

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 01/21/2024
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			Page 1 of 21



Technical Specification for Welded Steel Tanks

02	01/21/2024	Issued For Final				
01	01/02/2024	Issued For Approval				
00	09/19/2023	Issued For Review				
Rev.	Date	Description	Prepared	Checked	Approved	Authorized

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client
	Document Title: Technical Specification for Welded Steel Tanks	02
		00
		Date: 01/21/2024
		Page 2 of 21

02

Tabulation of Revised Page

Sheet	Revisions							Sheet	Revisions						
	00	01	02	03	04	05			00	01	02	03	04	05	
1	X	X	X					41							
2	X	X	X					42							
3	X							43							
4	X							44							
5	X							45							
6	X							46							
7	X							47							
8	X							48							
9	X							49							
10	X							50							
11	X							51							
12	X							52							
13	X							53							
14	X							54							
15	X							55							
16	X							56							
17	X							57							
18	X							58							
19	X							59							
20	X							60							
21	X							61							
22								62							
23								63							
24								64							
25								65							
26								66							
27								67							
28								68							
29								69							
30								70							
31								71							
32								72							
33								73							
34								74							
35								75							
36								76							
37								77							
38								78							
39								79							
40								80							

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 01/21/2024
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			Page 3 of 21

TABLE OF CONTENTS

1- GENERAL.....5

1-1 Introduction5

1-2 Scope5

1-3 Regulations6

1-4 Reference codes and standards6

1-5 Occupational Health and Safety7

1-6 Quality Management and Records8

1-7 Measurement Units8

1-8 Language9

2- Design Data9

2-1- Working Time9

2-2- Site Condition.....9

2-3- Alternative design.....9

3- Design Requirements10

3-1- General.....10

3-2- Design Wind Load.....10

3-3- Seismic Load.....10

3-4- Design rainfall intensity10

3-5- Shell11

3-6- Bottom.....11

3-7- Fixed Roof.....11

3-8- Manhole-Nozzle-Manway.....11

3-9- Material.....12

3-10- Corrosion Allowance12

3-11- Cathodic Protection.....12

4- Accessories.....13

4-1- General.....13

4-2- Stairways..... Error! Bookmark not defined.

4-3- Ladders13

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev		Date: 01/21/2024
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor	Page 4 of 21
	Document Title: Technical Specification for Welded Steel Tanks	02	00	

4-4- *Roof Handrail*13

4-5- *Vents*13

4-6- *Nameplates*14

5- Fabrication and Erection..... 14

5-1- *General*.....14

5-2- *Welding*15

5-3- *Weld Inspection*.....17

5-4- *Filler Metal*.....18

5-5- *Tolerances*18

6- Inspection and Tests..... 19

6-1- *Radio graphic inspection*.....19

6-2- *Material identification*19

6-3- *Testing*.....19

7- Documentation 21

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			5 Page of 21

1- GENERAL

1-1 Introduction

This project involves the engineering and construction of a new mineral processing facility, designated as “Phase 3,” dedicated to copper and molybdenum concentration as a primary and byproduct recovery operation.

The facility is engineered to process mineral ore with the following operational capacity parameters:

- **Nominal Capacity:** 2,340 dry tonnes per hour (dtph) of fresh ore feed.
- **Design Capacity:** 2,700 dry tonnes per hour (dtph) of fresh ore feed.

The plant design configuration incorporates sufficient operational flexibility and redundancy to ensure reliable performance under “Maximum” throughput conditions, adhering to the specified design capacity requirements.

1-2 Scope

This specification defines the minimum requirements for the design, manufacture, inspection and testing of Welded Steel Tanks in Phase III Copper-Moly concentrate plant project. If some item of this specification is not applicable, VENDOR shall specify, a list of any specific exclusion to this specification, otherwise any claims for extras arising out of non-compliance with this specification will not be considered. Compliance by the manufacturer with the provisions of this specification does not relieve him of the responsibility of furnishing Pressure Vessels and relevant accessories of proper design, mechanically suited to meet operating guarantees at the specified service conditions.

In addition to requirements of this criteria, work shall be done in accordance with recognized and accepted theories, methods, codes, standards and good engineering practice. It should be noted that all Engineering (Detail Design), Procurement and

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev		Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor	6 Page of 21
	Document Title: Technical Specification for Welded Steel Tanks	02	00	

Construction activities must be done by Contractor, based on Project Design Criteria, Specifications and engineering documents approved by Employer.

No deviations or exceptions from this specification shall be permitted without written approval of the Contractor. All activities must be done base on contract documents by contractor and should be submitted to Employer for review and approval. Contractor should be assured about using last revision of all documents.

Supplier shall follow requirements of this specification together with all its due referred approved documents (such as P&ID, data sheets, material requisition, welding procedure specification, surface preparation and painting specification, etc.) as well as latest available edition of all specified international codes and standards which most of them are mentioned in following section.

1-3 Regulations

The work shall be done in accordance with the national and local laws and regulations. For subjects not covered by regulations or specifications, the design and construction shall be based on good engineering and working practice and shall be subject to approval by EMPLOYER in written.

