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|  | Technical Specification | | NORDLUXE POD 1 |
| | Document Number: | NL-1-1-100 | Rev 001 |

TECHNICAL SPECIFICATIONS

Client: Nordluxe Project:

Nordluxe Pods

CTR: P.o.P

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1.0 GENERAL

2.0 DESIGN CRITERIA

3.0 ARCHITECTURAL

4.0 PIPING

5.0 ELECTRICAL

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7.0 HEALTH SAFETY ENVIROMENT

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Section 1.0 General

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1.1 DEFINITIONS & ABBREVIATIONS

| | |
|----------|--|
| .dwg | AutoCAD |
| .pdf | Portable Document Format |
| BOA | Based on Area |
| BBR_23 | Swedish Building Regulations |
| CE | European Conformity |
| Client | Nordlux |
| CTR | EKON Konteyner & Prefabrik, Istanbul, Turkey |
| dB(A) | Decibels |
| EAHP | Exhaust Air Heat Pump |
| GA | General Arrangement |
| House(s) | Complete or whole set of Nordlux Pods |
| HU | Hook Up |
| ITP | Inspection Test Plan |



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|---------|-----------------------------------|
| ITR | Inspection Test Record |
| LAN | Local Area Network |
| QC | Quality Controller- Kevin Mann |
| MAR | Material Approval Request |
| mm | Millimetres |
| MSDS | Material Safety Data Sheet |
| PBA | Planning and Building Act |
| QAQC | Quality Assurance Quality Control |
| RAL | Colour Matching System |
| SWL | Safe Working Load |
| Unit(s) | Single FLEXI-PACK unit |
| VL | Vendor List |
| VO | Variation Order |
| WHB | Wash Hand Basin |
| WC | Water Closet |

1.2 UNITS

All weights and dimensions are in metric units except where noted otherwise.

1.3 DRAWINGS, GENERAL, MATERIALS

The Client will be responsible for the approval as necessary of all drawings. Text on drawings and As-Built drawings shall be in English language. Design and Detailed Engineering drawings for all disciplines shall be submitted to Client for review in both .dwg and .pdf formats. Preparation of drawings, instruction books and manuals shall be done in co-operation with the Client. All construction activities shall be in accordance with the latest Swedish and Norwegian building regulations BBR_23.

MATERIAL SPECIFICATION AND DOCUMENTATION:



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All materials, equipment and components for use shall be new, and of good quality and suitable for use in the European market under the CE marking. Deviations from any product or material that does not have CE conformity must be prior approved by the Client. All materials, equipment and components must be pre-approved using the Client MAR documentation process. Construction products must be certified by type approval controlled under the regulations of PBA. No asbestos containing products shall be used. All MSDS, Fire Rating Certification, Manufacturers Product Data Sheet, Energy Performance Calculations, Snow and Wind Load Calculations must be provided by the CTR at the earliest opportunity for approval from Client Architect and management.

See section 6.2 & 6.3 for Fire Protection Documentation and Fire Classification.

1.4 CONSTRUCTION AND PERFORMANCE

PLANNING:

It will be the responsibility of the CTR to supply a master schedule of the construction activities for these works within 30 days of signing the contract. This schedule shall be revision 0 and will reflect the key duration periods and milestones.

Sections under the heading of House Construction will clearly identify and not be limited to a minimum of the following:

Engineering: A breakdown of all related stages including planning and materials take off info.

Procurement: A breakdown of all CTR and client materials and equipment with key delivery dates.

Fabrication: Identify all the various stages of fabrication to final assembly and will include secondary supports.

Outfitting: Assembly and installation, detail cable routing plans, equipment installation, cable pulling, termination, piping installation, HVAC system and pre-commissioning.

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PROGRESS REPORTING:

During the contract, the CTR shall submit an agreed form of progress report to the Client every fortnight.

The report shall include planned and actual progress (and percentage complete figures) for the design and construction activities in line with the master schedule and in agreement with the requirements of the Client

The report shall include details of all procurement progress, i.e. placing of orders, estimated delivery dates, actual receipt of deliverables. Construction progress, key objectives, man power requirements, issues and concerns.

INSPECTION AND TEST PLAN (ITP):

The CTR shall follow Client ITP format after the effective date of the contract. This plan shall include but not be limited to inspection and testing, electrical, architectural, piping and HVAC.

INSPECTION AND TEST RECORD (ITR):

The CTR shall follow Client ITR format after the effective date of the contract. These records shall include but not be limited to inspection and testing, electrical, architectural, piping and HVAC and will form part of the commissioning scope.

1.5 MODIFICATIONS

The Client is entitled to request modifications or additional work. Such extra work shall only be carried out upon written request to the CTR.

All such work shall be carried out only per separate written agreements, which describe the additional work or changes to Contract

For all modifications and changes the Variation Order (VO) form shall be filled out and signed by both parties. No work shall start before the VO is signed.

Changes arising during the construction period, from contract date and, which require modification to the House shall be carried out by the CTR.

For work of the type mentioned above, additional charges or reductions shall be calculated per the stipulations of the contract and forwarded to the Client for approval before the execution.



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1.6 VENDOR MATERIAL SUPPLIER LIST

CTR shall provide to Client a detailed vendor list of all material suppliers that shall be used on the project. Client can reserve the right to audit any supplier on the VL regarding QAQC procedures, previous projects, safety performance etc.

Note – Vendors must be selected based on CE approval, ISO certification and type approval of materials.

1.7 LIFTING METHOD

Primary lifting method used for Nordluxe assembly sequence shall be lifting crane with boom and gib. CTR to submit to Client a SWL for the selection of crane.

Secondary lifting method used for Nordluxe assembly shall be mechanical fork-lift or mechanical lifting aid.

1.8 HU WORKS

CTR shall submit details of foundations, structural analysis and the hook-up joints of the house(s) and unit(s) required for site works.

1.9 Quality Controller- Kevin Mann

Final list for all documentation e.g. Safety, Energy, Fire, Moisture shall be decided from the Quality Controller who shall assist in any documents deemed necessary by the relevant authorities.

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Section 2.0 Design Criteria

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2.1 MAIN CHARACTERISTICS

Unit shall be designed, fabricated and erected using the Nordluxe system.

