

SPECIFICATION PREFACE SHEET

DEPARTMENT:Engineering/Building Services

SHEET 1 OF 21

AREA: Grundartangi Reduction Plant

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REV: C1

STANDARD TECHNICAL
SPECIFICATION
FOR
BUILDING FITOUT AND FINISHES

This Standard Technical Specification is subject to change without prior notice. The most current issue will at all times be located on the Nordural web site, www.nordural.is.

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1 GENERAL REQUIREMENTS

1.1 GENERAL

Building Fitout and Finishes shall be executed in accordance with the requirements of this specification and particular specifications issued for individual rooms and areas, and as indicated on the Drawings. The Contractor shall make himself familiar with the working conditions in the buildings and verify all measurements before commencement of the work.

The work includes but is not limited to the following types of work:

- Doors and windows, exterior and interior
- Interior gypsum board walls and concrete wall insulation
- Access floors
- Surface finishes
- Suspended ceilings
- Painting
- Sanitary systems

In this Document the following words and expressions have the meaning hereby assigned to them except where the context otherwise requires:

Engineer: The Owner or any person or organisation employed or engaged at any time by the Owner and authorised by the Owner, in writing, from time to time to act on behalf of the Owner in the execution of the items covered by this Document, in whole or in any part, for any or all purposes provided in this Technical Specification.

Owner: Norðurál hf (Nordic Aluminum Corporation Ltd.), an independent legal entity owned by Century Aluminum.

1.2 REGULATIONS

The requirements of building regulations and fire protection regulations shall be adhered to as well as other regulations that may be relevant to the work. Inspection and approval by the respective authorities shall take place before acceptance of the work.

1.3 PRODUCTS AND WORK

All products and materials shall be of recognized brands and shall be subject to the approval by the Engineer and skilled trades workers shall perform all trades work.

Before the following products are selected the Contractor shall submit with a sufficient time-allowance necessary information such as catalog data and quality assurance reports:

Glass
Doors
Windows
Doors hardware
Insulation
Gypsum board
Paints and paint systems
Suspended ceilings
Access floors
Piping materials, fittings and equipment
Fixtures and equipment for the sanitary systems

Where products from a particular manufacturer are mentioned in this specification, this is for information and reference purposes only. The Contractor shall feel absolutely free to offer other products that fulfill the requirements specified, and as approved by the Engineer.

1.4 PROTECTION AND CLEANING

Prior to commencement of building fitout work, mask or protect equipment and apparatus already installed by nonstaining craft building paper or polyethylene film of an approved quality and thickness. When parts of the work have been finished, they shall be securely kept clean and protected as above described. Keep covering in sound condition and replace damaged portions. Remove all protective covering when directed by the Engineer.

2 DOORS AND WINDOWS

2.1 EXTERIOR DOORS

Design of all doors, windows, frames, etc. shall be in accordance with pertinent design codes and the following conditions. All exterior doors shall be designed to resist, in closed position, a characteristic value of windload, $w_{sk} = 2.5 \text{ kN/m}^2$ (design value of windload $w_{sd} = 3.8 \text{ kN/m}^2$). Windload can act in both directions, in and out. Maximum allowed door panel deflection is $L/200$.

2.1.1 Galvanized Steel Doors

All door steel material shall be galvanized.
Single-leaf personnel doors and two-leaf access doors shall be as indicated on the Drawings. Size door leafs to maximum utilization of the wall opening. Secure doors frames to the concrete or steel members as recommended by the doors manufacturer. Seal around doors frames with an approved sealant after installation.

Doors shall have at least three hinges per door panel. Hinges shall be of approved quality, and fit the weight and windload on each door panel. Panels shall be sound-dampened with rock-wool mats. Personnel steel doors with leaf size max. BxH = 1200x2200 mm, shall include a door closer of the type Dorma TS 83, Geze TS4000, or an approved equal. Personnel steel doors with larger leaf size shall have hinges of heavy duty type, and shall be equipped with a door closer that can withstand a windload of $w_{sk} = 1.6 \text{ kN/m}^2$ ($w_{sd} = 2.4 \text{ kN/m}^2$) under operation. Doors shall include locks of ASSA standard type as indicated, fit for a Master system as directed by the Engineer. Handles shall be stainless steel. Inactive leaf of two-leaf access doors shall be with cane bolts at top and bottom. Active leaf of two-leaf access doors shall include hardware as indicated.

