

Architectural components and equipment

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Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are, as far as possible, intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable for most standards work and according to established procedures defined in NORSOK A-001.

The NORSOK standards are prepared and published with support by The Norwegian Oil Industry Association (OLF), The Federation of Norwegian Industry, Norwegian Shipowners' Association and The Petroleum Safety Authority Norway.

NORSOK standards are administered and published by Standards Norway.

Annex A is normative.

Introduction

Main changes from second edition to third edition are in summary:

- general reformatting;
- inclusion of operational experience feedback from recent projects;
- inclusion of new section for handrails guard rails and barriers;
- inclusion of door selection tables;
- inclusion of "Items to be specified" in each section;
- deletion of floor screed, tiles and galvanised steel from prefabricated bathroom units;
- section on provision stores rewritten;
- section on signs rewritten;
- Annex A: CDS-201 is revised. CDS-204 and CDS-209 are deleted.

1 Scope

This NORSOK standard defines the minimum functional requirements for design and construction of architectural components and equipment to be installed and used on offshore installations in the petroleum industry.

This NORSOK standard is primarily applicable to fixed installations. The standard may also be used for mobile installations for which, however, other requirements may be applicable.

2 Normative and informative references

The following standards include provisions and guidelines which, through reference in this text, constitute provisions and guidelines of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements and guidelines of the standards referenced below.

2.1 Normative references

ISO 140-3,	Acoustics - Measurements of sound insulation in building and building elements - Part 3: Laboratory measurements of airborne sound insulation of building elements
ISO 354,	Acoustics - Measurement of sound absorption in a reverberation room
ISO 717-1,	Acoustics - Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
ISO 15138,	
EN ISO 14122 (all parts),	Safety of machinery – Permanent means of access to machinery -
IMO Res.A 653,	Recommendation on improved fire test procedure for surface flammability of bulkhead, ceiling and deck finish material
IMO Res.MSC 61(67),	Adoption of the international code for application of fire test procedures – Part 2: Smoke and toxicity
NORSOK C-001,	Living quarters area
NORSOK H-001,	HVAC (Heating, ventilation and air conditioning)
NORSOK H-CR-002,	Piping and plumbing
NORSOK M-501,	Surface preparation and protective coating
NORSOK N-003,	Actions and action effects
NORSOK R-004,	Piping and Equipment Insulation
NORSOK S-001,	Technical safety
NORSOK S-002,	Working environment
NS 17305,	Aluminium - Wrought aluminium AlSi1Mg
NS-EN 10025,	Hot rolled products of non-alloy structural steels - Technical delivery conditions
NS-EN 12600,	Glass in building – Pendulum test – Impact test method and classification for flat glass
SOLAS Regulation,	CHAPTER II-I PART B: Subdivisions and stability. Regulation 15 – Openings in watertight bulkheads in passenger ships

2.2 Informative references

None

3 Terms, definitions and abbreviations

For the purposes of this NORSOK standard, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

can

verbal form used for statements of possibility and capability, whether material, physical or casual

3.1.2**may**

verbal form used to indicate a course of action permissible within the limits of this NORSOK standard

3.1.3**shall**

verbal form used to indicate requirements strictly to be followed in order to conform to this NORSOK standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.4**should**

verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.1.5**primary stairway**

stairs which are part of major personnel traffic routes and main emergency escape ways

3.1.6**secondary stairway**

all types of stairs, which are not part of major personnel traffic routes and main emergency escape ways, and which do not provide access to machinery and equipment skids

3.1.8**flight**

sequence of steps between two landings

3.1.9**going**

horizontal distance between the edges of two consecutive nosings

3.1.10**pitch**

angle between the pitch line and its projection on the horizontal surface

3.1.11**nosings**

top edge at the front of the step

3.1.12**pitch line**

straight line touching the top of tread nosings

3.1.13**rise**

height between two consecutive tread surfaces

3.1.14**tread**

horizontal surface on which the foot is placed

NOTE Same as step.

3.1.15**stringer**

flanking framework element supporting the steps

3.1.16**left or right handed doors**

doorleaf location at open position, when viewed from doorleaf side of wall/ bulkhead

3.1.17**clear opening width**

net distance between insides of frame

3.1.18**clear opening height**

net vertical distance between floor/deck finish and inside of frame

3.1.19**dry fix insulation**

certified, incombustible insulating material which is supplied in a dry, stable and ready-to-use state from the manufacturer without requiring any further preparation or treatment before application, as opposed to spray-on insulation

3.1.20**spray-on insulation**

certified, incombustible insulating material which is supplied as a semi-wet substance, requiring further preparation, treatment and curing time after application

3.1.21**partition system**

modularised wall system, solid skin or double skin cavity system, with all necessary reinforcements, bracings, frames, insulation and installation aids

3.1.22**ceiling system**

modularised ceiling system, compatible with the wall system, and being either suspended or self supporting, with all necessary reinforcements, frames, insulation and installation aids

3.1.23**external prefabricated wall**

external, prefabricated, structurally self supporting wall system, with built-in penetrations, trims, braces, cut-outs, lifting lugs, supports, equipment, elements, insulation, materials, installation aids, etc., complete and ready for installation on specified external location

3.1.24**internal panels wall system**

internal, prefabricated, structurally self supporting wall system, with a flat surface, having built-in penetrations, trims, braces, cut-outs, supports, equipment, elements, insulation, materials, installation aids, etc., complete and ready for installation on specified internal location

3.1.25**cassette wall system**

prefabricated cassette wall system, comprising louvred and plated (explosion relief or fixed) panels in various combinations, with vertical or horizontal supports, internal drainage system, sound attenuators, built-in frames, reinforcements, penetrations, flashings, trims, lifting lugs, fixings and all other materials and work required for a successful installation on the specified location

3.1.26**wind shield panels**

a prefabricated windshield panel system, with flat or corrugated trapezoidal shaped profiles, penetrations, flashings, trims, lifting lugs, fixings and all other materials and work required for a successful installation on the specified location

3.1.27**heat shield panels**

prefabricated heat-shield panel system comprising

- frames of stainless steel rod in a ladder type construction with woven stainless steel wire mesh facing sheets,

- perforated stainless steel plates,
- stainless steel expanded metal panels.

3.1.28**conductive flooring**

floor covering which is conductive

NOTE Measured in 10^4 to 10^5 Ohms resistance.

3.1.29**semi-conductive flooring**

floor covering which is semi-conductive

NOTE Measured in 10^6 to 10^8 Ohms resistance.

3.1.30**non-conductive flooring**

floor covering which is non-conductive

NOTE Measured in 10^9 to 10^{11} Ohms resistance.

3.2 Abbreviations

AISI	American Iron and Steel Institute
CE	Conformité Européen
HTCC	helicopter traffic control centre
HVAC	heating, ventilation and air conditioning
ID	identity
IP	ingress protection
LCI	life cycle information
LQ	living quarters (accommodation)
NCS	Natural Colour System
NVE	Norges Vassdrags- og Elektrisitetsvesen (Norwegian authority)
PC	personal computer
PSA	Petroleum Safety Authority
PVC	polyvinyl chloride
NMD	Norwegian Maritime Directorate
RAL	Deutsches Institut für Gütesicherung und Kennzeichnung e.V., Bonn
SOLAS	safety of life at sea
TV	television
UHF	ultra high frequency
VHF	very high frequency

4 Common requirements**4.1 General**

This NORSOK standard specifies minimum requirements of a general nature. All detailed and project specific requirements, shall be specified in relevant data sheets and schedules, e.g. type, brand, quantity, capacity, dimensions, etc. The user group shall participate in the selection process, in accordance with operator/company requirements. The equipment lists contained in this NORSOK standard are of a typical/general nature. The establishing of basic, project specific data sheets shall be performed at an early date by the individual project, as a basis for pricing and further development.

Achieving a fit for purpose level of functionality and safety within the different areas shall be a governing requirement. As a result, where necessary minor detail requirements are not stated in this NORSOK standard or data sheet, these shall be allowed for.

Suppliers may propose, and correspondingly justify, alternative solutions in order to reduce life cycle costs, providing the level of function and safety are maintained.

All architectural supplies described in this NORSOK standard shall be installed as complete and finished units, comprising all the work and materials required for a successful installation and intended use. All components, equipment and elements shall be set plumb and level. The installed work shall be true, clean and free from any faults, marks and damage. It shall withstand severe abuse.

Standard, fit for purpose products shall be used, unless a purpose made solution is required. Where relevant, the selection of all furniture, equipment and accessories shall be co-ordinated and standardised on the entire installation.

The work shall always be performed by qualified personnel, and in accordance with the producer's/manufacture's written procedures and instructions.

Life cycle costs, design life expectancy and minimalization of environmental impact shall be reflected and given governing attention, in selection of components and their detailing.

All supplies shall be properly protected and preserved throughout all project phases. The preservation shall not be removed before mechanical completion. Cleaning shall be performed in accordance with manufacturers' guidelines prior to preservation. Preservation shall be applied in a manner that does not leave tape marks or stains. It shall be easy to remove.

Data sheets and schedules are attached to certain clauses in this NORSOK standard. They shall be used to specify all requirements related to that clause, complete with all accessories and systems. The data sheets and schedules shall be continuously updated throughout the various project phases, until all required information is available prior to commencement of procurement and fabrication activities.

Preliminary and final weight data of equipment and products shall be given.

Prototypes and/or preassemblies of purpose made items shall be made available for inspection and verification prior to delivery. This shall upon request from operator/company, include the following items as a minimum:

- cabin(s) including shower/bathroom;
- kitchen purpose made consoles;
- cold table and cold storage room(s);
- standard office arrangement;
- doors;
- coffee bar unit;
- reception unit;
- central control room operator desk and emergency room operations table;
- laboratory fume cabinets and workstation;
- crane cabin;
- drillers cabin.

The inspections shall be performed at an early stage, to allow adjustments to be made without affecting the overall production schedule.

Structural reinforcement of walls, floors and ceiling constructions shall be provided as required.

4.2 Certification

All materials, components and equipment shall be provided with necessary test reports and certificates from relevant recognised authorities, confirming compliance with project and regulatory requirements.

The standards listed in guidelines to the PSA Facilities Regulations, paragraph 11, shall be used to determine the technical fire qualities of materials. In addition IMO Res. MSC 61(67) and IMO Res. A653 shall be used, as well as the relevant requirements in NORSOK S-001.

Documentation of acoustic properties shall be in accordance with ISO 140-1, ISO 354 and ISO 717-1. For noise and vibration control, special attention shall be given to applicable clauses of NORSOK S-002.

4.3 Penetrations

A penetration dossier shall be developed for all areas on the installation.

Penetrations, including field run penetrations shall, as far as practical, be of standardised types, and located in areas of lowest fire-rating/fire-load. Penetrations shall not reduce the strength and fire/blast, acoustic, gas and water tightness integrity of the divisions in which they are installed.

Valid fire certificates from a recognised authority shall be documented in compliance with governing body regulations. Where certificates are not available, test reports from a recognised authority shall be provided. The certificates/test reports shall be compiled in a separate certification dossier and referred to in the penetration dossier. The certification dossier shall be presented to operator/company prior to start of fabrication. Certification shall also be provided for multiple penetrations. Pipe penetrations shall be tested and installed as described in NORSOK R-004.

Any 3D modelling systems shall be configured to reflect the actual penetration cut-out sizes.

If penetrations are exposed to weather or subject to mechanical damage, suitable protective cover shall be provided. Mechanical protection at exposed areas (e.g. transport routes) shall be able to withstand heavy abuse.

Deck penetrations exposed to frequent moisture or hosing down shall have a permanently elastic seal on top. This requirement is also applicable for cable penetrations, unless these have a fail safe detailing for drainage.

Penetrations requiring additional insulation to maintain the fire, thermal or acoustic requirements shall have this clearly indicated in the penetration dossier.

Multi table transit penetrations shall have fire insulation at flanges only where strictly required to comply with the applicable fire certificate. Detailing shall allow effective access for maintenance and re-pulling of cables. Adjacent insulation detailing shall be arranged to allow maintenance access, without having to remove or replace large sections of lining and insulation.

Penetration types for cables, piping and ducting shall be co-ordinated with the relevant disciplines.

Penetrations that are likely to be exposed to excessive movement and vibrations (e.g. those located close to rotating type pumps, emergency generators etc., or for piping systems where "hammering" effects are likely to occur during commissioning or operation) shall withstand the vibration without functional deterioration. Minimum service clearance to sleeves shall allow for vibrational, mechanical and thermal movement. Mastic type penetration seals shall have the applicable sleeve and pipe surfaces degreased as required, to achieve permanent adhesion.

A sufficient number of openings for temporary cables shall be provided adjacent to doors during the construction phase. Details of these openings, including methods of sealing after use, shall be shown in the penetration dossier.

Penetrations in walls located below raised access floors should be grouped together in yard sacrificial plate areas.

In order to avoid hot work, sand blasting and touch-up during later phases, additional penetrations shall be provided for future services in accordance with respective discipline spare capacity requirements.

4.4 Master lock and key suiting system

A master lock and key suiting system shall be developed and delivered for the entire installation in accordance with operator/company requirements. A practical storage system for spare keys shall be part of the supply. The name of the installation, operator/owner, room name and number shall be inscribed on the key holders. Certain key holders (e.g. to cabins) shall also have the lifeboat station number included, if applicable.

Three coded and labelled keys per lock shall be issued directly to the operator/owner.

The key cylinders and locks shall be adjusted to allow locking without excessive use of force. Keys shall have a smooth fit in their cylinders, to reduce breakage.

Further requirements for door locks are given in Clause 7.

4.5 Materials

All materials shall be resistant to corrosion in a saliferous environment. The materials, components and equipment shall be as light as possible, without adversely affecting compliance with any requirements. Alternative materials may be used for all supplies, providing they comply with relevant requirements.

Drilling through fire-rated deck head plates or floating floors shall not be used as a fixing method for equipment.

Components specified with a brushed stainless finish should have a grit between 180-220, for ease of cleaning.

Equipment and processes shall not emit dust, fumes or other contaminants, which may impair health. A list of chemicals applicable to each supply shall be provided. The list shall include adhesives, finishes and filler material, and all required cleaning and maintenance agents. Selection and documentation of hazardous chemicals shall satisfy the requirements of NORSOK S-002.

4.6 Identification

Each major component, furniture and equipment item shall be provided with a discreetly placed and securely fixed name plate showing the manufacturer's name, equipment type, model, serial number, fire rating, etc., as appropriate. For doors and windows with a B-rating or stricter, the relevant fire certificate number shall be included on the identification plate. Rated penetrations shall have identification of applicable fire rating, and reference to relevant certificate number.

Where applicable, equipment with environmental declaration marking shall be selected.

4.7 CE marking

Contractor shall be responsible for compliance with CE marking, and provision of documentation in accordance with regulatory requirements.

4.8 Tagging

The following items shall be tagged and coded, in accordance with project requirements:

- doors (all doors with the exception of lightweight B type doors that are not connected to a system);
- control cabinets;
- air reservoirs;
- equipment permanently connected to power supply;
- items connected to instrument air supply;
- medical oxygen systems (fixed type);
- refrigeration systems;
- other equipment requiring regular maintenance/documentation for the operational phase.

4.9 Life cycle information (LCI)

LCI shall be developed and transferred to operator/company in accordance with project requirements. The information shall be available for engineering, preparations for operations, start-up, maintenance, repair, modifications and decommissioning of equipment and systems.

The LCI shall include both information to be submitted to operator/company, and information to be retained by the supplier on behalf of operator/company.

All LCI shall be transferable in digital format.

The final LCI shall reflect the as-built status at take-over by the operator/company.

4.10 Installation, operation and maintenance manual

All supplies shall be provided with an installation manual, as a minimum.

Components and equipment to be in regular use, or requiring inspection and maintenance, shall in addition be provided with an operation manual and an inspection/maintenance manual.

4.11 Function testing

All installed equipment and systems shall be formally function tested to comply with functional requirements as part of mechanical completion/commissioning activities. Equipment, which is damaged, or equipment which does not perform as specified, shall be identified in accordance with project procedures, and rectified or replaced without delay.

4.12 Equipment follow up

Each supply shall include a quantity of appropriate paint and/or foil, to allow minor repairs during the installation phase.

4.13 Architectural finishes schedule

A detailed architectural finishes schedule shall be developed for all internal areas. The schedule shall specify the manufacturer coding and colour reference for each proprietary architectural element.

The schedule shall also include the colour references for all internal painted surfaces.

For bulk components and equipment packages, manufacturer's standard colours shall generally be used, where changes will result in a cost increase. Where manufacturer standard topcoats are used, a repair/maintenance procedure shall be supplied for acceptance by the project.

Topcoats shall be denoted by RAL or NCS coding. The surface shall have a minimum reflectance factor of 70 %, except where non-slip surfaces are required, or in areas where low reflectance factor are required, e.g. in control rooms, inside of crane cabins, etc.

Sample boards in A3 size, illustrating the proposed finishes and colour scheme, shall be provided for acceptance by the operator/company.

4.14 Architectural colour coding schedule

4.14.1 General

A detailed architectural colour coding schedule shall be developed for all external areas on the entire installation, and include graphic illustration(s) of the overall view. The schedule shall also include parts of the installation that are below water level.

Colours shall be selected to enhance perception of the installation as a coherent whole, emphasise orientation and escape/access routes, and allow for standardisation of topcoat types throughout the installation. Application method shall be part of colour selection criteria.

Stainless steel, metallized carbon steel and aluminium surfaces shall not be painted, unless specified otherwise by the operator/project.

For bulk components and equipment packages, manufacturer standard colours shall generally be used, where changes will result in a cost increase. Where manufacturer standard topcoats are used, a repair/maintenance procedure shall be supplied for acceptance by the project.

Topcoats shall be denoted by RAL or NCS coding. The surface shall in general have a minimum reflectance factor of 70 %, except where non-slip surfaces are required.

Topcoat application shall be in accordance with NORSOK M-501.

Where topcoats are used at non-visible areas such as within shafts voids and under insulation, the colour should be standardised as far as practical throughout the installation. The colour should be white/off-white.

The architectural colour coding schedule does not cover piping and ductwork systems coding.

Upon request, samples of the main topcoat colours shall be provided.

4.14.2 Identification and safety colours

Identification and safety colour coding requirements shall take precedence.

Escape routes outside “clean” areas with applied floor finishes shall be marked with traffic yellow RAL 1023.

A uniform approach shall be adopted for safety marking of stairs in external and unmanned area escape routes.

Fire equipment cabinets, firemen's equipment containers, fire water equipment cabinets, etc., shall be traffic red RAL 3020. Exempted are fire water cabinets inside the LQ, which may be painted white/off-white with red lettering, to match the interior overall colour scheme better.

First aid cabinets shall be painted emerald green RAL 6001.

4.15 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this clause require specification by the operator/company:

- master lock and key suiting system;
- required prototypes and/or preassemblies of purpose made items;
- user group participation in the selection process for elements and equipment.

5 Stairs

5.1 General requirements

All stairs on a field installation except those providing means of access to machinery or equipment skids shall comply with these requirements.

Other stairs, stepladders and ladders that provide access to machinery or equipment skids shall comply with the requirements of EN ISO 14122 (all parts).

Stairs shall be provided in daily frequented areas where there is a height difference between levels of more than 350 mm, and where a ramp cannot maintain the functional requirements. For height differences of less than 350 mm, a ramp solution shall be used.

Main internal stairway(s) and all emergency stairways in or adjacent to the LQ shall always be defined as primary stairways.

Stairways in escape routes shall be designed to allow for transportation of injured personnel by use of standard stretchers (length x width = 2 200 mm x 650 mm).

Secondary stairways, including spiral stairs and inclined and vertical ladders, may be used for access to isolated areas or areas with little personnel traffic. Inclined ladders shall be used in preference to vertical ladders where space permits.

For internal stairs, selection of materials and construction shall give due attention to ease of cleaning/maintenance, and to the appropriate reduction in impact sound insulation and reverberation times.

5.2 Stair width

The minimum width of a stairway shall be 1 000 mm measured between the inside of handrails. For secondary stairs with limited traffic, a width of less than 1 000 mm may be accepted on the basis of individual written justification.

Continuous stairways with access to more than two levels shall be minimum 1 200 mm wide, measured between the inside of handrails.

Primary stairways shall have a minimum width of 1 200 mm measured between inside of handrails. Wider stairways may be required if specified by the project.

5.3 Stair pitch and proportion

The maximum pitch of stairs shall not exceed 38°.

The following formula shall be used in determining the stair proportion:

GOING + TWICE THE RISE = 630 mm +/- 30 mm

The maximum rise shall be 190 mm.

Treads shall be evenly spaced. The maximum allowable deviation of the rise dimension in a single flight of stairs is +/-5 mm, including the first and last riser of every flight. Stairs for areas requiring installation contingency, may incorporate an adjustment facility. The projection of the treads shall overlap one another with minimum 20 mm.

5.4 Nosing

All nosings shall have a non-slip surface with secure and permanent fixing on top of the flooring material. Internal stairs shall have nosings, which allow efficient cleaning.

5.5 Flight

There shall be a maximum of 16 risers in any single stair flight.

There shall be a minimum of two risers for any flight in a stair that has more than one flight.

In long, straight stairways, after a maximum of 36 risers in consecutive flights, there shall be a change in direction of minimum 30°, or a landing of minimum 2 000 mm length.

5.6 Treads and landings

Each stairway shall have a landing at the top and bottom of every flight. There shall be an intermediate landing when two or more flights converge between deck levels. The depth of the landing shall not be less than the width of the stair.

Treads shall withstand a foot load of 2 000 N (200 kg) on an area of 100 mm x 100 mm at any position without permanent deflection.

For internal stairs, treads and landings shall be constructed in a material suitable for the stair's function and location, e.g. flat plate, flat plate for application of screed and floor finishes, checkered plate, low-density punched hole plate or open grating. Flat plate for application of screed and floor finishes shall be provided for the main internal stairways in the LQ.

For external stairs, treads and landings should be made of open grating. Grating openings shall not allow a 20 mm diameter ball to pass through at any point. This applies above places where personnel are likely to be present. Otherwise 35 mm diameter is acceptable. Low-density punched plate shall be used for treads and landings in external areas where open grating is not suitable. Maximum openings in the plate shall be as above.

Grating types and detailing of stairs shall be coordinated with the method of escape-way marking/painting of the stairs.

Where external stair treads and landings form part of a fire rated deck, all walking surfaces shall be made of non-slip checkered plate. Treads and landing surfaces shall be sloped for drainage as necessary.

All treads shall have a toe plate of minimum 50 mm height. All landings shall have a toe plate of minimum 100 mm height. Openings between toe plate and decks or gratings shall not exceed 10 mm.

The floor finish for internal stairways shall also cover the side walls (stringer) and be finished with a U-shaped profile at the top.

5.7 Headroom

Clear headroom (free height) shall be maintained in all stairs, and shall be a minimum of 2 300 mm measured vertically above the pitch line of the stair.

5.8 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

6 Handrails, guardrails and barriers

6.1 General requirements

This subclause applies to handrails, guardrails and barriers that are not part of a machine or equipment skid. For handrails, guardrails and barriers that are part of a machine or equipment skid, see EN ISO 14122 (all parts).

All handrails and guardrails shall be solidly designed for personnel protection, and shall resist the accidental impact of a falling person, in any direction and at any point.

NOTE The scenario may be a person falling down a stairway, hitting the hand- and guardrail on the landing with considerable force.

Generally, handrails should be designed for 1,5 kN/m², acting horizontally on top of the supports. Any additional loads to be supported by the hand- and guardrails shall be avoided. If applied, however, such loads and forces shall be verified by structural calculations in each case, where structural members shall be dimensioned accordingly, e.g. support of minor equipment such as light fittings (not flood lights), signs, cable trays, etc. General structural loading conditions are covered in NORSOK N-003.

The hand- and guardrail system consists typically of a continuous handrail at the top to be grasped by the hand, or just a continuous top-rail when hand support is not required, knee-rails placed parallel with the handrail to prevent accidental passage of a body, vertical stanchions for anchorage of the guardrail system, and a solid toe plate at the bottom to prevent the fall of minor objects.

Decks, gangways and platforms higher than 500 mm shall be equipped with hand- and guardrails.

Handrail and guardrail supports shall normally be arranged at a maximum c/c distance of 1 500 mm. Handrail fixings to internal partition systems shall be reinforced for permanent stability, as required.

The top of the handrail shall be minimum 1 100 mm above the finished floor or deck. Exempted is the top of handrails around the lowered helideck perimeter walkway, where the height shall be minimum 1 400 mm. The distance between stanchions shall in this case be maximum 750 mm.

Vertical openings between horizontal knee-rails, handrails and toe plates, shall not exceed 380 mm.

The toe plate shall have a minimum height of 100 mm, and a clearance of maximum 10 mm to the deck.

A stanchion shall be provided in each corner (change of direction), unless stanchions are provided on either side of the corner, at a maximum c/c distance of 350 mm from the corner.

There shall always be at least two stanchions before and after a corner.

Hand- and guardrails shall not cause hindrance or injury to personnel. Sharp corners, rough edges, welds with burrs, etc., are not acceptable. Bolts, nuts and screws shall have a user-friendly design, which will not catch fingers or any part of a body in motion.

The multi-barrier principle shall apply for the complete hand- and guardrail system, where a single fault shall not cause a system failure. Any weaknesses or faults developed over time shall be detectable by visual inspection.

The installed hand- and guardrail system, complete with all its parts and fixing details, shall be practically maintenance free. It shall be constructed of a solid non-corrosive material.

6.2 Handrails

All handrails shall provide a continuous, smooth handgrip, without any sharp angles, rough edges, obstructions, protruding brackets, or similar. The handgrip area shall be without screws and bolts, unless they are completely recessed.

The distance between the handrail and any obstruction shall be minimum 50 mm in internal LQ areas. In other areas the minimum distance shall be 100 mm.

All handrails in LQ shall have a low maintenance finish, e.g. brushed stainless steel or suitable hardwood.

The outside diameter of the handrail shall be between 25 mm to 50 mm.