Dimensions of a single unit are as follows:

Length: 6.53m Width: 3.33m Height: 3.09m

Support brackets 10cm & 20cm

Quantity of units shall be as per approved detailed engineering drawings.

Minimum requirements are as follows:

- Open plan kitchen
- Living area
- Toilet and shower area
- Bedroom
- Cupboard space

The above minimum requirements shall be approved during the detailed engineering phase.

2.2 OPERATIONAL CONDITIONS

Design for the Nordluxe Pods shall be in accordance to the design calculations and municipality requirements.

The average temperatures are as follows:

- Winter 20^C
- Summer 45^C

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2.3 ENVIRONMENT CONDITION

Special attention should be paid in the design and construction to limit the vibration and noise levels within the houses. The noise and vibration limits shall conform to the latest Swedish and Norwegian building regulations. Consideration shall be taken to achieve Zero pollution in all conditions.

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3.1 GENERAL

The finished houses shall comply with the latest building regulations and municipality requirements. The construction and layout design should consider minimizing noise and temperature transmission. The houses shall be arranged to European compliance considering type approval and CE standards. Design drawings shall be submitted to CTR with a maximum of two (2) different designs envisaged for the project. Height in accommodation must not be lower than 2400 mm from top finish floor to lower edge ceiling, ceilings shall be arranged in cooperation with Client Architect. Corridor bulkheads, including doors shall satisfy the requirements for fire-safety classification rules. See section 6.0. Structural openings for windows and doors shall have a +/- clearance of 20-30mm.

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3.2 INSULATION BULKHEADS AND PANELLING

All insulation, bulkheads and paneling shall be built and installed as per latest building regulations. Special consideration shall be made towards insulation requirements to the house with regards to fire protection and to prevent the loss of heat from the external environment and thermal bridging. Insulation shall be calculated as per Table A. Insulation materials shall be non-combustible, vermin proof, damp proof, and suitably protected against mechanical damage. Asbestos based products shall **NOT** be used. Supplier shall submit Asbestos Free Compliance Certificate for all the materials used. Special attention should be given to ensure adequate sound insulation within the houses. Internal and external insulation thickness shall be calculated per U-Values. Section 1.4 above shall be applicable with the submittal of Energy Performance Calculations for insulation products and materials.

Table A

| Walls | | Ceiling | | Floor | |
|-------|------|---------|------|-------|------|
| 0,18 | 0,18 | 0,13 | 0,13 | 0,15 | 0,15 |

Bulkheads and ceilings shall be prefabricated at the CTR worksite premises consisting but not limited to the following: insulation, magnesium board, battens, foil face film, neoprene and air gaps for vapour and the like. Minimum decibel level shall be 45 dB(A). Fire rating certification shall be submitted as per Section 1.4 and have a minimum resistance of one (1) hour. Client requires that the internal sizes of the rooms be maximized in both width and height. Magnesium boards shall be water resistant in all areas of the house and **chloride free**, no mold growth shall be permitted. Data sheets as per Section 1.4 must be submitted to Client for review on Magnesium boards for the house. Manufacturer's instructions for fixing shall be adhered to, in general Stainless-Steel screws shall be used.

Toilet areas shall have ceramic tiles as a standard finish with Client Architect approving type, quality and colour finish. Data sheets and colour charts shall be submitted to Client Architect at the earliest opportunity. Anti-slip tiles shall be used for the floor. Moisture resistant properties shall be used and type of material or coverings for all toilets and wet areas shall be submitted to Client as per Section 1.4

Wall and ceiling finish shall be smooth and free from any obtrusions, ready for painting at site. Ceiling colour shall be durable pure white paint with all fixtures and fitting flush type. Wall colour shall be approved by Client Architect.

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3.3 WINDOWS

All windows shall be formed with tempered safety glass and triple glazed or latest Argon gas type suitable to BBR requirements and Swedish and Norwegian rules. Tilt and turn, sliding, casement and fixed windows shall be used as a norm. All windows shall every window shall have at least one key. Multi-point single-lever locking system to used. Manufacturers U-Value data to be submitted to Client in accordance to Section 1.4.

3.4 DOORS

All doors shall not be less than 900mm with a clear passage dimension of at least 800mm, when the door is opened at 90°. Standard width for entrance door shall be 1000mm. Minimum height of threshold shall be no higher than 15mm. All internal and entrance doors shall be confirmed by Client Architect and as per municipality requirements. Doors shall either be of aluminum or with RAL finish(s) confirmed by Client Architect. Hollow core internal shall not be used. Manual door closers shall be installed on all entrances. Stainless steel hinges shall be used on all doors with door stopping devices used as a norm on all doors to prevent damage to bulkheads. Glazed doors shall have toughened safety glass. Apertures must not to be added to fire doors unless the fire integrity can be maintained. Manufacturers U-Value data for external door to be submitted to Client in accordance to Section 1.4.

3.5 FLOORING

Final floor finish shall be hardwood flooring installed in all areas except from bathroom. Product material to be suitable for designated area with moisture resistant properties allowed for kitchen area. Durable anti-slip ceramic floor tiles to be used in bathrooms. All floors shall be on the same elevation and one continuous level. Underfloor heating will be used in all areas as a norm. The toilet area shall be wet type with a slope to the floor drain. No steps are acceptable within the houses. All flooring types and colours shall be approved by the Client Architect. Flooring to be installed as per manufacturer instructions with the substrate clean and dry with a moisture content of less than 10%.

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3.6 TOILET AND SHOWER

Toilet and shower area as per the design drawings. All toilets and showers shall be outfitted with high quality fixtures and fittings and meet CE standards and latest building regulations. Future maintenance shall be the factor for choice of ceramic sanitary ware with spare parts locally available in Sweden and Norway. Toilet facilities shall be lockable from the inside. Floor drainage shall be stainless steel type. Shaving sockets shall be incorporated within the mirror and all electrical fittings shall be IP44 rated. Ceramic tiles to be used on walls and anti-slip tiles on floors. Moisture resistant barrier to be used in all wet areas between the structural walls, floor and ceiling and the ceramic tiles. Restricted mobility guidelines to be adhered to for distance between shower, WC & WHB. Documentation to be submitted as per Section 1.4.