Paint steel doors and frames as indicated in accordance with the requirements specified.

2.1.2 Two-leaf Aluminum Sliding Doors

Two-leaf sliding doors shall be as indicated on the Drawings. Doors and frame shall be white aluminum and fabricated to be installed in-side concrete exterior wall openings. Secure doors frame to the concrete as recommended by the door manufacturer. Seal around door frame with an approved sealant after installation. Automatic sliding door operator shall be type DORMA ES 70, GEZE TSA 350, or an approved equal. Glaze with double glazed thermo-panes with sun-stop, using moldings and beads as standard by the doors manufacturer. Maximum allowed door panel deflection is $L/300$.

2.1.3 Sectional Overhead Doors

Sectional overhead doors shall be hot-dip galvanized steel doors including tracks. Doors sections shall be galvanized and shop primed. After installation of doors, paint as specified.

Doors shall be designed for the following load conditions:

- a) Load condition according to paragraph 2.1 above.
- b) Doors partly open: Characteristic value of windload, $w_{sk} = 2.5 \text{ kN/m}^2$ (design value of windload $w_{sd} = 3.8 \text{ kN/m}^2$). Additional wind load at bottom of door, $q_{sk} = 1.2 \text{ kN/m}$ ($q_{sd} = 1.8 \text{ kN/m}$).
- c) Doors in operation. Doors not specifically marked on drawings shall resist load conditions in b) above under full operation. Doors specifically marked on drawings shall resist the following wind load: Characteristic value of windload, $w_{sk} = 1.6 \text{ kN/m}^2$ (design value of windload $w_{sd} = 2.4 \text{ kN/m}^2$). Additional wind load at bottom of door, $q_{sk} = 0.8 \text{ kN/m}$ ($q_{sd} = 1.2 \text{ kN/m}$).

At all load conditions wind load is assumed to act perpendicular to the door surface, in both directions, in and out. Doors shall remain operable and undamaged after conclusion of tests using the above design wind load. Maximum allowed door panel deflection is L/200.

Hardware shall be as indicated on the Drawings

Sections shall be insulated, with not less than 40 mm thick insulation. Joints between sections shall be weatherproof. Adjustable weather-strip shall be at top and jambs; and a compressible rubber, or vinyl weather seal attached to the bottom of the door.

Counterbalance doors with a torsion spring mounted on a steel shaft. Spring tension shall be adjustable. Connect spring to door with steel cables through cable drums. The doors shall be manually operable using not more than a 0.15 kN force. The door motor shall have enough force to operate the door at design wind load, see above.

Vertical tracks shall be with continuous steel angles for installation to walls. Adjust vertical track with adjustable brackets to obtain weathertight closure at jambs. Support horizontal tracks from ceiling with galvanized steel angles and cross brace to provide a rigid installation.

Install doors in accordance with approved shop drawings and the manufacturer's instructions. Upon completion, doors shall be weathertight and free from distortion. Lubricate and adjust doors to operate freely.

After installation, operate doors to demonstrate proper installation and function in presence of the Engineer. Correct deficiencies.

2.2 INTERIOR DOORS

Interior doors shall be galvanized steel doors, white aluminum doors, and wooden doors as indicated. Fire rated doors shall be as indicated in Schedule of Interior Finishes. Fire-rated doors and their installation shall be approved by Iceland Fire Authority.

2.2.1 Galvanized Steel Doors EI-CS60 (Ei-CS120)

All door steel material shall be galvanized.

Single-leaf personnel doors shall be sized to maximum utilization of the wall opening but always at least 2100 mm in height. Door frames shall be fastened as recommended by the door manufacturer. Seal around doors frames with an approved sealant after installation.

