



Exploration & Production

GENERAL SPECIFICATION

STRUCTURAL

GS STR 901

**Design rules and construction standards
for ancillary structures of offshore installations**

03	10/04	Revised section 3.4.1 – Anodes fixing and 3.7.5 – Landing stage (Addition of standard for surfer landing on boat-landing (on jacket) and on supplies, tugs and FPSO)
02	10/03	Revised sections 3.1.3 – Change of Group name and logo
01	10/02	Revised sections 3.1.2, 3.1.3, 3.4.4, 3.5.1, 3.7.1, 3.7.2.1, 3.7.2.2, 3.7.2.3, 3.7.3, 3.7.4, revised standards
00	02/01	First issue
Rev.	Date	Notes

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1. Scope

This document defines the minimum requirements to be applied in the design and construction of standard ancillary structural elements on petroleum installations.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Where national regulations exist, their provisions and those of the standards and codes to which they refer shall be mandatorily applied, supplementing or amending the provisions of this document.

If there are no mandatory national regulations, the international standards and codes shall be applied.

COMPANY may accept proposals for recommendations based on international standards and codes or national or foreign standards and codes (the reference documents, if any, shall be stated).

Standards

Reference	Title
EN ISO 14122-3	Permanent means of access – Part 3
ISO 1460	Metallic coatings – Hot dip galvanised coating on ferrous materials
ISO 1461	Metallic coatings – Hot dip galvanised coating on fabricated iron and steel articles
ICAO – Annex 14	Volume II Heliports
CAP 437	Offshore helicopter landing areas

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

The provisions of this document shall be applied in light of the supplementary documents issued by COMPANY, including:

- Job specification
- Data sheets
- Articles and clauses; list of tasks
- Quality assurance provisions.

Reference	Title
GS CIV 404	Design and construction of offshore living quarters

3. Technical and operational definitions

3.1 Floors and bulkheads

3.1.1 Stiffened plate for floors and bulkheads

Free space between the stiffeners or corrugation troughs shall be less than 100 times the thickness of the plate.

3.1.2 Decking plate

In circulation areas, flat plate with anti-slip paint shall be used.

Flat plate shall be used.

Where specifically required, tear plate with a minimum relief of 1.5 mm is allowed.

3.1.3 Grating plates

- Unless otherwise arranged and justified, the normal steel grating shall comprise 30*5 mm load-bearing bars serrated on a maximum 24 mm pitch (20 mm ball test) and galvanized to 700 g/m² (ISO 1460/ISO 1461 or equivalent).
- **Composite** material gratings shall not be allowed on evacuation routes. In other areas, they may be used and their fire resistance must be specified according to the risks present.
- Gratings under flare burners; the gratings and guard rails may be of heat-resisting steel if necessary.

Grating panel fixings: the project documentation shall specify the type of fixing selected with the following conditions:

- **Mooring blocks:** minimize the random risks of loosening and loss of mooring blocks in transportation and normal operation.
- **Electrically welded stud bolts:** The corrosion-resistant coating shall be carefully reworked after welding, according to an approved procedure.
- **Steel pins:** may be used only on secondary or non – structural steels > 13 mm thick unless otherwise specified and tested, and a minimum edge distance of 10 mm. The coating shall be repaired above and below the impact area, according to an approved procedure to be strictly followed in particular for the use of the cartridge with a specific energy.
- **Spot welding:** The corrosion-resistant coating shall be carefully reworked according to an approved procedure. Areas in which dismantling is necessary (maintenance, equipment transfer areas) shall be defined and fixing types specified.
- **Other:** to be specified.

For any bolted fasteners, redundancy shall be provided to avoid that failure of two fastenings does not lead to total collapse or unstability or danger for personal injury.

Large hole in grating plates for crossing of pipes flanges shall be edged with 150*6mm plate. Small hole shall be edged with 30*5mm plate.

For all levels located inside areas that may be subject to wave loads, the gratings and fixings shall withstand all hydrodynamic forces, slamming in particular.

3.1.4 Service hatches on wells

These shall be of the same type as the main decking.

They shall be designed to ensure that they cannot pass through the opening.

Opening dimensions: square with a side of 0.8 m or rectangular with a diagonal greater than 1.1 m and a width greater than 0.6 m.

3.1.5 Penetrations through class A and/or H bulkheads

These penetrations shall comply with the specifications and satisfy the tests according to resolution A754 of the "IMO" (International Maritime Organization) and SOLAS, and the systems shall be approved by an authorized certification authority.

Penetrations through blast walls is prohibited unless the systems shall be approved by an authorized certification authority or justified by a quantitative risk analysis to avoid any risk of damage escalation.

3.1.6 Splash protection/Flameproof/Fire wall

Splash protection wall for separating the drilling area from the production area should be made of ribbed 316L stainless steel cladding panels, welded, bolted or rivetted together (minimum 1 mm thick).

Flameproof wall: comprising materials which must be mechanically resistant and proof to the passage of flames and hot or combustible gases. To be considered flameproof, it must be at least 1.6 mm thick if made of 316L stainless steel and 4 mm thick if made of steel.

Fire wall: comprising materials which must be mechanically resistant and proof to the passage of flames and hot or combustible gases, and provide thermal insulation limiting rises in temperature on the side opposite from the fire.

3.2 Skidding beams on the drilling rig

The beams incorporated into the deck (mainly Africa) shall be designed to support the use of jacks and a locking system. For this:

- The top of the top sill shall be located 100 mm above the decking.
- The top sill shall have a constant thickness of 50 mm.
- The skidding beams shall extend at least 9.45 m beyond the centre line of the limit wells.

3.3 Bracing

For guy wires made of steel rope (galvanized); the ends shall be fitted with a clew iron or equivalent at each end, so they can be replaced. The guy wires shall be continuous for the greasing apparatus. If made of 316L stainless steel, they shall not be subjected to heat and sprinkling.

3.4 Equipment fixings

3.4.1 Anodes (fixings)

Anodes shall, wherever possible, be installed in a substantially vertical plane of the structure (note that anodes must be installed in casings and sumps too).

- Doubler plates: connection of anodes to jacket structure shall be made via doubler plates, with a thickness greater than twice the thickness of the anode tube, and with a fillet weld size of 0.7 x doubler plate thickness.
- Doubler plates shall be 35 mm more (all around) than the dimension of incoming brace foot print and shall have 50 mm radius corner.
- Anode connections shall be designed for all applicable load cases, including fatigue induced by vibration during pile/CP driving, fatigue during transportation and for installation loads (launching). It is recommended that the core tube is ϕ 114 mm by 8.6mm (ϕ 4", sch. 80).

The anode tube shall be welded onto the doubler plate by a full penetration weld.

3.4.2 Riser fixings

Risers should be fixed to the structure by collars. A coating of 8 mm thick Neoprene or similar according to the temperature of the riser in service shall be inserted between the riser and the collar (coating hardness: 40 to 60 Shore).

The fixing shall:

- Immobilize the riser horizontally but not axially, except at the anchor point
- Not damage the coating on tightening, on movement due to axial or radial expansion
- Be provided with nut locks
- Have electrical continuity.

Provision for future risers: the diameter of the riser is liable to change. The provision shall comprise greased plates and retaining plates.

3.4.3 Skid-mounted equipment

Skids shall be bolted, clamped or welded.