3.7 DECORATION

CTR shall present at the earliest opportunity all data sheets and documentation as per Section 1.4. Colour charts for all types of decoration to be submitted to Client, flooring type, wallpaper, paint, ceramic tiles, cladding etc.

Joints on walls to be plastered and free from obtrusions ready for painting. Durable undercoat to be used on wall surface prior to top coat finish.

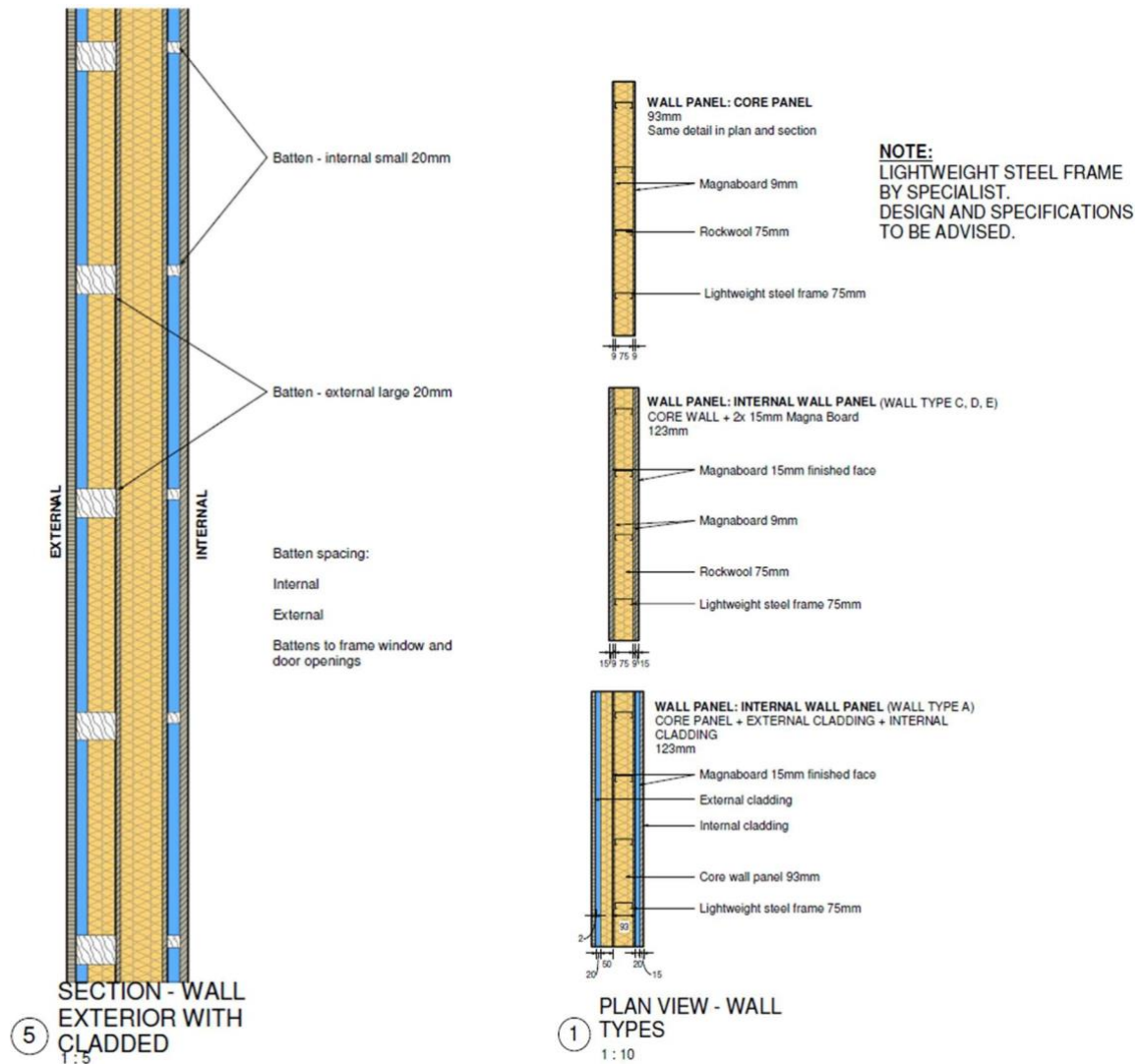
3.8 EXTERNAL CLADDING

All cladding shall be installed as per manufacturer's instructions. Sub-frame, studs or like to be used with concealed fixing method used wherever possible. Iron vitriol (Ferrous Sulphate) surface treatment to be used on ground floor cladding. Treatment to be brushed or sprayed. Dimensions of untreated wood to be approved by Client Architect. Sheet material shall be used on first floor with approval from Client Architect. Manufacturers fixing methods shall be used for all types of cladding. All documentation and U-Value data to be submitted as per Section 1.4. Cladding materials shall not constitute an undue fire risk and shall be non-combustible.