Doors shall have at least three hinges per door panel. Hinges shall be of approved quality, and fit the weight of each door panel. Door panels shall be sound dampened with rock-wool mats. Personnel steel doors shall include a door closer, a pump to fit the size and weight of the door, of the type Dorma

TS 83, Geze TS4000, or an approved equal, and locks of ASSA standard type as indicated, fit for a Master system as directed by the Engineer. Provide stainless steel handles

Paint steel doors and frames in accordance with the requirements specified.

2.2.2 Aluminum doors EI-CS30

Single-leaf personnel doors shall include a door-sweep, frames and trim. Size door leafs to maximum utilization of the wall opening but always at least 2100 mm in height. Door frames shall be fastened as recommended by the door manufacturer. Seal around doors frames with an approved sealant after installation.

Doors shall have at least three hinges per door panel. . Door panels of aluminum frames shall be clad with plain aluminum sheets and shall have sound dampening mats. Personnel aluminum doors shall include a door closer, a pump to fit the weight of the door, of the type of the type Dorma TS 83, Geze TS4000, or an approved equal, and locks of ASSA standard type, fit for a Master system as directed by the Engineer. Handles shall be stainless steel.

2.2.3 Aluminum doors

Single-leaf personnel aluminum doors shall include a door-sweep, frames and trim. Size door leafs to maximum utilization of the wall opening but always at least 2100 mm in height. Door frames shall be fastened as recommended by the door manufacturer. Seal around doors frames with an approved sealant after installation.

Doors shall have at least three hinges per door panel. Door panels of aluminum frames shall be clad with plain aluminum sheets and shall have sound dampening mats. Personnel aluminum doors shall include locks of ASSA standard type, fit for a Master system as directed by the Engineer. Handles shall be stainless steel.

2.2.4 Wooden doors EI-CS30

Single-leaf personnel wooden doors shall include a door-sweep, frames and trim. Size door leafs to maximum utilization of the wall opening but always at least 2100 mm in height. Door frames shall be fastened as recommended by the door manufacturer. Seal around doors frames with an approved sealant after installation.

Door panels shall be solid-core with hardwood lining on all edges. Panels surface shall be High Pressure Laminates, type FORMICA, DUROPAL, or an approved equal. Personnel wooden doors shall include a door closer, a pump to fit the size and weight of the door of the type of the type Dorma TS 83, Geze TS4000, or an approved equal, and locks of ASSA standard type, fit for

a Master system as directed by the Engineer. Handles shall be stainless steel.

2.2.5 Wooden doors

Single-leaf personnel wooden doors shall include a door-sweep, frames and trim. Size door leafs to maximum utilization of the wall opening but always at least 2100 mm in height. Door frames shall be fastened as recommended by the door manufacturer. Seal around doors frames with an approved sealant after installation.

Door panels shall be solid-core with hardwood lining on all edges. Panels surface shall be High Pressure Laminates, type FORMICA, DUROPAL, or an approved equal. Personnel wooden doors shall include locks of ASSA standard type, fit for a Master system as directed by the Engineer. Handles shall be stainless steel.

2.3 WINDOWS

Windows and windows frames shall be white aluminum, standard fabrication. Fasten window frames as recommended by the window manufacturer. Attach certificates for windows showing no leakage when tested for pulsating driving rain under 1100 P pressure for 10 minutes according to Nordtest Build Method NT build 116 or an approved equal specification. Seal around window frames with an approved sealant after installation.

Openable windows and emergency exit openings with hardware shall be as indicated on the Drawings.

Glaze with double glazed thermo-panes with sun-stop, using moldings and beads as standard by the windows manufacturer.

2.4 ELECTRICAL OPERATION

All electrical equipment i.e. door motor, junction box and control box and etc shall be with protection at least IP54. Junction box shall include push button switches i.e. up – down - stop. The door shall be equipped with mechanical / electrical emergency stop that will stop movements of the door if there will be some kind of enforcement. Cabling work shall be made for environments that suit conditions.

Otherwise the installation shall be in accordance with Norðurál Technical Specifications 00/06/TS021, 00/06/TS022 and 00/06/TS023.

3 INTERIOR GYPSUM BOARD WALLS

Non-load bearing gypsum board walls shall be as indicated on the Drawings.

Tape and plaster joints of gypsum panels as recommended by the panel's manufacturer. Sand joints to form a smooth surface for painting.