To avoid corrosion in airgaps, a sealing weld is recommended.

A recommended solution is to use suitable stand-offs. These stand-offs, tall enough to be painted, shall be adjusted to compensate for any horizontal misalignment of the supporting beams.

3.4.4 Helistation

To provide at least four anchoring points to anchor a helicopter in accordance with [CAP 437](#). These anchoring points, unless otherwise stipulated in the project documents, shall be flush mounted, partially flush mounted or surface mounted. If surface mounted, the device shall comply with the applicable regulations (height and marking conditions).

3.5 Protection

3.5.1 Transformers

Protection is required around the transformers:

This 1.8 m high protective enclosure shall comprise panels that can be removed at appropriate points to allow maintenance work and transformers to be replaced, with an open-worked mesh that does not allow ingress of items bigger than 5 cm.

Panels made of steel wire mesh shall preferably be galvanized after production to prevent corrosion, particularly around welds fixing the wires.

3.5.2 Protection of flowlines against falling objects

Flowlines should be routed in such a way that they are protected by the beams of the structure.

Flowlines arranged on a pipe rack shall be protected by a drill pipe deflector made of steel plate at least 15 mm thick and set at an angle of 15°.

3.6 Identification plate

The dimensions and markings shall be defined in the project specifications.

The panels shall be made of corrosion-proof, rigid materials.

The strength and fixings of the panels shall satisfy the design conditions of the structure.

3.7 Personnel access and protection

3.7.1 Staircases

They shall conform to the local regulations and as a minimum shall comply with the following requirements.

These shall be classified in two categories:

- **Main staircases:** These shall satisfy the following conditions of use:
 - Frequent use with or without load
 - Access to a level occupied by numerous personnel
 - Preferred route for the evacuation of personnel and injured crew-members.
- **Secondary staircases:** these shall satisfy the following conditions of use:
 - Access to a sparsely populated level
 - Emergency staircase for isolated personnel
 - Individual, infrequent passage, without load.

The incline shall be as follows:

- 38° for Living Quarters
- 38° to 40° for main staircases of a production or wellhead platform
- 38° to 42° for secondary staircases of a production or wellhead platform

The incline of main staircases shall be uniform throughout the same complex.

- **Flights:** maximum height 3 m for a single straight flight for main and helideck staircases and 4 m for a single straight flight for secondary staircases. For more than 4 m, the height of a flight shall not exceed 3 m per flight, and intermediate rest stages shall be provided. The length of the intermediate rest stages shall be 1200 mm. In the splash zone and where required for long flights, small cross bracings between the stringers shall be provided to limit the lateral buckling and displacements.
- **Staircase headway:** vertical headroom between the staircase and any obstacle. This shall be greater than 2.4 m for main staircases and 2.3 m for secondary staircases.
- **Staircase width:**

Type of area served	Main staircases	Secondary staircases
Drilling platform	1.00 m (1)	0.80 m
Production platform	1.00 m - 1.20 m (1)	0.80 m
Accommodation quarters	See GS CIV 404	See GS CIV 404

Note 1 : For escape routes : 1200 mm

- **Size of staircase stages:** Size of turning stages shall be large enough to allow stretcher to pass.
- **Loads:** staircases in areas that may be subject to heave shall withstand, in addition to the gravity and traffic loads, all hydrodynamic forces, slamming in particular.

- **Staircase treads:** Basic solution of metallic grating; the non-skid nosings shall be made of two ribbed reinforced bars protruding 1 cm upwards. Alternative solutions may be proposed and documented.

The nosing line shall be at least 50 mm below the top of the string.

3.7.2 Hand rails

3.7.2.1 "Fixed" handrails and "removable" handrails

They shall conform to the local regulations and as a minimum shall comply with the following requirements.

The minimum height of the handrails shall be 1100 mm. The maximum width of the clear opening between the horizontal rails and also with the top of the kick-rail shall be 500 mm.

All handrails shall be fitted with a 150 x 6 mm kick-rail leaving at the bottom a maximum clear opening of 10 mm. The maximum spacing between the uprights shall be 1500 mm. The clear opening between two handrails shall be between 50 mm and 75 mm.

A general drawing shall define the locations of removable or fixed handrails.

Removable handrails shall be provided around the handling and lay-down areas. For temporary open hatches, intermediate posts with 3 lines of chains shall be provided where required.

The minimum free space behind the upper handrail shall be 100 mm.

3.7.2.2 Handrails shall be installed

- At the first level of jackets where removable handrails fixed with one bolt shall be provided on both sides of the walkways.
- Around the edge of all floors, hatches and staircase openings. Where openings along a wall or an equipment are equal or less than 200 mm, a kick rail shall be provided, and are higher than 200 mm, handrails with kick rail shall be provided.
- For walkways or service levels on a main floor.
 - If the difference in level is equal or less than 0.5 m, handrail not required
 - If the difference in level is greater than 0.5 m, handrails required on both sides.
- For accommodation quarters, the internal upper handrail of the internal and external stair cases shall be continuous to provide a guide line in the obscurity. For the internal stair case, at least a single rail shall be provided and duly fixed along the wall.

3.7.2.3 Handrail characteristics

Handrails shall normally be made of steel. A composite material may be proposed, subject to the following conditions:

- Not for main floors, stair openings and intensive handling areas
- Installation areas shall be specified
- Technical characteristics and loading and calculation conditions shall be submitted for approval, in particular with respect to the risks of impact and fire
- The use of bolts for fixing handrails to the structure is not recommended, unless special corrosion protection measures are required.

When made of steel, the following shall be provided:

- A top rail of schedule 40 1.5" pipe
- A mid rail of schedule 40 1.5" pipe
- A kick rail secured to 150 x 6 mm flat uprights, 1 cm above the floor
- Uprights of schedule 40 1.5" pipe, no more than 1.5 m apart.

On staircases less than 500 mm height, handrail is not required. On staircases higher than 500 mm, the handrail shall have the same above characteristics, apart from the kick rail which does not exist (unless stipulated by local regulations). At the start and landing of the stairs, a smooth transition of the handrails shall be provided to match the height of the handrails of the floors.

3.7.3 Fixed vertical ladders

They shall conform to the local regulations and as a minimum shall comply with the following requirements.

Emergency or occasional maintenance access

Maximum height: 9 m, unless covered by special requirement and/or local regulation.

Side access to the ladder shall be preferred over front access.

The top access to the ladder shall have an automatically closing safety gate or a safety bar. If this access point is in a working area, the gate option is mandatory. If the access point is in an intermediate area, a safety bar should be accepted.

3.7.3.1 Characteristics

- Distance between uprights: 0.4 m minimum
- Rungs: square shape with 45° axial rotation, 300 mm apart
- Safety cages: these shall be mandatory if the distance between two levels is greater than 2.5 m. Safety cages shall have an internal radius of 355 mm, and the centre shall be 380 mm from the rungs
- The safety cage shall be extended as far as the handrail where the ladder is located within 1.5 m of the edge of a floor.

3.7.3.2 Strength

- Rungs: these shall withstand a force of 150 daN
- Uprights: these shall withstand a horizontal force of 250 daN and a maximum bow of 1/250
- Safety cage: this shall support a vertical load of 100 daN at any point.

