlja inverter koji zavisno od toplotnog opterećenja objekta odabira najpovoljniju brzinu obrtanja kompresora. Rashladni fluid se dovodi do unutrašnjih jedinica sa promjenljivim zapreminskim protokom, dok unutrašnje jedinice imaju elektronski ekspanzioni ventil sa opsegom otvaranja 0-100%.

Ovakvim sistemima se obezbjeđuje istovremeno grijanje i hlađenje pojedinih prostorija – jedna jedinica radi u režimu grijanja dok druga jedinica radi u režimu hladjenja. Ovaj sistem je povoljan u prelaznim periodima (proljeće, jesen) kada jedna grupa prostorija zahtijeva hlađenje a druga istovremeno grijanje.

U narednoj tabeli je prikazan zbirni Izvještaj iz proračuna potrebne količine toplote za grijanje i hlađenje po pojedinim sistemima i navedeno na koji dio objekta se koji sistem odnosi.

SISTEM	Q_{HL}(W)	Q_{GR}(W)	LOKACIJA
SISTEM 1	35820	30471	SUTEREN
SISTEM 3	24132	17218	PRIZEMLJE
SISTEM 4	47403	45057	PRIZEMLJE
SISTEM 5	33940	22799	PRVI SPRAT
SISTEM 6	41816	36988	PRVI SPRAT
SISTEM 7	40587	31612	DRUGI SPRAT
SISTEM 8	33814	27805	DRUGI SPRAT

Spoljašnje jedinice VRV sistema se smještaju na krovu objekta. Od spoljašnjih do unutrašnjih jedinica vodi se izolovani bakarni cjevovod.

Cjevovod ulazi u objekat sa krova i se spušta vertikalno niz zid koji se oblaže gipsom, i zatim se vodi po plafonu odredjenih etaža do unutrašnjih jedinica.

Kao unutrašnje jedinice u kancelarijama i kabinetima predvidjene su kasetne jedinice sa četvorosmjernim izduvavanjem dimenzija 700x700mm, dok su u holovima, salama, kopirnici, modelarnici i vježbaonicama predvidjene kanalske jedinice različitih dimenzija.

Spoljašnje jedinice se sa unutrašnjim jedinicama povezuju bakarnim mekim i polutvrdim cijevima koje se međusobno povezuju tvrdim lemljenjem. Sva odvajanja rashladnog fluida se izvode prefabrikovanim izolovanim račvama. Bakarne cijevi se izoluju samogasivom izolacijom od sintetičke gume, debljine 9-13 mm. Za izolaciju koja se vodi izvan objekta (po krovu) potrebno je izvšiti njenu zaštitu samoljepljivom aluminijskom trakom, izolacijom otpornom na UV zračenje ili aluminijskim limom.

Kondenzat od unutrašnjih jedinica se spaja u zajedničke odvodne cijevi i odvodi izvan objekta u oluke. Horizontalna cijevna mreža za odvod kondenzata se vodi po plafonu. Cijevi za odvod kondenzata su PVC cijevi prečnika Ø32 mm. Priključci unutrašnjih jedinica na kondenz mrežu se izrađuju od PP-R cijevi Ø25mm. Visinu priključka odrediti vodeći računa o visini dizanja pumpi za kondenzat ugrađenih u unutrašnjim jedinicama.

Unutrašnje jedinice imaju sopstvene žičane kontrolere koji se postavljaju na zidu prostorija, sa višejezičkim displejom. Unutrašnje jedinice se sa kontrolerima povezuje dvožilnim LiYCY kablovima 2x0,75 mm^2. Kontroleri su u izvedbi sa mogućnošću povezivanja na centralni sistem nadzora upravljanja.

Unutrašnje jedinice se povezuju sa spoljašnjim jedinicama dvožilnim kontrolnim LiYCY kablovima 2x0,75 mm^2, pa svaka od unutrašnjih jedinica ima svoju adresu i zajedno sa spoljašnjimm jedinicama čini jedinstveni kontrolni sistem.

Za sistem grijanja i hlađenja predviđena je ugradnja centralnog kontrolera kojim je omogućena centralna kontrola i nadzor nad sistemima koji su predviđeni za objekat.

Centralni kontroler omogućava sledeće kontrolne funkcije: uključivanje/isključivanje, režim rada, podešavanje temperature, brzina ventilatora i pozicija istrujnih lamela, grupno ili individualno upravljanje (uključivanje/isključivanje, režim i podešavanje temperature), regulacija temperature, kalendar, nedjeljni i dnevni programi ograničavanje pristupa individualnim žičanim upravljačima u prostorijama.

Centralni kontroler omogućava sledeće nadzorne funkcije: grafički prikaz na ekranu kontrolera, rad unutrašnjih i spoljašnjim jedinica, signalizacija greške, signalizacija zaprljanosti filztera na unutrašnjim jedinicama, različite nivoe pristupa (korisnički, servisni).

2. Instalacija za grijanje i hlađenje amfiteatra i kluba/kafe-a

Za ubacivanje vazduha u prostore, kao i za izvlačenje vazduha, predviđene su dvoetažne klima-komore proizvođača "DIKIN" ili sl, za spoljašnju ugradnju, smještene na ploči - dio krova objekta predviđen za tu namjenu. U sistemima se održava natpritisak. Komore rade sa 100% svježim vazduhom.

Sastav potisnog dijela komora je: priključak za svježi vazduh sa zaštitnom mrežicom i žaluzinama, filtar, rekuperator, potisni ventilator, freonski izmjenjivač, izlazni priključak sa fleksi vezom (potis sa čela); a odsisnog dijela: ulazni priključak sa fleksi vezom, filtar, rekuperator, odsisini ventilator, žaluzina za otpadni vazduh.

Za grijanje i hladjenje amfiteatra na drugom spratu i kluba/kafe-a u suterenu koriste se klima komore sa rekuperatorima, sto povecava efikasnost sistema, jer se vazduh zagrijava/hladi, otpadnim vazduhom iz prostorije, bez miješanja svježeg i otpadnog vazduha. . Grijač i hladnjak su predviđeni kao jedan izmjenjivač.

Klima komora za amfiteatar koristi dva freonska izmjenmjivača. Na svaki od izmjenjivača povezana je po jedna spoljašnja VRV jedinica.
Ova klima komora obezbedjuje protok od 6310 m³/h pripremljenog svježeg vazduha, i isto toliko otpadnog vazduha izbacuje van objekta. Na izlaznom dijelu kanala za otpadni vazduh, kao i na ulazu u kanal svježeg vazduha, predvidjena je ugradnja prtivkišnih žaluzina sa zaštitnom mrežom.

Klima komora za klub/kafe koristi jedan freonski izmjenjivač,i obezbedjuje protok od 4400 m³/h pripremljenog vazduha. 4400 m³/h otpadnog vazduha se odvodi iz prostorije i prolazi kroz rekuperator toplote gdje se energija preko razmjenjivača prenosi na svježi vazduh.

Svježi i otpadni vazduh se do i od klima komore vode kanalima od pocinčanog lima pravougaonog poprečnog presjeka. Kanali se spuštaju kroz vertikalni šaht u objektu, do odredjenih etaža a zatim se vode po plafonu. Od kanala pravougaonog poprečnog presjeka do varijabilnih vrtložnih difuzora vazduh se vodi sporo kanalima. Oblaganje kanala obrađenog vazduha se vrši termičkom izolacijom od mineralne staklene vune, keširane sa Al folijom bez natron papira, tip URSA TF R2/Ah ili sl. debljine 50 mm. Odsisni kanali i kanali otpadnog vazduha su od pocinkovanog lima odgovarajuće debljine izoluju se, na isti način, kao i kanali potisnog vazduha.

3. Instalacija ventilacije prostorija

Za prostorije: sala za nastavno osoblje(306), čajna kuhinja i trpezarija(325), arhiv studentskih radova(326) i radna sala(327) koje se nalaze na drugom spratu predviđena je prinudna ventilacija koja se ostvaruje ventilacionim jedinicama sa iskorištenjem otpadne toplote vazduha. Ove jedinice koriste toplotu vazduha iz prostorije koji izbacuje izvan objekta, da bi zagrijale svježi vazduh koji se ubacuje u objekat što i ovaj sistem čini izuzetno energetski efikasnim, tj. ne koristi se toplota, odnosno energija za grijanje odnosno hlađenje spoljašnjeg vazduha za ventilaciju.

Količina vazduha je određena po vazdušnom obroku od 28m^3/h po osobi tako da ukupna količina vazduha za salu za nastavno osoblje iznosi 1000 m^3/h (36 osoba).

Za ventilaciju sale za nastavno osoblje predviđena je jedna ventilaciona jedinica kapaciteta od 1000 m^3/h.

Količina vazduha je određena po vazdušnom obroku od 37m^3/h po osobi tako da ukupna količina vazduha za radnu salu iznosi 450 m^3/h (12 osoba).

Količina vazduha je određena po vazdušnom obroku od 50m^3/h po osobi tako da ukupna količina vazduha za arhiv studentskih radova iznosi 100 m^3/h (2 osoba).

Količina vazduha je određena po vazdušnom obroku od 38m^3/h po osobi tako da ukupna količina vazduha za čajnu kuhinju I trpezariju 450 m^3/h (12 osoba).

Za ventilaciju radne sale, arhiva studentskih radova I čajnu kuhinju I trpezariju predviđena je jedna ventilaciona jedinica kapaciteta od 1000 m^3/h.

Ventilacione jedinice se postavljaju na plafonu objekta. Svježi vazduh za ubacivanje u prostore uzimaju se sa fasade preko fiksnih protivkišnih žaluzina. Otpadni vazduh koji se izvlači iz prostora izbacuje se izvan objekta takođe preko fiksnih protivkišnih žaluzina postavljenih na fasadi objekta.

Od ventilacionih jedinica vazduh se neizolovanim spiro kanalima dovodi do elemenata za njegovu distribuciju. Za ubacivanje vazduha u prostore predviđeni su vrtložni difuzori, opremljeni sa priključnom kutijom i regulatorom protoka. Za odsisavanje vazduha predviđeni su takođe vrtložni difuzori – izvedba za izvlačenje vazduha. Difuzori se sa kanalskom mrežom povezuju fleksibilnim crijevima od PVC-a. Kanali i kutije distributivnih elementa se postavljaju vidno na plafonu.

Ventilacionom jedinicom se komanduje kontrolerom koji se sa istom povezuje kablom LIY-CY 2x0.75mm^2.

U svrhu uštede energije za pogon ventilacionih jedinica i kontrolu nivoa CO2 u prostoru predviđena je ugradnja CO2 senzora, koji usled promjene nivoa CO2 u prostoru povećavaju i smanjuju broj obrtaja ventilatora ventilacione jedinice.

4. Instalacija ventilacije toaleta

U toaletima u suterenu objekta je predviđena ventilacija (odsisavnje vazduha) preko kanalskog ventilatora koji odsisavanje vazduha vrši kroz spiro kanale i ventilacione ventile koji su predviđeni kao odsisni elementi.

Za toalete na prvom i drugom spratu koji nemaju mogućnost prirodnog provjetravanja predviđeni su individualni ventilatori sa nepovratnom klapnom, koji se ugradjuju na vertikalni šaht kroz koji se vrši odvodjenje vazduha.

Na odvodima otpadnog vazduha izvan objekta predviđena je ugradnja fiksnih protivkišnih žaluzina sa zaštitnom mrežom. Ventilatori se uključuju sa paljenjem rasvjete.
Količina vazduha koja se odsisava iz zasebnih sanitarnih prostorija iznosi 54 m^3/h.

ODGOVORNI PROJEKTANT,
Vuk Janković, dipl.ing.maš.

2. OPŠTI POGODBENI I POSEBNI TEHNIČKI USLOVI

2.1. POGODBENI USLOVI

I OPŠTE ODREDBE

1. Odnosi između naručioca i izvođača radova u poslovima izvođenja na građevinskim objektima uređuju se posebnim uzansama o građenju (Zakon o izgradnji objekata, Službeni list RCG br. 51/08), ako su ugovarači pristali na njihovu primjenu.
2. Poštenje i savjesnost je osnovno načelo kojeg se ugovarači moraju pridržavati.
3. Ugovarači su dužni nastojati da ostvare ciljeve koje su ugovorom postavili.
4. Ugovarači su dužni da svoje obaveze ispunjavaju u predviđenim rokovima. Ako ugovarač ne ispuni svoju obavezu u predviđenom roku, drugi ugovarač mu može odrediti naknadni primjerni rok za ispunjenje odnosne obaveze.
5. Ugovarač je dužan da blagovremeno obavijesti drugog ugovarača o činjenicama čije je nastupanje od uticaja na ispunjenje ugovora, kao što su smetnje u ispunjenju ugovora, promjena okolnosti i sl. Obavještavanje se vrši u pismenoj formi.
6. Ugovarač ne može tražiti od drugog ugovarača da ispuni obavezu, ako sam nije ispunio ili nije spreman da ispuni svoju obavezu, osim ako ugovorom nije drugačije određeno.

II DEFINICIJE SASTAVNIH DJELOVA UGOVORA

7. Sastavni djelovi ugovora su tehnička dokumentacija sa svim grafičkim, računskim i opisnim prilozima potrebnim za izvođenje radova koji su predmet ugovora, kao i posebni i drugi uslovi naručioca koji su ugovorom određeni.

III PROUČAVANJE I IZMJENA TEHNIČKE DOKUMENTACIJE

8. Izvođač je dužan da blagovremeno i detaljno prouči tehničku dokumentaciju na osnovu koje se izvode ugovoreni radovi i da od naručioca blagovremeno zatraži objašnjenje o nedovoljno jasnim detaljima.
9. Izvođač nema pravo da mijenja tehničku dokumentaciju. Ako uoči nedostatke u tehničkoj dokumentaciji ili smatra da tu dokumentaciju treba mijenjati radi njenog poboljšanja ili iz drugih razloga Izvođač je dužan da blagovremeno obavijesti Naručioca.
10. Naručilac ima pravo da mijenja tehničku dokumentaciju na osnovu koje se izvode radovi. Ako se izmijeni tehnička dokumentacija mijenjaju se na odgovarajući način ugovorene cijene, rok za izvođenje radova i drugi djelovi ugovora na koje utiče izmjena tehničke dokumentacije.
11. Projekat izvedenih radova su crteži i proračuni izvršenih izmjena i dopuna tehničke dokumentacije i stvarno izvedenih na osnovu tih izmjena i dopuna. Projekat izvedenih radova izvođač predaje naručiocu po završetku radova, odnosno po raskidanju ugovora.
12. Izvođač je dužan da izvede ugovorene radove na način i u rokovima koji su određeni ugovorom, propisima i pravilima struke. Ugovorenim radovima se smatraju i viškovi radova.
13. Izvođač je dužan da po pismenom nalogu naručioca izvede nepredviđene radove.
14. Naručilac je dužan da izvođenje nepredviđenih radova ustupi izvođaču, a trećem licu ih može ustupiti ako izvođač odbije da ih izvede ili nije u mogućnosti da ih izvede uopšte ili blagovremeno.
15. Naručilac je dužan da izvođenje naknadnih radova prije ustupanja trećem licu ponudi izvođaču.

IV CIJENA

16. Cijena radova određuje se na način utvrđen uslovima naručioca za podnošenje ponuda i ugovaranje predmetnih radova.
17. Svaki ugovarač ima pravo da zahtijeva izmjenu ugovorene cijene u slučaju nastupanja

vanrednih događaja koji utiču na visinu cijene.

18. Ugovarač ne može zahtijevati izmjenu cijene zbog promijenjenih okolnosti koje su nastupile po isteku roka određenog na ispunjenju njegove obaveze, osim ako je za donju kriva druga ugovorna strana.
19. Ako izvođač bez prethodne saglasnosti naručioca upotrijebi materijal boljeg kvaliteta od ugovorenog, ocjena radova se po tom osnovu može izmijeniti uz pristanak naručioca.
20. Naručilac koji je primio izvedene radove ima pravo na srazmjerno smanjenje cijena ako kvalitet upotrijebljenog materijala ili izvedenih radova bude ispod ugovorenog. Iznos smanjenja cijene utvrdiće se sporazumno između naručioca i izvođača.

V ROKOVI ZA IZVOĐENJE RADOVA

21. Pod rokom za izvođenje radova u smislu ovih uzansi podrazumijevaju se i rokovi za završavanje pojedinih faza radova koji su predviđeni dinamičkim planom radova, ako su ugovarači tako odredili.
22. Ako je naručilac ustupio izvođenje radova dvojici ili većem broju izvođača na istom objektu, dužan je da koordinira rad tih izvođača za izvršenje tih radova.
23. Izvođač ima pravo da zahtijeva produženje roka za izvođenje radova u slučaju u kome je zbog promijenjenih okolnosti ili neispunjavanja obaveza naručioca bio spriječen da izvodi radove.

VI UVOĐENJE IZVOĐAČA U POSAO

24. Pod uvođenjem izvođača u posao podrazumijeva se ispunjenje ovih obaveza naručioca bez čijeg prethodnog ispunjenja započinjanja radova faktički nije moguće ili pravno nije dozvoljeno.

VII USTUPANJE RADOVA TREĆEM LICU

25. Izvođač može izvođenje pojedinih radova ustupiti trećem licu.

VIII UGOVORNA KAZNA

26. Ako je ugovorom predviđena ugovorna kazna, a nije određeno u kojim se slučajevima plaća, smatra se da je kazna ugovorena za slučaj neurednog izmirenja ugovorenih obaveza.
27. Dužnik se oslobađa od plaćanja ugovorne kazne ako je do neispunjenih ili neurednog ispunjenja ugovorenih obaveza došlo zbog uzroka za koji nije odgovoran.

IX PLAĆANJE

28. Izvedeni radovi plaćaju se na osnovu privremenih situacija i okončane situacije.
29. Privremena situacija i okončana situacija ispostavljaju se na osnovu izvedenih količina ugovorenih radova i ugovorenih cijena. Situacijama se prikazuju radovi na način i po specifikaciji koja je data u tehničkoj dokumentaciji
30. Naručilac ima pravo da zadrži srazmjerni dio cijena za otklanjanje nedostataka utvrđenih prilikom primopredaje radova.

X PRIVREMENO OBUSTAVLJANJE IZVOĐENJA RADOVA

31. Izvođač ima pravo da privremeno obustavi izvođenje radova, ako je postupcima naručioca spriječen da izvodi radove ili je zbog tih postupaka izvođenje radova znatno otežano.
32. U slučaju obustavljanja radova izvođač je dužan da već izvedene radove zaštiti od propadanja preduzimanjem mjera zaštite koje su nužne.

XI KVALITET RADOVA I MATERIJALA

33. Izvođač je dužan da saglasno pravilima struke ispita pravilnost tehničkog rješenja u

tehničkoj dokumentaciji i da naručioca upozori na grešku koju primijeti.

34. Izvođač je dužan da pruži dokaze o kvalitetu upotrijebljenog materijala i opremi izvedenih radova i da naručiocu omogući kontrolu.
35. Svi nalazi kontrole izvođača i kontole naručioca upisuju se u građevinski dnevnik.

XII GARANCIJA ZA KVALITET IZVEDENIH RADOVA

36. Izvođač garantuje da su izvedeni radovi u vrijeme primopredaje u skladu sa ugovorom, propisima i pravilima struke.
37. Garantni rok na kvalitet izvedenih radova iznosi dvije godine, ako ugovorom ili propisima nije drugačije određeno.
38. Za opremu koju ugrađuje izvođač važi u pogledu sadržine i roka, garancija proizvođača opreme, s tim što je izvođač dužan da svu dokumentaciju o garancijama proizvođača opreme zajedno sa uputstvima za upotrebu, pribavi i preda naručiocu.
39. Izvođač je dužan da da o svom trošku otkloni sve nedostatke koji se pokažu u toku garantnog roka, a koji su nastupili usled toga što se izvođač nije držao svojih obaveza u pogledu kvaliteta radova i materijala.

XIII MATERIJAL I OPREMA KOJI NABAVLJA NARUČILAC

40. Ako je ugovorom između naručioca i izvođača predviđeno da izvođač ugrađuje određenu opremu i materijal koji nabavlja naručilac, izvođač je dužan da materijal i opremu koju primi od naručioca uskladišti,čuva i održava do ugrađivanja.

XIV OSIGURANJE

41. Izvođač osigurava radove, materijal i opremu za ugrađivanje od uobičajenih rizika do njihove pune vrijednosti.

XV SNOŠENJE RIZIKA

42. Do primopredaje izvedenih radova, rizik slučajne propasti i oštećenja radova, materijala i opreme snosi izvođač. Naručilac snosi rizik za materijal i opremu, koju je nabavio do njihove predaje izvođaču.

XVI STRUČNI NADZOR NARUČIOCA

43. Naručilac ima pravo da vrši stručni nadzor nad radovima izvođača radi provjeravanja i obezbjeđenja njihovog kratkog izvođenja, naročito u pogledu vrsta, količina i kvaliteta radova, materijala i opreme i predviđenih rokova.

XVII ODGOVORNOST IZVOĐAČA ZA STABILNOST I SIGURNOST OBJEKTA

44. Izvođač odgovara za nedostatke objekta u pogledu njegove stabilnosti i sigurnosti, koji bi se pokazali na vrijeme od 10 godina od dana primopredaje radova.

XVIII MJERE SIGURNOSTI

45. Izvođač je dužan da na gradilištu preduzme mjere radi obezbjeđenja sigurnosti objekta i radova, opreme, uređaja i instalacija, radnika, prolaznika, saobraćaja, susjednih objekata i okoline.

XIX OBEZBJEĐENJE I ČUVANJE GRADILIŠTA

46. Od početka izvođenja do predaje radova naručiocu, izvođač na pogodan način obezbjeđuje i čuva izvedene radove, opremu i materijal od oštećenja, propadanja, odnošenja ili korišćenja.

XX PRIMOPREDAJA IZVRŠENIH RADOVA

47. Odmah po završetku radova izvođač obavještava naručioca da su radovi koji čine predmet ugovora završeni.
48. Naručilac i izvođač su dužni da bez odlaganja pristupe primopredaji i konačnom obračunu.
49. Ako je naručilac počeo da koristi objekat prije primopredaje, smatra se da je primopredaja izvršena danom početka korišćenja.

XXI KONAČAN OBRAČUN

50. Konačnim obračunom se raspravljaju odnosi između ugovarača i utvrđuje izvršenje njihovih međusobnih prava i obaveza iz ugovora.
51. Konačan obračun vrši se po primopredaji izvedenih radova. Rad na konačnom obračunu započinje odmah po izvršenoj primopredaji a završava se u roku od 60 dana od dana primopredaje.
52. Konačnim obračunom obuhvataju se svi radovi, izvedeni na osnovu ugovora, uključujući i nepredviđene i naknadne radove koje je izvođač bio dužan ili ovlašćen da izvede, bez obzira da li su radovi obuhvaćeni privremenim situacijama.

XXII POSLEDICE RASKIDA UGOVORA

53. Ako dođe do raskida ugovora naručilac je dužan da izvođaču plati izvedene radove i u slučaju u kome je izvođač odgovoran za raskidanje.

XXIII UREĐENJE GRADILIŠTA

54. Po završenim radovima, odnosno po raskidanju ugovora, izvođač je dužan da sa gradilišta povuče svoje radnike, ukloni preostali materijal, opremu i sredstva za rad, kao i privremene objekte koje je sagradio i očisti objekat i gradilište.

2.2. POSEBNI TEHNIČKI USLOVI

a) Opšti dio

1. Instalacija mora biti izvedena u svemu prema projektu i može se ustupiti samo nom izvođaču koji je u stanju da se obaveže i dokaže da je u mogućnosti da kompletnu instalaciju isporuči, montira, ispita i pusti u pogon.
2. Prije početka radova izvođač je dužan da pregleda projekat i uporedi ga sa objektom i da o eventualnim nedostacima projekta ili bitnim potrebnim promjenama obavijesti investitora i zatraži njegova dalja uputstva.
3. Investitor je dužan da izvođaču obezbijedi zatvoren prostor na gradilištu za uskladištenje i pripremu materijala.
4. Izvođač instalacije može biti samo ono preduzeće koje raspolaže znanjem i mogućnostima koji se zahtijevaju za izradu ove vste instalacije, tj:
   - da može nabaviti, isporučiti i montirati sve elemente instalacije predviđene projektom, i da ima načina da za ovu opremu pribavi kompletnu tehničku dokumentaciju;
   - da raspolaže znanjem i mogućnostima rješavanja svih detalja potrebnih za montažu instalacije centralnog grijanja, na odgovarajući tehnički i estetski način;
   - da respolaže potrebnom kontrolnom, mjernom i regulacionom opremom kako bi izvršio dobru regulaciju svih elemenata izrađene regulacije.
5. Svi elementi predviđeni projektom za ugradnju u jednocijevni sistem moraju imati odgovarajućI sertifikat.
6. Elementi instalacije koji nijesu serijski proizvod, već se izrađuju posebno moraju biti izrađeni

od materijala dobrog kvaliteta i na najbolji način koji se predviđa za tu vrstu radova. Površinska zaštita mora biti izvedena tačno kako je naznačeno u projektu, a na mjestima gdje to nije naznačeno, na način uobičajen za tu vrstu radova i u skladu sa propisima o kvalitetu.

7. Projektant objekta, kao i izvođač građevinskih radova, moraju u dogovoru sa projektantom i izvođačem instalacije predvidjeti u zidovima dovoljno velike otvore i prodore za ugradnju horizontalnih i vertikalnih razvoda.
8. Izvođač instalacije centralnog grijanja mora koordinirati izvođenje svojih instalacija sa izvođačima ostalih instalacija, da ne bi došlo do nesporazuma i do oštećenja instalacije.

b) Cijevna mreža

1. Sve cijevi horizontalnog i vertikalnog cjevovoda moraju imati atest i odgovarati standardima JUS C.B5.221, DIN 2440, DIN2441, odnosno DIN 2448.
2. Trasa vođenja cijevnih vodova i raspored oslonaca ne smiju se mijenjati bez saglasnosti projektanta.
3. Horizontalnu cijevnu mrežu u objektima sa podrumom treba vješati o plafon podruma ilki oslanjati na zidne konzole. U objektima bez podruma dozvoljava se polaganje cijevne mreže u podne kanale, koji nojanju od 8 do 10m imaju lagane kontrolne poklopce. Prije zatvaranja kanala, treba ga očistiti i cijevnumrežu zaštititi od korozije i na odgovarajući način izolovati.
4. Na prolazu kroz građevinsku konstrukciju cijevi ne smiju biti čvrsto uzidane, već uvijek mora biti dovoljno mjesta za slobodnu dilataciju cijevi usled promjena temperature.
5. Vertikalne cijevne vodove i priključke na grejna tijela treba voditi slobodno uz zid. Na vertikalnim vodovima odmah iza priključaka na horizontalnu cijevnu mrežu, treba ugraditi zasune ili prolazne ventile, a iznad njih slavine za pražnjenje.
6. Na mjestu ukrštanja priključaka za grejno tijelo sa vertikalnim vodom priključak mora da ima odgovarajući zaobilazni luk koji se obavezno izvodi u horizontalnoj ravni.
7. Priključci za grejna tijela ne mogu biti kraći od 30cm.
8. Usponski napojni vod uvijek se postavlja sa lijeve strane i mora biti fiksiran odgovarajućim brojem obujmica.
9. Za izradu cijevne mreže koja se montiura u betonski sloj poda upotrijebiće se plastificirana bakarna cijev JUS C.D5.502. Prilikom savijanja cijevi, svijetli otvor se ne smije smanjitri, a za sve spojeve i nastavke moraju se upotrijebiti fitinzi za bakarne cijevi.
10. Odzračivanje instalacije treba rješavati u principu centralno, sa odzsračnom mrežom preko odzračnih ili ekspanzionih posuda.
11. Na mjestima prolaska usponskih vodova kroz međuspratnu konstrukciju, cijevi treba obaviti talasastom hartijom, izuzev u mokrim čvorovima gdje se na prolazima postavlajju metalne čaure većeg prečnika radi slobodnog kretanja cijevi. Prostor između cijevi i čaure popuniti zaptivnom masom postojanom na radnoj temperaturi. U podnim prolazima ove čaure treba da budu izdignute 5 cm iznad poda.
12. Za prave cijevne vodove dužine preko 30m, po pravilu moraju se predvidjeti kompenzacione lire.
13. Djelovi cijevi koji nijesu predviđeni za odavanje toplote, a prolaze kroz negrijane prostorije, moraju se izolovqati dobrom termičkom izolacijom. Izolaciju postaviti tako da pri širenju cijevi uslijed zagrijavanja ne dođe do njenog oštećenja.
14. Horizontalna mreža u svim djelovima treba da se vodi nagibom od 0.5 do 1% u smjeru odzračnih posuda, odnosno ventila i slavina za pražnjenje.
15. Spajanje cijevi vrši se zavarivanjem ili, ukoliko je potrebno ostvariti razdvojivu vezu, pomoću prirubnica. Zavarena mjesta moraju biti dobro obrađena, sa dovoljnom debljinom vara, ali tako izvedenim da se presjek cijevi ne smanji. Kvalitet vara mora biti prvoklasan.
16. Pri svakom spajanju zavarivanjem moraju se obaviti sledeći radovi:
    - turpijanje (zakošavanje) rubova na djelkovima cijevi koje se bspajaju. Cijevi sa zidovima debljine manje od 3mm zavaruju se bez zakošenja ivica. Za cijevi sa debljinom zida većom od 3mm, ugao zakošenja ivica mora iznositi 60-70°;
    - čišćenje šavova od rđe i nečistoće;
    - skidanje šljake sa izvedenih varova i njihova antikorozivna zaštita osnovnim

premazom.

17. Cijevi se učvršćuju pokretnim i nepokretnim osloncima, jednodjelnim i dvodjelnim cijevnim obujmicama i konzolama. Maksimalno dozvoljeni razmaci između oslonaca navedeni su u sledećoj tabeli:

Dimenzije cijevi (mm)	Maksimalno rastojanje (m)
Ø17.2x1.8	2.0
Ø21.3x2.0	2.0
Ø26.9x2.3	2.0
Ø33.7x2.6	2.0
Ø42.4x2.6	2.5
Ø48.3x2.6	2.5
Ø57x2.9	2.5
Ø60.3x2.9	2.5
Ø70.0x2.9	3.0
Ø76.1x2.9	3.0
Ø88.9x2.9	3.0
Ø108.0x3.6	3.5

18. Pri izradi prirubničkih spojeva koristiti standardne prirubnice propisanih dimenzija i za odgovarajući radni pritisak. Pri spajanju cjevovoda i armature prirubnicama obavezna je upotreba zaptivnih prstenova od klingerita, minimalne debljine 3mm, ili grafitno-azbestne pletenice četvrtastog presjeka. Pletenice se moraju sjeći pod uglom od 45°, a nikako vertikalno.
19. Konzole i vješaljke na koje se oslanja cjevovod moraju omogućiti njegovo slobodno kretanje usled toplotnih dilatacija, bez mogućnosti stvaranja ugiba. Oslonci i konzole moraju biti ugrađeni u zidove pomoću cementnog maltera, a nikako gipsom.
20. Izrada krivina i fazonskih djelova na cijevnim vodovima može biti izvedena savijanjem cijevi (za prečnike do 26.9mm), ili upotrebom odgovarajućih lukova načinjenih od istog materijala. Armatura i fazonski djelovi ne smiju se postavljati unutar građevinskih elemenata. Na mjestima prodora cijevnih vodova kroz zidove i međuspratnu konstrukciju, a u prostorijama za boravak ljudi, sa obje strane postaviti rozete.
21. Sve cijevi, armatura i ostali metalni djelovi moraju se nakon završene montaže i obavljenih propisanih ispitivanja temeljno očistiti od rđe i zaštititi odgovarajućim temeljnim premazima. Nakon toga cijevi se moraju u zidu omotati talasastim papirom, izolovati ili bojiti uljanim lak-bojamam otpornim na visoke temperature.
22. Ugradnju zasuna, slavina i ventila izvesti tako da se vreteno sa točkom postavi vertikalno na horizontalne vodove. Svoj armaturi mora biti obezbijeđen prilaz radi eventualnih intervencija. Svi radijatorski ventili moraju biti podešeni prema podacima iz projekta.
23. Na svoj ugrađenoj armaturi mora biti strelicama vidno označen smjer kretanja grejnog fluida.
24. Na odgovarajućim mjestima potrebno je obezbijediti prostor za ugradnju ormana za smještaj priključne armature i mjerača utroška toplotne energije za svaki stan ili jednu cjelinu poslovnog prostora.
25. Ormani za smještaj priključne armature moraju biti tipski, sa unificiranom bravom za cijelo naselje. Takođe moraju biti dovoljnih dimenzija da omogućavaju normalnu montažu i demontažu elemenata. Visina razdjelnika i sabirnika smještenih u orman mora iznositi h=1.5m od kote poda prostorija u kojima su smještena grejna tijela. Detalj ormana, mjesto i prostor za njegovu ugradnju moraju biti usaglašeni sa arhitektonsko-građevinskim projektom, a potvrda o ovoj usaglašenosti, ovjerena pečatom i potpisima projektanata, treba da bude priložena investiciono-tehničkoj dokumentaciji.

c) Montaža instalacije

1. Izvođač je dužan da cjelokupnu opremu predviđenui ovim projektom montira na način utvrđen grafičkom dokumentacijom, tehničkim opisom i ovim tehničkim uslovima.
2. Montaža obuhvata cjelokupnu instalaciju za grijanje, povezivanje cijevima sa toplotnom podstanicom, povezivanje sa priključcima vodovoda i kanalizacije koji će biti dovedeni do podstanice od strane izvođača radova na vodovodu i kanalizacije.
3. Svi zidarski radovi potrebni za pričvršćivanje držača, nosača, obujmica za nošenja kanala i drugih elemenata instalacije, spadaju u obavezu izvođača instal;acija.
4. Prije svakog štemovanja ili bušenja betona potrebno je tražiti saglasnost nadzornog organa građevinskih radova, odnosno zahtijevati da se građevinski posao izzvede i dati uputstvo kako da se izvede. Izvođač je dužan da nakon ugrađivanja elemenata izvrši zatvaranje rupa na način koji odgovara vrsti ugrađenih elemenata.

2.3. Tehnički uslovi za instalacije provjetravanja

2.3.1. Opšti tehnički uslovi

1. Instalacija mora biti izvedena u svemu prema projektu i može se ustupiti samo onom izvođaču koji je u stanju da se obaveže i dokaže da je u mogućnosti da kompletnu instalaciju isporuči, montira, reguliše, ispita i pusti u pogon, uključijići i automatiku, tačno prema projektu.
2. Svi elementi instalacije moraju biti takvi da u svim detaljima odgovaraju specificiranim karakteristikama i moraju imati takve dimenzije da se mogu uklopiti u gabarite predviđene projektom.
3. Elementi instalacije koji nijesu serijski proizvod, već se izrađuju posebno, moraju biti izrađeni od materijala dobrog kvaliteta i na najbolji način koji se predviđa za tu vrstu radova. Površinska zaštita mora biti izvedena tačno kako je naznačeno u projektu, a na mjestima gdje to nije naznačeno, na način uobičajen za tu vrstu radova i u skladu sa propisima o kvalitetu.
4. Izvođač instalacije izjavljuje da raspolaže znanjem i mogućnostima koji se od izvođača instalacija ove vste zahtijevaju, tj.:
   a) da može nabaviti, isporučiti, montirati, povezati sa ostalim elementima instalacije predviđene projektom bilo da se radi o domaćoj ili uvoznoj opremi, i da ima načina da za ovu opremu dobavi odgovarajuće prospekte, uputstva i objašnjenja koja bi u tu svrhu bila potrebna;
   b) da raspolaže znanjem i mogućnostima rješavanja svih detalja u okviru montaže instalacije , na odgovarajući tehnički i estetski način, za koje nisu dati detaljni crteži kao što su: vješanje cijevi i kanala za vazduh, izrada čvrstih i kliznih oslonaca, postavljanje sudova za odzračivanje, postavljanje grejnih tijela, postavljanje opreme na plivajuće, elastične ili čvrste fundamente, uklapanje opreme u arhitektonsko-građevnisku cjelinu itd.;
   c) da raspolaže mogućnostima potrebnim za regulaciju radnih parametara instalacije: brzinom strujanja i protoka, temperaturom vode, i vazduha i vlažnošću vazduha koristeći sve projektom predviđene regulacione elemente.
5. Oprema, materijal i armatura koji budu upotrijebljeni za izradu instalacija moraju biti najnovije fabričke proizvodnje u svemu prema važećim propisima. Armature i mjerni instrumenti moraju biti solidne izrade i u potpunosti odgovarati svojoj namjeni.
6. Izvođač instalacija dužan je da cjelokupnu opremu predviđenu ovim projektom montira na način predviđen crtežima, tehničkim opisom i ovim tehničkim uslovima. Izvođač je dužan da obezbijedi svoju stručnu i pomoćnu radnu snagu, svoj alat, mašine, instrumente i sve ostalo što je potrbno za montažu.
7. Radovi na izradi temelja za opremu koja zahtijeva fundiranje spadaju u dio isporuke instalacije i izvođač instalacije je dužan da ih izvede. Isto tako, svi zidarski radovi potrebni za pričvršćenje držača, nosača, obujmica, zatega i dr. za nošenje elemenata instalacije,

spadaju u obavezu izvođača ove instalacije.

8. Regulacione krugove, kao i sve ostale elemente koji čine automatsku regulaciju, montirati prema priloženoj dokumentaciji. Izvođač je dužan da se prilikom montaže u potpunosti pridržava uputstava proizvođača opreme za mjerenje i regulaciju i to: detaljnih šema povezivanja, uputstava za montažu i uputstava za regulisanje i rukovanje.
9. Nakon potpuno završene montaže cjelokupne instalacije, izvođač je obavezan da izvrši kontrolu i fino regulisanje opreme za mjerenje i automatsku regulaciju prema projektovanim parametrima.
10. Elektroinstalacija je predmet projekta električnih instalacija, međutim, povezivanje svih električnih uređaja u sastavu projektovane mašinske opreme, dužan je da izvrši izvođač mašinskih instalacija, sa svojom radnom snagom, materijalom i alatom.
11. Sva električna oprema predviđena za ugradnju u projektovanu instalaciju mora biti prilagođena za priključenje na mrežu 3x380V, 50Hz, odnosno 220V i 50Hz za monofazne priključke.
12. Elektromotori treba da budu isporučeni zajedno sa osiguračima i upuštačima.
13. Elektro-komandne razvodne table treba da sadrže sve elemente potrebne za upravljanje, kontrolu i osiguranje uređaja (osigurači, upuštači, kontrolne lampe i sl.). Na električnoj komandnoj tabli treba da budu montirani i svi potrebni releji i ostali električni instrumenti koji spadaju u okvir automatike ili su dio opreme koja čini vezu između automatike i elektromotora.
14. Izvođač instalacije dužan je da obezbijedi sav materijal potreban električno povezivanje svih elektromotora i ostalih električnih uređaja kojki ulaze u sastav instalacija, međusobno, kao i sa elektro-komandnom razvodnom tablom.
15. Izolaciji i bojenju pristupa se po završenoj montaži i nakon uspješnog ispitivanja hermetičnosti instalacije. Prije izolacije i bojenja sve sve metalne djelove instalacije bez fabričke površinske zaštite potrebno je temeljno očistiti čeličnom četkom i dva puta premazati temeljnom bojom. Izolaciju izvesti pravilno u svemu i na način definisan projektom. Bojenje instalacije izvesti bojom po izboru investitora. Boja treba da ima dobra pokrivajuća svojstva i otpornost na maksimalnu predviđenu temperaturu.
16. Po kompletno završenoj montaži treba pristupiti probnom radu i regulisanju instalacije. Pri probnom radu izvršiti sve pripremne radnje, kao što je ispuštanje vazduha iz cjevovoda, prethodno regulisanje, postavljanje klapni u radni položaj i sl., a zatim instalaciju pustiti u pogon. Po otklanjanju eventualnih nedostataka koji se jave u pogonu instalacije, pristupiti njenom finom regulisanju, koristeći sveprojektom predviđene i ugrađene regulacione i mjerne uređaje i opremu. Regulaciju brzina, protoka i temperatura izvesti tačno i dobro, pridržavajući se u svemu projektom definisanih uslova.

Odgovorni projektant,
Vuk Janković, dipl.ing.maš.

3. PRILOG ZAŠTITE NA RADU

SADRŽAJ:

1. Opasnosti i štetnosti koje mogu nastati od termomašinskih instalacija
2. Predviđene mjere za otklanjanje opasnosti i štetnosti
3. Opšte napomene i obaveze
4. Zaključak

1. OPASNOSTI I ŠTETNOSTI

1. Nepravilno izvršenog dimenzionisanja opreme i cjevovoda kao i nepridržavanja važećih tehničkih propisa i standarda.
2. Nepravilnog izbora opreme, cjevovoda, mjerno regulisanje i sigurnost armature
3. Nepravilnog rasporeda opreme i armature, neispravnog postavljanja cjevovoda i mehaničkog oštećenja istih.
4. Nekvalitetno izvedenih i montiranih cijevi, armature i spojeva.
5. Nesigurnog i nepravilnog rukovanja i održavanja instalacije.
6. Nestručnog rukovanja i održavanja instalacije.
7. Nedovoljne termičke izolacije cjevovoda i opreme.
8. Nemogućnosti regulacije instalacije
9. Nepravilnog rasporeda ventilacionih kanala i mjesta za uzimanje spoljašnjeg vazduha i izbacivanje otpadnog vazduha.
10. Nepravilnog izbora materijala za ventilaciju kanala.
11. Prekomjernog odnosno nedovoljnog odvođenja toplote iz prostorija.
12. Velike brzine strujanja vazduha u prostorijama.
13. Nepravilnog rasporeda mjesta za ubacivanje i izvlačenje vazduha u prostorijama.
14. Pojave nedozvoljene buke u prostorijama, usled rada pojedinih uređaja u instalaciji ventilacije

2. PREDVIĐENE MJERE ZA OTKLANJANJE OPASNOSTI I ŠTETNOSTI

1. Na bazi izvedenog proračuna izvršeno je pravilno dimenzionisanje pojedinih elemenata instalacije i regulacione armature i uz primjenu važećih tehničkih normativa i standarda.
2. Spajanje instalacije vrši se pertlovanjem i odgovarajućim nastavcima i priključcima. Cijevi se postavljaju iz jednog komada tako da nema zavarenih spojeva.
3. Svi uređaji i oprema na elektro pogon su takve konstrukcije da obezbjeđuju sigurnu zaštitu od električnog napona.
4. Na izolaciji je predviđena odgovarajuća toplotna izolacija i antikoroziona zaštita, kako ne bi došlo do brzog propadanja instalacije i gubitka toplotne energije.
5. Izvođač radova i proizvođač opreme su dužni da investitoru predaju sve ateste i uputstva za rad sa uređajima i cjelokupnom instalacijom.

6. Materijal i dimenzije kanala i rešetaka za vazduh je izabran prema propisima JUS-a i DIN-a. Sve rešetke su sa mogućnošću regulisanja dometa i količine vazduha.
7. Ventilatori i ostali izvori buke su odabrani i postavljeni tako da u prostorijama izazivaju što manju buku, odnosno buka mora biti u granicama koje određuju odgovarajući propisi.
8. Oprema se postavlja na električne podloge a veza između ventilatora i kanala je sa elastičnim kanalima.
9. Na ventilatore i žaluzine postavljeni su prigušivači buke, tako da je nivo buke u granicama koje određuju odgovarajući propisi.

3. OPŠTE NAPOMENE I OBAVEZE

1. Izvođač radova je obavezan da uradi poseban elaborat o uređenju gradilišta i o radu na gradilištu.
2. Proizvođač oruđa za rad na mehanizovani pogon je obavezan da dostavi uputstva za bezbjedan rad i da potvrdi da su na oruđu primijenjene mjere o zaštiti na radu odnosno dostavi uz oruđe za rad atest o primijenjenim propisima zaštite na radu.
3. Radna organizacija je obavezna da prije početka radova na 8 dana obavijesti nadležni organ i inspekciju rada o početku radova.
4. Radna organizacija je obavezna da izradi normativna akta iz oblasti zaštite na radu(Samoupravni sporazum o zaštiti na radu, Program za obučavanje i vaspitanje radnika iz oblasti zaštite, Pravilnik o pregledima,ispitivanjima i održavanju oruđa i alata, Program mjera i unapređenja zaštite na radu i dr.)
5. Radna organizacija je obavezna da izvrši obučavanje radnika iz materije zaštite na radu, opasnostima i zaštitama u vezi sa radom i obavi provjeru sposobnosti radnika za samostalan i bezbjedan rad.
6. Radna organizacija je obavezna da utvrdi radna mjesta sa posebnim uslovima rada ukoliko takva radna mjesta postoje.
7. Investitor je obavezan da rukovanje instalacijom povjeri stručnom čovjeku koji će se starati o ispunjavanju zahtjeva zakona zaštite na radu.
8. Projekat predlaže i navodi sledeće JUS propise i Zakone kojih se mora pridržavati Izvođač radova i korisnik objekta:
    - Zakon o zaštiti i zdravlju na radu
    - Interne propise i mjere o zaštiti na radu

4. ZAKLJUČAK

Projektom su predviđene sve potrebne mjere za otklanjanje opasnosti i štetnosti u pogledu zaštite na radu.

Odgovorni projektant,

Vuk Janković, dipl.ing.maš.

4. PROGRAM KONTROLE I OSIGURANJA KVALITETA

Ovim programom navode se mjere koje Izvođač radova u građenju predmetnog objekta moraju primijeniti kako bi se osigurao kvalitet pojedinih faza radova i objekta kao cjeline.

Program se odnosi na radnje koje slijede nakon završetka glavnog projekta i dobijanja građevinske dozvole, tekstualne i grafičke dokumente obavezne u fazi pripreme građenja. Mašinske termotehničke instalacije izvode se na osnovu projekta čiji je prilog ovaj program kontrole i osiguranja kvaliteta.

Sastavni dio projekta su:
- svi priloženi dokumenti projekta
- kompletni proračuni
- tehnički opis

Za sve promjene i odstupanja od ovog projekta mora se pribaviti pismena saglasnost Nadzornog inženjera, odnosno Projektanta.

Izvođač radova je dužan prije izvođenja proučiti projekat, a takođe provjeriti postojeće stanje. Za sva eventualna odstupanja potrebno je konsultovati Projektanta ili Nadzornog inženjera.

Materijal i oprema ugrađeni u instalaciju moraju biti odgovarajućeg kvaliteta i posjedovati ateste o ispitivanju. Pored materijala i sam rad mora biti kvalitetno izveden, a sve što bi se u toku rada i kasnije pokazalo nekvalitetno Izvođač radova je dužan o svom trošku otkloniti.

Sva oprema, mjerni instrumenti, a naročito sigurnosni uređaji moraju besprijekorno funkcionisati i u djelovanju biti sigurni.

Funkcionalnu probu instalacije grijanja, hlađenja i regulacija vrši se u periodu od 8 sati i trajanju od jednog do više dana što zavisi o složenosti i veličini instalacije te zahtjevu Nadzornog inženjera.

Ispitivanje je potrebno potvrditi zapisnicima i ustanoviti:
- radi li instalacija bez šumova i udaraca
- rade li regulacijski sklopovi (automatika) prema traženim projektnim parametrima
- pokazuju li svi kontrolni instrumenti ispravne podatke
- postoje li oznake na svim osnovnim elementima postrojenja kojima korisnik objekta mora rukovati
- postoje li odgovarajući priručnici za korišćenje i održavanje

Garantni rok za ispravnost uređaja i postrojenja teče od dana tehničkog prijema, odnosno predaje instalacije Investitoru na korišćenje. Garantni rok na kvalitetu izvršenog posla daje Izvođač radova na rok od dvije godine, odnosno prema odredbi Ugovora, a garantni rok na opremu daje Proizvođač prema svojim uslovima.

Instalacije smije izvoditi samo ovlašćeni Izvođač. U protivnom svu nastalu štetu snosi onaj ko je angažovao nestručnog Izvođača.

Tehnička primopredaja instalacija nakon završetka svih radova vrši se u prisustvu Nadzornog inženjera i predstavnika Investitora.

Ukoliko se prilikom predaje instalacije vrši i tehnički pregled u svrhu dobivanja upotrebne dozvole, prisutni su i predstavnici tijela nadležnog za izdavanje upotrebne dozvole.

MJERENJA I KONTROLNI PREGLEDI

Najmanje jedanput godišnje treba izvršiti kontrolu i funkcionalno ispitivanje svih uređaja. Kontrola uređaja i opreme, kao što su filteri, mjerni uređaji i slično vrši se više puta u godini prema potrebi i

tehničkim uslovima.