3.1 STANDARD WALLS A - EI60

Construct walls of a metal support system of 95 mm steel profiles unless otherwise indicated. Space studs at 400 mm. Secure top and bottom runners to concrete, where applicable, with 10/50 mm anchor bolts at 600 mm spacing. Fill void between studs, entire wall thickness with rock-wool.

Apply 13 mm gypsum wall-boards to both sides of walls. Fasten gypsum wall-board panels to the metal support system with stainless steel screws as recommended by the panels manufacturer. One horizontal joint in the wall height is acceptable. A metal profile shall be installed at horizontal joints as a fixed base. Use the panel manufacturer's standard details for door openings and for walls intersections.

3.2 STANDARD WALLS B - EI60

Construct a standard wall as described above and fill the void between studs, entire wall thickness with rock-wool. Then apply 9 mm plywood sheets to both sides of metal studs and then 13 mm gypsum wall-boards to both sides of walls. Fasten gypsum wall-board panels to the metal support system with stainless steel screws as recommended by the panels manufacturer. One horizontal joint in the wall height is acceptable. A metal profile shall be installed at horizontal joints as a fixed base. Use the panel manufacturer's standard details for door openings and for wall intersections.

3.3 WALLS A – EI90

Construct a standard wall as described above except that the metal support system of shall be of 120 mm steel profiles and add a second layer of fiber reinforced 13 mm gypsum panels on one wall side as indicated. Overlap joints in double wall sheeting by minimum of 400 mm.

3.4 CONCRETE WALL INSULATION

Construct a metal support system of 95 mm steel profiles. Space studs at 400 mm. Secure top and bottom runners to concrete, where applicable, with 10/50 mm anchor bolts at 600 mm spacing. Fill void between studs, entire wall thickness with rock-wool. Cover the entire wall with a vapor barrier of 0.2 mm long lasting durable plastic sheet of suitable type and fit for the purpose. Tape joints and all edges of the vapor barrier with long lasting durable tape.

Adjacent surfaces to receive tape shall be dust-free and primed with a suitable primer.

Apply 13 mm gypsum wall-boards. Fasten gypsum wall-board panels to the metal support system with stainless steel screws as recommended by the panels manufacturer. One horizontal joint in the wall height is acceptable. A metal profile shall be installed at horizontal joints as a fixed base. Use the panel manufacturer's standard details for wall openings.

4 ACCESS FLOORS

Access floors shall be a heavy duty standard fabrication flooring system, UNISTRUT or an approved equal. Flooring systems shall allow universal access to the space beneath the flooring. Complete technical information, as standard by the flooring system manufacturer, shall be attached to the Bid.

Location, layout and level of floors shall be as shown on the Drawings. Installation tolerances shall not exceed:

Plant coordinates X, Y: ± 5 mm

Elevation : ± 2 mm

Install access floors on self-supporting steel frames, and in strict accordance with the flooring manufacturer's written instructions.

Design loads for flooring systems shall be:

Vertical uniform load: 5.0 kN/m²

Vertical point load: 2.0 kN

Design and calculations shall be in accordance with approved standards.

Maximum allowable deformations of flooring structural members are L/400.

5 SURFACE FINISHES

5.1 PREPARATION OF CONCRETE SURFACES

Surfaces that are to receive a finish shall be clean, dry, smooth, sound and free of oil, paint, dirt, or other damaging materials. Rinse floors surfaces with a hydrochloric acid dilution and flush thoroughly with clean water. Grind ridges and other uneven surfaces smooth. Provide a 40x40 mm cant strip of cement based grout along all walls and floors intersections.

Underlayment shall be compatible with the finish to be applied, to fill remaining holes, cracks, and depressions and for smoothing, and feather-edging the surfaces to receive a finish. Adhere to the finish material manufacturer's requirements regarding all conditions for application.

5.2 FLOORS PAINTING

Paint floors with Paint D in accordance with the paint manufacturer's applicable specifications. Provide a standard fabrication of paint systems from Harpa Sjöfn, Málning or an approved equal.

Paint floor, cant strip and a 150 mm high skirting on-to the walls above the cant strip.