3.7.4 Helideck safety mesh

If there are no specific regulations, the safety mesh shall be 1.5 m wide and at an angle of between 10 and 15° towards the centre of the helideck. The top of the mesh shall not exceed the landing level by more than 25 cm.

- It shall withstand a static load of 100 daN at any point and an impact load of 75 daN released at 1 m. The fixing around the mesh shall be duly robust and tested.

- It shall be easy to mount and remove without the use of lifting equipment
- It shall be designed for minimum and easy maintenance. If a galvanized mesh is used, it shall be galvanized after it is welded to the receiving structure.

3.7.5 Landing stage

Unless otherwise stipulated, fixed structures shall not be designed to absorb the mooring forces generated by support vessels.

The type of personnel transport vessel that may be berthed on the structure shall be defined in the project specification.

The landing stage shall be designed for the type of boat normally used. The mass, shape and the protection of the boat shall be taken into account, with the corresponding water mass added and a rate of advance. Limiting operational conditions shall then be specified.

- Landing stage for supply boats: shock absorbing devices, arranged axially or transverse to the landing stage shall be provided
- Light landing stage: provided for light personnel transports of the SURFER, TROLL or ZODIAC type.

3.7.5.1 Light landing stage on jacket

Section 4.6 provides a standard schematic of a surfer landing structure adapted to jacket for the Gulf of Guinea area. This standard is to be adapted to other areas and other meteorological conditions.

3.7.5.2 Light landing stage on boat-landing

Section 4.7 provides a standard schematic of a surfer landing structure included within a boat-landing structure, adapted to jacket for the Gulf of Guinea area. This standard is to be adapted to other areas and other meteorological conditions.

3.7.5.3 Light landing stage on supply

Section 4.8 provides a standard schematic of a surfer landing structure for supply (size > 1500T). Dimension and sizing of this standard must be adapted according to hull structure and local meteorological conditions.

3.7.5.4 Light landing stage on tug

Section 4.9 provides a standard schematic of a light surfer landing structure (removable) for tug. Dimension and sizing of this standard must be adapted according to tug characteristics.

3.7.5.5 Light landing stage on FPSO

Section 4.10 provides a standard schematic of a surfer landing structure for FPSO. Dimension and sizing of this standard must be adapted according to FPSO characteristics and local meteorological conditions.

3.7.6 "I" and "J" tubes

The "I" and "J" tubes and their fixings shall be sized to absorb the dragging forces of the lines for which they are intended. The particular characteristics of these lines shall be taken into account in defining diameters, curvature and both ends.



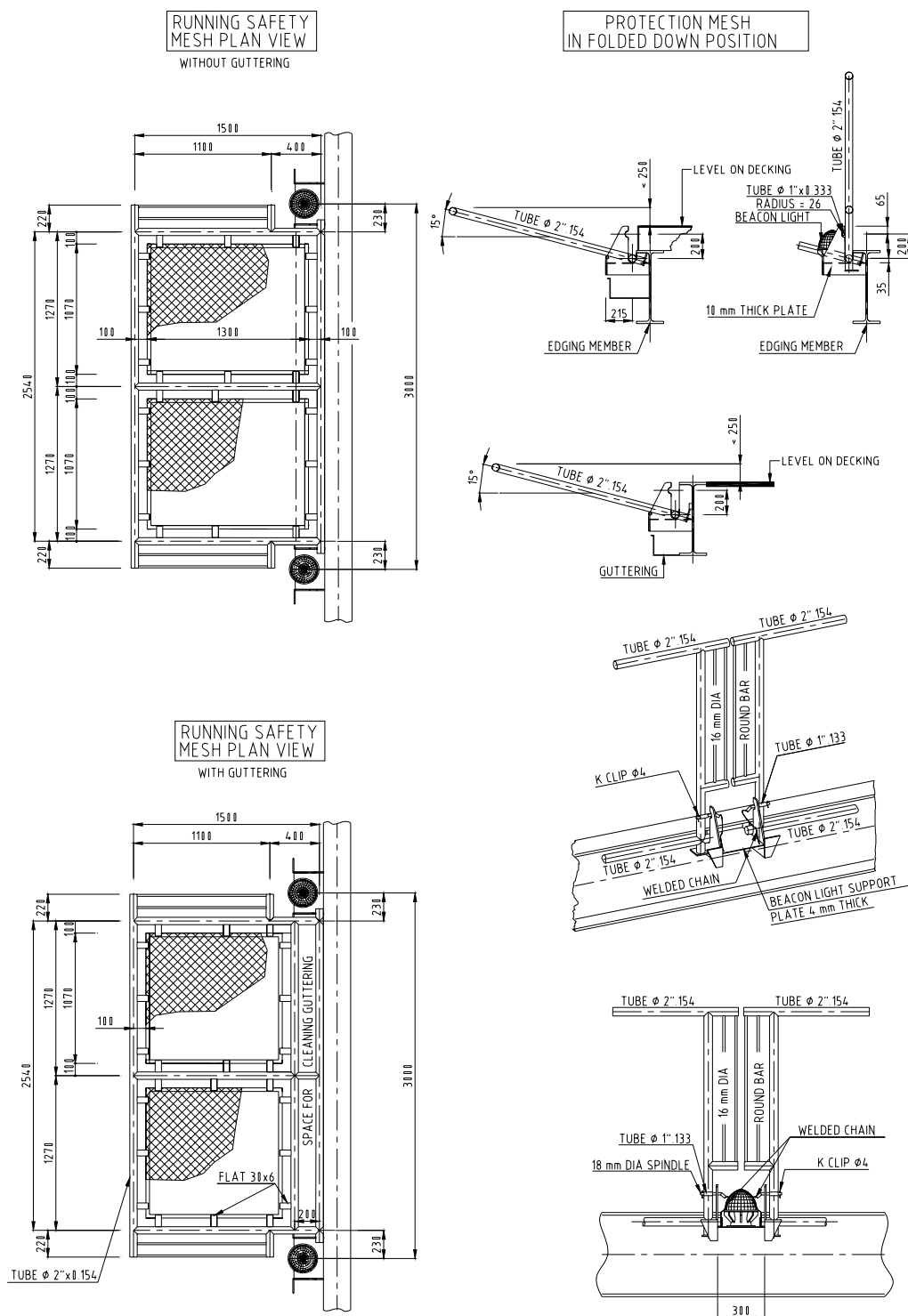
Ventilation openings in the top part shall be provided to cool electrical cables.

A messenger line should be provided in each tube.

4. Standard schematics

The standards proposed below shall not be mandatory if the CONTRACTOR has his own standards, provided that they offer at least the same specifications.