Sve uređaje i opremu koja ima posebnu namjenu i posebne tehničke zahtjeve treba kontrolisati i servisirati prema posebnim tehničkim uputstvima koje su date uz navedene uređaje.

Preventivno održavanje, kontrolu i servis mogu vršiti samo osobe koje su za to tehnički osposobljene i ovlaštene od strane odgovorne osobe.

ATESTI, MJERENJA I ISPITIVANJA KOJE JE POTREBNO PRILOŽITI UZ ZAHTJEV ZA TEHNIČKI PREGLED

- Elektro ateste na napon i otpor uzemljenja
- Zapisnik o probi na pritisak
- Uvjerenje o kvalitetu cijevi
- Atesti ugrađene opreme i materijala
- Mjerenje o postignutim parametrima postrojenja: pritisci, temperature
- Atest o obavljenom funkcionalnom ispitivanju

ODGOVORNI INŽENJER,
Vuk Janković, dipl.ing.maš.

D) NUMERIČKA DOKUMENTACIJA

5. PRORAČUNI

Heat load sum up table

Room name	Fl	Sys -tem	Qty. of rooms	Cooling				Heating				Floor area	Heat load per area	
				Indoor SH	Total	Selected	Time	Total	Selected	Humid.	Time		Cooling	Heating
				[W]			[Hr]	[W]		[kg/h]	[Hr]	[m2]	[W/m2]	
001 Hol	1	1	1	6410	9412	9883	14	7408	8149	1.35	8	180.2	54.8	45.2
008 Zenski wc	1	10	1	1417	1822	1913	16	1452	1597	0.17	8	25.3	75.6	63.1
010 Muski wc	1	10	1	1298	1706	1791	15	1355	1491	0.17	8	25.4	70.5	58.7
011 Stamp./kopirnica	1	1	1	3295	3925	4121	15	4051	4456	0.61	8	68.8	59.9	64.8
012 Modelarnica	1	1	1	7492	10510	11036	15	7364	8100	1.23	8	143.8	76.7	56.3
013 Visenamjen. sala	1	1	1	7870	10357	10875	14	8878	9766	1.72	8	192.0	56.6	50.9
015 Kafe/klub	1	2	1	10407	18940	19887	15	5948	6543	1.03	8	121.2	164.1	54.0
107 Centralni hol	2	4	1	16013	19598	20578	15	21285	23414	3.40	8	380.8	54.0	61.5
111 Biblioteka	2	4	1	6520	8177	8586	17	8142	8956	1.11	8	124.1	69.2	72.2
112 Student.sluzba 1	2	3	1	2275	2757	2895	18	2282	2510	0.28	8	31.3	92.5	80.2
113 Student.sluzba 2	2	3	1	2072	2555	2683	18	1895	2085	0.29	8	32.1	83.6	64.9
114 Vjezbaonica 1	2	3	1	7202	9626	10107	15	6292	6921	0.86	8	100.7	100.4	68.7
115 Vjezbaonica 2	2	3	1	6202	8632	9064	14	5184	5702	0.86	8	101.4	89.4	56.2
116 Vjezbaonica 3	2	4	1	6202	8632	9064	14	5184	5702	0.86	8	101.4	89.4	56.2
117 Vjezbaonica 4	2	4	1	6986	9416	9887	14	6350	6985	0.86	8	101.4	97.5	68.9
201 Centralni hol	3	6	1	12338	15005	15755	15	16078	17686	2.42	8	270.3	58.3	65.4
202 Diplomska sala	3	5	1	4785	6208	6518	18	4295	4725	0.59	8	66.3	98.3	71.3
206 Vjezbaonica 5	3	5	1	7252	9676	10160	15	6292	6921	0.86	8	100.7	100.9	68.7
207 Vjezbaonica 6	3	5	1	6202	8632	9064	14	5184	5702	0.86	8	101.4	89.4	56.2
208 Vjezbaonica 7	3	5	1	6015	8438	8860	14	4955	5451	0.83	8	97.0	91.3	56.2
209 Vjezbaonica 8	3	6	1	6178	8607	9037	14	5148	5663	0.86	8	101.1	89.4	56.0
210 Vjezbaonica 9	3	6	1	6973	9403	9873	14	6325	6958	0.86	8	101.4	97.4	68.6
211 Toaleti	3	10	1	1449	1691	1776	17	984	1082	0.11	8	12.6	140.9	85.9
214 Racunovodstvo	3	6	1	1154	1472	1546	18	1056	1162	0.15	8	17.0	90.9	68.3
215 Prodekan 1	3	6	1	1545	1944	2041	18	1495	1645	0.20	8	22.5	90.7	73.1
216 Prodekan 2	3	6	1	1815	2220	2331	17	2067	2274	0.20	8	22.6	103.1	100.6
217 Pravna sluzba	3	6	1	1478	1891	1986	14	1456	1602	0.19	8	22.5	88.2	71.2
301 Hol	4	7	1	12942	15548	16325	14	16810	18491	2.06	18	221.3	73.8	83.6
302 Diplomska sala	4	7	1	8201	12135	12742	18	5373	5910	0.65	18	69.9	182.3	84.6
306 Sala nast. osob.	4	7	1	3802	7591	7971	15	3540	3894	1.90	18	49.0	162.7	79.5
307 Kabinet dekana	4	7	1	3397	4377	4596	14	3015	3317	0.41	18	46.0	99.9	72.1
308 Amfiteatar	4	9	1	20195	38628	40559	15	21084	23192	8.68	18	215.2	188.5	107.8
309 Hodnik	4	8	1	4324	5195	5455	17	4891	5380	0.94	18	100.7	54.2	53.4
311 Toaleti	4	10	1	1516	1760	1848	17	1102	1212	0.14	18	14.6	126.6	83.0
313 Kabinet 1	4	8	1	1742	2139	2246	18	1333	1466	0.19	18	19.9	112.9	73.7
314 Kabinet 2	4	8	1	1742	2139	2246	18	1333	1466	0.19	18	19.9	112.9	73.7
315 Kabinet 3	4	8	1	1680	2075	2179	18	1247	1372	0.17	18	18.2	119.7	75.4
316 Kabinet 4	4	8	1	2155	2558	2686	17	2347	2582	0.19	18	20.9	128.5	123.5

SH : Sensible heat

Heat load sum up table

Room name	Fl	Sys -tem	Qty. of rooms	Cooling				Heating				Floor area	Heat load per area	
				Indoor SH	Total	Selected	Time	Total	Selected	Humid.	Time		Cooling	Heating
				[W]			[Hr]	[W]		[kg/h]	[Hr]	[m2]	[W/m2]	
317 Kabinet 5	4	8	1	940	1189	1248	14	958	1054	0.13	18	14.1	88.5	74.7
318 Kabinet 6	4	8	1	1097	1349	1416	14	1140	1254	0.14	18	16.1	88.0	77.9
319 Kabinet 7	4	8	1	1937	2268	2381	14	2076	2284	0.16	18	18.1	131.6	126.2
320 Kabinet 8	4	8	1	1241	1568	1646	14	1119	1231	0.14	18	15.7	104.9	78.4
321 Kabinet 9	4	8	1	1255	1508	1583	14	1195	1315	0.15	18	17.2	92.1	76.4
322 Kabinet 10	4	8	1	1255	1508	1583	14	1195	1315	0.15	18	17.2	92.1	76.4
323 Kabinet 11	4	8	1	1185	1436	1508	14	1119	1231	0.14	18	15.7	96.0	78.4
324 Sekretarica	4	8	1	1301	1556	1634	14	1246	1371	0.16	18	18.2	89.8	75.3
325 Trpezarija	4	8	1	1628	3068	3221	15	1532	1685	0.77	18	23.3	138.3	72.3
326 Arhiv st.radovi	4	8	1	1073	1406	1476	15	1086	1195	0.38	18	23.4	63.1	51.1
327 Radna sala	4	8	1	1549	2987	3136	15	1460	1606	0.75	18	21.4	146.6	75.0
Peak load of building			49	218723	309170	324628	15	224606	247067	42.45	18	3661.3	88.7	67.5

SH : Sensible heat

Table of system heat load

Sys -tem	Cooling							Heating						
	Time	F/A vol	Indoor SH	Indoor	Outside	Total	Selected	Time	F/A vol	Indoor	Outside	Total	Selected	Humid.
	[Hr]	[m3/h]	[W]					[Hr]	[m3/h]	[W]				[kg/h]
1	15	0	24993	34114	0	34114	35820	8	0	27701	0	27701	30471	4.91
2	15	0	10407	18940	0	18940	19887	8	0	5948	0	5948	6543	1.03
3	15	0	17131	22983	0	22983	24132	8	0	15653	0	15653	17218	2.29
4	15	0	35013	45146	0	45146	47403	8	0	40961	0	40961	45057	6.24
5	15	0	23593	32324	0	32324	33940	8	0	20726	0	20726	22799	3.15
6	15	0	30744	39825	0	39825	41816	8	0	33625	0	33625	36988	4.89
7	17	1300	27725	37651	1003	38654	40587	18	1300	27065	1673	28738	31612	5.01
8	14	1150	24252	31045	1159	32204	33814	18	1150	23796	1481	25277	27805	4.74
9	15	6100	20195	32587	6041	38628	40559	18	6100	13233	7851	21084	23192	8.68
10	16	0	5617	6918	0	6918	7264	18	0	4893	0	4893	5382	0.61

F/A : Fresh air
SH : Sensible heat

Table of peak heat load detail(Cooling)

```
 [Room name:001 Hol              ]       Floor: 1F      Floor area: 180.2m2      Ceiling height: 3.8m       Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade                       333   (35.40-26.00)   2.20   16.1
                              374                           (16.1*0.95)    72             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                          104         14.20           0.60    ( 3.2*3.8- 0.0)
  SW
  NW                           50          6.80           0.60    ( 3.2*3.8- 0.0)
  Shade                        69          3.60           0.60    (12.7*3.8-16.1)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         949    (35.40-26.00)*0.40   1.40      180.2
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               425           136.95            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               266           136.95                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2090     1.160                 1802                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                           2016          56              36         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                           2736          76              36         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            9412              6410     3002
                        [  8094] (kcal/h)  [  5513] [  2582]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            9412            9412                0                0
                        [  8094] (kcal/h)  [  8094]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:001 Hol              ]      Floor: 1F      Floor area: 180.2m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:18.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade                       935       1.10                        1.00                      (18.00+ 6.00)        0.00             2.20   16.1
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                          184       1.05                        1.00                      (18.00+ 6.00)        0.00             0.60  ( 3.2*3.8- 0.0)
  SW
  NW                          193       1.10                        1.00                      (18.00+ 6.00)        0.00             0.60  ( 3.2*3.8- 0.0)
  Shade                       509       1.10                        1.00                      (18.00+ 6.00)        0.00             0.60  (12.7*3.8-16.1)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit         2422        ---                         ---                      (18.00+ 6.00)*0.40    ---              1.40       180.2
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor                1375   (18.00- 8.47)       0.80  180.2
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            1790            225.97            (18.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                             855            225.97                  ( 6.40- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            1354            225.97                  ( 6.40- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         225.97          0.30                1.10           684.76

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                       7408              7408        0
                                 [  6371] (kcal/h)    [  6371] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                       7408              7408            0                    0
                                 [  6371] (kcal/h)    [  6371]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     1354                      1354                                 0


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:008 Zenski wc       ]      Floor: 1F      Floor area:  25.3m2      Ceiling height: 2.9m      Peak time in cooling:16:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:34.4CDB    ,  36.8%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          33   (34.40-26.00)   2.20    1.8
                             191                          ( 1.8*0.95)   329             0.34
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                          88         10.10           0.60    ( 5.0*2.9- 0.0)
  SE
  SW
  NW                          44         10.20           0.60    ( 3.1*2.9- 1.8)
  Shade                       34          5.70           0.60    ( 3.4*2.9- 0.0)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        119    (34.40-26.00)*0.40   1.40       25.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                41             14.67            (34.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                25             14.67                   (12.54-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         587     1.160                 506                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            280           56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            380           76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1822              1417      405
                        [  1567] (kcal/h)  [  1219] [   348]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1822              1822                0                 0
                        [  1567] (kcal/h)  [  1567]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:008 Zenski wc       ]      Floor: 1F      Floor area:  25.3m2      Ceiling height: 2.9m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        113       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    1.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        238       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 5.0*2.9- 0.0)
  SE
  SW
  NW                        123       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 3.1*2.9- 1.8)
  Shade                     169       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 3.4*2.9- 0.0)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        368        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        25.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor               233   (20.00- 8.47)       0.80   25.3
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          208             24.21             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          109             24.21                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          173             24.21                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         24.21          0.30               1.10            73.37

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      1452            1452        0
                                [  1249] (kcal/h)   [  1249] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1452            1452            0                  0
                                [  1249] (kcal/h)   [  1249]          [     0]            [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     173                        173                                0

                                                                          OHTC : Overall heat transfer coefficient
                                                                          SH : Sensible heat
                                                                          LH : Latent heat
                                                                          F/A : Fresh air
                                                                          THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:010 Muski wc        ]       Floor: 1F      Floor area:  25.4m2      Ceiling height: 2.9m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                        area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                          87         10.40           0.60    ( 4.8*2.9- 0.0)
  SE                         165         14.40           0.60    ( 6.6*2.9- 0.0)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        132    (35.30-26.00)*0.40   1.40       25.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              45             14.73            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              28             14.73                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        589     1.160                  508                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             280           56                5          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             380           76                5          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1706              1298      408
                        [  1467] (kcal/h)  [  1116] [   351]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1706              1706                0                 0
                        [  1467] (kcal/h)  [  1467]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:010 Muski wc        ]      Floor: 1F      Floor area:  25.4m2      Ceiling height: 2.9m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        228       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 4.8*2.9- 0.0)
  SE                        314       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 6.6*2.9- 0.0)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        370        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        25.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor               234   (20.00- 8.47)       0.80   25.4
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          209             24.31             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          109             24.31                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          173             24.31                  ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         24.31          0.30               1.10            73.66

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      1355          1355        0
                                [  1165] (kcal/h)    [  1165] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1355                1355                0                    0
                                [  1165] (kcal/h)    [  1165]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     173                          173                                  0

                                                                                OHTC : Overall heat transfer coefficient
                                                                                SH : Sensible heat
                                                                                LH : Latent heat
                                                                                F/A : Fresh air
                                                                                THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:011 Stamp./kopirnica]      Floor: 1F      Floor area:  68.8m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade                       262   (35.30-26.00)   2.20   12.8
                              265                           (12.8*0.95)    64             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                          183         12.00           0.60    ( 6.7*3.8- 0.0)
  NW
  Shade                        79          5.00           0.60    (10.3*3.8-12.8)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         358    (35.30-26.00)*0.40   1.40       68.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              160             52.29            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               98             52.29                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1596     1.160                 1376                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             392           56               7          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             532           76               7          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              3925              3295      630
                        [  3376] (kcal/h)  [  2834] [   542]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              3925              3925                0                0
                        [  3376] (kcal/h)  [  3376]            [     0]            [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:011 Stamp./kopirnica]      Floor: 1F      Floor area:  68.8m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade                      805       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   12.8
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                         417       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 6.7*3.8- 0.0)
  NW
  Shade                      452       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.3*3.8-12.8)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        1002        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        68.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor                635   (20.00- 8.47)       0.80   68.8
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           740             86.28             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           388             86.28                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           615             86.28                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         86.28          0.30                1.10           261.44

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                              4051              4051        0
                           [  3484] (kcal/h)    [  3484] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              4051              4051              0                    0
                           [  3484] (kcal/h)    [  3484]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                               615                        615                                  0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:012 Modelarnica     ]       Floor: 1F      Floor area: 143.8m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        129   (35.30-26.00)   2.20    6.3
                            165                           ( 6.3*0.95)    81             0.34
  SE

  SW                        129   (35.30-26.00)   2.20    6.3
                            781                           ( 6.3*0.95)   384             0.34
  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        198         10.40           0.60    (10.0*3.8- 6.3)
  SE
  SW                        228         12.00           0.60    (10.0*3.8- 6.3)
  NW                        204          8.70           0.60    (10.3*3.8- 0.0)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       749    (35.30-26.00)*0.40   1.40      143.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                335           109.29            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                206           109.29                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2502     1.160                 2157                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            2072          56              37         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2812          76              37         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            10510             7492     3018
                         [  9039] (kcal/h)  [  6443] [  2595]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            10510           10510            0                    0
                         [  9039] (kcal/h)  [  9039]            [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:012 Modelarnica     ]      Floor: 1F      Floor area: 143.8m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        378       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20    6.3
  SE
  SW                        378       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20    6.3
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        519       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.0*3.8- 6.3)
  SE
  SW                        519       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.0*3.8- 6.3)
  NW                        672       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.3*3.8- 0.0)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       2094        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40       143.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor              1327   (20.00- 8.47)       0.80  143.8
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1477            172.13            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           774            172.13                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          1227            172.13                  ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        172.13          0.30                1.05           546.44

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                            7364              7364        0
                        [  6333] (kcal/h)    [  6333] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            7364              7364                0                      0
                        [  6333] (kcal/h)    [  6333]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                          1227                        1227                                   0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:013 Visenamjen. sala]      Floor: 1F      Floor area: 192.0m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade                       728   (35.40-26.00)   2.20   35.2
                              819                           (35.2*0.95)    72             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade                       148          3.60           0.60    (27.3*3.8-35.2)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         757    (35.40-26.00)*0.40   1.40      143.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                453           145.92            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                283           145.92                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       3341     1.160                 2880                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1624          56              29          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2204          76              29          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            10357              7870     2487
                         [  8907] (kcal/h)  [  6768] [  2139]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            10357            10357              0                  0
                         [  8907] (kcal/h)  [  8907]          [     0]           [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:013 Visenamjen. sala]      Floor: 1F      Floor area: 192.0m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade                      2215       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   35.2
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade                      1176       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (27.3*3.8-35.2)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit         2094        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       143.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor                1327   (20.00- 8.47)       0.80  143.8
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           2066           240.77            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           1083           240.77                 ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           1716         240.77                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        240.77         0.30               1.10           729.60

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                      8878                8878        0
                                [  7635] (kcal/h)    [  7635] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      8878                8878             0                    0
                                [  7635] (kcal/h)    [  7635]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   1716                      1716                                 0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:015 Kafe/klub       ]       Floor: 1F      Floor area: 121.2m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                          65   (35.30-26.00)   2.20    3.2
                              84                          ( 3.2*0.95)    81             0.34
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                          91         14.40           0.60    ( 3.6*3.8- 3.2)
  SW                          44         12.00           0.60    ( 1.6*3.8- 0.0)
  NW
  Shade                      237          5.00           0.60    (20.8*3.8- 0.0)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        631    (35.30-26.00)*0.40   1.40      121.2
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              283            92.11            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              173            92.11                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2812     1.160                 2424                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            6160           56             110          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            8360           76             110          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            18940             10407     8533
                         [ 16288] (kcal/h)  [  8950] [  7338]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            18940             18940              0                  0
                         [ 16288] (kcal/h)  [ 16288]          [     0]            [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:015 Kafe/klub       ]      Floor: 1F      Floor area: 121.2m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        192       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20    3.2
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        172       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 3.6*3.8- 3.2)
  SW                        100       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 1.6*3.8- 0.0)
  NW
  Shade                    1356       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (20.8*3.8- 0.0)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1765        ---                         ---                      (20.00+ 6.00)*0.40    ---              1.40       121.2
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor              1118   (20.00- 8.47)       0.80  121.2
  With air layer
  Without air layer
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1245            145.08             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           653            145.08                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          1034            145.08                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        145.08          0.30                1.05           460.56

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      5948              5948        0
                                [  5115] (kcal/h)    [  5115] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      5948              5948             0                    0
                                [  5115] (kcal/h)    [  5115]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                      1034                      1034                                 0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:107 Centralni hol   ]      Floor: 2F      Floor area: 380.8m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                        352   (35.30-26.00)   2.20   17.2
                           1389                          (17.2*0.95)   250             0.34
  Shade                    1178   (35.30-26.00)   2.20   57.6
                           1191                          (57.6*0.95)    64             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         71         10.40           0.60    ( 3.0*3.8- 0.0)
  SE
  SW                         68         12.00           0.60    ( 2.5*3.8- 0.0)
  NW                        164          8.70           0.60    (12.8*3.8-17.2)
  Shade                      89          5.00           0.60    (23.0*3.8-57.6)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist      1983    (35.30-26.00)*0.40   1.40      380.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer        1983   (35.30-26.00)*0.40  1.40  380.8
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              888           289.41            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              545           289.41                  (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       4417     1.160                 3808                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            2240          56              40         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            3040          76              40         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            19598             16013     3585
                         [ 16854] (kcal/h)  [ 13771] [  3083]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            19598            19598              0                    0
                         [ 16854] (kcal/h)  [ 16854]          [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:107 Centralni hol   ]      Floor: 2F      Floor area: 380.8m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        1082       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   17.2
  Shade                     3624       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   57.6
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         187       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 3.0*3.8- 0.0)
  SE
  SW                         156       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 2.5*3.8- 0.0)
  NW                         540       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (12.8*3.8-17.2)
  Shade                      511       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (23.0*3.8-57.6)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        5544        ---                          ---                      (20.00+ 6.00)*0.40    ---             1.40       380.8
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         5544   (20.00+ 6.00)*0.40  1.40  380.8
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          4097           477.52            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          2148           477.52                ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          3404           477.52                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                       477.52          0.30               1.10          1447.04

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             21285              21285        0
                          [ 18305] (kcal/h)   [ 18305] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             21285              21285        0                    0
                          [ 18305] (kcal/h)   [ 18305]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             3404                      3404                                0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:111 Biblioteka      ]      Floor: 2F      Floor area: 124.1m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        198   (33.30-26.00)   2.20   12.3
                            187                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW                        347   (33.30-26.00)   2.20   21.6
                           1554                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        142          9.80           0.60    ( 9.6*3.8-12.3)
  SE
  SW
  NW                        291         11.90           0.60    (16.4*3.8-21.6)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       507    (33.30-26.00)*0.40   1.40      124.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         507   (33.30-26.00)*0.40  1.40  124.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                227             94.32            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                137             94.32                   (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1440     1.160                 1241                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1120           56              20          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            1520           76              20          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            8177              6520     1657
                        [  7032] (kcal/h)  [  5607] [  1425]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            8177              8177              0                    0
                        [  7032] (kcal/h)  [  7032]          [     0]           [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                  <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          911      351      39                 0.6    39                    0.34         (21.60 * 0.95)
                              0.6        1.03    1.81       1.4    2.2                     <     0.53,    -0.73>
  NW                          188      351      39                 0.5    39                    0.34         (21.60 * 0.95)
                              0.5        0.82    1.81       1.4    2.2                     <     0.53,    -0.73>
  NW                          455      351      39                 0.6    39                    0.34         (21.60 * 0.95)
                              0.6        1.03    1.81       1.4    2.2                     <     0.53,    -0.73>
  NE                           47       47      39                 1.0    39                    0.34         (12.30 * 0.95)
                              1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                           94       47      39                 1.0    39                    0.34         (12.30 * 0.95)
                              1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                           47       47      39                 1.0    39                    0.34         (12.30 * 0.95)
                              1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
[Room name:111 Biblioteka      ]      Floor: 2F      Floor area: 124.1m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SE
  SW
  NW                       1359       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   21.6
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        396       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 9.6*3.8-12.3)
  SE
  SW
  NW                        699       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (16.4*3.8-21.6)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1807        ---                         ---                      (20.00+ 6.00)*0.40    ---              1.40       124.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1807   (20.00+ 6.00)*0.40  1.40  124.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1335            155.62             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           700            155.62                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          1109            155.62                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        155.62          0.30                1.10           471.58

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      8142             8142        0
                                [  7002] (kcal/h)    [  7002] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      8142             8142             0                    0
                                [  7002] (kcal/h)    [  7002]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   1109                       1109                                 0


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:112 Student.sluzba 1]       Floor: 2F      Floor area:  31.3m2       Ceiling height: 3.8m       Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          80   (31.90-26.00)   2.20    6.2
                             512                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                         263         17.20           0.60    ( 6.7*3.8- 0.0)
  NW                         106         13.40           0.60    ( 5.1*3.8- 6.2)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        103    (31.90-26.00)*0.40   1.40       31.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          103   (31.90-26.00)*0.40  1.40   31.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              46             23.79            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              26             23.79                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        726     1.160                 626                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            336          56               6         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            456          76               6         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2757              2275      482
                        [  2371] (kcal/h)  [  1957] [   415]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             2757              2757                0                    0
                        [  2371] (kcal/h)  [  2371]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          273      332      23                 0.8    23                   0.34         (6.20 * 0.95)
                              0.8        1.15    2.19       1.4    2.2                     <     0.24,    -0.51>
  NW                          240      332      23                 0.7    23                   0.34         (6.20 * 0.95)
                              0.7        0.99    2.19       1.4    2.2                     <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:112 Student.sluzba 1]      Floor: 2F      Floor area:  31.3m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        390       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                        417       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 6.7*3.8- 0.0)
  NW                        226       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 5.1*3.8- 6.2)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        456        ---                          ---                      (20.00+ 6.00)*0.40    ---             1.40        31.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         456   (20.00+ 6.00)*0.40  1.40   31.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            337             39.25             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            177             39.25                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            280             39.25                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                           39.25          0.30               1.10           118.94

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                      2282              2282        0
                                [  1963] (kcal/h)    [  1963] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      2282              2282             0                    0
                                [  1963] (kcal/h)    [  1963]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   280                        280                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:113 Student.sluzba 2]      Floor: 2F      Floor area:  32.1m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          80   (31.90-26.00)   2.20    6.2
                             546                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                         106         13.40           0.60    ( 5.1*3.8- 6.2)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        106    (31.90-26.00)*0.40   1.40       32.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          106   (31.90-26.00)*0.40  1.40   32.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                47             24.40            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                27             24.40                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        745     1.160                 642                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            336          56               6         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            456          76               6         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              2555             2072      483
                        [  2197] (kcal/h)  [  1782] [   415]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              2555          2555              0                    0
                        [  2197] (kcal/h)  [  2197]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          273      332      23                 0.8    23                   0.34         (6.20 * 0.95)
                              0.8        1.15    2.19       1.4    2.2                     <     0.24,    -0.51>
  NW                          273      332      23                 0.8    23                   0.34         (6.20 * 0.95)
                              0.8        1.15    2.19       1.4    2.2                     <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
[Room name:113 Student.sluzba 2]      Floor: 2F      Floor area:  32.1m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          390       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          226       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 5.1*3.8- 6.2)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit          467        ---                          ---                      (20.00+ 6.00)*0.40    ---             1.40        32.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer           467   (20.00+ 6.00)*0.40  1.40   32.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                              345             40.25             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              181             40.25                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                              287             40.25                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                              40.25          0.30               1.10           121.98

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                      1895              1895         0
                                [  1630] (kcal/h)    [  1630] [      0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1895              1895              0                    0
                                [  1630] (kcal/h)    [  1630]             [      0]              [      0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    287                        287                                 0


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:114 Vjezbaonica 1   ]      Floor: 2F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        252   (35.30-26.00)   2.20   12.3
                            322                           See <1'>Load detail of window glass with canopy
  SW                        252   (35.30-26.00)   2.20   12.3
                            667                           See <1'>Load detail of window glass with canopy
  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        222         14.40           0.60    (10.0*3.8-12.3)
  SW                        188         12.00           0.60    (10.1*3.8-12.3)
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       524    (35.30-26.00)*0.40   1.40      100.7
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         524   (35.30-26.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              235            76.53            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              144            76.53                  (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2336     1.160                 2014                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             9626              7202     2424
                        [  8278] (kcal/h)  [  6194] [  2085]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             9626            9626              0                          0
                        [  8278] (kcal/h)  [  8278]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SW                        152      384      64                 0.3    64                    0.34         (12.30 * 0.95)
                            0.3        0.89    0.97       1.4    2.2                     <     1.18,     0.64>
  SW                        343      384      64                 0.3    64                    0.34         (12.30 * 0.95)
                            0.3        1.08    0.97       1.4    2.2                     <     1.18,     0.64>
  SW                        172      384      64                 0.3    64                    0.34         (12.30 * 0.95)
                            0.3        1.08    0.97       1.4    2.2                     <     1.18,     0.64>
  SE                         81       81      64                 1.0    64                    0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        161       81      64                 1.0    64                    0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         81       81      64                 1.0    64                    0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:114 Vjezbaonica 1   ]      Floor: 2F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        421       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.0*3.8-12.3)
  SW                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1466        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       100.7
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1466   (20.00+ 6.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1034           120.54             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           542           120.54                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           859           120.54                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        120.54          0.30               1.05           382.66

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             6292              6292        0
                          [  5411] (kcal/h)   [  5411] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             6292              6292              0                    0
                          [  5411] (kcal/h)   [  5411]          [     0]            [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             859                       859                                 0

                                                                  OHTC : Overall heat transfer coefficient
                                                                  SH : Sensible heat
                                                                  LH : Latent heat
                                                                  F/A : Fresh air
                                                                  THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:115 Vjezbaonica 2   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        254   (35.40-26.00)   2.20   12.3
                            374                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        235         14.20           0.60    (10.5*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       534    (35.40-26.00)*0.40   1.40      101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         534   (35.40-26.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              239            77.06            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              150            77.06                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2352     1.160                 2028                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             8632              6202     2430
                          [  7424] (kcal/h)  [  5334] [  2090]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             8632            8632              0                        0
                          [  7424] (kcal/h)  [  7424]            [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:115 Vjezbaonica 2   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        452       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.5*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1476        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40       101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1476   (20.00+ 6.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1041           121.38            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           546           121.38                    ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           865           121.38                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.38          0.30               1.05           385.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      5184               5184        0
                                [  4458] (kcal/h)    [  4458] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      5184               5184             0                    0
                                [  4458] (kcal/h)    [  4458]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   865                       865                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:116 Vjezbaonica 3   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        254   (35.40-26.00)   2.20   12.3
                            374                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        235         14.20           0.60    (10.5*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       534    (35.40-26.00)*0.40   1.40      101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         534   (35.40-26.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              239            77.06            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              150            77.06                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2352     1.160                 2028                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             8632              6202     2430
                          [  7424] (kcal/h)  [  5334] [  2090]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             8632            8632             0                    0
                          [  7424] (kcal/h)  [  7424]            [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:116 Vjezbaonica 3   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        452       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.5*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1476        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40       101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1476   (20.00+ 6.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1041           121.38            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           546           121.38                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           865           121.38                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.38          0.30               1.05           385.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      5184               5184        0
                                [  4458] (kcal/h)    [  4458] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      5184               5184             0                    0
                                [  4458] (kcal/h)    [  4458]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   865                       865                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:117 Vjezbaonica 4   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        254   (35.40-26.00)   2.20   12.3
                            374                           See <1'>Load detail of window glass with canopy
  SE                        254   (35.40-26.00)   2.20   12.3
                            374                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        156         10.00           0.60    (10.1*3.8-12.3)
  SE                        235         14.20           0.60    (10.5*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       534    (35.40-26.00)*0.40   1.40      101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         534   (35.40-26.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              239            77.06            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              150            77.06                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2352     1.160                 2028                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             9416              6986     2430
                          [  8098] (kcal/h)  [  6008] [  2090]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             9416            9416                0                    0
                          [  8098] (kcal/h)  [  8098]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:117 Vjezbaonica 4   ]      Floor: 2F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  SE                        452       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.5*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1476        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1476   (20.00+ 6.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1041           121.38            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           546           121.38                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           865           121.38                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.38          0.30               1.05           385.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             6350             6350        0
                          [  5461] (kcal/h)   [  5461] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             6350             6350             0                    0
                          [  5461] (kcal/h)   [  5461]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                              865                       865                                 0

                                                                  OHTC : Overall heat transfer coefficient
                                                                  SH : Sensible heat
                                                                  LH : Latent heat
                                                                  F/A : Fresh air
                                                                  THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:201 Centralni hol   ]      Floor: 3F      Floor area: 270.3m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                        327   (35.30-26.00)   2.20   16.0
                           1292                          (16.0*0.95)   250             0.34
  Shade                    1111   (35.30-26.00)   2.20   54.3
                           1122                          (54.3*0.95)    64             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        170          8.70           0.60    (12.8*3.8-16.0)
  Shade                      55          5.00           0.60    (19.1*3.8-54.3)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist      1408    (35.30-26.00)*0.40   1.40      270.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer        1408   (35.30-26.00)*0.40  1.40  270.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              630           205.43            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              387           205.43                  (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       3135     1.160                 2703                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             15005             12338     2667
                          [ 12904] (kcal/h)  [ 10611] [  2294]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             15005            15005              0                    0
                          [ 12904] (kcal/h)  [ 12904]          [     0]           [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:201 Centralni hol   ]      Floor: 3F      Floor area: 270.3m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        1007       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   16.0
  Shade                     3417       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   54.3
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                         560       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (12.8*3.8-16.0)
  Shade                      314       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (19.1*3.8-54.3)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        3936        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       270.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         3936   (20.00+ 6.00)*0.40  1.40  270.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          2908            338.96             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          1525            338.96                    ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          2416            338.96                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        338.96          0.30                1.10          1027.14

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                     16078              16078        0
                                  [ 13827] (kcal/h)   [ 13827] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                     16078              16078        0                    0
                                  [ 13827] (kcal/h)   [ 13827]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    2416                      2416                                 0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:202 Diplomska sala  ]      Floor: 3F      Floor area:  66.3m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          160   (31.90-26.00)   2.20   12.3
                             1064                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                          263         17.20           0.60    ( 6.7*3.8- 0.0)
  NW                          216         13.40           0.60    (10.3*3.8-12.3)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         219    (31.90-26.00)*0.40   1.40       66.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           219   (31.90-26.00)*0.40  1.40   66.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               98             50.39            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               55             50.39                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1538     1.160                 1326                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             1008           56              18          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             1368           76              18          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                               6208             4785     1423
                          [  5339] (kcal/h)  [  4115] [  1224]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                               6208             6208              0                    0
                          [  5339] (kcal/h)  [  5339]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                        241      332      23                0.7    23                  0.34         (12.30 * 0.95)
                            0.7        0.99    2.20       1.4    2.2                    <     0.24,    -0.51>
  NW                        549      332      23                0.8    23                  0.34         (12.30 * 0.95)
                            0.8        1.15    2.20       1.4    2.2                    <     0.24,    -0.51>
  NW                        274      332      23                0.8    23                  0.34         (12.30 * 0.95)
                            0.8        1.15    2.20       1.4    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
[Room name:202 Diplomska sala  ]      Floor: 3F      Floor area:  66.3m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        774       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                        417       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 6.7*3.8- 0.0)
  NW                        461       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.3*3.8-12.3)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        965        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        66.3
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         965   (20.00+ 6.00)*0.40  1.40   66.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          713             83.14             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          374             83.14                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          593             83.14                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        83.14          0.30                1.10           251.94

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                             4295             4295        0
                        [  3694] (kcal/h)    [  3694] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             4295             4295             0                    0
                        [  3694] (kcal/h)    [  3694]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             593                        593                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:206 Vjezbaonica 5   ]      Floor: 3F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        252   (35.30-26.00)   2.20   12.3
                            322                           See <1'>Load detail of window glass with canopy
  SW                        252   (35.30-26.00)   2.20   12.3
                            717                           See <1'>Load detail of window glass with canopy
  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        222         14.40           0.60    (10.0*3.8-12.3)
  SW                        188         12.00           0.60    (10.1*3.8-12.3)
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       524    (35.30-26.00)*0.40   1.40      100.7
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         524   (35.30-26.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               235            76.53            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               144            76.53                  (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2336     1.160                 2014                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             9676              7252     2424
                          [  8321] (kcal/h)  [  6237] [  2085]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             9676            9676              0                          0
                          [  8321] (kcal/h)  [  8321]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SW                        163      384      64                 0.3    64                   0.34         (12.30 * 0.95)
                            0.3        0.89    1.08       1.4    2.2                     <     1.18,     0.64>
  SW                        369      384      64                 0.4    64                   0.34         (12.30 * 0.95)
                            0.4        1.08    1.08       1.4    2.2                     <     1.18,     0.64>
  SW                        185      384      64                 0.4    64                   0.34         (12.30 * 0.95)
                            0.4        1.08    1.08       1.4    2.2                     <     1.18,     0.64>
  SE                         81       81      64                 1.0    64                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        161       81      64                 1.0    64                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         81       81      64                 1.0    64                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:206 Vjezbaonica 5   ]      Floor: 3F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        421       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.0*3.8-12.3)
  SW                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1466        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       100.7
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1466   (20.00+ 6.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1034            120.54             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           542            120.54                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           859            120.54                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        120.54          0.30                1.05           382.66

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             6292              6292        0
                          [  5411] (kcal/h)   [  5411] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             6292              6292              0                    0
                          [  5411] (kcal/h)   [  5411]            [     0]             [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             859                       859                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:207 Vjezbaonica 6   ]      Floor: 3F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        254   (35.40-26.00)   2.20   12.3
                            374                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        235         14.20           0.60    (10.5*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       534    (35.40-26.00)*0.40   1.40      101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         534   (35.40-26.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              239            77.06            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              150            77.06                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2352     1.160                 2028                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             8632              6202     2430
                          [  7424] (kcal/h)  [  5334] [  2090]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             8632            8632              0                          0
                          [  7424] (kcal/h)  [  7424]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
[Room name:207 Vjezbaonica 6   ]      Floor: 3F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        452       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.5*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1476        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40       101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1476   (20.00+ 6.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1041           121.38            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           546           121.38                    ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           865           121.38                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.38          0.30               1.05           385.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      5184               5184        0
                                [  4458] (kcal/h)    [  4458] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      5184               5184             0                    0
                                [  4458] (kcal/h)    [  4458]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   865                       865                                  0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:208 Vjezbaonica 7   ]      Floor: 3F      Floor area:  97.0m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        254   (35.40-26.00)   2.20   12.3
                            374                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        206         14.20           0.60    ( 9.6*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       511    (35.40-26.00)*0.40   1.40       97.0
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         511   (35.40-26.00)*0.40  1.40   97.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              229            73.72            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              143            73.72                  (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2250     1.160                 1940                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                          1680          56              30         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                          2280          76              30         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                           8438              6015     2423
                        [  7257] (kcal/h)  [  5173] [  2084]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                           8438            8438              0                          0
                        [  7257] (kcal/h)  [  7257]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:208 Vjezbaonica 7   ]      Floor: 3F      Floor area:  97.0m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        396       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 9.6*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1412        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40        97.0
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1412   (20.00+ 6.00)*0.40  1.40   97.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           996            116.11             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           522            116.11                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           828            116.11                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        116.11          0.30                1.05           368.60

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                              4955             4955        0
                          [  4261] (kcal/h)    [  4261] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              4955             4955             0                    0
                          [  4261] (kcal/h)    [  4261]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                              828                      828                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:209 Vjezbaonica 8   ]      Floor: 3F      Floor area: 101.1m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                          254   (35.40-26.00)   2.20   12.3
                              374                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                          222         14.20           0.60    (10.1*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         532    (35.40-26.00)*0.40   1.40      101.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           532   (35.40-26.00)*0.40  1.40  101.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              238            76.84            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              149            76.84                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2346     1.160                 2022                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             8607              6178     2429
                          [  7402] (kcal/h)  [  5313] [  2089]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             8607            8607              0                    0
                          [  7402] (kcal/h)  [  7402]             [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:209 Vjezbaonica 8   ]      Floor: 3F      Floor area: 101.1m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1472        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40       101.1
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1472   (20.00+ 6.00)*0.40  1.40  101.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1038            121.02             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           544            121.02                   ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           863            121.02                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.02          0.30                1.05           384.18

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                            5148                5148        0
                         [  4427] (kcal/h)   [  4427] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            5148                5148              0                    0
                         [  4427] (kcal/h)   [  4427]          [     0]            [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                            863                       863                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:210 Vjezbaonica 9   ]      Floor: 3F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        254   (35.40-26.00)   2.20   12.3
                            374                           See <1'>Load detail of window glass with canopy
  SE                        254   (35.40-26.00)   2.20   12.3
                            374                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        156         10.00           0.60    (10.1*3.8-12.3)
  SE                        222         14.20           0.60    (10.1*3.8-12.3)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       534    (35.40-26.00)*0.40   1.40      101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         534   (35.40-26.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                239            77.06            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                150            77.06                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2352     1.160                 2028                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            9403              6973     2430
                        [  8087] (kcal/h)  [  5997] [  2090]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            9403            9403              0                    0
                        [  8087] (kcal/h)  [  8087]             [     0]              [     0]
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                        187       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  SE                         94       94      72                 1.0    72                   0.34         (12.30 * 0.95)
                            1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:210 Vjezbaonica 9   ]      Floor: 3F      Floor area: 101.4m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SE                        739       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20   12.3
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  SE                        427       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  (10.1*3.8-12.3)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit       1476        ---                         ---                      (20.00+ 6.00)*0.40    ---             1.40       101.4
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1476   (20.00+ 6.00)*0.40  1.40  101.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1041           121.38            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           546           121.38                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           865           121.38                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        121.38          0.30               1.05           385.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                            6325                6325        0
                        [  5440] (kcal/h)    [  5440] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            6325                6325            0                    0
                        [  5440] (kcal/h)    [  5440]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                            865                       865                                 0


                                                                                  OHTC : Overall heat transfer coefficient
                                                                                  SH : Sensible heat
                                                                                  LH : Latent heat
                                                                                  F/A : Fresh air
                                                                                  THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:211 Toaleti         ]      Floor: 3F      Floor area:  12.6m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                        103   (33.30-26.00)   2.20    6.4
                            726                         ( 6.4*0.95)   351             0.34
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                         33         11.90           0.60    ( 2.9*3.8- 6.4)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        52    (33.30-26.00)*0.40   1.40       12.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          52   (33.30-26.00)*0.40  1.40   12.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              23              9.58            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              14              9.58                   (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        292     1.160                 252                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1691              1449      242
                        [  1454] (kcal/h)  [  1246] [   208]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1691          1691                0                 0
                        [  1454] (kcal/h)  [  1454]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:211 Toaleti         ]      Floor: 3F      Floor area:  12.6m2      Ceiling height: 3.8m      Peak time in heating: 8:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          403       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    6.4
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                           79       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 2.9*3.8- 6.4)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit         183        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        12.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer          183   (20.00+ 6.00)*0.40  1.40   12.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            136             15.80             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                             71             15.80                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            113          15.80                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         15.80          0.30               1.10            47.88

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                       984              984        0
                              [   846] (kcal/h)    [   846] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                       984                984              0                  0
                              [   846] (kcal/h)    [   846]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     113                        113                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:214 Racunovodstvo   ]      Floor: 3F      Floor area:  17.0m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB   ,  50.0%RH      Outdoor temperature:31.9CDB   ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          40   (31.90-26.00)   2.20    3.1
                             274                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          85         13.40           0.60    ( 3.6*3.8- 3.1)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         56    (31.90-26.00)*0.40   1.40       17.0
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           56   (31.90-26.00)*0.40  1.40   17.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              25             12.92            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              14             12.92                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        394     1.160                 340                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             224           56                4         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             304           76                4         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1472             1154      318
                        [  1266] (kcal/h)  [   992] [   273]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1472            1472                0                 0
                        [  1266] (kcal/h)  [  1266]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          274      332      23                 0.8    23                  0.34         (3.10 * 0.95)
                              0.8        1.15    2.20       1.4    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:214 Racunovodstvo   ]      Floor: 3F      Floor area:  17.0m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          195       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    3.1
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          182       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 3.6*3.8- 3.1)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit          248        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        17.0
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer           248   (20.00+ 6.00)*0.40  1.40   17.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                              183             21.32             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               96             21.32                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                              152             21.32                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                             21.32          0.30               1.10            64.60

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      1056            1056        0
                                [   908] (kcal/h)   [   908] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1056            1056            0                    0
                                [   908] (kcal/h)   [   908]          [     0]            [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    152                       152                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:215 Prodekan 1      ]      Floor: 3F      Floor area:  22.5m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          80   (31.90-26.00)   2.20    6.2
                             515                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          97         13.40           0.60    ( 4.8*3.8- 6.2)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         74    (31.90-26.00)*0.40   1.40       22.5
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           74   (31.90-26.00)*0.40  1.40   22.5
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              33            17.10            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              19            17.10                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        392     1.160                 338                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1944              1545      399
                        [  1672] (kcal/h)  [  1329] [   343]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1944            1944                0                0
                        [  1672] (kcal/h)  [  1672]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          274      332      23                 0.8    23                  0.34         (6.20 * 0.95)
                              0.8        1.15    2.20       1.4    2.2                    <     0.24,    -0.51>
  NW                          241      332      23                 0.7    23                  0.34         (6.20 * 0.95)
                              0.7        0.99    2.20       1.4    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:215 Prodekan 1      ]      Floor: 3F      Floor area:  22.5m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          390       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          207       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 4.8*3.8- 6.2)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit          328        ---                          ---                      (20.00+ 6.00)*0.40    ---             1.40        22.5
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer           328   (20.00+ 6.00)*0.40  1.40   22.5
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                              242             28.22             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              127             28.22                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                              201             28.22                 ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                           28.22          0.30               1.10            85.50

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      1495             1495        0
                                [  1286] (kcal/h)    [  1286] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1495             1495             0                 0
                                [  1286] (kcal/h)    [  1286]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    201                       201                                0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:216 Prodekan 2      ]      Floor: 3F      Floor area:  22.6m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        100   (33.30-26.00)   2.20    6.2
                             94                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW                        100   (33.30-26.00)   2.20    6.2
                            466                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         71          9.80           0.60    ( 4.8*3.8- 6.2)
  SE
  SW
  NW                         86         11.90           0.60    ( 4.8*3.8- 6.2)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist        92    (33.30-26.00)*0.40   1.40       22.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          92   (33.30-26.00)*0.40  1.40   22.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                41             17.18            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                25             17.18                   (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        393     1.160                 339                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            280           56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            380           76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate

<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)

<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2220              1815      405
                        [  1909] (kcal/h)  [  1561] [   348]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             2220              2220                0                    0
                        [  1909] (kcal/h)  [  1909]            [     0]             [     0]

                                                                          OHTC : Overall heat transfer coefficient
                                                                          SH : Sensible heat
                                                                          LH : Latent heat
                                                                          F/A : Fresh air
                                                                          THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          233      351      39                 0.6    39                   0.34         (6.20 * 0.95)
                              0.6        1.03    1.86       1.4    2.2                     <     0.53,    -0.73>
  NW                          233      351      39                 0.6    39                   0.34         (6.20 * 0.95)
                              0.6        1.03    1.86       1.4    2.2                     <     0.53,    -0.73>
  NE                           47       47      39                 1.0    39                   0.34         (6.20 * 0.95)
                              1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                           47       47      39                 1.0    39                   0.34         (6.20 * 0.95)
                              1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:216 Prodekan 2      ]      Floor: 3F      Floor area:  22.6m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        372       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  SE
  SW
  NW                        390       1.10                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        197       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 4.8*3.8- 6.2)
  SE
  SW
  NW                        207       1.10                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 4.8*3.8- 6.2)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        329        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        22.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         329   (20.00+ 6.00)*0.40  1.40   22.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          243             28.34             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          127             28.34                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          202             28.34                  ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          28.34          0.30                1.10            85.88

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                              2067             2067        0
                         [  1778] (kcal/h)    [  1778] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              2067             2067             0                    0
                         [  1778] (kcal/h)    [  1778]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                              202                       202                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:217 Pravna sluzba   ]      Floor: 3F      Floor area:  22.5m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        128   (35.40-26.00)   2.20    6.2
                            187                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         72         10.00           0.60    ( 4.8*3.8- 6.2)
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist       118    (35.40-26.00)*0.40   1.40       22.5
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         118   (35.40-26.00)*0.40  1.40   22.5
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               53            17.10            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               33            17.10                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         522     1.160                 450                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1891              1478      413
                        [  1626] (kcal/h)  [  1271] [   355]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1891          1891                0                    0
                        [  1626] (kcal/h)  [  1626]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                          94       94      72                 1.0    72                  0.34         (6.20 * 0.95)
                             1.0        1.40    2.20       1.4    2.2                     <        0,        0>
  NE                          94       94      72                 1.0    72                  0.34         (6.20 * 0.95)
                             1.0        1.40    2.20       1.4    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:217 Pravna sluzba   ]      Floor: 3F      Floor area:  22.5m2      Ceiling height: 3.8m      Peak time in heating: 8:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  81.8%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        372       1.05                        1.00                      (20.00+ 6.00)        0.00             2.20    6.2
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        197       1.05                        1.00                      (20.00+ 6.00)        0.00             0.60  ( 4.8*3.8- 6.2)
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit        328        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        22.5
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         328   (20.00+ 6.00)*0.40  1.40   22.5
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          231            26.93            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          121            26.93                  ( 7.26- 1.86)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          192            26.93                ( 7.26- 1.86)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          26.93          0.30               1.05            85.50

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                       1456            1456        0
                                 [  1252] (kcal/h)    [  1252] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                       1456            1456            0                  0
                                 [  1252] (kcal/h)    [  1252]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    192                        192                                 0

                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:301 Hol              ]      Floor: 4F      Floor area: 221.3m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                        436   (35.40-26.00)   2.20   21.1
                            491                           See <1'>Load detail of window glass with canopy
  Shade                    1855   (35.40-26.00)   2.20   89.7
                           2086                           (89.7*0.95)    72             0.34
  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                         63          6.80           0.60    ( 9.6*3.8-21.1)
  Shade                      68          3.60           0.60    (31.9*3.8-89.7)
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                2009     22.70                0.40      221.3
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer        1165   (35.40-26.00)*0.40  1.40  221.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               522            168.19            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               326            168.19                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       2567     1.160                 2213                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            1680           56              30          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            2280           76              30          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            15548             12942     2606
                         [ 13371] (kcal/h)  [ 11130] [  2241]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            15548            15548                0                 0
                         [ 13371] (kcal/h)  [ 13371]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          491      138      72                 0.0    72                   0.34         (21.10 * 0.95)
                              0.0        9.60    0.00       9.6    2.2                     <     4.67,    -3.08>
```