5.3 RESIN/POLYMER BASED QUARTZ FLOOR FINISH

Quartz floor finish shall be as indicated on the Drawings. The finish shall be of a minimum 5 mm thick layer on top of underlayment and round corners along wall or other permanent structures. A 120 mm high skirting shall be installed on-to walls and structures unless otherwise indicated. Aggregate colours shall be as directed by the Architect.

5.4 SHEET VINYL FLOORING

Sheet vinyl flooring shall be as indicated on the Drawings. Pattern and colors as approved by the Engineer. Flooring material shall be minimum 2.0 mm thick of homogeneous polyvinyl chloride from DLW Royal or an approved equal. Prime surfaces as recommended by the sheet vinyl manufacturer. Adhesives shall be as recommended by the sheet vinyl manufacturer to suit materials, substrate conditions and temperature.

The sheet vinyl flooring shall form a 120 mm high wall base above the cant strip.

All seams shall be welded. Cut and weld seams as recommended by sheet vinyl manufacturer.

5.5 RESIN/POLYMER BASED QUARTZ WALL FINISH

Quartz wall finish shall be as indicated on the Drawings. Finish shall be of a minimum 3 mm thick layer on top of underlayment and round corners along wall. Aggregate colours shall be as directed by the Architect.

6 SUSPENDED CEILINGS

Suspended ceilings shall be a gypsum lay-in panels system of perforated acoustical panels and plain panels, size 600x600 mm. Use recessed metal support system including wall moldings as recommended by the ceiling panels manufacturer. Metal support system parts exposed to view shall be white lacquered. Acoustical panels shall be applied un-cut. Use plain panels where cutting of panels is necessary.

Fill scratches, voids and other defects and sand to prepare the surface for painting. Remove damaged or improperly installed ceiling panels and install new materials.

7 PAINTING

7.1 GENERAL REQUIREMENTS

Materials shall be delivered in sealed, labeled containers bearing the manufacturer's name, brand designation, specification number, batch number, color, and date of manufacture. Restrict storage and mixing of materials to locations designated by the Engineer.

Painting includes interior buildings surfaces excluding floors (Ref. Floors Painting above). Where a space surface is indicated to be painted, include exposed columns, structural beams, and other contiguous surfaces.

Conform to the specifications and standards referenced in the paint manufacturer's standard technical specifications.

Prepare surfaces to be painted. Remove dirt, splinters, loose particles, grease, oil, and other substances deleterious to coating performance as specified for each substrate.

7.2 PRODUCTS AND APPLICATION

Paint systems shall be from Harpa Sjöfn, Málning, or an approved equal. Adhere strictly to the paint manufacturer's specifications regarding personnel safety, environmental conditions and application methods requirements. Colours shall be as indicated on the Drawings.

7.3 PAINT SYSTEMS

7.3.1 GYPSUM WALLS AND CEILINGS

PAINT A1 (Gypsum surfaces)

Base coat: One coat acrylic texture filler

Top coats walls: Two coats of alkyd based topcoats with 20% gloss.

Top coats ceilings: Two coats of alkyd based topcoats with 5% gloss.

PAINT A2 (Hygiene rooms)

Base coat: One coat acrylic texture filler

Top coats walls: Two coats of alkyd based topcoats with 40% gloss.

Top coats ceilings: Two coats of alkyd based topcoats with 20% gloss.

7.3.2 CONCRETE WALL AND CEILING SURFACES

PAINT B1 (Concrete surfaces)

Primer: Acrylic based primer

Base coat: One coat acrylic texture filler

Top coats walls: Two coats of alkyd based topcoats with 20% gloss.

Top coats ceilings: Two coats of alkyd based topcoats with 5% gloss.

PAINT B2 (Dust free surfaces)

Primer: Acrylic based primer

Top coat all surfaces: One coat of interior-type paint with 5% gloss.

PAINT B3 (Hygiene rooms)

Primer: Acrylic based primer

Base coat: One coat acrylic texture filler

Top coats walls: Two coats of alkyd based topcoats with 40% gloss.

Top coats ceilings: Two coats of alkyd based topcoats with 20% gloss.