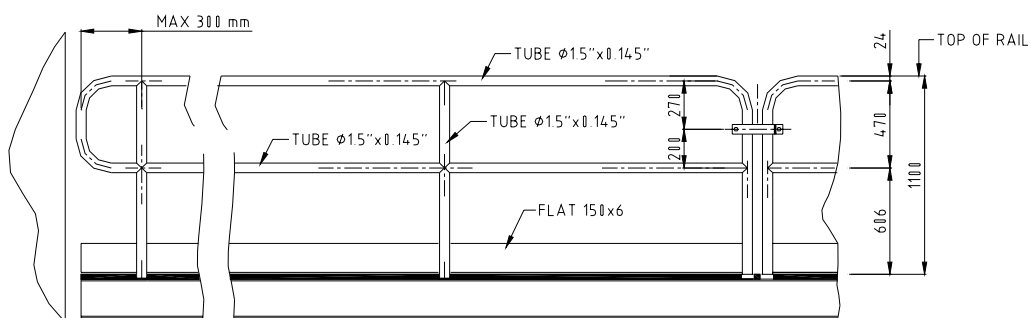
4.1 Helideck safety mesh



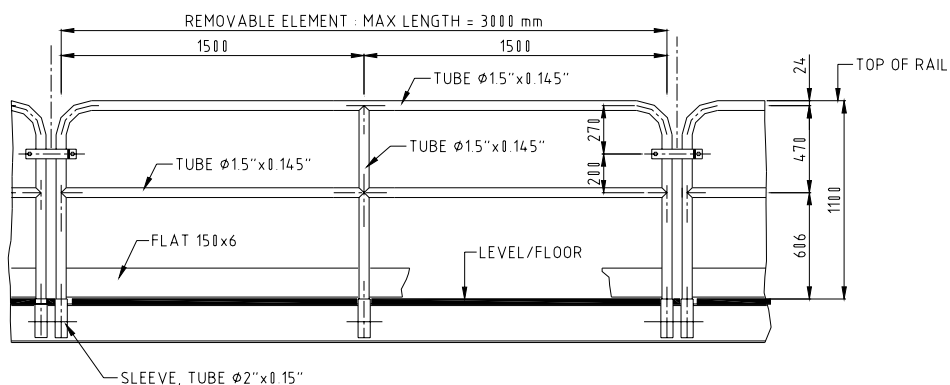
4.2 Metallic handrails

OUTLINE DRAWING DEFINING THE VARIOUS PARTS
OR ARRANGEMENTS OF A HANDRAIL

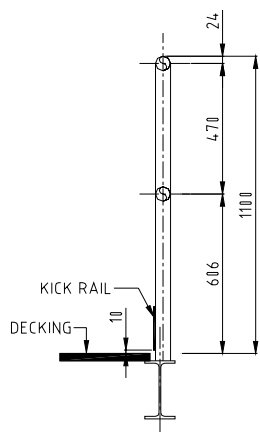
FIXED HANDRAIL DETAIL



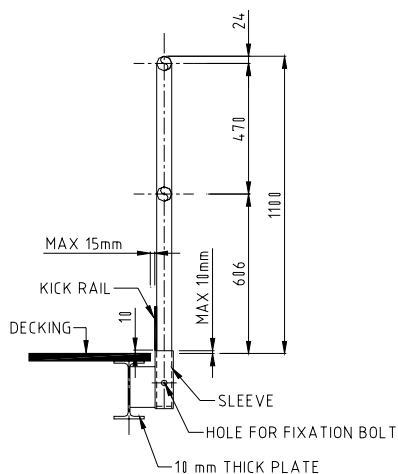
REMOVABLE HANDRAIL DETAIL



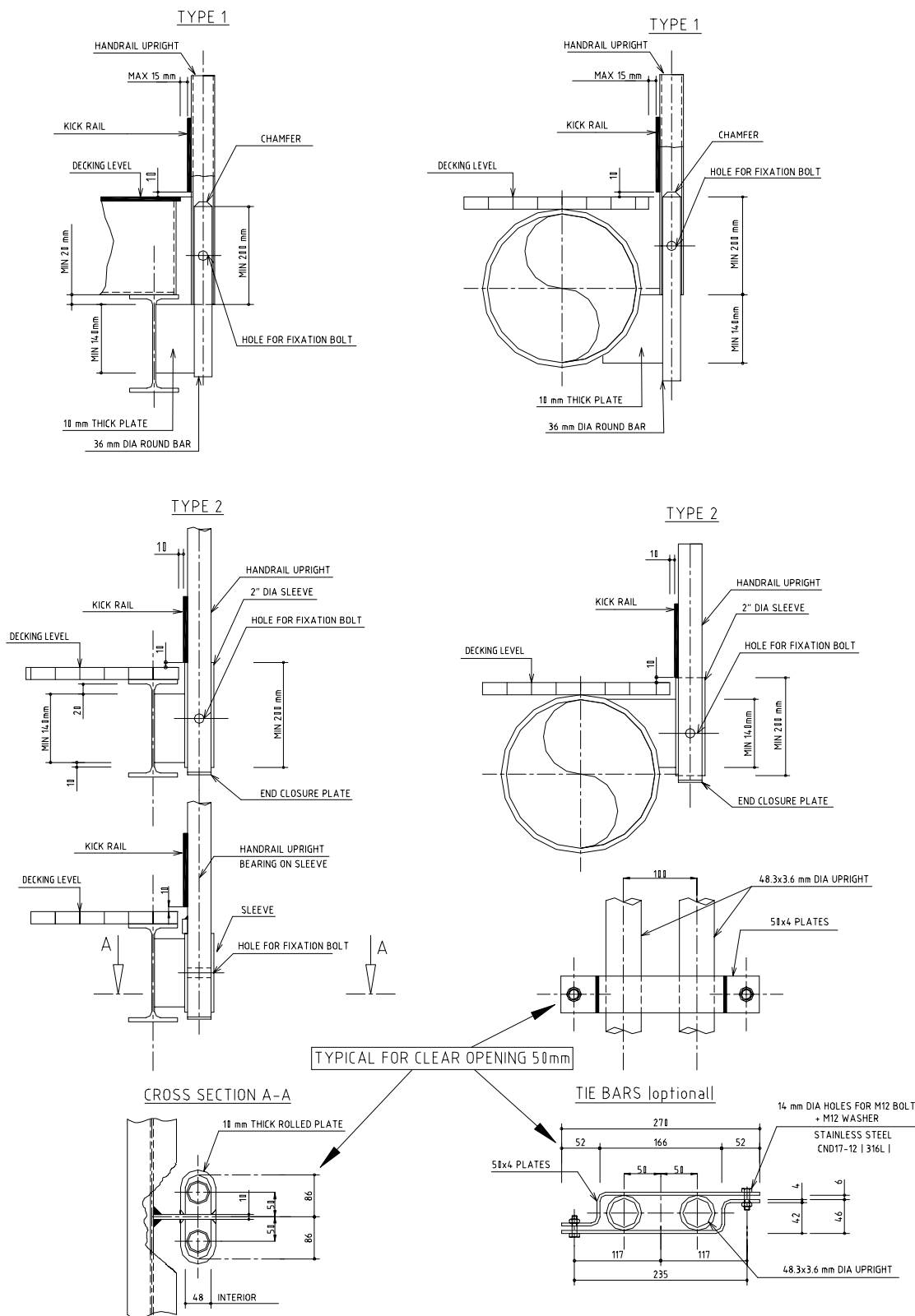
FIXED HANDRAIL DETAIL

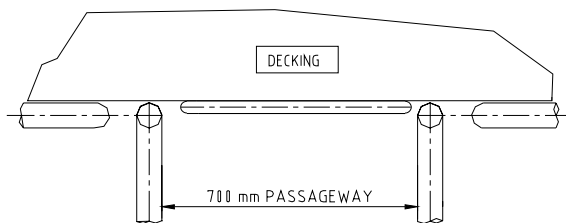
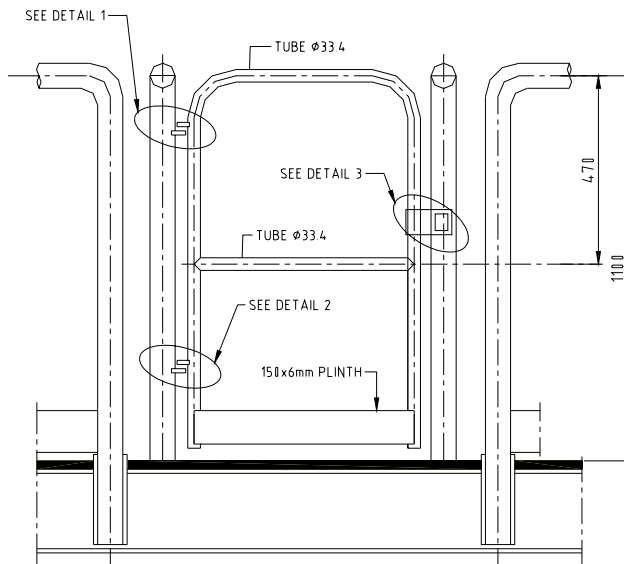