Table of peak heat load detail(Heating)

```
[Room name:301 Hol              ]      Floor: 4F      Floor area: 221.3m2      Ceiling height: 3.8m      Peak time in heating:18:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        1430       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20   21.1
  Shade                     6078       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20   89.7
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                         284       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 9.6*3.8-21.1)
  Shade                      582       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  (31.9*3.8-89.7)
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 2833       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40       221.3
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         3222   (20.00+ 6.00)*0.40  1.40  221.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          2381           277.51            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          1297           277.51                ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          2055         277.51                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        277.51         0.30               1.10           840.94

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                     16810              16810        0
                                  [ 14457] (kcal/h)    [ 14457] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                     16810              16810        0                    0
                                  [ 14457] (kcal/h)    [ 14457]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   2055                      2055                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:302 Diplomska sala  ]      Floor: 4F      Floor area:  69.9m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW                        119   (31.90-26.00)   2.20    9.2
                            348                           See <1'>Load detail of window glass with canopy
  NW                        287   (31.90-26.00)   2.20   22.1
                           2050                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                        172         17.20           0.60    ( 6.8*3.8- 9.2)
  NW                        140         13.40           0.60    (10.4*3.8-22.1)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 679     24.30               0.40       69.9
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         231   (31.90-26.00)*0.40  1.40   69.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              103            53.12            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               58            53.12                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1216     1.160                 1049                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            2856          56              51         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            3876          76              51         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            12135              8201     3934
                         [ 10436] (kcal/h)  [  7053] [  3383]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            12135            12135            0                    0
                         [ 10436] (kcal/h)  [ 10436]            [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                        2050      332      23                 0.9    23                   0.34         (22.10 * 0.95)
                             0.9        9.60    1.97       9.6    2.3                     <     0.24,    -0.51>
  SW                         348      164      23                 0.7    23                   0.34         (9.20 * 0.95)
                             0.7        4.00    1.54       4.0    2.3                     <     0.48,     1.98>
```

Table of peak heat load detail(Heating)

```
 [Room name:302 Diplomska sala  ]      Floor: 4F      Floor area:  69.9m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                          595       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    9.2
  NW                         1497       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20   22.1
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW                          294       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 6.8*3.8- 9.2)
  NW                          322       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  (10.4*3.8-22.1)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                   895       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        69.9
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer          1018   (20.00+ 6.00)*0.40  1.40   69.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            752             87.65             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            410             87.65                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            649             87.65                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         87.65          0.30               1.10           265.62

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                      5373                5373         0
                                [  4621] (kcal/h)    [  4621] [      0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      5373                5373                0                    0
                                [  4621] (kcal/h)    [  4621]             [      0]              [      0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   649                          649                                   0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:306 Sala nast. osob.]      Floor: 4F      Floor area:  49.0m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 504     25.70                0.40       49.0
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         255   (35.30-26.00)*0.40  1.40   49.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                            114             37.24            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                             70             37.24                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1137     1.160                 980                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                          1792          56              32         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                          2432          76              32         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                           798      1300.0        (35.30-26.00)           0.800

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)
                           489      1300.0         (12.75-10.49)                0.800


<<Total>> Indoor heat load(W)       =       SH  +    LH
                          6304              3802     2502
                       [  5421] (kcal/h)  [  3270] [  2152]

            Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                          7591              6304                 798                  489
                       [  6528] (kcal/h)  [  5421]             [   686]              [   421]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
[Room name:306 Sala nast. osob.]      Floor: 4F      Floor area:  49.0m2      Ceiling height: 3.8m      Peak time in heating:18:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                  627       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        49.0
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer          713   (20.00+ 6.00)*0.40  1.40   49.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           527             61.45             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           287             61.45                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           455          61.45                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                           61.45          0.30                1.10           186.20

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                        1673      1300.0        (20.00+ 6.00)           0.850

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)
                         911      1300.0              ( 7.26- 1.65)                 0.850

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)
                        1444  1300.0          ( 7.26- 1.65)            1.10             0.850

<<Total>> Indoor heat load(W)      =        SH  +    LH
                        1867                1867        0
                     [  1606] (kcal/h)    [  1606] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                        3540                1867                1673                0
                     [  3044] (kcal/h)    [  1606]             [  1439]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                        1899                        455                              1444


                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:307 Kabinet dekana  ]      Floor: 4F      Floor area:  46.0m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        281   (35.40-26.00)   2.20   13.6
                            414                          See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        195         14.20           0.60    ( 9.6*3.8-13.6)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 418     22.70                0.40       46.0
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         242   (35.40-26.00)*0.40  1.40   46.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              108            34.96            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               68            34.96                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1067     1.160                 920                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             672           56              12         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             912           76              12         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             4377              3397      980
                          [  3764] (kcal/h)  [  2921] [   843]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             4377              4377                0                    0
                          [  3764] (kcal/h)  [  3764]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        414       94      72                  1.0    72                    0.34         (13.60 * 0.95)
                            1.0        6.20    2.20       6.2    2.2                      <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:307 Kabinet dekana  ]      Floor: 4F      Floor area:  46.0m2      Ceiling height: 3.8m      Peak time in heating:18:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        880       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20   13.6
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        404       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 9.6*3.8-13.6)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 589       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        46.0
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         670   (20.00+ 6.00)*0.40  1.40   46.0
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          472             55.06             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          257             55.06                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          408             55.06                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          55.06          0.30               1.05           174.80

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                              3015                3015        0
                         [  2593] (kcal/h)    [  2593] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              3015                3015                0                    0
                         [  2593] (kcal/h)    [  2593]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                              408                       408                                  0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:308 Amfiteatar      ]       Floor: 4F      Floor area: 215.2m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        892   (35.30-26.00)   2.20   43.6
                           1140                           See <1'>Load detail of window glass with canopy
  SW                        432   (35.30-26.00)   2.20   21.1
                            810                           See <1'>Load detail of window glass with canopy
  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        303         14.40           0.60    (20.7*3.8-43.6)
  SW                        135         12.00           0.60    (10.5*3.8-21.1)
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                2212     25.70                0.40      215.2
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer        1121   (35.30-26.00)*0.40  1.40  215.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              502           163.55            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              308           163.55                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       3744     1.160                 3228                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            8904          56             159         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                           12084          76             159         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                            3744      6100.0        (35.30-26.00)           0.800

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)
                            2297      6100.0         (12.75-10.49)                0.800


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             32587             20195    12392
                          [ 28025] (kcal/h)  [ 17368] [ 10657]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             38628            32587              3744                 2297
                          [ 33220] (kcal/h)  [ 28025]            [  3220]             [  1975]


                                                                                OHTC : Overall heat transfer coefficient
                                                                                SH : Sensible heat
                                                                                LH : Latent heat
                                                                                F/A : Fresh air
                                                                                THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>         (!Area of heat transf. is contained sash area.
                                                                S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SW                          810      384      64                 0.2    64                    0.34         (21.10 * 0.95)
                              0.2        9.60    0.38        9.6    2.2                     <     1.18,     0.64>
  SE                         1140       81      64                 1.0    64                    0.34         (43.60 * 0.95)
                              1.0       19.80    2.20       19.8    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
[Room name:308 Amfiteatar      ]      Floor: 4F      Floor area: 215.2m2      Ceiling height: 3.8m      Peak time in heating:18:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        2820       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20   43.6
  SW                        1365       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20   21.1
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         618       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  (20.7*3.8-43.6)
  SW                         332       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  (10.5*3.8-21.1)
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 2755       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40       215.2
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        3133   (20.00+ 6.00)*0.40  1.40  215.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          2210           257.59             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          1204           257.59                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          1908         257.59                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        257.59         0.30               1.05          817.76

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                        7851      6100.0        (20.00+ 6.00)          0.850

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)
                        4276      6100.0              ( 7.26- 1.65)                0.850

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)
                        6776  6100.0          ( 7.26- 1.65)            1.10             0.850

<<Total>> Indoor heat load(W)      =        SH  +    LH
                        13233                13233        0
                     [ 11380] (kcal/h)    [ 11380] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                        21084                13233                7851                0
                     [ 18132] (kcal/h)    [ 11380]             [  6752]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                        8684                        1908                                6776


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:309 Hodnik          ]      Floor: 4F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        100   (33.30-26.00)   2.20    6.2
                             94                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW                        109   (33.30-26.00)   2.20    6.8
                            569                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         31          9.80           0.60    ( 3.0*3.8- 6.2)
  SE
  SW
  NW                         38         11.90           0.60    ( 3.2*3.8- 6.8)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 1059     26.30               0.40      100.7
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          412   (33.30-26.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               184            76.53            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               111            76.53                  (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp       1168     1.160                 1007                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             560          56              10          1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             760          76              10          1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate

<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)

<<Total>> Indoor heat load(W)       =       SH  +    LH
                             5195             4324      871
                        [  4468] (kcal/h)  [  3719] [   749]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             5195             5195              0                    0
                        [  4468] (kcal/h)  [  4468]        [     0]             [     0]

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                                S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                          94       47      39                 1.0    39                   0.34         (6.20 * 0.95)
                             1.0        1.40    2.20       1.4    2.2                     <         0,        0>
  NW                         569      351      39                 0.7    39                   0.34         (6.80 * 0.95)
                             0.7        3.10    1.55       3.1    2.2                     <     0.53,    -0.73>
```

Table of peak heat load detail(Heating)

```
[Room name:309 Hodnik          ]      Floor: 4F      Floor area: 100.7m2      Ceiling height: 3.8m      Peak time in heating:18:00
   Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        401       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.2
  SE
  SW
  NW                        461       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         92       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.0*3.8- 6.2)
  SE
  SW
  NW                         99       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.2*3.8- 6.8)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 1289       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40       100.7
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer        1466   (20.00+ 6.00)*0.40  1.40  100.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          1083            126.28             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           590            126.28                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           935            126.28              ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        126.28          0.30               1.10           382.66

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      4891            4891        0
                                [  4206] (kcal/h)   [  4206] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      4891            4891            0                    0
                                [  4206] (kcal/h)   [  4206]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                   935                        935                                 0


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:311 Toaleti         ]      Floor: 4F      Floor area:  14.6m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          103   (33.30-26.00)   2.20    6.4
                              726                           ( 6.4*0.95)   351             0.34
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                           33         11.90           0.60    ( 2.9*3.8- 6.4)
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist         60    (33.30-26.00)*0.40   1.40       14.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           60   (33.30-26.00)*0.40  1.40   14.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                27             11.10            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                16             11.10                   (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         339     1.160                 292                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            168          56                3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            228          76                3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1760              1516      244
                        [  1514] (kcal/h)  [  1304] [   210]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1760              1760                0                 0
                        [  1514] (kcal/h)  [  1514]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:311 Toaleti         ]      Floor: 4F      Floor area:  14.6m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          434       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20    6.4
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                           85       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 2.9*3.8- 6.4)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit         213        ---                          ---                      (20.00+ 6.00)*0.40    ---              1.40        14.6
  Flat roof
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer          213   (20.00+ 6.00)*0.40  1.40   14.6
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           157             18.31             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            86             18.31                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           136          18.31                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         18.31         0.30               1.10            55.48

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             1102             1102        0
                        [   948] (kcal/h)    [   948] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1102             1102             0                    0
                        [   948] (kcal/h)    [   948]         [     0]           [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             136                      136                                 0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:313 Kabinet 1       ]      Floor: 4F      Floor area:  19.9m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                        area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          88   (31.90-26.00)   2.20    6.8
                             691                          See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          49         13.40           0.60    ( 3.4*3.8- 6.8)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                  193     24.30               0.40       19.9
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           66   (31.90-26.00)*0.40  1.40   19.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                29            15.12            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                17            15.12                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        346     1.160                 299                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2139              1742      397
                        [  1840] (kcal/h)  [  1498] [   341]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             2139              2139                0                 0
                        [  1840] (kcal/h)  [  1840]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

<1'> Load detail of window glass with canopy

```
      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          691      332      23                 0.9    23                  0.34         (6.80 * 0.95)
                              0.9        3.10    2.07       3.1    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:313 Kabinet 1       ]      Floor: 4F      Floor area:  19.9m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        461       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                        113       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.4*3.8- 6.8)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 255       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        19.9
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         290   (20.00+ 6.00)*0.40  1.40   19.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          214             24.95             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          117             24.95                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          185          24.95                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        24.95         0.30               1.10            75.62

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +     LH
                                        1333              1333        0
                                   [  1146] (kcal/h)    [  1146] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                        1333              1333              0                    0
                                   [  1146] (kcal/h)    [  1146]          [     0]            [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                      185                        185                                 0

                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:314 Kabinet 2       ]      Floor: 4F      Floor area:  19.9m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          88   (31.90-26.00)   2.20    6.8
                             691                          See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          49         13.40           0.60    ( 3.4*3.8- 6.8)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                  193     24.30               0.40       19.9
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           66   (31.90-26.00)*0.40  1.40   19.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                29            15.12            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                17            15.12                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        346     1.160                 299                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            2139              1742      397
                        [  1840] (kcal/h)  [  1498] [   341]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            2139            2139                0                   0
                        [  1840] (kcal/h)  [  1840]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          691      332      23                 0.9    23                  0.34         (6.80 * 0.95)
                              0.9        3.10    2.07       3.1    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:314 Kabinet 2       ]      Floor: 4F      Floor area:  19.9m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          461       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          113       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.4*3.8- 6.8)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                   255       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        19.9
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer           290   (20.00+ 6.00)*0.40  1.40   19.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                              214             24.95             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              117             24.95                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                              185          24.95                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                           24.95          0.30                1.10            75.62

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +     LH
                                        1333              1333        0
                                   [  1146] (kcal/h)    [  1146] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                        1333              1333              0                  0
                                   [  1146] (kcal/h)    [  1146]          [     0]           [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                      185                        185                                0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:315 Kabinet 3       ]      Floor: 4F      Floor area:  18.2m2      Ceiling height: 3.8m      Peak time in cooling:18:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:31.9CDB    ,  39.9%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW                          88   (31.90-26.00)   2.20    6.8
                             691                          See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          40         13.40           0.60    ( 3.1*3.8- 6.8)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                  177     24.30               0.40       18.2
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer           60   (31.90-26.00)*0.40  1.40   18.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                27             13.83            (31.90-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                15             13.83                   (11.80-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         317     1.160                 273                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2075             1680      395
                          [  1785] (kcal/h)  [  1445] [   340]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             2075             2075             0                    0
                          [  1785] (kcal/h)  [  1785]            [     0]              [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          691      332      23                 0.9    23                  0.34         (6.80 * 0.95)
                              0.9        3.10    2.07       3.1    2.2                    <     0.24,    -0.51>
```

Table of peak heat load detail(Heating)

```
 [Room name:315 Kabinet 3       ]      Floor: 4F      Floor area:  18.2m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                          461       1.10                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW                           92       1.10                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.1*3.8- 6.8)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                   233       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        18.2
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer           265   (20.00+ 6.00)*0.40  1.40   18.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            196             22.82             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            107             22.82                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            169          22.82                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         22.82         0.30               1.10            69.16

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +     LH
                                      1247             1247        0
                                [  1072] (kcal/h)    [  1072] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1247             1247             0                    0
                                [  1072] (kcal/h)    [  1072]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     169                        169                                 0


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:316 Kabinet 4       ]      Floor: 4F      Floor area:  20.9m2      Ceiling height: 3.8m      Peak time in cooling:17:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:33.3CDB    ,  38.2%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        194   (33.30-26.00)   2.20   12.1
                            184                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW                        109   (33.30-26.00)   2.20    6.8
                            569                           See <1'>Load detail of window glass with canopy
  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         63          9.80           0.60    ( 6.0*3.8-12.1)
  SE
  SW
  NW                         49         11.90           0.60    ( 3.6*3.8- 6.8)
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 220     26.30               0.40       20.9
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          85   (33.30-26.00)*0.40  1.40   20.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               38            15.88            (33.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               23            15.88                   (12.23-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         364     1.160                 314                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             280          56               5         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             380          76               5         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate

<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)

<<Total>> Indoor heat load(W)       =       SH  +    LH
                              2558             2155      403
                        [  2200] (kcal/h)  [  1853] [   347]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              2558          2558              0                    0
                        [  2200] (kcal/h)  [  2200]            [     0]             [     0]

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NW                          569      351      39                 0.7    39                   0.34         (6.80 * 0.95)
                              0.7        3.10    1.55        3.1    2.2                     <     0.53,    -0.73>
  NE                          184       47      39                 1.0    39                   0.34         (12.10 * 0.95)
                              1.0        5.50    2.20        5.5    2.2                     <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:316 Kabinet 4       ]      Floor: 4F      Floor area:  20.9m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        783       1.05                      1.00                     (20.00+ 6.00)        2.00             2.20   12.1
  SE
  SW
  NW                        461       1.10                      1.00                     (20.00+ 6.00)        2.00             2.20    6.8
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        189       1.05                      1.00                     (20.00+ 6.00)        2.00             0.60  ( 6.0*3.8-12.1)
  SE
  SW
  NW                        127       1.10                      1.00                     (20.00+ 6.00)        2.00             0.60  ( 3.6*3.8- 6.8)
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 268       1.00                      1.00                     (20.00+ 6.00)        6.00             0.40        20.9
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         304   (20.00+ 6.00)*0.40  1.40   20.9
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          215             25.02             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          117             25.02                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          185          25.02                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        25.02         0.30               1.05            79.42

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                                        2347             2347        0
                                   [  2018] (kcal/h)    [  2018] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                        2347             2347             0                    0
                                   [  2018] (kcal/h)    [  2018]             [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                      185                        185                                  0

                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:317 Kabinet 5       ]      Floor: 4F      Floor area:  14.1m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                        area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        105   (35.40-26.00)   2.20    5.1
                            154                        See <1'>Load detail of window glass with canopy
  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         33         10.00           0.60    ( 2.8*3.8- 5.1)
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 128     22.70                0.40       14.1
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          74   (35.40-26.00)*0.40  1.40   14.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                33            10.72            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                21            10.72                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         245     1.160                 212                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1189               940      249
                          [  1023] (kcal/h)  [   808] [   214]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1189               1189                0                 0
                          [  1023] (kcal/h)  [  1023]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                        154       94      72                  1.0    72                    0.34         (5.10 * 0.95)
                            1.0        2.30    2.20       2.3    2.2                      <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:317 Kabinet 5       ]      Floor: 4F      Floor area:  14.1m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        330       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    5.1
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         98       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 2.8*3.8- 5.1)
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 180       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        14.1
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         205   (20.00+ 6.00)*0.40  1.40   14.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          145             16.88             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           79             16.88                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          125             16.88                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         16.88          0.30               1.05            53.58

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                       958          958        0
                                [   824] (kcal/h)    [   824] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                       958                958              0                 0
                                [   824] (kcal/h)    [   824]             [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     125                        125                                 0

                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:318 Kabinet 6       ]      Floor: 4F      Floor area:  16.1m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         32         10.00           0.60    ( 3.2*3.8- 6.8)
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 146     22.70                0.40       16.1
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          85   (35.40-26.00)*0.40  1.40   16.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                38            12.24            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                24            12.24                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         280     1.160                 242                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1349             1097      252
                          [  1160] (kcal/h)  [   943] [   217]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1349             1349                0                 0
                          [  1160] (kcal/h)  [  1160]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load    =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                 =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                      <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:318 Kabinet 6       ]      Floor: 4F      Floor area:  16.1m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         95       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.2*3.8- 6.8)
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 206       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        16.1
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         234   (20.00+ 6.00)*0.40  1.40   16.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                           165             19.27             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            90             19.27                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                           143             19.27                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          19.27          0.30               1.05            61.18

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                              1140             1140        0
                          [   980] (kcal/h)    [   980] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1140             1140             0                    0
                          [   980] (kcal/h)    [   980]             [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                              143                        143                                  0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:319 Kabinet 7       ]      Floor: 4F      Floor area:  18.1m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE                        213   (35.40-26.00)   2.20   10.3
                            314                           See <1'>Load detail of window glass with canopy
  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                         57         10.00           0.60    ( 5.2*3.8-10.3)
  SE                         59         14.20           0.60    ( 3.6*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 164     22.70                0.40       18.1
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          95   (35.40-26.00)*0.40  1.40   18.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                43             13.76            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                27             13.76                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         420     1.160                 362                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            224           56                4         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            304           76                4         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            2268              1937      331
                        [  1950] (kcal/h)  [  1666] [   285]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            2268            2268                0                 0
                        [  1950] (kcal/h)  [  1950]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  NE                        314       94      72                 1.0    72                  0.34         (10.30 * 0.95)
                            1.0        4.70    2.20       4.7    2.2                     <        0,        0>
  SE                        207       94      72                 1.0    72                  0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                     <        0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:319 Kabinet 7       ]      Floor: 4F      Floor area:  18.1m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        666       1.05                      1.00                     (20.00+ 6.00)        2.00             2.20   10.3
  SE                        440       1.05                      1.00                     (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE                        167       1.05                      1.00                     (20.00+ 6.00)        2.00             0.60  ( 5.2*3.8-10.3)
  SE                        121       1.05                      1.00                     (20.00+ 6.00)        2.00             0.60  ( 3.6*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 232       1.00                      1.00                     (20.00+ 6.00)        6.00             0.40        18.1
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         264   (20.00+ 6.00)*0.40  1.40   18.1
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          186             21.67             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          101             21.67                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          160          21.67                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        21.67         0.30               1.05            68.78

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                                        2076              2076        0
                                   [  1785] (kcal/h)    [  1785] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                        2076              2076             0                    0
                                   [  1785] (kcal/h)    [  1785]             [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                     160                        160                                 0


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:320 Kabinet 8       ]      Floor: 4F      Floor area:  15.7m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         42         14.20           0.60    ( 3.1*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 143     22.70               0.40       15.7
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          83   (35.40-26.00)*0.40  1.40   15.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                                37             11.93            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                                23             11.93                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         364     1.160                 314                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            224          56               4         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            304          76               4         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1568             1241      327
                         [  1348] (kcal/h)  [  1067] [   281]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1568             1568                0                0
                         [  1348] (kcal/h)  [  1348]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                 <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                      <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:320 Kabinet 8       ]      Floor: 4F      Floor area:  15.7m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         88       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.1*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 201       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        15.7
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         229   (20.00+ 6.00)*0.40   1.40   15.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          161             18.79             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           88             18.79                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          139             18.79                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        18.79          0.30                1.05            59.66

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                              1119             1119        0
                          [   962] (kcal/h)    [   962] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                        1119                1119              0                    0
                    [   962] (kcal/h)    [   962]             [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                          139                        139                                  0
```

OHTC : Overall heat transfer coefficient
SH : Sensible heat
LH : Latent heat
F/A : Fresh air
THEX : Total heat exchange efficiency

Table of peak heat load detail(Cooling)

```
 [Room name:321 Kabinet 9       ]      Floor: 4F      Floor area:  17.2m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         52         14.20           0.60    ( 3.4*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 156     22.70               0.40       17.2
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          91   (35.40-26.00)*0.40  1.40   17.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              41             13.07            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              25             13.07                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        399     1.160                 344                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                              1508             1255      253
                         [  1297] (kcal/h)  [  1079] [   218]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                              1508             1508                0                 0
                         [  1297] (kcal/h)  [  1297]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                     <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:321 Kabinet 9       ]      Floor: 4F      Floor area:  17.2m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        108       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.4*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 220       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        17.2
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         250   (20.00+ 6.00)*0.40   1.40   17.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            177             20.59             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                             96             20.59                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            152             20.59                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          20.59          0.30               1.05            65.36

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                                        1195             1195        0
                                  [  1028] (kcal/h)    [  1028] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                        1195             1195             0                    0
                                  [  1028] (kcal/h)    [  1028]            [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                       152                       152                                 0


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:322 Kabinet 10      ]      Floor: 4F      Floor area:  17.2m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         52         14.20           0.60    ( 3.4*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 156     22.70               0.40       17.2
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          91   (35.40-26.00)*0.40   1.40   17.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              41             13.07            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              25             13.07                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        399     1.160                 344                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                            168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                            228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1508              1255      253
                        [  1297] (kcal/h)  [  1079] [   218]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1508              1508                0                 0
                        [  1297] (kcal/h)  [  1297]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                     <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:322 Kabinet 10      ]       Floor: 4F      Floor area:  17.2m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        108       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.4*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 220       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        17.2
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         250   (20.00+ 6.00)*0.40   1.40   17.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          177             20.59             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           96             20.59                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          152             20.59                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                         20.59          0.30                1.05            65.36

  <8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
    Fluorescent lamp
    Incandescent lamp

  <9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

  <10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

  <11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

       Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

       (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

  <<Total>> Indoor heat load(W)      =        SH  +    LH
                                         1195             1195        0
                                   [  1028] (kcal/h)    [  1028] [     0]

            Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                         1195             1195             0                    0
                                   [  1028] (kcal/h)    [  1028]            [     0]              [     0]
               !Indoor heat load & total heat load are not contained latent heat.

            Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                      152                       152                                 0


                                                                                    OHTC : Overall heat transfer coefficient
                                                                                    SH : Sensible heat
                                                                                    LH : Latent heat
                                                                                    F/A : Fresh air
                                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:323 Kabinet 11      ]      Floor: 4F      Floor area:  15.7m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         42         14.20           0.60    ( 3.1*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 143     22.70               0.40       15.7
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          83   (35.40-26.00)*0.40  1.40   15.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              37             11.93            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              23             11.93                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        364     1.160                 314                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                          168          56               3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                          228          76               3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            1436              1185      251
                        [  1235] (kcal/h)  [  1019] [   216]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            1436            1436                0                    0
                        [  1235] (kcal/h)  [  1235]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load     =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                  =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                      <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:323 Kabinet 11      ]      Floor: 4F      Floor area:  15.7m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         88       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.1*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 201       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        15.7
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         229   (20.00+ 6.00)*0.40   1.40   15.7
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          161             18.79             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                           88             18.79                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          139             18.79                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                        18.79          0.30               1.05            59.66

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                             1119            1119        0
                        [   962] (kcal/h)    [   962] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1119            1119        0                    0
                        [   962] (kcal/h)    [   962]            [     0]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                             139                        139                                   0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:324 Sekretarica     ]      Floor: 4F      Floor area:  18.2m2      Ceiling height: 3.8m      Peak time in cooling:14:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.4CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE                        141   (35.40-26.00)   2.20    6.8
                            207                           See <1'>Load detail of window glass with canopy
  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                         59         14.20           0.60    ( 3.6*3.8- 6.8)
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
              *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 165     22.70                0.40       18.2
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer          96   (35.40-26.00)*0.40  1.40   18.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                               43             13.83            (35.40-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                               27             13.83                   (12.82-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         422     1.160                 364                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                           168          56                3         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                           228          76                3         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)


     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             1556              1301      255
                        [  1338] (kcal/h)  [  1119] [   219]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             1556              1556                0                 0
                        [  1338] (kcal/h)  [  1338]            [     0]             [     0]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail of window with canopy(Cooling)

```
<1'> Load detail of window glass with canopy

      Upper:solar heat load    =   ((S.SHG - S.SHG for shadow) * SG + S.SHG for shadow) * shading factor * area
      Lower:SG                 =   (   x   *   y   ) / (  Ww   *   Hw  )                <tanF, tanG>        (!Area of heat transf. is contained sash area.
                                                          S.SHG::std.solar heat gain, SG::Glass surface solar radition ratio.
  Azimuth
  SE                        207       94      72                  1.0    72                    0.34         (6.80 * 0.95)
                            1.0        3.10    2.20       3.1    2.2                      <         0,        0>
```

Table of peak heat load detail(Heating)

```
 [Room name:324 Sekretarica     ]      Floor: 4F      Floor area:  18.2m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        440       1.05                        1.00                      (20.00+ 6.00)        2.00             2.20    6.8
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE                        121       1.05                        1.00                      (20.00+ 6.00)        2.00             0.60  ( 3.6*3.8- 6.8)
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 233       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        18.2
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         265   (20.00+ 6.00)*0.40  1.40   18.2
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                            187             21.79             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                            102             21.79                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                            161             21.79                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          21.79          0.30               1.05            69.16

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)

<<Total>> Indoor heat load(W)      =        SH  +    LH
                                      1246             1246        0
                                [  1072] (kcal/h)    [  1072] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                                      1246             1246             0                    0
                                [  1072] (kcal/h)    [  1072]         [     0]            [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                                    161                       161                                0

                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:325 Trpezarija      ]      Floor: 4F      Floor area:  23.3m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 240     25.70                0.40       23.3
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         121   (35.30-26.00)*0.40  1.40   23.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              54            17.71            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              33            17.71                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        541     1.160                 466                 1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             672          56              12         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             912          76              12         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                             307       500.0        (35.30-26.00)           0.800

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)
                             188       500.0         (12.75-10.49)                0.800


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2573               1628      945
                        [  2213] (kcal/h)  [  1400] [   813]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             3068          2573              307                  188
                        [  2638] (kcal/h)  [  2213]             [   264]              [   162]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:325 Trpezarija      ]      Floor: 4F      Floor area:  23.3m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 298       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        23.3
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         339   (20.00+ 6.00)*0.40  1.40   23.3
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          251            29.22            (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          137            29.22                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          216            29.22                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          29.22          0.30               1.10            88.54

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                        644       500.0        (20.00+ 6.00)           0.850

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)
                        350       500.0              ( 7.26- 1.65)                 0.850

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)
                        555   500.0          ( 7.26- 1.65)            1.10              0.850

<<Total>> Indoor heat load(W)      =         SH  +    LH
                        888                  888        0
                    [   764] (kcal/h)    [   764] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                        1532                 888                 644                    0
                    [  1318] (kcal/h)    [   764]             [   554]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                        771                        216                                555


                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:326 Arhiv st.radovi ]      Floor: 4F      Floor area:  23.4m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                    (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                        area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
               *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 241     25.70               0.40       23.4
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         122   (35.30-26.00)*0.40  1.40   23.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              55            17.78            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              33            17.78                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp        543     1.160                 468                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                          112          56               2         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                          152          76               2         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                              92       150.0        (35.30-26.00)           0.800

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)
                              56       150.0         (12.75-10.49)                0.800


<<Total>> Indoor heat load(W)       =       SH  +    LH
                            1258              1073      185
                        [  1082] (kcal/h)  [   923] [   159]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                            1406          1258                92                    56
                        [  1209] (kcal/h)  [  1082]            [    79]             [    48]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:326 Arhiv st.radovi ]      Floor: 4F      Floor area:  23.4m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 300       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        23.4
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         341   (20.00+ 6.00)*0.40  1.40   23.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          252             29.34             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          137             29.34                   ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          217             29.34                 ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          29.34          0.30                1.10            88.92

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                        193       150.0        (20.00+ 6.00)           0.850

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)
                        105       150.0              ( 7.26- 1.65)                 0.850

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)
                        167   150.0          ( 7.26- 1.65)            1.10              0.850

<<Total>> Indoor heat load(W)      =         SH  +    LH
                          893                 893        0
                     [   768] (kcal/h)    [   768] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                          1086                893                 193                    0
                     [   934] (kcal/h)    [   768]             [   166]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                          384                        217                                 167


                                                                                OHTC : Overall heat transfer coefficient
                                                                                SH : Sensible heat
                                                                                LH : Latent heat
                                                                                F/A : Fresh air
                                                                                THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Cooling)

```
 [Room name:327 Radna sala      ]       Floor: 4F      Floor area:  21.4m2      Ceiling height: 3.8m      Peak time in cooling:15:00
    Indoor temperature:26.0CDB    ,  50.0%RH      Outdoor temperature:35.3CDB    ,  35.6%RH

<1> Load of window glass
 -Material I / with blind-
      Upper:heat transfer load = temp.diff.   *   OHTC * area                                        (!Area of heat transf. is contained sash area.
      Lower:solar heat load    =                          area * std.solar heat gain * shading factor (!Area of solar heat gain is not contained sash area.
  Azimuth
  N

  E

  S

  W

  NE

  SE

  SW

  NW

  Shade

  Skylight


<2> Load of outer wall         = effective temp.diff. * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
     (!Area of outer wall=length of outer wall
                *floor height[ceiling height+height of ceiling adv attic]-window area)

<3> Load of roof               = effective temp.diff. * OHTC     * area
  Overhead room exist
  Flat roof                 220     25.70                0.40       21.4
  Inclined roof

<4> Load of floor              = temp.diff.       *   OHTC * area
  Earth floor
  With air layer
  Without air layer         111   (35.30-26.00)*0.40  1.40   21.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC/unit ambient length * ambient length
    (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
    (depth>2.4m)

<7> Load of infiltration(SH) = infiltration vol.(m3/h) * temp.diff. * 0.33
                              50            16.26            (35.30-26.00)

    Load of infiltration(LH) = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                              31            16.26                   (12.75-10.49)

<8> Load of lighting         = heat gain/W * lighting consumption vol. * ope.rate
  Fluorescent lamp         496     1.160                 428                1.00
  Incandescent lamp

<9> Load of human body(SH)   = SH of human body * No of psns. * ope.rate
                             672          56              12         1.00

    Load of human body(LH)   = LH of human body * No of psns. * ope.rate
                             912          76              12         1.00

<10> Load of equipments      = heat gain from internal equip. * operating rate


<11> Fresh air load(SH)      = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                             307       500.0        (35.30-26.00)           0.800

     Fresh air load(LH)      = F/A vol.(m3/h) * abs.humid.diff. * 0.833 * (1 - THEX)
                             188       500.0         (12.75-10.49)                0.800


<<Total>> Indoor heat load(W)       =       SH  +    LH
                             2492               1549      943
                        [  2143] (kcal/h)  [  1332] [   811]

          Total heat load(W)        = indoor heat load + fresh air load(SH) + fresh air load(LH)
                             2987            2492                307                188
                        [  2569] (kcal/h)  [  2143]            [   264]            [   162]


                                                                    OHTC : Overall heat transfer coefficient
                                                                    SH : Sensible heat
                                                                    LH : Latent heat
                                                                    F/A : Fresh air
                                                                    THEX : Total heat exchange efficiency
```

Table of peak heat load detail(Heating)

```
 [Room name:327 Radna sala      ]      Floor: 4F      Floor area:  21.4m2      Ceiling height: 3.8m      Peak time in heating:18:00
    Indoor temperature:20.0CDB    ,  50.0%RH      Outdoor temperature:-6.0CDB    ,  72.7%RH

<1> Load of window glass       = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
  Skylight

<2> Load of outer wall         = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW
  Shade
          (!Area of outer wall=length of outer wall*floor height[ceiling height+height of ceiling adv.attic.]-window area)

<3> Load of roof               = azimuth factor * increasing factor of ceiling height * (temp.diff. + radiant cooling effect) * OHTC     * area
  Overhead room exit
  Flat roof                 274       1.00                        1.00                      (20.00+ 6.00)        6.00             0.40        21.4
  Inclined roof

<4> Load of floor              = temp.diff.     * OHTC * area
  Earth floor
  With air layer
  Without air layer         312   (20.00+ 6.00)*0.40  1.40   21.4
  Pilotis

<5> Load of inner wall         = temp.diff.       *   OHTC * area
  Azimuth
  N
  E
  S
  W
  NE
  SE
  SW
  NW

<6> Load of underground wall   = temp.diff. * OHTC * ambient length
     (depth<=2.4m)

    Load of underground wall   = temp.diff. * OHTC * area
     (depth>2.4m)


<7> Load of infiltration(SH)   = infiltration vol.(m3/h) * temp.diff. * 0.33
                          230             26.84             (20.00+ 6.00)

    Load of infiltration(LH)   = infiltration vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833
                          125             26.84                  ( 7.26- 1.65)

    (Humidifying vol.)(g/h)    = infiltration vol. * abs.humid.diff. * 1.2 * safety factor
                          199          26.84                ( 7.26- 1.65)          1.10

            !Infiltration vol. = No of ventilation * azimuth factor * room capacity
                          26.84         0.30               1.10            81.32

<8> Load of lighting       = -(heat gain/W * lighting consumption vol. * ope.rate * probable rate)
  Fluorescent lamp
  Incandescent lamp

<9> Load of human body(SH) = -(SH of human body * No of psns * ope.rate * probable rate)

<10> Load of equipments    = -(heat gain from internal equip. * operating rate * probable rate)

<11> Fresh air load(SH)    = F/A vol.(m3/h) * temp.diff. * 0.33 * (1 - THEX)
                        644       500.0        (20.00+ 6.00)           0.850

     Fresh air load(LH)    = F/A vol.(m3/h) * abs.humid.diff.(g/kg) * 0.833 * (1 - THEX)
                        350       500.0              ( 7.26- 1.65)                 0.850

     (Humidifying vol.)    = F/A vol. * abs.humid.diff. * 1.2 * safety factor * (1 - THEX)
                        555   500.0          ( 7.26- 1.65)            1.10             0.850

<<Total>> Indoor heat load(W)      =        SH  +    LH
                          816                816        0
                     [   702] (kcal/h)    [   702] [     0]

          Total heat load(W)       = indoor heat load + fresh air load(SH) + fresh air load(LH)
                          1460                816                644                 0
                     [  1256] (kcal/h)    [   702]             [   554]              [     0]
             !Indoor heat load & total heat load are not contained latent heat.

          Humidifying vol.(g/h) = humidification of infiltration + humidification of outdoor air
                          754                        199                                555