6.3 Prefabricated handrails and guardrails

Prefabricated hand- and guardrail systems shall be of a robust, non-corrosive type. All connections between elements shall be securely fixed by lock nuts and through bolts, or self-tapping screws. Setscrew type connections are not acceptable as a permanent fixing method. The fixed connections shall not loosen or weaken by normal use, wind and platform vibrations.

The width of the system shall be as small as possible to optimize the use of space in gangways, etc.

The hand- and guardrail system shall be installed in accordance with the latest issue of the manufacturer's written instructions and procedures. All installation personnel shall be given necessary theoretical and practical training, prior to installation.

Compliance with all requirements shall be verified before handrails and guardrails are taken into use. Assembly correctness, fixing details and correct torque are of particular importance. Demounted and remounted hand- and guardrails shall be rechecked. Areas containing unfinished hand and guardrails shall be temporally sealed off for personnel access.

6.4 Handrails and guardrails in stairs

All stairs shall have a handrail and guardrail on each side of every flight and every open intermediate landing. Handrails and guardrails shall be parallel to the pitch line of the stair flights and shall be level at open landings. Top of handrail shall be positioned minimum 1 000 mm (measured vertically) above the tread pitch line, and minimum 1 100 mm above landings and decks. The handrail shall be continuous from the top to the bottom of the stairway and shall be terminated in a safe manner at both ends.

Stairs shall have intermediate knee-rails parallel with the handrail, or other barrier of sufficient strength.

Handrails without intermediate knee-rails are sufficient, when walls surround the stairway.

Handrails on flights that are 180° to each other shall have a minimum of 100 mm clear distance between rails or between rails and supporting structures, to avoid the possibility of catching hands and fingers.

6.5 Gates

Self-closing gates shall provide access through guardrails, as required. The gates shall have the same design and strength as the surrounding guardrails. It shall open towards a deck or platform, and have a firm outward stop, to prevent accidents. A safe and user-friendly opening/locking device shall be provided.

6.6 Flexible barriers

A "heavy duty" type flexible barrier, with adequate elastic properties, shall be installed around material handling areas and truck operating areas. It shall be constructed in a solid non-corrosive material, which can withstand mechanical impact from containers and trucks. The system shall allow for easy replacement of any damaged element. A container guide system shall be provided, when required.

The barriers shall be bolted to welded foundations, to avoid leakages and penetrations through fire rated decks or bulkheads.

The barriers shall also provide personnel protection. Ordinary handrails and guardrails shall be avoided in areas where they may be subjected to mechanical damage from material handling.

6.7 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

7 Doors

7.1 General requirements

Doors, with associated equipment and hardware shall be designed and arranged according to ergonomic principles so that the potential for injury to persons is eliminated.

Door assemblies shall be easily operable in a hazardous or accidental situation.

Doors shall have a clear opening of at least 750 mm width x 2050 mm height from floor finish/deck. Doors to cabin bathrooms, toilets, and doors that are not escape routes for more than one person may have a width of less than 750 mm. On mobile installations, other requirements to dimensions of doors may apply. For doors to prefabricated bathroom units refer also to relevant clause of this NORSOK standard.

Panic bars shall be provided on doors in areas where there is a risk of congestion or panic.

Threshold detailing and door arrangement shall stop all ingress of water from decks.

Automatic opening devices should be installed on doors used frequently for transport and handling of goods.

If a hangar door is required for the installation, it shall be adequately dimensioned regarding strength, fire rating and exposure to use.

A preliminary door schedule shall be developed as part of the conceptual design phase. It shall be continuously updated throughout the various project phases, until all required information is specified prior to procurement of the doors.

With the exception of B15 type lightweight doors and special doors (e.g. water tight doors and doors to provision stores etc.) the same supplier should be used for all doors on the installation in accordance with operator/company requirements. This should also apply for doors to mechanical packages to the extent possible.

7.2 Opening force

The opening force (i.e. the initial force required to open a door) as measured with a dynamometer or similar device, shall not exceed the following limits for doors in frequent use (i.e. doors in major traffic and escape routes and doors likely to be used at least 10 times a day) when these doors are in a level position:

Hinged doors	:	65 N
Sliding doors	:	50 N

For all other doors the following limits shall not be exceeded:

Hinged doors	:	130 N
Sliding doors	:	105 N

The maximum acceptable opening force in an accidental situation shall never exceed 250 N for doors in main escape routes.

The above maximum opening forces shall be verified by the supplier prior to purchase and by the project as part of the mechanical completion activity.

On floating/mobile installations, the maximum acceptable opening forces under accidental heeling conditions shall be evaluated and resolved on a project by project basis during the conceptual phase.

Unless specified otherwise by the project, all escape route doors and fire sectioning doors on floating/mobile installations, shall be self-closing for a static heel of 3,5 degrees in accordance with SOLAS regulation.

The design shall optimise the use of materials and construction methods to provide doors that are as light as possible.

7.3 Fire rating and fire test requirements

Fire rated doors shall be certified to have the same fire rating as the divisions in which they are installed. Any additional components that are required to comply with the fire rating (e.g. exposed frame insulation covering and associated flashing) shall be part of the supply.

7.4 Acoustic requirements

Doors with acoustic requirements shall, as a minimum, have the same sound reduction requirement as the division in which they are installed. A lower sound reduction value for the door may be accepted if it can be documented that the overall door/wall assembly meets the required sound reduction value (Rw) for the division.

7.5 Materials

The material thickness of frames and door leaf plates shall be sufficient to provide robust and rattle free doors, suitable for the location and intended use. Heavy abuse from mechanical and natural forces and requirements to minimum repair and maintenance shall be given due attention.

Carbon steel doors shall be in accordance with NS-EN 10025, S235 JRG2 or equivalent.

Stainless steel shall be type AISI 316L, or alternatively AISI 316 with a maximum carbon content of 0,05 %. The stainless steel material shall be of the white pickled and passivated condition.

Aluminium shall be of seawater resistant type.

Alternative materials (e.g. composite, etc.) may be used, as long as such materials comply with all relevant requirements.

Doors shall be suitably preserved for transportation and storage, and for protection against damage throughout the construction phase. The door surface finish, after preservation removal, shall be stain resistant and require minimum maintenance. For doors that shall not be painted/coated, a procedure for stain removal (without dismantling the door) shall be part of the supply. Heavy-duty preservation, resistant to weld spatter, angle grinding grit and potential damage from other construction activities shall be in place immediately following installation.

All door leaves, with the exception of doors in un-insulated prefabricated cassette walls and V-doors, shall be of a double plate, sandwich type construction and fully insulated without any air pockets. Insulation fibres shall be sealed to prevent any fibres being released to the environment. Insulation within door-leaves shall not sag following continuous use.

Gasket seals shall permanently maintain the specified integrity of the door throughout the door's specified design lifetime. Gaskets shall be glued or mechanically fixed in such a way that they can easily be replaced. Gaskets shall be of a design that maintains elasticity and allows for latching and full perimeter sealing of door-leaves during continuous heavy use, without requiring excessive force or slamming. Special attention shall be paid to the gasket sealing of doors at LQ perimeter, to applicable doors at zone 1 classified areas and to doors that shall maintain an air pressure differential.

7.6 Painting

All carbon steel surfaces shall be sandblasted, prepared, primed and painted with a coating system in accordance with project requirements. Stainless steel surfaces shall not be painted, unless specified otherwise in the door schedule. Aluminium doors shall be anodised. B-rated type doors and internal doors where specified, may be provided with baked-on electrostatic powdered epoxy/polyester coating or PVC foil.

The internal face of unpainted external door leaves and frames to recreation rooms and other accommodation areas shall be painted to match the internal colour scheme.

7.7 Hinged doors

All hinged doors and the active leaf of all hinged double doors shall be self closing and self latching, unless specified otherwise in the door schedule.

Doors shall be provided with at least three hinges, and doors higher than 2 500 mm shall be provided with at least four hinges. A continuous piano hinge may also be used. The hinge design shall facilitate easy removal of the door. There shall be a lubrication nipple on each hinge, unless the hinges are guaranteed maintenance free.

Each hinge shall be fixed to the door leaf with a minimum of three screws. The hinge design and the fixing method to the frame and door leaf shall ensure that no buckling of the leaf or frame occurs during continuous normal use throughout the design life of the door. Thin plate doors (with faceplates of less than 2 mm thickness) shall have additional reinforcement inside the door leaf on the hinge side to satisfy this requirement. Hinges welded to door leaf are not acceptable.

The meeting edge of double door leaves shall have a continuous seal and overlap that satisfies all integrity requirements for the double door, without gaps at gasket joints.

The door leaf or the gasket shall be easily adjustable after the door has been installed to ensure proper closure and compression of all seals when closed.

7.8 Sliding doors

All sliding doors shall be self-closing, having an adjustable speed reduction brake to stop the door from closing or opening (on floating installations) too quickly. In addition, doors on floating or mobile installations shall be self-latching. They shall have fail-safe protection against falling down from their tracks and guides, and overturning.

All sliding doors shall be provided with a track housing which protects and encloses the top, front, back and ends of the track mechanism. The housing shall be of the same material as the door frame. The front panel of the track housing shall be hinged and have a fail-safe hold open device, allowing for easy inspection and maintenance of the mechanism. For H-rated doors the front panel of the track housing may be bolted, if required, for compliance with fire regulations. The panels shall not open unintentionally. The track housing on external doors shall provide maximum weather protection to the sliding mechanism. Track housings located in areas with suspended ceilings shall have the front panel hinges located below the level of the ceiling, to allow easy access to the mechanism without dismantling the ceiling panels.

Handles on sliding doors shall have an ergonomically correct grip for easy manual opening of the doors by personnel wearing gloves. Handgrips at frame side shall be designed to avoid accidental crushing of fingers.

Suspension track, rollers, top and bottom roller guides, latch, handles, etc. shall be in stainless steel. All doors shall be easily removable from their tracks.

Doors with counterweights shall be of a chain and cogwheel construction.

Recesses in the floor, which may collect moisture or contamination, shall not be used at sliding door installations.

7.9 Hardware and accessories

Generally, all hardware (inclusive hinges) shall be in stainless steel, unless specified otherwise in the door schedule. Visible surfaces shall have a brushed finish.

Door handles shall be of brushed stainless steel AISI 316 and shall be of a consistent type and design for the whole installation.

Door handles shall be solid with a minimum 8 mm spindle. Lock screws in spindles shall be of a type that does not need periodical re-tightening. Lever handles shall be secured on the backside of the escutcheon plate to stop side movement. The escutcheon plate shall encompass the lock cylinder (where applicable), and shall be properly secured, with local reinforcement in the door leaf, to prevent any movement, deflection or other weaknesses. Handles with roller bearing mountings may be required in areas of continuous heavy use.

The inactive leaf of B-rated double doors shall have flush bolts at top and bottom, adjustable to give a rattle free closing. The inactive leaf of all other double hinged doors shall have a heavy duty stretching latch, which is operated by a single lever handle and locks the leaf into the frame at the top and at the threshold at the bottom. The inactive leaf in escape-way doors shall have automatic release flush bolt and door leaf co-ordinator.

Doors shall normally be supplied with a single mortise latch and locking mechanism, provided they meet the specified performance requirements. All latch systems shall be removable and replaceable without any alteration to the door leaf. For doors in LQs the latching mechanism shall be recessed into the door leaf.

All striker plates shall be adjustable to ensure proper latching.

Door stops shall be provided for all doors to prevent damage to adjacent surfaces.

Panic devices shall be suitable for the specified door type and shall override the door lock (stainless steel rim latch with cross bar or similar).

Kick plates (300 mm height) and trolley protection plates (800 mm height) in brushed stainless steel shall be provided for hinged doors in relevant traffic areas. Trolley protection plates shall be provided to both sides of doors in kitchen area, scullery, provision stores and laundry.

Kick plates and trolley protection plates shall be mechanically fixed with flush fixings. There shall be no sharp or protruding edges.

It shall be possible to fit all doors with a temporary "hold open device" for use in the construction phase. Temporary "hold open devices" may be an integral part of the door closer system or a purpose made device. The temporary "hold open devices" shall be removed prior to commissioning. Certain doors (e.g. all cabin doors) shall be fitted with permanent "hold open devices", of a type compatible with the safety philosophy, to ease cleaning in the operational phase.

Electro-magnetic door holders, connected to the fire and gas system, shall be provided for certain corridor doors that are to be kept open in a normal use, all in accordance with operator/company requirements. The door holders shall have a manual release button. Door leaves and wall systems shall be suitably reinforced for fixing of door holders where required.

Door leaves shall be properly reinforced at hinges, locks, handles, closer devices and any other places where hardware is to be attached to the door.

Doors in transport routes where frequent movements of heavy pallets and goods are anticipated (e.g. to main internal storage areas and to kitchen storage from lay-down decks) shall have leaves and frames reinforced as necessary.

The frames and door leaves for all cabin doors shall be delivered with pre-drilled holes for fixing of door closers. This should also apply to other relevant doors.

7.10 Automatic opening devices

Doors that do not meet the specified opening force stated earlier in this subclause, or are frequently used for personnel, truck and trolley traffic, shall be provided with automatic opening devices.

The opening device shall be activated by a handle on the door leaf or a push-button, approximately 900 mm above the floor level. The handles and the push-buttons shall be located on both sides of the door. Sensors, which are safe in a fire may also be used, where appropriate.

Certain doors may be fitted with a pull-wire opening device on both side of the door. Such devices shall be carefully positioned for convenient use in accordance with the user requirements, e.g. fork lift truck operators.

The system shall incorporate a time laps mechanism to close the doors slowly, easily adjustable from 10 s to 2 min 30 s.

Care shall be taken to avoid structure borne and airborne noise emission from the automatic opening devices.

The doors shall be designed to return immediately to the open position upon meeting any resistance while closing. "Resistance" in this context shall be interpreted as meaning "any part of the human body". Where self opening doors have to be located in a manner which may create crushing or squeezing situations for personnel in the opening path of the door, special override or detecting devices may be required, dependent on location.

Doors with opening devices shall not "self-open" under the action of fire.

Manual override devices or emergency release valves shall be located approximately 1 750 mm above the floor, and have a self-explanatory arrangement for use.

Doors with inset personnel doors, shall not be operable if the personnel door is not properly closed.

Pneumatic assisted doors shall have moisture extractors fitted in air supply lines. Pneumatic systems shall not be supplied with pressure safety valves unless specified otherwise by the project. Control cabinets shall have permanent signs or labels for identification.

Instrument fittings and tubing shall be carefully coordinated with the project standard at an early stage prior to selection of supplier.

Unless otherwise specified by the project, pneumatic doors in escape routes shall be fitted with emergency air reservoirs to enable four complete activations (opening and closing) of the doors in the event of plant air failure.

Each air reservoir shall have a maximum capacity of 20 litres.

Pneumatic cylinders will be sensitive to contamination when air supply is disconnected. Consequently, the cylinder arrangement shall allow for simple disconnection from the door-leaf when the air supply is stopped for any period of time. Screw sealing plugs of same material as pneumatic supply lines shall be part of the pneumatic assembly supply. Plugs should be kept near the fitting by a safety chain.

Pneumatic system components in exposed weather conditions and in naturally ventilated areas shall be stainless steel AISI 316. This includes components inside and outside of the pneumatic control cabinets.

Electrical opening devices may be used provided that zone 1 classified area requirements and IP ratings are satisfied.

All doors with automatic opening devices shall have appropriate CE marking.

7.11 Thresholds

All required thresholds shall be dimensionally as low as possible, without impairing function with regard to fire rating, noise reduction, and ability to stop ingress of water.

The maximum height between the top of threshold and adjacent floor finish shall not be more than 25 mm. Doors used for regular passage of trolleys or forklift trucks, shall have the thresholds arranged to provide an absolute minimum of obstructions. This may be achieved by using thresholds with integral "ramps", or by using deck levelling screeds and associated floor-finishes to create local ramps to compensate for threshold heights. Door thresholds in forklift truck transport routes shall be detailed to withstand passage of the truck with its forks in the lowered position.

The maximum allowable threshold height shall be specified for each door type in the door schedule, together with heights of any associated ramps.

All doors shall have stainless steel thresholds. Doors that have painted or coated frames shall have either a brushed stainless steel threshold or a brushed stainless steel cover plate, minimum 1 mm thick, for the entire length, and down to the floor on both sides, leaving no gaps and sharp edges.

Fixing of thresholds shall not be by bolting through the fire rated deck below, and shall maintain the project standard of corrosion protection. For all sliding doors, large double-hinged doors and doors in areas with uneven deck plates, thresholds shall be fixed to doubling plates that are welded to the deck by the fabricator.

7.12 Frames

Door frames shall be installed, as appropriate, by either bolting through air tight isolation gaskets, or by a continuous fillet weld all round. Frames shall be reinforced at hinges, locks and closer device positions. Detailing shall minimise galvanic corrosion.

To reduce transmission of forces from the bulkhead into the door-frame, which may affect proper alignment and operation of doors, the maximum plate buckling at the perimeter of the cut-out shall be 5 mm along a straight edge. Where buckling is in excess of this, or where required for structural reasons, the cut-out shall be terminated at a welded angle profile into which the door frame may be welded or bolted.

7.13 Door locks

Doors shall be provided with locks in accordance with operator/company requirements. Non-lockable doors shall be fitted with "blind" escutcheon plates or blind cylinders. Lockable doors requiring key cylinder only on one side, shall have a wing shaped thumb-turn on the other side (normally inside), which overrides the lock mechanism. Certain doors shall be supplied with a "break-glass" unit to house a key or a thumb-turn.

Doors to cabins shall be lockable for privacy, with a thumb-turn on the inside. It shall be possible to unlock the door from the corridor side in an emergency. This may be achieved by locating a minimum of two pass keys in "break-glass" boxes at strategic positions on each cabin area level.

None of the doors in escape routes shall be lockable in the operational phase. Requirements for temporary locking of doors during the construction phase shall be agreed between the project and the operator/company.

All bathroom cubicle doors, solarium doors and doors to toilets and shower rooms etc., shall be fitted with inside thumb-turn and outside indicator.

Doors to high voltage electrical rooms shall be lockable. They shall open outwards from the room. They shall be equipped with a manual panic device, e.g. a vertical panic bar or push-button operated device that is operable from inside the room by the use of the knee, elbow or other part of the body, also by a person who is crawling. All in accordance with governing authority requirements.

High voltage rooms and certain local equipment rooms may require "break-glass" units for emergency access, if indicated in the door schedule. Such units shall be located by the door.

7.14 Vision panels

Vision panels shall be installed as required for orientation or safety reasons, and always in pendulum doors and doors in corridors and stairways. Doors with electro-magnetic door holders are exempted.

The vision panels shall be positioned to ensure good line-of-sight through the panel whilst operating the door. This may require the vision panel to be positioned off-centre in the door leaf.

The vision panels shall be an integral part of the certified door. The glazed area shall be approximately

200 mm x 500 mm (width x height) or 400 mm x 400 mm (width x height), and consist of tempered security glass. The vision panels shall not impair the function of the sliding door sealing.

7.15 Tolerances

All parts shall be supplied free from distortion. Face sheets shall be flat and shall not vary by more than 2 mm. Doors and frames shall be fabricated within tolerances on overall dimensions of 2 mm.

7.16 Tagging, marking and coding

Doors shall be tagged, marked and coded in accordance with project requirements. A tag plate shall be discreetly fixed to the door assembly, providing as a minimum, manufacturer's name and address, fire rating, sound insulation rating, project tag number and door number as listed in the door schedule. For all doors, the tag plates shall be fixed to an easily accessible but mechanically protected location.

7.17 Internal doors

The B-rated doors shall be fully compatible with the relevant proprietary B-rated partition systems.

B-rated folding doors are part of the partition supply, and are covered in Clause 10.

Internal A, B and non-rated doors requiring large glazed surfaces shall be included in the door schedule. The glazed area shall consist of laminated or tempered security glass, divided into at least two panes that are separated by horizontal muntin member(s). The glazing shall be an integral part of the certified door.

Doors being an integral part of an internal glazed partition system are covered in Clause 8, and are part of the glazed partition supply. The doors shall nevertheless comply with this subclause.

7.18 External doors

All external doors shall be robust stainless steel or aluminium sliding doors. Doors in recessed and sheltered entrances may be hinged.

The door leaf shall be a sealed unit, totally impervious to moisture. Sliding doors shall be mounted on the outside of the walls. The doors shall withstand the extreme environmental design conditions on the specified field location. The relative humidity shall be calculated at 100 %.

Detailing shall stop any pools of water on external decks from passing through the door construction.

Where weather tightness is required, weather tight seals shall be added. The weather tightness shall be verified by hose testing from the outside after installation. The water pressure shall be at least 0,2 MPa (2 bar), and the nozzle shall be held at a distance of maximum 1,5 m from the door. No leakage shall be accepted.

On floating production units, drill-ships, semi-submersibles etc., weather-tight doors may be required on or above freeboard decks. In addition to the sealing requirement stated above, these doors shall be designed for a strength equivalent to or better than that required for the weather-tightness of the structure in which they are positioned. The strength shall be verified by calculations.

7.19 "Gas-tight" doors

"Gas-tight" doors are normally located in the perimeter of areas where an air pressure differential shall be maintained, or where specified in the door schedule.

"Gas-tight" doors shall maintain a pressure differential between adjacent areas, where the allowable leakage rate shall not exceed $0,5 \text{ m}^3/\text{m}^2 \text{ h}$ at 50 Pa (5×10^{-4} bar) over-pressure, following prolonged use, or as specified by the project. A satisfactory test certificate shall be provided with each door type.

A pressure relief port and/or air lock is required for hinged doors separating areas of high differential pressure. It shall not reduce the door's specified fire rating and sound reduction properties.

7.20 Blast resistant doors

Certain doors shall be designed to withstand blast over-pressures. The magnitude of the static and dynamic design pressure (in bar), including impulse duration, shall be in accordance with project requirements.

The door shall be reinforced as required to maintain the given fire rating, integrity and operability (for escape), after the expected blast. Satisfactory laboratory test results (certificates) from a recognised laboratory shall be supplied with all blast resistant doors. The doors shall have been subjected to a full blast test followed by a fire test.

7.21 Explosion relief doors

Explosion relief doors are normally installed in external walls containing explosion relief panels. The doors shall have explosion relief panels, which open at an over-pressure of 0,005 kPa (0,05 bar), built into the door leaves. It shall be possible to open the door leaf up to a minimum of 60 % after an internal explosion. The panels and parts of the door shall not cause flying debris during the explosion.

The door frame, stiles and rails shall withstand an explosion over-pressure of minimum 0,01 MPa (0,1 bar) and remain in place.

7.22 Louvred doors

Louvred doors are normally installed in louvred walls providing natural ventilation to interior areas. The louvred doors shall be designed to maximise the passage of air through the louvres, whilst minimising the penetration of water to the interior.

7.23 Inset personnel doors

Inset personnel doors are doors set within larger hinged or sliding door leaves, as an integral part of the total door assembly. These doors shall be self-closing and self-latching.

7.24 Water tight doors

Doors or hatches within watertight bulkheads shall be certified to meet the applicable design pressures, see applicable NMD requirements.

All doors to be tested before installation at design pressure + 5 mWC (meter water column).

Hydraulically operated water tight doors shall be in accordance with current SOLAS Regulation. In addition to the requirements stated therein, it is strongly recommended that hydraulically operated water tight doors are equipped with a safety device to prevent accidental crushing injuries to personnel.

The central operating console at the bridge/control room shall then have a "master mode" with the following three modes of control:

- "local control" mode which allow any door to be locally opened and locally closed after use without automatic closure, with the safety device to prevent accidental crushing active;
- "door closed" mode which shall automatically close any door that is open, with the safety device to prevent accidental crushing active;
- "door closed safety override" mode which shall automatically close any door that is open, with the safety device to prevent accidental crushing not active.

NOTE Any proposed deviation to the above recommendation should be evaluated on a case by case basis with the operator/company.

Closing of doors shall be fail-safe. In the event of loss of control power the door shall close automatically.

Doors shall have a mechanical locking device to prevent the door from opening accidentally in an emergency.

Watertight doors shall be certified to have, as a minimum, the same fire rating as the divisions in which they are installed.

Arrangement of operation and local operation of the door shall be according to SOLAS Regulation, 15.7.1.5 and 15.7.4.

It shall not be possible to remotely open any door from the central operating console, see SOLAS Regulation, 15.8.3.

Alarm and indication on bridge/control room shall be according to SOLAS Regulation.

Control, alarm, and indication local on door shall be according to SOLAS Regulation.

A warning light shall be positioned on each side of the door and shall be active when the door is in "Door closed" mode.

The degree of protection for the electrical components shall be according to SOLAS Regulation, 15.7.6.

Electrical system shall be according to SOLAS Regulation, 15.7.7 and 15.7.8.

Control circuit and indication circuit shall be made separately.

Doors shall have a maximum of 20 mm threshold without recess. Hinged plates shall not be used.

Detailing of thresholds in material handling routes shall be carefully coordinated, with reference to the material handling report, in order to achieve a functional threshold that is as low and obstruction free as possible.

7.25 Emergency escape hatches

Emergency escape hatches shall be easy to open by a single individual from both sides, and shall have a minimum clear opening of 800 mm x 800 mm on fixed installations. On mobile installations, other requirements may apply. All emergency escape hatches shall be hinged.

Emergency escape hatches shall be of the same construction and quality as personnel doors, and shall be listed in the door schedule.

7.26 Inspection hatches

Horizontally arranged inspection hatches on top of decks shall be splash proof and detailed to be flush with the deck, with no protruding appurtenances likely to be a tripping hazard. They shall have fail-safe sealing detailing.

All inspection hatches shall be hinged wherever possible.

Inspection hatches in insulated bulkheads or decks shall be detailed to allow opening without causing damage to the adjacent insulation.

Inspection access panels in lightweight partition systems are covered in Clause 10.

7.27 Function testing/commissioning of doors

General function testing of all doors shall be carried out as part of the mechanical completion activities. Full perimeter gasket sealing, latching and compliance with specified opening pressure limits shall be formally verified. All adjustments shall have been completed, to ensure the fire- and smoke barrier properties are maintained.