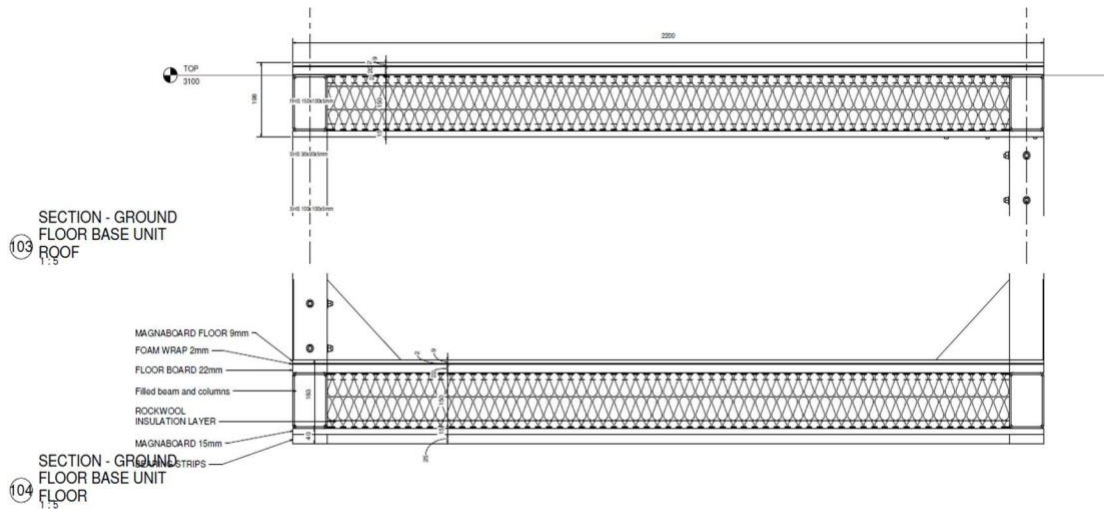
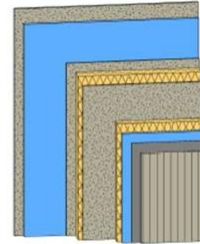
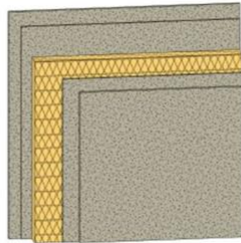
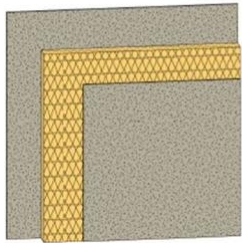
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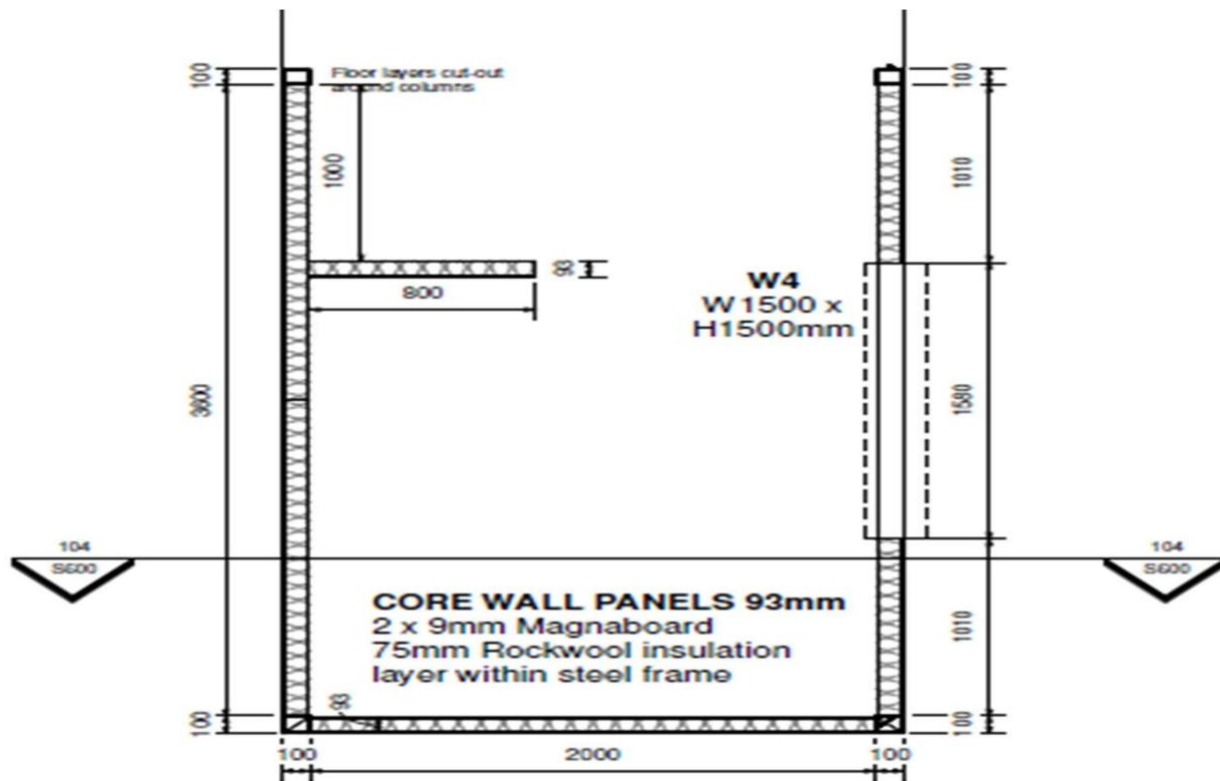
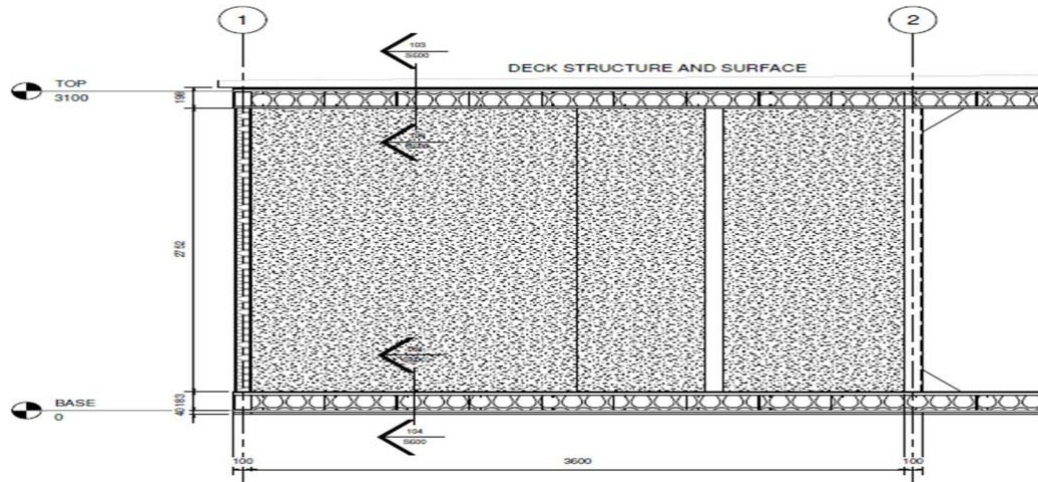
3.9 Nordlux SYSEM

All units and houses shall be designed using the unique Nordlux system. This system consists of a lightweight steel frame with insulation, battens, core panels and finished with chloride free magnesium board. See example details:



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Section 4.0 PIPING

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4.1 PIPING GENERAL

The hot and cold-water piping system shall be divided into suitable sections with isolating valves. All pipes for hot and cold-water pipes shall be PPR inside the house. Insulation of pipes shall be in accordance with latest Swedish and Norwegian building regulations. All materials shall be of a high standard and suitable for use in the European market under the CE standard. uPVC shall be used for the sewage lines. All pipes should be adequately supported with the spacing's dependent on the material of the pipe. Allowance should be made to accommodate reasonable movement, including thermal movement. Pipes, fittings and joints should be able to withstand an air test of positive pressure. At points where pipes are penetrating the structure, suitable measures must be taken to prevent damage or misalignment with the use of duct pieces or spool that must be suitably sealed to prevent the ingress of gas and vermin.