                                                                                   OHTC : Overall heat transfer coefficient
                                                                                   SH : Sensible heat
                                                                                   LH : Latent heat
                                                                                   F/A : Fresh air
                                                                                   THEX : Total heat exchange efficiency
```

5.2. KOLIČINE VAZDUHA ZA VENTILACIJU

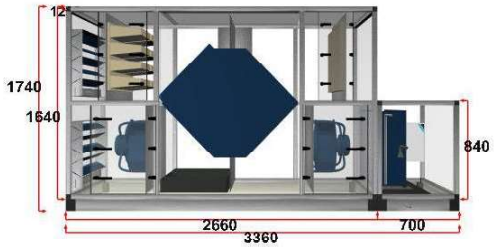
OBJEKAT: ARHITEKTONSKI FAKULTET PODGORICA

Količine svježeg vazduha

PODACI O PROSTORIJAMA					ASHRAE 62.1 (m^3/h)					EN 15251 (m^3/h)					USVOJENO (m^3/h)	
sistem/etaža	br. pr.	naziv prostorije	A (m2)	broj ljudi	l/s*m2	l/s*č	po površini	po br. ljudi	ukupno	l/s*m2	l/s*č	po površini	po br. ljudi	ukupno	ubacivanje	izvlačenje
SISTEM 1 - KAFE/STUDENTSKI KLUB																
SUTEREN	015	KAFE/STUDENTSKI KLUB	103,22	110	0,3	2,5	111	990	1101	1	10	372	3960	4332	4400	4400
SISTEM 2 – KANCELARIJE II SPRAT																
II SPRAT	306	Sala osoblje	49	32	0,3	2,5	53	288	341	0,7	7	123	806	929	1000	1000
II SPRAT	325	Trpezarija	23,3	12	0,3	2,5	25	108	133	0,7	8	59	346	405	450	500
II SPRAT	326	Arhiv	23,4	2	0,3	2,5	25	18	43	0,7	7	59	50	109	100	150
II SPRAT	327	Radna sala	21,4	12	0,3	2,5	23	108	131	0,7	8	54	346	400	450	500
														UKUPNO:	2000	2150
SISTEM 3 – AMFITEATAR																
II SPRAT	308	AMFITEATAR	215,2	159	0,3	2,5	232	1431	1663	0,4	10	310	5724	6034	6310	6310

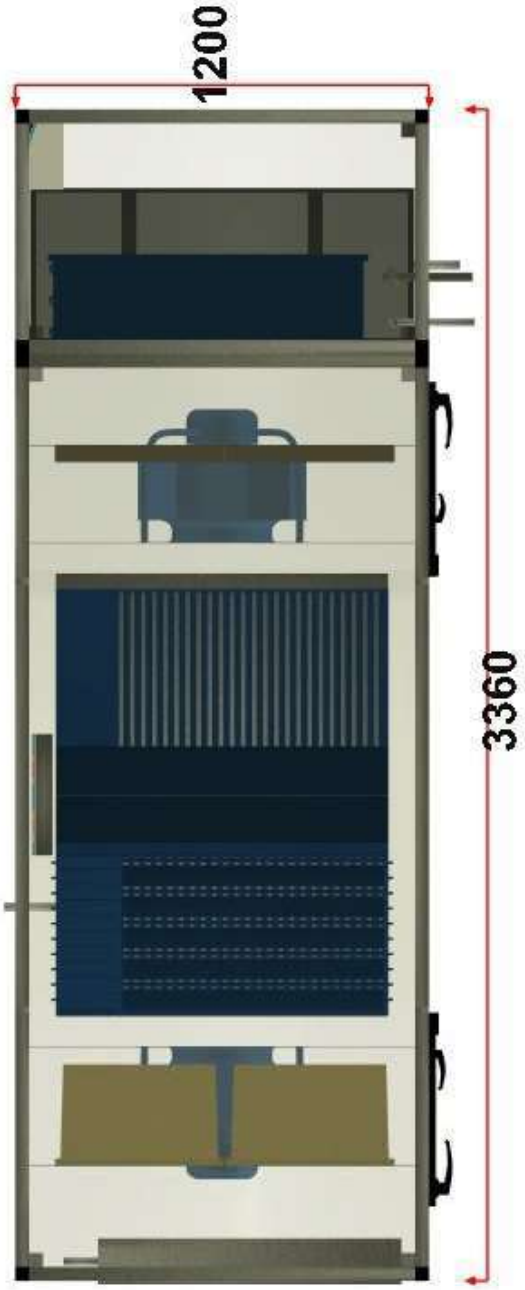
5.3 IZBOR KLIMA KOMORA

Project Arhitektonski fakultet Podgorica
Unit SISTEM_2_KK_STUDENTSKI_KLUB



Unit Data

Range / Series	D-AHU MODULAR_P
Model	SIZE 4
Panel • Insulation	42 mm • Foam
Model Box Ref.	Energy ThermiC° F2
Panel Inner Skin	Aluzinc 0.5 mm
Panel Outer Skin	Precoated 0.7 mm
Profile	Aluminium Anodized Thermal Break
AHU Base	100 mm Aluminium
Supply Width • Height	1200 mm • 840 mm
Return Width • Height	1200 mm • 840 mm
Length Overall	3360 mm
Weight	700 Kg
Connection Side	Left
Supply Air Flow	4400 m³/h • 1.22 m³/s
External Pressure Drop	200 Pa
Return Air Flow	4400 m³/h • 1.22 m³/s
External Pressure Drop	200 Pa
Electrical Connection	400V/3Ph/50Hz
Air Density	1.2 Kg/m³
Altitude	44 m a.s.l.
Specific fan power efficiency rating:	
SFPv (clean filters)	1414 W/(m³/s)
SFPe (medium filters)	1605 W/(m³/s)
ERP Compliant	ERP 2018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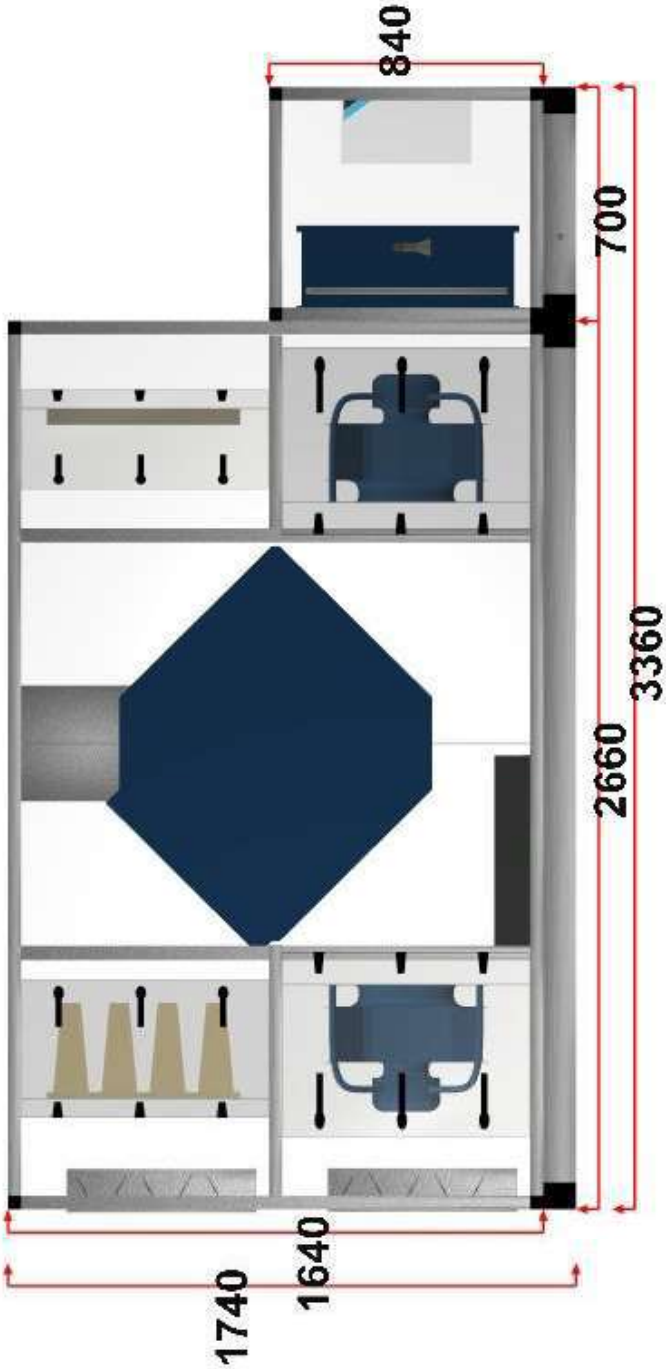
3360


1740
1640
2660
3360
700
840

1) Damper Supply

Pressure Drop	7 Pa
Material	Aluminium
Mounting	Internal • Left
Dimensions (HxW)	580x880 mm
Torque	4 Nm

2) Filter Supply

Mounting	Slide
Air Velocity	2.11 m/s
Pressure Drop Design	Medium
Filter Class	F7 ePM1 50%
Filter Energy Classification	A
Filter Name	VariCEL VXL-E
Material	Fiber Glass
Dimensions	2x(490x592x290)
Clean Pressure Drop	53 Pa
Medium Pressure Drop	103 Pa
Dirty Pressure Drop	153 Pa

3) Recuperator Heat Cube Supply

Part Number	PCF-K 55
Material	Aluminium
Side	648 mm
Dry Efficiency (Eurovent)	85.6 %
Energy Class (EN13053)	H1 • 77.83 %
ByPass	Standard ByPass
WINTER	
Power	35.6 kW
Efficiency	95.9 %
Supply	
Flow Rate	4400 m³/h
Actual Pressure Drop	116 Pa
Temp. Dry Bulb Outdoor • Supply	-6 °C • 20.9 °C
Relative Humidity Outdoor • Supply	90 % • 14 %
Temp. Wet Bulb Outdoor • Supply	-6.4 °C • 8.8 °C
Return	
Flow Rate	4400 m³/h
Actual Pressure Drop	137 Pa
Temp. Dry Bulb Extract • Exhaust	22 °C • 6.1 °C
Relative Humidity Extract • Exhaust	50 % • 100 %
Temp. Wet Bulb Extract • Exhaust	15.5 °C • 6.1 °C
SUMMER	
Power	12.7 kW

Efficiency	73.8 %
Supply	
Flow Rate	4400 m³/h
Actual Pressure Drop	148 Pa
Temp. Dry Bulb Outdoor • Supply	37 °C • 28.9 °C
Relative Humidity Outdoor • Supply	28 % • 44 %
Temp. Wet Bulb Outdoor • Supply	22.5 °C • 20.1 °C
Return	
Flow Rate	4400 m³/h
Actual Pressure Drop	140 Pa
Temp. Dry Bulb Extract • Exhaust	26 °C • 34.8 °C
Relative Humidity Extract • Exhaust	50 % • 30 %
Temp. Wet Bulb Extract • Exhaust	18.7 °C • 21.5 °C

Assumed that the system effect was considered in the design.

4) Fan Supply

Model	K3G355PH4905
Type	EC Centrifugal Fan
Material	Aluminium
Quantity	1x(Single Fan)
External Static Pressure	200 Pa
Internal Static Pressure	264 Pa
Total Static Pressure	464 Pa
Dynamic Pressure	53 Pa
Flow Design	4400 m³/h
Rotation Speed Work • Max	2312 RPM • 2870 RPM
Efficiency (Reg327/2011)	68.8 %
Efficiency	63.8 %
Electrical Power Input	0.99 kW
Power Class • PMREF (EN13053)	P1 • 1.32 kW
SFPv Class • SFPv (EN13053)	SFP1 • 707 W/(m³/s)

Motor Data

Efficiency Class	IE4
Power • Nominal Current	1.9 kW • 3 A
Electrical Connection	3Ph+N-380-480V

Fan system effect is taken into account in the fan performances

5) Coil Cooling • Heating DX Supply

Geometry

Model	1022A2603090025EO109
Geometry • Rows	P22 • 3
Frame	Galvanized
Tube Material • Thickness	Copper • 0.35 mm
Fin Material • Space	Al 0.1 mm • 2.5 mm
Connections (Diam) • Type • Side	16 mm • Braised • Right
Circuit Number	1

Sensible Capacity	19.8 kW
Total Capacity[B]*	27.4 kW

Cooling Air Side

Air Flow • Velocity	4400 m³/h • 2.09 m/s
Temp. Dry Bulb In • Out	28.9 °C • 16 °C
Temp. Wet Bulb In • Out	20.1 °C • 13.9 °C
Relative Humidity In • Out	44.3 % • 79 %
Pressure Drop Dry • Wet	29Pa • 38 Pa

Cooling Fluid Side

Fluid	R410A
Evaporating Temperature	6 °C
Fluid Volume	4.5 dm³
1[D]* x EKEXV250[A]*	Mounted

Heating Air Side

Max Power[C]*(based on maximum condensing unit)	22 kW
Temp. Dry Bulb In • Out	20.9 °C • 35.3 °C

* For VRV Xpress Input [A: EKEXV250] , [B: 27.4 kW] , [C: 22 kW] , [D: 1]

Calculated in Wet Condition

6) Filter Return

Mounting	Slide
Air Velocity	2.11 m/s
Pressure Drop Design	Medium
Filter Class	M5 ePM10 55%
Filter Energy Classification	E
Filter Name	Ecopleat Green
Material	Synthetic
Dimensions	2x(490x592x48)
Clean Pressure Drop	58 Pa
Medium Pressure Drop	108 Pa
Dirty Pressure Drop	158 Pa

7) Fan Return

Model	K3G355PH4905
Type	EC Centrifugal Fan
Material	Aluminium
Quantity	1x(Single Fan)
External Static Pressure	200 Pa
Internal Static Pressure	252 Pa
Total Static Pressure	452 Pa
Dynamic Pressure	53 Pa
Flow Design	4400 m³/h
Rotation Speed Work • Max	2299 RPM • 2870 RPM

Efficiency (Reg327/2011)	68.8 %
Efficiency	63.6 %
Electrical Power Input	0.97 kW
Power Class • PMREF (EN13053)	P1 • 1.29 kW
SFPv Class • SFPv (EN13053)	SFP1 • 707 W/(m³/s)

Motor Data

Efficiency Class	IE4
Power • Nominal Current	1.9 kW • 3 A
Electrical Connection	3Ph+N-380-480V

Fan system effect is taken into account in the fan performances

8) Damper Return

Pressure Drop	7 Pa
Material	Aluminium
Mounting	Internal • Right
Dimensions (HxW)	580x880 mm
Torque	4 Nm

Section List

Num.	Height (mm)	Width (mm)	Length (mm)	Weight (Kg)	Transportable
1	1740	1200	2660	604	Container or Truck
2	940	1200	700	96	Container or Truck

Options List

Unit Options

Rain Hood Fresh Air
Rain Hood Exhaust Air
Flat Roof
CO2
Remote Interface
Constant Airflow - Ambient

Sound Report

Supply Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	60	76	77	73	68	70	73	64	78
Fan Outlet	62	76	76	76	76	76	77	68	83
Unit Inlet	54	70	71	67	59	58	53	44	68
Unit Outlet	58	71	71	71	70	68	65	56	75
Airborne	54	67	60	58	58	56	57	34	64

Return Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	60	76	77	73	68	70	73	64	78
Fan Outlet	62	76	76	76	76	75	77	68	82
Unit Inlet	58	75	76	72	65	66	65	56	74
Unit Outlet	62	76	76	76	76	75	77	68	82
Airborne	53	67	60	58	58	55	57	34	64

NRVU - Regulation (EU) No 1253/2014

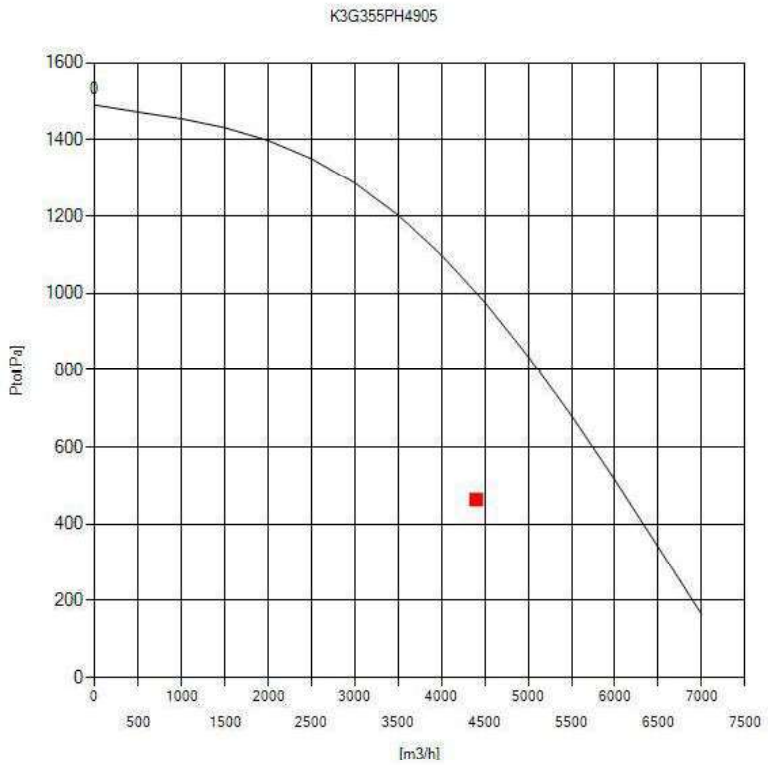
Manufacturer's Name	Daikin Applied Europe S.p.a.
Serial Number	331011
Typology (NRVU, UVU or BVU)*	NRVU BVU
Drive Type	Inverter (included on the electronic fan)
HRS Type	Other
HRS Thermal Efficiency (EN308)	82.8 %
Nominal NRVU Flow Rate	
Supply	1.22 m^3/s
Return	1.22 m^3/s
Effective Electric Power Input	
Supply	1.98 kW
SFP Internal	572 $W/(m^3/s)$
Face Velocity at Flow Rate Design	
Supply	1.4 m/s
Return	1.4 m/s
Nominal Internal Pressure Drop	
Supply	169 Pa
Return	195 Pa
Nominal External Pressure Drop	
Supply	200 Pa
Return	200 Pa
Efficiency (Reg327/2011)	
Supply	69 %
Return	69 %
External Leakage (RU) +400Pa • -400Pa	1.02 % • 0.51 %
Maximum Internal Leakage	1.5 %
Summer Outdoor Conditions	37 °C • 28 %
Winter Outdoor Conditions	-6 °C • 90 %
Filter Energy Classification	A|-
Filter Service Warning**	Displayed on HMI Controller
Sound Power Level (LWA)	Please refer to Selection Software
Pre-/Dis-assembly Instructions	http://www.daikinapplied.eu/en/index/page/download

* In accordance with Commission Regulation (EU) No 1253/2014 of July 2014

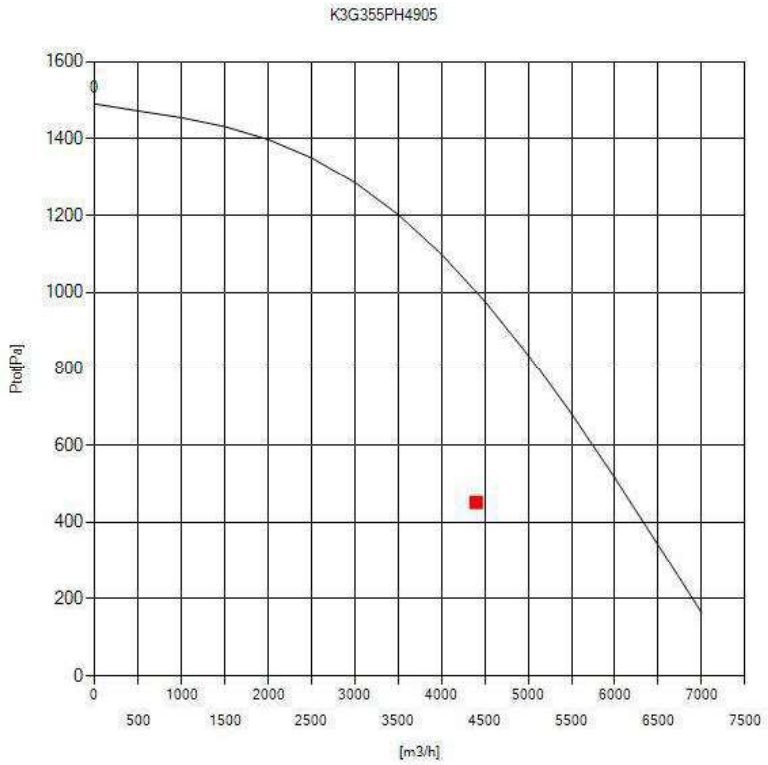
** Clean/replace Filter(s) when maximum pressure drop is reached or when warning is displayed on HMI controller

Fan Curves Diagrams

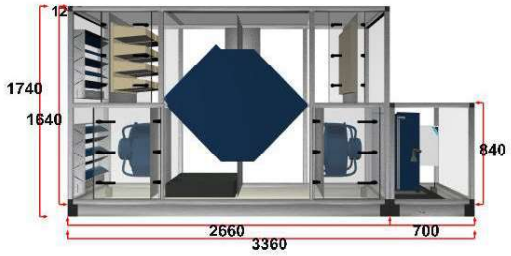
4) Fan Supply



7) Fan Return



Project	**Arhitektonski fakultet Podgorica**
Unit	**SISTEM_2_KK_STUDENTSKI_KLUB**



Unit Data

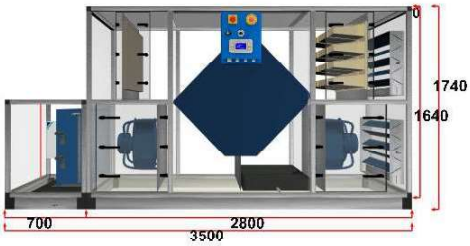
Range / Series	MODULAR_P
Model	840 X 1200
Panel	SP 45
Insulation	Foam
Panel Inner Skin	Aluzinc 0.5 mm
Panel Outer Skin	Precoated 0.7 mm
Profile	Aluminium Anodized Thermal Break

Prices

Unit	28489 €
Options	2120 €
Total (List)	**30609 €**

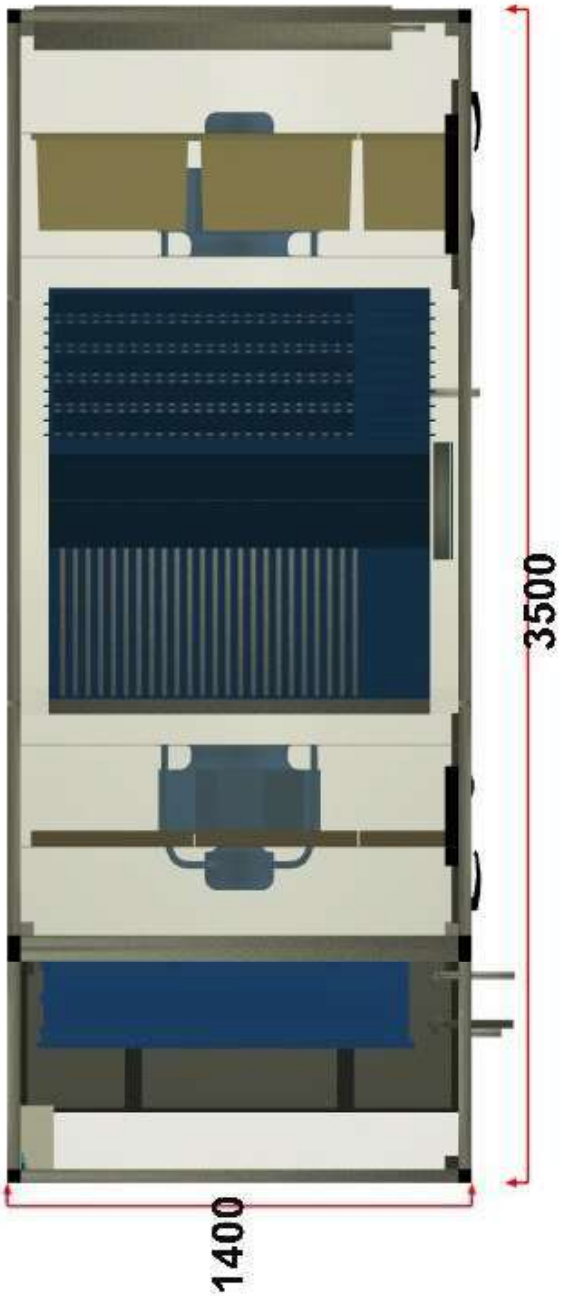
Standard terms and Conditions Validity 30 day Ex Work (ALL AHU's individual sections shall be checked carefully by the customer to assess whether a standard truck/container or a special truck/container might be required. An additional 150 mm dimension shall be added to the AHU's reported dimensions. The same additional 150mm is to be added on the overall height to consider Pallet height for transportation assessment)

Project Arhitektonski fakultet Podgorica
Unit SISTEM_9_KK_AMFITEATAR



Unit Data

Range / Series	D-AHU MODULAR_P
Model	SIZE 5
Panel • Insulation	42 mm • Foam
Model Box Ref.	Energy ThermiC° F2
Panel Inner Skin	Aluzinc 0.5 mm
Panel Outer Skin	Precoated 0.7 mm
Profile	Aluminium Anodized Thermal Break
AHU Base	100 mm Aluminium
Supply Width • Height	1400 mm • 840 mm
Return Width • Height	1400 mm • 840 mm
Length Overall	3500 mm
Weight	899 Kg
Connection Side	Left
Supply Air Flow	6310 m³/h • 1.75 m³/s
External Pressure Drop	200 Pa
Return Air Flow	6310 m³/h • 1.75 m³/s
External Pressure Drop	200 Pa
Electrical Connection	400V/3Ph/50Hz
Air Density	1.2 Kg/m³
Altitude	44 m a.s.l.
Specific fan power efficiency rating:	
SFPv (clean filters)	1512 W/(m³/s)
SFPe (medium filters)	1701 W/(m³/s)
ERP Compliant	ERP 2018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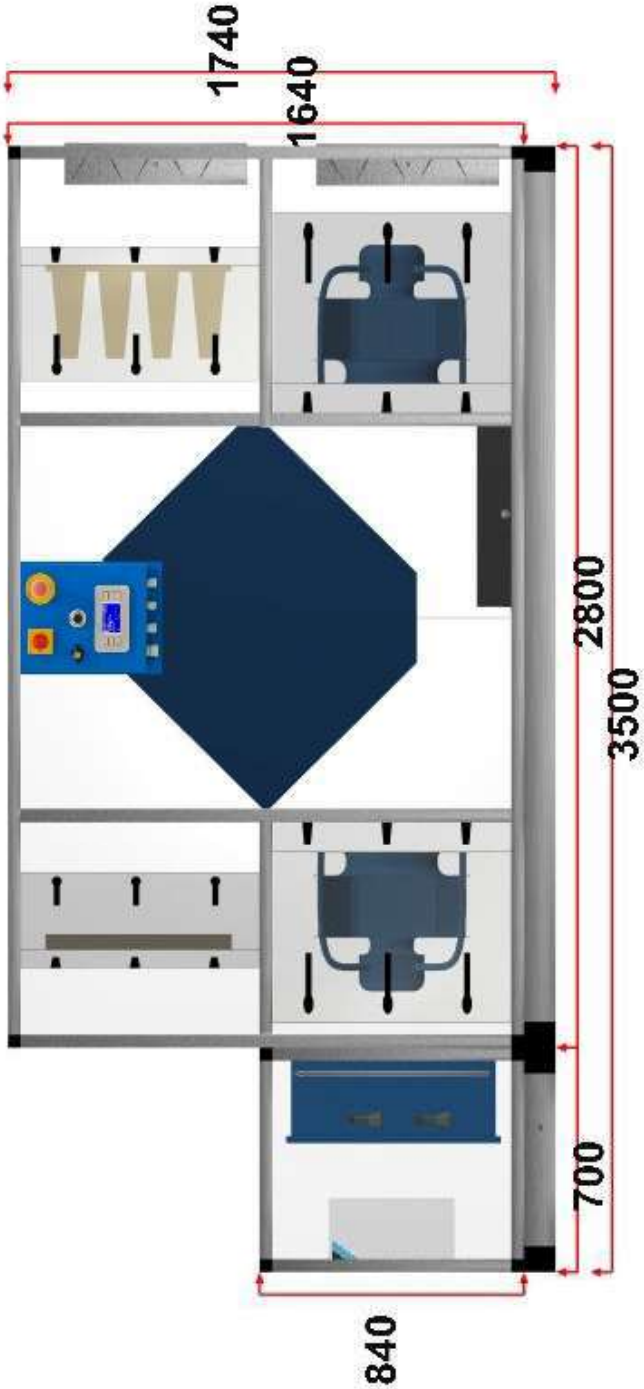
3500


1740
1640
2800
3500
700
840

1) Damper Supply

Pressure Drop	10 Pa
Material	Aluminium
Mounting	Internal • Left
Dimensions (HxW)	580x1080 mm
Torque	4 Nm

2) Filter Supply

Mounting	Slide
Air Velocity	2.34 m/s
Pressure Drop Design	Medium
Filter Class	F7 ePM1 50%
Filter Energy Classification	A
Filter Name	VariCEL VXL-E
Material	Fiber Glass
Dimensions	2x(490x592x290) 1x(287x592x290)
Clean Pressure Drop	58 Pa
Medium Pressure Drop	108 Pa
Dirty Pressure Drop	158 Pa

3) Recuperator Heat Cube Supply

Part Number	PCF-K 55
Material	Aluminium
Side	648 mm
Dry Efficiency (Eurovent)	84.6 %
Energy Class (EN13053)	H1 • 76.99 %
ByPass	Standard ByPass

WINTER

Power	50.7 kW
Efficiency	95.2 %
Supply	
Flow Rate	6310 m³/h
Actual Pressure Drop	155 Pa
Temp. Dry Bulb Outdoor • Supply	-6 °C • 20.7 °C
Relative Humidity Outdoor • Supply	90 % • 14 %
Temp. Wet Bulb Outdoor • Supply	-6.4 °C • 8.7 °C
Return	
Flow Rate	6310 m³/h
Actual Pressure Drop	183 Pa
Temp. Dry Bulb Extract • Exhaust	22 °C • 6.1 °C
Relative Humidity Extract • Exhaust	50 % • 100 %
Temp. Wet Bulb Extract • Exhaust	15.5 °C • 6.1 °C

SUMMER

Power	21.1 kW
Efficiency	72.3 %
Supply	
Flow Rate	6310 m³/h
Actual Pressure Drop	198 Pa
Temp. Dry Bulb Outdoor • Supply	37 °C • 27.6 °C
Relative Humidity Outdoor • Supply	28 % • 48 %
Temp. Wet Bulb Outdoor • Supply	22.5 °C • 19.7 °C
Return	
Flow Rate	6310 m³/h
Actual Pressure Drop	185 Pa
Temp. Dry Bulb Extract • Exhaust	24 °C • 34.3 °C
Relative Humidity Extract • Exhaust	50 % • 28 %
Temp. Wet Bulb Extract • Exhaust	17.1 °C • 20.5 °C

Assumed that the system effect was considered in the design.

4) Fan Supply

Model	K3G400PI9205
Type	EC Centrifugal Fan
Material	Aluminium
Quantity	1x(Single Fan)
External Static Pressure	200 Pa
Internal Static Pressure	339 Pa
Total Static Pressure	539 Pa
Dynamic Pressure	61 Pa
Flow Design	6310 m³/h
Rotation Speed Work • Max	2111 RPM • 2450 RPM
Efficiency (Reg327/2011)	70 %
Efficiency	69 %
Electrical Power Input	1.53 kW
Power Class • PMREF (EN13053)	P1 • 2.1 kW
SFPv Class • SFPv (EN13053)	SFP1 • 764 W/(m³/s)

Motor Data

Efficiency Class	IE4
Power • Nominal Current	2.5 kW • 3.8 A
Electrical Connection	3Ph+N-380-480V

Fan system effect is taken into account in the fan performances

5) Coil Cooling • Heating DX Supply

Geometry

Model	1022A2604110025EO2(6+7)
Geometry • Rows	P22 • 4
Frame	Galvanized
Tube Material • Thickness	Copper • 0.35 mm
Fin Material • Space	Al 0.1 mm • 2.5 mm
Connections (Diam) • Type • Side	16 mm • Braised • Left

Circuit Number	2
Sensible Capacity	30 kW
Total Capacity[B]*	43 kW

Cooling Air Side

Air Flow • Velocity	6310 m³/h • 2.45 m/s
Temp. Dry Bulb In • Out	27.6 °C • 14 °C
Temp. Wet Bulb In • Out	19.7 °C • 12.7 °C
Relative Humidity In • Out	47.7 % • 86 %
Pressure Drop Dry • Wet	51Pa • 66 Pa

Cooling Fluid Side

Fluid	R410A
Evaporating Temperature	6 °C
Fluid Volume	2 x 3.9 dm³
2[D]* x EKEXV200[A]*	Mounted

Heating Air Side

Max Power[C]*(based on maximum condensing unit)	35.4 kW
Temp. Dry Bulb In • Out	20.7 °C • 36.9 °C

* For VRV Xpress Input [A: EKEXV200] , [B: 43 kW] , [C: 35.4 kW] , [D: 2]

Calculated in Wet Condition

6) Filter Return

Mounting	Slide
Air Velocity	2.34 m/s
Pressure Drop Design	Medium
Filter Class	M5 ePM10 55%
Filter Energy Classification	E
Filter Name	Ecopleat Green
Material	Synthetic
Dimensions	2x(490x592x48) 1x(287x592x48)
Clean Pressure Drop	64 Pa
Medium Pressure Drop	114 Pa
Dirty Pressure Drop	164 Pa

7) Fan Return

Model	K3G400PI9205
Type	EC Centrifugal Fan
Material	Aluminium
Quantity	1x(Single Fan)
External Static Pressure	200 Pa
Internal Static Pressure	307 Pa
Total Static Pressure	507 Pa
Dynamic Pressure	61 Pa

Flow Design	6310 m³/h
Rotation Speed Work • Max	2081 RPM • 2450 RPM
Efficiency (Reg327/2011)	70 %
Efficiency	68.4 %
Electrical Power Input	1.46 kW
Power Class • PMREF (EN13053)	P1 • 1.99 kW
SFPv Class • SFPv (EN13053)	SFP1 • 748 W/(m³/s)

Motor Data

Efficiency Class	IE4
Power • Nominal Current	2.5 kW • 3.8 A
Electrical Connection	3Ph+N-380-480V

Fan system effect is taken into account in the fan performances

8) Damper Return

Pressure Drop	10 Pa
Material	Aluminium
Mounting	Internal • Right
Dimensions (HxW)	580x1080 mm
Torque	4 Nm

Section List

Num.	Height (mm)	Width (mm)	Length (mm)	Weight (Kg)	Transportable
1	1740	1400	2800	785	Container or Truck
2	940	1400	700	114	Container or Truck

Options List

Unit Options

Rain Hood Fresh Air
Rain Hood Exhaust Air
Flat Roof
CO2
Remote Interface
Constant Airflow - Ambient

Sound Report

Supply Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	62	80	78	74	73	70	75	67	80
Fan Outlet	64	82	78	78	80	75	78	70	84
Unit Inlet	56	74	72	68	64	58	55	47	70
Unit Outlet	59	76	74	73	74	67	66	58	77
Airborne	55	72	62	60	62	55	58	36	66

Return Sound Power (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	AVG dB (A)
Fan Inlet	61	81	78	73	73	69	75	67	80
Fan Outlet	63	82	78	77	80	75	77	70	84
Unit Inlet	60	80	77	72	70	65	67	59	76
Unit Outlet	63	82	78	77	80	75	77	70	84
Airborne	54	73	62	59	62	55	57	36	66

NRVU - Regulation (EU) No 1253/2014

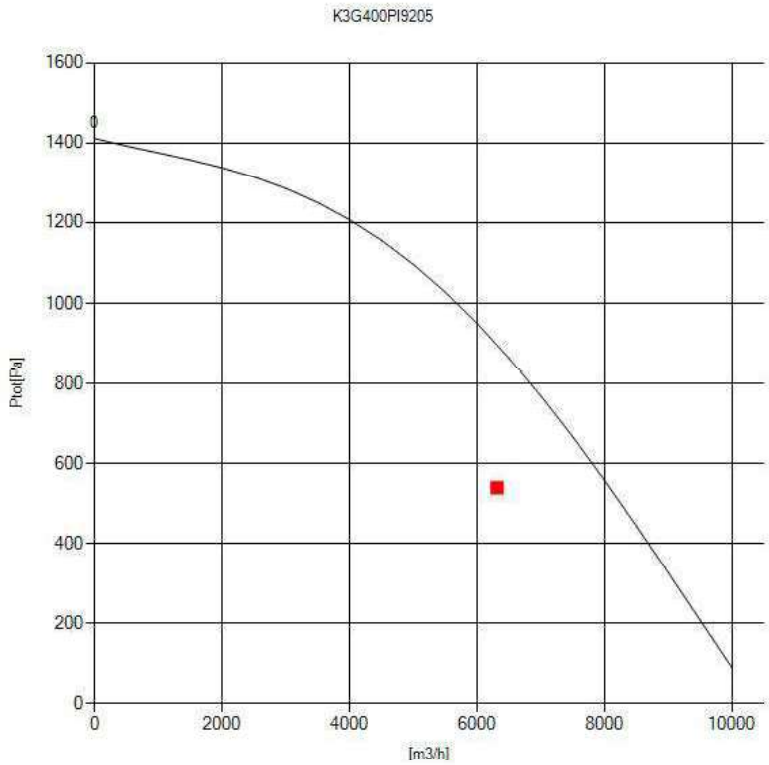
Manufacturer's Name	Daikin Applied Europe S.p.a.
Serial Number	330959
Typology (NRVU, UVU or BVU)*	NRVU BVU
Drive Type	Inverter (included on the electronic fan)
HRS Type	Other
HRS Thermal Efficiency (EN308)	81.9 %
Nominal NRVU Flow Rate	
Supply	1.75 m^3/s
Return	1.75 m^3/s
Effective Electric Power Input	
Supply	3.01 kW
SFP Internal	673 $W/(m^3/s)$
Face Velocity at Flow Rate Design	
Supply	1.7 m/s
Return	1.7 m/s
Nominal Internal Pressure Drop	
Supply	213 Pa
Return	247 Pa
Nominal External Pressure Drop	
Supply	200 Pa
Return	200 Pa
Efficiency (Reg327/2011)	
Supply	70 %
Return	70 %
External Leakage (RU) +400Pa • -400Pa	0.82 % • 0.41 %
Maximum Internal Leakage	1.5 %
Summer Outdoor Conditions	37 °C • 28 %
Winter Outdoor Conditions	-6 °C • 90 %
Filter Energy Classification	A|-
Filter Service Warning**	Displayed on HMI Controller
Sound Power Level (LWA)	Please refer to Selection Software
Pre-/Dis-assembly Instructions	http://www.daikinapplied.eu/en/index/page/download

* In accordance with Commission Regulation (EU) No 1253/2014 of July 2014

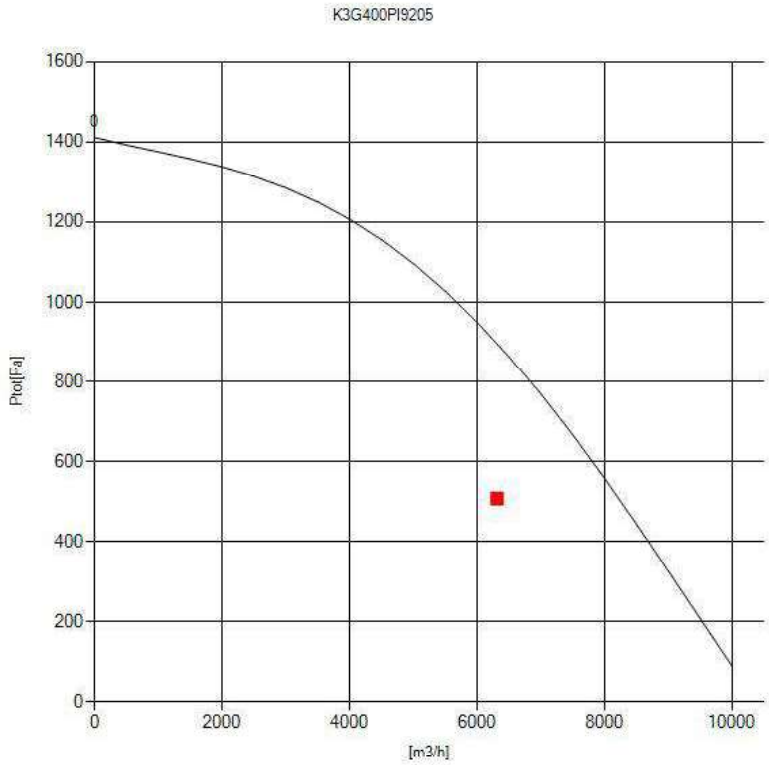
** Clean/replace Filter(s) when maximum pressure drop is reached or when warning is displayed on HMI controller

Fan Curves Diagrams

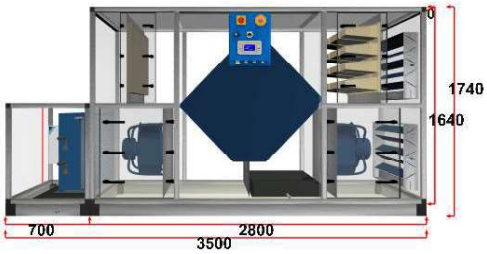
4) Fan Supply



7) Fan Return



Project Arhitektonski fakultet Podgorica
Unit SISTEM_9_KK_AMFITEATAR



Unit Data

Range / Series	MODULAR_P
Model	840 X 1400
Panel	SP 45
Insulation	Foam
Panel Inner Skin	Aluzinc 0.5 mm
Panel Outer Skin	Precoated 0.7 mm
Profile	Aluminium Anodized Thermal Break

Prices

Unit	32713 €
Options	3142 €
Total (List)	**35855 €**

Standard terms and Conditions Validity 30 day Ex Work (ALL AHU's individual sections shall be checked carefully by the customer to assess whether a standard truck/container or a special truck/container might be required. An additional 150 mm dimension shall be added to the AHU's reported dimensions. The same additional 150mm is to be added on the overall height to consider Pallet height for transportation assessment)

5.4 IZBOR REŠETKI ZA VENTILACIJU

AD - Grilles

Project: Untitled project

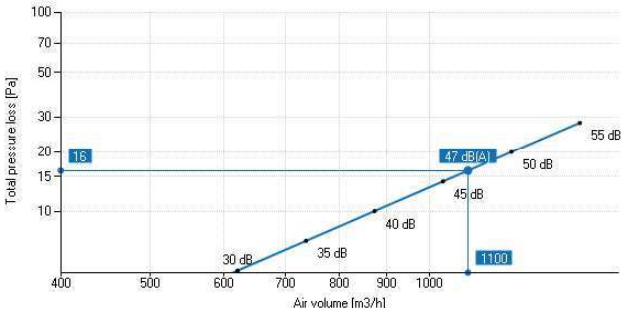
01-07-2019

Requirements:			
Air volume	qv	1100	m3/h
Room attenuation	Dr	4	dB
Length, L		1000	
Height, H		100	
Results:			
Total pressure loss	Δpt	16	Pa
Sound power level	LwA	47	dB(A)
Sound pressure level	LpA	43	dB(A)

AD - Grilles

AD is an adjustable single or double deflection grille made of aluminium. With adjustable blades, the grille is very useful for air supply and can be adapted to the required throw and air spread pattern.
The grille is available with several mounting options and can be delivered with mounting frame, opposed blade damper and plenum box accessories.

Hz	63	125	250	500	1K	2K	4K	8K
Kok [dB]	5	4	1	-2	-9	-16	-15	-8
ΔL [dB]	-	-	-	-	-	-	-	-



Order code

AD-11-HMD-1000-100	
Working setup	None
Function	Extract

We reserve the right to make changes without prior notice

AD - Grilles

Project: Untitled project

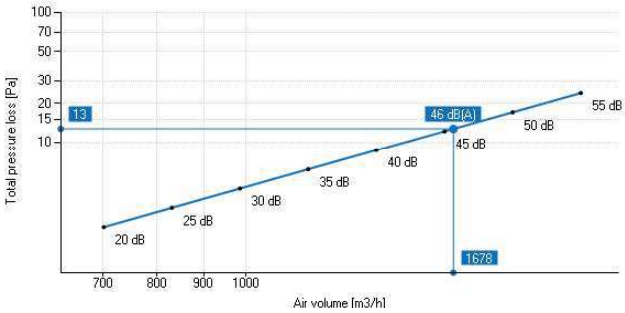
01-07-2019

Requirements:			
Air volume	qv	1678	m3/h
Room attenuation	Dr	4	dB
Length, L		1000	
Height, H		150	
Results:			
Total pressure loss	Δpt	13	Pa
Sound power level	LwA	46	dB(A)
Sound pressure level	LpA	42	dB(A)

AD - Grilles

AD is an adjustable single or double deflection grille made of aluminium. With adjustable blades, the grille is very useful for air supply and can be adapted to the required throw and air spread pattern.
The grille is available with several mounting options and can be delivered with mounting frame, opposed blade damper and plenum box accessories.

Hz	63	125	250	500	1K	2K	4K	8K
Kok [dB]	5	4	1	-2	-9	-16	-15	-8
ΔL [dB]	-	-	-	-	-	-	-	-



Order code

AD-11-HMD-1000-150	
Working setup	None
Function	Extract

We reserve the right to make changes without prior notice

5.5. IZBOR VRV SISTEMA

VRV Selection

Project Report

Report details

Produced on: 7/9/2019

Application version: 2019.7.2.5

Project details

Project name: ARHITEKTONSKI FAKULTET PODGORICA (shared)

Solution name: VRV

Client Name:

Customer reference:

Quotation reference:

Project number: 412178/483543

Selection parameters of the indoor units can be found in the Engineering Data Books
Selection parameters of the outdoor units can be found in the Engineering Data Books