Doors and hatches shall have recommended lubricants applied to hinges, mechanisms and gaskets as required at mechanical completion, in accordance with manufacturers' maintenance procedures.

Automatic opening devices shall be fully adjusted to comply with specified operation. Instrument quality air shall be provided if necessary, to allow for adjustment. Following adjustment, pneumatic cylinders shall be disconnected until air supply is permanently available. Air supply shall be checked for moisture content and contamination prior to permanent reconnection. Disconnected pneumatic tubing shall be sealed with screwed metal plugs of the same material as the tubing.

The function testing shall be performed by qualified/certified personnel.

7.28 Door schedule

A door schedule shall be developed based on attached data sheet, specifying all requirements for each door. All hardware, accessories and systems to be part of each door supply shall be included.

7.29 Door selection

It is of utmost importance that correct fit-for-purpose door types are selected, e.g. thin plate domestic/LQ category doors shall not be selected for use in medium or heavy-duty areas and vice versa. Table 1 to Table 3 shall be used to establish suitable door and escape hatch types for the respective areas of the installation. The door type codes shall be included in the door schedule in data sheet CDS-201, see Annex A. Special doors or doors that are part of equipment packages (e.g. provision stores) are not covered by Table 1 to Table 3.

Table 1 – Light and medium duty doors

	INTERNAL	INTERNAL	INTERNAL	EXTERNAL
CATEGORY/ ENVIRONMENT	Domestic/LQ	Domestic/LQ Light industrial/Utility	Medium industrial/Utility	Medium Industrial / LQ
USAGE	Personnel use only	Personnel/Infrequent mechanical handling	Personnel/Mechanical handling	Personnel/Mechanical handling
VENTILATION	Controlled	Controlled	Controlled	Open
TYPE OF AREA	Accommodation areas, cabins, offices, laboratories, control rooms, workshop offices, stores etc.	Accommodation areas, offices, laboratories, control rooms, switchboard rooms, workshop offices, stores etc.	Machinery rooms, workshops, switchboard rooms, main circulation routes, mud handling areas etc.	LQ laydown. Access / Emergency exits
EXPOSURE	Not exposed to weather. Not exposed to mechanical impact. Doors subject to occasional washdown shall be stainless steel.	Not exposed to weather. Not exposed to mechanical impact. Doors subject to occasional washdown shall be stainless steel.	Not exposed to weather. May be exposed to mechanical impact. Doors subject to occasional washdown shall be stainless steel.	Exposed to weather. May be exposed to mechanical impact.
MATERIAL	MS-SS-AL	MS-SS-AL	MS – SS -AL	SS-AL
RATING	B or non	A or non	A or non	A or non
DOOR TYPE CODE	L1	L2	M1	M2
DESCRIPTION	Thin plate light duty door leaf. For bolting into lightweight partition. Normally part of partition supply.	Thin plate light duty door leaf (normal plate thickness <1,5 mm). For bolting into bulkheads or prefabricated walls.	Stiffened plate medium duty door leaf (plate thickness min. 2 mm). For bolting into bulkheads or prefabricated walls.	Stiffened plate medium duty door leaf. (plate thickness min. 2mm). For bolting or welding into bulkheads or prefabricated walls. Weather tight seals where required.*

* Where weather tightness is a requirement for type M2 doors, weather tight seals shall be added. Weather tightness shall be verified by hose testing from the outside after installation.

Table 2 – Heavy duty doors

	SEMI - EXPOSED	EXTERNAL	EXTERNAL
CATEGORY/ENVIRONMENT	Heavy industrial/Production/Drilling	Heavy industrial/Production/Drilling	Heavy industrial/Production/Drilling
USAGE	Personnel/Mechanical handling	Personnel/Mechanical handling	Personnel/Mechanical handling
VENTILATION	Natural/Louvred	Open	Open
TYPE OF AREA	Drilling areas. Process areas. Drilling workshops. Heavy parts stores etc.	External walkways and main material handling routes. Adjacent to laydown areas etc.	External walkways and main material handling routes. Adjacent to laydown areas etc.
EXPOSURE	Semi-exposed to weather. Subject to regular washdown. Fire or blast rated. Exposed to mechanical impact.	Totally exposed to weather, driving rain, wind forces. Fire or blast rated. Exposed to mechanical impact.	Totally exposed to weather, driving rain, wind forces. Not fire or blast rated. Exposed to mechanical impact.
MATERIAL	SS-AL	SS	SS –AL
RATING	A/Blast or non	A/H/Blast or non	Non
DOOR TYPE CODE	H1	H2	H3/H4/H5
DESCRIPTION	Stiffened plate heavy-duty door leaf (normal plate thickness minimum 2 mm). For bolting or welding into bulkheads or prefabricated walls.	Stiffened plate heavy-duty door leaf (plate thickness minimum 3 mm). For bolting or welding into bulkheads or prefabricated walls. Weather tight seals where required.*	H3-Solid plate (stiffened). H4-Louvred. H5-Explosion relief. For bolting into prefabricated cassette wall systems.

* Where weather tightness is a requirement for type H2 doors, weather tight seals shall be added. Weather tightness shall be verified by hose testing from the outside after installation.

Table 3 – Water tight and weather tight doors

	INTERNAL/ EXTERNAL	EXTERNAL
CATEGORY/ENVIRONMENT	Heavy industrial	Heavy industrial
USAGE	Personnel/Mechanical handling	Personnel/Mechanical handling
VENTILATION	Controlled/Open	Open
TYPE OF AREA	External walkways and material handling routes. Areas exposed to water pressure or flooding. On and below freeboard decks.	External walkways and material handling routes. Areas exposed wave pressure/green sea. On and above freeboard decks.
EXPOSURE	May be exposed to water pressure from inside or outside. Fire rated. Exposed to mechanical impact.	May be exposed to wave pressure from outside. Fire rated. Exposed to mechanical impact.
MATERIAL	SS-MS	SS-MS-AL
RATING	A/non	A/non
DOOR TYPE CODE	W1	W2
DESCRIPTION	Water-tight* Stiffened plate heavy-duty door leaf (plate thickness minimum 4 mm). For bolting or welding into bulkheads. Strength equivalent to the structure in which they are installed.**	Weather-tight* Stiffened plate heavy-duty door leaf (plate thickness minimum 3 mm). For bolting or welding into bulkheads. Strength equivalent to the structure in which they are installed.**

* Water/weather tightness shall be verified by hose testing from the outside after installation.

** Strength shall be verified by calculations.

7.30 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this clause require specification by the operator/company:

- requirements for same supplier for all doors on the installation;
- dimensioning static heel (floating/mobile installations);
- corridor doors requiring electro-magnetic door holders;
- doors requiring pull-wire opening device, e.g for fork lift truck operator;
- master lock and key suiting system;
- temporary locking requirements;
- nominated supplier for instrument fittings and tubing (pneumatic system);
- for water-tight doors – the requirement for a safety device to prevent accidental crushing, together with third mode of control.

8 Windows and glazed surfaces

8.1 General requirements

All window frames shall be continuously welded to the outside surface of the external bulkheads or prefabricated walls. Bolted windows may be used, if approved by the project. The window units shall have an adjustment capability in depth to accommodate various external wall thicknesses. Detailing between internal frame and cut-outs in internal linings shall allow for mechanical closing of any gaps between these items, to stop passage of smoke and air borne noise.

The fixing detailing between window frames and bulkheads is a critical factor for noise control, weather tightness and structural integrity, and shall be carefully coordinated between the architectural and structural disciplines, together with the acoustic engineer and the supplier, at an early stage in the project. Forces from the steel structure shall not be transmitted into the glass pack unit.

The design of the windows installed in vertical bulkheads shall be such that all maintenance, repair and replacement of glass can be carried out from the inside. Internal bolts shall be hidden behind an easily demountable profile (covering) system, which surrounds the complete window unit.

In this NORSOK standard the term window shall also include porthole.

8.2 Environmental conditions

The complete window units shall withstand the extreme climatic conditions that may arise on the given field location with respect to wind, icing, temperature, humidity, saliferous corrosion, etc., throughout the installation's entire life span. The relative humidity shall be calculated at 100 %.

8.3 Glazing

The glazing shall consist of hermetically sealed multiple glazed units. A minimum 50 % neutral coloured, heat-reflecting layer shall be included for all external windows. The heat reflective layer should be on the inside of the outer glass.

The glass units shall be sized to allow sufficient expansion movement while maintaining the necessary performance requirements.

Any condensation between glass layers is unacceptable.

8.4 Gaskets and glazing compound

Gaskets, sealants, setting blocks, spacers and shims shall be of durable quality and have a high resistance to ultraviolet light. The grooves holding gaskets shall have good anchoring properties.

Glazing compound shall be best quality weather-resistant mastic, guaranteed to be stable and to maintain its adhesion to both glass and metal.

8.5 Blinds

Windows in cabins, offices or other areas shall be fitted with blackout blinds/curtains (or a combination of both) as required by the operator/company. The blinds shall be completely impenetrable to light. They shall be robust, reliable and of a suitable weight and duty to withstand continuous daily use.

8.6 Blast pressure resistance

The window units shall have the same blast pressure resistance as the adjoining wall, specified as a static design pressure in bar. Each unit shall be fully intact after being exposed to the specified blast pressure, maintaining full fire rating and functional integrity.

8.7 Resistance to water, gas and condensation

The complete window unit shall be totally gas- and spray-tight. Where window units are applied horizontally or at an angle, a complete drainage system shall be provided as an integral part of the unit. On floating installations, windows shall maintain the integrity of the bulkhead in an accidental heeling condition.

8.8 Fire rating

The complete window units, including window collars, shall have the same fire rating as the walls in which they are installed.

Windows should not be installed in H-rated fire divisions.

8.9 Thermal insulation

The U-value (heat transmittance) for windows shall not exceed $1,5 \text{ W/m}^2 \text{ }^\circ\text{C}$.

8.10 Acoustic requirements

The total window assembly, shall provide a minimum weighted sound reduction index $R_w = 48 \text{ dB}$ in general, and $R_w = 53 \text{ dB}$ (laboratory measurements) in cabins and HTCC, unless specified otherwise in the window schedule. The total window assembly may require two glass packs separated with an air gap in order to achieve the required sound reduction.

The objective shall be to ensure and verify that the maximum sound level inside the accommodation areas is in compliance with the specific requirements as stated in NORSOK S-002.

Certification verifying the sound reduction rating (laboratory measurement) of the window assembly (window and frame) shall be submitted to the operator/company for acceptance prior to placement of order. It shall be verified that the window assembly tested is identical to the actual window assembly planned to be installed.

The sound measurement test method shall be in accordance with ISO 140-3.

8.11 Material requirements

Carbon steel shall be in accordance with NS-EN 10025, S355 J2G3 or equivalent.

Stainless steel shall be type AISI 316L, or alternatively AISI 316 with a maximum carbon content of 0,05 %.

Aluminium shall be of seawater resistant type.

8.12 Painting

All carbon steel surfaces shall be prepared and painted with a full coating system in accordance with the project coating system standard. Stainless steel and aluminium surfaces shall in general not be painted, unless specified otherwise. Internal frames shall be provided with baked-on powder epoxy/polyester coating.

The edges and welds of external frames shall be thoroughly ground and cleaned for the best possible bonding of coating and sealant. Any surface protection burns from welding shall be repaired prior to final installation of glazing

8.13 Tolerances

All parts shall be supplied free from distortion. All faces are to be level and plumb.

8.14 Helicopter traffic control centre (HTCC) and wheelhouse windows

HTCC and wheelhouse windows shall be equipped with a complete demister or heating system, wiper system and a spray-jet water system for cleaning of windows, in accordance with operator/company requirements.

The windows shall be set at an angle of approximately 15° outwards at the top, to provide a glare-free and optimal view. Visual distortion is not acceptable. The frames between the window panes shall be as narrow as possible. Glazing shall be externally reflective, and have good night-time vision properties. Glazing of type "Kappa Optima Neutral", or equivalent, shall be used.

The windows shall otherwise comply with the requirements in this clause.

8.15 Driller's house windows

The windows shall be complete, prefabricated units, ready for use. The supply shall include the following items, as a minimum:

- toughened laminated safety glass in accordance with NS-EN 12600-CLASS 2(B)2;
- protection against dropped objects;
- hydraulic or pneumatic cylinders for opening windows;
- hydraulic or pneumatic operated wiper system (oil resistant);
- heavy duty spray-jet system for use of chemicals to clean oil and dirt on windows;
- internal panel for operation of switches;
- demister system, unless function is covered by HVAC system;
- due to long delivery times for replacement windows, a reserve glass pack shall be provided on the installation.

The dropped object protection grills shall be hot dipped galvanised carbon steel or stainless steel. The grill shall be of a type that allows for good through visibility. Grilles shall be hinged to allow for safe access to glazing.

All switches for individual operation of windows, wipers, and the spray-jet system, shall be mounted on a panel that can be conveniently reached by the driller's house operator.

The angle of the driller's house window shall be aligned to optimise the view up into the derrick.

Replacement of glazing shall be from the safest side.

The windows shall otherwise comply with the requirements in this clause.

8.16 Internal glazed partitions

The internal glazed partition system shall consist of a series of fire rated glazed or solid panels, which are supported by framing members, mullions and muntin members. Partitions of the same fire rating shall, wherever possible, have the same thickness, regardless of span. The system shall be finished complete with all insulation, make-up pieces and cover plates of the same material and finishes as the glazed partition system.

Fire rated glazed doors, including door frame and hardware, are an integral part of the glazed partition system supply. The hardware shall be of the same type and quality as specified for internal doors. The glazed area shall be divided into at least two panes, which are separated by a horizontal muntin member. Transparent doors and partitions shall be clearly designed/marked and arranged to avoid unintentional personnel contact and injury.

Glazed partitions and doors shall have sound reduction, fire-rating and threshold requirements as specified in the data sheet.

For dividing large areas into separate functional zones, non-rated glazed partitions and doors may be installed if approved by the project.

Glazing shall be laminated or tempered security glass.

There shall be no visible bolts, fastening screws, etc. The system shall allow for glazing replacement without damaging framework or flashings.

8.17 Window schedule

The window schedule, complete with all accessories and systems shall be based on the attached data sheet, and shall cover all windows and glazed components in the project.

8.18 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this clause require specification by the operator/company:

- HTCC and wheelhouse window system requirements;
- requirements for blackout blinds/curtains.

9 Insulation

9.1 General requirements

This subclause defines the general requirements for supply and installation of dry fix fire, thermal and acoustic insulation to be applied to all types of walls, bulkheads, floors, decks, roofs, ceilings and structural elements.

If it is proven impossible to use dry fix insulation, a spray-on type alternative may be considered, but requires approval from company/operator on a case by case basis. In this case the material shall be water repellent with good non-cracking and adhesive properties.

Application of glass wool is not acceptable.

Where decks requiring dry fix insulation are over open sea or directly exposed to the external environment, the insulation should, where practicable be on the protected side.

All insulating materials shall be water repellent, and shall be suitable for the marine environment and the context in which they will be used. The materials shall not be corrosive to metal or emit any toxic gases or harmful dust. Insulation materials containing fibres shall be totally sealed with a membrane to prevent any fibres or fibre dust from being emitted into the environment. The membrane shall be flame retardant and impervious to moisture.

All carbon steel surfaces that are to be insulated shall be inspected and approved prior to application of insulation, to confirm that surface preparation and application of coating has been completed in accordance with specified requirements.

Fire, thermal, and acoustic insulation may be combined where appropriate, provided all requirements are met.

Typical insulation details shall as far as practicable be standardised throughout the installation, and shall be reflected in the wall type/deck type details and schedules. Details showing insulation to counteract thermal bridging, and fire insulation with specific fire direction identified shall be produced early in the project. Insulation details shall be suitably referenced on project documentation so that they may be used for verification of installed insulation as part of mechanical completion activities, and for repair work or modification during later phases.

9.2 Fixing pins and wire mesh

Bulkheads and decks that are to be insulated shall be provided with fixing pins and washers to retain the insulating material.

The pins and washers shall be spaced at a maximum centre-to-centre distance of 300 mm in both directions, perpendicular to each other. The pins shall be welded to the structural material, e.g. steel surface.

In areas where access may be required for periodic maintenance, the insulation pins shall have capped dome washers to avoid injuries to personnel.

Gluing of pins may be acceptable in certain cases for fixing of acoustic and thermal insulation, but only after project approval in writing.

For fire rated dry fix insulation, additional galvanised wire mesh secured by the pins and washers, shall be used to retain the insulation.

On insulated structures that are designed to resist a blast overpressure, the fixing pins shall be long enough to be bent over the washer and the wire mesh, and allow the mesh to flex in both directions in the event of a blast.

9.3 Vapour barrier

A vapour barrier in a strong, non-combustible and suitable material (e.g. 0,048 mm reinforced aluminium foil), shall be used where there is a temperature differential. The vapour barrier shall be fixed on the internal (warm) side of the insulation. All joints and penetrations shall be properly sealed with tape of the same material as the barrier. Overlap at joints shall be at least 50 mm. The vapour barrier shall be impervious to moisture, completely sealed including all edges, and free from any punctures.

9.4 Protective cover

All dry fix insulation exposed to possible mechanical damage shall have suitable protective cover.

Where mechanical protection is required for internal bulkhead and internal under-deck insulation, technical linings shall be used.

In areas where mechanical protection is not required (e.g. at high level above technical linings) glass fibre or "Dacron" type cloth may be used to provide a combined protective cover/vapour barrier/sound absorbent membrane. The material shall be flame retardant and impervious to moisture, and have well documented sound absorption properties. Tape, with a matching surface texture and colour, shall be used to seal all joints. The tape adhesive shall be of a type that retains its adhesive properties, e.g. acrylic based.

If insulation is applied on top of decks, it shall be protected with sturdy floor panels or screed that can resist mechanical impact from relevant traffic.

Dry fix insulation applied to external surfaces shall have suitable protective cover that can resist mechanical impact, any required blast pressure, climatic conditions, and ingress of water into the insulation.

Where the insulation is applied to the cold side of a wall or deck, the insulation should be protected with a moisture permeable wind barrier.

Fire insulation on top of external roofs, decks and container lay-down areas, shall be protected with surfaces suitable for the respective personnel and material handling traffic. The top surface shall be thermally insulated from the main structural deck. It shall be even and smooth and pitched to drains to enable efficient water dissipation. Surface buckling, which may promote pools of water, shall be avoided. The construction shall be certified.

All external cladding covering A- and H-rated dry fix insulation shall have fire rated gaskets between cladding and fixing brackets to maintain fire rating of the overall installation. Cladding covering thermal insulation shall have isolation gaskets between cladding and fixing brackets to avoid migration of condensation.

9.5 Technical lining

Technical linings are constructed from flat metal panels fixed to support profiles.

The technical linings shall be stainless steel, aluminium or other suitable non-corrosive material. They shall be perforated where required for sound absorption. Galvanised plate may only be used in areas not subject to dampness.

Technical linings shall be suitably stiffened and detailed to avoid rattling of panels after installation. There shall be no sharp, protruding edges.

At the interface between the vertical lining and the deck, the technical lining shall be securely fixed to a continuous angle or plate upstand that is glued/stud bolted or welded to the deck, forming a watertight bund to prevent water from reaching the insulation. The detail shall remain watertight during and after cleaning with high-pressure water hose.

The technical lining shall be arranged and detailed without overlaps, to allow removal of an individual panel section without affecting adjacent panels.

The material thickness of the technical linings shall be minimum 0,9 mm for steel sheets, and minimum 1,5 mm for aluminium.

For areas subject to wash-down, it shall be possible to hose down internal perforated technical linings without moisture being trapped within the wall.

9.6 Removal of insulation for inspection

It shall be possible to easily remove and replace insulation covering a structural member, deck or bulkhead at any point to inspect the condition of the supporting structure. A procedure for performing this task shall be developed by the supplier for use in the operational phase.

9.7 Fire insulation

The application of fire insulation shall be in accordance with relevant certification, project documents and regulations.

B-0 class draught stoppers shall be installed above suspended ceilings. The distance between draught stoppers shall not exceed 14 m. Where there is a cavity between the external wall and internal lining, the draught stopper shall continue down the cavity to provide a continuous seal.

Draught stopper sectioning shall be coordinated with fire and smoke detector locations, and locations of smoke doors.

9.8 Blast pressure resistance

Insulated structures and elements designed to resist a specified fire and design blast pressure (specified as a static design pressure in bar), shall be fully intact after being exposed to the specified blast pressure, maintaining full fire rating and integrity. Necessary documentation shall be provided.

9.9 Thermal insulation

Thermal insulation should be placed on the internal (warm) side of the structure.

For the LQ and other manned areas, the complete construction, including thermal insulation shall provide a U-value (heat transmittance) of 0,5 W/m² °C, or better.

9.10 Acoustic requirements

The insulation materials shall form an integral part of structures and elements in order to provide

- absorption,
- sound insulation.

Sound absorption in manned areas shall be provided by appropriate perforation in suspended ceilings and acoustic wall elements. The perforation grade shall be selected to satisfy the requirements of the noise prediction study. The wall elements shall have the same surface finish as any surrounding non-perforated walls. Fibre insulation in perforated panels shall be totally sealed with a membrane to prevent any fibres or fibre dust from being emitted into the environment. The membrane shall be flame retardant and impervious to moisture.

Wall panels shall not be perforated below 1 500 mm above finished floor level.

The acoustic insulation shall be selected and detailed to achieve the sound absorption and sound reduction requirements specified in the project documentation.

Acoustic requirements are specified in NORSOK S-002.

The laboratory sound insulation shall be documented by a test in accordance with ISO 140-3. The sound absorption shall be documented by a test in accordance with ISO 354.

9.11 Acoustic cassettes

Sound absorbing cassettes may be mounted to bulkheads, walls, ceilings and underside of decks in areas where additional absorption of sound is required. Sound absorption data for the cassettes shall be provided from a recognised acoustic laboratory. The cassettes shall have good sound absorption properties in the 63 Hz to 4 000 Hz frequency range.

Measurements shall be in accordance with ISO 354.

Acoustic cassettes may only be used for sound absorption in kitchen and galley areas if accepted in writing by project, and only if they comply with the relevant hygiene requirements.

9.12 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

10 Partitions and ceiling systems

10.1 General requirements

The partition and ceiling systems shall be fully compatible with all relevant installations, elements, fixtures, fittings and penetrations, as well as all relevant requirements to stability, sound reduction and fire class.

Each partition and ceiling panel, or an appropriate section of the respective systems, shall be easy to remove and to reinstall/replace, without affecting the design performance requirements. Special attention shall be given to ceiling systems subjected to frequent removal and reinstallation.

The supplier of the systems shall provide a procedure for removal and replacement of panels.

All insulation shall be of the dry fix type (as defined in Clause 9) with a suitable density. Fibres shall be properly sealed (including at termination details) with membrane to prevent any fibres or fibre dust from being emitted into the environment. The membrane shall be flame retardant and impervious to moisture. All insulation shall be properly fixed in position.

Partition and ceiling panels shall be aligned and set plumb and level. Overall dimensional tolerance shall not exceed 3 mm.

All types of services (e.g. pipes, ducts, cables, boxes, switches, sockets, grilles, speakers, sprinklers, light fittings and detectors) shall be carefully co-ordinated with the setting of the panels. All cut-outs in partition and ceiling panels shall be properly trimmed. Sharp edges and corners are unacceptable. Field cutting shall be kept to a minimum. Gaps between components and panels may impair smoke and noise barrier performance, and shall be avoided.

Detailing at interfaces between components of different supplies shall be carefully co-ordinated and resolved. Fixing components and infill elements for these interfaces shall be part of the partition/ceiling system supply. Dissimilar elements shall be separated to avoid galvanic corrosion.

Partition and ceiling systems shall be delivered with heavy-duty transparent protective foil covering the finished surfaces of the respective systems. The protective foil shall be flame retardant. The protective foil shall not be removed before the mechanical completion phase. It shall be easy to remove and the adhesive shall not discolour the elements if it is removed at different intervals.

10.2 Fire test requirements

Fire test certificates shall be provided for all rated partitions and ceiling systems. Components installed within the partition and ceiling systems (e.g. hatches and light fixtures) shall be certified to comply with the applicable fire rating. Where insulation batts are used around light fixtures to maintain fire-rating, they shall

be properly sealed to prevent any fibres or fibre dust from being emitted into the environment. A check shall be performed, to ensure that potential heat build-up will not negatively affect performance of the light fixture.

10.3 Acoustic requirements

The partition and ceiling system shall meet the sound insulation requirements stated in NORSOK S-002 with respect to field measured values (R'_w) unless otherwise stated due to noise requirements. All partitions towards rooms and areas with high noise levels shall have a noise reduction that is sufficient to meet the noise requirement in adjoining rooms.

As a guidance in the choice of system, the laboratory sound reduction index (R_w) shall be between 3 dB and 5 dB better than the field requirement.

Special attention shall be paid to avoid noise leaks, flanking transmission, noise transmission via floor and ceiling voids, etc.

The R'_w value applies to the complete construction assembly, including ventilation openings, doors, windows, penetrations and perforated ceilings, etc., unless otherwise specified.

Perforated ceilings shall generally be used in manned areas to provide the required degree of sound absorption.

10.4 Partition system

10.4.1 Partition types

The partition system shall be one of the following types, and shall be of a proprietary brand:

- cavity wall system with interior finishes on both sides;
- liner panel with interior finish on one side;
- compact panel with interior finish on both sides.

The system may consist of either inter-locking, structurally self-supporting panels, or panels attached to an integral structural frame system. All installed panels and structural members shall be non-corrosive, rigid and robust, maintaining the walls integrity under various operational conditions. The system shall be smooth, easy to maintain and clean, and free from any rattling noises.

Glazed panels may also be an integral part of the partition system, and shall comply with Clause 7.

10.4.2 Sheet material

Any suitable material may be used. Face sheets shall be non-corrosive, perfectly flat and sufficiently thick to resist any likely force or impact it may be subjected to. Visible pop-rivets are unacceptable.