REMOVABLE HANDRAIL DETAIL

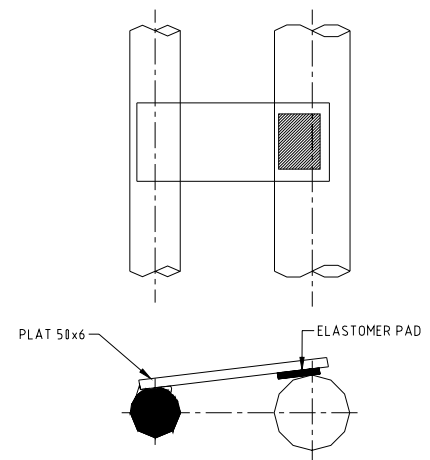


SOLUTIONS TO USE
WITH GALVANIZED HANDRAIL

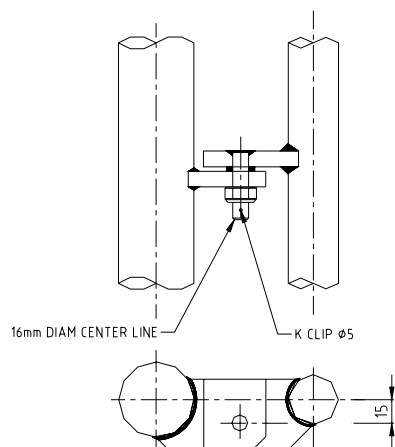




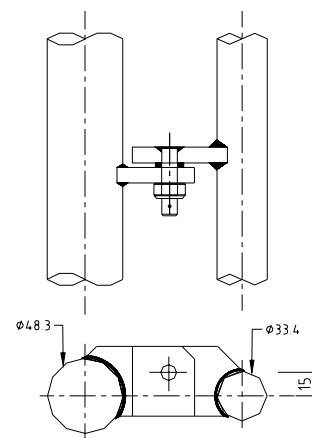
DETAIL 3



DETAIL 1

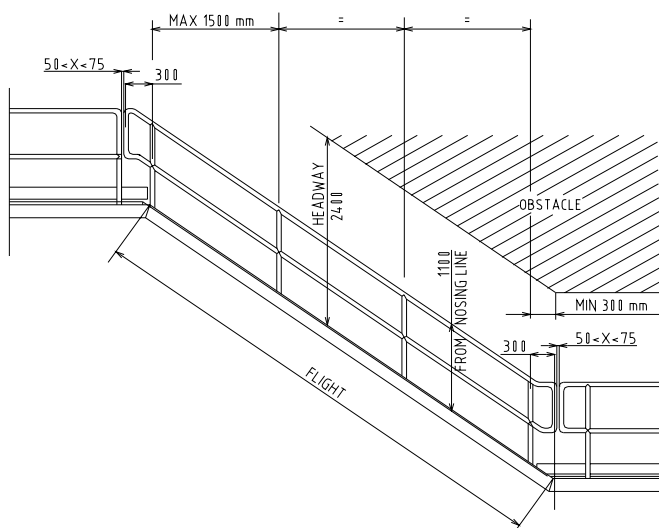


DETAIL 2

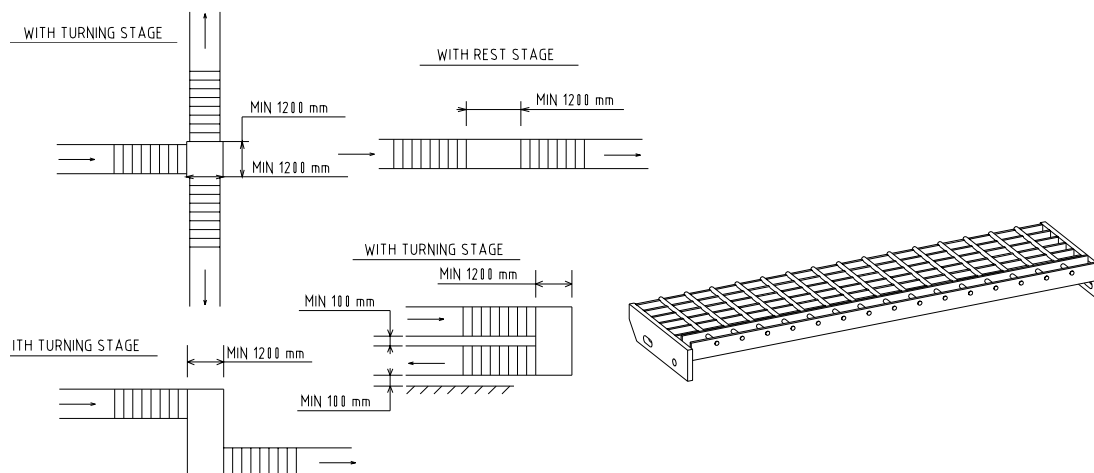


4.3 Staircases

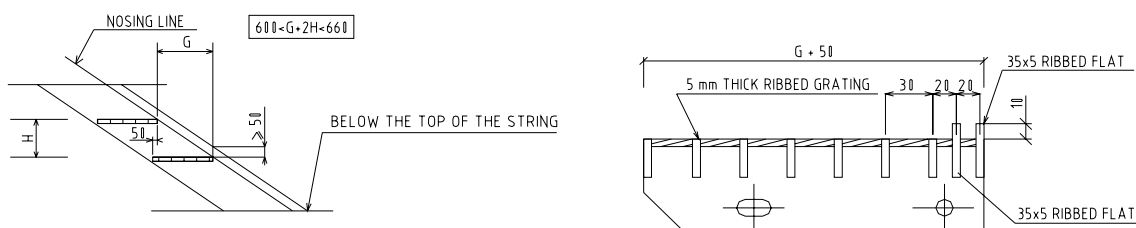
DIMENSIONAL CHARACTERISTICS



STAIR DIMENSIONS

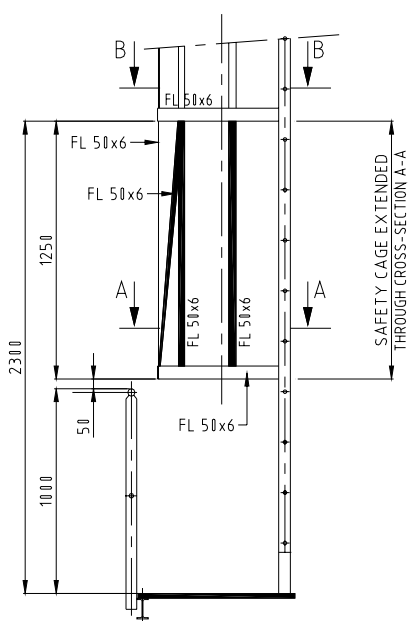


TREAD DETAIL

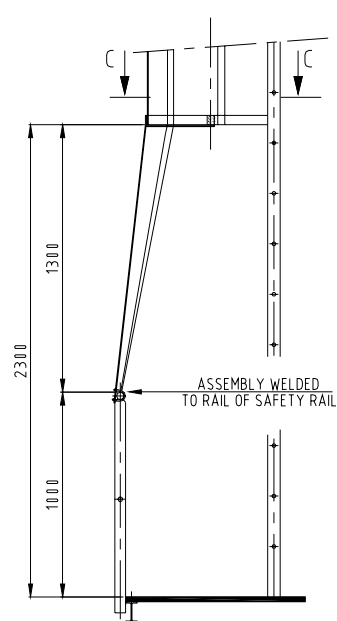