Only the data published in the data book are correct. This program uses close approximations of these data.

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Material list

Model	Quantity	Description
ERQ200AW1	2	ERQ-AW1 (AHU application 3phase)
ERQ250AW1	1	ERQ-AW1 (AHU application 3phase)
REYQ12U	1	REYQ-U (VRV IV)
REYQ14U	3	REYQ-U (VRV IV)
REYQ16U	1	REYQ-U (VRV IV)
REYQ18U	1	REYQ-U (VRV IV)
REYQ20U	1	REYQ-U (VRV IV)
BS1Q10A	9	Branch selector unit
BS1Q16A	6	Branch selector unit
BS1Q25A	7	Branch selector unit
FXFQ50B	1	FXFQ-B - Round flow cassette
FXFQ100B	1	FXFQ-B - Round flow cassette
FXMQ200MB	3	FXMQ-MB - Ducted unit large ESP
FXSQ32A	2	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ50A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ80A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ100A	7	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	6	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ140A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXZQ15A	4	FXZQ-A - Fully flat cassette
FXZQ20A	5	FXZQ-A - Fully flat cassette
FXZQ25A	7	FXZQ-A - Fully flat cassette
FXZQ32A	3	FXZQ-A - Fully flat cassette
FXZQ40A	2	FXZQ-A - Fully flat cassette
KHRQ22M20T	18	Refnet branch piping kit
KHRQ22M29T9	4	Refnet branch piping kit
KHRQ23M20T	1	Refnet branch piping kit
KHRQ23M29T9	1	Refnet branch piping kit
KHRQ23M64T	13	Refnet branch piping kit
AHU 1	1	D-AHU ADT
AHU 2	1	D-AHU ADT
DCM601A51	1	Intelligent Touch Manager
BRC1H519W	12	Remote controller (white)
BRC1H519W7	32	Remote controller (white)
BYCQ140E	2	Standard decoration panel
BYFQ60CW	21	New decoration panel (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	83.4	0.0	0.0	83.4
9.5mm	334.3	0.0	0.0	334.3
12.7mm	106.2	83.4	130.1	319.7
15.9mm	55.5	291.5	2.8	349.8
19.1mm	0.0	16.9	52.1	69.0
22.2mm	0.0	25.9	102.5	128.4
28.6mm	0.0	161.7	28.0	189.7

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Indoor unit details

Table of abbreviations

Abbreviation	Description
Name	Logical name of the device
FCU	Device model name
Tmp C	Indoor conditions in cooling
Rq TC	Required total cooling capacity
Rv TC	Revised total cooling capacity (asked from outdoor)
Max TC	Available total cooling capacity
Rq SC	Required sensible cooling capacity
Tevap	Evaporating temperature of indoor unit coil
Tdis C	Indoor unit discharge air temperature in cooling
Max SC	Available sensible cooling capacity
Tmp H	Indoor temperature in heating
Rq HC	Required heating capacity
Max HC	Available heating capacity
Tdis H	Indoor unit discharge air temperature in heating
Sound	Sound pressure level low and high
PS	Power supply (voltage and phases)
MCA	Minimum Circuit Amps
MOP	Maximum Overcurrent Protection
FLA	Fan Motor Input
RLA	Nominal Running Amps
WxHxD	WidthxHeightxDepth
Weight	Weight of the device
Min coil	Minimum coil volume
Max coil	Maximum coil volume
Air Flow Rate	Air Flow Rate

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SISTEM 1 - SUTEREN - REYQ14U

Capacity data at conditions and connection ratio (114) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S1-1	FXSQ125A	24.0/50%	10.9	12.3	n/a	6.0	9.1	20.0	9.8	16.0	600.00
S1-2	FXSQ125A	24.0/50%	11.1	12.3	n/a	6.0	9.1	20.0	8.1	16.0	600.00
S1-3	FXSQ100A	26.0/50%	9.9	11.0	n/a	6.0	7.9	20.0	8.2	12.5	533.33
S1-4	FXSQ50A	24.0/50%	4.2	4.9	n/a	6.0	3.7	20.0	4.5	6.3	253.33
			36.1						30.6		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S1-1	013 Visenamjena sala	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0
S1-2	012 Modelarnica	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0
S1-3	001 Hol	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S1-4	001 Stampa, kopirnica	29 - 35	220V 1ph	1.1	Factory Std	700 x 245 x 800	29.0

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 36.1kW for cooling and 30.6kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 35.8kW (=99%) and for heating of 30.5kW (=100%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 13.0m above the indoor units.

SISTEM 3 - PRIZEMLJE - REYQ12U

Capacity data at conditions and connection ratio (96) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S3.1	FXSQ100A	24.0/50%	9.1	9.8	n/a	6.0	7.4	20.0	5.8	12.5	533.33
S3.2	FXSQ125A	24.0/50%	10.2	12.3	n/a	6.0	9.1	20.0	7.0	16.0	600.00
S3.3	FXSQ32A	24.0/50%	2.7	3.2	n/a	6.0	2.4	20.0	2.1	4.0	158.33
S3.4	FXSQ32A	24.0/50%	2.9	3.2	n/a	6.0	2.4	20.0	2.6	4.0	158.33
			24.9						17.5		

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Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S3.1	115 Vjezbaonica 2	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S3.2	114 Vjezbaonica 1	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0
S3.3	113 Studentska sluzba 2	26 - 31	220V 1ph	0.8	Factory Std	550 x 245 x 800	24.0
S3.4	112 Studentska sluzba 1	26 - 31	220V 1ph	0.8	Factory Std	550 x 245 x 800	24.0

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 24.9kW for cooling and 17.5kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 24.2kW (=97%) and for heating of 17.3kW (=99%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 9.0m above the indoor units.

SISTEM 4 - PRIZEMLJE - REYQ20U

Capacity data at conditions and connection ratio (105) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S4.1	FXMQ200MB	26.0/50%	20.6	22.0	n/a	6.0	15.9	20.0	23.5	25.0	966.67
S4.2	FXSQ100A	24.0/50%	9.1	9.8	n/a	6.0	7.4	20.0	5.7	12.5	533.33
S4.3	FXSQ125A	24.0/50%	9.9	12.3	n/a	6.0	9.1	20.0	7.0	16.0	600.00
S4.4	FXSQ100A	24.0/50%	8.6	9.8	n/a	6.0	7.4	20.0	9.0	12.5	533.33
			48.2						45.2		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S4.1	107 Centralni hol	45 - 48	220V 1ph	10.3	Factory Std	1,380 x 470 x 1,100	132.0
S4.2	116 Vjezbaonica 3	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S4.3	117 Vjezbaonica 4	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S4.4	111 Biblioteka	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 48.2kW for cooling and 45.2kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 46.0kW (=95%) and for heating of 43.5kW (=96%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 9.0m above the indoor units.

SISTEM 5 - I SPRAT - REYQ14U

Capacity data at conditions and connection ratio (116) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S5.1	FXSQ100A	24.0/50%	8.9	9.8	n/a	6.0	7.4	20.0	5.5	12.5	533.33
S5.2	FXSQ100A	24.0/50%	9.1	9.8	n/a	6.0	7.4	20.0	5.8	12.5	533.33
S5.3	FXSQ125A	24.0/50%	10.2	12.3	n/a	6.0	9.1	20.0	7.0	16.0	600.00
S5.4	FXSQ80A	24.0/50%	6.6	7.8	n/a	6.0	5.8	20.0	4.8	10.0	383.33
			34.8						23.1		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S5.1	208 Vjezbaonica	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S5.2	207 Vjezbaonica	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S5.3	206 Vjezbaonica	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0
S5.4	202 Diplomska sala	29 - 35	220V 1ph	1.9	Factory Std	1,000 x 245 x 800	36.5

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 34.8kW for cooling and 23.1kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 34.0kW (=98%) and for heating of 22.8kW (=99%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 5.0m above the indoor units.

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SISTEM 6 - I SPRAT - REYQ18U

Capacity data at conditions and connection ratio (114) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S6.1	FXMQ200MB	26.0/50%	15.8	22.0	n/a	6.0	15.9	20.0	17.7	25.0	966.67
S6.2	FXSQ100A	24.0/50%	9.1	9.8	n/a	6.0	7.4	20.0	5.7	12.5	533.33
S6.3	FXSQ125A	24.0/50%	9.9	12.3	n/a	6.0	9.1	20.0	7.0	16.0	600.00
S6.4	FXZQ15A	24.0/50%	1.5	1.5	n/a	6.0	1.3	20.0	1.2	1.9	141.67
S6.5	FXZQ25A	24.0/50%	2.1	2.5	n/a	6.0	1.8	20.0	1.7	3.2	150.00
S6.6	FXZQ25A	24.0/50%	2.4	2.5	n/a	6.0	1.8	20.0	2.3	3.2	150.00
S6.7	FXZQ25A	24.0/50%	2.0	2.5	n/a	6.0	1.8	20.0	1.7	3.2	150.00
			42.8						37.3		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S6.1	201 Hol	45 - 48	220V 1ph	10.3	Factory Std	1,380 x 470 x 1,100	132.0
S6.2	209 Vjezbaonica	31 - 36	220V 1ph	2.4	Factory Std	1,400 x 245 x 800	46.0
S6.3	210 Vjezbaonica	33 - 39	220V 1ph	2.6	Factory Std	1,400 x 245 x 800	47.0
S6.4	214 Racunovodstvo	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S6.5	215 Prodekan 1	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S6.6	216 Prodekan 2	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S6.7	217 Pravna sluzba	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 42.8kW for cooling and 37.3kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 41.9kW (=98%) and for heating of 37.0kW (=99%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 5.0m above the indoor units.

SISTEM 7 - II SPRAT - REYQ16U

Capacity data at conditions and connection ratio (123) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S7.1	FXFQ50B	24.0/50%	4.6	4.9	n/a	6.0	3.7	20.0	3.4	6.3	250.00
S7.2	FXFQ100B	24.0/50%	8.0	9.8	n/a	6.0	7.1	20.0	3.9	12.5	441.67
S7.3	FXMQ200MB	26.0/50%	16.4	22.0	n/a	6.0	15.9	20.0	18.5	25.0	966.67
S7.4	FXSQ140A	24.0/50%	12.8	14.0	n/a	6.0	10.4	20.0	6.0	18.0	650.00
			41.8						31.8		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S7.1	307 Kabinet dekana	28 - 33	220V 1ph	0.4	Factory Std	840 x 204 x 840	21.0
S7.2	306 Sala nastavnog osoblja	33 - 41	220V 1ph	0.8	Factory Std	840 x 246 x 840	24.0
S7.3	301 Hol	45 - 48	220V 1ph	10.3	Factory Std	1,380 x 470 x 1,100	132.0
S7.4	302 Diplomska sala	34 - 42	220V 1ph	3.1	Factory Std	1,550 x 245 x 800	51.0

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 41.8kW for cooling and 31.8kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 40.6kW (=97%) and for heating of 31.7kW (=100%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 1.0m above the indoor units.

SISTEM 8 - II SPRAT - REYQ14U

Capacity data at conditions and connection ratio (120) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S8.1	FXZQ20A	24.0/50%	1.7	2.0	n/a	6.0	1.5	20.0	1.4	2.5	145.00
S8.2	FXZQ20A	24.0/50%	1.6	2.0	n/a	6.0	1.5	20.0	1.3	2.5	145.00
S8.3	FXZQ20A	24.0/50%	1.6	2.0	n/a	6.0	1.5	20.0	1.4	2.5	145.00
S8.4	FXZQ20A	24.0/50%	1.6	2.0	n/a	6.0	1.5	20.0	1.4	2.5	145.00
S8.5	FXZQ20A	24.0/50%	1.7	2.0	n/a	6.0	1.5	20.0	1.3	2.5	145.00
S8.6	FXZQ25A	24.0/50%	2.4	2.5	n/a	6.0	1.8	20.0	2.3	3.2	150.00
S8.7	FXZQ40A	24.0/50%	3.3	3.9	n/a	6.0	2.9	20.0	1.7	5.0	191.67
S8.8	FXZQ15A	24.0/50%	1.5	1.5	n/a	6.0	1.3	20.0	1.2	1.9	141.67
S8.9	FXZQ40A	24.0/50%	3.2	3.9	n/a	6.0	2.9	20.0	1.7	5.0	191.67
S8.10	FXZQ32A	26.0/50%	2.8	3.5	n/a	6.0	2.3	20.0	2.7	4.0	166.67

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Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
S8.11	FXZQ32A	26.0/50%	2.8	3.5	n/a	6.0	2.3	20.0	2.7	4.0	166.67
S8.12	FXZQ25A	24.0/50%	2.3	2.5	n/a	6.0	1.8	20.0	1.5	3.2	150.00
S8.13	FXZQ25A	24.0/50%	2.3	2.5	n/a	6.0	1.8	20.0	1.5	3.2	150.00
S8.14	FXZQ25A	24.0/50%	2.2	2.5	n/a	6.0	1.8	20.0	1.4	3.2	150.00
S8.15	FXZQ32A	24.0/50%	2.7	3.2	n/a	6.0	2.2	20.0	2.6	4.0	166.67
S8.16	FXZQ15A	24.0/50%	1.3	1.5	n/a	6.0	1.3	20.0	1.1	1.9	141.67
S8.17	FXZQ15A	24.0/50%	1.5	1.5	n/a	6.0	1.3	20.0	1.3	1.9	141.67
			36.5						28.5		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
S8.1	324 Sekretarica	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.2	323 Kabinet 11	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.3	322 Kabinet 10	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.4	321 Kabinet 9	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.5	320 Kabinet 8	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.6	319 Kabinet 7	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.7	325 Trpezarija	28 - 37	230V 1ph	0.4	Factory Std	575 x 260 x 575	16.5
S8.8	326 Arhiv studentski radova	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.9	327 Radna sala	28 - 37	230V 1ph	0.4	Factory Std	575 x 260 x 575	16.5
S8.10	309.1 Hodnik	26 - 34	230V 1ph	0.4	Factory Std	575 x 260 x 575	16.5
S8.11	309.2 Hodnik	26 - 34	230V 1ph	0.4	Factory Std	575 x 260 x 575	16.5
S8.12	313 Kabinet 1	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.13	314 Kabinet 2	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.14	315 Kabinet 3	26 - 33	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.15	316 Kabinet 4	26 - 34	230V 1ph	0.4	Factory Std	575 x 260 x 575	16.5
S8.16	317 Kabinet 5	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5
S8.17	318 Kabinet 6	26 - 32	230V 1ph	0.3	Factory Std	575 x 260 x 575	15.5

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Remarks

Reduced operational load

The sum of the required indoor unit capacities is 36.5kW for cooling and 28.5kW for heating. However, the outdoor unit selection uses reduced load values for cooling of 34.3kW (=94%) and for heating of 27.9kW (=98%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed 1.0m above the indoor units.

SISTEM 2 KK KLUB - ERQ250AW1

Capacity data at conditions and connection ratio (96) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
AHU 1 box 1		n/a	26.9	30.8	n/a	6.0	n/a	n/a	28.0	34.7	n/a
			26.9						28.0		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
AHU 1 box 1		-	230V 1ph			215 x 401 x 78	2.9

Remarks

Reduced operational load

The sum of the required indoor unit capacities is 28.0kW for heating. However, the outdoor unit selection uses reduced load values for heating of 25.0kW (=89%). Be aware that unrealistic reductions may lead to reduced comfort levels, different noise levels or increased wear and tear.

Outdoor vs. indoor position

Outdoor unit placed at the same level as the indoor units.

SISTEM 9-1 KK AMFITEATAR - ERQ200AW1

Capacity data at conditions and connection ratio (94) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
AHU 2 box 1		n/a	21.2	24.6	n/a	6.0	n/a	n/a	20.0	27.7	n/a
			21.2						20.0		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
AHU 2 box 1		-	230V 1ph			215 x 401 x 78	2.9

Remarks

Outdoor vs. indoor position

Outdoor unit placed at the same level as the indoor units.

SISTEM 9-2 KK AMFITEATAR - ERQ200AW1

Capacity data at conditions and connection ratio (94) as entered

Name	FCU	Cooling						Heating			
		Tmp C	Rq TC	Max TC	Rq SC	Tevap	Max SC	Tmp H	Rq HC	Max HC	Air Flow Rate
		°C (DBT/RH)	kW	kW	kW	°C	kW	°C	kW	kW	l/s
AHU 2 box 2		n/a	21.2	24.6	n/a	6.0	n/a	n/a	20.0	27.7	n/a
			21.2						20.0		

Name	Room	Sound	PS	MCA	MOP	WxHxD	Weight
		dBA		A		mm	kg
AHU 2 box 2		-	230V 1ph			215 x 401 x 78	2.9

Remarks

Outdoor vs. indoor position

Outdoor unit placed at the same level as the indoor units.

Outdoor unit details

Table of abbreviations

Abbreviation	Description
Name	Logical name of the device
Model	Device model name
CR	Connection ratio
Tmp C	Outdoor conditions in cooling
WFR per module	Water flow per outdoor unit module
CC	Available cooling capacity
Rq CC	Required cooling capacity
PIC	Power input in cooling mode
InC	Water inlet temperature in cooling mode
OutC	Water outlet temperature in cooling mode
Tmp H	Outdoor conditions in heating (dry bulb temp. / RH)
HC	Available heating capacity (integrated heating capacity)
Rq HC	Required heating capacity
PIH	Power input in heating mode
InH	Water inlet temperature in heating mode
OutH	Water outlet temperature in heating mode
Piping	Largest distance from indoor unit to outdoor unit
Bse Refr	Standard factory refrigerant charge (16.4ft actual piping length) excluding extra refrigerant charge. For calculation of extra refrigerant charge refer to the databook
Ex Refr	Extra refrigerant charge
PS	Power supply (voltage and phases)
MCA	Minimum Circuit Amps
MOP	Maximum Overcurrent Protection
FLA	Fan Motor Input
RLA	Nominal Running Amps
WxHxD	WidthxHeightxDepth
Weight	Weight of the device
EER	EER value at nominal condition
IEER	IEER value at nominal condition
COP47	COP value at nominal condition and at ambient temperature of 8°C
COP17	COP value at nominal condition and at ambient temperature of -8°C

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Outdoor details

Name	Model	CR	Cooling			Heating			Piping
			Tmp C	CC	Rq CC	Tmp H	HC	Rq HC	
		%	°C	kW	kW	°C (DBT/RH)	kW	kW	m
SISTEM 1 - SUTEREN	REYQ14U	114.3	37.0	37.9	36.1	-6.0/86%	31.3	30.6	51.0
SISTEM 3 - PRIZEMLJE	REYQ12U	95.8	37.0	25.7	24.9	-6.0/86%	25.3	17.5	53.5
SISTEM 4 - PRIZEMLJE	REYQ20U	105.0	37.0	46.9	48.2	-6.0/86%	43.7	45.2	54.5
SISTEM 5 - I SPRAT	REYQ14U	115.7	37.0	37.4	34.8	-6.0/86%	31.3	23.1	48.5
SISTEM 6 - I SPRAT	REYQ18U	114.4	37.0	43.9	42.8	-6.0/86%	39.1	37.3	60.5
SISTEM 7 - II SPRAT	REYQ16U	122.5	37.0	43.0	41.8	-6.0/86%	35.0	31.8	50.4
SISTEM 8 - II SPRAT	REYQ14U	119.6	37.0	37.5	36.5	-6.0/86%	30.9	28.5	66.4
SISTEM 2 KK KLUB	ERQ250AW1	96.1	37.0	27.7	26.9	-6.0/86%	25.2	28.0	7.5
SISTEM 9-1 KK AMFITEATAR	ERQ200AW1	94.4	37.0	22.1	21.2	-6.0/86%	21.1	20.0	7.5
SISTEM 9-2 KK AMFITEATAR	ERQ200AW1	94.4	37.0	22.1	21.2	-6.0/86%	21.1	20.0	7.5

Name	Model	PS	MCA	MOP	RLA	FLA	WxHxD	Weight
			A	A	A	A	mm	kg
SISTEM 1 - SUTEREN	REYQ14U	400V 3Nph	27.0	32.0	15.6	1.8	1,240 x 1,685 x 765	314.0
BS 1	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
BS 2	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
BS 3	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
BS 4	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
SISTEM 3 - PRIZEMLJE	REYQ12U	400V 3Nph	24.0	32.0	13.8	1.5	930 x 1,685 x 765	230.0
BS 5	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 6	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
SISTEM 4 - PRIZEMLJE	REYQ20U	400V 3Nph	39.0	50.0	28.5	2.6	1,240 x 1,685 x 765	317.0
BS 7	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 8	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 9	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
SISTEM 5 - I SPRAT	REYQ14U	400V 3Nph	27.0	32.0	15.6	1.8	1,240 x 1,685 x 765	314.0
BS 10	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
BS 11	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 12	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
SISTEM 6 - I SPRAT	REYQ18U	400V 3Nph	35.0	40.0	22.0	2.6	1,240 x 1,685 x 765	317.0
BS 13	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 14	BS1Q25A	230V 1ph					388 x 207 x 326	15.0

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Name	Model	PS	MCA	MOP	RLA	FLA	WxHxD	Weight
			A	A	A	A	mm	kg
BS 15	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
SISTEM 7 - II SPRAT	REYQ16U	400V 3Nph	31.0	40.0	18.5	2.6	1,240 x 1,685 x 765	314.0
BS 16	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
BS 17	BS1Q10A	230V 1ph					388 x 207 x 326	12.0
BS 18	BS1Q25A	230V 1ph					388 x 207 x 326	15.0
BS 19	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
SISTEM 8 - II SPRAT	REYQ14U	400V 3Nph	27.0	32.0	15.6	1.8	1,240 x 1,685 x 765	314.0
BS 20	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
BS 21	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
BS 22	BS1Q16A	230V 1ph					388 x 207 x 326	12.0
SISTEM 2 KK KLUB	ERQ250AW1	400V 3Nph	21.6	25.0			930 x 1,680 x 765	240.0
SISTEM 9-1 KK AMFITEATAR	ERQ200AW1	400V 3Nph	18.5	25.0			930 x 1,680 x 765	187.0
SISTEM 9-2 KK AMFITEATAR	ERQ200AW1	400V 3Nph	18.5	25.0			930 x 1,680 x 765	187.0

LOT21 - information

Name	Model	$\eta_{s,h}$ heating	$\eta_{s,c}$ cooling	SCOP	SEER
		%	%		
SISTEM 1 - SUTEREN	REYQ14U	255.8	168.3	4.30	6.50
SISTEM 3 - PRIZEMLJE	REYQ12U	257.0	183.8	4.70	6.50
SISTEM 4 - PRIZEMLJE	REYQ20U	246.7	162.7	4.10	6.20
SISTEM 5 - I SPRAT	REYQ14U	255.8	168.3	4.30	6.50
SISTEM 6 - I SPRAT	REYQ18U	250.6	172.5	4.40	6.30
SISTEM 7 - II SPRAT	REYQ16U	243.1	167.5	4.30	6.20
SISTEM 8 - II SPRAT	REYQ14U	255.8	168.3	4.30	6.50
SISTEM 2 KK KLUB	ERQ250AW1				
SISTEM 9-1 KK AMFITEATAR	ERQ200AW1				
SISTEM 9-2 KK AMFITEATAR	ERQ200AW1				

For more information go to: https://energylabel.daikin.eu/.

Refrigerant information

Name	Model	Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
SISTEM 1 - SUTEREN	REYQ14U	R410A	2087.5	11.8	7.7	40.8
SISTEM 3 - PRIZEMLJE	REYQ12U	R410A	2087.5	9.9	5.4	31.9
SISTEM 4 - PRIZEMLJE	REYQ20U	R410A	2087.5	11.8	14.0	53.9

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SISTEM 5 - I SPRAT	REYQ14U	R410A	2087.5	11.8	7.8	**41**
SISTEM 6 - I SPRAT	REYQ18U	R410A	2087.5	11.8	14.4	**54.7**
SISTEM 7 - II SPRAT	REYQ16U	R410A	2087.5	11.8	6.9	**39.1**
SISTEM 8 - II SPRAT	REYQ14U	R410A	2087.5	11.8	10.0	**45.6**
SISTEM 2 KK KLUB	ERQ250AW1	R410A	2087.5	8.4	unknown	**17.5**
SISTEM 9-1 KK AMFITEATAR	ERQ200AW1	R410A	2087.5	7.7	unknown	**16.1**