Carbon steel face sheets shall be a minimum 0,6 mm thick and pre-galvanised of Sendzimir type or equal, which allows bending and forming of the sheets without the zinc coat detaching from the steel.

Stainless steel sheets shall be minimum 0,7 mm thick and brushed on one side.

10.4.3 Top coat finish and colour

The top coat finish to panels and any locking or cover profiles shall be smooth, uniform and identical in any one wall surface. Foil finishes shall be minimum 150 microns thick. Colours shall be in accordance with the colour schedule for each room and area.

A clear procedure to support future maintenance repairs shall be part of the supply, and shall include applicable codes for foil replacement and Natural Colour System (NCS) or RAL paint codes for touch-up.

10.4.4 Reinforcements and services

The partition system shall accommodate and conceal all localised reinforcements required for support of fittings, equipment and furniture.

All services (e.g. cables, pipes, ducts) shall be concealed within the partition system or by fixed installed furniture.

10.4.5 Joints, skirtings and corner guards

The wall system shall have splash-proof joints in areas defined as wet rooms.

The joint between the partition wall and the floor finish shall have a coved skirting detail in all wet rooms. The partition wall faces shall overlap skirtings to form a "drip nose" detailing.

A full height and flush mounted brushed stainless steel corner guard shall be installed on all exposed partition wall corners. If the corner guard is applied to the outside of a corner, it shall have a minimum thickness of 1,5 mm. If the corner guard is a recessed, integrated part of the partition system, the thickness may be reduced to 1,0 mm.

10.4.6 Partitions in wet rooms

Partitions in wet rooms and shower rooms shall be completely splash-proof and easy to maintain and clean.

10.4.7 Hinged inspection panels

Hinged inspection panels (or doors) shall be provided where inspection and maintenance behind the wall is required. The inspection panels shall blend with the wall and shall be labelled as required. The panels shall be hinged and lockable by use of a snap lock or a hexagonal key system. Hexagon or square keys for inspection panels in walls shall where possible be of a standardised type, or suited to the master key system if required.

The insulation on the inside of inspection panels shall be mechanically protected with a solid technical liner.

10.4.8 Folding walls

Folding walls shall be of a proprietary system and easy to maintain and operate. The panels shall be hinged and lockable in both open and closed position by the use of a handle.

10.5 Ceiling system

10.5.1 Ceiling types

The ceiling system shall be of the following types:

- strip ceiling, suspended, perforated or unperforated;
- flat panel, suspended or self-supporting, perforated or unperforated;
- cassette type with total accessibility, suspended, perforated or unperforated;
- open grid ceiling system;
- decorative type ceiling system for dining room, main recreation rooms etc.

Strip ceiling shall consist of 100 mm to 300 mm wide panels with interlocking profiles.

Cassette type ceiling with total accessibility shall consist of a primary support grid system with cassette type infill elements, which are individually removable for easy access into the ceiling void. The system shall have resilient mountings at the supports.

Ceiling construction and ceiling voids in areas subject to possible over-pressure, shall be detailed to avoid damage when over-pressure below the ceiling is lost, e.g. when doors are opened.

Installed ceiling systems shall be flat and smooth, easy to clean and maintain, and be free from any rattling noises. Dust traps shall be avoided on edge profiles.

Ceiling systems shall have sufficient strength to allow for repeated dismantling and reinstallation.

Ceilings on floating/mobile installations shall have mechanical fixings in accordance with relevant certification.

Ceilings in smoking areas shall not be perforated. Required acoustic absorption shall be achieved by other means.

10.5.2 Sheet material and insulation

The sheet material shall be of a suitable metal, e.g. non-corrosive aluminium, galvanised carbon steel or stainless steel. Material thickness shall be minimum 0,6 mm.

Each individual ceiling panel shall be insulated to obtain desired sound absorption and fire rating. If multiple layers of insulation are required to achieve the required rating, they shall be securely fixed to each panel as an integral part of the ceiling system. Insulation laid loosely over the ceiling system is not acceptable.

All fibre insulation (including above perforations in perforated ceiling panels) shall be totally sealed with a flame retardant membrane, to prevent any fibres or fibre dust from being emitted into the environment. The membrane shall be impervious to moisture.

10.5.3 Top coat finish

All visible surface finishes of the ceiling system shall be foil, baked-on epoxy or stove enamel coating. Brushed stainless steel may be used in certain areas, e.g. kitchen/galley. Other suitable finishes may be used on decorative elements of the ceiling system.

10.5.4 Suspension system

The suspension system shall be of an elastic type to reduce transmission of structure borne sound. Fixing to service systems and equipment is unacceptable.

10.5.5 Inspection hatches

Hinged inspection hatches, which blend with the surrounding ceiling panels, shall be provided where access to installed services above the ceiling is required. The clear opening shall be minimum 500 mm x 500 mm or 600 mm x 400 mm. The insulation on the inside of inspection hatches shall be mechanically protected with a solid technical liner.

The hatch construction shall be strong enough to allow for repeated opening. Unless the hatch has a fail-safe opening mechanism, a safety chain shall be installed to prevent accidental opening.

Locking shall be by hexagon or square type key, of same type as used for inspection panels in walls.

10.6 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

11 Prefabricated wall systems

11.1 General requirements

All fabrication and installation work shall be based on approved project documentation which has been thoroughly co-ordinated with all disciplines concerned. A detailed wall schedule shall be developed, showing all information required to complete the work, e.g. wall types, dimensions, constructions, fire rating, penetrations and any other pertinent elements and details. Drawings shall show major interfaces with other elements and systems, and overall structural support details.

Drawings shall clearly define the split in scope of work between prefabrication by supplier and field modification to fit at location.

11.2 Fire rating

The fire rating shall be as required by the project, and certified in compliance with governing body regulations.

11.3 Blast requirements

All walls and wall elements designed to resist a specified fire and design blast pressure (specified as a static design pressure in bars), shall be intact after being exposed to the specified blast and drag pressures stated in the design accidental load specification, maintaining full fire rating and integrity. Necessary documentation shall be provided.

The project should define the allowable pressure the wall can impose on the other members.

11.4 Thermal requirements

Where thermal insulation is required a U-value (heat transmittance) of $0,5 \text{ W/m}^2 \text{ }^\circ\text{C}$, or better, shall be achieved, unless specified otherwise. Thermal insulation shall normally be placed on the internal (warm) side of the structure.

11.5 Acoustic requirements

All installed wall assemblies shall meet the sound insulation requirements stated in NORSOK S-002 with respect to field measured values, R_w , unless otherwise stated due to noise requirements.

As guidance in the choice of system, the laboratory sound reduction index, R_w , shall be at least 5 dB better than the field requirement. In addition, special attention shall be paid to avoid noise leaks, flanking transmission, noise transmission via floor and ceiling voids, etc.

Perforation for sound absorption shall be provided as required, without affecting the airborne sound reduction requirements. Perforations shall not be below 1 500 mm above finished floor level. Absorption properties shall be tested in accordance with ISO 354.

11.6 Pressure requirements

The complete wall system, including penetrations, shall be able to maintain a pressure differential between adjacent areas to resist the passage of smoke and flames, in accordance with governing body fire rating definitions. Maximum allowable leakage rate shall not exceed $1,7 \text{ m}^3/\text{m}^2 \text{ h}$ at 50 Pa (5×10^{-4} bar) over-pressure. For areas where maintaining a permanent pressure differential is an integral part of the overall safety philosophy, other maximum leakage rate values ($0,6 \text{ m}^3/\text{m}^2 \text{ h}$ or less) may be specified by the project.

Installed walls between areas requiring a permanent pressure differential and/ or "gas-tight" barrier shall be of a certified construction without need for periodical resealing.

11.7 Material requirements and coating

Stainless steel shall be type AISI 316L, or alternatively AISI 316 with a maximum carbon content of 0,05 %. The stainless steel materials shall be supplied in the white pickled and passivated condition. Stainless steel surfaces shall not be painted, unless specified otherwise.

If Duplex stainless steel is considered, the standard and grade of Duplex shall be proposed by the Supplier and approved by the project.

Carbon steel shall be in accordance with NS-EN 10025, S355 J2G3 or equivalent. Carbon steel shall be galvanised with minimum 50 microns zinc, and coated.

Galvanised plate may only be used in areas not subject to dampness.

All nuts and bolts fixed to external surfaces and internal surfaces exposed to natural ventilation, shall be stainless steel, unless specified otherwise. Galvanised steel bolts and nuts may be used in other areas, unless specified otherwise. Pop rivets should be avoided.

Alternative materials (e.g. aluminium, composite materials, titanium, etc.) may be used, provided such materials comply with all relevant requirements.

Appropriate coating materials are part of the wall system supply, and shall be applied whenever drilling of holes, cutting of corrodible materials on site, etc., is necessary.

The material surfaces shall be smooth, "self-cleaning" and require minimum maintenance. Surface finish of systems shall be optimised to maintain a uniform finish, and shall be designed to allow for cleaning and removal of stains and contamination caused by salt deposits, blasting grit and welding spatter. Stain cleaning procedures shall be included in supply.

Stainless to carbon steel welds shall be over-painted to project standard by a minimum of 50 mm.

Prefabricated wall systems shall be suitably preserved for transportation and storage, and for protection against damage throughout the construction phase. The wall surface after removal of preservation shall be stain resistant and require minimum maintenance. A procedure for stain removal shall be part of the supply.

Heavy-duty preservation that is resistant to weld spatter, angle grinding grit and potential damage from other construction activities shall be in place immediately following installation. The height of the heavy-duty preservation shall be 2 m. Thin plastic foil shall not be used.

11.8 Structure, reinforcements and deflections

The wall systems may consist of either inter-locking, structurally self supporting panels, or panels attached to an integral structural frame system.

All walls and wall panels shall be adequately structurally dimensioned to support, receive and transfer all relevant loads and forces. External wall panels should only be supported at horizontal steel beams. Bracings and main structural columns shall not be used as supports. Internal panels shall span between deck support points. Care shall be taken to prevent any damaging forces being transferred from the main support structure to the wall systems.

All openings shall be trimmed and strengthened to receive and support the weight of windows, door frames and doors including sliding doors with head track. Additional reinforcement shall be provided at the extreme end of door head tracks. The wall system shall allow for bolting of door frames to facilitate future adjustments to doors without affecting the wall system.

The wall design with support details shall allow for the fabrication tolerances of the supporting structure. Deflection tolerances and fabrication tolerances for support steel shall be established prior to fabrication of the wall systems.

The span over deflection ratio (inclusive maximum design wind loads, where applicable), shall not be less than 200, unless specifically noted otherwise in the project documentation.

The wall systems shall be provided with necessary flexible joints to accommodate deflection tolerances they may be exposed to.

The external plate thickness of all external wall (and roof) panels shall be minimum 2 mm stainless steel unless specified otherwise by the project. It shall satisfy all design criteria and be in accordance with details shown on the certified test data.

11.9 Method of fixing

The panel fixing method shall be designed to satisfy all requirements to transmission of forces, fire resistance, blast resistance, sound reduction, moisture resistance, weather-tightness and gas-tightness, as required on each location.

Where applicable, walls to be fixed by continuous seal weld, shall be designed to facilitate temporary fixing of panels to structural steel support elements, thus allowing the panels to be removed as required to provide access for large equipment during the installation phase.

Internal surface panels and liner panels that are not welded shall be installed with concealed fixings.

11.10 Insulation and vapour barrier

All required insulation shall be of the dry fix type (as defined in Clause 9) with a suitable density. A continuous membrane to prevent any fibres or fibre dust from being admitted to the environment shall properly seal fibres. The membrane shall be impervious to moisture. The insulation shall be properly fixed in position and shall not be corrosive to metal.

A vapour barrier in a strong, non-combustible and suitable material (e.g. minimum 0,048 mm reinforced aluminium foil) shall be used where there is a temperature differential. The vapour barrier shall be fixed on the internal (warm) side of the insulation. All joints and penetrations shall be properly sealed with tape of the same material as the barrier. Overlap at joints shall be at least 50 mm. The vapour barrier shall be completely sealed inclusive all edges, and free from any punctures to prevent any ingress of water.

Where there is a perforated liner and additional sound absorption is required, an extra layer of minimum 25 mm sound absorbing insulation shall be provided between the vapour barrier and the perforated liner panel. This insulation shall be sealed with an appropriate black flame-retardant foil that is impervious to moisture.

11.11 Removable panels

The external wall system shall allow for removal of a wall panel at a predefined point without affecting the adjacent panels. Each panel, or an appropriate section of the external wall system, shall be easy to remove and reinstall.

Where frequent removal of external wall panels is required, a special bottom support detail shall be provided to avoid a "threshold" at floor level after the panel has been removed. Removable external wall panels shall be supplied with permanent, unobtrusive lifting lugs. Removable panels shall be bolted through continuous gaskets. The external wall panel shall be clearly marked "Removable panel" on both sides.

11.12 Internal panel wall systems

Internal panel wall systems shall have flush face sheets in galvanised coated carbon steel, stainless steel or aluminium. Other material may be accepted provided it satisfies the design criteria and has the necessary certification. Visible cover profiles and flashings etc., shall be of the same material, colour and finish as the face sheets. The floor/wall joint shall have a sealed skirting detailing, see Clause 15.

The wall system shall be fixed at the top to a yard supplied steel down-stand plate that extends below all stiffeners. Where possible all penetrations shall be routed through the down-stand plate.

With the exception of LQ, offices, control rooms and areas not subject to mechanical impact, face sheets shall have a minimum thickness of 0,9 mm.

In LQ, offices and control rooms, the face sheets of prefabricated walls shall be of a similar type and have the same finish as any surrounding partition walls.

Where applicable, it shall be possible to hose down internal perforated liner panels without moisture being trapped within the wall. All wet rooms shall have a recessed, coved skirting detailing between the wall and floor joint.

Wall panels shall not be perforated below 1 500 mm above finished floor level.

These requirements also apply to the internal liners of external prefabricated walls.

11.13 Penetrations

All penetrations shall be in strict accordance with the project's penetration dossier.

The wall system may include special penetration panels, which are designed to accommodate the majority of service penetrations within the wall system. The detailed arrangement of such panels shall be carefully co-ordinated with pertinent project documentation. The wall system shall also facilitate simple installation of site run penetrations.

All the penetrations in the penetration panels shall be site installed. Penetration sleeves can either be site installed or delivered installed in the panels.

11.14 Weather protection

The external panel wall system with all windows, doors, penetrations etc., shall comply with all relevant environmental design criteria. The wall shall provide a fully weather-tight assembly, and shall shed water efficiently. Crevices and other moisture traps are unacceptable. Any ledges exposed to weather or water shall be sloped. Flashing shall be provided at the top of doors to prevent ingress of water.

11.15 Interface with other supplies

The prefabricated wall systems shall be provided with all necessary penetration kits, fixing components, infill pieces and flashings etc. for junctions and interfaces with other elements and supplies, e.g. computer raised access floors, bulkheads, doors, windows etc. All interface joints shall be fully sealed, and dissimilar materials shall be separated to avoid galvanic corrosion. Interface details shall maintain the fire rating integrity of the division.

11.16 Testing

Wall systems that will be required to maintain a resistance to air leakage or that shall act as a smoke barrier shall have these properties documented prior to production, and verified early in the construction phase to allow for any necessary rectification.

11.17 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

12 Prefabricated cassette wall systems

12.1 General requirements

All fabrication and installation shall be based on approved project documentation that has been thoroughly co-ordinated with all disciplines concerned. A detailed schedule of the cassette wall system, the wind shield panels and the heat shield panels shall be developed, showing all information required to complete the work, e.g. positions of the various cassettes and panels, dimensions, penetrations, doors, hinged access panels and any other pertinent elements and details. Drawings shall also show interfaces with other elements and systems, and overall structural support details.

Prefabricated cassette wall systems shall be detailed to avoid rattling due to wind or vibrations.

12.2 Material requirements and coating

The material surfaces shall be smooth, "self-cleaning" and require minimum maintenance. Surface finish of systems shall be optimised to maintain a uniform finish, and shall be designed to allow for cleaning and removal of stains and contamination caused by salt deposits, blasting grit and welding spatter. Stain cleaning procedures shall be included in supply.

Aluminium shall be seawater resistant type, NS 17305, Al Si Mg or equivalent. Maximum corrosion allowance for aluminium is 0,5 mm over the entire design life of the given field installation.

Stainless steel shall be type AISI 316L, or alternatively AISI 316 with a maximum carbon content of 0,05 %.

If specified in the project documentation, galvanised carbon steel NS-EN 10025, S355 J2G3 or equivalent, with minimum 50 microns zinc and additional layers of coating on all surfaces, may be used for the windshield panels.

Other materials (e.g. composite materials) may be used, provided such materials comply with all relevant requirements.

Material thicknesses shall be based on considerations of corrosion allowance and the noise and loads that the system may be subjected to. Panel faces shall be free from noticeable buckling or dents.

All bolts, nuts and washers shall be stainless steel.

Special isolation washers or gaskets shall be used to separated dissimilar materials where required to avoid galvanic corrosion.

Any required insulation shall be of the dry fix type in accordance with Clause 9.

Aluminium and stainless steel surfaces shall not be painted, unless specified otherwise. Components and materials requiring coating shall be delivered with appropriate coating materials as part of the supply. The coating materials shall be applied whenever drilling of holes, removal of installation aids, cutting of corrodible materials on site, etc., is necessary.

External prefabricated cassette wall systems shall be installed with a protective covering that is resistant to welding spatter and grit impact. The covering shall be removed when agreed between the project and the operator/company. It shall be easy to remove.

12.3 Structure, reinforcements and deflections

All walls and panels shall be adequately sized to support, receive and transfer all relevant weights and loads. Where applicable, care shall be taken to prevent any damaging forces being transferred from the main support structure to the panel wall systems.

The wall systems shall be checked in the ultimate limit state, progressive collapse limit state and serviceable limit state, as required.

Where applicable, openings shall be trimmed and strengthened to receive and support the weight of windows, door frames and doors, including sliding doors with head track, etc. The wall systems shall allow for bolting of door frames to facilitate future adjustments to doors without affecting the wall system.

The design of the wall system shall allow for the fabrication tolerances of the module or unit to which they are attached. Deflection tolerances and fabrication tolerances shall be established prior to fabrication of the wall systems.

The span over deflection ratio at maximum wind loading shall not be less than 200, unless specifically noted otherwise in the project documentation.

The wall systems shall be provided with necessary flexible joints to accommodate the expansion and deflection tolerances to which they may be exposed.

Fabrication tolerances on overall dimensions of the panels shall be 2 mm, unless specified otherwise.

Louvred walls exposed to mechanical damage from walkways or work areas shall either be protected by guardrails, or be suitably reinforced to a height of 1,5 m above deck level to withstand an impact of 750 Nm without serious deflection, deformation or failure.

12.4 Method of fixing

The fixing method for the wall systems shall be designed to satisfy all requirements to transmission of structural and wind loads and forces, blast resistance, noise reduction, moisture resistance and weather-tightness, as required on each location. Fixing shall be mainly by bolting through isolation gaskets, but welding may be necessary in certain instances, as required by the project. All welds shall be continuous.

12.5 Panel format

Panels shall be standardised and modularised to the extent possible. Each panel shall be sized so that it can be easily handled and installed by two persons.

12.6 Penetrations

Penetrations shall be in accordance with the project's penetration dossier.

The wall systems shall include special penetration panels, which are designed to accommodate the majority of service penetrations. The detailed location and arrangement of penetration panels shall be carefully co-ordinated with pertinent project documentation and disciplines concerned.

Complete penetration kits shall be part of the supply.

There shall be no penetrations in explosion relief plates. Unavoidable penetrations through walls with explosion relief cassettes shall be through dedicated areas of fixed plate.

12.7 Weather protection

The wall systems shall shed water efficiently. Crevices and any other moisture traps are unacceptable. Any ledge exposed to weather or water shall be sloped. The top edge and all exposed openings shall be trimmed with flashings, as required. The interface between sliding doors and the wall systems shall be weather-tight and prevent ingress of water into the head track system.

12.8 Interface with other supplies

The wall systems shall be provided with fixing components and infill pieces and flashings etc. for junctions and interfaces with other elements and supplies. Dissimilar materials shall be separated to avoid galvanic corrosion.

12.9 The cassette wall system

12.9.1 General

The cassette wall system shall contain various types of interchangeable cassettes (panels), which are bolted to vertical or horizontal supports. If perforated plates are used in the construction they shall not generate unacceptable noise due to wind. Types of panels include

- louvred panels,
- water jet release panels,
- explosion relief panels,
- plated panels (solid panels),
- sound attenuator panels,
- louvred explosion relief panels,
- any combination of the above into one panel.

The top and bottom of vertical support posts shall be bolted through insulating gaskets to specially designed supports attached to horizontal main beams at junctions with major deck levels.

The panels should be of a standard size to facilitate optimal interchangeability. They shall be supported by means of bolted twist, slide-lock brackets or similar devices, to allow for easy removal and reinstallation.

There shall be no pockets where water can collect. Water shall be directed for release on the outer side of the cassette wall. Easy access for clearing of any obstructions that may prevent proper drainage shall be provided.

The cassette wall system shall withstand the required explosion overpressure from one or both sides in all environmental conditions without causing flying debris. The specific explosion overpressure shall be based on individual project analysis and documentation.

All relevant test data shall be provided to confirm that the installed cassette wall system complies with all specified requirements.

The detailed arrangement of the various panels shall maintain the required airflow through the wall system, whilst ensuring optimal climatic working conditions for personnel.

12.9.2 Louvred panels

To optimise louvre design, due consideration shall be given to pressure drop and reverse pressure drop across the louvres, separation efficiency, requirements for maintaining nominal air flow at low wind velocities, self generated noise and behaviour of the louvred wall during an explosion within a module/area.

The louvred blades shall be profiled and rigidly fixed by either welding or bolting to the panels. Each louvred panel shall have a minimum free (net) space for air passage of 70 % of the total face area.

The maximum pressure drop coefficient for the area of the panel system that is louvred (including panel frame and posts) shall allow for adequate ventilation at any wind speed and flow direction to prevent any build up of gas concentration within the louvred areas. Further requirements are given in NORSOK H-001 and ISO 15138.

The noise generated by a 10 m² louvred panels at wind velocities up to 25 m/s (for wind directions of 0° to 180°), shall not exceed a sound pressure level of 75 dBA for a distance of 1 m from either face of the louvred wall.

12.9.3 Water jet release panels

Water jet release panels will normally be used in hazardous areas. They may be either louvred or explosion release panels. The panels shall have an "opening up" device, which opens up on impact from a direct, heavy water spray, released from a standby ship's water cannons at a distance of 100 m away from the wall. The system shall operate in a controlled and safe manner, allowing unobstructed fire water access without causing flying debris. The panels shall resist a specified internal explosion pressure and still operate as required.

12.9.4 Explosion relief panels

Explosion relief panels shall provide the required venting from an internal explosion. They shall be as light as possible to allow for quick opening after reaching a maximum over-pressure of 5 kPa (0,05 bar), or as otherwise specified by the project.

The explosion relief panels shall provide pressure relief by means of "opening up" without causing flying debris. The panels shall not obstruct the free operation of sliding doors after an explosion.

The cassette wall system shall withstand the dimensioning explosion drag pressure, as dictated by the individual project, applied to the net area of the wall system after the explosion relief panels have opened. Permanent deformation may be accepted provided system components do not loosen.

In certain areas, walls with explosion relief panels may be subjected to condensation due to a high temperature differential between the interior (warm) and the exterior (cold) environment. Care shall be taken to deal with this problem in a satisfactory manner.

Explosion relief panels may be perforated in areas where internal ventilation is required in addition to explosion relief, or to avoid air turbulence in working areas protected by the wall system.

Explosion relief panels to be built into doors shall be supplied directly to the door supplier and shall be considered to be part of the door package supply.

12.9.5 Plated panels

The plated panels (blanking panels) shall have necessary stiffeners, internal face sheet, etc., as required by the project on each location.

12.9.6 Sound attenuators

Where required, sound attenuator panels (baffles) shall be an integral part of the cassette wall system supply. The sound attenuators shall be used wherever required, to reduce sound transmission through the louvred panels. The attenuator panels shall either be free-standing elements or bolted to the internal side of the wall system. Sound reduction data for the complete system shall be provided at centre octave bands within the frequency range of 63 Hz to 8 000 Hz. The arrangement of sound attenuators shall not reduce or affect any functional requirements of the complete wall system.

12.9.7 Louvred explosion relief panels

Louvred explosion relief panels shall have construction requirements as for louvred panels, and explosion relief criteria as for explosion relief panels.

12.10 Wind shield panels

The minimum metal thicknesses of wind shield panels shall be in accordance with project requirements, but never less than 0,8 mm for stainless steel and coated galvanised steel, and 1,0 mm for aluminium.

Wind shield panels may be perforated in areas where ventilation is required or to avoid air turbulence in working areas protected by the wind shield.

The wind shield panel system shall be bolted to pre-installed back-up steel on the module to receive the system. The windshield panel joints shall be either overlapping with bolting through separation gaskets, or of a "lock form" type.

Fire resistant flute fillers shall be provided, if required.

12.11 Heat shield panels

The heat shield panels shall be provided with the following features, as a minimum:

- 75 % reduction in radiation from the external to the internal face of the panels;
- visibility through the panels;
- natural ventilation through the panels;
- integral hinged access panels, where required.

The heat shield panels shall be bolted through isolation gaskets to pre-installed back-up framing on the module to receive the system. The panel system shall provide a continuous shield between the heat source and the area to be protected.

The maximum allowable temperature on the personnel/protected side of the heat shield shall be as defined by the safety discipline.

There shall be panels with hinged sections for personnel access through the heat shield system. The hinged sections shall be closed with a latch and shall be an integral part of the heat shield supply.

The supply shall include frames, supports, fixings, isolation gaskets and all other materials and work required for a successful installation on the specified location

12.12 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

13 Floor screed

13.1 General requirements

The floor screed shall be a standard proprietary product. It shall be applied to all decks requiring a flat and smooth surface as a basis for an installation of floor finishes.

Floor screed is generally not required on decks under raised access floors, unless otherwise specified by the project.