4.4 Ladder

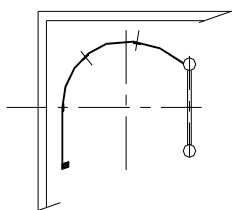
PROTECTION ON LADDER WITH SAFETY CAGE
TO END OF DECKING



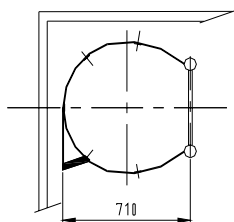
PROTECTION ON LADDER WITH SAFETY CAGE
AT EDGE OF DECKING



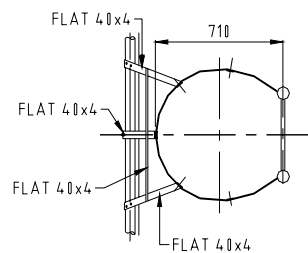
CROSS-SECTION A-A

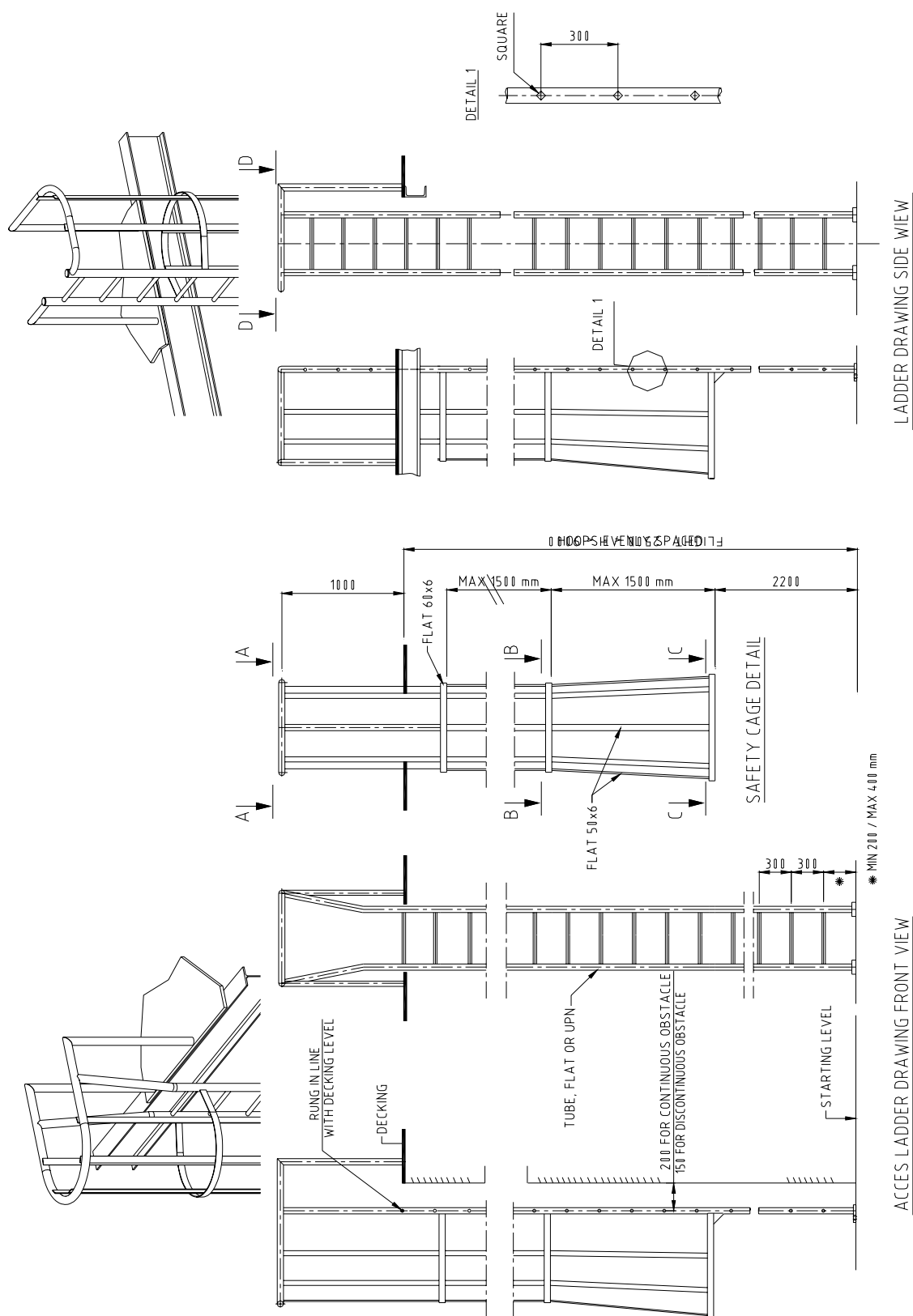


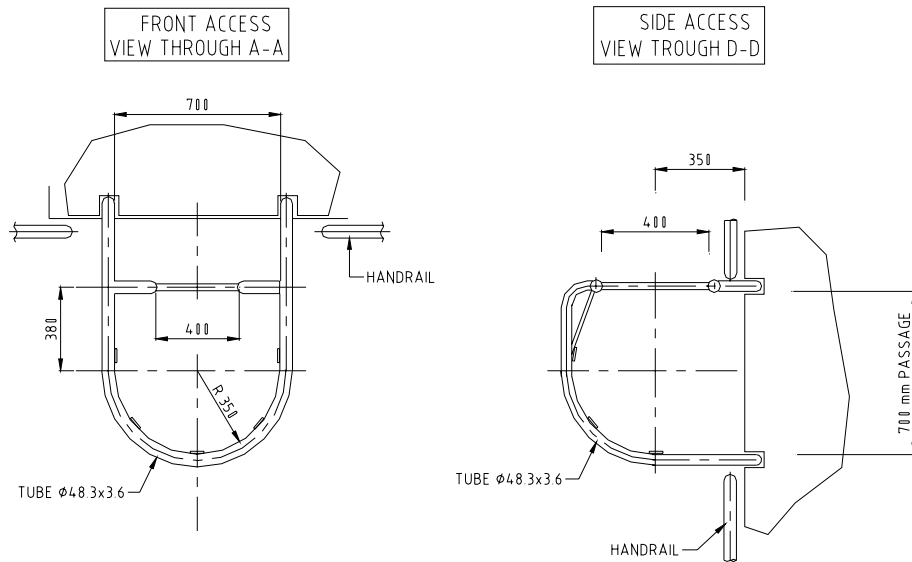
CROSS-SECTION B-B



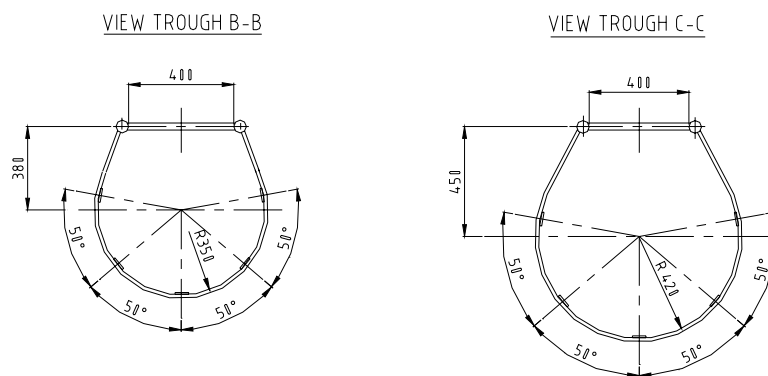
CROSS-SECTION C-C



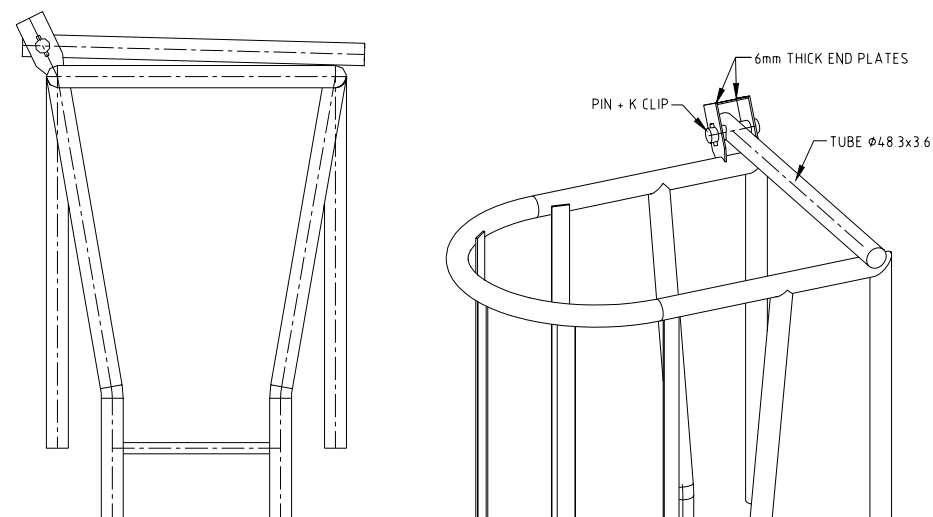




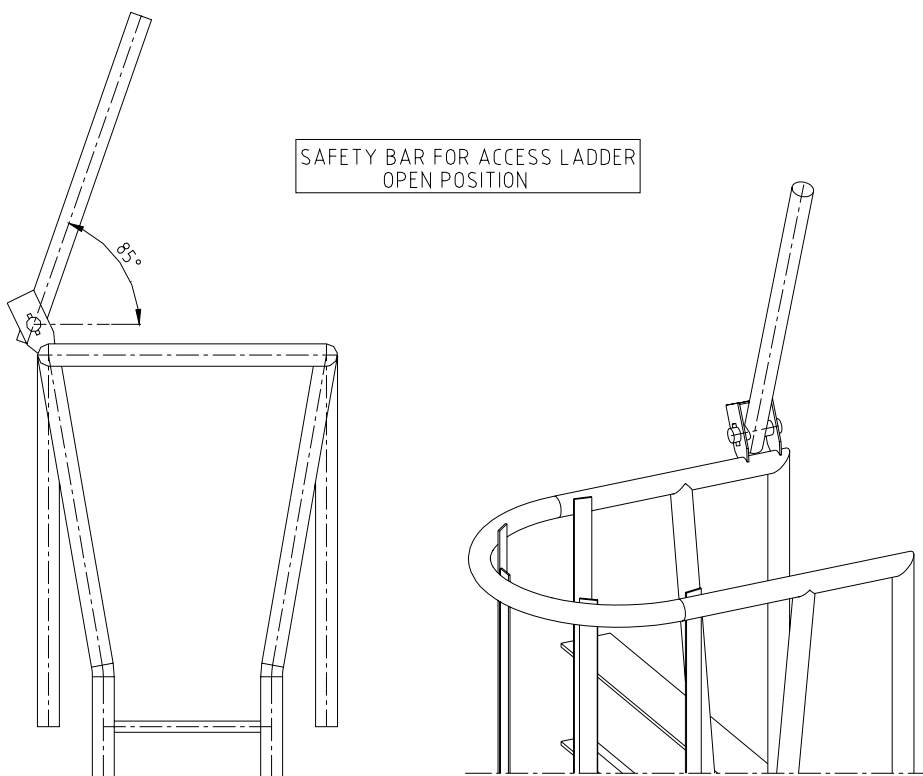