SISTEM 9-2 KK AMFITEATAR	ERQ200AW1	R410A	2087.5	7.7	unknown	**16.1**

The system(s) contain fluorinated greenhouse gases.

When extra refrigerant charge requirements are not calculated, TCO2 equivalent is calculated only considering the base refrigerant charge. Depending on the field pipe length extra refrigerant needs to be added which will increase the TCO2 equivalent.

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

SISTEM 1 - SUTEREN - REYQ14U

Model	Quantity	Description
REYQ14U	1	REYQ-U (VRV IV)
BS1Q10A	2	Branch selector unit
BS1Q16A	2	Branch selector unit
FXSQ50A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ100A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	2	FXSQ-A - Concealed ceiling unit with medium ESP
KHRQ23M20T	1	Refnet branch piping kit
KHRQ23M29T9	1	Refnet branch piping kit
KHRQ23M64T	1	Refnet branch piping kit
BRC1H519W	4	Remote controller (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	2.0	0.0	0.0	2.0
9.5mm	42.5	0.0	0.0	42.5
12.7mm	24.0	2.0	31.0	57.0
15.9mm	0.0	37.0	1.0	38.0
19.1mm	0.0	1.0	4.5	5.5
22.2mm	0.0	4.5	24.0	28.5
28.6mm	0.0	24.0	0.0	24.0

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	7.7*)	40.8

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 1.3 (B) + 0.3 (C) + 1.04 × [24.0 m (ø12.7 mm) × 0.12 + 42.5 m (ø9.5 mm) × 0.059 + 2.0 m (ø6.4 mm) × 0.022] = 7.7kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	15.9mm (liquid) x 28.6mm (gas) x 22.2mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum Connection Index	Diameters
Main pipe size up	15.9mmx28.6mmx22.2mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

SISTEM 3 - PRIZEMLJE - REYQ12U

Model	Quantity	Description
REYQ12U	1	REYQ-U (VRV IV)
BS1Q10A	1	Branch selector unit
BS1Q25A	1	Branch selector unit
FXSQ32A	2	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ100A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	1	FXSQ-A - Concealed ceiling unit with medium ESP
KHRQ22M20T	1	Refnet branch piping kit
KHRQ22M29T9	1	Refnet branch piping kit
KHRQ23M64T	1	Refnet branch piping kit
BRC1H519W	4	Remote controller (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	10.0	0.0	0.0	10.0
9.5mm	38.0	0.0	0.0	38.0
12.7mm	20.5	10.0	16.0	46.5
15.9mm	0.0	34.5	0.0	34.5
19.1mm	0.0	0.0	23.0	23.0
22.2mm	0.0	3.5	0.0	3.5
28.6mm	0.0	20.5	0.0	20.5

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	9.9	5.4*)	31.9

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.25 (C) + 1.04 × [20.5 m (ø12.7 mm) × 0.12 + 38.0 m (ø9.5 mm) × 0.059 + 10.0 m (ø6.4 mm) × 0.022] = 5.4kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	15.9mm (liquid) x 28.6mm (gas) x 19.1mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	15.9mmx28.6mmx19.1mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

SISTEM 4 - PRIZEMLJE - REYQ20U

Model	Quantity	Description
REYQ20U	1	REYQ-U (VRV IV)
BS1Q10A	1	Branch selector unit
BS1Q25A	2	Branch selector unit
FXMQ200MB	1	FXMQ-MB - Ducted unit large ESP
FXSQ100A	2	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	1	FXSQ-A - Concealed ceiling unit with medium ESP
KHRQ22M29T9	1	Refnet branch piping kit
KHRQ23M64T	2	Refnet branch piping kit
BRC1H519W	4	Remote controller (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
9.5mm	47.5	0.0	0.0	47.5
12.7mm	1.0	0.0	12.0	13.0
15.9mm	28.0	37.5	0.0	65.5
19.1mm	0.0	3.0	6.5	9.5
22.2mm	0.0	7.0	0.0	7.0
28.6mm	0.0	29.0	28.0	57.0

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	14.0*)	53.9

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 4.8 (B) + 0.45 (C) + 1.04 × [28.0 m (ø15.9 mm) × 0.18 + 1.0 m (ø12.7 mm) × 0.12 + 47.5 m (ø9.5 mm) × 0.059] = 14.0kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	19.1mm (liquid) x 28.6mm (gas) x 28.6mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	19.1mmx28.6mmx28.6mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

SISTEM 5 - I SPRAT - REYQ14U

Model	Quantity	Description
REYQ14U	1	REYQ-U (VRV IV)
BS1Q10A	2	Branch selector unit
BS1Q25A	1	Branch selector unit
FXSQ80A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ100A	2	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	1	FXSQ-A - Concealed ceiling unit with medium ESP
KHRQ22M29T9	1	Refnet branch piping kit
KHRQ23M64T	2	Refnet branch piping kit
BRC1H519W7	4	Remote controller (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
9.5mm	55.0	0.0	0.0	55.0
12.7mm	19.0	0.0	22.5	41.5
15.9mm	0.0	51.5	0.0	51.5
19.1mm	0.0	0.0	4.0	4.0
22.2mm	0.0	3.5	17.5	21.0
28.6mm	0.0	19.0	0.0	19.0

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	7.8*)	41

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 1.3 (B) + 0.3 (C) + 1.04 × [19.0 m (ø12.7 mm) × 0.12 + 55.0 m (ø9.5 mm) × 0.059] = 7.8kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	15.9mm (liquid) x 28.6mm (gas) x 22.2mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	15.9mmx28.6mmx22.2mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

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SISTEM 6 - I SPRAT - REYQ18U

Model	Quantity	Description
REYQ18U	1	REYQ-U (VRV IV)
BS1Q10A	1	Branch selector unit
BS1Q25A	2	Branch selector unit
FXMQ200MB	1	FXMQ-MB - Ducted unit large ESP
FXSQ100A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXSQ125A	1	FXSQ-A - Concealed ceiling unit with medium ESP
FXZQ15A	1	FXZQ-A - Fully flat cassette
FXZQ25A	3	FXZQ-A - Fully flat cassette
KHRQ22M20T	3	Refnet branch piping kit
KHRQ22M29T9	1	Refnet branch piping kit
KHRQ23M64T	2	Refnet branch piping kit
BRC1H519W7	7	Remote controller (white)
BYFQ60CW	4	New decoration panel (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	16.0	0.0	0.0	16.0
9.5mm	50.5	0.0	0.0	50.5
12.7mm	1.0	16.0	10.0	27.0
15.9mm	27.5	40.0	0.0	67.5
19.1mm	0.0	4.5	5.5	10.0
22.2mm	0.0	6.0	27.5	33.5
28.6mm	0.0	28.5	0.0	28.5

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	14.4*)	54.7

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 4.7 (B) + 0.45 (C) + 1.04 × [27.5 m (ø15.9 mm) × 0.18 + 1.0 m (ø12.7 mm) × 0.12 + 50.5 m (ø9.5 mm) × 0.059 + 16.0 m (ø6.4 mm) × 0.022] = 14.4kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	19.1mm (liquid) x 28.6mm (gas) x 22.2mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	19.1mmx28.6mmx22.2mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

SISTEM 7 - II SPRAT - REYQ16U

Model	Quantity	Description
REYQ16U	1	REYQ-U (VRV IV)
BS1Q10A	2	Branch selector unit
BS1Q16A	1	Branch selector unit
BS1Q25A	1	Branch selector unit
FXFQ50B	1	FXFQ-B - Round flow cassette
FXFQ100B	1	FXFQ-B - Round flow cassette
FXMQ200MB	1	FXMQ-MB - Ducted unit large ESP
FXSQ140A	1	FXSQ-A - Concealed ceiling unit with medium ESP
KHRQ23M64T	3	Refnet branch piping kit
BRC1H519W7	4	Remote controller (white)
BYCQ140E	2	Standard decoration panel

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	2.9	0.0	0.0	2.9
9.5mm	40.3	0.0	0.0	40.3
12.7mm	16.6	2.9	23.9	43.4
15.9mm	0.0	34.3	0.0	34.3
19.1mm	0.0	4.6	4.0	8.6
22.2mm	0.0	1.4	14.0	15.4
28.6mm	0.0	16.6	0.0	16.6

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	6.9*)	39.1

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 1.4 (B) + 0.4 (C) + 1.04 × [16.6 m (ø12.7 mm) × 0.12 + 40.3 m (ø9.5 mm) × 0.059 + 2.9 m (ø6.4 mm) × 0.022] = 6.9kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	15.9mm (liquid) x 28.6mm (gas) x 22.2mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	15.9mmx28.6mmx22.2mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

SISTEM 8 - II SPRAT - REYQ14U

Model	Quantity	Description
REYQ14U	1	REYQ-U (VRV IV)
BS1Q16A	3	Branch selector unit
FXZQ15A	3	FXZQ-A - Fully flat cassette
FXZQ20A	5	FXZQ-A - Fully flat cassette
FXZQ25A	4	FXZQ-A - Fully flat cassette
FXZQ32A	3	FXZQ-A - Fully flat cassette
FXZQ40A	2	FXZQ-A - Fully flat cassette
KHRQ22M20T	14	Refnet branch piping kit
KHRQ23M64T	2	Refnet branch piping kit
BRC1H519W7	17	Remote controller (white)
BYFQ60CW	17	New decoration panel (white)

Piping	Liquid	Suction	Discharge	Total
	m	m	m	m
6.4mm	52.5	0.0	0.0	52.5
9.5mm	60.5	0.0	0.0	60.5
12.7mm	24.1	52.5	14.7	91.3
15.9mm	0.0	56.7	1.8	58.5
19.1mm	0.0	3.8	4.6	8.4
22.2mm	0.0	0.0	19.5	19.5
28.6mm	0.0	24.1	0.0	24.1

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	11.8	10.0*)	45.6

The system(s) contain fluorinated greenhouse gases.

*) Extra refrigerant charge = 0.5 (A) + 1.3 (B) + 0.3 (C) + 1.04 × [24.1 m (ø12.7 mm) × 0.12 + 60.5 m (ø9.5 mm) × 0.059 + 52.5 m (ø6.4 mm) × 0.022] = 10.0kg

The extra charge is calculated based on the pipe lengths specified. This may differ from the actual pipe lengths on site and therefore also from the real extra charge and the real TCO2 equivalent.

Piping limitations

Description	Value
Maximum total length	1,000.0m
Maximum longest actual length	165.0m
Maximum longest equivalent length	190.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	90.0m
Maximum length of indoor units to nearest branch	40.0m

The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	90.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	90.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	90.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	90.0m
Maximum height difference between indoor units	30.0m
Connection ratio range	50.0% - 130.0%
Refrigerant pipe diameters	15.9mm (liquid) x 28.6mm (gas) x 22.2mm (discharge)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	90.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mmx12.7mm
199.9	9.5mmx19.1mmx15.9mm
289.9	9.5mmx22.2mmx19.1mm
419.9	12.7mmx28.6mmx19.1mm
639.9	15.9mmx28.6mmx28.6mm
919.9	19.1mmx34.9mmx28.6mm
> 919.9	19.1mmx41.3mmx28.6mm
Main pipe size up	15.9mmx28.6mmx22.2mm

Remarks

Please make sure to provide a drain pipe connection to each multi BS-box in the system.

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SISTEM 2 KK KLUB - ERQ250AW1

Model	Quantity	Description
ERQ250AW1	1	ERQ-AW1 (AHU application 3phase)

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	8.4	unknown	17.5

The system(s) contain fluorinated greenhouse gases.

Piping limitations

Description	Value
Maximum total length	50.0m
Maximum longest actual length	50.0m
Maximum longest equivalent length	50.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	50.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	30.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	30.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	30.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	30.0m
Maximum height difference between indoor units	-
Connection ratio range	50.0% - 110.0%
Refrigerant pipe diameters	9.5mm (liquid) x 22.2mm (gas)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	50.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mm
199.9	9.5mmx19.1mm
289.9	9.5mmx22.2mm
419.9	12.7mmx28.6mm
639.9	15.9mmx28.6mm

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Maximum Connection Index	Diameters
919.9	19.1mmx34.9mm
> 919.9	19.1mmx41.3mm
Main pipe size up	9.5mmx22.2mm

SISTEM 9-1 KK AMFITEATAR - ERQ200AW1

Model	Quantity	Description
ERQ200AW1	1	ERQ-AW1 (AHU application 3phase)

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	7.7	unknown	16.1

The system(s) contain fluorinated greenhouse gases.

Piping limitations

Description	Value
Maximum total length	50.0m
Maximum longest actual length	50.0m
Maximum longest equivalent length	50.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	50.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	30.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	30.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	30.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	30.0m
Maximum height difference between indoor units	-
Connection ratio range	50.0% - 110.0%
Refrigerant pipe diameters	9.5mm (liquid) x 19.1mm (gas)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	50.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mm
199.9	9.5mmx19.1mm
289.9	9.5mmx22.2mm
419.9	12.7mmx28.6mm
639.9	15.9mmx28.6mm

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Maximum Connection Index	Diameters
919.9	19.1mmx34.9mm
> 919.9	19.1mmx41.3mm
Main pipe size up	9.5mmx19.1mm

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SISTEM 9-2 KK AMFITEATAR - ERQ200AW1

Model	Quantity	Description
ERQ200AW1	1	ERQ-AW1 (AHU application 3phase)

Refrigerant information

Refrigerant type	GWP	Base charge kg	Extra charge kg	TCO2 equivalent
R410A	2087.5	7.7	unknown	16.1

The system(s) contain fluorinated greenhouse gases.

Piping limitations

Description	Value
Maximum total length	50.0m
Maximum longest actual length	50.0m
Maximum longest equivalent length	50.0m
Maximum main pipe length (size up of main pipe required if longer)	-
Maximum length first branch to indoor unit(size up of intermediate pipes required if longer)	40.0m
Maximum length first branch to indoor unit	50.0m
Maximum length of indoor units to nearest branch	40.0m
Maximum length difference between longest and shortest distance to indoor units	40.0m
Maximum height difference, outdoor unit below indoor units	30.0m
Minimum connection ratio, outdoor unit below indoor units	-
Maximum height difference, outdoor unit above indoor units	30.0m
Minimum connection ratio, outdoor unit above indoor units	-
Maximum height difference in technical cooling, outdoor unit below indoor units	30.0m
Maximum height difference in technical cooling, outdoor unit above indoor units	30.0m
Maximum height difference between indoor units	-
Connection ratio range	50.0% - 110.0%
Refrigerant pipe diameters	9.5mm (liquid) x 19.1mm (gas)
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET (size up of intermediate pipes required if longer)	-
Maximum equivalent length from BP unit or VRV indoor to VRV REFNET	50.0m
Maximum actual length between CM and HM	-
Maximum height difference between CM and HM	-

Pipe capacities

Maximum Connection Index	Diameters
149.9	9.5mmx15.9mm
199.9	9.5mmx19.1mm
289.9	9.5mmx22.2mm
419.9	12.7mmx28.6mm
639.9	15.9mmx28.6mm

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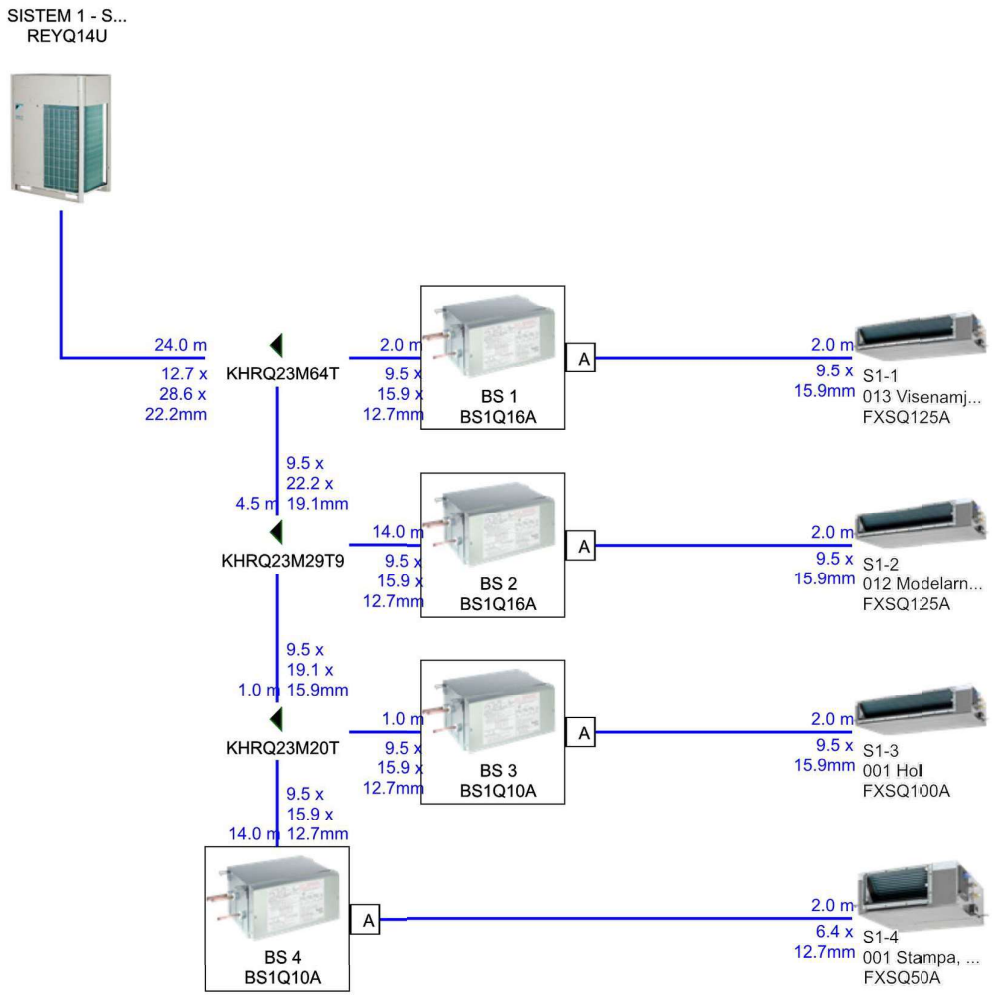
Maximum Connection Index	Diameters
919.9	19.1mmx34.9mm
> 919.9	19.1mmx41.3mm
Main pipe size up	9.5mmx19.1mm

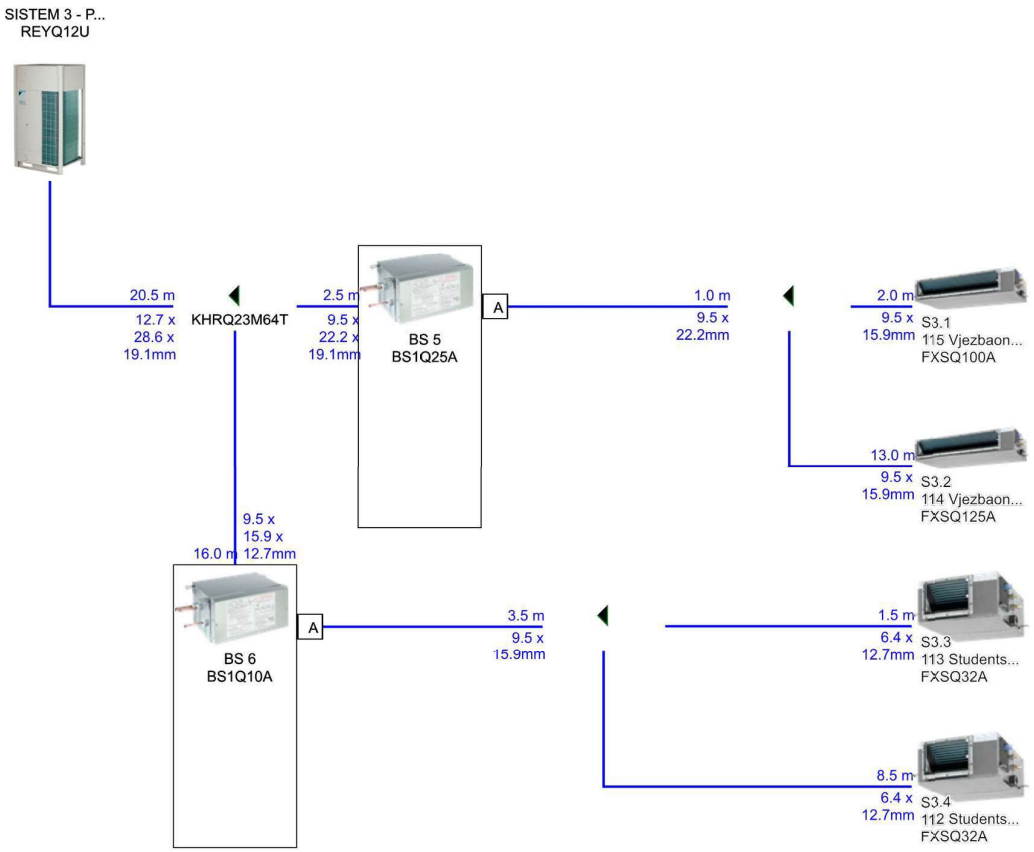
The VRV Selection application is property of Daikin Europe N.V. Daikin Europe N.V. cannot be held liable for any inaccuracy, reliability of the outcome of the VRV Selection application.

Piping diagrams

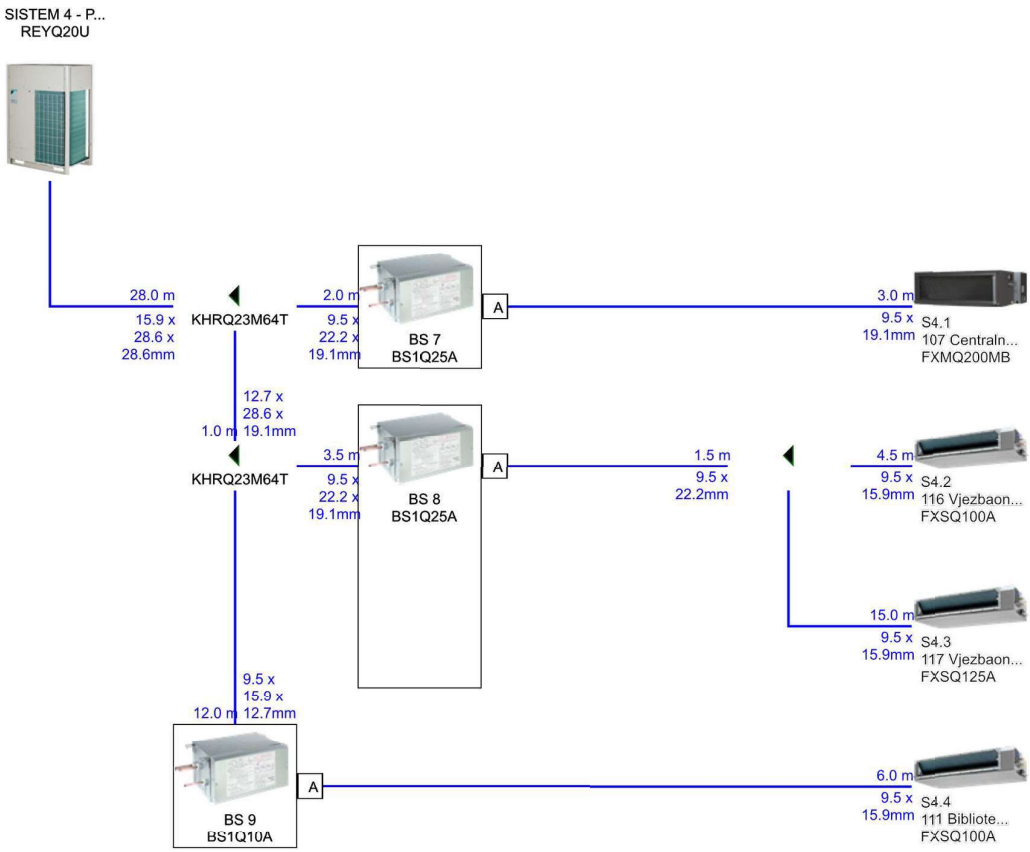
Piping SISTEM 1 - SUTEREN



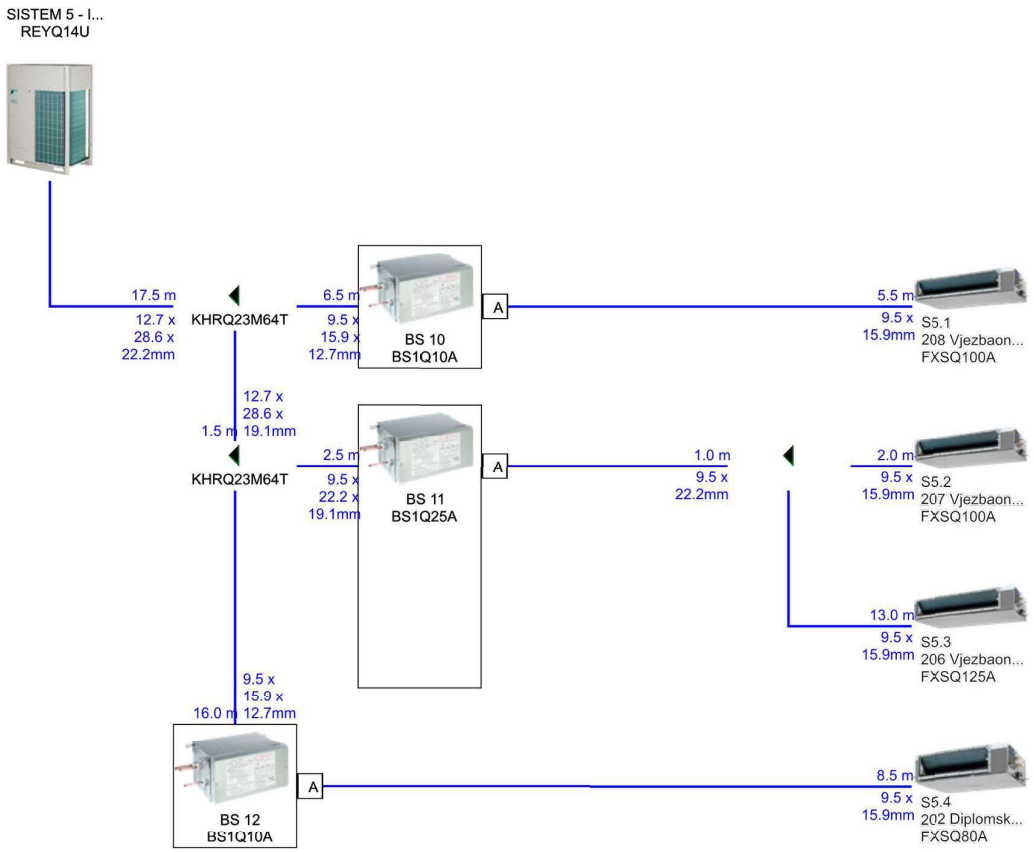
Piping SISTEM 3 - PRIZEMLJE



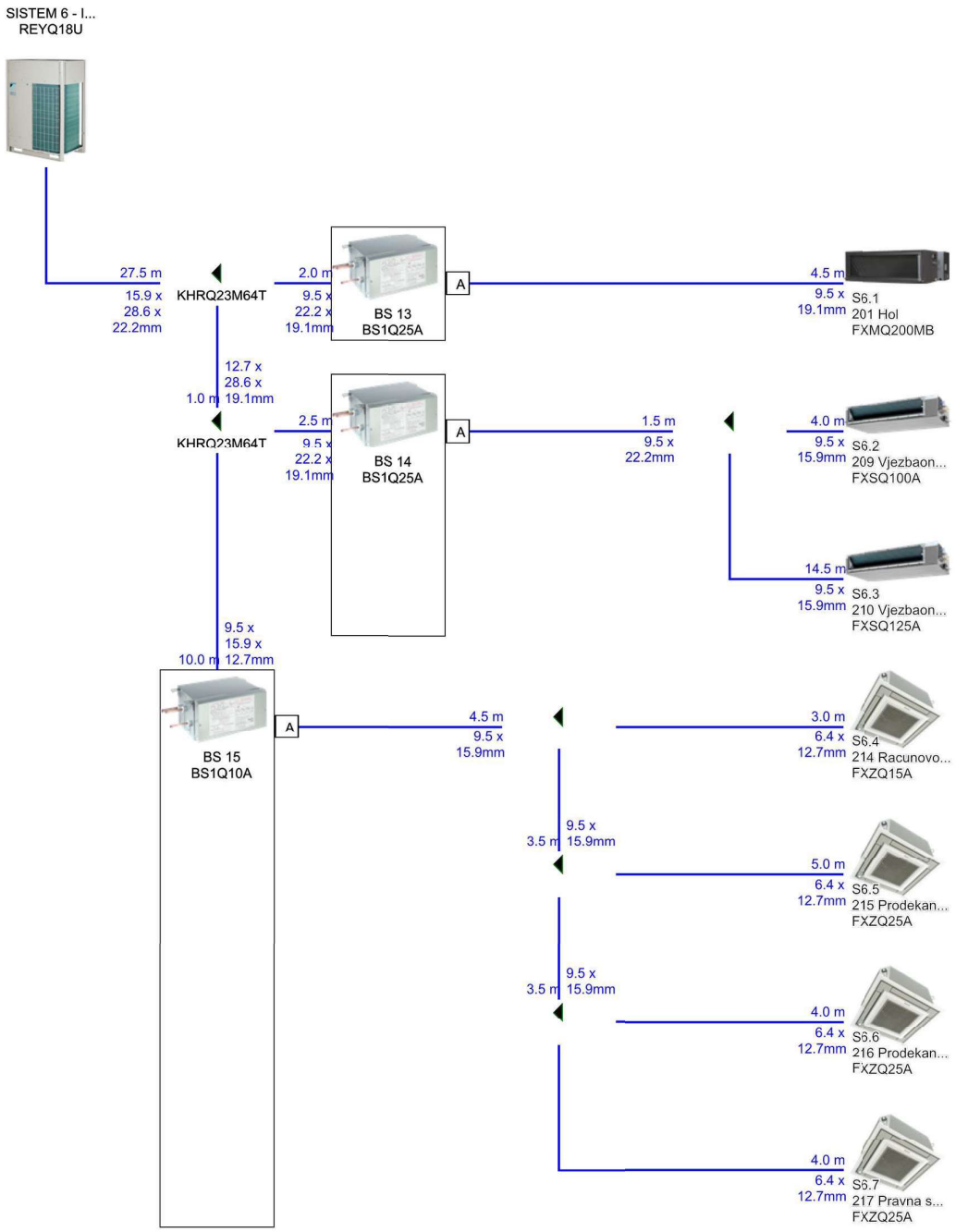
Piping SISTEM 4 - PRIZEMLJE



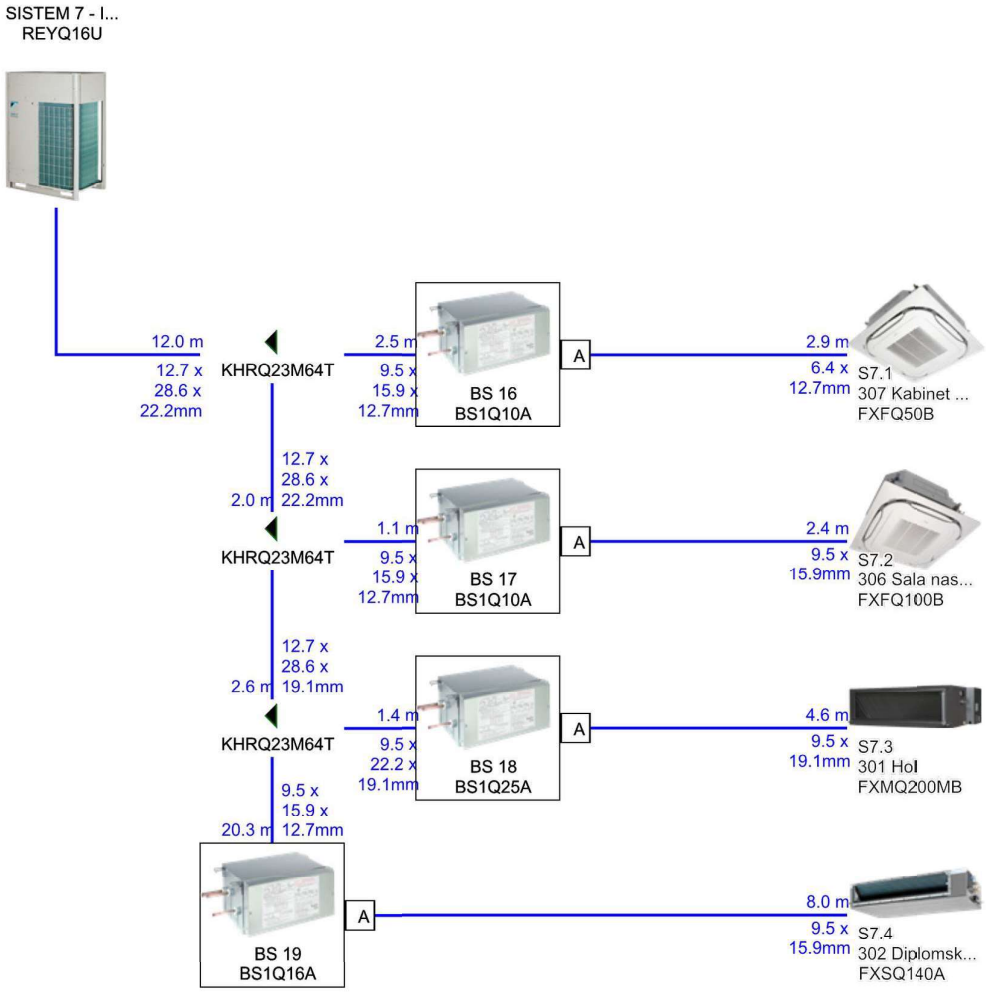
Piping SISTEM 5 - I SPRAT



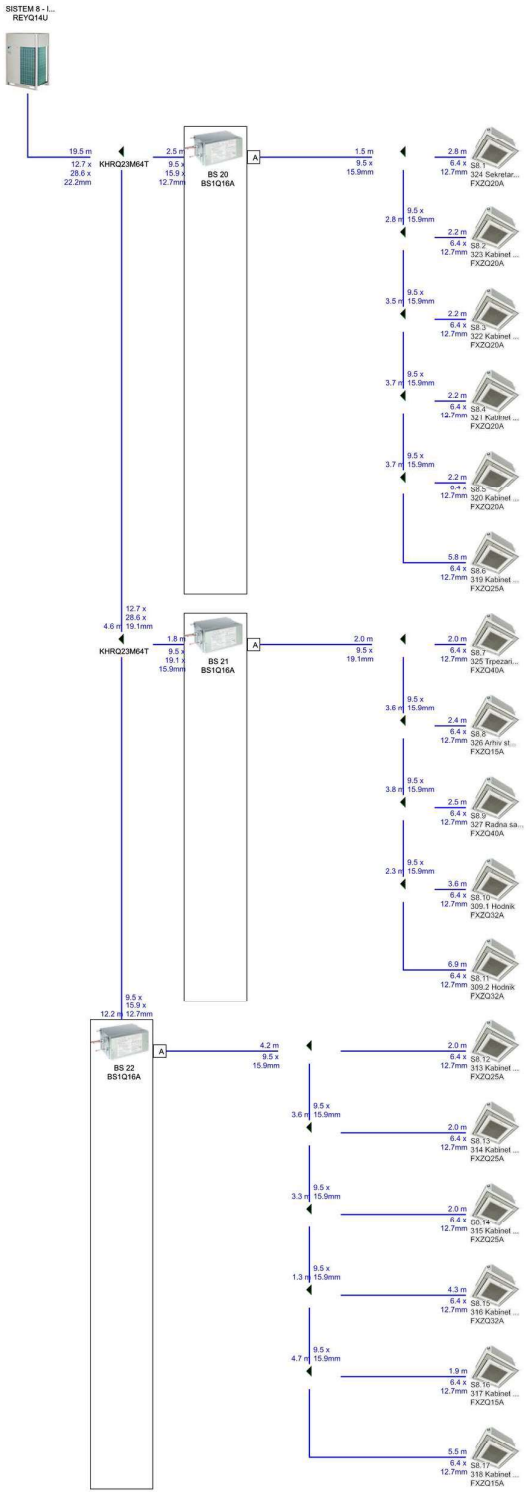
Piping SISTEM 6 - I SPRAT



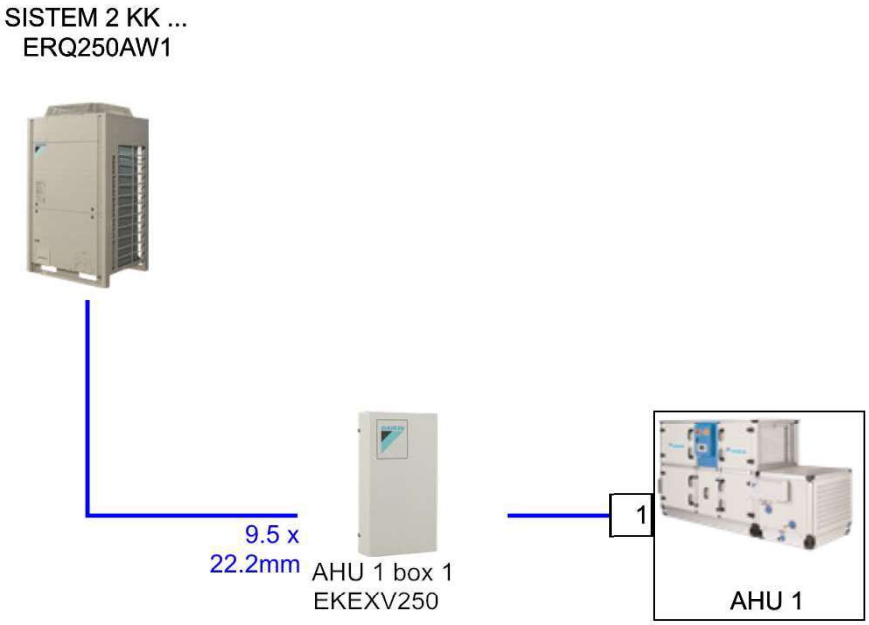
Piping SISTEM 7 - II SPRAT



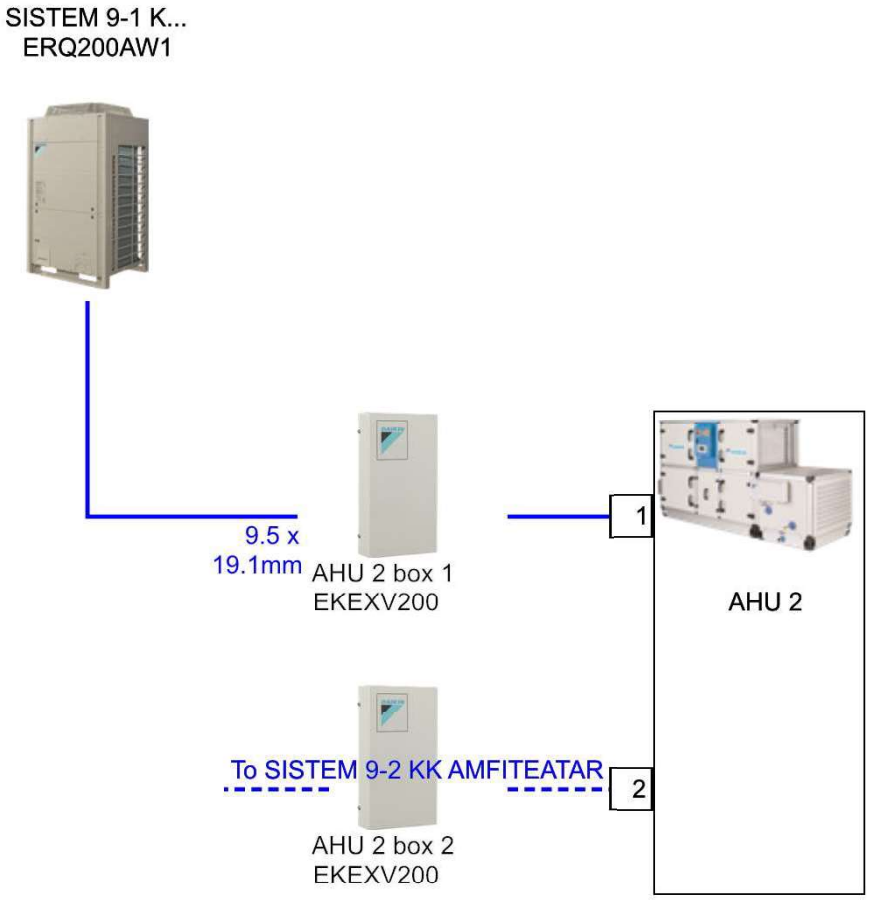
Piping SISTEM 8 - II SPRAT



Piping SISTEM 2 KK KLUB



Piping SISTEM 9-1 KK AMFITEATAR



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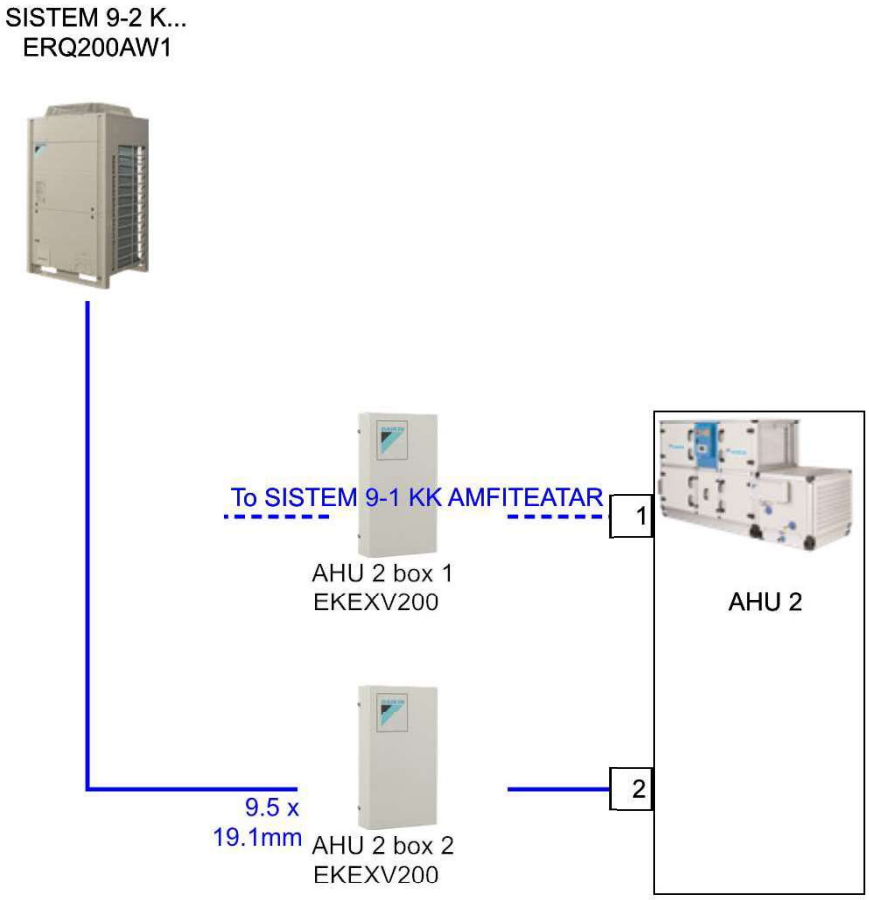
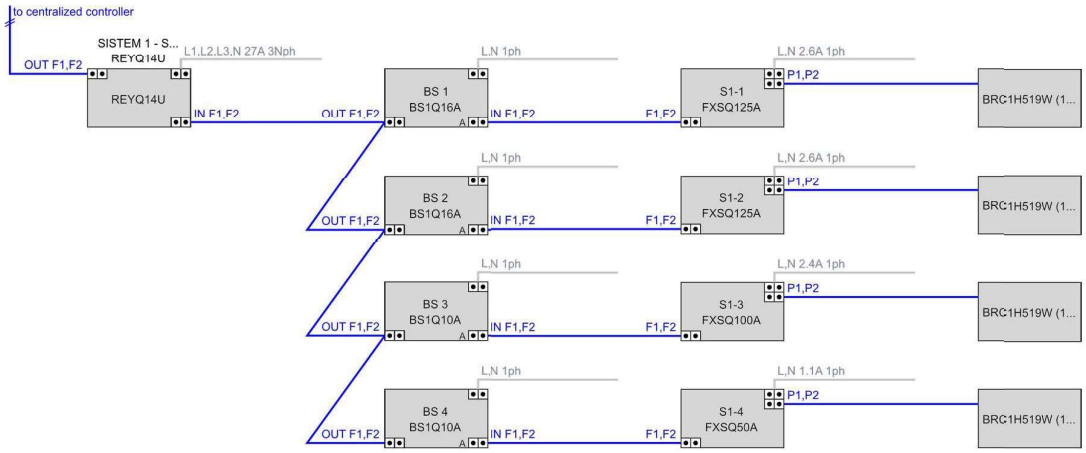
Piping SISTEM 9-2 KK AMFITEATAR



Wiring diagrams

Wiring SISTEM 1 - SUTEREN

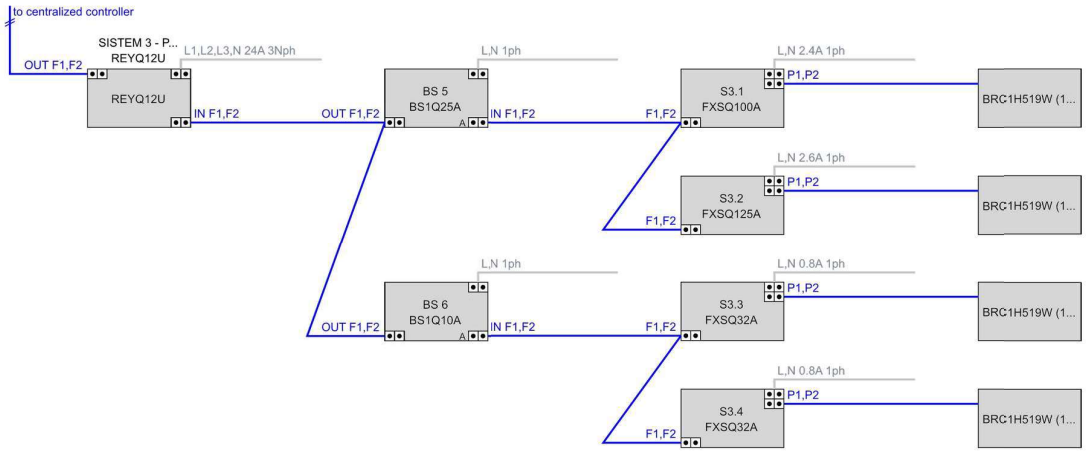


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 3 - PRIZEMLJE

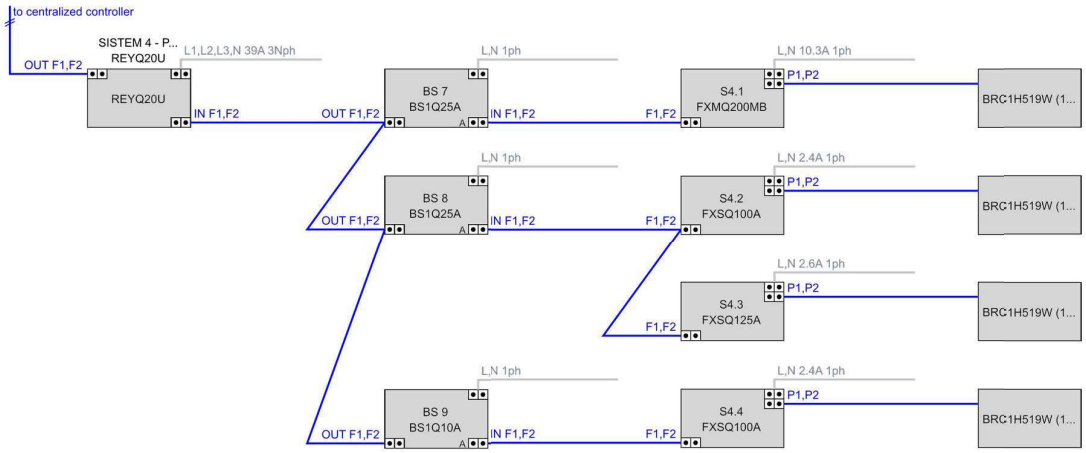


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 4 - PRIZEMLJE

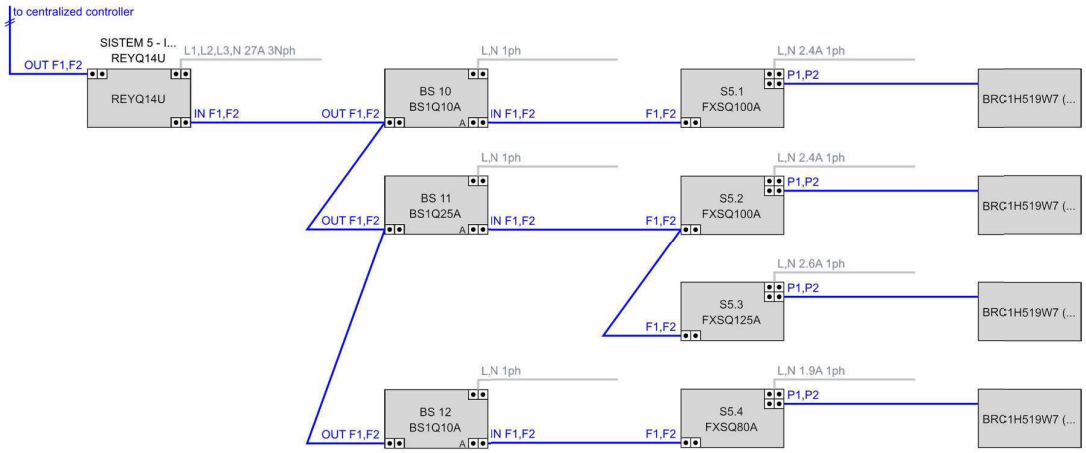


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 5 - I SPRAT

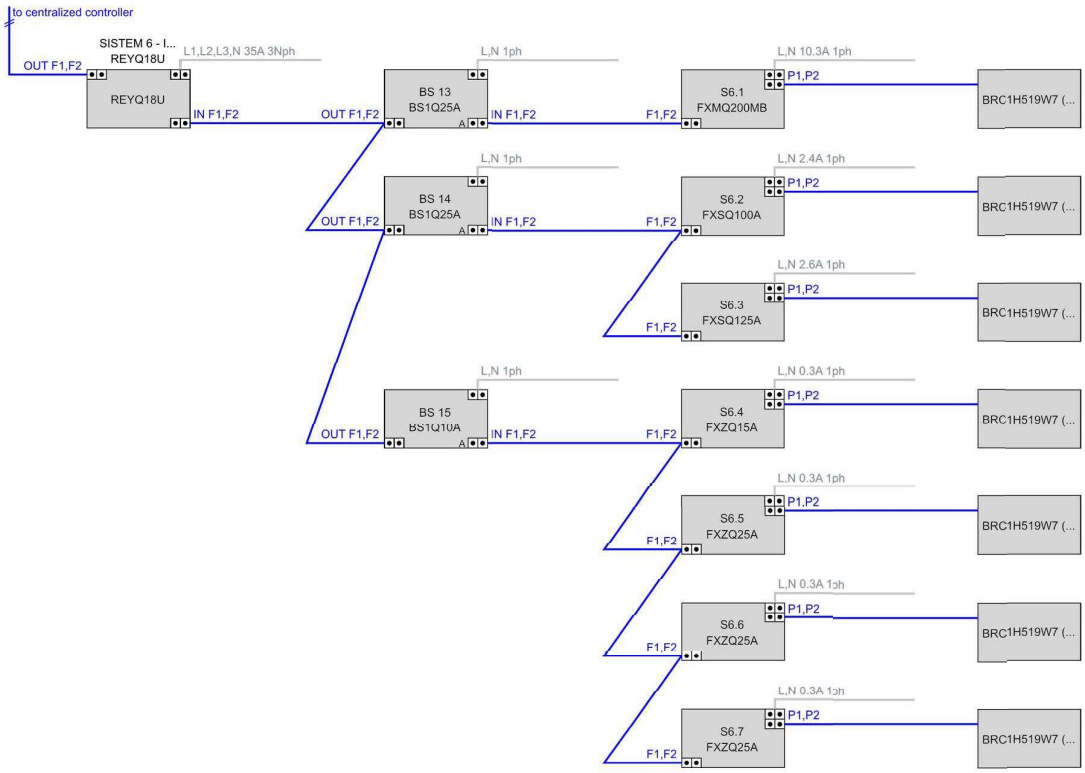


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 6 - I SPRAT

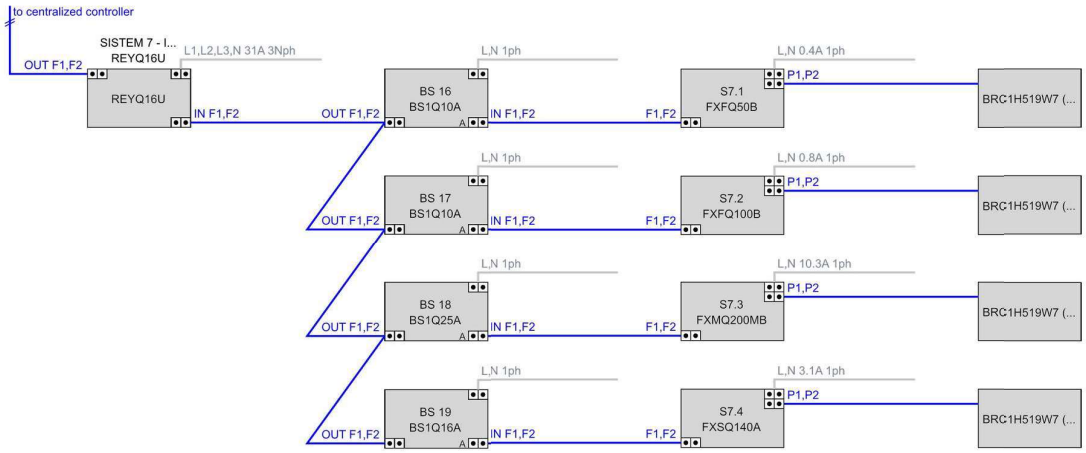


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 7 - II SPRAT

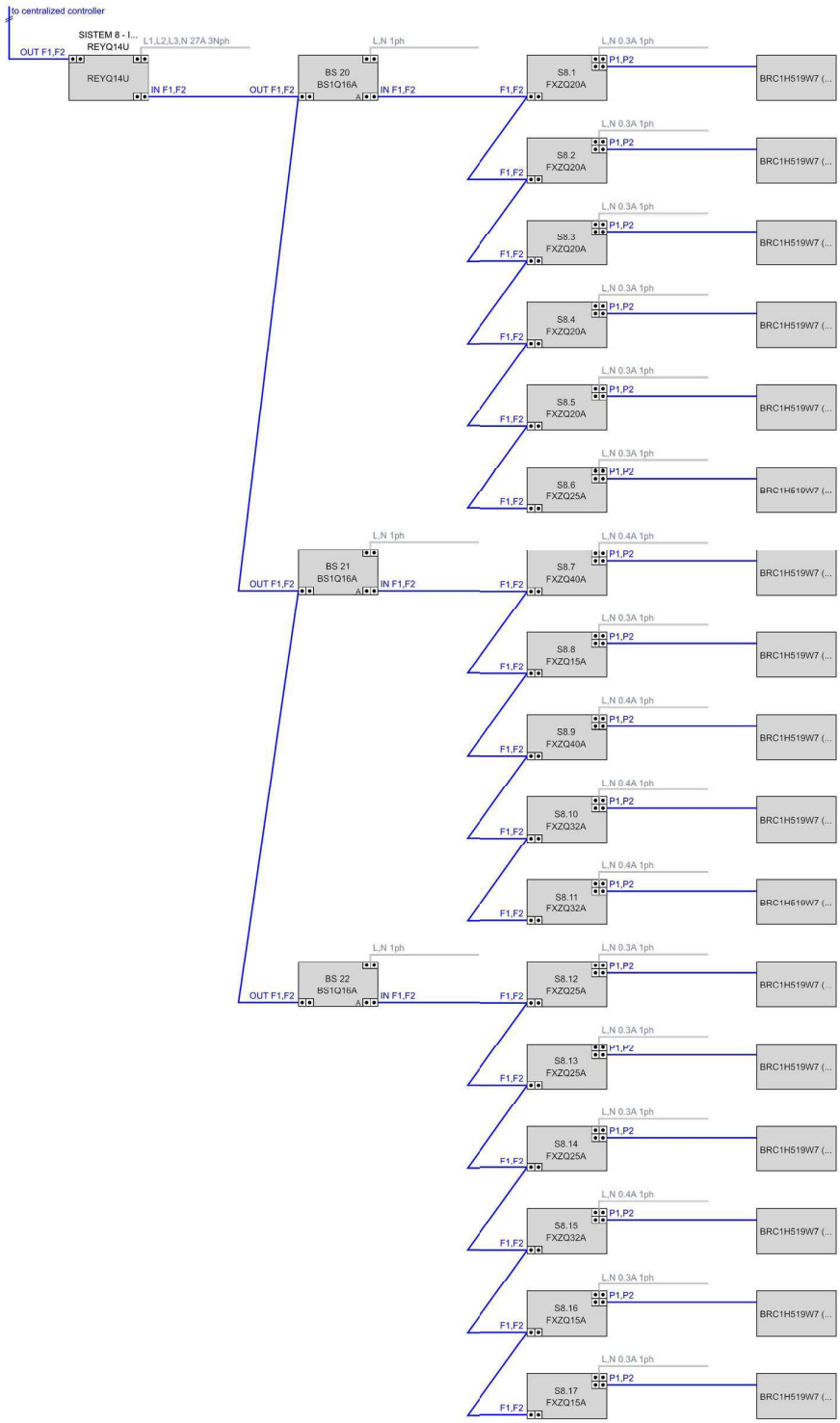


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 8 - II SPRAT

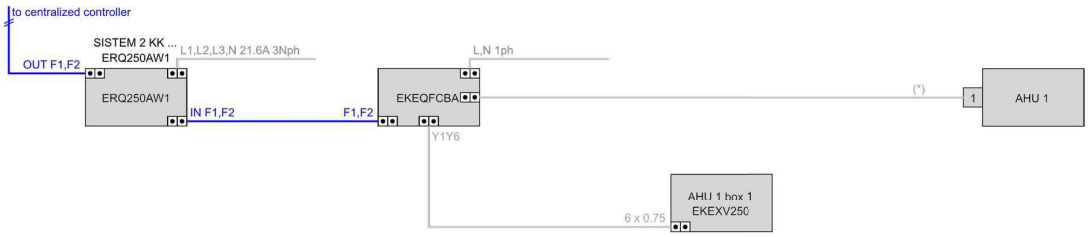


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

P1P2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 2 KK KLUB

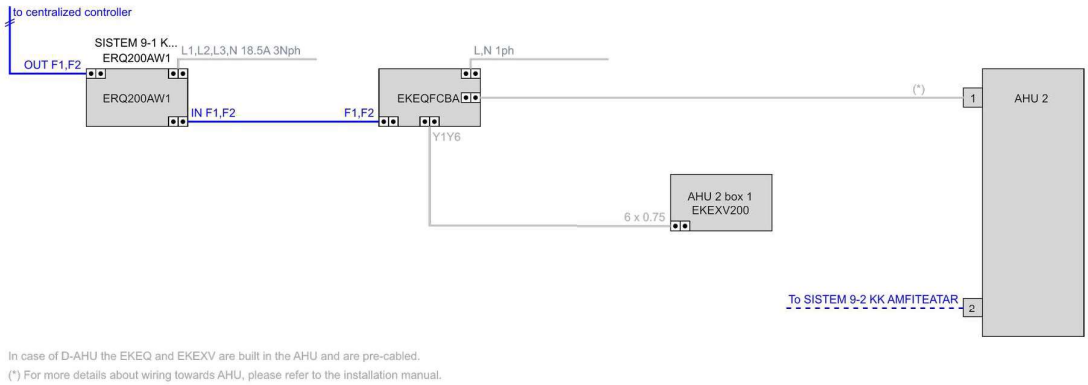


In case of D-AHU the EKEQ and EKEXV are built in the AHU and are pre-cabled.
(*) For more details about wiring towards AHU, please refer to the installation manual.

Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

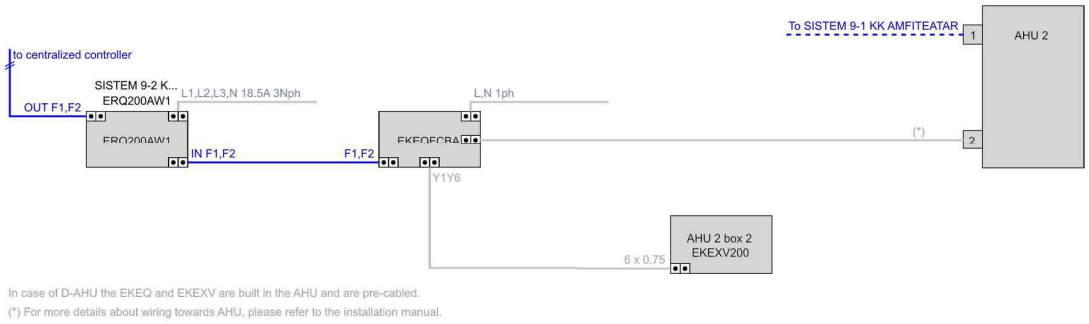
Wiring SISTEM 9-1 KK AMFITEATAR



Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

Wiring SISTEM 9-2 KK AMFITEATAR

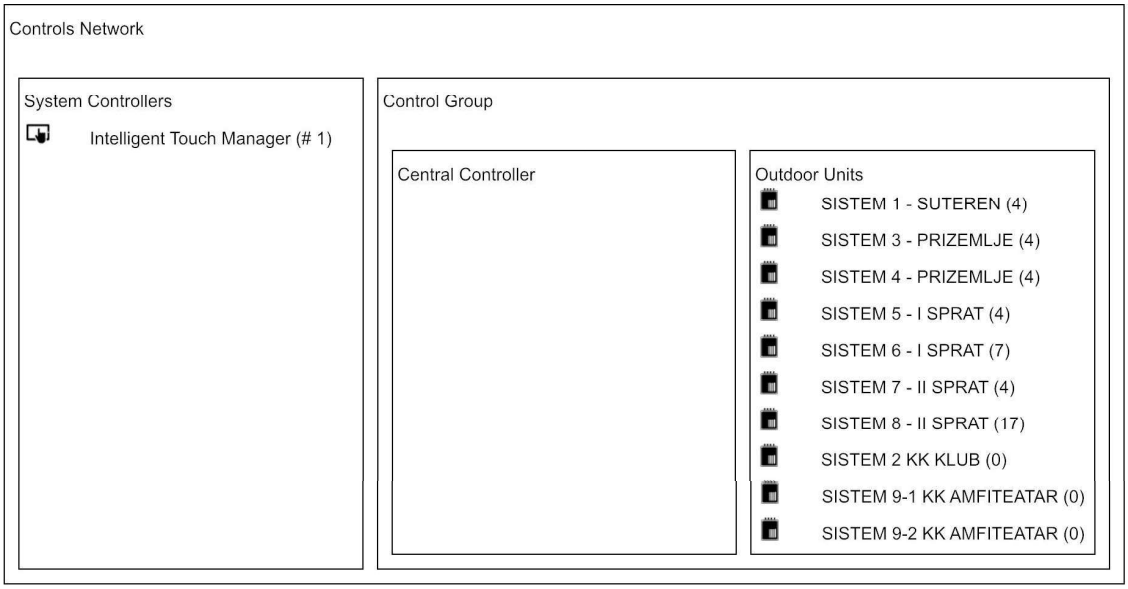


Remarks

F1F2 = AWG 18-2 is required - however always refer to local code for further information.

Centralized controllers

Concept



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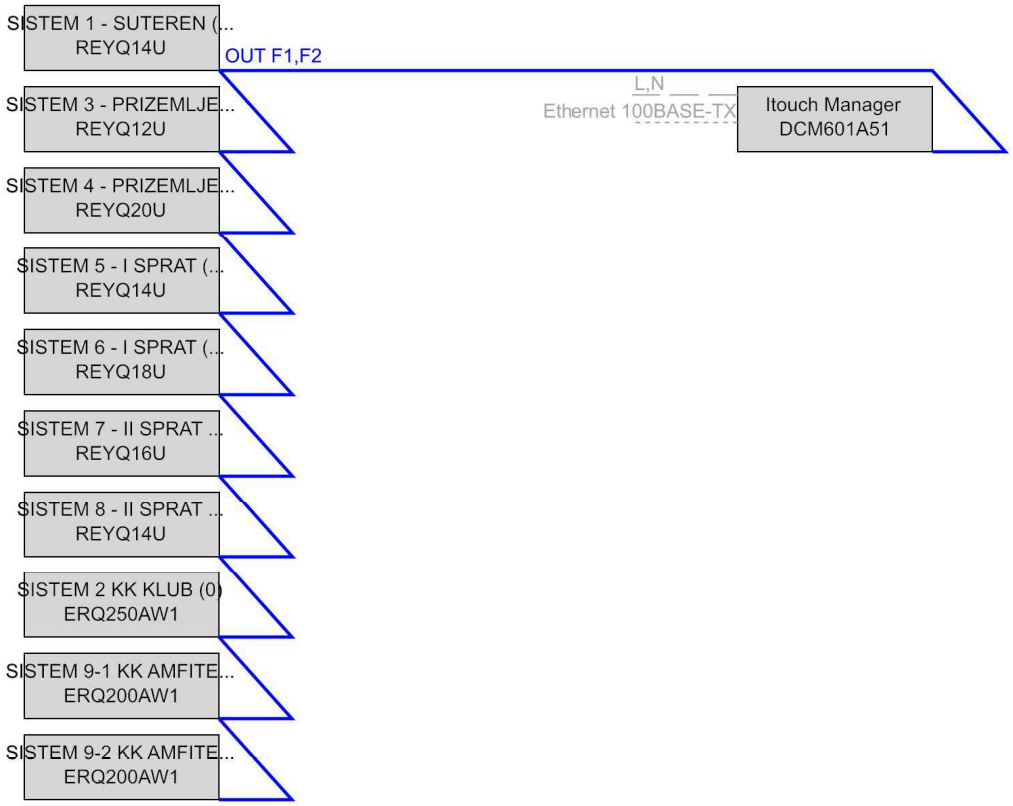
Controller wiring diagrams

Control Group



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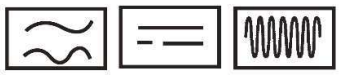
Best Practices

Residual Current Circuit Breaker

For better protection of installations against the risk of fire, power supply of indoor and outdoor units must be protected with a Residual Current Circuit Breaker. For protection against fire, we recommend a sensitivity of 300mA. The selected RCCB should be of the type B, suitable for inverter devices and indicated by the symbols here below. Further electrical characteristics of the RCCB must be selected in accordance with local regulation.



For a complete list of all required safety precautions, warnings and attention points, please consult the “general safety precautions manual” delivered with the unit.

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5.6. IZBOR HRV SISTEMA (REKUPERATORA)

1. Specification Data

Selected ventilation device: VAM1000J, Ultra-High 14

Room Airflow Conditions	
Total supply air	1000m³/h
Total exhaust air	1000m³/h
External Static Pressure (ESP)	
Design supply ESP	150.0Pa
Design exhaust ESP	150.0Pa
Altitude Selection	
Altitude	44m

Cooling		Heating	
Room Air Conditions (RA)		**Room Air Conditions (RA)**	
Dry bulb temperature	26.0°C	Dry bulb temperature	20.0°C
Relative humidity	50%	Relative humidity	50%
Ambient Air Conditions (OA)		**Ambient Air Conditions (OA)**	
Dry bulb temperature	37.0°C	Dry bulb temperature	-4.0°C
Relative humidity	28%	Relative humidity	90%
Discharge Temperature Setting		**Discharge Temperature Setting**	
Temperature	18.0°C	Temperature	25.0°C
		Electric Heaters	
		Inlet heater	0.000kW

2. Selection Data

Ratios	
Exhaust / Supply ratio	1.00
Additional resistance	
Supply side	10.9Pa
Exhaust side	10.9Pa

Cooling		Heating	
Efficiencies		**Efficiencies**	
Temperature exchange efficiency	79.6%	Temperature exchange efficiency	79.6%
Enthalpy exchange efficiency	62.6%	Enthalpy exchange efficiency	68.6%
Savings over Heat Exchanger		**Savings over Heat Exchanger**	
Latent heat savings	0.371kW	Latent heat savings	2.208kW
Sensible heat savings	2.912kW	Sensible heat savings	4.653kW
Total heat savings	3.283kW	Total heat savings	6.862kW
Heaters		**Heaters**	
Switch on inlet heater above	59.5°C	Switch on inlet heater below	5.0°C
Inlet heater (user settings)		Inlet heater (user settings)	2.500kW

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Inlet heater (calculated minimum)		Inlet heater (calculated minimum)	1.648kW
		Supply heater (user settings)	
		Supply heater (calculated minimum)	

3. Commissioning parameters

Fan mode	
Supply	Ultra-High 14
Exhaust	Ultra-High 14
ESP data	
Supply side	10.9Pa
Exhaust side	10.9Pa

4. Technical data

Mechanical Data		**Electrical Data**	
W×H×D	1350×368×1170mm	Power supply	VE
Weight	70.0kg	Frequency	50/60Hz
Speed Related Data		Phases	1
Sound level		Voltage	220V
Current		Min~max V	220~240
Wattage		MCA	4.9A
Ambient Operation Range		MFA	16.0A
Min~max temperature	-10.0~46.0°C	RLA	
Maximum relative humidity	80%	FLA	
Heater Threshold Temperature		**Duct Data**	
Minimum temperature	-10.0°C	Duct diameter	250mm
Room Operation Range		**Relative Humidity Maxima**	
Min~max temperature	0.0~40.0°C	Exhaust air (EA)	95%
Maximum relative humidity	80%	Ventilation out air (VO)	95%

5. Psychrometric Points

Cooling			
Room Air (RA)		**Exhaust Air (EA)**	
Dry bulb temperature	26.0°C	Dry bulb temperature	34.8°C
Wet bulb temperature	18.6°C	Wet bulb temperature	20.9°C
Relative humidity	50.0%	Relative humidity	29.0%