Floor screed shall not pass under A-rated and H-rated fire walls.

Requirements shall apply to the system as a whole, including any primers, topcoats, scratchcoats or fillers required prior to installation of floor finishes.

13.2 Material properties

The screed shall have the following properties:

- it shall be of a permanently flexible type which does not crack or spall under conditions of deck deflections, plate buckling and deck vibrations. Module of elasticity shall be stated on data sheet;
- screed surface shall not promote bacterial growth or emission of odours;
- it shall have permanently good bonding properties with the structural deck;
- it shall have a compressive strength of minimum 25 MPa (25 N/mm²) (a higher compressive strength may be specified for certain areas);
- it shall not be corrosive to metal or emit any dust, fibres or toxic gases during installation or later;
- the floor screed shall be compatible with the coating systems applied to decks. Where primers are required for adhesion or other reasons, these shall be part of screed supply;

- special high impact screed types may be specified for noise and impact absorption at container laydown areas;
- top surface of screed shall be protected, and/or have all impurities and contamination removed, prior to application of floor finishes;
- the floor screed shall be compatible with underfloor heating systems, where applicable.

13.3 Fire test requirements

For fire test requirements, see 4.2.

13.4 Water resistance

The screed system shall be completely impervious to water. Screeds that are hygroscopic shall be protected by a water-tight membrane. Special precautions shall be taken to prevent ingress and spread of water underneath the screed. All joints (inclusive expansion joints), and penetrations in floor screeds (e.g. drains, wall skirtings, fixtures, etc.) shall be sealed with a permanently elastic polyurethane joint. Precautionary measures shall also be taken to prevent any water condensation from surrounding bulkheads penetrating underneath the screed. Perimeter detailing of screed should eliminate situations where condensation or moisture may collect undetected in troughs created by interface toward bulkhead insulation or other components.

13.5 Tolerances

The floor screed surface shall be even and level. Permissible deviations from datum of screed level shall not exceed ± 3 mm under a 2 m straight edge and ± 1 mm under a 0,2 m straight edge.

13.6 Weight

The floor screed should be of a light-weight type. The installed screed shall be as thin as possible without adversely affecting the required performance. Minimum installation thickness and weight by volume in a cured condition shall be stated.

13.7 Installation

The installation of the floor screed, including mixing, curing protection and supervision of installation, shall be performed by experienced personnel. The work shall be performed in strict accordance with the manufacturer's written procedures and instructions, which shall be project specific and include for any primers and topcoats.

Screed underneath permanent equipment shall be sealed with a membrane, to simplify periodical cleaning.

All surfaces shall be inspected prior to application of the floor screed. Steel decks shall be thoroughly cleaned and free from all dirt, scale, rust, oil, grease and any loose particles, before being primed.

Floor screed in wet rooms shall be laid with predetermined slopes to floor drains. Minimum slope should be 1:80.

13.8 Data sheet

Data sheet CDS-203, see Annex A, shall be completed and submitted to project prior to selection of the floor screed.

13.9 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

14 Floating floors

14.1 General requirements

The floating floor shall be a "dry" and/or a "wet" system of standard products. A "wet" system shall be applied in conformance with Clause 13, with all materials, reinforcements, etc., as required.

The "dry" type of floating floors shall be a construction of suitable prefabricated panels. The material thickness shall be adequate to comply with all specified requirements. The floating floor panels shall be interconnected to provide a continuously even and structurally stable surface. Any unevenness or grooves in the joints are unacceptable.

The floating floor systems may incorporate a noise reducing resilient layer of an appropriate material. All joints between the floating floor and bulkheads with stiffeners, equipment bases, door frames etc., shall be elastic and water-tight.

A thin layer of screed shall be applied to the structural deck to even out any variations in the deck surface before the floating floor is installed.

All floating floors shall pass under internal B-rated partitions, unless specified otherwise in project documentation.

14.2 Material properties

The floating floor shall have the following material properties:

- it shall be permanently flexible and detailed to allow for large deck deflections and minimise transfer of structure borne vibrations;
- it shall have a compressive strength of minimum 25 MPa (25 N/mm²) (a higher compressive strength may be specified for certain areas);
- it shall be stiff and stable without any noticeable deflection when subjected to relevant traffic (personnel, trolleys, trucks, etc.). "Oil canning" is unacceptable;
- it shall not transfer any stresses or cause any damage to the floor finishes;
- the resilient layer shall be non-corrosive to metal. Any fibre deterioration or sagging of the material is unacceptable;
- the floating floor shall be compatible with underfloor heating systems, where applicable.

14.3 Fire test requirements

For fire test requirements, see 4.2.

14.4 Acoustic requirements

The installed floating floor system, inclusive the structural deck, shall provide a minimum sound reduction index, (R_w), in accordance with NORSOK S-002 (the R_w value as defined in ISO 717-1).

Measurements shall be performed in a laboratory in accordance with ISO 140-3.

Impact sound insulation data shall be provided for the complete floating floor system at centre octave bands within the frequency range of 63 Hz to 8 000 Hz.

14.5 Thermal insulation

Where the floating floor system is required to provide thermal insulation, a U-value of 0,5 W/m² °C, or better, shall be achieved for the complete construction, inclusive structural deck.

14.6 Water resistance

The installed floating floor system shall be completely impervious to water. Special care shall be taken to prevent ingress and spread of water underneath the floating floor system. All joints, edges and penetrations in the floating floor system (e.g. drains, wall skirtings, fixtures, etc.) shall be sealed with a permanently elastic polyurethane joint or other suitable material, providing a fail safe detail against water ingress. Precautionary measures shall also be taken to prevent any water condensation from surrounding bulkheads penetrating underneath the floating floor system.

Special precautionary measures shall be taken to prevent ingress of water into the floating floor system during the installation phase.

Special termination profiles may be required at bulkhead, to maintain water resistance.

Fibre based, porous core material shall be avoided, where possible.

14.7 Tolerances

The floating floor shall be level. Permitted deviation from datum shall not exceed ± 3 mm under a 2 m straight edge, and ± 1 mm under a 0,2 m straight edge.

14.8 Installation

The installation of the floating floor, including mixing, curing protection and supervision of installation, shall be performed by experienced personnel. The work shall be performed in strict accordance with the manufacturer's written procedures and instructions, which shall be project specific and include for any primers and bulkhead deck levelling substances.

Top surface of the floating floor shall be protected, and/or have all impurities and contamination removed, prior to application of floor finishes.

There shall be a properly detailed physical separation of the floating floor system at the interface with drains, skirtings, fixtures etc.

"Dry" type floating floors shall be tack welded strictly in accordance with manufacturers welding procedure, to avoid excessive heat and buckling. The installation procedure shall include for corner and end details.

"Wet" type floating floors shall have local reinforcements as required for point loads from heavy equipment, e.g. prefabricated bathrooms. Separating materials or membranes shall be installed for sound insulation or moisture protection, as required.

14.9 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

15 Floor finishes

15.1 General requirements

All floor materials shall be carefully selected to comply with the conditions and functional requirements of each room/area, and anticipated method and standard of cleaning. They shall be easy to maintain and clean, as these aspects will form by far the largest parts of the life cycle costs.

Materials, adhesives, sealing mastics, levelling screed, etc. shall be compatible and shall not emit toxic gases and dust. The surface to receive the floor finish shall be thoroughly clean, stable and have the correct consistency, humidity and temperature.

The installed floor finish shall be level, even and smooth. Adhesives, fillers and comb type applicators to correct specification shall be part of the supply where applicable, and shall give a strong, uniform adhesion of a durable quality. Joints between dissimilar materials shall be neatly finished with a metal profile, flexible joint or similar solution.

Carpets shall be glued with waterproof floor adhesive.

Finishes for areas where occasional water, oil and liquid on floors are anticipated, shall be of a non-slip type.

Flooring in kitchen areas, toilets, changing rooms, showers and laundry areas etc. shall be completely water repellent, and shall allow for heavy use and frequent wash-downs with disinfectants without development of cracks.

Floor materials outside the LQ shall be chemical proof and oil resistant.

All colours should be selected from the manufacturer's standard colour range.

All floor finishes shall be prepared for heavy use. They shall be cleaned, sealed and impregnated in accordance with manufacturer's written instructions. They shall be provided with a suitable protective covering, which shall be removed when agreed between the project and the operator/company.

Areas defined by the project to be used as temporary offices shall be provided with an additional temporary floor finish laid over the permanent floor finish. The temporary floor finish shall consist of hardboard covered with a washable, sealed protective covering.

The protective covering shall be flame retardant.

15.2 Antistatic properties

High and low-voltage electrical switchgear rooms and transformer rooms shall have non-conductive (antistatic) flooring.

Local electrical rooms, local instrument rooms, control rooms, telecom equipment rooms, antenna /amplifier rooms etc. will generally require semi-conductive flooring.

15.3 Fire test requirements

For fire test requirements, see 4.2.

15.4 Skirting

Joints at walls shall be fully covered by the wall skirting, or, where appropriate, the floor material itself may be formed and turned up as a skirting. A neat metal profile shall be used to conceal and protect carpet skirtings. The skirting shall be glued or mechanically fixed to the wall, as appropriate. Corner pieces and joints shall be glued. Mechanical fixings shall be recessed, without protruding sharp edges.

Wet rooms shall have an approximately 100 mm high waterproof coved skirting at walls, equipment bases, etc. which is properly fixed and sealed. Wall faces shall overlap skirtings to form a "drip nose" detailing.

15.5 Acoustic properties

Impact and airborne noise reduction properties shall be documented and evaluated as part of the selection criteria.

15.6 Carpets

Carpet types shall be selected and categorised as follows:

- cabin and light traffic areas: The total pile weight shall be minimum 1 200 g/m²;
- common rooms and heavy traffic areas: The total pile weight shall be minimum 1 400 g/m² for woven carpets and 1 900 g/m² for tufted carpets.

The pile height shall be maximum 7 mm.

All carpets shall be minimum 80 % wool and maximum 20 % nylon polyamid (Antron B or similar).

The carpets shall be of a woven type with cut or looped pile, woven through a fire-proof backing of synthetic material to stay shrink-proof.

Wool shall be of the quality "Pure New Wool", and the polyamid shall be of a permanent antistatic fibre (Antron B or similar).

Carpets shall have good cleaning (shampooing) properties. Carpets in recreation rooms shall be patterned to help disguise marks and stains.

All carpets shall be laid wall to wall, unless specified otherwise in the room finishes schedule. The number of visible joints shall be minimised. The warp (direction) of carpets shall be the same within any single room or area.

Tufted carpets may be used if they are produced in a heavy-duty contract quality. In general, tufted carpets shall comply with the above criteria for woven carpets.

The carpets shall be without felt backing, unless specified otherwise in the room finishes schedule. The woven back shall be glued directly to the screed with waterproof adhesive.

All types of carpet shall be treated with a factory applied Teflon^{®1} type protective coating to ease maintenance.

Carpets should only be used on installations that have a central vacuum cleaning system.

15.7 Rubber

The rubber floor material shall be waterproof chemical proof and have good non-slip properties. It shall be oil and chemical resistant for all areas.

The minimum material thickness shall be 2 mm.

The rubber floor shall be laid wall to wall, unless specified otherwise in the room finishes schedule. All joints shall be, smooth and flush with the surrounding surfaces.

A permanently elastic sealing joint shall be applied at full perimeter of the material, including toward door thresholds, to achieve a water-tight barrier, prior to application of wall skirting profiles.

15.8 Polyvinylchloride (PVC) floor finishes

PVC floor finishes shall be of minimum 2 mm thick vinyl of extra heavy wear quality (class K5) and include a minimum 0,7 mm wear layer of PVC or similar. The floor finish shall be waterproof, chemical proof and of non-slip quality, capable of withstanding heavy wear and maintaining a high hygienic standard. Polyurethane top layer shall not be used.

For environmental reasons, the PVC floor finish shall be provided with a field and laboratory emission cell emissions test certificate, where the values shall not exceed $115 \mu\text{g}/\text{m}^2 \text{ h}$ after four weeks in 23 °C and 50 % humidity, and $50 \mu\text{g}/\text{m}^2 \text{ h}$ after 26 weeks in 23 °C and 50 % humidity. The PVC floor finish shall not contain any formaldehyde or asbestos.

All joints shall be hot welded using hot air welding techniques. The joints shall be smooth and flush with the surrounding surfaces.

15.9 Epoxy

Epoxy may be applied as a top finish to steel decks or screed surfaces. A data sheet for the top finish shall be approved by the operator/company.

¹ Teflon[®] is an example of a suitable product available commercially. This information is given for the convenience of users of this NORSOK standard and does not constitute an endorsement by NORSOK of this product.

15.10 Ceramic tiles

Ceramic tiles shall in general have a minimum thickness of 5,5 mm with a non-slip and easy to clean surface. Floor tiles shall be through coloured.

The floor tiles shall be laid with alkali and acid resistant, waterproof epoxy adhesive. Any ingress of water to underlying materials and constructions is unacceptable. Tiles and joints in the kitchen (galley) shall resist thermal shock from hot grease and boiling water.

All tile joints shall be firmly and neatly finished in alkali and acid resistant, waterproof epoxy grout with documented elastic properties. Grout joints in floors and skirtings shall align in both directions. The maximum joint width shall be 6 mm. Joints between top of skirting and wall panels shall be neatly sealed with an appropriate flexible and waterproof polyurethane mastic. Expansion joints shall be provided at approximately every 10 m, and against fixed equipment and constructions. The finished tile floor shall have an even surface with superior hygienic properties and with functioning slopes to floor drains.

All ceramic tile floors shall have coved ceramic tile skirtings.

15.11 Natural stone

Natural stone shall be calibrated, hard, polished and non-porous, e.g. granite. The grout and adhesive material shall have similar properties as for ceramic tiles. The material shall not be used in wet rooms.

15.12 Wood

Floor finishes in hard wood may be used for decorative purpose, or as appropriate, provided the material complies with the requirements in this NORSOK standard and relevant codes and regulations.

15.13 Sports floor

Sports floor with markings, and a shock absorbing construction, shall be installed where indicated in the room finishes schedule. Sports flooring shall have passed the NT FIRE 007 "Floorings, fire spread and smoke generation" test and satisfy the relevant fire test requirements stated in 4.2, second paragraph.

15.14 Stairs finishes

Floor finishes in stairs shall be without gaps and allow for efficient cleaning, including nosings. Separate nosings shall be of a type proven to withstand heavy use.

15.15 Absorbant mats

Absorbant mats (type "Nuway") with closed profiles or equivalent, or other footwear cleaning products to improve preventive cleaning shall be installed at all access points from "dirty" to "clean" areas.

15.16 Other floor finishes

Other floor finishes may be used provided such materials comply with this NORSOK standard and relevant codes and regulations.

15.17 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

16 Raised access floors**16.1 General requirements**

The raised access floor system shall be a standard lightweight product. It shall be supplied and installed complete with all floor finishes, removable protective covering, skirtings for fixing to perimeter walls, support stringers, pedestals, base plates, and all gaskets, glues, bolts, fixing lugs, installation aids, earthing clips etc., as required on each specified location.

The raised access floor system shall be flexible in design to allow installation in areas with a high concentration of ducts, cables and pipes under the floor. The installed system shall be rigid, rattle free and with a continuous, flat top surface.

The raised access floor system shall accommodate specified heights within the range between the minimum height required for two cable trays to cross each other (approximately 350 mm), and a maximum height of 1 200 mm.

It shall be possible for one person to easily remove and handle all floor panels using the panel-lifting tool provided.

Individual perimeter panels and panels adjacent to equipment foundations may be removed after completed installation. Skirtings shall be detailed accordingly.

On installations where weight saving measures are required, lightweight honeycomb floor panels shall be used.

16.2 Structural requirements

The raised access floor system shall be designed to support loads in accordance with project requirements.

The raised access floor system shall accommodate deflections in the deck structure caused by module lifting, load-out, tow-out or similar operations, without any adverse affect on the system.

16.3 Tolerances

The raised access floor shall be level to within 2 mm over the entire floor area, and shall be free from rocking panels. The height difference between adjacent panels shall be less than 0,3 mm.

16.4 Support system

The support structure shall be completely rigid in all directions, even when all the floor panels are removed. It shall be independent of surrounding walls. The system shall include primary and secondary stringers, which shall support the floor panels on at least two opposite edges. The stringer system shall allow for a 90° change in the primary stringer direction at any point.

The system shall permit irregular spacing of pedestals.

The support pedestal shall have an easy and reliable height adjustment facility of minimum +/-25 mm at the mean design height.

16.5 Floor panels

The standard panels shall be approximately 600 mm x 600 mm or 600 mm x 1 200 mm, but alternative sizes may be considered by the project. The panels shall rest on sound deadening gaskets.

All openings for penetrations, etc., shall be provided with a 50 mm high kick-plate to prevent dirt and other objects falling down in the floor void. Field cut panels shall be corrosion protected and be provided with suitable edge trimmings.

Certain "heavy duty" type panels shall withstand extra heavy loads from rolling wheels, while complying with all relevant requirements.

Air-flow panels for ventilation shall provide an opening of approximately 15 % through regularly spaced perforations. They shall be located away from the main walking zones to minimise ingress of dirt into the floor void below. Air-flow panels shall be coordinated with smoke detector locations.

Each individual panel shall be numbered to ensure it is replaced in the original position after temporary removal.

16.6 Floor finishes

All floor panels shall be supplied complete with a floor finish. The selected floor finish shall comply with relevant requirements in Clause 15.

Unless specified otherwise by the project, floor panels shall be supplied complete with a temporary protective covering to the floor finish, which shall comply with the same conducting/insulating criteria as the permanent floor. The temporary covering shall be removed when required by the project at the end of mechanical completion/commissioning, and the permanent floor finish cleaned in accordance with manufacturer's recommendations.

Skirtings shall be provided against all walls.

Semi-conductive and conductive floor systems shall be earthed in accordance with requirements and the manufacturer's instructions.

Non-conductive floor systems shall be insulated in accordance with requirements and manufacturer's instructions. Electrical resistance between the floor surface and the platform steelwork should in this instance be between 1 Mohm and 1 000 Mohm.

Conducting/isolating properties shall be verified prior to commissioning.

16.7 Accessories

A minimum of two panel lifting tools shall be provided for each room with a raised access floor, labelled for function and location, and installed in a clearly designated holder on the wall.

The supply shall include stairs, ramps, kick plates, infill panels and handrails, whenever required. These items shall be bolted and fully removable. The appearance shall blend with the appearance of the raised access floor system. Stair treads shall be covered with the same floor finish as the adjacent floor panels. Risers and sides to stairs should be covered.

A sturdy guard rail shall be provided along the perimeter of the raised access floor system, where there is a vertical drop of more than 200 mm. The top of the guardrail shall be minimum 1 000 mm above the surface of the raised access floor. Posts shall be fixed to the support system by brackets. The guardrail shall consist of evenly-spaced ballusters, wire-mesh panel, or similar.

Any vertical openings between the raised access floor and the structural deck shall be appropriately covered with removable panels.

16.8 Interface with other supplies

Special attention shall be given to interface details with other elements and systems. All required fixing components and infill elements for interface junctions between the raised access floor system and walls and decks, are part of the raised access floor supply.

Where the raised access floor functions as an HVAC plenum chamber, all openings toward walls, equipment and cables shall be sealed against air leakage.

16.9 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

17 Prefabricated bathroom units

17.1 General requirements

For new projects, the prefabricated bathroom units shall be supplied and installed as complete units ready for use. For modification projects, where transportation/installation space may be limited, a prefabricated "knock-down" alternative system may be considered. However, the bottom tray shall always be constructed in one piece as described below. Each unit shall be connected to all relevant systems. The units shall be self supporting and have adjustable legs with sufficient adjustment for exact alignment and levelling. All units shall be standardised.

The shower area should be separated from the rest of the bathroom by means of a robust, transparent shower wall with door, or shower curtain, as specified by the operator/company. Special attention shall be paid to cleanability and hygiene in design, detailing and use of materials. All surface materials shall resist extensive use of cleaning detergents. All joints shall be flush with surrounding materials.

Sanitary fixtures and accessories are part of the bathroom supply, and shall be in accordance with the requirements in Clause 20.

A prototype or pre-production bathroom, complete with fixtures and fittings, shall be made available for inspection and verification at an early date.

17.2 Floor

The bottom tray shall be rigid and constructed in one piece from stainless steel, aluminium or other non-corrosive material. Galvanised steel shall not be used. The base of the bottom tray shall be pre-formed to provide minimum pitch to the floor drain(s) of 1:80 in the general area and 1:40 in the shower area. Floor screed shall not be used. A seamless synthetic coating shall be bonded to the bottom tray forming a non-slip, completely impervious waterproof base that is both hardwearing and easy to clean.

The bottom tray, upstands and drain box shall be constructed by use of continuous seam welding.

Water from the shower area should not reach adjoining floor areas in the bathroom.

17.3 Walls

The walls shall be constructed from stainless steel, aluminium or other non-corrosive material. Galvanised steel shall not be used. A seamless synthetic material shall be bonded to the face of the wall forming a completely impervious waterproof surface that is hardwearing and easy to clean. The corners shall have a gentle radius to aid cleaning. Vertical joints in corners shall be avoided.

All penetrations shall be neat, flexible and completely watertight.

The walls shall be reinforced as required, for fixing of equipment.

The walls shall be connected to the bottom tray by a continuous weld whenever possible. Where this is not possible, an impervious watertight drip-nosing detail shall be used.

17.4 Ceilings

Various materials and finishes may be used as long as they comply with all relevant requirements. If pre-galvanised steel is used for the bathroom ceiling panel face plates, it shall be minimum 0,7 mm thick. The zinc coating to each side shall be minimum 40 microns thick.

17.5 Insulation

Wall and ceiling panels shall be insulated with dry fix insulation in accordance with fire and sound insulation requirements. Insulation shall be completely sealed with a membrane against release of fibres. The membrane shall be flame retardant and impervious to moisture.

17.6 Door and hardware

The door frame and hardware shall be of the same finish as the doors in the adjoining partition system. The door shall swing out from the bathroom unit. Pivot hinges, indicator lock and two lever handles and thumb turn knob on bathroom side shall be included with the door. A brushed stainless steel threshold with sides extending down to finished floor on the outside of the units (cabin side) shall be installed without visible fixings. There shall be no exposed sharp edges. A hold open device to assist cleaning shall be provided, if specified. Doors to prefabricated bathroom units with a built up floor construction, shall have a clear height of minimum 1 950 mm, measured from the top of the floor finish inside the bathroom to the underside of the top frame.

The doors shall comply with other relevant requirements as stated in Clause 7.

17.7 Sanitary fixtures

The units shall contain, as a minimum, the following sanitary items:

- wall hung water or vacuum closet (as required) with concealed cistern. Vacuum closets shall be of a type that allow maintenance access from the service shaft;
- hand wash basin;
- single lever mixing tap in matt chrome or brushed stainless steel, for hand wash basin with ceramic discs;
- shower head and controls in matt chrome or brushed stainless steel, with ceramic discs;
- provision for hosing down the floor, together with floor drain(s), shall be provided in toilet areas.

17.8 Bathroom accessories

The units shall contain, as a minimum, the following accessory items:

- mirror;
- soap dishes or soap dispensers (as required by the project);
- toilet paper holder;
- towel hooks;
- coat hook(s);
- hook for sanitary napkin bags;
- shower head holder (adjustable in height);
- transparent shower wall with door or shower curtain, as specified by the project;
- shelving under basin (for toilet bag(s), spare toilet paper, etc.);
- toilet brush and holder;
- shelving below mirror, with integrated disposable cup holder(s).

The units may contain the following additional accessory items, if specified by the operator/company:

- splash panel (behind wash basin);
- spare toilet paper holder;
- waste bin;
- handgrip in shower.

Items in metal shall be in brushed stainless steel.

Accessories in bathrooms for double cabins shall be permanently labelled as appropriate.

All equipment/accessories shall be wall mounted.

17.9 Plumbing

All pipes and fittings shall be compatible with the water quality and water pressure specified for each project. Pipes shall be concealed. Hot and cold water pipes which are installed outside the bathroom units shall be insulated. No joints shall be formed in the thickness of walls, floor and ceiling, or in non-accessible spaces, e.g. between two units. All pipework shall be installed on fixed, galvanically insulated supports. Water supply pipes shall be easily replaceable or maintenance free. Whenever possible, all water supply pipes and the handwash basin drain pipe shall be routed to avoid non-accessible spaces, e.g. routed directly to service shaft concealed below washbasin construction.

The floor drain(s) shall be of non-corrosive material, compatible with the bottom tray, and have a perforated cover plate in satin finished stainless steel. The cover plate shall be "press fitted" or clipped into place, i.e. it shall not be screw fixed. The floor drains shall be continuously welded to the bottom tray. It shall have a minimum 50 mm high effective water trap and rodding eye for clearing blocked pipe work from inside the bathroom.

Local shut-off valves shall allow for replacement of individual mixing taps or shower heads, without affecting neighbouring cabins.

Plumbing shall be executed to recognised sanitary standard and project approval. Supply lines shall be flushed, cleaned and hydrostatically pressure tested to 0,9 MPa (9 bar) pressure for 1 h, prior to fitting of fixtures and transport cappings.

17.10 Ventilation

A satisfactory arrangement for extracting air from the cabin via the bathroom unit shall be provided.

Each bathroom unit shall be installed with one extract register recessed in the ceiling above the shower area. The extract register shall be easily dismantled from inside the bathroom and shall have an adjustable centre core for controlling the air flow. The extract register shall have sufficient capacity.

17.11 Electrical

The bathroom units shall be complete with all electrical light fittings, conduits, junction boxes, cables, sockets, light fittings, thermostat, etc. All cables shall be concealed.

The average illuminance level on the floor (including the shower area) shall be accordance with NORSOK S-002. A socket outlet with hinged lid for electric shaver and hair dryer shall be mounted on the wall near the mirror.

One double-poled light switch (to match cabin switches), and a noiseless relay or thermostat switch for the floor heating, shall be installed in a suitable location outside the bathroom unit.