7.3.3 CONCRETE FLOORS

PAINT D

Paint shall be Epoxy paint system with hardening flakes on the surface.
Colour as indicated on drawings.

8 SANITARY SYSTEMS

8.1 GENERAL REQUIREMENTS

8.1.1 Scope of Work

The work includes piping, inside exterior walls and foundation face of a building, building drains, and water intake piping under slab on grade. Connection of these piping systems to the stormwater, sewer and water

piping systems is covered by Earth Works. Furthermore the work includes plumbing fixtures and water heating equipment in buildings.

8.1.2 Insulation and Finishes

Interior piping systems shall be insulated with prefabricated mineral or glass fibre collars of minimum thickness as indicated:

10 mm - 20 mm diameter pipes:	20 mm insulation thickness
25 mm - 40 mm diameter pipes:	30 mm insulation thickness
50 mm - 100 mm diameter pipes:	40 mm insulation thickness
Interior roof drain stacks:	50 mm insulation thickness

All piping joints shall be carefully insulated after pressure testing.

Interior plastic vent piping systems above ground shall be insulated with 25 mm mineral blanket insulation.

All piping systems insulation shall be with a vapor barrier in accordance with the insulation manufacturer's recommendations.

8.1.3 Penetrations

All pipes penetrating walls, beams, floors and ceilings shall be with sleeves intended for the penetration of the respective type of construction. Secure proper position and location of sleeves during construction. Sleeves shall be of sufficient length to pass through the entire thickness of the construction. Sleeves material shall be sheet metal or other fire resistant material. At least 7 mm space shall be provided between the exterior of pipe and interior of sleeve. Firmly pack space with mineral wool and calc at both ends of the sleeve with plastic waterproof cement which will dry to a firm pliable mass.

Instead of sheet metal sleeves, penetrations may be performed by core drilling as approved.

Where pipes penetrate fire rated partitions, walls, floors and ceilings, penetrations shall be in accordance with the requirements of the ICELAND FIRE AUTHORITY.

8.1.4 Materials and Workmanship

The Contractor shall furnish and install all materials necessary for the completion of the work, including finishes work that may be performed by other trades than plumbers. All work shall be of high quality and performed by skilled workers under the supervision of a trades master who shall in detail be familiar with all drawings and the design of the sanitary system.

All materials shall be of recognized brands and subject to approval by the Engineer.

8.1.5 Regulations and Inspection

All rules and regulations in force regarding potable water systems, and other sanitary systems shall be strictly adhered to.

Inspection by the respective authorities shall have taken place before the work is finished but does not replace the inspection of the Engineer.

8.2 DRAIN AND WASTE PIPING

The drain, waste and vent piping shall be completed in accordance with the Drawings and this specification.

Place all pipes in straight lines and with an even slope. All changes in directions shall be performed with fittings. Bells of building drain piping shall be closed ed with special covers of PVC after the piping has been inspected, cleaned and proved to be in complete order.

Inside buildings, place bell tops of piping flush with the surface of concrete floors, and never above finished floor.

Do not rinse tools or equipment into the piping system, and the Contractor is responsible for the cleanliness of the piping system as he completes the work.

Do not cover building drains and water intake piping until the Engineer has accepted the work and it has been inspected by the respective authorities.

8.2.1 Building Drains

Building drains material shall be hard PVC in accordance with DIN 16929. Pipes and fittings shall be in accordance with DIN 19534. Building drains PVC piping may comply to other standards as approved by the Engineer. Join pipes with rubber rings specially intended for the respective joint type. All building drains materials shall be of the same type and quality.

Finish and fill around pipes in accordance with the Icelandic Standard IST 65:1975, Plastic earthcovered sanitation piping.

8.2.2 Building Storm Drains

Pipes under buildings shall be of concrete and be manufactured in accordance with DS 400-3-1:2002 and the sizes shall be as indicated on the Drawings. Pipes shall be laid on compacted backfill.