Absolute humidity	0.0106kg/kg	Absolute humidity	0.0101kg/kg
Enthalpy	53.1kJ/kg	Enthalpy	60.9kJ/kg
Outdoor Air (OA)		**Supply Air (SA)**	
Dry bulb temperature	37.0°C	Dry bulb temperature	28.2°C
Wet bulb temperature	22.2°C	Wet bulb temperature	20.0°C
Relative humidity	28.0%	Relative humidity	47.7%

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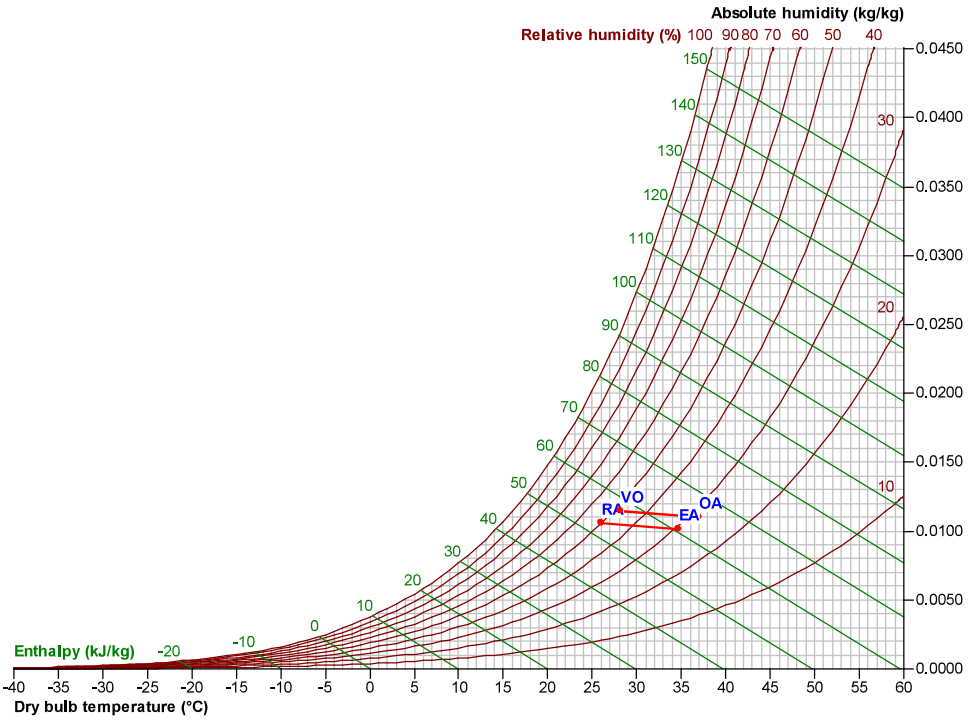
Absolute humidity	0.0110kg/kg	Absolute humidity	0.0115kg/kg
Enthalpy	65.6kJ/kg	Enthalpy	57.7kJ/kg
Ventilation In (VI)		**Ventilation Out (VO)**	
Dry bulb temperature	37.0°C	Dry bulb temperature	28.2°C
Wet bulb temperature	22.2°C	Wet bulb temperature	20.0°C
Relative humidity	28.0%	Relative humidity	47.7%
Absolute humidity	0.0110kg/kg	Absolute humidity	0.0115kg/kg
Enthalpy	65.6kJ/kg	Enthalpy	57.7kJ/kg

Heating			
Room Air (RA)		**Exhaust Air (EA)**	
Dry bulb temperature	20.0°C	Dry bulb temperature	6.3°C
Wet bulb temperature	13.7°C	Wet bulb temperature	4.8°C
Relative humidity	50.0%	Relative humidity	79.7%
Absolute humidity	0.0073kg/kg	Absolute humidity	0.0047kg/kg
Enthalpy	38.6kJ/kg	Enthalpy	18.3kJ/kg
Outdoor Air (OA)		**Supply Air (SA)**	
Dry bulb temperature	-4.0°C	Dry bulb temperature	16.5°C
Wet bulb temperature	-4.4°C	Wet bulb temperature	10.0°C
Relative humidity	90.0%	Relative humidity	43.1%
Absolute humidity	0.0024kg/kg	Absolute humidity	0.0050kg/kg
Enthalpy	2.1kJ/kg	Enthalpy	29.3kJ/kg
Ventilation In (VI)		**Ventilation Out (VO)**	
Dry bulb temperature	2.8°C	Dry bulb temperature	16.5°C
Wet bulb temperature	-0.3°C	Wet bulb temperature	10.0°C
Relative humidity	52.6%	Relative humidity	43.1%
Absolute humidity	0.0024kg/kg	Absolute humidity	0.0050kg/kg
Enthalpy	9.0kJ/kg	Enthalpy	29.3kJ/kg

This Ventilation Xpress is property of Daikin Europe NV. Daikin Europe NV cannot be held liable for any inaccuracy, reliability of the outcome of this program.

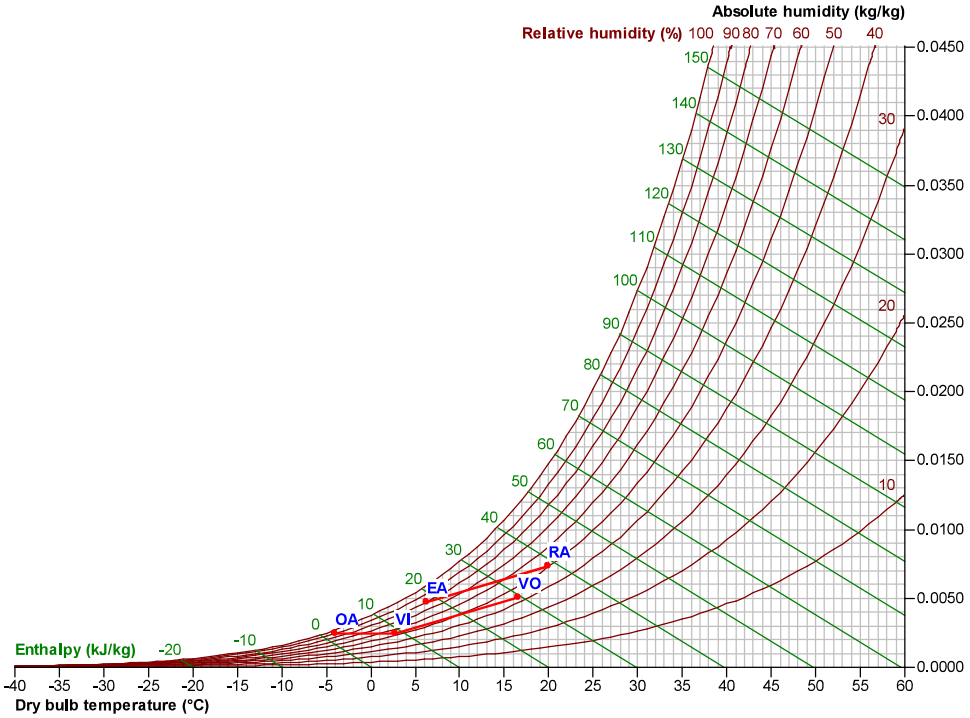
6. Psychrometric Diagram

6.1. Cooling



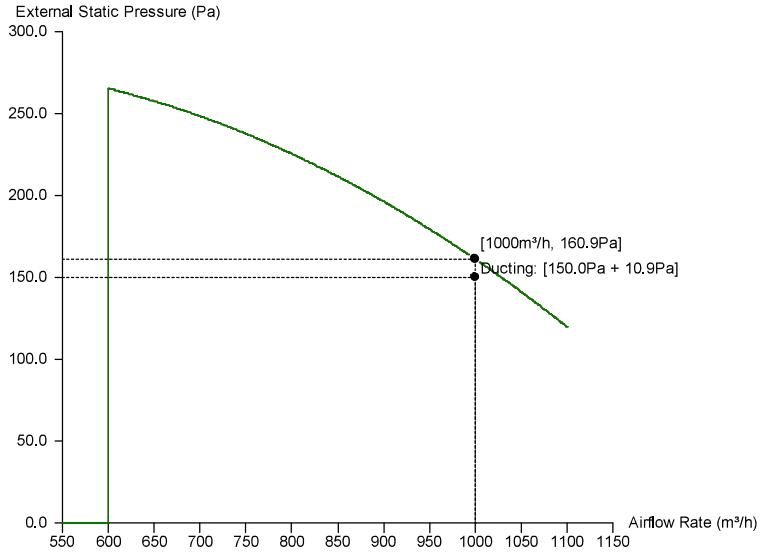
This Ventilation Xpress is property of Daikin Europe NV. Daikin Europe NV cannot be held liable for any inaccuracy, reliability of the outcome of this program.

6.2. Heating

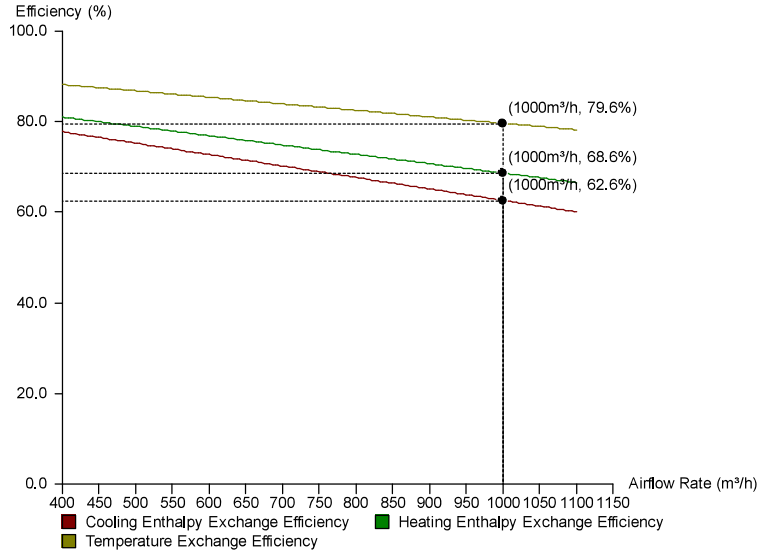


This Ventilation Xpress is property of Daikin Europe NV. Daikin Europe NV cannot be held liable for any inaccuracy, reliability of the outcome of this program.

7. Fan Characteristics

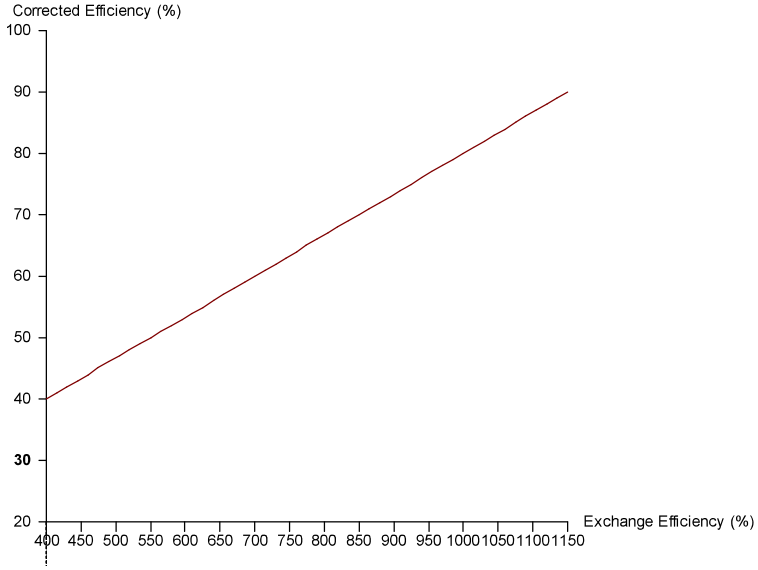


8. Efficiency Data

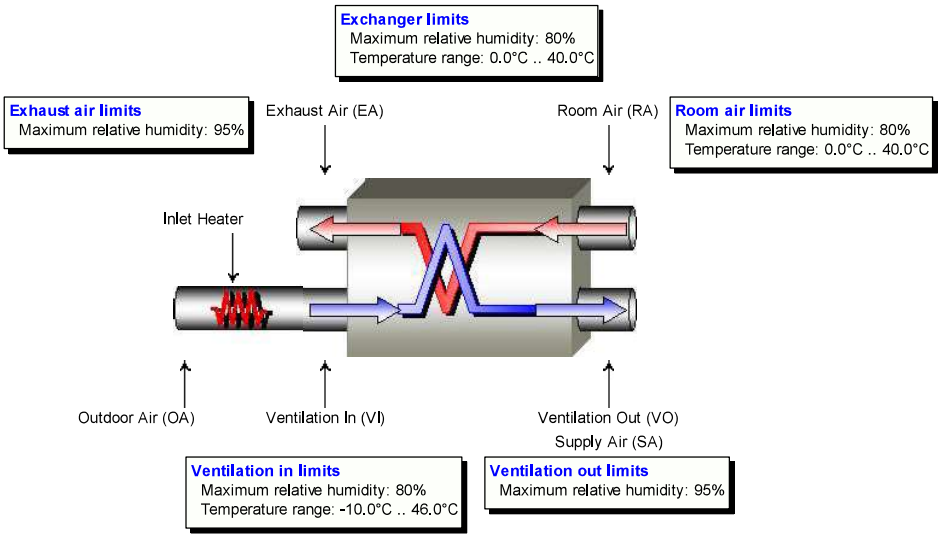


This Ventilation Xpress is property of Daikin Europe NV. Daikin Europe NV cannot be held liable for any inaccuracy, reliability of the outcome of this program.

9. Corrected Efficiency Data



10. Configuration Data



The minimum ventilation in temperature is -10.0°C. However, below -10.0°C, an inlet heater will be selected to avoid an intermittent operation and make sure the supply air fan operates continuously.

This Ventilation Xpress is property of Daikin Europe NV. Daikin Europe NV cannot be held liable for any inaccuracy, reliability of the outcome of this program.

5.7. IZBOR VENTILATORA

CBF 100LS BATHROOM FAN

Item no. 5959

Version: 50 Hz

Document type: **Product card**
Document date: **2019-07-09**
Generated by: **Systemair Online Catalogue**

Description

- BF axial fan for bathrooms
- CBF centrifugal fan for bathrooms, toilets and store rooms
- Both types can be installed on the wall or the ceiling

The BF/CBF units are extraction fans manufactured from ABS plastic. These fans, can be connected either through the light switch, so that they start when the light is turned on, or to a separate switch. The CBF has a spring-loaded back draft damper.

There are three models: standard model (S), a model with timer (T) and a model with timer and humidity sensor (TH). A time delay of between 1 and 20 minutes can be set on the timer after removing the unit's front cover. The humidity sensor can be set to a value between 40 and 95% relative humidity. The BF fan has an adjustment knob that is easily accessible at the bottom of the fan. To adjust the humidity sensor on the CBF fan, the front cover should be removed first.

Technical parameters

Nominal data		
Voltage	230	V
Frequency	50	Hz
Phase	1	~
Input power (P1)	15,8	W
Current	0,104	A
Max. airflow	96,8	m³/h
Fan impeller speed	2233	r.p.m.
Weight	1,2	kg

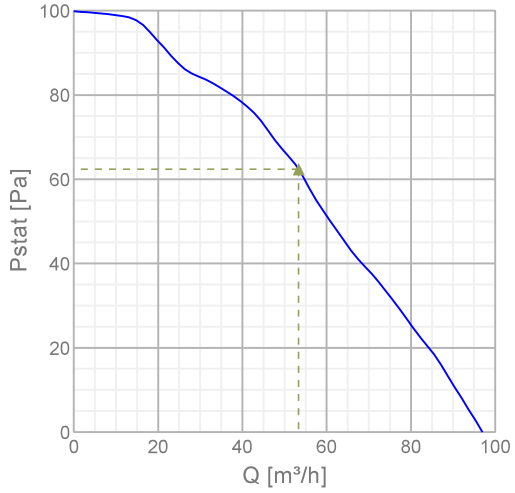
Temperature data		
Max. temperature of transported air	70	°C
Max. temperature of transported air when voltage-controlled	70	°C

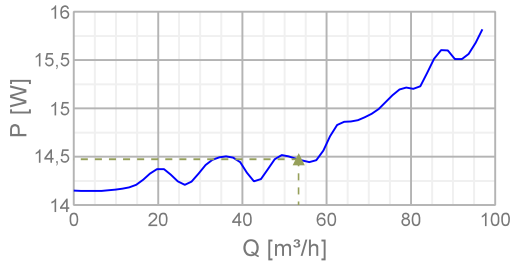
Sound data		
Sound pressure level at 3 m (20m² Sabin)	51	dB(A)

Protection / Classification		
Insulation class	B	
Enclosure class, motor	-	

Performance

Diagrams



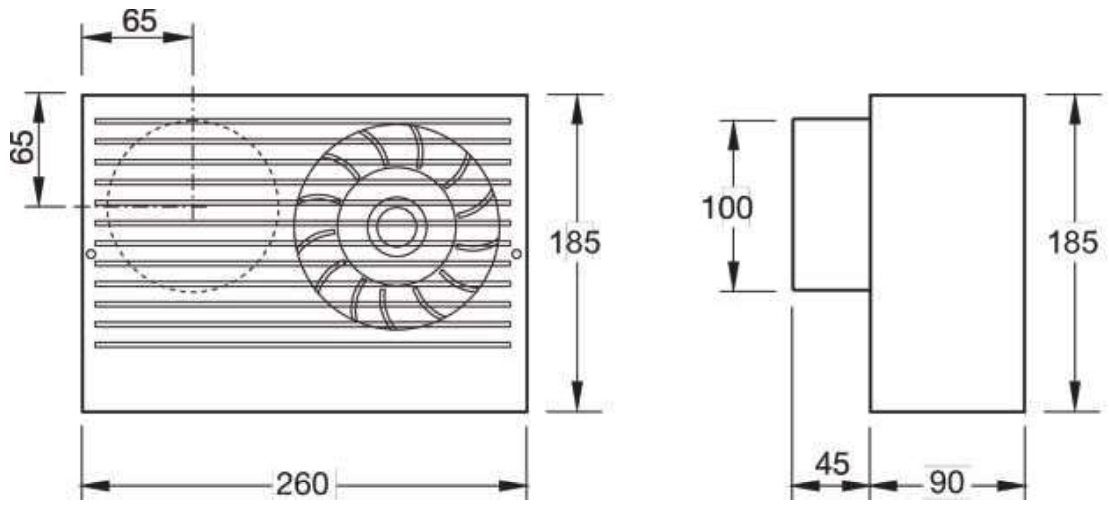


Max efficiency

Hydraulic data		
Working air flow	53,3	m³/h
Working static pressure	62,4	Pa
Power	14,5	W
Speed	2452	r.p.m.
Current	0,0977	A
SFP	0,977	kW/(m³/s)
Voltage	230	V

Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	19	34	54	52	51	46	40	30	58

Dimensions



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Accessories

Accessories

BVK 100 Wall vent kit (5965)

Documentation

CBF100_IMO_SE,GB,FR,_DE.pdf (472,22kB)

Decl.of Conformity CBF.pdf (521,32kB)

Specification text

.

PRIO 200EC CIRC. DUCT FAN

Item no. 78186

Document type: **Product card**
Document date: **2019-06-25**
Generated by: **Systemair Online Catalogue**

Description

- EC-motors, high level of efficiency
- Low SFP values
- 100% speed controllable
- Integrated motor protection
- Can be installed in any position
- Compact design
- Low sound level
- Potentiometer included for ease of commissioning

EC fans are intelligent devices using integrated motor electronics, ensuring that the motor always runs at optimal load. With EC motors the proportion of energy utilized effectively is higher, which as a result reduces the energy usage considerably, compared with AC motors.
Another special feature of EC fans is their energy-saving potential not only at full load, but especially when speed controlled, i.e. at part load. When operating at part-load, the energy used is much lower than with an asynchronous motor of equivalent output.
Reduced energy usage guarantees a drop in operating costs.
The prioAir series is designed for installation in ducts. The prioAir models have 25 mm long spigot connections in acc. with EN 1506:1997. The fans have aerodynamically optimized impellers and guide vanes. Motor protection is integrated in the electronics of the motor. The air tight casing (tightness class C in acc. with EN12237:2003) is manufactured from special composite material.

The mounting clamp facilitates easy installation and removal, and prevents the transfer of vibrations to the duct. Mounting bracket to the wall or ceiling as accessory.
For installation in damp locations we recommend to use a run-on timer. The fans are delivered with a pre-wired potentiometer (0-10 V) that allowes you to easily find the required working point.

Technical parameters

Nominal data		
Voltage	230	V
Frequency	50/60	Hz
Phase	1	~
Input power (P1)	117	W
Current	0,921	A
Max. airflow	1318	m³/h
Fan impeller speed	3463	r.p.m.
Weight	2,4	kg

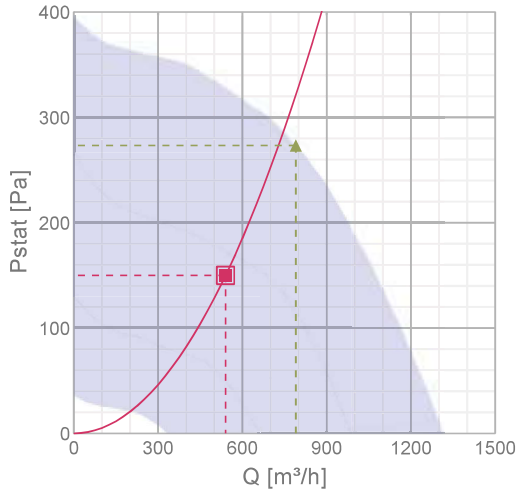
Temperature data		
Max. temperature of transported air	55	°C

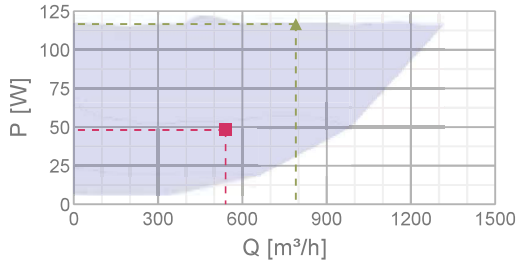
Sound data		
Sound pressure level at 3 m (20m² Sabin)	52	dB(A)

Protection / Classification	
Insulation class	B
Enclosure class, motor	IP44

Performance

Diagrams





Selection

Hydraulic data		
Required air flow	540	m³/h
Required static pressure	150	Pa
Working air flow	540	m³/h
Working static pressure	150	Pa
Power	48	W
Speed	2582	r.p.m.
Current	0,384	A
SFP	0,32	kW/(m³/s)
Voltage	230	V

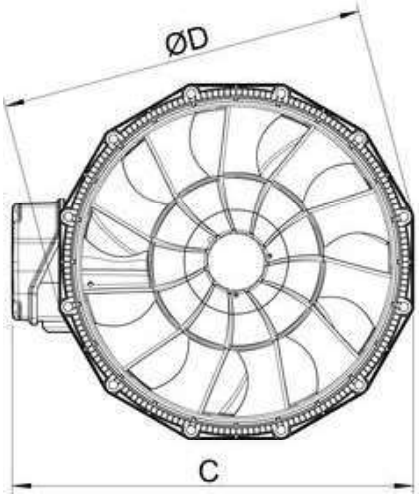
Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	39	51	64	62	64	60	55	45	69
Outlet	dB(A)	36	51	56	59	60	56	52	45	65
Surrounding	dB(A)	6	25	33	45	47	44	36	21	50

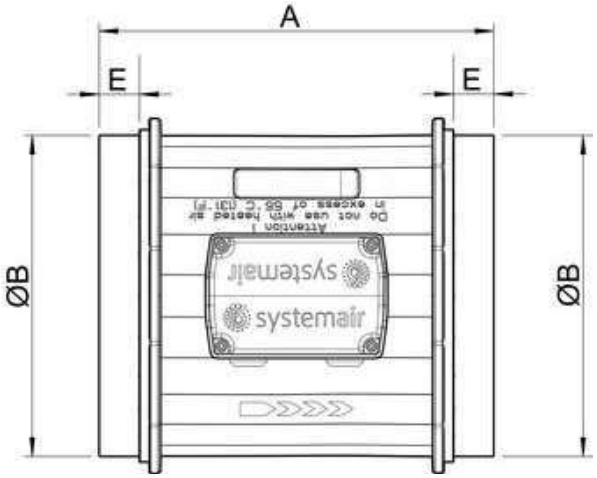
Max efficiency

Hydraulic data		
▲ Working air flow	790	m³/h
▲ Working static pressure	273	Pa
▲ Power	117	W
Speed	3512	r.p.m.
Current	0,91	A
SFP	0,531	kW/(m³/s)
Voltage	230	V

Sound power level		63	125	250	500	1k	2k	4k	8k	Tot
Inlet	dB(A)	45	54	70	71	73	69	64	56	77
Outlet	dB(A)	43	54	58	67	68	65	61	56	72
Surrounding	dB(A)	13	27	38	52	56	53	45	32	59

Dimensions



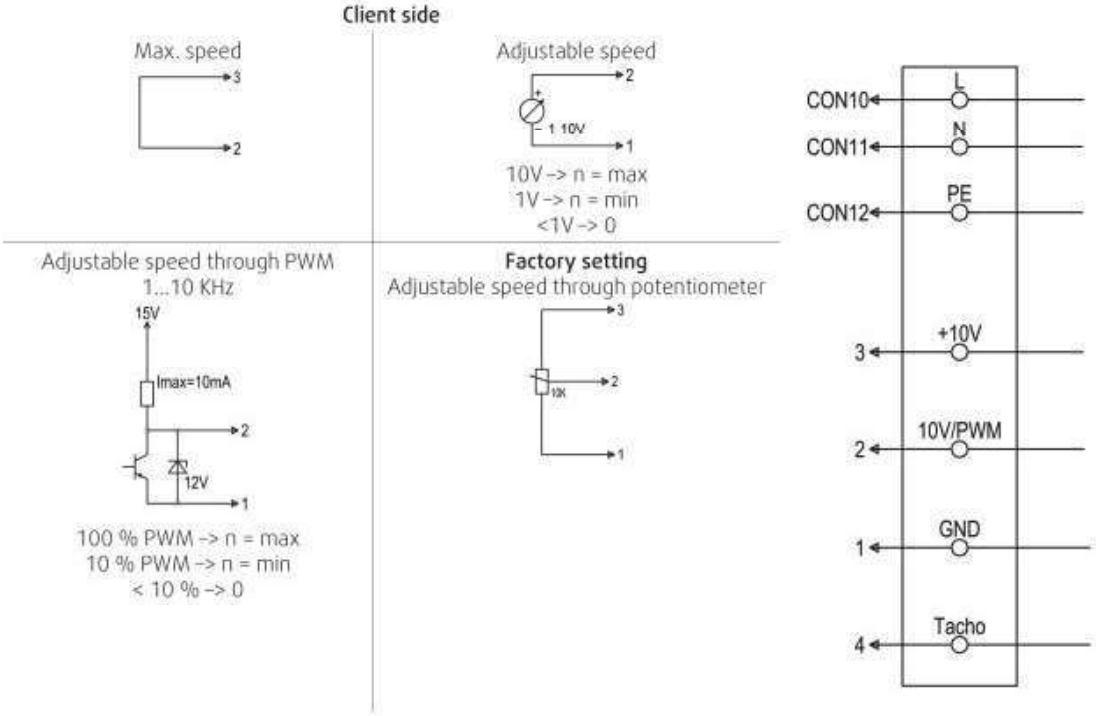


	A	øB	C	øD	E
prio 200	245	199	249	227	25

Wiring

9.3.1.1 Wiring diagram prioAir EC

The fans are delivered with a pre-wired potentiometer (0–10 V)



Wire no.	Connection	Color	Function/assignment
CON10	L	black or brown	Power supply 230 V AC, 50...60 Hz, see name plate for voltage range
CON11	N	blue	Neutral conductor
CON12	PE	green/yellow	Protective conductor
1	GND	blue	GND-connection of the controller interface
2	0...10 V PWM	yellow	Controller input 0...10 V or PWM
3	10 V	red	Voltage output 10 V / Short-circuit-proof power supply for external devices (e.g. poti) prioAir 150EC, prioAir 160EC -> I max=1.1mA prioAir 200ECprioAir 250EC -> I max=10mA
4	Tacho	white	Speed output: Open Collector, 1 impulse per revolution, electrically isolated, Isink_max = 10 mA

Accessories

Electric accessories

RT 0-30 Room Thermostat (5151)
CO2RT-R-D Transmitter (6993)
Presence detector/IR24-P (6995)
MTV-1/010 Controller 0..10V+ (30650)
MTP 10, 10K, Speed control (32731)
EC-Vent Room Unit (3018)
EC-Vent control board (3115)
REV-3POL/03 ON/OFF (33978)
MTP 20, on/off, 3-step (310220)
EC-Basic-H humidity (24807)
EC-Basic-T temperature (24805)
EC-Basic-U universal 0-10V (24806)
EC-Basic-CO2 and temperature (24808)
CXE/AVC Modbus (37256)

Accessories

CB 200/S1/3,0KW 400V/2Duct hea (5294)
CB 200-3,0 230V/1 Duct heater (5370)
CB 200-5,0 400V/2 Duct heater (5371)
CB 200-2,1 230V/1 Duct heater (5384)
CBM 200-5,0 400V/2 Duct heater (5483)
VBF 200 Water heating battery (1732)
CWK 200-3-2,5 Duct cooler,circ (30023)
VBC 200-2 Water heating batt (5459)
LDC 200-600 Silencer (5194)
LDC 200-900 Silencer (5195)
FFR 200 Filter cassette (1773)
FGR 200 Filter cassette (1812)
FK 200 Fast clamp (1611)
VKK-200 Back draft damper (1626)
IGK-200 Wall Grid (1633)
RSK-200 Back draft damper (5602)
SG 200 Protection guard (5609)
VBC 200-3 Water heating batt (9841)
LDC 200-300 Silencer (53369)
prio 200 mount, bracket compl. (79315)

Documentation

manual_prioair_en_[006].pdf (7,45MB)

eu declaration of conformity_prio_en_001.pdf (47,97kB)

prio_air200_o_rahmen.dxf (5,47MB)

Specification text

.

MTP 10, 10K, SPEED CONTROL

Item no. 32731

Document type: **Product card**
Document date: **2019-06-25**
Generated by: **Systemair Online Catalogue**

Description

Potentiometer 10kΩ for speed controlling
- Combined flush or surface mounting

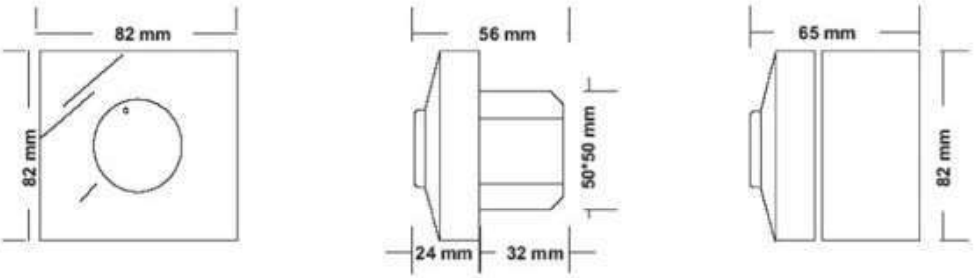
For the manual control of speed and air flow of electrical fans with 0-10V output. The jetproof IP 54 enclosure is achieved with the included surface mounting case. (Flush-mounting without the surface mounting case,gives a splash proof IP 44 enclosure also suitable for highly demand environments as bathrooms etc).

Technical parameters

Default group		
Control signal	0...10 kOhm	
Enclosure class	IP44	
Voltage supply	10 V DC	
Rangeability	0...10 V	
Contact	1 NO	
Switching capacity	4A / 250V	

Dimension		
Weight	0,2	kg

Dimensions

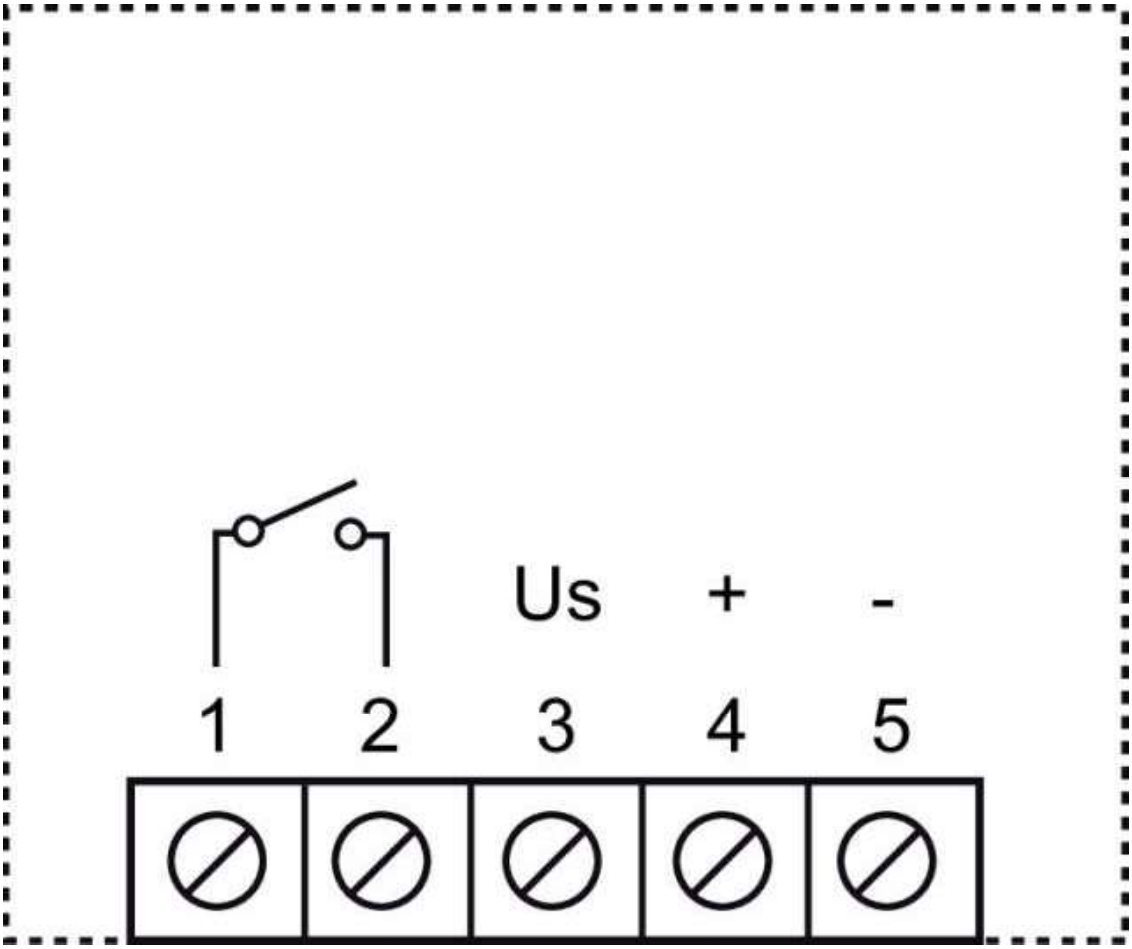


Documentation

MTP-Declaration of conformity.pdf (291,60kB)

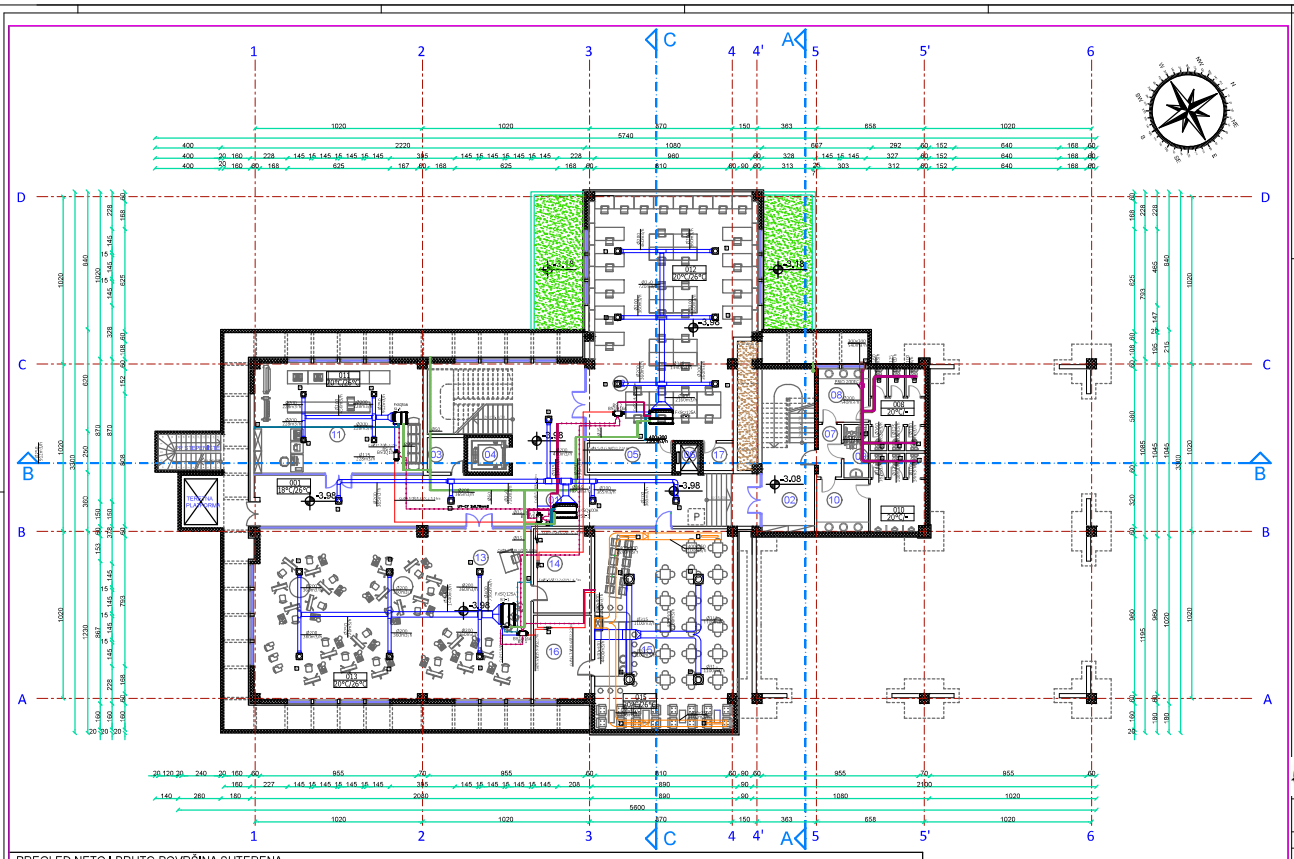
ds_mtp010.pdf (156,06kB)

Wiring



Us = 10V Supply
+ = 0-10V Output signal
- = GND

E) GRAFIČKA DOKUMENTACIJA



PREGLED NETO I BRUTO POVRŠINA SUTERENA

01. HOL SA STEPENIŠTEM	145,31m²	08. TOALET ŽENSKI	25,25m²	15. KAFE / STUDENTSKI KLUB	103,23m²	UKUPNO NETO P SUTERENA	791,42m²
02. HODNIK SA STEPENIŠTEM	31,84m²	09. TOALET ZA INVALIDE	4,95m²	16. OSTAVA KAFEA	17,92m²	UKUPNO BRUTO P SUTERENA	876,19m²
03. SPRINKLER INSTALACIJE	4,72m²	10. TOALET MUŠKI	25,40m²	17. RECK ORMARI	3,08m²		
04. LIFT ZA STUDENTE	5,25m²	11. ŠTAMPARIJA / KOPIRNICA	68,76m²				
05. OSTAVA	8,37m²	12. MODELARNICA	143,79m²			UKUPNO NETO P OBJEKTA	3795,22m²
06. LIFT ZA OSOBLJE	2,56m²	13. VIŠENAMJENSKA SALA	174,15m²			UKUPNO BRUTO P OBJEKTA	4464,80m²
07. PREDPROSTOR TOALETA	4,60m²	14. OSTAVA UZ SALU	17,88m²				

UKUPNO BRUTO P POSTOJEĆEG SUTERENA	109,40m²
UKUPNO BRUTO P PLANIRANOG SUTERENA	766,79m²
UKUPNO BRUTO P POSTOJEĆEG OBJEKTA	1024,30m²
UKUPNO BRUTO P PLANIRANOG OBJEKTA	3440,50m²

VENTILATORI

OZNAKA	Maksimalni protok vazduha	Prosječnoći protok vazduha	Napor ventilatora	Električne karakteristike
PRO 200EC	1310m3/h	540m3/h	273 Pa	117W (230V/1F/50Hz)

VFI CENTRALNE ZA UGRADNJU I UNUTRAŠNJA BLAGO OMNIDIRAJUĆA PLATONIJ HLAPICA da ZRAKPNA PREMA ISO 6/12/2011 I NR 62/2012, FENERFI PREMA DIN 1953 SPASNOSTNOSTI SE MUFLIRI I DIFFUSORI UZ BORAVAK SU SUMS BRIBIRI.

SFIO HLADI I KAPTIVAJUĆI SISTEMA KOJIM SE VRŠI ISSUJ UNUTRAŠNJE I SPOLJAŠNJE JEDINICE KAO I KABLIRNICI I LOKALNIM KONTROLERA SULLIN-ZI DALTRIKIZ

- CIRCUKOD RADNOG PLIJEDA - I CIJEVNI SISTEM
- CIRCUKOD RADNOG PLIJEDA - II CIJEVNI SISTEM
- CIRCUKOD ZA ODVOD KONDENZATA
- FABRIL KONTROLNOG SISTEMA
- FABRIL ZA LOKALNE KONTROLERE
- FABRIL ZA KONTROLER KRIŽNIH VEZA

Oznaka ventilacionih kanala prema MEST EN 13779

- Kanal za otpadni vazduh
- Kanal za svježi vazduh
- Kanal za pripremljeni vazduh
- Kanal za odsisni vazduh vazduh

UNUTRAŠNJE JEDINICE VRV SISTEMA

OZNAKA	Rashladni kapacitet UKUPNI	Kapacitet grijanja	Dimenzije kvrčić (mm)	Električne karakteristike	Priključci cjevovoda	
					Tečnost	Gas
FXSQ50A	5,600 W	6,300 W	245x700x800	154W (230V/1F/50Hz)	Cu=6,35	Cu=12,7
FXSQ100A	11,200 W	12,500 W	245x1400x800	280W (230V/1F/50Hz)	Cu=9,52	Cu=15,9
FXSQ125A	14,000 W	16,000 W	245x1400x800	331W (230V/1F/50Hz)	Cu=9,52	Cu=15,9

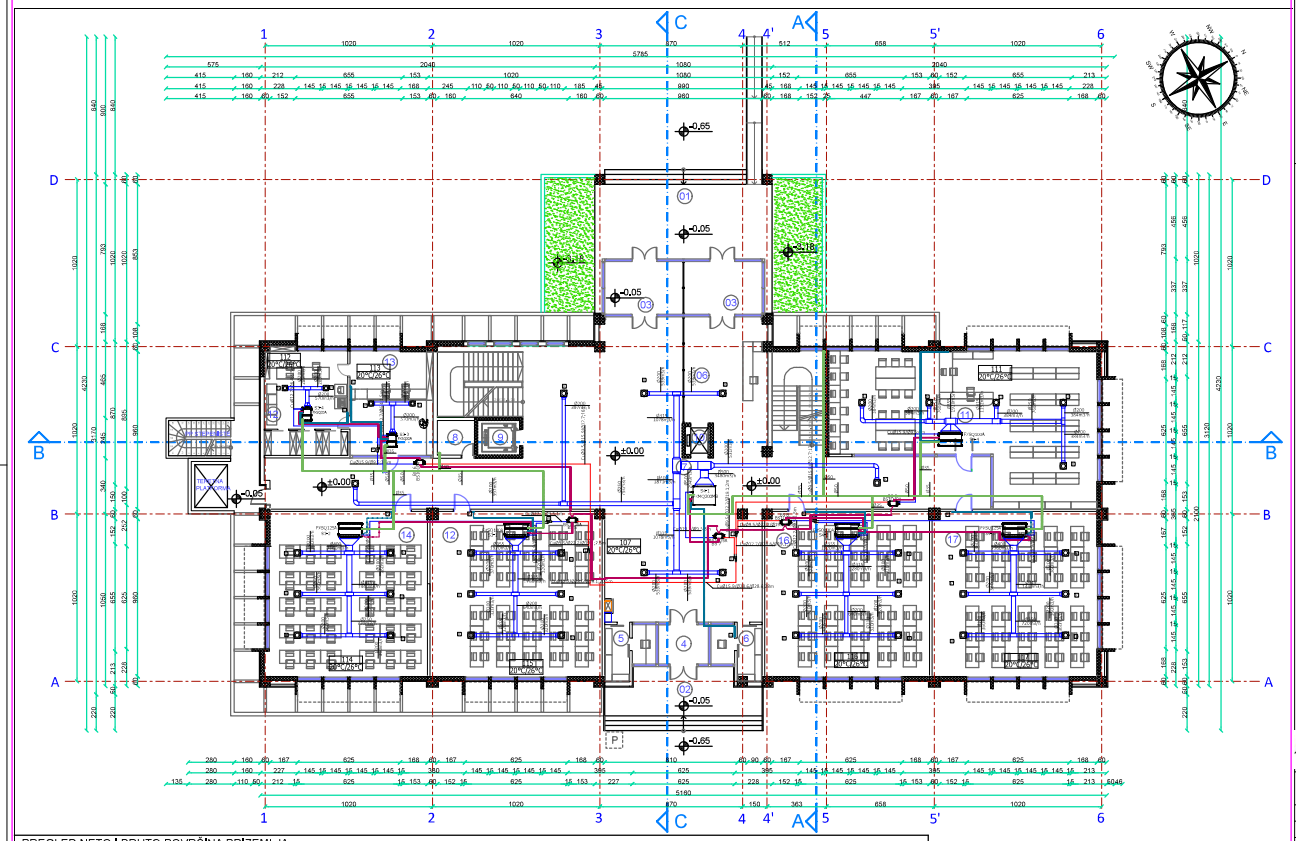
- BAKARNA RAČVA (REFNET JOINT) za tračjenu VRV sistem, TIP: KHRQ22M64T, indeks kapacitета do 256-340
- BAKARNA RAČVA (REFNET JOINT) za tračjenu VRV sistem, TIP: KHRQ22M29T, indeks kapacitета do 256-340
- BAKARNA RAČVA (REFNET JOINT) za tračjenu VRV sistem, TIP: KHRQ22M20T, indeks kapacitета do 200
- BAKARNA RAČVA (REFNET JOINT) za dvojnim VRV sistem, TIP: KHRQ22C29T9, indeks kapacitета do 200-290
- BAKARNA RAČVA (REFNET JOINT) za dvojnim VRV sistem, TIP: KHRQ22C20T, indeks kapacitета do 200
- DŽAKI KONTROLERI UNUTRAŠNJE VRV JEDINICE, tip: EKCB101B1, proizvod: „DAIKIN" d.o.o.
- DIGITALNI KONTROLER, tip: DCM601A51, proizvod: „DAIKIN" d.o.o.
- ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip: VLM-22 dimenzija 300x225 mm, proizvod: LINDAB d.o.o.
- VENTILACIONI VENTIL, tip: FK-36, veličina 315, proizvod: LINDAB d.o.o.
- MATABARNI WTLIZNI DIFUZORI: DD-11, veličina 250, za obezvrijeđenje vazduha
- okrugli difuzor za obezvrijeđenje vazduha, tip: DD-70/60/DUSK, veličina 315, proizvod: LINDAB d.o.o.
- okrugli difuzor za obezvrijeđenje vazduha, tip: DD-70/60/DUSK, veličina 315, proizvod: LINDAB d.o.o.
- okrugli difuzor za obezvrijeđenje vazduha, tip: DD-70/60/DUSK, veličina 400, proizvod: LINDAB d.o.o.
- okrugli difuzor za obezvrijeđenje vazduha, tip: DD-70/60/DUSK, veličina 500, proizvod: LINDAB d.o.o.
- ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip: VLM-22 dimenzija 700x300 mm, proizvod: LINDAB d.o.o.
- MATABARNI WTLIZNI DIFUZORI: DD-11, veličina 400, za obezvrijeđenje vazduha
- MATABARNI WTLIZNI DIFUZORI: DD-11, veličina 500, za obezvrijeđenje vazduha
- MATABARNI WTLIZNI DIFUZORI: DD-11, veličina 700, za obezvrijeđenje vazduha
- MATABARNI WTLIZNI DIFUZORI: DD-11, veličina 200, za obezvrijeđenje vazduha
- Metalna jednosmjerna rešetka za odsisnog vazduha, tip: RG-1H-MK-1000x200 dimenzija 1000x150 mm
- Metalna jednosmjerna rešetka za odsisnog vazduha, tip: RG-1H-MK-1000x200 dimenzija 1000x200 mm

NOVA ENERGIJA

DRUŠTVO ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE
NOVA ALEKSANDRA 34, 81000 PODGORICA, CRNA GORA
Tel/fax: +382 (0)20 261142, email: novaenergija@t-com.me

PROJEKTANT NOVA ENERGIJA doo, Ivana Vujoševića 26 81000 Podgorica, Crna Gora, PIB 02282226 tel/fax: +3822261142, email: novaenergija@t-com.me	NARUČILAC UNIVERZITET CRNE GORE ARHITEKTONSKI FAKULTET
Glavni inženjer: dr Miroslava Vujadinović, dipl.inženj.	Objekat JU ARHITEKTONSKI FAKULTET
Odgovorni inženjer: Vuk Jeknović, dipl.inženj.	Lokacija: KP 1372/4 KO "PODGORICA I, PODGORICA LIP 14. DUP UNIVERZITET DR CENTAR, PODGORICA
Saradnik: Miloš Ćurčić, BSc. mel.	Naziv tehničke dokumentacije Glavni projekat
	Naziv tehničke dokumentacije Termotehničke instalacije
Naziv: Osnova suterena - Dispozicija opreme za grijanje, hlađenje i ventilaciju	Razmjera: 1:100 Broj crteža: 1
Datum izrade: TGO apr 1, 2015. godine	Datum revizije TGO 302

995/594mm



PREGLED NETO I BRUTO POVRŠINA PRIZEMLJA

01. PODEST GLAVNI	50,85m²	09. LIFT ZA STUDENTE	5,35m²	14. VJEŽBAONICA	100,70m²		
02. PODEST ZADNJI	24,24m²	10. LIFT ZA OSOBLJE	2,56m²	15. VJEŽBAONICA	101,40m²	UKUPNO NETO P PRIZEMLJA	1021,88m²
03. VJETROBRANI (2X)	29,12m²	11. BIBLIOTEKA / MEDIJATEKA	124,11m²	16. VJEŽBAONICA	101,10m²	UKUPNO BRUTO P PRIZEMLJA	1201,17m²
04. VJETROBRAN ZADNJI	7,32m²	12. KANCELARIJA STUDENT. SLUŽBE	31,24m²	17. VJEŽBAONICA	101,40m²		
05. PROSTOR ZA DOMARA/ČUVARA	8,93m²	13. STUDENTSKA SLUŽBA	32,10m²				
06. PROSTOR ZA ČISTAČICU	8,93m²						
07. CENTR. HOL SA STEPENIŠTIMA	362,9m²						

UKUPNO BRUTO P POSTOJEĆEG PRIZEMLJA	457,45m²
UKUPNO BRUTO P PLANIRANOG PRIZEMLJA	743,72m²

TFT CENTRIFUGE ZA FORMIRANJE ZIDNIH DIJELOVA SA FIXO OMBRAŽNIM PRIJELNIM HLAPIRIM
(ZA SENDVIČNE PANELE SIN 1/2 PLATE, SIN 1/2 PLATE I SIN 1/2 PLATE, DEBLJINE PANELA OD: 100 I 150 MM, SPAJANJE CELIĆ SE MLAPIM I CENTRIFUGIRAJU OD EPOXY-a U CELIĆIMA OD 60L)

SPIS NAŠIH KONTROLNIH SISTEMA KOJIMA SE PRVENSTVENO UNUTRAŠNJE I SPOLJAŠNJE JEDINICE CALL I REGULATORI (ZA NAŠEM KONTROLERU SU I PO 24 PRIKLJ.

CENTRALNO RADNOG FLUIDA - 3 CEVNI SISTEM
CENTRALNO RADNOG FLUIDA - 2 CEVNI SISTEM
CENTRALNO ZA CENTRALNO NADZIRANJE
FABAL KONTROLNIH SISTEMA
FABAL ZA LINIJAMA KONTROLERE
FABAL ZA KONTROLER REPERATORA

Oznaka ventilacionih kanala prema MEST EN 13779

- Kanal za otpadni vazduh
- Kanal za svježi vazduh
- Kanal za pripremljeni vazduh
- Kanal za odsisni vazduh vazduh

UNUTRAŠNJE JEDINICE VRV SISTEMA

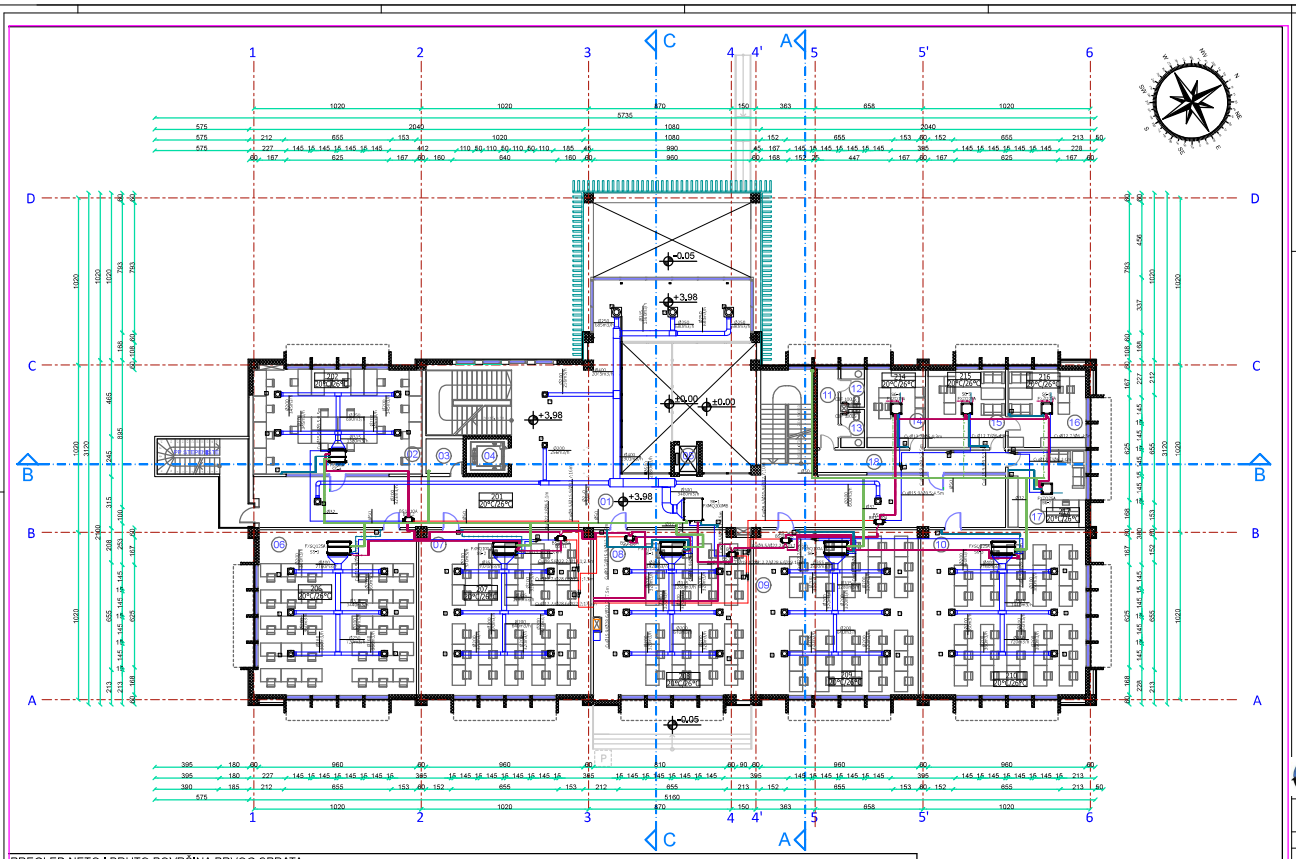
OZNAKA	Rashladni kapacitet UKUPNI	Kapacitet grijanja	Dimenzije H×W×D (mm)	Električne karakteristike	Priključci cjevovoda	
					Tečnost	Gas
FXSQ32A	3,600 W	4,000 W	245x550x800	9W (230V/P/50Hz)	Cu#6,35	Cu#12,7
FXSQ50A	11,200 W	12,500 W	245x1400x800	29W (230V/P/50Hz)	Cu#6,35	Cu#15,9
FXSQ125A	14,000 W	16,000 W	245x1400x800	33W (230V/P/50Hz)	Cu#9,52	Cu#15,9
FXMQ200MB	22,400 W	25,000 W	470x1380x1100	86W (230V/P/50Hz)	Cu#9,52	Cu#19,1

1. BAKARNA RAČVA (REFNET JOINT) za trocijevni VRV sistem, TIP: HRFQ28MXT, indeks kapaciteta do 28<240
2. BAKARNA RAČVA (REFNET JOINT) za trocijevni VRV sistem, TIP: HRFQ28MXT, indeks kapaciteta do 28<280
3. BAKARNA RAČVA (REFNET JOINT) za trocijevni VRV sistem, TIP: HRFQ28MXT, indeks kapaciteta do 28<
4. BAKARNA RAČVA (REFNET JOINT) za dvocijevni VRV sistem, TIP: HRFQ28MXTP, indeks kapaciteta do 28<280
5. BAKARNA RAČVA (REFNET JOINT) za dvocijevni VRV sistem, TIP: HRFQ28MXTP, indeks kapaciteta do 200
6. DŽAK U PATRONI (AUTRAŽNE VRV JEDINICE, tip: BHCMY50PB, proizvod: DAIKIN) 1 kom
7. CENTRALNI KONTROLER, tip: DCM601A51, proizvod: DAIKIN 1 kom
8. ELIMINATOR ZAŠTITNA REŠETKA, tip: VLAN-C dimenzije 550x200 mm, proizvod LINDAB 1 kom
9. VENTILACIONI VENTIL, tip: PK-N, veličina 100, proizvod LINDAB 1 kom
10. MAKARNA VRTLOŽNI DIFUZOR: KO-1; veličina 250; za obezvređenje vazduha
11. Kružni difuzor za obezvređenje vazduha, tip: KO-1NRADUM, veličina 315, proizvod LINDAB 1 kom
12. Kružni difuzor za obezvređenje vazduha, tip: KO-3NRADUM, veličina 315, proizvod LINDAB 1 kom
13. Kružni difuzor za obezvređenje vazduha, tip: KO-4NRADUM, veličina 315, proizvod LINDAB 1 kom
14. Kružni difuzor za obezvređenje vazduha, tip: KO-5NRADUM, veličina 315, proizvod LINDAB 1 kom
15. ELIMINATOR ZAŠTITNA REŠETKA, tip: VLAN-C dimenzije 700x400 mm, proizvod LINDAB 1 kom
16. MAKARNA VRTLOŽNI DIFUZOR: KO-1; veličina 400; za obezvređenje vazduha
17. MAKARNA VRTLOŽNI DIFUZOR: KO-1; veličina 300; za obezvređenje vazduha