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4.2 BLACK & GREY WASTE

An adequate system of drainage shall be provided to carry foul water from appliances within the Pods to the public sewers. Attention shall be given to adequate grey water drainage within shower area. Grey and black water system drainages shall be collected as per the requirements of the detailed engineering drawing. Sewage water installation shall be in such a way that 150% of the draw off flow of the water outlets can be continuously drained. Odour must not spread through the waste pipe system; black and grey waste stack pipes shall be sufficiently vented. Sufficient rodding points shall be installed to clear any blockages that may occur. Waste pipes for toilets shall be no less than 100mm. All points of discharge into the system shall be fitted with a trap (e.g. water seal trap) to prevent foul air from entering the system.

- **Note: The sewage system shall meet the Rules/ Requirements to operate in the European market under the CE standard and comply with local BBR standards**

4.3 HOT & COLD WATER

Isolating valves shall be provided in the water supply system to permit maintenance. Each toilet / shower area shall be capable of being isolated with valves for hot and cold water. Stop valves shall be provided on all supply lines to wash basins, sinks and showers etc. All hot water lines shall have miniature ball valves at faucet connections. Taps to which hoses may be, connected externally for use in the garden location are to be protected against backflow by means of a double check valve. Electric calorifiers, with heating elements suitably per area shall be provided and each sized for circulation by one (1) hot water pump. The domestic hot water system shall be a ring main. Hot water circulating pumps shall be provided as required. Cold tap water shall meet the quality requirements for drinking. Hot tap water shall be hot enough with a water temperature of at least 50 °C can be achieved after the water outlet. To reduce the risk of scalding, the maximum hot tap water temperature must not exceed 60 °C. Circulation pipes for hot tap water shall be designed in such a way that the temperature of the circulating hot tap water does not drop below 50 °C in any part of the house. Hot and cold-water piping shall be sufficiently protected by freezing and condensation.

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4.4 SHOWER, WC, WHB

Shower cabinets shall be fitted into all houses. All sanitary equipment shall be European style and high quality in compliance with CE standards. All shower cabinet fittings shall be chrome type.

The shower cabinets shall include but not be limited to:

- One (1) door lockable from the inside
- One (1) shower fitted with thermostatic temperature control and soap holder
- One (1) shower screen or cubicle
- One (1) towel rack
- One (1) toilet
- One (1) wash basin with hot & cold-water supply
- One (1) mirror shaving cabinet with light & shaving socket outlet
- Two (2) coat hooks
- One (1) Extract fan

4.5 WATER HEATER

Water heater serving one (1) Pod shall have sufficient hot water requirements and shall be designed to ensure for a maximum period of 2 hours, it can heat cold tap water from 10°C to ensure two water draw-offs can each maintain a 140l flow of mixed hot and cold tap water at 40 °C within one hour. Sizing of water heater to be determined by CTR with Client approval.

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4.6 MAINTENANCE

Hot and cold-water piping that are concealed within walls, floors etc. must be made without joints. Connections on piping shall be situated to ensure that any leakage can quickly be discovered and to ensure that water does not cause any damage. Any maintenance hatches shall easily accessible and clearly marked. Stop valves and facilities for draining the water system shall be installed in each house.

4.7 HEAT TRACE

All pipe work shall have heat trace elements physically run along the length of the pipes. Heat generated by the element shall maintain the temperature of the pipe and shall also protect against freezing and maintain a constant flow temperature in hot water systems. Insulation shall also be used as per Section 5.1 Piping General.

4.8 TESTING

Air test - Pipes should be pressurized up to a pressure of 110mm water gauge and held for approximately 5 minutes prior to testing. Following this the pipe should be able to hold an initial 100mm pressure with a maximum loss of head on a manometer of 25mm in a period of 7 minutes.

Water test - The system should be filled with water up to a depth of 5m above the lowest invert in the test section and a minimum depth of 1 m measured at the highest invert in the test section. This may then be left for a period (one hour is generally sufficient) to condition the pipe. The test pressure should then be maintained for a period of 30 minutes, by topping up the water level as necessary so that it is within 100mm of the required level throughout the test. The losses per square metre of surface area should not exceed 0.15 litres for test length.

All water fittings should be capable of withstanding an internal water pressure of not less than 1.5 times the maximum operating pressure.

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4.9 EAHP EXTRACT DUCT

Extract ducting is required from all shower areas and the kitchen cooker hood to be connected to the extractor.

U-Value of the building, design flow temperature of the heating system and outside temperature design documentation shall be submitted by CTR as per Section 1.4

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5.1 GENERAL

All electrical installation, systems, equipment, etc. shall fully comply with CE standards, latest regulations and the electrical safety board. All electrical items shall be installed in the locations defined in the design drawing. Methods of installation shall be in accordance to the manufacturer's instructions. Throughout the construction phase the CTR shall ensure that all equipment and materials are adequately protected. All major equipment shall be appropriately certified & supplied with Class certificate. All electrical equipment shall meet the requirements to operate in the European market. The electrical system, equipment, components and materials shall be designed, produced and installed in accordance with specification, proven construction practice, CE requirements as well as local rules and regulations. It will be noted that all equipment shall conform to the standards. Consideration shall be given in the design of all equipment to the environmental conditions. In general, all main electrical equipment shall be supplied through one (1) manufacturer to ensure that the equipment is of the same approved type/ make and,


forms an integrated package compliant with CE standards.

All equipment manufacturers / suppliers shall be approved by Client.