Care shall be taken to lay the pipes as shown on the Drawings and the pipe line shall be straight and in level and grade. For jointing of pipes clamps specially made for that purpose shall be used. The pipe joints shall be made tight by use of rubber gaskets. Special care shall be taken to ensure that the clearance between pipe lines that cross is at least 100 mm. All connections to pipes shall be made by branch pipes. The pipelines shall incline 20 - 300 o/oo towards the drains system.

When placing the pipes the bells shall be dug free ensuring that the pipes lay on the drum. Pipelines may not be covered before the Engineer has had the opportunity to verify correct location and finish.

All pipe ends for later use shall be securely closed with material and technique approved by the Engineer. .

After completion of the work the Contractor and the Engineer shall jointly verify that pipelines have not been damaged and that they are straight and clean.

8.2.3 Interior Drain and Waste Piping

Piping materials shall be as indicated on the Drawings. All interior drain and vent piping materials shall be of the same type and quality. Install piping tensionless and support in accordance with the piping manufacturer's instructions, especially taking into account the heat expansion of the piping.

Slope drain and waste piping minimum 20‰.

Install sockets for connection of plumbing fixtures so as to fit the fixture intended to be connected. Calc around piping sockets protruding from a wall board with an approved sealant.

8.3 DOMESTIC WATER PIPING

The domestic water piping shall be completed in accordance with the Drawings and this specification.

8.3.1 Branch Supply

Branch supply to the first shut-off valve situated inside the building above the ground floor shall be PEH as shown on the Drawings, designed for 6 kp/cm² working pressure. Fittings shall be brass, BEULCO 66 according to DIN 8076 or similar. Sand bedding shall be on all sides, 150 mm thick measured from exterior of pipe. Do not backfill on top of sand bedding with coarse gravel or gravel containing stones with sharp edges.

8.3.2 Interior Piping and Finishes

Piping shall be hard-drawn copper conforming to DIN 1786. Fittings shall be of a recognized brand compatible with the piping systems.

All pipes shall be clean and with neatly cut ends to minimize flow resistance. Support all pipes at maximum 2 m spacing to secure a straight alignment of piping.

Fasteners and piping installation procedure is subject to approval by the Engineer.

Install all piping with a slope to facilitate emptying of the piping system.

Install domestic water piping sockets for connection of plumbing fixtures so as to fit the fixture intended to be connected. Calc around piping sockets protruding from a wall board with an approved sealant.

Insulate as specified and insulate all piping joints carefully after pressure testing.

Cold domestic water piping shall have a plastic vapor barrier over the insulation and joints carefully sealed with a sealing tape. Cover vapor barrier with a protective winding layer of sisal paper.

Hot domestic water piping shall have a plastic protection over the insulation.

Piping running in an exterior wall shall have minimum 20 mm of insulation between the cold wall part and the piping insulation.

Piping within a mechanical room or compartment shall have a PVC jacket. Fittings shall have preformed jackets.

Visible and accessible piping shall have colour tape or arrows showing the flow direction at maximum 1 m spacing. Colours shall be in accordance with IST 64.

8.3.3 Valves

Domestic water piping valves shall be ball valves or gate valves and backflow preventers. All valves shall be of an approved brand. Valves shall be for minimum 85°C and 1 Mpa (10 kp/ cm²) working pressure and VA approved in Denmark or by similar approval. Valves are subject to approval by the Engineer.

8.3.4 Pressure Testing

Before applying insulation, hydrostatically test each piping system at not less than 1 Mpa (10 kp/ cm²) pressure with no leakage or reduction in gauge for 24 hours.

Inform the Engineer with 24 hours notice when pressure testing shall take place.

8.4 PLUMBING FIXTURES

All plumbing fixtures for the sanitary system including fittings and connections shall be finished and ready for use.

All china shall be (1. Class) Vitrous China.

All visible plumbing fixtures faucets, trim, valves and fittings shall be chromium-plated.

All plumbing fixtures other than wall connected faucets shall be connected to the domestic water piping system by globe valves to each supply and to the drain and waste system by a self tightening rubber gasket.

Steel sinks shall be with plastic traps and threaded flexible connections and rubber gaskets. Wash basins shall have pop-up drains and push-pull knobs combined with center set faucets except otherwise indicated.