Bathroom floors shall be electrically heated. The heating cables shall be installed underneath the bottom tray. Heating cables shall be regulated in accordance with project requirements. It shall be possible to replace damaged cables easily during the operational phase without dismantling the bathroom unit.

The exposed top of floor drain(s) shall be earthed, in accordance with Norges Vassdrags- og Elektrisitetsvesen (NVE) requirements.

17.12 Service shafts

A service shaft with an access panel/door from the corridor side shall be provided for all bathrooms. All pipes, cisterns, rodding eyes, etc., shall be located here. Shared service shafts should be arranged to allow equipment maintenance to take place on one bathroom, without disrupting the use of the neighbouring bathroom.

The base of the service shafts shall be detailed to avoid undetected spread of water into other areas. Any potential water leakage should be directed towards the corridor side of the service shaft enabling early detection.

All shut-off valves for hot and cold water supply shall be provided in the service shaft for each cabin.

17.13 Testing

Each floor base construction shall be formally checked for specified welding and surface protection before assembly.

Each floor base shall be formally water pressure tested prior to assembly.

All drains, pipes, toilets, etc. shall be formally function tested by the manufacturer in his workshop prior to delivery of each bathroom unit. Any faults shall be rectified immediately. This test shall be formally repeated after the units have been installed.

The heating cables shall be formally function tested prior to installation of bathroom units.

A test certificate shall be provided with each bathroom unit specifying types of tests, and results.

17.14 Data sheet

The data sheet CDS-206 (see Annex A) shall specify sanitary fixtures and bathroom accessories to be used in the project.

17.15 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this subclause require specification by the operator/company:

- requirement for transparent shower wall with door, or shower curtain;
- bathroom accessories:
 - splash panel (behind wash basin);
 - spare toilet paper holder;
 - waste bin;
 - handgrip in shower;
 - material for wash hand basins ("solid surface composite"/porcelain/other).

18 Provision stores

18.1 General requirements

The provision stores include dry storage rooms, cold storage rooms, freezer rooms, and thawing rooms. The cold storage, freezer and thawing rooms, including refrigeration system, shall be of a proprietary, prefabricated system, while the dry storage rooms may be built of a standard partition system and have normal displacement air supply. The provision stores shall be supplied and installed as complete units, with all required accessories and service systems intact, ready for use.

Any service pipes or cables etc. shall be neatly concealed inside the construction of the provision room walls or ceilings. Where this is not possible, the services shall be neatly enclosed in a stainless steel box with no ledges or dust traps. Visible surface mounted services are unacceptable.

18.2 Floors, walls and ceiling

The wall and ceiling elements of the freezer and cold storage rooms shall be of a fully insulated panel system. The floor shall be an in-situ purpose built type with fail safe detailing to prevent ingress of water below the floor.

All internal and external panel joints shall be thoroughly sealed.

The exposed wall and ceiling surfaces shall be extremely robust, smooth and easily cleanable. The face-plates shall be made of minimum 0,7 mm brushed stainless steel plate. External stainless wall panels and doors shall be supplied with a temporary protective covering resistant to welding spatter and blasting grit, which shall not be removed until agreed between the project and the operator/company.

The finished floor shall be in a continuous stainless steel (or other suitable material) welded plate with a continuous stainless steel welded perimeter up-stand. The finished floor shall be easily cleanable and have anti-skid surface. The floor construction shall be of a suitable heavy-duty quality to maintain its integrity in the event of impact from heavy dropped objects. The floor shall be stiffened so there is no appreciable deflection from the weights of shelves and trolleys when fully loaded. Any void between floors and the steel deck should be avoided, but if required, necessary measures shall be taken to prevent any condensation and collection of water in the void.

The connection between the prefabricated wall panels and the floor construction shall be detailed with an impervious watertight drip-nosing.

The floors shall allow efficient cleaning and disinfecting by hosing down, and be detailed to enable easy dispersal of moisture/water to the corridor drains.

The ceiling or wall of the storage rooms shall be reinforced, if required, to support the evaporator unit. The location of the evaporator unit shall minimise obstruction of usable storage space.

The floor in the freezer and cold storage room shall be slightly higher or level with the external floors. A sloped built-up floor should be provided outside the entrance to the rooms in the same material as used on the surrounding floor, to allow for trolley and goods transport access. Floor detailing shall allow for effective cleaning. Special attention shall be given to sealing and drainage at bottom of door frame and all junctions.

18.3 Doors

Doors to freezer and cold storage rooms shall be refrigerator/freezer type doors, which can open 180°. All surfaces shall be stainless steel or in the same material as the adjoining wall surfaces.

Threshold detailing shall allow for hosing down and enable easy dispersal of water to the corridor drains. Threshold/floor details shall be submitted to project for approval prior to order.

The doors shall have a minimum clear opening of 900 mm x 2 050 mm (width x height).

Door hardware shall be extremely robust and in stainless steel. Door catches shall be quick release type and easy to open from either side. The inside of the door shall have an emergency opening device.

Doors shall close automatically. They shall be fitted with hold open devices for loading of food, defrosting, etc., without obstructing the outside passageway.

Door edges and door frames shall be reinforced to provide protection against damage from handling of goods.

18.4 Shelves

The complete shelf system shall be in stainless steel. Shelves on floating installations shall be provided with removable storm edges. The shelf system shall be supported by the floor. It shall be fixed to the wall or ceiling by purpose made devices to prevent overturning. There shall be a minimum of five levels of height adjustable shelves in each room. Shelves in freezer rooms shall be grated, while shelves in cold and dry storage rooms shall be plated. Maximum allowable deflection of a fully loaded shelf is 5 mm. Shelves shall be arranged to optimise available space. Shelves on floating or mobile installations shall have collapsible upstands at front to limit movement.

The shelf depth shall be minimum 520 mm and the load bearing capacity shall be minimum 1 500 N (150 kg) per running metre of shelf. The minimum circulation space between and around shelves shall be 900 mm.

18.5 Temperatures

The range of temperatures for provision room shall be as follows:

Dry store	+16 °C to +20 °C
Cold store	0 °C to +6 °C
Thawing	0 °C to +6 °C
Freezer	-20 °C to -28 °C

18.6 Insulation

The insulation thicknesses shall provide the following minimum U-values:

Freezer rooms	$U = 0,20 \text{ W/m}^2 \text{ °C}$
Cold storage rooms	$U = 0,25 \text{ W/m}^2 \text{ °C}$

18.7 Condensation

The air in the kitchen area may be warm and humid. Condensation in any voids or on external surfaces surrounding the freezer and cold storage rooms is unacceptable.

18.8 Floor drains

With the exception of thawing rooms, there shall be no floor drains inside provision rooms.

18.9 Electrical and controls

There shall be no visible wiring in any of the provision rooms.

All light fittings shall be watertight and suitable for use in a cold environment. Light switches shall be mounted on the outside wall of the provision rooms adjacent to the handle side of the door.

Door frames to freezer rooms shall be heat traced.

There shall be a personnel "locked-in" alarm and a rising temperature alarm in each freezer and cold storage room. The audio/visual alarm signal shall be located in a clearly visible place in the kitchen.

Freezer and cold storage rooms shall be individually temperature controlled. A quick defrost cycle facility shall be provided for the freezer room(s).

There shall be a control panel outside each freezer and cold storage room with

- temperature indicator,
- fan time-delay switch,
- on/off running indicator for fan,
- power supply indicator,
- alarm for interruption of power supply (light indicator).

If specified by the operator/company, a control system shall be provided that can generate an electronic temperature log for the provision rooms.

The control panels for freezer rooms shall also show defrost cycle operation.

The control panel shall be adjacent to the handle side of the door, without creating obstructions.

Junction boxes for non-frequent service requirements should be located near cooling machinery.

18.10 Cleaning requirements

All equipment, shelving, fixtures, fittings, piping and cables shall be easy to clean to maintain an extremely high standard of commercial hygiene.

18.11 Refrigeration system

18.11.1 General

The central refrigeration systems shall serve all local freezer rooms, cold stores, thawing room and cold benches/cold cupboards within the kitchen and servery areas.

All compressors for the plant shall be located on skids in a machine room, located and arranged for periodical maintenance access in a safe and effective manner. The compressor skids shall consist of separate

2 x 100 % compressors for the freezer rooms and 2 x 100 % compressors for the cold stores and cold benches/cupboards. A dedicated switchboard and a floor drain will be required in conjunction with the compressors.

The air cooled condenser skids shall be located inside the machine room and comprise of separate 2 x 100 % condensers fans for the cold stores and 2 x 100 % condensers fans for the freezer rooms.

Freezer rooms shall have 2 x 100 % evaporators with necessary control equipment per room. Tubing/piping system between evaporators and compressor/condenser units may be common (1 x 100 %).

For cold stores and equipment, a water/glycol distribution system shall be offered as an alternative to a direct expansion system. Piping distribution system can be single, with 2 x 100 % fan coils and control equipment for each cold store room and equipment.

The main control cabinet shall serve all refrigeration systems and shall be located in the machine room. The control cabinet shall be equipped with all necessary fuses, contactors, motor protection relays, wiring terminals, alarm/status lights, start/stop switches and required interconnection with safety and automation systems.

Local alarms and temperature indicators/settings shall be provided in the kitchen area, recessed in wall partition systems, in brushed stainless steel enclosures.

All piping/ tubing shall be routed to allow future maintenance access, and to avoid noise sensitive areas.

Necessary anti-vibration mountings and piping connections for the compressors, and any necessary extra sound insulation against noise sensitive areas shall be included.

The cooling capacity for each system shall maintain specified steady state performance without assistance from the standby compressors.

All constructions and components shall be of a well-proven type, suitable for long-term heavy-duty marine operation.

Refrigerants shall be selected based on minimum environmental impact for the applicable temperature ranges.

Noise limits shall not exceed regulatory body requirements.

For piping components requiring periodical disconnection, screwed connections are acceptable up to and including 26 mm diameter. Above this dimension, flanges shall be used. Permanently installed equipment shall have capillary soldered connections. Elastic vibration insulating gaskets shall be used at all pipe supports. The suction and low pressure liquid lines shall have closed cell insulation of sufficient quality and thickness to prevent condensation.

Electrical motors for the compressors shall have thermal overload protection, and shall together with general electrical supply, be to project standard.

18.11.2 Condensing system

Seawater based cooling systems shall withstand growth of algae. Air based cooling systems shall have heat exchangers arranged to minimise routine cleaning and maintenance.

The compressors for the condensing system shall be free from vibration throughout their operating range, supported on anti vibration mountings, be of a well-proven and robust design and be capable of both intermittent running and continuous operation.

The condensers shall have high heat transfer efficiency, and shall be sized to hold the complete charge of refrigerant unless there is a receiver for this purpose.

The compressors with motors, condensers, control panel (with pressure controllers to project standard) and accessories shall be supported on a steel base-frame skid, which shall as far as possible allow for transport as a unit. The skid and the condensers shall be supplied with lifting-lugs. Maintenance access shall be provided for all components of the skid.

18.11.3 Evaporation system

Evaporators shall be selected to be compatible with a high standard of commercial hygiene. Except in the thawing room, evaporators shall normally be located on the wall opposite the door, arranged to optimize shelf storage space.

Evaporator cabling and piping shall be arranged and detailed to eliminate dirt-traps which may promote bacterial growth, and shall allow frequent efficient cleaning.

Drain tubes from evaporators shall be routed shortest way through wall and outside the room towards connection to sewage system. In cold storage rooms all drain tubing inside the room shall be of stainless steel 316 L (diary type). In freezer rooms all drain tubing inside the room shall be of copper with heat tracing and insulation covered with flush surface stainless steel.

Wall mounted cables shall be avoided, but where strictly necessary, shall be covered with stainless steel profiles. All cover profiles shall be sealed in ends and joints.

Cooling/evaporator fans in all rooms shall be provided with an automatic stop function when doors are opened.

Evaporator units shall be sized according to temperature requirements and cooling capacity for the different rooms, and located to optimise efficient circulation of air with maximum storage space. They shall include automatic electric defrost heaters. Trace heating shall cover the drip-tray drain tubes, and have capacity to include any drain traps located within the cold area. Water from drain tubes shall not be released onto the corridor floor.

Tubing insulation and all evaporation equipment within storage rooms shall have a standard of finish corresponding to the extremely high standard of commercial hygiene required for these rooms.

18.11.4 Accessories

The refrigerant circuits shall include all necessary sight glasses with moisture indicators, oil separators, filters, level indicators and all valves including shut-off valves.

18.11.5 Testing

Components in the refrigeration system shall be tested to withstand 1,5 times design maximum pressure for at least 1 h.

Commissioning shall be performed to achieve specified performance including any required fine tuning and balancing. Temperature limits shall be verified in a steady state situation.

18.12 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this Clause require specification by the operator/company:

- freezer rooms control system with electronic temperature log;
- cooling system requirements.

19 Kitchen (galley), catering and laundry equipment

19.1 General requirements

Wherever possible, all equipment shall be standard proprietary products to acknowledged professional catering standard, which shall not be modified unless strictly required.

The primary noise control measure shall be to install equipment with low noise characteristics. Where additional sound absorption measures are required, the detailing shall avoid dust, grease and dirt traps and allow for efficient cleaning.

Equipment shall not have any sharp edges or corners.

All standard and purpose made equipment, fixtures and fittings shall be easy to clean to maintain an extremely high standard of commercial hygiene.

19.2 Material properties

The following properties shall apply:

- carbon steel shall be finished with a powder epoxy or polyester coating; aluminium shall be anodised or finished with a powder epoxy or polyester coating;
- all exposed stainless steel surfaces shall have brushed finish;
- plastic laminates shall be best quality fire retardant class. Corners and edges shall be smooth and rounded;
- cores shall be a suitable, non-combustible material, sealed on all sides;
- hardware shall be stainless steel wherever possible; lockable items shall be provided with a recessed cylinder lock and three numbered, labelled and coded keys.

19.3 Design and fabrication

All steel or aluminium sheets or sections shall be adequately reinforced to prevent buckling or "oil canning".

All furniture and equipment shall as far as practical be wall or console mounted. The number of floor support points shall be kept to a minimum, and be detailed to comply with hygiene regulations.

Floor drain gratings and filter baskets shall be detailed to allow for easy and frequent removal for cleaning without causing injury to the hands. Large gratings shall be sub-divided into smaller sections for easy handling. The entire floor drain construction shall be of stainless steel. Floor drain constructions shall maintain the fire-rating of the deck in which they are installed. Conformance to this requirement shall be documented.

The back face of all equipment shall be positioned at a distance of minimum 50 mm from the vertical surfaces for cleaning purposes.

All floor consoles shall be complete units providing all necessary services and interface connection points. Easy access shall be provided to all services behind water-tight, demountable inspection panels. All brackets and supports for benches, machines and equipment shall be built-in and shall not be visible from the outside, i.e. no through bolting or visible screw heads, etc.. The base detailing of all floor consoles shall prevent the presence of undetected moisture between the foundations.

All work tables and equipment providing permanent work places shall be of an ergonomic design and shall be adjustable in height from 800 mm to 1 050 mm above the floor level for standing work, and 660 mm to 800 mm for seated work. The height adjustment shall be easy to perform.

All cupboard doors shall remain level through their entire swing and close to form a tight seal against sealing strips. Sliding doors and drawers shall be rigid and slide easily on rails or rollers.

All shelving on mobile installations shall have storm edges.

Serving counters shall be fixed to a plinth approximately 250 mm high. There shall be no visible pipes or wires. All counter fronts shall be identical in material, coatings, finish and colour. All counters shall be "self-service" type.

All sinks shall be stainless steel and shall be integral with counter tops, wherever possible.

Visible pop-riveting or screws shall be minimised. There shall be no overlapping edges, where grease and dirt can be trapped. All joints and connections shall be tight and free from all rattles.

Each major item of equipment shall be provided with a discreetly placed and securely fixed nameplate showing the manufacturer's name, equipment type, electrical requirements, model, serial number etc.

Washing and drying machines shall be mounted so that the front loading doors are at the optimum ergonomic working height for use with laundry basket trolleys.

19.4 Electrical requirements

The power supply to all electrical equipment shall be 230 V/380 V/50Hz and/or to project standard. The equipment shall be provided with a control panel. All electrical equipment shall be earthed. Height adjustable worktops and equipment shall be continuously earthed.

Electrical equipment shall be tagged, and be supplied with a "manufacturer's declaration" stating compliance with requirements, including specified effect, voltage, frequency and IP-rating.

Equipment requiring special earthing methods, or which have a sensitivity to water purity, shall have these highlighted at an early stage in the relevant data sheets.

Large equipment items shall have cable marking and associated wiring diagrams to accepted or project standard, to expedite problem solving at breakdowns.

The time switch on all tumble dryers shall have a 0 h to 2 h running period.

19.5 Plumbing requirements

Equipment shall have standard fittings, nozzles, valves, etc. ready for installation. All items shall have local shut-off valves, to allow for equipment replacement, maintenance etc. Kitchen general area shall have clearly marked and readily accessible main shut-off valves.

Sanitary piping shall be to project standard.

The following water temperatures shall be used, unless specified otherwise:

- hot potable water temperature to be 55 °C;
- very hot potable water temperature to be minimum 80 °C at point of use.

Hose reels for hosing down preparation worktops are the only items requiring very hot potable water, and shall have hoses, valves and variable display temperature adjustment with temperature limiting devices which operate safely at this temperature. It is recommended to install very hot potable water as a separate system, to reduce accident potential.

The waste disposer shall be connected to a hot water supply with adjustable temperature. The outlet pipe from the waste disposers shall be connected to the drain pipe in accordance with the manufactures instructions, and shall allow for height adjustment where required. Waste disposers and potato peelers shall have minimum 101,6 mm (4 in) pipe connections from the machines, to avoid clogging.

The dish washing machine and pot scrub machine drain lines shall not discharge water onto the floor. The associated floor drain shall be easy to clean.

Cold and hot water pipes shall be insulated, and have galvanically insulated supports.

All mixing taps in the kitchen area shall be of a single lever control type with matt chrome or brushed stainless steel finish, and standardised to a single manufacturer. Taps to hand wash basins shall be elbow or automatic operated, in accordance with hygiene regulations.

Washing machine drain lines shall be piped directly into an adjacent floor drain gulley, which has the capacity to empty all machines simultaneously. The drain grating shall be easily demountable for floor drain maintenance and cleaning.

Drain pipes from basins in height adjustable benches shall have a heavy duty flexible detailing. Equipment having pressure supply limits shall have reduction valves fitted in supply lines as required.

For further plumbing requirements, see NORSOK H-CR-002.

19.6 Kitchen area extract hoods etc.

19.6.1 General

Extract hoods shall be made of stainless steel. They shall not generate excessive noise. Their main functions are described in 19.6.2 to 19.6.5.

19.6.2 Kitchen extract hood

The kitchen extract hood shall be mounted above the main cooking area and shall as a minimum contain the following:

- flame guard filters, grease filters with safe access for cleaning;
- filter cleaning units;
- drainage piping;
- integrated manually actuated fire-extinguishing system;
- integrated light fittings, for specified illumination of worktops below;
- automatic cleaning system;
- noise reduction facilities, if required.

The extract hood shall not generate excessive noise, and it shall have a minimum plate thickness of 1,0 mm, or 1,2 mm, where plate buckling is a potential problem. It shall be detailed with no gaps that may promote bacterial growth.

The design of the extract hood system shall prevent the possibility of personnel exposure to frying fumes.

19.6.3 Bakery table extract hood

The hood shall be mounted above the baking table and contain a flour filter, which is easily removable for cleaning and maintenance. It shall contain integrated light fittings, for specified illumination of worktops below.

19.6.4 Baking oven/combi steamer extract hood

Where required, the hood shall be mounted above the bakery oven and/or combi steamer and contain grease filter, which is easily removable for cleaning and maintenance.

The hood may not be required if the equipment and arrangement allows for effective steam extraction.

19.6.5 Dish washing and scrub extraction system

The system shall have especially good capacity to evacuate heat and steam from the area. The system shall be provided with a condenser unit.

19.7 Noise control requirements

The noise levels shall not exceed those stated in NORSOK S-002. The manufacturers' data sheet shall give guaranteed noise levels of the equipment.

19.8 Main functions and recommended equipment

19.8.1 General

Typical equipment for the different functions is specified in 19.8.2 to 19.8.16. Any specific equipment required by the operator/company shall be listed separately for each project.

19.8.2 Scullery/dish wash

Typical equipment is as follows:

- receiving bench for dish wash baskets, with temperate continuous water flushing and drain underneath. Soaking tray for dirty cutlery basket (50 mm water depth) to be mounted on top of receiving bench, and arranged so it may be pulled on to dish wash conveyor belt without lifting;
- tray-slide w/chutes for refuse, with standard sack container trolleys below;
- roller benches;

- two pre-rinse basins, with hand operated pre-rinse units;
- dish-washing machine, incl. necessary sound insulation and vapour condensation unit. The machine shall operate in accordance with the prevailing governing body temperature limits. Extract hood above, or direct connection to built-in ventilation extract. Discharge to drain shall not obstruct passage;
- shelving;
- hand wash basin (if applicable);
- trolleys for baskets or racks below hatch for storage of empty baskets;
- waste trolleys;
- cleaning hose reel including thermostat tap and adjustable nozzle;
- waste disposal unit with pre-rinse (hand operated). If possible the machine shall be located in the deck below.

19.8.3 Servery

Typical equipment is as follows:

- serving bench(es), including tray slide;
- plate dispensers with internal lining, diameter to be in accordance with operator requirements (heated for hot plates);
- tray holder(s), tray size to be stated by operator/company;
- bain marie with integrated overflow piping and a warm cupboard under, and heating and illumination of food from display shelf above. On floating installations the bain marie shall have device to prevent spillage due to wave movement;
- cold bench with cold cupboards under, a maximum of 7 °C shall be achieved in salad or dessert wells, overshell with illumination of food below. Salads should be located early in the food supply line;
- cold table with cold cupboards underneath and cold air supply from edges of overshell. 7 °C maximum shall be measured between the serving plates, and shall be verified prior to installation. Integrated lighting for all food. Separate tray holder and plate dispenser to be included;
- drinks counter with drainage;
- coffee machine;
- juice dispensers;
- milk dispensers;
- crushed ice dispenser that dispenses ice directly into the glass;
- cold glazed display for yoghurt etc., with height for 1 litre packs;
- cabinets under serving benches where available space, with height adjustable shelves.

19.8.4 Warm kitchen

Typical equipment is as follows:

- console walls with integrated el. and pipe supply. Plinth mounted, el. sockets at each worktop, water mixing fixtures with access to relevant equipment;
- fryer (air convection type), or deep fat fryer, as specified;
- tilting kettle, with oversized floor gulley below;
- cooking range (with storm rails for floating installations), height adjustable, shelves below,
- salamander grill;
- height adjustable tilting frying pan (150 mm to 200 mm deep for floating installations) with oversized floor gulley below;
- a cooled air supply system in stainless steel shall be provided along the sides and front edge of the frying pan to reduce exposure to frying fumes;
- combi steamer, condensation discharge routed to drain;
- overselves, with integrated lighting, for specified illumination of worktops below;
- adjustable workbench(es) with underselves;
- mixer, with required mixing equipment mounted on walls;
- refrigerator;
- hand wash basin(s);
- slop sink;
- steam cooker, condensation discharge routed to drain;
- chilled bench with cold cupboard, height adjustable;
- cleaning hose reel including thermostat tap and adjustable nozzle;
- heated food storage cabinet (warm cabinet).

19.8.5 Cold kitchen

Typical equipment is as follows:

- working bench, height adjustable w/shelves and/or cabinets below;
- overshelves with integrated lighting, for specified illumination of worktop below;
- food processor;
- bench with sink and cold cupboard under, height adjustable;
- slicing machine;
- refrigerator;
- bread slicer;
- blast chiller(s).

19.8.6 Scrub

Typical equipment is as follows:

- pot wash machine, including control cabinet, vapour condensator, rack for loading and equipment. Discharge to drain shall not obstruct passageway;
- pot wash bench, height adjustable, with sink (400 mm deep) and mixing faucet;
- overshelves;
- pot rack, wall mounted;
- waste disposal unit w/piping connections hot/cold, non-clogging drain connection;
- wall mounted pot scrub including all necessary fixing brackets, wall plate and accessories.

19.8.7 Bakery (if required by operator/company)

Typical equipment is as follows:

- mixer, with required mixing equipment mounted on wall;
- combi steamer/baking oven;
- baking plate trolley, w/lockable wheels;
- baking bench, height adjustable, w/drawer and cold cabinets below. Top plate in beech or Corian[®]/Surrel^{® 2}, with approximately 30 mm coved upstands on three sides;
- overshelves;
- consoles;
- proving oven;
- muffin machine, with worktop at approximately 900 mm height;
- refrigerator, high, with glazed door;
- bench top with wash basin.

19.8.8 Preparation

Typical equipment is as follows:

- working bench, height adjustable, w/drawers and/or rack for 1/1 gastronorm trays, sink(s) (400 mm deep) with mixing faucet;
- combi cutter mounted on rack w/lockable wheels, wall mounted brackets for accessories;
- thawing cabinets;
- overshelves;
- waste disposal unit w/piping connections hot/cold. Minimum 101,6 mm (4 in) non-clogging drain pipe connection. If possible, the machine shall be located in the deck below;
- hand wash basin;
- potato peeler, mounted on rack, non-clogging drain connection;
- meat saw with emergency stop at front;
- cleaning hose reel including thermostat tap and adjustable nozzle.

² Corian[®] and Surrel[®] are examples of suitable products available commercially. This information is given for the convenience of users of this NORSOK standard and does not constitute an endorsement by NORSOK of these products.

19.8.9 Thawing

Separate rooms or cabinets shall be provided for thawing. The temperature range is 0 °C to 6 °C. A floor drain shall be provided for the thawing room.

19.8.10 Coffee bars

The counters shall include counter top in a solid non-porous composite material (e.g. Corian) with integrated sink and mixing tap, cabinets under with laminated front and sides, a refrigerator, and shelving or wall-mounted cupboards above. A coffee/hot water machine and cold drinks dispensers to be included, with associated piping, and an integrated solution for rubbish disposal sacks. A dishwasher shall be provided if specified by the operator/company.