All electrical equipment shall be so located that; they are not exposed to risk of mechanical injury or damage from outside elements. Where unavoidably, exposed to such risks, the equipment shall be suitably protected or enclosed. All electrical equipment shall be designed and located for readily accessibility for operation and maintenance.

5.2 MARKING OF ELECTRICAL SYSTEMS

All electrical equipment shall be clearly and durably labelled for easy identification. All cables (at both ends), conductors and terminals shall be clearly labelled for easy reference to drawings, etc. All switchboards, distribution panels, junction boxes, etc. shall be permanently marked at the outside using engraved durable labels (PVC or equal) fixed by screws in accordance with installation drawings and practice. All instruction manuals, drawings, diagrams, name plates, etc. shall be in English.

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5.3 DISTRIBUTION BOARDS


63A distribution boards for supply of low consumption and domestic equipment shall be located where necessary around the house. Distribution panels for houses shall be in a central position on the level served. To the extent possible, lighting distribution panels will be in the same position. Single-phase circuits shall be distributed evenly. Single phase 230V and three phase 400V shall be to CE standard.

5.4 CABLE, INSTALLATION, SUPPORTING

All cables shall be of one continuous length from outlet to outlet. No cable splice shall be permitted. Cables in the houses shall be concealed in conduits behind ceiling and linings. Halogen free plastic conduits, wall boxes and ceiling boxes shall be used. Cables supplying a single load, in general, shall have a continuous current carrying capacity of the connected load. Cables supplying multiple loads, in general, shall have a current carrying capacity calculated without consideration of demand factor and/or diversity factor to the total connected loads. The type of cables and installation inside panels, etc. shall be provided in compliance with the latest Swedish building regulations, national electrical safety board and CE standards. All electrical cables at ends, conductors and terminals shall be clearly and durably labelled for easy indication and drawing reference. Cable marking labels shall be numbered per the CTR s cable installation list. In general, all cables shall be supported by continuous corrosion resistant steel metal hangers, ladders or cable trays as far as possible. Metal hangers, ladders or cable trays also shall be provided in bends to get a continuous support. Expansion joints shall be provided where required. No cables shall be run on unpainted steel. Cable runs shall be located as far as possible away from spaces exposed to excessive heat, steam, exhaust and moisture. All cable runs shall be as continuous and as straight as possible. A minimum of 20% spare capacity in each cable tray shall be provided for any future extension.

Note: Care should be taken not to overload cable trays.

All cables shall be securely and properly protected against mechanical damage during the construction period. If the outer sheath of a cable is damaged, the cable shall be replaced by a new cable. The minimum internal bending radius for power cables shall be in accordance with the manufacturers' recommendations. Clips, saddles, bands and supports shall not present any sharp edges against the cables. Cables shall be properly fixed without damaging their outer covering. Cable penetrations through decks or bulkheads shall be of CE approved multi cable transit type (MCT), with possibilities to open the transit for future additional cables.

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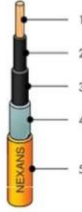
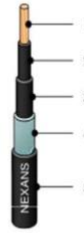
Cable installation shall comply with the cable manufacturer’s instruction (minimum bending radius, safe pulling tensions etc.)

All cables to have CE class certificate and shall in general be constructed by use of tinned stranded copper conductor, insulation of Cross Linked Poly-Ethylene (XLPE) or Ethylene Propylene Rubber (EPR) and with outer sheath of EVA cross linked rubber. All power cables shall be produced and tested in accordance with the following international standards: IEC 60092-352 (insulation material), IEC 60092-359 (sheathing material), IEC 60331* (fire resistant), IEC 60332-3 (fire retardant), IEC 61034 (low smoke), IEC 60754-1 (halogen free), IEC 60754-2 (no corrosively).

* (Subject to CE class requirements) Note:

All cable type to be halogen free

Below types of cables shall be used as required – single core, multi core, fire retardant etc.

| | |
|--|--|
| <p>LV. POWER CABLE Max core temperature: 90°C</p> <p>Design</p> <p>1 Conductor Stranded annealed round plain copper (Class 2)</p> <p>2 Insulation Silicone rubber (SIL)</p> <p>3 Inner sheath Low smoke, zero halogen (LSZH) coloured black</p> <p>4 Metallic armour Aluminium tape (ATA)</p> <p>5 Protective sheath Low smoke, zero halogen (LSZH) coloured orange</p>  | <p>LV. POWER CABLE Max core temperature: 90°C</p> <p>Design</p> <p>1 Conductor Stranded annealed round plain copper (Class 2)</p> <p>2 Insulation Cross-linked polyethylene (XLPE)</p> <p>3 Inner sheath Low smoke, zero halogen (LSZH) coloured black</p> <p>4 Metallic armour Aluminium tape (ATA)</p> <p>5 Protective sheath Low smoke, zero halogen (LSZH) coloured black</p>  |
| <p><small>Fire resistant tests according to IEC 60331-11 (Tests temperature at 1000°C during 30 min.) Fire resistant tests according to IEC 60331-21 (Tests voltage at 500 V)</small></p> | |

L.V. POWER CABLE

Max core temperature: 90°C

L.V. POWER & CONTROL CABLE

Max core temperature: 90°C

Design

1 Conductor

Stranded annealed round plain copper (Class 2)

2 Insulation

Silicone rubber (SIL)

3 Assembling

An inner sheath acting as a filler with practically zero thickness

4 Inner sheath

Low smoke, zero halogen (LSZH) coloured black

5 Metallic armour

- Paraffin-waxed crepe paper
- Galvanized steel tape (GSTA)

Fire resistant tests according to IEC 60331-11 (Tests temperature at 1000°C during 30 min.)
Fire resistant tests according to IEC 60331-21 (Tests voltage at 500 V)

6 Protective sheath
Low smoke, zero halogen (LSZH) coloured orange



Design

1 Conductor

Stranded annealed round plain copper (Class 2)

2 Insulation

Cross-linked polyethylene (XLPE)

3 Assembling

An inner sheath acting as a filler with practically zero thickness or assembling tape

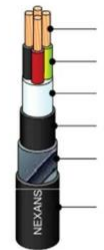
4 Inner sheath

Low smoke, zero halogen (LSZH) coloured black

5 Metallic armour

- Galvanized steel tape (GSTA)