DETAILS AND CROSS-SECTION ON SAFETY CAGE



SAFETY BAR FOR ACCESS LADDER
CLOSED POSITION

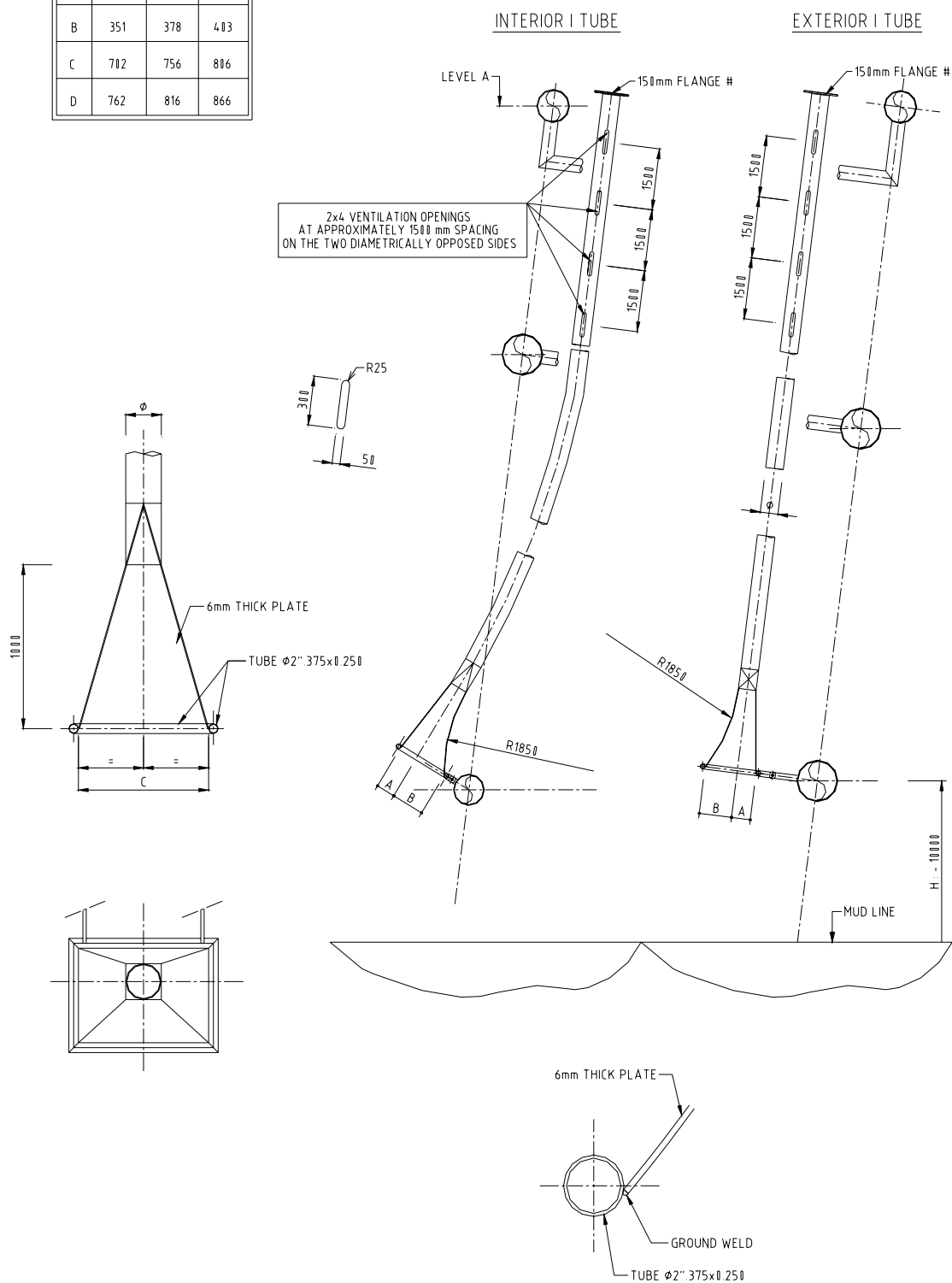


SAFETY BAR FOR ACCESS LADDER
OPEN POSITION



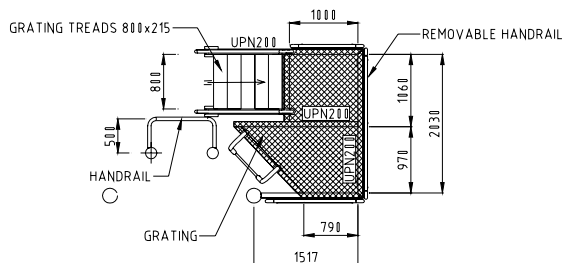
4.5 "I" tube for electrical cable

φ	4"	6"	8"
A	182	209	234
B	351	378	403
C	702	756	806
D	762	816	866

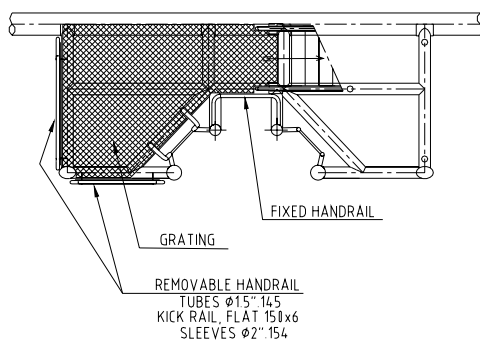


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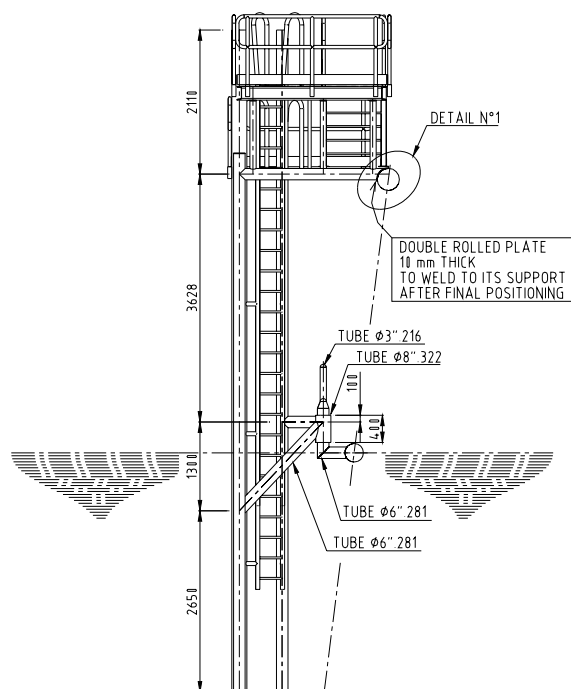
+5.387 M LEVEL LANDING



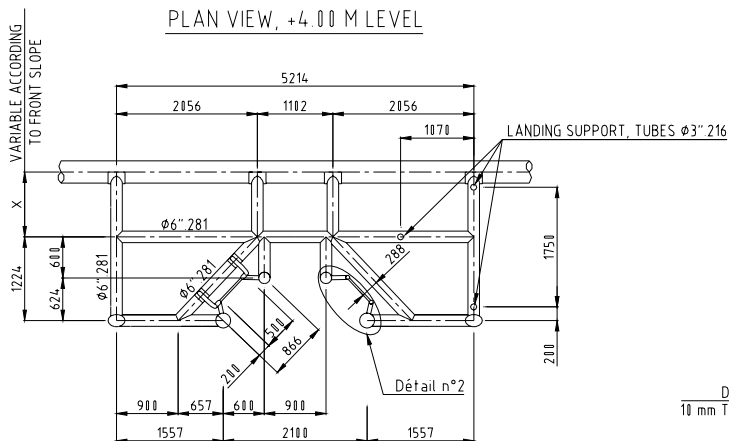
DECKING AND HANDRAIL
+4.00 M LEVEL



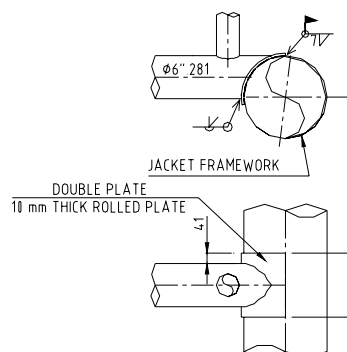
SIDE VIEW



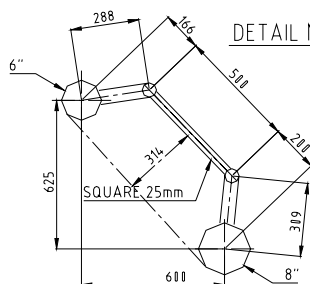
PLAN VIEW, +4.00 M LEVEL



DETAIL N°1
SCALE 1/20



DETAIL N°2





4.7 Light standing stage included in boat-landing

To be provided by COMPANY on request

4.8 Light standing stage on supply

To be provided by COMPANY on request

4.9 Light standing stage on tug

To be provided by COMPANY on request

4.10 Light standing stage on FPSO

To be provided by COMPANY on request