19.8.11 Laundry machinery room

Typical equipment is as follows:

- automatic washing machines with spin dryer, small and large types, on plinth if required for noise or ergonomic reasons. The lower part of the washing machine door shall be 800 mm to 1 000 mm above the floor. Prepared for automatic detergent dispensing system;
- tumble dryers, small and large types, with lint filters cabinets in the ventilation extract lines arranged with hinged access panels and designed for safe and effective daily cleaning;
- cleaning hose reel including thermostat tap and adjustable nozzle;
- mop washing machine, with accessories (if applicable);
- soaking sink(s) in bench;
- soaking trolley(s).

19.8.12 Laundry handling area

Typical equipment is as follows:

- working bench, user adjustable for height, 800 mm to 1 050 mm;
- table and armchair(s);
- shelving;
- unit for storage with shelves/ hanging bar (hanging bar height 1 800 mm);
- private laundry pick-up area with bed-numbered shelf cubicles, sized for maximum personnel on board,
- adjustable stool(s);
- ironing board (to be folded in a cabinet);
- trolleys, open mesh type, for dirty laundry transport;
- trolleys, stainless steel, with spring loaded bottoms for wet laundry local transport.

19.8.13 Laundry store

Typical equipment is as follows:

- shelving/hanger bars;
- cleaners cabinet.

19.8.14 Central cleaning store

Typical equipment is as follows:

- large floor drain (if required);
- slop sink;
- shelving.

19.8.15 Shelving, trolleys etc.

Adjustable shelving shall be provided in all storage rooms and may be a combination of the following:

- open grid, stainless steel shelving;
- solid flat panel stainless steel shelving;
- open grid, stainless steel troughed basket type shelving.

Shelving shall be arranged to optimise available space.

All trolleys and baskets shall be stainless steel. Trolley wheels shall be rubber, lockable, large in size, with ball or roller bearings.

19.8.16 Soap dispensing systems

Soap dispensing systems shall be integrated in the room arrangements and have safe and ergonomic access for refilling of liquids. The following requirements apply:

- dish and potwash machines shall have large capacity automatic detergent and rinse systems;
- laundry washing machines shall have electrically operated central soap and softener dispensing system. Canisters shall be safely mounted on a stainless steel shelf;
- all hosing down reels in LQ shall have medium capacity dispensers;
- all hand wash basins shall have soap dispensers. Additional oil removing dispensers will be required for main change rooms and drilling areas;
- kitchen extract hood shall have cleaning liquid dispenser with acid resistant tubing and pump;
- all showers to have soap dispensers.

A nominated supplier shall be used for the soap dispensing systems.

19.9 Kitchen and laundry equipment data sheet

Data sheet CDS-207 (see Annex A) shall be used by the project to specify all requirements with respect to capacity, dimensions and other functional and technical requirements for each item of equipment.

19.10 Testing

All items shall be formally tested and adjusted to comply with specified functional requirements as part of mechanical completion activities/commissioning. Temporary utilities shall be provided as required, to allow functional adjustments and verification of equipment at an early date.

Several equipment items (e.g. boiling kettle, pot-wash machine and coffee machines) may require manufacturer's representatives to be present for initial start-up adjustments, in order to achieve a steady state performance level. This shall be allowed for as required.

Re-preservation of equipment shall be performed as required following testing, in accordance with manufacturer's recommendations.

19.11 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items require specification by the operator/company:

- project specific requirements for furniture and equipment for all areas/rooms;
- servery-plate dispensers diameter;
- servery-tray size;
- bakery;
- coffee bars-dishwasher.
- list of company provided items to be installed by contractor.
- list of company provided items to be installed by company.
- list of company nominated suppliers.
- waste handling and housekeeping philosophies.

20 Furniture, equipment and accessories

20.1 General requirements

All items shall be standard products, wherever possible.

All items shall be easy to clean and shall not have complicated junctions, recesses or niches. Dust traps shall be avoided. High-level cabinets and furniture items shall have infill pieces to towards suspended ceilings to avoid dust traps. To minimise the risk of injury, there shall be no sharp corners or edges. Loose furniture shall be light in weight and easy to handle, to ease cleaning.

All items shall be of an ergonomic design and shall be comfortable to use. Office chairs and office desks shall be easily height adjustable.

Workstations in permanent use by seated personnel shall be easily adjustable within the minimum range of 660 mm to 800 mm, by a single operation while seated. The minimum space below workstations for seated personnel shall be 610 mm width, 500 mm depth at knee height and 650 mm depth at floor level. Workstations in permanent use by standing personnel shall be easily adjustable within the minimum range of 800 mm to 1 050 mm, by a single operation while standing.

The support structure below desk/workstation tops shall be detailed to avoid sharp or protruding edges or obstructions that are likely to cause injury or discomfort to personnel.

Wall-mounted items shall be positioned at an ergonomically correct and uniform height throughout the installation, to optimise comfort and effect of use.

Shelves and cabinets for document storage shall allow for large size A4 ring-binders. Shelving for all areas shall be height adjustable. Shelving shall extend to the full length of available walls to optimise storage space, wherever practical.

Storm edges/rails/up-stands shall be provided on floating installations. Furniture items shall be fixed in position as required, on floating installations.

Shelving units on floating installations shall have solid backs and ends to retain contents in place, and to withstand the dynamic forces to which the units may be exposed. Shelves shall have maximum 15 mm fixed up-stand edges.

The colour of all exposed surfaces, textiles and covers will form part of the overall colour schedule. Samples of the available colours and textures shall be provided for development of the overall colour schedule.

All lockable furniture shall be suited to the master key system. Three keys shall be supplied for each lock.

Worktops shall as a rule have integrated splash-backs toward adjacent walls. Cabinets and shelves above worktops shall have integrated worktop lighting.

20.2 Fire test requirements

For fire test requirements, see 4.2.

Certification documenting the properties of all materials, including textiles, upholstery foam, core and surface materials etc., shall be collated throughout the engineering phase in a formal dedicated certification dossier.

20.3 Materials

20.3.1 Metal

Sheet metal surfaces shall not buckle or deform. Metal shall be finished in baked enamel, matt chrome or powder epoxy/polyester coating. Stainless steel shall be brushed to a grit of 180 to 220. Aluminium shall be anodised. The legs of tables and chairs shall be brushed stainless steel or matt chrome.

20.3.2 Textiles and leather

All upholstered furniture shall be finished with leather, unless specified otherwise for a particular area. The covering, whether loose fit or fixed, shall be easy to clean and maintain.

Curtains shall remain non-flammable or flame retardant after cleaning, and shall be pre-shrunk. Curtains shall be Trevira^{®3} quality, to allow for repeated washing. All textiles shall be of good quality with a high resistance to wear.

Leather quality shall be semi-anilin with a thickness of at least 1,0 mm, and have wearing and cleaning properties suitable for heavy duty use in public areas.

Leather quality for central control room operator chairs shall be pure anilin.

20.3.3 Core material

Core material shall be of high quality, providing sufficient mechanical strength for its purpose. The material shall not sag or warp, and shall be documented as fire retardant, e.g. fire retardant medium density fiberboard, fire retardant plywood, aluminium honeycomb etc..

20.3.4 Plastic laminate and veneer

Laminates shall be of fire retardant quality. Corners and edges of laminated finishes shall be smooth and rounded. Rounded edges and corners shall be post-formed or supplied with a rounded profile. Alternatively, solid rounded hardwood profiles with fire retardant lacquer may be used as edges. Laminate shall be thoroughly bonded to the core material.

Veneer of natural wood with fire retardant lacquer may be used as surface material. Veneer shall be thoroughly bonded to core material.

20.4 Hardware

Hardware shall be heavy duty, suitable for the intended use. Locks shall be of the recessed, cylinder type and shall be coordinated with the master lock suiting system. Change room lockers may require padlocks, if specified by the operator/company.

20.5 General living quarters (LQ) area – Recommended furniture and equipment

20.5.1 Cabin furniture

Recommended furniture and equipment are

- bed(s) with inner spring mattress 2 100 mm x 800 mm with visually identifiable hard/soft sides and with ventilation holes and handgrips along edges. A 20 mm to 30 mm thick fire certified and washable top mattress (with thickness and extra length to ease making of bed) and a washable protective covering shall be laid on top. The top of the top mattress shall be 550 mm to 600 mm above the floor. The side panels of the bed shall be detailed with a large rounded top profile to avoid discomfort to personnel when sitting on the edge of the bed. Pillows and quilts are not part of this supply. The void below beds resting on the floor shall be closed off to ease cleaning, but shall have easy access for inspection. The bed(s) shall have two drawers underneath which shall be removable for inspection. One of the drawers shall be lockable and suited in accordance with the master key system. The drawers shall have silent operation. A collapsible or removable and easily fitted side protection board shall be fitted to beds on floating or mobile installations where excessive movement is anticipated. Type of mattress shall be in accordance with operator/company requirements,
- convertible sofa beds shall fulfill the same requirements as for beds. The void below the sofa bed shall be closed off both when the sofa bed is in its open and closed positions,
- sofa (if applicable),
- table,

³ Trevira[®] is an example of a suitable product available commercially. This information is given for the convenience of users of this NORSOK standard and does not constitute an endorsement by NORSOK of this product.

- writing desk with required illumination, to achieve specified illumination at worktop, wall mounted, with pencil drawer below to be included. A wall mounted heater shall be coordinated with the desk,
- reading lamp with low heat radiation bulb,
- chair for writing desk,
- wardrobe cabinet(s) with shelf and rod. Suitable space for pilot type suitcase shall be provided,
- recessed space/compartments for survival suit(s) and smoke mask(s),
- shelf for each bed/sofa bed, with integrated or recessed light to achieve required illumination at pillow,
- curtain and fascia boards,
- alarm clock, fit for purpose type, with "green" battery, unless wake-up by programmable telephone is available,
- TV support bracket (allowing for installation movement, where applicable),
- concealed public address (PA) speaker supports.

20.5.2 Furniture in common rooms/areas

Recommended furniture and equipment are

- dining tables (fixed to deck and/or with storm railings, where specified),
- dining chairs (it shall be possible to "hang" the chairs on table edge for cleaning – alternatively, a simple device should be provided for fixing chairs to the underside of tables when not in use),
- lounge tables,
- lounge sofas and chairs,
- lounge equipment with book shelves and cabinets,
- newspaper display shelves/cabinet with designated spacing/cubicles,
- coffee bar tables,
- coffee bar chairs,
- coffee bar bench(es) with integrated sink, mixing tap, storage cabinets above and below, with designated space for refuse. For "clean" and "dirty" areas, as specified,
- multi purpose room/cinema chairs and/or retractable seating,
- multi purpose room stage/rostrum,
- multi purpose room equipment and/or video equipment storage cabinets,
- TV room chairs,
- TV room shelf/cabinet arrangement with space for TV and video equipment,
- sky lobby tables,
- sky lobby sofa group seating,
- sky lobby shelf/cabinet arrangement for TV, and/or TV mounting bracket,
- sky lobby storage unit/cabinet for offshore bags,
- sky lobby storage arrangement for day visitor's survival suits,
- reception check-in counter, with height adjustable worktop, lockable sliding glass above, electrical baggage weighing machine with remote display visible to receptionist, space for check-in cards, all coordinated with PC table, key display panel, lockable key cabinet, copy machine,
- general areas: Fire extinguisher recessing frame (to allow semi recessed extinguisher installation),
- general areas: Curtain fascia panels (including illumination, if specified),
- general areas: "Decorative" partitions,
- general areas: Plant boxes, including accessories,
- general areas: Plants (live and/or synthetic).

20.5.3 Lockers

20.5.3.1 Change room lockers

One change room locker shall be provided for each bed on the installation, plus an additional 10 %. The locker size shall be minimum width x depth x height = 300 mm x 350 mm (500 mm is preferable) x 1 750 mm. Locker bottom shall be approximately 350 mm above finished floor level. The hanger rod in the locker shall be 1 400 mm above the locker bottom, and have two hooks in each locker and a shelf for hardhat above.

The locker shall be equipped with air grilles or perforated bottom, and have an air extract at top for connection to the mechanical ventilation extract system. The ducts at the top shall be hidden behind front panels from the top of the lockers up to the ceiling. A bench in front shall be included if specified by the operator/company. All lockers shall be separately lockable.

Change room lockers and benches shall as far as practical be wall hung with an absolute minimum of support feet to the floor. The support feet shall have wet room detailing.

20.5.3.2 Leave lockers

Three leave lockers shall be provided for each bed on the installation. The width shall be minimum 300 mm, and the volume shall be approximately 0,1 m³. Under special circumstances a minimum volume of 0,06 m³ may be used, if approved by the operator/company. The lockers shall be designed for natural ventilation. All lockers shall be separately lockable, as part of the master key system.

20.5.3.3 Work lockers

Work lockers for personal tools, protective gear etc., shall be provided in accordance with operator/company requirements, and shall be located adjacent to workshop areas.

20.5.4 Office furniture

Recommended furniture and equipment are

- office desks, user height adjustable. Corresponding drawer unit below desk, complete with pencil tray and internal dividers (arranged to maintain required clearances below desk),
- computer tables (may be combined with desk, where functionally appropriate),
- office chairs, including adjustable armrests and pneumatic height adjustment (with five self locking wheels on floating/mobile installations),
- monitor type high-back chairs with padded armrests and neck support, for permanent workplaces in control rooms, etc. (with five self locking wheels on floating/mobile installations),
- bookshelves,
- storage and filing cabinets, complete with accessories,
- two coat hooks for each office, reinforced to support 750 N (75 kg),
- conference tables,
- conference chairs,
- overhead screens and whiteboards,
- display walls,
- furniture for video conference equipment with provisions for PC,
- office divider partitions,
- Interactive whiteboards (smart boards).

Offices shall be fully furnished according to data sheets. Office desks and computer tables for all permanently manned areas shall be mechanically user adjustable from a single point, from 660 mm to 800 mm. Furniture locking method shall allow for security of personal effects for different shifts.

Document storage shall, where practical, be contained within incombustible storage cabinets. Storage capacity shall be in accordance with operator/company requirements.

20.6 Medical centre – Recommended furniture and equipment

20.6.1 Examination room

Recommended furniture and equipment are

- examination couch, three part, with shoulder support,
- examination chair,
- ceiling mounted examination lamp, adjustable for use above couch and chair. Shall be lockable in position for floating installations,
- bed head unit including two separate oxygen outlets with dosimeter, suction outlet, phone outlet and double electrical outlets on emergency power,
- equipment rail, length 1 000 mm, including wall brackets and end pieces,
- instrument cupboard,
- bench with cupboard below, integrated sink with elbow operated/automatic mixing taps,
- PC table with data outlet,
- wall mounted cupboards with sliding doors,
- hand operating trolley, tiltable and height adjustable,

- instrument trolley and assistant trolley,
- stool with back support, on gliders.

20.6.2 Ward

Recommended furniture and equipment are

- hospital bed with adjustable height and adjustable head and foot ends,
- bed side table and lamp,
- observation chair, comfortable easy chair type,
- bed head unit including two separate oxygen outlets with dosimeter, suction outlet, phone outlet and double electrical outlets on emergency power,
- equipment rail, length 1 000 mm, including wall brackets and end pieces,
- audio box including all wiring, if required by the project,
- emergency shower hose with fixed temperature adjustment, length in accordance with project requirements,
- ambulance type stretcher, height adjustable with scissors action, including mattress, handgrip, straps and storage cabinet.

20.6.3 Laboratory

Laboratory work bench with integrated sink and elbow operated/automatic mixing taps, cabinets and drawers as described below:

- cupboard above workbench to ceiling, full length, with sliding glass doors and integrated lighting for illumination of worktop below;
- adjustable stool with foot- and backrest;
- refrigerator, medical type at ergonomic height (with storm rails for floating installations);
- autoclave, wall mounted on support brackets, approximately 1 600 mm height to loading door centre.

20.6.4 Medical oxygen system (if specified by operator/company)

Medical oxygen system, complete, leakage tested and certified, with outlets above examination couch and ward bed. Fixed oxygen bottles to be located in separate, naturally ventilated area (oxygen bank). Location shall be in accordance with operator/company requirements. System shall include falling pressure alarm, all necessary piping and manifolds and an external pressure-limiting valve. The supply shall include a maintenance program in local language (Norwegian for Norwegian continental shelf, etc.) for routine pressure testing of piping, valves, outlets etc.

20.6.5 Office

Recommended furniture and equipment are

- lockable medicine cabinet with unique key cylinder and three keys (with storm rails for floating/ mobile installations),
- clear/occupied light to corridor,
- wardrobe cabinet,
- office furniture to project standard, including desk, PC table and drawer unit,
- computer and VHF or UHF outlets,
- ample storage shelves for A4 ring-binders.

20.6.6 Storage room

The storage room shall be equipped with storage shelving in five levels.

20.6.7 Emergency hospital

Recommended furniture and equipment are

- emergency equipment trolleys on lockable wheels in accordance with operator/company requirements,
- emergency shower hoses temperature adjustable, length to suit applicable outlet,
- telephone and VHF or UHF outlets,
- wall cupboard with lockable doors.

20.7 Games and exercise equipment

Equipment shall be selected to be suitable for use by the majority of the personnel on board. Heavy equipment shall be permanently fixed. The selection of equipment shall be developed in close cooperation with the operator/company.

Typical equipment are

- table tennis tables, foldaway type on lockable wheels, including accessories,
- pool/billiard tables, including accessories,
- dart boards,
- sequence training equipment with minimum six stations for selective training of muscles. The equipment shall be safe to use and of a semi-professional standard,
- rowing trainer,
- treadmill(s), tiltable, electrical driven, and of a safe and semi-professional standard,
- cycling trainer,
- head weight stand (mobile),
- leg trainer,
- wall bars, with 10 rungs,
- inclined boards, with footrest and hand bar,
- mats, goals and nets,
- wall mirrors for aerobics training areas.

20.8 Curtains with accessories

The following curtains shall be supplied:

- window curtains;
- glazed partition curtains;
- bed privacy curtains;
- shower curtains, draw curtain for health centre ward bed.

All supplies shall be complete, including rails, fixings and fittings, etc. All curtains shall be pre-shrunk prior to installation, and treated with anti smudging systems where specified. The size of curtains and draperies shall include an extra 100 % in width for folds and an additional 300 mm in length for hems at top and bottom. A tucking tape shall be sown into each curtain and drape.

20.9 Sauna and solarium equipment

The following equipment shall be supplied:

- prefabricated wooden interior sauna unit, including sauna stove with controls, benches, door with vision panel, sauna lighting, hygrometer, thermometer and accessories. Construction shall not emit uncontrolled moisture into adjacent wall and ceiling voids. The floor and skirtings shall have detailing compatible with frequent hosing down and disinfection. The floor shall be sloped towards the door. The door shall be minimum 2 050 mm high with no threshold to allow for hosing down.
- solarium beds with controls and time switch. The solarium beds shall have a time limiting device, if specified by the operator/company.

20.10 Workshop and laboratory – Recommended furniture and equipment

20.10.1 General

Gantry cranes, monorails and lifting systems shall be provided and arranged in close cooperation with the operator/company.

20.10.2 Mechanical workshop

Recommended furniture and equipment are

- steel working table with vices. Height adjustable 800 mm to 1 150 mm, shelves and drawers underneath,
- height adjustable workbench(es), 800 mm to 1 150 mm height, one off covered with 50 mm thick fire treated hardwood, with open shelves underneath,
- storage cabinets above workbenches,
- hosing down reel,
- blackboard, 1 500 mm x 1 000 mm,
- hydraulic press,
- parts cleaning machine/station (may be in a dedicated room),
- pressurised hot water cleaning station,
- blast cleaning machine with filter,
- grit blasting cabinet,
- emergency shower facilities,
- floordrain(s),
- eyewash facilities, portable/permanent, as required,
- stainless steel sink with mixing battery,
- tool trolley on wheels,
- charging station for hand tools,
- wall brackets for storage of 6m standard length pipes.

20.10.3 Machine workshop

Recommended furniture and equipment are

- lathe(s), with grinding discs and accessories,
- pedestal grinding machine,
- power hack saw,
- universal milling/drilling machine,
- pedestal drilling machine,
- hydraulic press, with motor,
- portable pipe threading machine,
- grinder,
- vices,
- portable pipe cutter,
- portable hydraulic pipe bender,
- band grinding machine,
- portable grinder/cutting machine,
- floor drain(s),
- waste-bin for hazardous waste,
- lockers for machine accessories,
- pipe and steel plate storage securing devices,
- adjustable point extract hoods,
- height adjustable workbench, 800 mm to 1 150 mm height, shelves/drawers below,
- stainless steel sink with mixing battery.

20.10.4 Welding workshop

Recommended furniture and equipment are

- height adjustable workbench, 800 mm to 1 150 mm height, shelves/drawers below,
- height adjustable welding table, 800 mm to 1 150 mm height, vertical flatbars on 50 % of tabletop,
- electrode heating cabinet(s),
- electrode drying oven,
- welding machines, 50 amp to 600 amp, as specified by the project,
- plasma cutting unit, for minimum 10 mm stainless steel,
- gas welding/burning set,
- band grinding machine,
- grinding machine, bench mounted,
- vices,
- anvil, floor mounted with fire treated wood foundation,
- shelves above workbenches,
- blackboard, 1 500 mm x 1 000 mm,
- lockers,
- chairs,
- adjustable fume extract hood(s),
- welding hand-tools,
- heavy, incombustible welding "curtains",
- pipe and steel plate storage securing devices,
- steel storage cabinet(s),
- stainless steel sink with mixing battery,
- pedestal drill,
- band saw.

20.10.5 PSV workshop

Recommended furniture and equipment are

- height adjustable test workbench, 800 mm to 1 150 mm height,
- vices,
- polishing machine,
- lockable storage cabinets.

20.10.6 Tools store

Recommended furniture and equipment are

- tools storage equipment; rotamat type containing units, if specified by operator/company,
- tools storage rails,
- tools storage shelves.

20.10.7 Electrical workshop

Recommended furniture and equipment are

- height adjustable work and test benches, 800 mm to 1 150 mm height,
- vice,
- facility for soldering equipment, with flexible fume extract above,
- washbasin with mixing tap,
- shelves above workbenches,
- blackboard 1 500 mm x 1 000 mm,
- chairs,
- covered waste bins,
- parts and consumables storage arrangement,
- storage equipment: rotamat type containing units, if specified by operator/company,
- storage cabinets for documentation manuals,
- test panel.

20.10.8 Instrument workshop

Recommended furniture and equipment are

- earthed height adjustable workstations and instrument test benches, 800 mm to 1 150 mm height, with associated PC terminal desk(s),
- vice,
- facility for soldering equipment, with flexible fume extract above,
- shelves above workbenches,
- blackboard 1 500 mm x 1 000 mm,
- earthed chairs,
- covered waste bins,
- parts and consumables storage arrangement,
- storage cabinets for documentation manuals,
- test panel.

20.10.9 Telecom workshop

Recommended furniture and equipment are

- earthed height adjustable workstations and telecom test benches, 800 mm to 1 150 mm height, with associated PC terminal desk(s),
- earthed chair(s),
- rough mechanical worktop,
- large storage cabinet for small items storage in trays/drawers,
- storage cabinets for A4 binders,
- test panel,
- facility for soldering equipment, with flexible fume extract above,
- storage facility for PCs and TVs.

Electrical/instrument/telecom workshops may be combined, in accordance with operator/company requirements.

20.10.10 Production laboratory

Recommended furniture and equipment are

- height adjustable workbenches, drawers below,
- height adjustable workbench for location of density measuring equipment,
- ventilated fume cupboards with workbench, basin and mixing taps and associated drainage etc. as required by the operator/company,
- drying cabinet, heated,
- double overselves above workbenches,
- wall cupboards,
- counter with lockers,
- shelf section, high,
- extraction hood for handling of hazardous fumes and gases. Extract capacity to be clearly defined,
- energy bridge with test gases, instrument air and electrical outlets,
- cabinet for test gas cylinders for external installation, complete with cylinder fixings, manifolds and associated piping (nitrogen, argon, instrument air etc., as required by operator/company),
- laboratory glassware washing machine with oil resistant gaskets,
- refrigerator with lockable compartments, temperature control from 0 °C,
- separator/centrifuge,
- incubator,
- ice making machine,
- stool with footring and backrest,
- emergency shower facilities with drain in floor,
- eyewash facilities, portable/permanent in accordance with operator/company requirements,
- wash basin with mixing tap,
- covered waste bin,
- double sink unit with mixing tap and outlet to closed drain,

- all workbenches shall be of an acid resistant type,
- for gas installations: hard piped test gas system and space for gas chromatograph(s), including point extract above,
- for gas installations: additional cabinets for storage of empty test gas cylinders.

20.10.11 Production laboratory office

Recommended furniture and equipment are

- office type writing desk with associated drawer unit below and PC table,
- table for equipment, printer and fax,
- filing cabinet(s) for A4 binders,
- bookshelf,
- office type chairs.

20.10.12 Production laboratory storage room

Recommended furniture and equipment are

- storage shelves/cabinets,
- fire-rated, lockable chemical storage cabinet(s) with mechanical HVAC extract.

20.10.13 Darkroom/x-ray room

Recommended furniture and equipment are

- darkroom bench (acid resistant finish to worktop) with wash hand basin and mixing battery,
- wall storage cabinets,
- space for developing machine adjacent to darkroom bench with flexible point extract above,
- facility for removal of waste chemicals,
- dark room safelights.

Dark room shall be provided with a floor drain and acid resistant flooring.

20.10.14 Mud laboratory

Recommended furniture and equipment are

- workbench(es) with basin and mixing tap, drawer section and cabinets. Hazardous substances, if applicable, to separate cannister or special drain,
- storage facilities.

20.10.15 Remotely operated vehicle (ROV) workshop

Recommended furniture and equipment are

- height adjustable workbenches, 800 mm to 1 150 mm height, drawers below. One worktop to be surfaced in 25 mm fire treated wood,
- vices,
- shelves above workbenches,
- facility for soldering equipment, with flexible fume extract above,
- blackboard 1 500 mm x 1 000 mm,
- wash basin with mixing battery,
- chair,
- covered waste bin,
- tool storage arrangement,
- parts and consumables storage arrangement.