6 Protective sheath
Low smoke, zero halogen (LSZH) coloured black



L.V. POWER CABLE

Max core temperature: 90°C

L.V. POWER CABLE

Max core temperature: 90°C

Design

1 Conductor

Stranded annealed round plain copper (Class 2)

2 Insulation

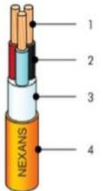
Silicone rubber (SIL)

3 Assembling (optional)

An inner sheath acting as a filler with practically zero thickness

4 Protective sheath

Low smoke, zero halogen (LSZH) coloured orange



Design

1 Conductor

Stranded annealed round plain copper (Class 2)

2 Insulation

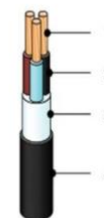
Cross-linked polyethylene (XLPE)

3 Assembling (optional)

An inner sheath acting as a filler with practically zero thickness or assembling tape

4 Protective sheath

Low smoke, zero halogen (LSZH) coloured black



Fire resistant tests according to IEC 60331-11 (Tests temperature at 1000°C during 30 min.)
Fire resistant tests according to IEC 60331-21 (Tests voltage at 500 V)

5.1 EARTHING

Generally, all metal parts of the electrical installation, other than current carrying parts are earthed. Earthing may, however, be omitted for double-insulated equipment, bearing housings, low voltage equipment etc. Earth bars of non-metallic enclosures shall be properly earthed. Earthing of power cables and electrical equipment shall be done per the latest building regulations, the Swedish and Norwegian national electrical safety board and CE standards.

5.2 LAN, FIBRE OPTIC CABLE

House's type halogen free twisted pair high rate data transmission cable (Cat 7) of solid bare copper conductors, with tinned copper drain wire + tinned copper screen shall be used for House's Local Area Network. The cable shall be suitable for environment with high signal/noise coefficient.

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Standards: EN 50172, 50167, ISO/IEC 11801, M TIA/EIA 568A. Equipment suppliers shall approve the cable type before installation.

House's type halogen free cables for the fiber optic communications shall be glass fiber, armoured cable suitable for construction use. The cable shall be tight buffered for fast and reliable splicing and connector mounting. The cable shall have strength elements of aramid yarn around the cable core for easy installation of longer lengths. The cable shall also be oil and fire resistant.

The cable shall comply with the IEC publication Nos. 794-1 and 794-2.

5.5 LIGHTING

Lighting fixtures and accessories exposed to water and water spray shall be watertight with IP rating 44 as per CE standard and the Swedish and Norwegian national electrical safety board. Lighting control panels shall be installed in suitable locations as appropriate. Switches and receptacles shall have sufficient current carrying capacity for the circuits. Exterior lighting fixtures and receptacles shall not be connected to branch circuits used for interior lighting or receptacles. In general, the type of lighting fixtures and fittings shall be dependent upon the intended service and the location of the fixture. High quality fluorescent fixtures of recognised standard type, constructed for CE standard shall be used throughout the whole house. All fixtures shall be accessible for maintenance.

All light fixtures shall be approved by the Client.

5.6 JUNCTION BOXES

Junction boxes may be provided for cable joints, where necessary, but in general, the numbers of junction boxes should be restricted to a minimum.

Junction boxes shall be clearly marked with PVC labels designating voltage and feeder circuit/system. If junction boxes are concealed behind ceiling or lining, the labelling should be located on the outside of such panels.

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5.7 SWITCHES

Switches shall be installed at a standard height throughout all houses. Switches used for lighting branch circuit shall be of 16A double pole type and the material of body shall be synthetic resin or cast brass.

Switches shall be flush mounted in the houses. Surface mounted switches shall **NOT** be used. For ceiling lights in houses, one (1) switch shall be fitted near the entrance door and an additional switch located by the bedside. CE standard PVC conduit pipe shall be used to conceal cables within bulkheads and ceilings. Trunking shall not be used within the houses.

Switches for ceiling lights in lounges and other public or control spaces with multiple entrances shall be of the two-way or three-way type and the ceiling lights shall be switched ON and OFF at stations near each entrance door. Additionally, ceiling lights in lounges and other public spaces shall be divided into not less than two separate circuits so that half the lights in a space may be energised or secured as necessary from each entrance door.

5.8 SOCKETS / RECEPTACLES

Receptacles shall be installed at standard height throughout all Pods. Receptacles of a sufficient number and per design drawings will be installed throughout the Pods. 13A single / double shall be CE standard.

The receptacle arrangement shall include but is not limited to the following:

In interior passageways, one single receptacle shall be provided at approximately 5 meter intervals to support use of electric cleaning machine.

Power outlet and LAN connection at desk area, light switch at entrance door and bedside. In general, there shall be minimum one receptacle on each bulkhead within the houses inside living and bedroom areas.

Final locations on receptacles shall be prior approved by Client in accordance to design drawings

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5.9 ILLUMINATION LEVELS

In general, rooms and spaces shall be effectively illuminated per latest Swedish building regulations and the Swedish and Norwegian electrical safety board. The measuring point for rooms in the accommodation space shall be at the centre of the space between the lamp and wall and/or between lamps in rooms. Measurements shall be taken at the height of 850mm above the deck.

Section 6.0 FIRE PROTECTION

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- . 6.1 General
- . 6.2 Documentation
- . 6.3 Fire Classification
- . 6.4 Fire Detectors
- . 6.5 Fire Protection

6.1 GENERAL

The house's fire protection shall be designed with adequate robustness to ensure all parts of the protection is not disabled by individual events or stresses. Tilt and turn windows are required for evacuation in the event of a fire if no suitable external doors are available. Separating construction refers to separation by means of floor and wall, including penetrations. Separating construction shall comply with relevant requirements for integrity and insulation. The requirement that the separating construction shall restrict the spread of fire and smoke shall be applied with the regard to probable fire progression and the need for protection of the building. Alarm systems shall be designed with the necessary properties that can detect fire reliably and give signals to the functions that depend on the alarm. The system shall be designed with sufficient coverage and shall activate quickly enough to ensure proper function. The system shall be designed to ensure that corrosion, thermal effects or other factors in the house's environment do not affect the reliability. The function

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of the installation shall be maintained following power outages and shall be provided with protection against power outages due to fire. Fire and smoke spread shall be restricted between houses with separating structures. Units shall be designed as separate fire compartments and the separating structure between units shall have a fire rating of EI 60.