Faucets shall be for one hand operation. Handles shall not require tight grasping or twisting of the wrist.

Where plumbing fixtures of certain brands are indicated, it shall be for guidance for selection of type and quality. The bidder may offer other brands that fulfill the requirements of this specification.

8.4.1 Flush Tank Water Closets

Water Closets type A

Flush tank water closets shall be IFÖ Cera 3893 or an approved equal. The seat shall be of white solid plastic with a cover. The water closet and the watertank shall be fixed to a wall with steel supports supplied with the water closets. The steel supports shall be made for proper wall mounting of the water closets. The steel structure shall be fitted into the wall and fixed before construction of the wall is completed.

Water Closets type B

Type B flush tank water closets shall be of Samit 995 steel structure type with a watertank for wall mounted units and white china bowl from IFÖ 3875, or an approved equal. The seat shall be of white solid plastic with a cover. This type of WC is for situations where it is impossible to fit drainage pipes into a wall. Inclusive for this type of Water Closet shall be all cladding of 18 mm MDF around the steel structure and watertank

8.4.2 Flush Valve Urinals

Flush valves and other exposed to view metal fittings and trim shall be of chromium-plated copper alloy. Urinals shall be of white china, wall-mounted, wall outlet, siphon jet, integral trap type. Mount urinals with the rim approximately 450 mm above the finished floor.

8.4.3 Wash Basins

Wall hung basins including steel support framing, and counter-top basins shall be for center-set faucets. Faucets shall be of the type Grohe 21154, Moratemp EURO MA no. 701717.00 or approved equal. Basins shall be approximately 400x500 mm size, type Ifö Aqua or approved equal, with 32 mm diameter bottle type traps as approved

8.4.4 Countertop Coffee Room Sinks

One compartment stainless steel sinks shall be with integrated lateral apron, total size approximately 500x700 mm, type Juvel O 340 or an approved equal. Faucets shall be of the type Grohe 31768, Moratemp MA no. 701751.00 or an approved equal. Traps shall be 40 mm diameter plastic traps shall be with threaded flexible connections with rubber gaskets.

8.4.5 Wall Hung Service Sinks

One compartment stainless steel sinks shall be furnished with a wall mounting bracket. Approximate dimensions 450x 600 mm, 250 mm deep, with a chain hung stainless steel plug and a bucket support. Faucets shall be type Grohe 31105, Moramix MA no. 700826.00 or an approved equal. Traps shall be 40 mm diameter plastic traps with threaded flexible connections shall be with rubber gaskets. Sink rim height above finished floor shall be 700 mm.

8.4.6 Emergency Showers

Emergency showers shall be with a ceiling mounted shower head and an above ceiling mounted thermostatically controlled mixing valve type Grohe, Moraterm or an approved equal. A valve with a rigid pull rod with a handle shall control the emergency shower. The handle shall stay in position when pulled to provide a deluge. Pushing up on the rod shall close the valve.

8.4.7 Bathtub Showers

Bathtub showers shall be with wall mounted controls, a 100 mm diameter hand shower mounted on a 275 mm long chromium plated pipe. Faucets shall be thermostatically controlled with single mixing valve and a separate flow valve with a connection for hand shower, and a bathtub outlet. Faucet type shall be Grohe, Moraterm or an approved equal.

8.4.8 Eye/Face Wash Fountains

A bright colour wall mounted polyethylene bowl shall be with a stainless steel push plate that activates a 15 mm stay-open ball valve. A mixing valve shall be thermostatically controlled to control a pre-fixed flow and temperature of water. Two plastic spray heads shall be with float-off protective covers to flush entire face.

8.4.9 Bathtubs

White enameled bathtubs shall be of minimum 3 mm steel plate and minimum outside dimensions 800x1800x600 mm. Drain outlet shall be for above-the-floor drain installation.

8.4.10 Floor Drains

Highly impact resistant Polypropylen drains shall be with a chromium plated strainer for flush installation. Types and installation procedures as indicated on the Drawings.

8.4.11 Equipment

Electrically heated domestic water tanks and water heaters shall be of the type and size as indicated on the Drawings. Submit technical specifications of proposed equipment for approval by the Engineer.