20.10.16 Shale shaker/cementing area workstations

Recommended furniture and equipment are

- height adjustable stainless steel workbench, 800 mm to 1 150 mm height, with sink and mixing tap, undershelf and drawers. Hazardous substances, if applicable, to separate cannister or special drain,

- storage shelf section,
- covered waste bin.

20.11 Miscellaneous equipment and accessories

Miscellaneous equipment and accessories are as follows:

- handwash basins, wall mounted, complete with ceramic disc type mixing taps in matt chrome or brushed stainless steel, height 800 mm to 820 mm above floor throughout the installation;
- as above, but with automatic sensor activated mixing taps (battery activated), for kitchen and other safe areas;
- sturdy wall mounted slop sinks complete with ceramic disc type mixing taps in matt chrome or brushed stainless steel, bucket support gratings and necessary wall reinforcements. Mounting height 600 mm to top of sink throughout the installation. Mixing tap mounting (approximately height 950 mm) shall allow for easy filling of buckets;
- drinking water coolers, brushed stainless steel finish. IP rating shall be as required, cooling medium shall be to project standard;
- toilets as required throughout the installation, wall hung, 450 mm seat height. Toilet seat shall be flat underneath to simplify cleaning, and of robust, durable quality. Thin plastic type shall not be used. Toilets and cistern types shall be standardised for the whole installation;
- toilet brush, wall hung, and of simple replaceable quality;
- toilet brush holder, wall mounted and of robust and self draining type;
- toilet paper holder, type without lid. Spare toilet paper holder;
- hooks for sanitary napkin bags;
- paper towel dispensers, with visible empty/full display. To be installed at all handwash points throughout the installation, except for cabins and where electrical hand dryers are installed;
- refuse bins, wall hung wire mesh type for plastic bag inserts. For installation by all paper towel dispensers. Waste trolley type to be used at high exposure areas;
- clothes hooks, for installation within all office, toilet, change room, shower and wardrobe areas at 1 800 mm height. They shall have any necessary reinforcements behind to be able to support 750 N (75 kg);
- mirrors for all change rooms and toilets, minimum height from 1 400 mm to 1 900 mm above floor, small shelf below, with fixing detailing to simplify cleaning;
- hosing down reels with adjustable temperature and soap dispensing unit shall be installed to cover all change rooms and saunas, in accordance with hygiene regulations;
- shelving for janitor and cleaners stores, five levels;
- shelving for linen- and coverall stores, stainless steel, five levels;
- shelves/racks for hard-hats, at access points from "dirty" to "clean" areas;
- shelves for shoes, stainless steel, at access points from "dirty" to "clean" areas;
- heavy duty storage units (pallet storage/shelves) for main storage areas, suited to applicable function and transport equipment access;
- mechanical rolling/rotating storage units;
- linen trolleys, stainless steel with lockable wheels;
- electrical hand dryers sensor activated (button activated for small toilets) and hair dryers;
- electrical boot dryers, for installation at suitably detailed shelves;
- plot display boards for emergency operations centre;
- hooks;
- mirrors;
- notice boards, pin-boards located where common announcements are required near skylobby/reception, and by lounge areas. Pin-boards/magnet-boards shall be arranged for each office worktop, size minimum 800 mm x 1 200 mm;
- cabinet/shelving units for sorting and distribution of internal post to be positioned at suitable location in office/administration areas;
- sanitary napkin dispensers;
- table type ashtrays for smoking areas;
- dispensers for plastic footwear covers together with stainless steel containers for used footwear covers, shall be installed at all access points from "dirty" to "clean" areas. They shall be neatly located in wall recesses;
- telephone hoods for internal, manned "clean" areas, brushed stainless finish;
- waste handling stations as specified in NORSOK C-001.

20.12 Labelling

Keys and key cylinders shall be labelled and marked for identification.

Beds in double cabins shall be designated A and B. All respective furniture and equipment (bed, lockers, drawers etc.) shall be marked with a discreetly located sign identifying the bed (A or B) to which it is allocated.

Leave lockers shall be provided with an identification number linked to the floor level on which they are located.

20.13 Testing

All equipment shall be formally tested and adjusted to comply with functional requirements as part of mechanical completion activities/ commissioning. Items with systems connections shall be verified for function. Where applicable, manufacturers' start up procedures shall be strictly adhered to. Laboratory fume extract cabinets shall be checked for airflow function. Hospital oxygen system shall be checked and adjusted for operation, and certified as required. Damaged or non-functioning items shall be repaired or replaced without delay. Represervation shall be performed as required and in accordance with manufacturers' recommendation, following function testing.

20.14 Data sheets

The attached data sheets (see Annex A) shall be completed, as required, prior to enquiry.

20.15 Company specified items

Operator/company specific requirements deviating from the requirements stated in this NORSOK standard should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this Clause require specification by the operator/company:

- project specific requirements for furniture and equipment and accessories for all areas/rooms;
- requirements for work lockers;
- lockers - padlocks for change room lockers;
- lockers - bench in front of change room lockers;
- office furniture – document storage capacity;
- medical centre – requirements for type, operation and location of medical oxygen system;
- emergency hospital - emergency equipment trolleys on lockable wheels;
- solarium – time limiting device for solarium beds;
- workshops - gantry cranes, monorails and lifting systems;
- tools stores and electrical workshop - tools storage equipment: rotamat type containing units;
- electrical/instrument/telecom workshops – rooms to be combined;
- production laboratory – fume cupboard requirements;
- production laboratory – cabinets for test gas cylinders – types of gases;
- production laboratory – eyewash facilities – portable or permanent;
- type and make of mattresses.

21 Signs

21.1 General requirements

Proper signage is a major factor in ensuring that personnel feel secure in the complex working environment of an offshore installation. The human orientation factor is initially limited until a complete knowledge of the installation is acquired. It is therefore of vital importance that in any situation, personnel are in no doubt as to the escape direction, location of emergency and fire fighting equipment, requirements for use of protective clothing etc.

The function of signs is to assist people in acquiring knowledge of the installation and to guide personnel in situations of unexpected nature, as well as to give clear information regarding locations of various functions

and areas. In this respect, a sufficient number of signs shall be provided to convey the necessary information, but it is essential to avoid too many signs as this can lead to confusion.

Sign design, arrangement method and installation shall be consistent throughout all areas. Standard sign system symbols shall be used. New symbols shall be developed for project approval where satisfactory standard symbols do not exist.

Where a symbol on a sign does not easily convey the message, a descriptive text shall be added to the sign. Text shall be kept to a minimum.

Individual signs may be assembled into a combination sign in order to give a total information picture in a given situation. Mixture of colour coding shall be avoided.

No signs shall be placed next to an emergency exit arrow sign in the direction of the arrow. The arrow shall always point outwards from the sign combination.

Sign frames and support systems shall be designed to provide flexibility for installation and final positioning of the signs, and shall allow for changing, adding or deleting individual signs at a later date.

Where signs are fixed with double-sided tape, the tape shall be applied to all perimeter edges of the sign to ensure proper fixing and to avoid dust traps behind the sign.

Signs shall not be mechanically fixed (screwed or bolted) directly to door leaves or wall surfaces, unless accepted by the operator. Signs shall not be mounted directly on the door leafs, unless the information is directly linked to the passage throughout the door.

Signs adjacent to, or above doors, shall be mounted on the handle side, starting from the upper corner and down or sideways, respectively.

Where arrow signs are used above doors, the arrow shall be located over the centre line of the door handle.

Signs that are exposed to excessive heat loads (e.g. from flare) shall be designed and constructed of suitable materials that withstand the project defined heat load.

The sign installation drawings (sign plot plans) shall be the basis for locating every individual sign post throughout the installation. Each individual sign post shall be identified with an area and a sequence number. To secure an accurate position of all the signs on the installation, an appropriate procedure or methodology shall be used.

All external signs and their supports shall be designed to withstand the environmental wind forces and heavy duty cleaning methods to which they will be subjected.

21.2 Category of signs and colour coding

21.2.1 General

In addition to the basic sign colours specified in 21.2.2, 21.2.3 and 21.2.4, secondary colours may be used to clarify the sign's message. A maximum of four different colours to any one sign may be used.

The main categories of signs are given in 21.2.2 to 21.2.5.

21.2.2 Signs related to safety, emergency preparedness, evacuation etc

Basic sign colours are as follows:

- Exit and safety signs – Green background with white graphic.
- Fire equipment signs – Red background with white graphic.
- Safety plans – Coloured symbols on multicoloured graphics.

Exit and safety signs are the most important signs for personnel life saving. They shall be clearly visible from any location throughout the installation and be positioned to enable safe and organised escape towards the safe areas and lifeboat stations in an emergency.

Escape route signs shall be positioned at strategic points where escape direction changes, and above doors and other exits.

Exit and safety signs include low-level escape signs and signs for emergency exits, exits, escape routes, lifeboats, safety equipment, survival suits, life jackets, stretchers, etc. Emergency exit signs shall be used for escape routes, hatches, etc., where normal exit is not permitted. Low-level signs shall be strategically positioned throughout the installation near the floor to show the main escape route.

Fire equipment signs include fire alarm, hose reel, portable fire equipment, etc. These signs shall be visible from the escape routes therefore directional signs to this equipment are generally not required.

Safety plans showing locations of safety and fire fighting equipment and escape routes, emergency exits, stairways, lifeboats, etc., shall inform personnel of their location with reference to one specific point, "YOU ARE HERE", and shall include a legend of symbols. Colours shall reflect the colours determined by the other sign categories. The graphics of each sign shall be "rotated" to give the correct geographical orientation relative to its installed location. Safety plans shall include evacuation instructions and legend for signals. Each sign shall only show the relevant level for its location. These plans are normally combined with orientation plans and they shall be strategically located at major circulation points at each level of the installation, e.g. adjacent to main stairways.

21.2.3 Signs related to working environment

Basic sign colours are as follows:

- Warning signs – Yellow background with black triangular graphic.
- Protection signs – White background with white graphic on blue circle.
- Prohibition signs – White background with black graphic and red circle with diagonal line.

This category of signs shall be used for protecting or warning personnel against any potential occupational hazards or health risks, e.g. exposure to hazardous substances, high noise levels etc. The required number, types and locations of these signs shall be established in close cooperation with the safety discipline and with reference to NORSOK S-002.

Warning signs convey the message of caution or danger. These signs include: high voltage, explosion, radioactivity, wet floor, and other potential hazards.

Protection signs convey the message of instruction for personnel to wear protective clothing or equipment. These signs include: hard-hat, ear, eye, and hand protection etc.

Prohibition signs convey the message of operations or movements that are unauthorised for reasons of security, safety or privacy. These signs include: no entry, no smoking, photography forbidden etc.

21.2.4 Signs related to general information and orientation

Basic sign colours are as follows:

- Information signs – Blue background with white graphic.
- Orientation plans – Multicoloured graphics.
- Room information signs – Multicoloured graphics.
- Cabin occupant signs – Special sign as specified by operator.
- Transport route limitation signs – Multicoloured graphics.

Information signs are used to convey information of a general nature. These signs include: special text signs for rooms/areas, standard symbol signs for toilets, lifts, telephones etc. All rooms and areas on the installation shall be identified with an information sign stating room or area number, room name or symbol, and for areas outside LQ, fire area number.

Orientation plans showing locations of major functions and common facilities shall be provided at strategic points throughout the installation. Separate orientation plans may be provided for the LQ and other modules as required by the operator. Each plan shall show all levels of the respective area/module, and shall include a cross section and a "YOU ARE HERE" identification point. The graphics of each sign shall be "rotated" to give the correct geographical orientation relative to its installed location. These plans are normally combined with safety plans.

Room information signs shall be placed in each cabin on the internal face of the cabin door. The sign shall have a simplified layout, showing the cabins location (marked) to emergency escape routes, fire alarms and fire fighting equipment. The sign shall also contain information about location of life jackets and survival suits, instructions in case of fire (with appropriate telephone number) and instructions for abandoning the installation.

A cabin occupants sign shall be located at the corridor side of the cabin door, stating room number, number and name of occupants, and the emergency station to which each individual belongs. The sign shall have slots for each cabin bed, which allow easy insertion and removal of paper name strips. The size shall be agreed with the operator/company. If required by the operator/company, the sign shall have three slots for each cabin bed, marked day, night and flexi respectively. A frame with removable indicator for weekdays shall be included if required by the operator/company.

Transport route and limitation signs shall be developed and strategically located as required. These signs shall include simplified plan graphics of transport routes and their respective limitations, e.g. maximum weight limit, etc.

Engraved equipment signs (traffolite or equal) shall include equipment tag title and equipment number. Where tagged equipment is installed behind partitions or above ceilings, the access location to the equipment shall be identified by the use of this sign type. The signs shall have black lettering engraved on a white background.

21.2.5 Identification (ID) signs and operator/owner logo requirements

Installation ID signs shall identify the installation at a long distance, from air or sea, at day and night. Good legibility is a primary requirement. At least one ID sign shall be visible from any direction.

The ID sign shall comprise individual panels fixed to a support system. The individual panels shall be easy to handle and install. The supply shall include lighting supports and a safe arrangement for maintenance access to the panels and lighting system. The sign panels shall be in aluminium or other suitable material. The complete ID sign structure shall be designed to withstand the project environmental design loads.

The ID sign shall display block number, name of field etc., as required by governing body regulations. Letters/figures shall be black and 1 m high on a yellow reflective background. The sign shall be illuminated for visibility in complete darkness.

The helideck ID sign shall be painted on the helideck.

The operator logo shall be applied as required by the operator/company. Configuration, dimensions, proportions, lettering, symbols, colours, etc. shall be in strict accordance with the logo's design guidelines and rules. For ship type vessels, the operator/owner logo may be included on the funnel.

Information content on ID signs, and the use of operator/owner logo, shall be in accordance with the operator/company.

21.2.6 Hull mounted ID signs, for ship type vessels

Hull mounted ID signs with name of field or vessel shall be arranged at both sides of the vessels bow, and at the vessels stern. Letters and symbols shall be 1 m high, black on a contrasting background. The stern sign may include the vessels home port.

Hull mounted ID signs which are painted shall have the text outlined in welding seam or plate, to simplify maintenance.

Ship type vessels shall also have ID signs comprising individual panels fixed to a support system (as described in 21.2.5) installed centrally at the port and starboard sides.

21.3 Types and usage of signs

Self-powered signs shall be located at strategic points (e.g. emergency exits) and areas with limited light, including outdoor areas. Self-powered signs shall only be used for exit and safety signs and fire equipment sign categories.

Luminous (fluorescent) signs shall only be used in areas not subjected to ultra-violet radiation. Luminous signs shall only be used for exit and safety signs and fire equipment sign categories.

Reflective signs shall be used in outdoor areas subjected to ultra-violet radiation. Sufficient light source for sign recognition shall be provided at each sign. Reflective signs shall only be used for exit and safety signs and fire equipment sign categories.

Non-luminous signs shall be used for indoor and outdoor areas. Non-luminous signs shall be used for warning, protection, prohibition and information sign categories.

Baked enamel signs shall be used only in areas with possibility of extreme temperatures. Where required, these signs shall be accompanied with a dedicated light source.

21.4 Materials

21.4.1 General

All material shall be durable and suitable for the intended use. Exposed signs shall be non-corrosive and resistant to sea water, oils, chemicals, weather and ultra-violet radiation.

21.4.2 Plastic materials

Plastic materials shall resist temperatures between +90 °C and -40 °C without visible damage or change in physical properties.

21.4.3 Luminous materials (fluorescent)

Luminous material shall be a fluorescent plastic foil which provides the best luminosity with minimum charging time and a guaranteed useful after glow of minimum 1 h.

Fluorescent marking paints shall be suitable for application on steel surfaces and include a transparent coating to protect paint from wear and tear.

Fluorescent foil shall have a useful life of minimum 10 years.

21.4.4 Reflective materials

Reflective film or foil for safety and information signs shall have a reflective characteristic equal to 3M type 580-10, and shall have a useful life of minimum 10 years.

The reflective surface for the installations' ID signs shall be equal to Scotchlite High Intensity Grade 2871 yellow.

21.4.5 Self-powered material

Self-powered material shall function independently of any external energy source and shall have a maintenance free useful life of minimum 15 years.

21.4.6 Metals

Carbon steel shall be hot dipped galvanised. Support structures and fixing brackets for safety and information signs shall have powder epoxy/polyester coating.

Stainless steel shall be of minimum grade AISI 316 with a maximum carbon content of 0,05 %.

Aluminium shall be anodised for indoor use and seawater resistant quality for outdoor use and in exposed locations.

21.5 Adhesives

Synthetic adhesive or tape should be used for safety and information signs and shall provide a strong bond to the background material. It shall not sag within 10 years. If used externally, silicone shall be applied around the entire perimeter of the sign in addition to the synthetic adhesive or tape, to ensure a weather-tight seal.

Adhesive for applying reflective surface and letters to the installations' ID signs shall be a heat-activated type.

21.6 Language and text

All text on exit, safety and fire equipment signs shall be in both Norwegian and English language. The text on all other signs shall be in the language specified by the operator/company.

The text type-face shall be "Scandia Medium" or "Helvetica Medium", evenly spaced and of optimum height for best possible legibility.

21.7 Size of signs

All signs shall have standardised dimensions, unless specified otherwise.

The standard size of signs shall be approximately 200 mm x 200 mm. Larger signs shall be used where viewing from a distance is of importance. Smaller formats may be used for cabin occupants signs, locker and equipment signs etc.

Orientation plans, safety plans and transport limitation signs shall be in sizes ranging from A1 to A0, or the maximum size required to achieve the intended function at the specific locations.

Engraved equipment signs (traffolite or equal) shall be 30 mm x 80 mm.

The size of ID signs and operator logo signs will vary from installation to installation and shall be as agreed with the operator.

21.8 Installation

Signs shall be installed as late as possible during the fabrication phase, or as otherwise agreed with the operator/company.

Temporary signage shall be provided during the fabrication phase to satisfy all safety and working environment requirements.

21.9 Company specified items

Operator/company specific requirements deviating from the requirements stated herein should be included as an addendum to this NORSOK standard in the contract documentation. Otherwise, they shall be established during the project by cooperation between the project and the operator/company.

As a minimum, the following items from this clause require specification by the operator/company:

- requirements for cabin occupants signs;
- requirements for operator logo;
- information content for ID signs;
- language for signs;
- size of ID signs and operator logo signs;
- time of installation of signs.

Annex A
(Normative)
Datasheets

CDS-201	Door schedule	Rev. 3, November 2004
CDS-202	Windows	Rev. 2, September 1997
CDS-203	Floor screed	Rev. 2, September 1997
CDS-205	Floor finishes	Rev. 2, September 1997
CDS-206	Sanitary fixtures & fittings types	Rev. 2, September 1997
CDS-207	Kitchen & laundry equipment	Rev. 2, September 1997
CDS-208	Equipment, furniture & accessories	Rev. 2, September 1997

NORSOK C-002		DOOR SCHEDULE DATA SHEET				CDS-201 Rev. 3, Nov. 2004 Page 1 of 1	
P. O. No.		Area : Package no.					
Door number (untagged doors)							
Tag number							
Location							
Room number							
DOOR TYPE CODE (ref Norsok C-002)							
L1-L2-M1-H1-H2-H3-H4-H5-W1-W2							
Clear opening, WxH, mm							
Installation opening, W1xH1, mm							
Bulkhead cut out opening, W2xH2, mm							
Height to cut out from top struct. deck, mm							
Fire rating							
Door operation (H=Hinged; S=Sliding; L=Left; R=Right; D=Double)							
Leaf/Frame material (A=Aluminium; SS=Stainless Steel; CS=Carbon Steel)							
Frame fixing (B=Bolted; W=Welded)							
Bolt type							
Pre-drilled frame							
Interface Bulkhead material (A=Aluminium; SS=Stainless Steel; CS=Carbon Steel)							
Finish - Door leaf							
Finish - Door over panel/Track casing							
Finish - Door frame							
Vision panel							
Threshold type (F=Fixed; R=Removable)							
Threshold height max - wall side mm							
Threshold height max - hinge/track side mm							
"Ramp" height mm							
Air pressure differential Pa							
Auto. operation; (E=Electric; P=Pneumatic)							
Remote push button activator							
Push turn activator							
Pull cord activator/sensor							
Blast overpressure rating in Barg							
Noise rating Rw dB(A) minimum							
Max. opening pressure - normal use, N							
Max. opening pressure - accidental situation, N							
Weight of door leaf, Kg							
Weight of total door assembly, Kg							
Automatic closer type							
Magnetic hold open device, signal to S.A.S.							
Manual hold open device							
Crash / Panic bar							
Thumbturn							
Occupied / Vacant indicator							
Break glass box							
Kick plate / Trolley protection plate							
Ventilator in threshold / door top							
Lockable in Construction / Operational phase							
Key side (H=Hinged side; P=Push side; T=Track side; O=Opposite track side)							
NOTES:							

[illegible]

NORSOK C-002	FLOOR SCREED DATA SHEET			CDS-203
	PROJECT:			Rev. 2, Oct. 1997
				Page 1 of 1
P. O. No.	Doc. no.			Rev.
Package no.				
Supplier : Manufacturer : Material type : Product name :				
	ISO/project	Lab. data	Actual	
	norm	value*	value	Comments
Density cured state, main comp.		kg/m ²		
Density cured full sytem incl.				
Primers/topcoats, at 25 mm Thc.		kg/m ²		
Module of elasticity		N/mm ²		
Ultimate elongation		%		
Compressive strength		MPa		
Bonding to substrate		MPa		
Curing temperature range		°C		
Curing time for other work, 5°C				
Curing time for other work, 15°C				
Curing time for other work, 25°C				
Stepsound reduction				
Structure noise reduction				
Health data sheet supplied				
Repair procedure supplied				
Fire test certificate (s)				
Ignition property test (s)				
U Value **				
Scratchcoat type: **				
Limitation to deck coating system **				
Minimum application thickness in mm.				
Application quantity** m2/m3			/	
Notes: * To be specified by supplier. 1PA= 1N/m2. **To be specified where applicable only.				

NORSOK C-002		FLOOR FINISHES DATA SHEET		CDS-205 Rev. 2, Oct. 1997 Page 1 of 1	
P. O. No.		Doc. No.		Rev.	
Package no.		Area:			
Supplier : Manufacturer : Product name : Finish type : Finish/colour code : Skirting type/fixing :					
Construction thickness, incl. backing : mm Format mm Construction weight, incl. backing : kg/m ² Application quantity of flooring* : m ² Application quantity of skirting* : m					
		ISO/project	Lab.data		
		norm	value	Comments	
Fire test certificate (s)					
Ignition test certificate (s)					
Health data sheet supplied					
Repair procedure supplied					
Stepsound reduction					
Structure noise reduction					
Electrical resistance			OHM		
static shock build-up			kV		
Cleaning principle recommendation :					
Cleaning procedure supplied :					
Initial impregnation type :					
Initial polishing type :					
Represervation recommended type :					
Tiles/stone					
Format & thickness, mm. Surface finish :					
Jointing material & recommended spacing :					
Expansion joint material :					
Carpet					
G.U.T. test provided					
<input type="checkbox"/> Tufted,		<input type="checkbox"/> Woven,		<input type="checkbox"/> Cut,	
<input type="checkbox"/> Looped		Fibre type :			
Fixing type :		Backing underlay type :			
Pile weight : kg/m ²		Pile height above backing :		mm	
Installation procedures supplied :					
Installation adhesives supplied :					
Notes:					
* Where applicable only.					

NORSOK C-002		SANITARY FIXTURES & FITTINGS TYPES DATA SHEET		CDS-206 Rev. 2, Oct. 1997 Page 1 of 1	
P. O. No.		Doc. No.			Rev.
Package no.		Area:			
Component		Brand name/ type	Code no.	Finish type/ code	
Shower mixing tap					
Shower rod/ hose assembly					
Shower soap dispenser/ dish					
Handwashbasin mixing tap (manual)					
Handwashbasin plug assembly					
Handwashbasin type a					
Handwashbasin type b					
Handwashbasin type c					
Handwashbasin soap dispenser/ dish					
Toilet, wall hung					
Toilet cistern					
Toilet seat					
Toilet brush					
Toilet paper holder					
Toilet paper holder (spare)					
Clothes hook					
Towel hook					
Sanitary napkin hook					
Toothbrush glass holder					
Paper towel dispenser					
Slop sink mixing tap					
Slop sink plug assembly/ strainer					
Slop sink type a					
Slop sink type b					
Washbasin mixer, sensor activated					
El. handdrier, sensor activated					
El. handdrier, pushbutton activated					
Notes:					

NORSOK C-002	KITCHEN & LAUNDRY EQUIPMENT	CDS-207
	PROJECT:	Rev. 2, Oct. 1997
	Page 1 of 1	

P. O. No.	Doc. No.	Rev.
Package no.	Area:	

Tag no. XX-XX-
Item no.

Location/room no:
Description:

Supplier :
Manufacturer :
Manufacturers model/brand name :

Quantity:

	Project requirement	Manufacturers data *	Comments
Transport/operative weight, in kg		/	
Transport/operative size, WxDxH, mm		/	
Working height above FFL, mm			
Top of unit above FFL, mm			
Fixing details: Doubler plates, plinth height, wall reinforcements			
Material/finish			
Capacity/temperature range			
ELECTRICAL			
El.conn to box/socket			
Volts/Hz	/	/	
Phase/Watt	/	/	
Special earthing reqts.			
IP rating			
PIPING			
Cold water Ø conn/max litres/minute		/	
Hot water Ø conn/max litres/minute		/	
Very hot water Ø conn/max litres/minute		/	
Max discharge, litres/minute, min Øconn.		/	
Max. noise, dBA, freefield cond.			
Actual noise, dBA, installed			
Direct ventilation extract reqd.		m ³ /h	
Indirect ventilation extract reqd.		m ³ /h	
Specialist installation required			
Special preservation required after function testing			

Notes: * To be filled in by supplier

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