18. MAKARNA VRTLOŽNI DIFUZOR: KO-1; veličina 300; za obezvređenje vazduha
19. MAKARNA VRTLOŽNI DIFUZOR: KO-1; veličina 300; za obezvređenje vazduha
20. Rešetka potisnog rešetka za odušnog vazduha, tip: KO-1x4PDC-600x200 dimenzija 200x150 mm
21. Rešetka potisnog rešetka za odušnog vazduha, tip: KO-1x4PDC-600x200 dimenzija 300x100 mm

NOVA ENERGIJA
TEHNIČKI ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE
NOVA ENERGIJA d.o.o., Ivana Vujoševića 26, 81000 Podgorica, Crna Gora
Tel/Fax: +382 (0)20 246142, email: novaenergija@t-com.me

PROJEKTANT: NOVA ENERGIJA doo, Ivana Vujoševića 26 81000 Podgorica, Crna Gora, PIB 02282226 tel/fax: +3822246142, email: novaenergija@t-com.me	INVESTITOR: UNIVERZITET CRNE GORE ARHITEKTONSKI FAKULTET
Glavni inženjer: dr Mirosava Vujadinović, dipl.inženj.	Objekat: JU ARHITEKTONSKI FAKULTET
Odgovorni inženjer: Vuk Jeknović, dipl.inženj.	Lokacija: KP 1372/6 KO "PODGORICA I, PODGORICA UP 14. DUP UNIVERZITET DR CENTAR, PODGORICA
Saradnik: Miloš Ćurčić, BSc. mel.	Naziv tehničke dokumentacije: Glavni projekat
	Naziv tehničke dokumentacije: Termotehničke instalacije
	Razmera: R=1:100
Naziv: Osnova prizemlja - Dispozicija opreme za grijanje,hlađenje i ventilaciju	Broj crteža: 2
Datum izrade: IVQ. god. 2015. godine	Glavni inženjer: dr Mirosava Vujadinović 303

996x594mm



PREGLED NETO I BRUTO POVRŠINA PRVOG SPRATA

01. HOL ZA STEPENIŠTIMA	270,27m²	08. VJEŽBAONICA	96,96m²	15. KABINET PRODEKANA	22,47m²		
02. DIPLOMSKA SALA	66,25m²	09. VJEŽBAONICA	101,09m²	16. KABINET PRODEKANA	22,59m²	UKUPNO NETO P I SPRATA	964,40m²
03. TEHNIČKA PROSTORIJA	4,72m²	10. VJEŽBAONICA	101,38m²	17. PRAVNA SLUŽBA	22,44m²	UKUPNO BRUTO P I SPRATA	1078,71m²
04. LIFT ZA STUDENTE	5,26m²	11. PREDPROSTOR TOALETA	6,08m²	18. HODNIK	15,78m²		
05. LIFT ZA OSOBLJE	2,56m²	12. TOALET	3,24m²				
06. VJEŽBAONICA	97,82m²	13. TOALET	3,24m²				
07. VJEŽBAONICA	105,39m²	14. RAČUNOVODSTVO	16,97m²				

UKUPNO BRUTO P POSTOJEĆEG I SPRATA	457,45m²
UKUPNO BRUTO P PLANIRANOG I SPRATA	621,26m²

VENTILATORI

OZNAKA	Maksimalni protok vazduha	Promjenjivi protok vazduha	Napor ventilatora	Električne karakteristike
CBF100L5	100m3/h	54m3/h	75 Pa	28,1W (230V/1F/50Hz)

TIP I CENTRIČNI ZA CIJEVOVODNI MREŽNIK SLJUD PRIKLJUČNICE PTLUSENE I HLJEVICA do DIMENZIJA PRIMA 315 i/ili 200, 315 i/ili 200 i 125 i/ili 160, LEŽIŠNIM PRIMA DN 1653, OKVIRUČE ČELIČNE ZEMLJIVIM CENTRIČNIM UŠIVIM i/ili CURE DIN 1851a

SITA-MELOVI KONTROLUJUĆI SISTEMA KOJIM SE POVEZUJU UNUTRAŠNJE I SPOLJAŠNJE JEDINICE KAO I KABLIRAJU I DO LOKALNIH KONTROLERA SU LJ=70 i 24,75mm2

- CJEVOVOD RADNOG FLUIDA - 3-CJEVNI SISTEM
- CJEVOVOD RADNOG FLUIDA - 2-CJEVNI SISTEM
- CJEVOVOD ZA ODVOD KONDENZATA
- KABL KONTROLNOG SISTEMA
- KABL ZA LOKALNE KONTROLERE
- KABL ZA KONTROLER REKUPERATORA

Oznaka ventilacionih kanala prema MEST EN 13779

- Kanal za otpadni vazduh
- Kanal za svježi vazduh
- Kanal za pripremljeni vazduh
- Kanal za odsisni vazduh vazduh

UNUTRAŠNJE JEDINICE VRV SISTEMA

OZNAKA	Rashladni kapacitet (kW)	Kapacitet grijanja	Dimenzije H×W×D (mm)	Električne karakteristike	Priključci cjevovoda	
					Vod/Gas	Gas
FXSQ80A	8,000 W	10,000 W	245x1000x800	213W (230V/1F/50Hz)	Cu#9,52	Cu#15,9
FXSQ100A	11,200 W	12,500 W	245x1400x800	296W (230V/1F/50Hz)	Cu#9,52	Cu#15,9
FXSQ125A	14,000 W	16,000 W	245x1400x800	334W (230V/1F/50Hz)	Cu#9,52	Cu#15,9
FWXZ20TAB	22,400 W	25,000 W	470x1380x1100	890W (230V/1F/50Hz)	Cu#9,52	Cu#19,1
FXZQ15A	1,700 W	1,800 W	260x575x575	43W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXZQ25A	2,800 W	3,200 W	260x575x575	43W (230V/1F/50Hz)	Cu#6,35	Cu#12,7

1. SAMARNA RAČVA (BRYNET JOINT) za tranjerni VRV sistem, TIP: HRW22BRJMT, indeks kapacitета do 25*>=50
2. SAMARNA RAČVA (BRYNET JOINT) za tranjerni VRV sistem, TIP: HRW22BRJMT, indeks kapacitета do 36*>=90
3. SAMARNA RAČVA (BRYNET JOINT) za tranjerni VRV sistem, TIP: HRW22BRJMT, indeks kapacitета do 25*
4. SAMARNA RAČVA (BRYNET JOINT) za tranjerni VRV sistem, TIP: HRW22BRJ3TP3, indeks kapacitета do 25*>=25
5. SAMARNA RAČVA (BRYNET JOINT) za tranjerni VRV sistem, TIP: HRW22BRJMT, indeks kapacitета do 200
6. ZONA KONTROLUJUĆI UNUTRAŠNJE VRV JEDINICE, tip: BRC1E53B5, protokol: ,DIAGNOV' i ili/ili
7. CENTRALNI KONTROLER, tip: DCM601A51, protokol: ,DIAGNOV' i ili/ili
8. ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip: VAL-K-22 dimenzija 204x102 mm, proizvođač LINDAB i ili/ili
9. VENTILACIONI VENTIL, tip: F-A-TL, ili/ili slič. proizvođač LINDAB i ili/ili
10. MAKSIMALNE VRTLOŽNE DIFUZORI VD-11, ili/ili slič. 25l za stavljanje vazduha
11. ili/ili difuzor za stavljanje vazduha, tip: VD-TR/RD25M, ili/ili slič. proizvođač LINDAB i ili/ili
12. ili/ili difuzor za stavljanje vazduha, tip: VD-TR/RD15M, ili/ili slič. proizvođač LINDAB i ili/ili
13. ili/ili difuzor za stavljanje vazduha, tip: VD-TR/RD25M, ili/ili slič. proizvođač LINDAB i ili/ili
14. ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip: VAL-K-22 dimenzija 204x102 mm, proizvođač LINDAB i ili/ili
15. MAKSIMALNE VRTLOŽNE DIFUZORI VD-11, ili/ili slič. 25l za stavljanje vazduha
16. MAKSIMALNE VRTLOŽNE DIFUZORI VD-11, ili/ili slič. 25l za stavljanje vazduha
17. MAKSIMALNE VRTLOŽNE DIFUZORI VD-11, ili/ili slič. 25l za stavljanje vazduha
18. MAKSIMALNE VRTLOŽNE DIFUZORI VD-11, ili/ili slič. 25l za stavljanje vazduha
19. ili/ili difuzor protivnog rešetka za ili/ili/ili vazduha, tip: RD-1M-RD-1/200-RD dimenzija 300x150 mm
20. ili/ili difuzor protivnog rešetka za ili/ili/ili vazduha, tip: RD-1M-RD-1/200-RD dimenzija 300x300 mm

NOVA ENERGIJA

DOO ZA PROJEKTOVANJE, INŽENJERING, PROMET I USLUGE
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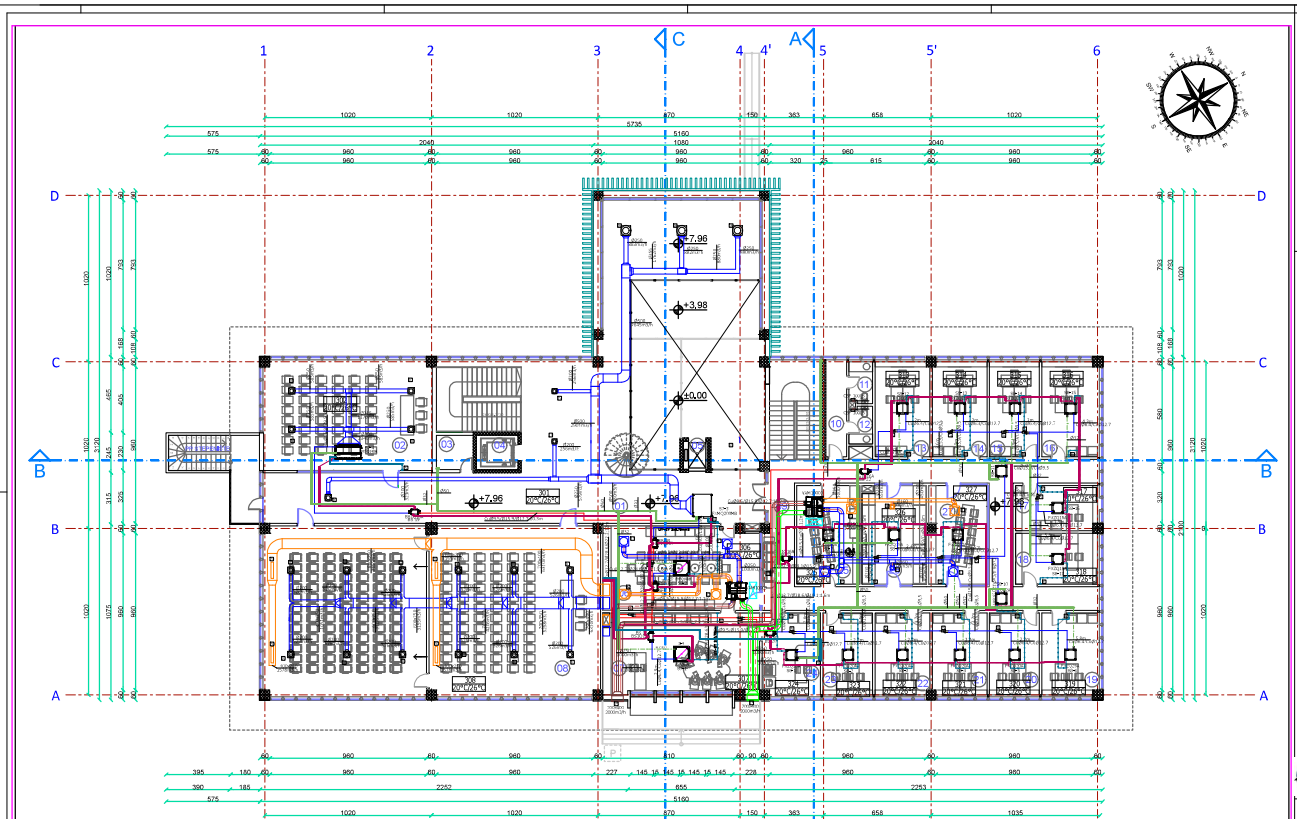
PROJEKTANT NOVA ENERGIJA doo, Ivana Vujoševića 26 81000 Podgorica, Crna Gora, PIB 02282326 tel/fax: +38220241142, email: novaenergija@mail.com	INVESTITOR UNIVERZITET CRNE GORE ARHITEKTONSKI FAKULTET
Glavni inženjer: dr Miroslava Vujadinović, dipl.inženj.	Objekat: JU ARHITEKTONSKI FAKULTET
Odgovorni inženjer: Vuk Jenković, dipl.inženj.	Lokacija: KP 1372/6 KO "PODGORICA I, PODGORICA LIP 14. DUP UNIVERZITET DR CENTAR, PODGORICA
Saradnik: Miloš Ćurović, BSc. mel.	Naziv tehničke dokumentacije: Glavni projekat
	Naziv tehničkog dokumentacije: Termotehničke instalacije
	Razmjera: R=1:100
Naziv: Osnova prvog sprata - Dispozicija opreme za grijanje/hlađenje i ventilaciju	Brojprilog: 3
Datum izrade: IV/V god. 2015. godine	Datum revizije IV/V 304

995×594mm



PREGLED NETO I BRUTO POVRŠINA DRUGOG SPRATA

01. HOL SA STEPENIŠTEM	221,29m²	09. HODNIK IZ ZA OSOBLJE SA STER.	100,65m²	17. KABINET	14,09m²	25. ČAJNA KUHINJA I TRPEZARIJA	23,29m²
02. SALA ZA DOKTORANTE	69,88m²	10. PREDPROSTOR TOALETA	7,58m²	18. KABINET	14,09m²	26. ARHIV STUDENTSKIH RADOVA	23,35m²
03. TEHNIČKA PROSTORIJA	4,72m²	11. TOALET	3,78m²	19. KABINET	18,06m²	27. RADNA SALA	21,35m²
04. LIFT ZA STUDENTE	5,35m²	12. TOALET	3,24m²	20. KABINET	15,69m²		
05. LIFT ZA OSOBLJE	2,56m²	13. KABINET	19,82m²	21. KABINET	17,14m²		
06. SALA ZA NASTAVNO OSOBLJE	49,00m²	14. KABINET	19,52m²	22. KABINET	17,14m²		
07. KABINET DEKANA	45,26m²	15. KABINET	18,13m²	23. KABINET	15,69m²		
08. AMFITEATAR	215,13m²	16. KABINET	20,98m²	24. SEKRETARIJA DEKANA	18,20m²		

UKUPNO NETO P II SPRATA	917,89m²
UKUPNO BRUTO P II SPRATA	1 196,23m²
UKUPNO BRUTO P PLANIRANOG II SPRATA	1 196,23m²

VENTILATORI

OZNAKA	Maksimalni protok vazduha	Prosječnoći protok vazduha	Napor ventilatora	Električne karakteristike
CBF100LS	100m3/h	54m3/h	75 Pa	29,1W (230V/1F/50Hz)

SVI CEVOVODI ZA FORIRANJE I NAMJENJENI SU ZA PRIMJENU SAMO PLIN GRUPE A1 (DO 2GRUPNE PREMA DIN 1953), ZRAKA ZA SUŠENJE (BEZ PRAŠINE I OSTALIH ČVRSTIH ČESTICA) I SLIČNE SREDINE.

SVI ELEMENTI KONTROLNOG SISTEMA KOJIM SE POVEZUJU UNUTRAŠNJE I SPOLJAŠNJE JEDINICE KAO I KABLIRANJE I LOKALNIH KONTROLERA SU U CENI 24,75m/m2

- CEVOVOD RADNOG FLUIDA - 3 CEVNI SISTEM
- CEVOVOD RADNOG FLUIDA - 2 CEVNI SISTEM
- CEVOVOD ZA ODVOD KONDENZATA
- KABL KONTROLNOG SISTEMA
- KABL ZA LOKALNE KONTROLERE
- KABL ZA KONTROLER REKUPERATORA

Oznaka ventilacionih kanala prema MEST EN 13779

- Kanal za otpadni vazduh
- Kanal za svježi vazduh
- Kanal za pripremljeni vazduh
- Kanal za odsisni vazduh vazduh

VENTILACIONE JEDINICE - REKUPERATORI

OZNAKA	Protok vazduha	Napor ventilatora	Dimenzije HxWxD (mm)	Električne karakteristike	Stepen korisnosti temperaturni	entalpijski
VMH1000J	1000m3/h	90 Pa	388x1350x1170	417W (230V/1F/50Hz)	79,0-86,1%	64,2%(h)/69,4%(g)

UNUTRAŠNJE JEDINICE VRV SISTEMA

OZNAKA	Rashladni kapacitet UKUPNI	Kapacitet grijanja	Dimenzije HxWxD (mm)	Električne karakteristike	Priključci cjevovoda Vrućost	Gas
FXSQ140A	16,000 W	18,000 W	245x1550x800	38kW (230V/1F/50Hz)	Cu#9,52	Cu#15,9
FXMQ200MB	22,400 W	25,000 W	470x1380x1100	86kW (230V/1F/50Hz)	Cu#9,52	Cu#19,1
FXZQ25A	1,700 W	1,900 W	260x575x575	43W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXZQ25A	2,200 W	2,500 W	260x575x575	43W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXZQ32A	2,800 W	3,200 W	260x575x575	43W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXZQ32A	3,600 W	4,000 W	260x575x575	49W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXZQ40A	4,500 W	5,000 W	260x575x575	59W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXFQ50B	5,600 W	6,300 W	204x840x840	50W (230V/1F/50Hz)	Cu#6,35	Cu#12,7
FXFQ100B	11,200 W	12,500 W	246x840x840	120W (230V/1F/50Hz)	Cu#9,52	Cu#15,9

- 01 SALA ZA STEPENIŠTEM (REFINET JOINT) za trazjeni VRV sistem, TIP: 1xRQ28MAHT, indeks kapaciteta do 28+40
- 02 SALA ZA RAČUN (REFINET JOINT) za trazjeni VRV sistem, TIP: 1xRQ28MAHT, indeks kapaciteta do 28+30
- 03 SALA ZA RAČUN (REFINET JOINT) za trazjeni VRV sistem, TIP: 1xRQ28MAHT, indeks kapaciteta do 28+
- 04 SALA ZA RAČUN (REFINET JOINT) za trazjeni VRV sistem, TIP: 1xRQ28MAHT, indeks kapaciteta do 28+30
- 05 SALA ZA RAČUN (REFINET JOINT) za trazjeni VRV sistem, TIP: 1xRQ28MAHT, indeks kapaciteta do 28
- 06 ČELNA KONTROLER UNUTRAŠNJEG VRV JEDINICE, tip BRC1H419W, proizvod „Daikin" 1 kom
- 07 DIGITALNI KONTROLER, tip DCM601A51, proizvod „Daikin" 1 kom
- 08 ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip VAA-02 dimenzije 1000x200 mm, proizvod LINDAB 1 kom
- 09 VENTILACIONI VENTIL, tip FK-3A, veličine 315, proizvod LINDAB 1 kom
- 10 MAKSIMALNE VRTLOŽNE DIFUZORI IDI-11, veličine 700, za ubacivanje vazduha
- 11 kom difuzor za ubacivanje vazduha, tip IDI-700/2DVN, veličine 315, proizvod LINDAB 1 kom
- 12 kom difuzor za ubacivanje vazduha, tip IDI-315/1DVN, veličine 125, proizvod LINDAB 1 kom
- 13 kom difuzor za ubacivanje vazduha, tip IDI-315/1DVN, veličine 160, proizvod LINDAB 1 kom
- 14 kom difuzor za ubacivanje vazduha, tip IDI-160/1DVN, veličine 160, proizvod LINDAB 1 kom
- 15 ALUMINIJUMSKA ZAŠTITNA REŠETKA, tip VAA-02 dimenzije 700x400 mm, proizvod LINDAB 1 kom
- 16 MAKSIMALNE VRTLOŽNE DIFUZORI IDI-11, veličine 400, za ubacivanje vazduha
- 17 MAKSIMALNE VRTLOŽNE DIFUZORI IDI-11, veličine 300, za ubacivanje vazduha
- 18 MAKSIMALNE VRTLOŽNE DIFUZORI IDI-11, veličine 300, za ubacivanje vazduha
- 19 MAKSIMALNE VRTLOŽNE DIFUZORI IDI-11, veličine 300, za ubacivanje vazduha
- 20 Metalna perforirana rešetka za ubacivanje vazduha, tip IDI-1M-MR-1000-20 dimenzije 1000x200 mm
- 21 Metalna perforirana rešetka za ubacivanje vazduha, tip IDI-1M-MR-1000-20 dimenzije 1000x200 mm

NOVA ENERGIJA

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Odgovorni inženjer:
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Lokacija: KP 1372/6 KO "PODGORICA I, PODGORICA
LIP 14. DUP UNIVERZITET DR CENTAR, PODGORICA

Saradnik:
Miloš Ćurović, BSc. mal.

Na temelju dokumentacije
Glavni projekat

Naziv tehničke dokumentacije
Termotehničke instalacije

Razmera
1:100

Naziv:
Osnova drugog sprata - Dispozicija opreme za grijanje,hlađenje i ventilaciju.

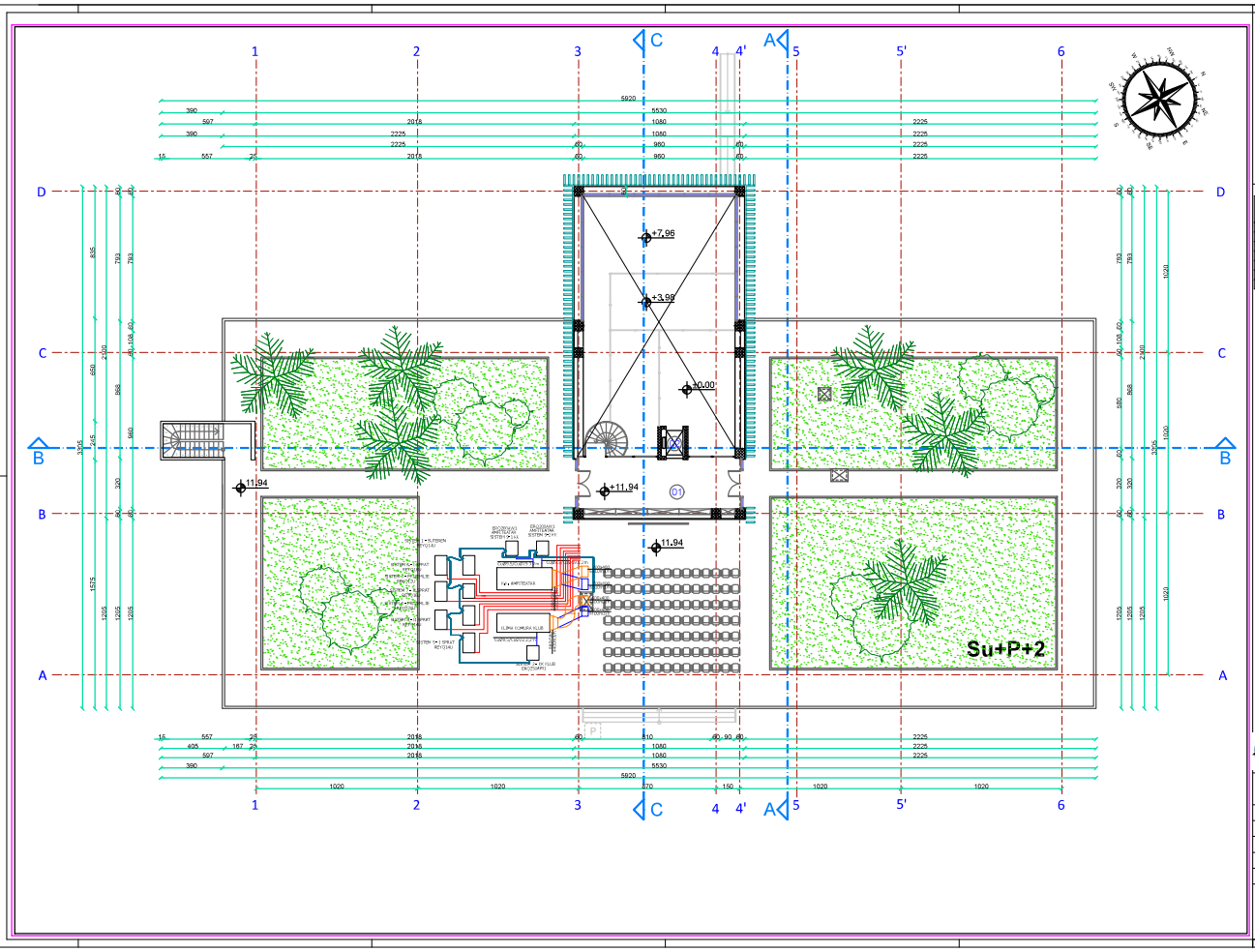
Broj crteža
4

Datum izrade i ver.
apr 1. 2015. godine

Datum revizije i ver.

305

595x594mm



STI CENTRALNE ZA GRIJANJE I HLAĐENJE SU UID UMREŽAVAJU POJEDINE HLJUČEVE (ka ZENITHU, PRIMA 320 ili Gira55, 320 ili Gira901 i 320 ili Gira901, ODNOSNO PRIMA CBI: DRU • SPAJANJE CEKI Ø MUFOM I CENTRALNIM ID-EOPNu 1.1 ILIMC SM-011).

SVIJETLARNICI KONTROLNOG SISTEMA KOSIM SE PRIVEZUJU UDUTRAŠNJE I SPOLJAŠNJE JEDINICE KAO I MRLJENICI ZA ALARM KONTROLERA SU (ITC- 24/7PRO)

- CEV KOJOI RADNOG FLUIDA - 3 CEJEN SISTEM
- CEV KOJOI RADNOG FLUIDA - 2 CEJEN SISTEM
- CEV KOJOI ZA UDUKO HUMIDIFIKATA
- FARBA KONTROLNOG SISTEMA
- FARBA ZA UNUTRAŠNJI KONTROLER
- FARBA ZA KONTROLER REMOTE/WIFI

Oznaka ventilacionih kanala prema MEST EN 13779

- Kanal za otpadni vazduh
- Kanal za svježi vazduh
- Kanal za pripremljeni vazduh
- Kanal za odsisni vazduh vazduh

SPOLJAŠNJE JEDINICE VRV SISTEMA

OZNAKA	Rashladni kapacitet UKUPNI	Kapacitet grijanja	Dimenzije HxWxD (mm)	Električne karakteristike	Priključci cjevovoda	
					Tečnost	Gas
REYQ32U	33,500 W	37,500 W	1685x930x765	8,230W (400V/3P/50Hz)-32A	Cu#12,7	Cu#28,6
REYQ40U	40,000 W	45,000 W	1685x1240x765	10,750W (400V/3P/50Hz)-32A	Cu#12,7	Cu#28,6
REYQ48U	45,000 W	50,000 W	1685x1240x765	12,800W (400V/3P/50Hz)-32A	Cu#12,7	Cu#28,6
REYQ60U	56,470 W	66,500 W	1685x1240x765	15,200W (400V/3P/50Hz)-32A	Cu#15,9	Cu#28,6
REYQ72U	63,000 W	63,000 W	1685x1240x765	19,600W (400V/3P/50Hz)-32A	Cu#15,9	Cu#28,6
ERQ20AAW	22,400 W	25,000 W	1680x930x765	5,980W (400V/3P/50Hz)-25A	Cu#9,52	Cu#19,1
ERQ25AAW	28,000 W	31,500 W	1680x930x765	7,700W (400V/3P/50Hz)-25A	Cu#9,52	Cu#22,2

1. BALANSNA RAČUN (REFNET JOINT) za trocjevni VRV sistem, TIP: HR(Q)BM4T, indeks kapaciteta do 25÷140
2. BALANSNA RAČUN (REFNET JOINT) za trocjevni VRV sistem, TIP: HR(Q)BM3T, indeks kapaciteta do 28÷200
3. BALANSNA RAČUN (REFNET JOINT) za trocjevni VRV sistem, TIP: HR(Q)BM2T, indeks kapaciteta do 280
4. BALANSNA RAČUN (REFNET JOINT) za dvocjevni VRV sistem, TIP: HR(Q)BM1TPS, indeks kapaciteta do 28÷280
5. BALANSNA RAČUN (REFNET JOINT) za dvocjevni VRV sistem, TIP: HR(Q)BM1T, indeks kapaciteta do 300
6. ZIDNA HLADNJAČNA JEDINICA VRV SISTEMA, tip: REC(W)EN6, proizvod: DAIKIN ( ) kW
7. DECENTRALIZE KONTROLER, tip: DIMS0EN1, proizvod: DAIKIN ( ) kW
8. ELIMINATOR/MIRILJ ZAŠTITNA REŠETKA, tip: VLAN2, dimenzije 595x295 mm, proizvod: LINDAB ( ) kW
9. VENTILACIONI VENTIL, tip: FP-36, ø50mm 230, proizvod: LINDAB ( ) kW
10. KARUSELNI VRTLIČNI DIFUZORI: KD-11, ø125mm 250, za ubacivanje vazduha
11. Difuzor za ubacivanje vazduha, tip: CD-7R/RCDRM, ø125mm 235, proizvod: LINDAB ( ) kW
12. Difuzor za ubacivanje vazduha, tip: CD-7R/RAVSM, ø125mm 325, proizvod: LINDAB ( ) kW
13. Difuzor za ubacivanje vazduha, tip: CD-7R/RAVLSM, ø125mm 460, proizvod: LINDAB ( ) kW
14. Difuzor za ubacivanje vazduha, tip: CD-7R/RAVMM, ø125mm 560, proizvod: LINDAB ( ) kW
15. ELIMINATOR/MIRILJ ZAŠTITNA REŠETKA, tip: VLAN2, dimenzije 595x295 mm, proizvod: LINDAB ( ) kW
16. KARUSELNI VRTLIČNI DIFUZORI: KD-11, ø125mm 470, za ubacivanje vazduha
17. KARUSELNI VRTLIČNI DIFUZORI: KD-11, ø125mm 350, za ubacivanje vazduha
18. KARUSELNI VRTLIČNI DIFUZORI: KD-11, ø125mm 350, za ubacivanje vazduha
19. KARUSELNI VRTLIČNI DIFUZORI: KD-11, ø125mm 350, za ubacivanje vazduha
20. Rešetka jednosmjerna rešetka za odsisnog vazduha, tip: KE-24/RE-270W/270 dimenzija 270W/270 mm
21. Rešetka jednosmjerna rešetka za odsisnog vazduha, tip: KE-24/RE-270W/150 dimenzija 270W/150 mm

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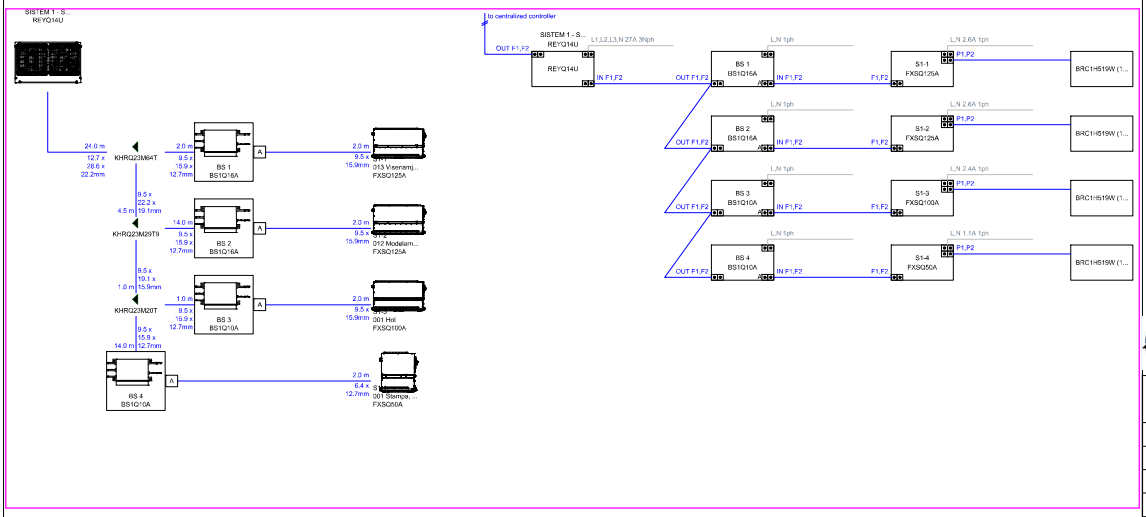
Saradnik Miloš Ćurović, BSc. mal.	Vrsta tehničke dokumentacije Glavni projekat
	Naziv tehničke dokumentacije Termotehničke instalacije — Razmjera 1:100
Naziv Osnova krova - Dispozicija opreme za grijanje,hlađenje i ventilaciju	Broj crteža 5
Datum izrade: IVQ ap 1. 2015. godine	Datum revizije: IVQ 306

930x594mm



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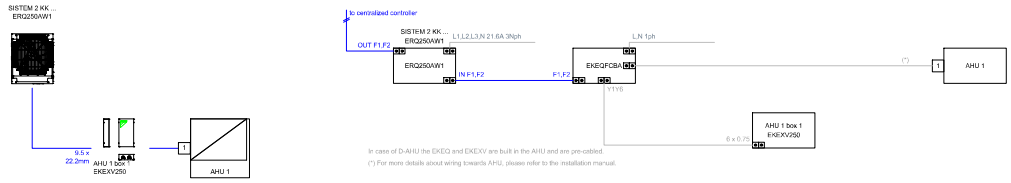
Saradnik Miloš Ćurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera -
Prilog Šema povezivanja cjevovoda i kablova VRV sistema 1	Broj priloga 6
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P.

307

695x297mm



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Saradnik Miloš Ćurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 2	Broj priloga: 7
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P. 308

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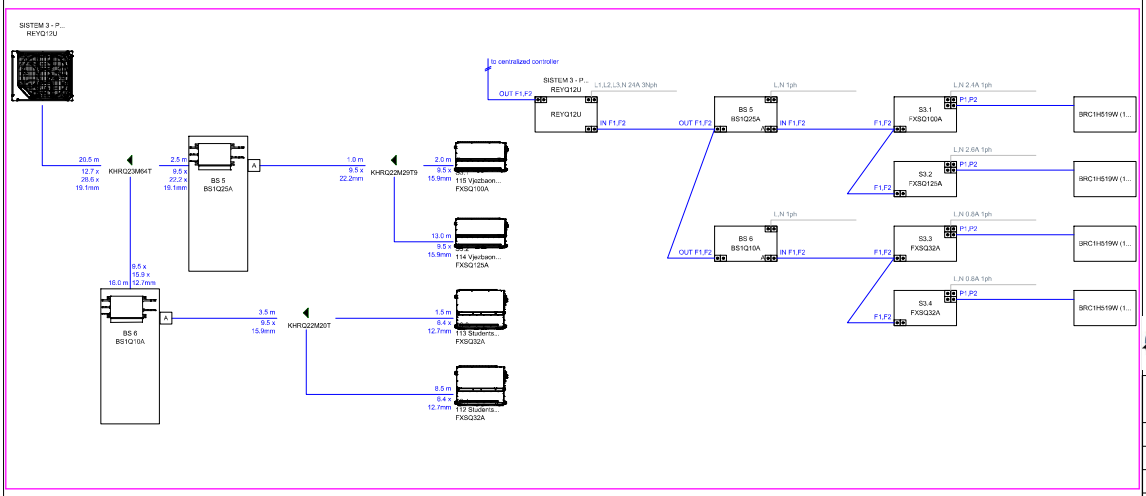

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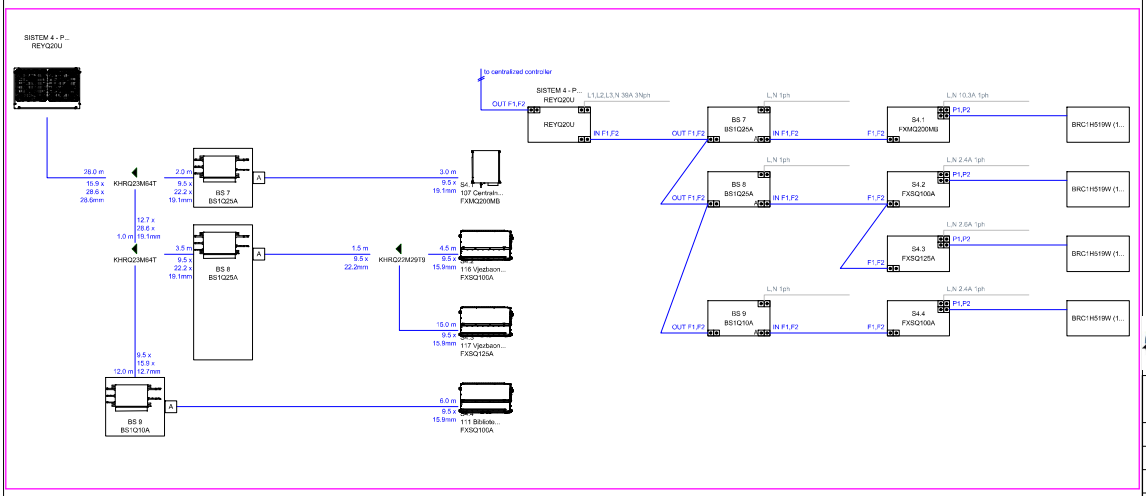
Odgovorni inženjer: Vuk Janković, dipl.ing.maš.	Lokacija KP 1372/4 KO "PODGORICA I, PODGORICA UP 14, DUP UNIVERZITETSKI CENTAR, PODGORICA
Saradnik Miloš Čurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 3	Broj priloga: 8
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P.:

309

695x297mm



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Odgovorni inženjer: Vuk Janković, dipl.ing.maš.	Lokacija KP 1372/4 KO "PODGORICA I, PODGORICA UP 14, DUP UNIVERZITETSKI CENTAR, PODGORICA
Saradnik	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera -
Prilog Šema povezivanja cjevovoda i kablova VRV sistema 4	Broj priloga 9
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P. 310

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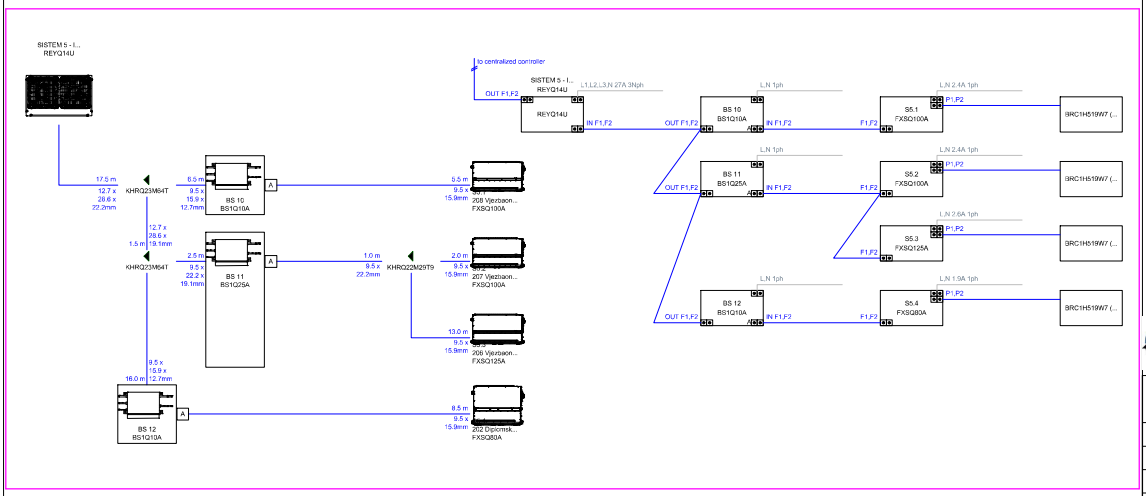

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	Dio tehničke dokumentacije: Termotehničke instalacije Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 5	Broj priloga: 10
Datum izrade i MJR: april, 2019. godine	Datum revizije i MJR:

311

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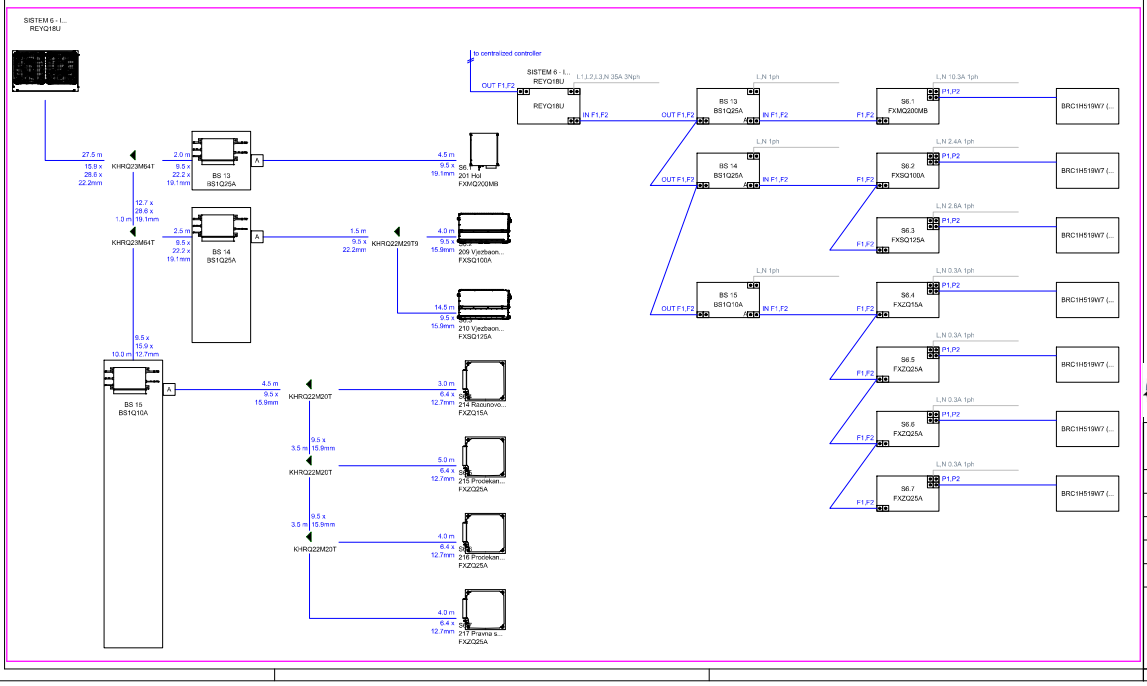

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Saradnik: Miloš Ćurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije: Termotehničke instalacije Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 6	Broj priloga: 11
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P. 312

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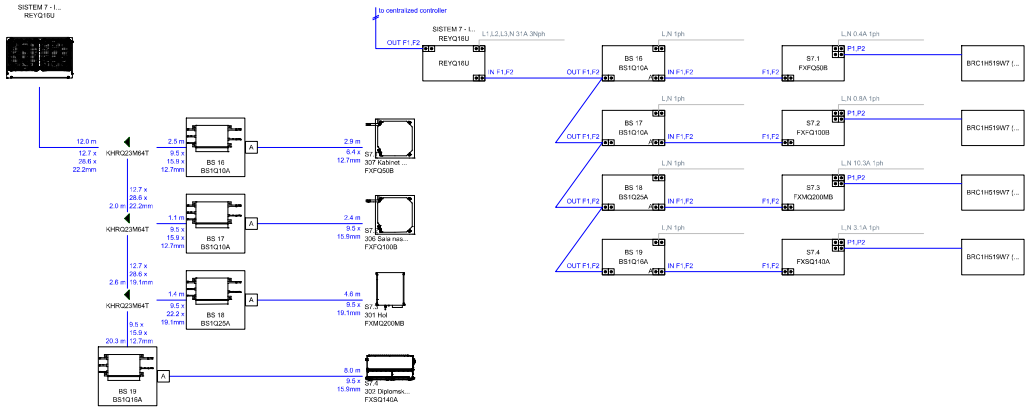

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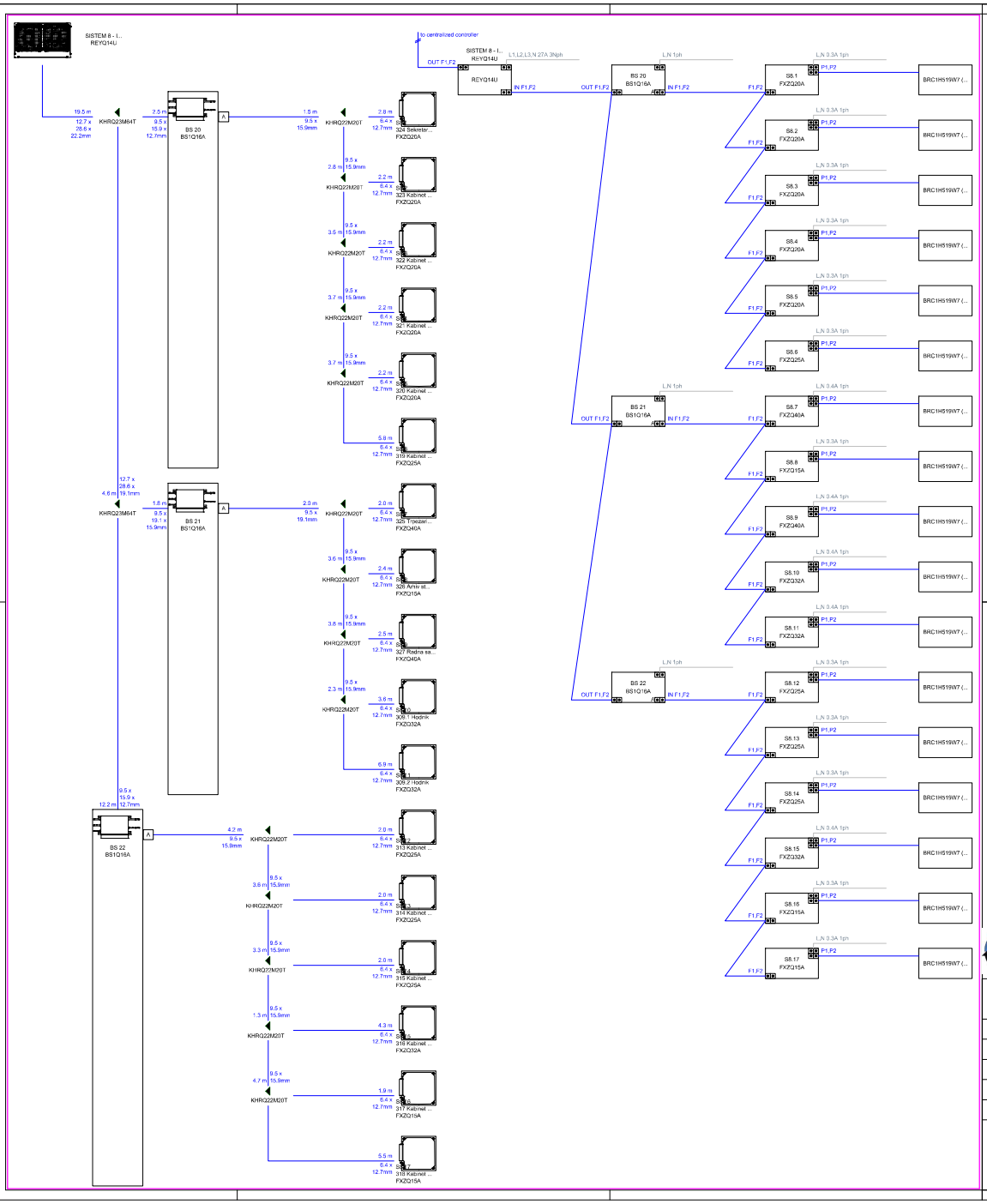
Odgovorni inženjer: Vuk Janković, dipl.ing.maš.	Lokacija KP 1372/4 KO "PODGORICA I, PODGORICA UP 14, DUP UNIVERZITETSKI CENTAR, PODGORICA
Saradnik: Miloš Ćurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije: Termotehničke instalacije; Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 7	Broj priloga: 12
Datum izrade i MJR: april, 2019. godine	Datum revizije i MJR:

313

695x297mm



NOVA ENERGIJA

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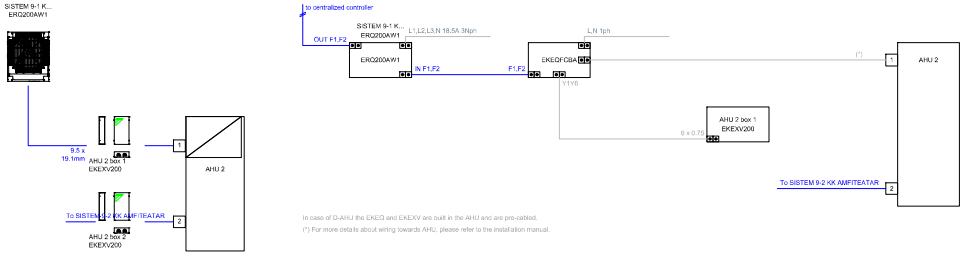
Odgovorni inženjer: Vuk Janković, dipl.ing.maš.	Lokacija KP 1372/4 KO "PODGORICA I, PODGORICA UP 14, DUP UNIVERZITETSKI CENTAR, PODGORICA
Saradnik Miloš Čurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera: -
Prilog Šema povezivanja cjevovoda i kablova VRV sistema 8	Broj priloga 13
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P. 314

695x594mm



In case of D-AHU the EKEQ and EKEXV are built in the AHU and are pre-cabled.

(*) For more details about wiring towards AHU, please refer to the installation manual.

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Saradnik Miloš Čurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera: -
Prilog: Šema povezivanja cjevovoda i kablova VRV sistema 9-1	Broj priloga: 14
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P. 315

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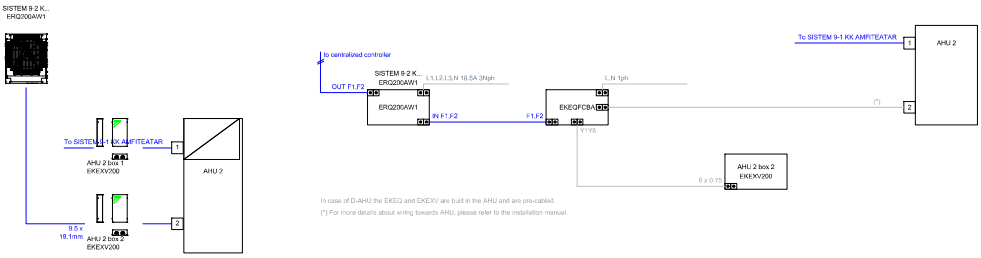

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Saradnik Miloš Čurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije — Razmjera: -
Prilog Šema povezivanja cjevovoda i kablova VRV sistema 9-2	Broj priloga 15
Datum izrade i MJR april, 2019. godine	Datum revizije i MJR

316

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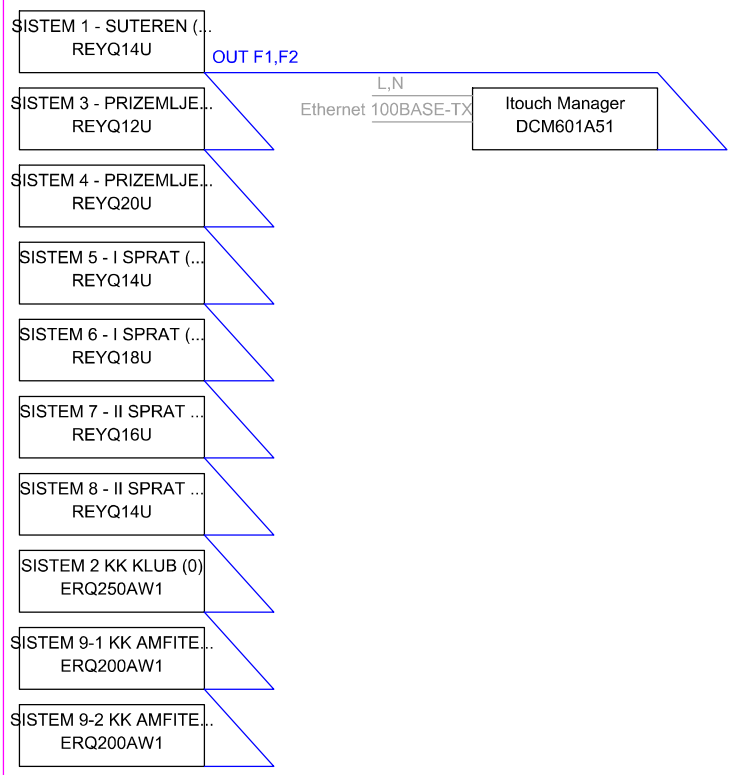

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Saradnik Miloš Ćurović, BSc. maš.	Vrsta tehničke dokumentacije Glavni projekat
	Dio tehničke dokumentacije Termotehničke instalacije Razmjera -
Prilog Šema povezivanja kablova centralnog kontrolera	Broj priloga 16
Datum izrade i M.P. april, 2019. godine	Datum revizije i M.P.

317

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