6.2 DOCUMENTATION

A fire protection dossier shall be compiled. The fire documentation shall include information about the type of construction materials used. The documentation shall also include the design of components used in respect to Section 5 of BBR, any maintenance, operation procedures and preconditions that may include restrictions on how the house is used. For example, the number of people that the house is designed for and which fire protection is in place. Fire protection documentation shall be submitted to the Client for review at the earliest opportunity. Examples of what the fire documentation should contain are as follows:


- Fire protection design
- Fire cell boundaries
- Evacuation routes
- Emergency exits
- Fire safety installations
- Fire alarms
- Fire sprinklers (project specific as per detailed engineering)

6.3 FIRE CLASSIFICATION

Occupancy classes as per BBR_23 are divided into different classes. The classification depends on the extent to which people are knowledgeable about the building and its evacuation procedures and if people can mainly evacuate on their own.

- The complete Pods shall be accredited to CLASS 3 – Dwellings.

As per BBR_23 Section 5. The occupancy class includes dwellings where residents are likely to have a good local knowledge and can evacuate without assistance and cannot be assumed to be awake.

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Building classes are divided into Br based on the need for protection.

- The units shall be accredited to Br2 as per BBR Section 5

Class Br2: Building with a moderate need for protection.

House classes dependent on their function, structural elements shall have, REI load-bearing capacity, integrity and insulation, – E integrity, – EI integrity and insulation, – EI1 or EI2 integrity and insulation for fire separating windows (which can be opened only with tools, keys or similar) or for fire doors, – EW integrity and limited radiation, the classes are accompanied by a time requirement: 15, 30, 45, 60, 90, 120, 180, 240 or 360 minutes. The classes may be combined with additional subclasses – M mechanical impact - Sa or Sm smoke seals for doors. – C doors with door closers in one of classes C1–C5. Fire classes are further described in SS-EN 13501 parts 1–5

6.4 FIRE DETECTORS

Fire detectors shall be preinstalled and suitably located to ensure that they detect and warn of fire with a high reliability. Fire detectors shall also be designed with sufficiently fast reaction time to alert at an early stage. As general rule the design must ensure corrosion, thermal effects or other factors in the building's environment do not affect reliability. The design of fire detectors can be verified in accordance with SS-EN 14604. Fire detectors shall be fitted with alarm indicators, a power supply must be guaranteed during power outage. To ensure good coverage, at least one fire detector should be placed on each floor containing spaces where people are present other than occasionally. Fire detectors should be placed in, or outside, every room for sleeping people.

6.5 FIRE PROTECTION

Walls, ceilings, floors, cladding (internal and external) fixtures and fittings shall have the necessary properties or be part of the structural elements in such a way that they are difficult to ignite, do not contribute to rapid fire spread, do not quickly develop large amounts of heat, smoke or toxic emissions, do not deform following low fire effects meaning danger may arise, do not collapse or are otherwise altered meaning the risk of injury increases, do not melt and drip outside the immediate vicinity of the fireplace. Fire resistant class K210/B-s1 shall be used for insulation, sheet material and the like. Ceilings shall have fire resistant class C-s2, d0.

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Section 7.0 HEALTH SAFETY ENVIROMENT

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- . 7.1 General
- . 7.2 Materials
- . 7.3 Light
- . 7.4 Windows
- . 7.5 Noise
- . 7.6 Toxic Material

7.1 GENERAL

Houses shall be designed to ensure that the quality of air and water, as well as light, moisture, temperature and sanitary conditions are satisfactory during the working life of the house, thereby avoiding conditions detrimental to human health. Ventilation systems shall be designed to ensure the required outdoor air flow can be supplied to the building. Airing shall be made possible by use of an openable window or ventilation hatch. These shall be openable to the outside or to a separate glazed balcony or patio, which in turn has a window or ventilation hatch openable to the outside. Doors, windows and access panels shall be designed to ensure rats, mice and birds are prevented from entering the building when these openings are closed. Insects, arthropods and other vermin shall not be able to enter via penetrations for pipes, cables, or through ventilating openings. Ventilation openings shall be fitted with a durable metal mesh with a maximum width of 5mm and with an insect proof screen. Houses shall be designed to minimise the risk of accidents such as falls, collisions, crushing, burns, explosions, being locked in, poisoning and electric shocks.

7.2 MATERIALS

Materials and construction products used in a building shall not in themselves, or through their treatment, negatively affect the indoor environment or the local environment of the building. All materials used shall be non-combustible and shall not pose a risk to health in the event of a fire. All asbestos related material or products are strictly forbidden.

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7.3 LIGHT

Houses shall have satisfactory light conditions and shall be achieved without the risk of injury and harm to human health. No glare or interfering reflections are permitted, lighting suitable for intended use shall be used throughout the house.

7.4 WINDOWS

In spaces where children may be present, openable windows and glazed panels – e.g. glazed-in balconies – with the bottom of the frame lower than 1.8 m above floor level shall have safety fittings, locking devices or other protection which limits the risk of children falling out. Balcony doors and openable windows where the distance between the glass surface and the floor is less than 0.60 m shall have safety fittings and a locking device to prevent children from opening and going through the door or window. Safety devices are not necessary on French windows or windows on the ground floor.

7.5 NOISE

Houses shall be designed so that noise from installations in the building, from adjacent houses and from the outside is attenuated. This shall be achieved to the extent required by the intended use and so that residents are not disturbed by the noise. Sufficient sound insulating measures shall be considered for adjacent houses. House acoustic documentation shall be in accordance with SS 25267.

7.6 TOXIC MATERIAL

Inhalation of toxic smoke is the primary cause of death from fires. Selection of all products and materials shall be approved by the Client based on toxicity levels in the event of a fire within the house. Non-combustible products shall be used whenever possible. Toxic levels of smoke shall not be permitted and are strictly forbidden. Filing materials, fabrics and coverings shall also meet the requirements for resistance to cigarette and match ignition safety rules 1988. Recyclable products shall be used whenever available.