The contractor shall inform the EMPLOYER in case of any deviation from the requirements of this specification, which is considered necessary, in order to comply with national/local regulations.

1-4 Reference codes and standards

Design, developed work, and materials in use should be according to the latest version of the relevant standards and codes from the following organizations:

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
7 Page of 21			

API SPEC 12D	Specification for Field Welded Tanks for Storage of Production Liquids
API SPEC 12F	Specification for Shop Welded Tanks for Storage of Production Liquids
API STD 650	Welded Steel Tanks for Oil Storage
API STD 653	Tank Inspection, Repair, Alteration, and Reconstruction
API STD 2000	Venting Atmospheric and Low-Pressure Storage Tanks Nonrefrigerated and Refrigerated
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASME SEC IX	BPVC SECTION IX Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators
ASTM A123 REV A	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products (AASHTO M111)
ASTM A153/A153M ASTM A307	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware (AASHTO No. M232) Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength

1-5 Occupational Health and Safety

The Contractor shall adopt safe systems of work which minimize the risk to health and safety. All persons working on the site shall be competent to carry out their tasks and duties safely and in a manner that will not endanger their own health nor the health of others. Persons, when first employed on the site, shall be subject to appropriate pre-employment occupational health checks, instructed on the hazards inherent in the site, precautions to be taken, the form of construction, and emergency

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev		Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor	8 Page of 21
	Document Title: Technical Specification for Welded Steel Tanks	02	00	

procedures and fire safety. Such instructions shall be given whenever there is a material change in the working arrangements. The Contractor shall maintain a record of all persons instructed and each person shall be required to sign such record confirming that instruction has been received. No person shall be permitted on site without being inducted as set out above. The Contractor shall prepare a written statement of Safe Systems of Working which shall be issued to all persons at site.

1-6 Quality Management and Records

- The project shall be administered using an accredited Quality Management System conforming.
- References to the agreement of materials, workmanship, methods, etc. throughout this Specification shall be interpreted as requiring the agreement of the Employer.
- The Contractor shall maintain all records necessary under this Specification, including quality records as appropriate.
- Copies of all site records shall be available to the Employer.
- The Contractor shall supply the Engineer with all information necessary for the Health and Safety File including as-built drawings and records, maintenance schedules, operation and maintenance manuals, within the time specified in the contract, after substantial completion of the Works. Information shall be provided in the agreed format.

1-7 Measurement Units

SI units shall be applied to the measuring units.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
9 Page of 21			

1-8 Language

All drawing design information, Documentation, Operation, and Maintenance Instructions & Correspondence shall be in English.

2- Design Data

2-1 Working Time

The working time is as follows:

Description	Value
Calendar days per year	365
Production days per year	320
Number of shifts per day	3
Working hours per shift	8
Utilization factor	0.85

2-2 Site Condition

For Site Condition Refer to Document no. 12002-D-PR-DOC-303-GNL-001.

2-3 Alternative design

Manufacturer's quotation shall be in accordance with this specification. Manufacturer may supplement his basic quotation with alternative selections of materials and/or fabrication methods provided that they offer significant advantages with respect to price, delivery date, quality and/or suitability for the specified service without loss of capability, capacity or shortening the anticipated life of tank.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev		Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor	10 Page of 21
	Document Title: Technical Specification for Welded Steel Tanks	02	00	

3- Design Requirements

3-1 General

In addition to the requirements of this specification, tanks shall be designed, constructed, inspected and tested in accordance with the latest edition of API standard 650 “Welded steel tanks for oil storage” and relevant appendices.

3-2 Design Wind Load

The design wind load velocity shall be taken as Maximum wind gust according to site condition (for tanks located outdoor).

3-3 Seismic Load

Plant is located in zone 2 (High) according to ISIRI No. 2800 standard “seismic design for buildings”.

3-4 Design rainfall intensity

The vendor shall design the tanks for the rainfall intensity as specified on “site Conditions” (Applicable for outdoor tanks only).

Note:

- Capacities given for individual tanks include allowance for freeboard vapor space and inaccessible bottom and no further allowance in establishing tank size.
- When calculating for vacuum conditions during lowering of tank product in fixed roof tanks, maximum gravity transfer conditions should also be considered.
- Wind and earthquake loading shall not be applied simultaneously.
- Either overturning stability shall be verified on the empty tanks in the corroded condition or anchorage shall be provided.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
11 Page of 21			

3-5 Shell

- The tank nameplate shall show the maximum permissible product specific gravity
- based on actual shell thickness less corrosion allowance.
- Calculations for intermediate wind girders for tanks where the shell corrosion allowance exceeds 1.5 mm (1/16 in) shall be based on the nominal shell thickness minus the corrosion allowance.
- Plates in the bottom shell course shall be minimum 6mm thickness.

3-6 Bottom

Bottom may be built to either lap-welded or butt-welded construction per code. The corrosion allowance specified for the bottom on the tank drawing shall be added to the minimum nominal thickness of 6mm.

3-7 Fixed Roof

When purchaser's drawing specified fixed roof, the manufacturer shall submit most economical fixed roof design, either supported or self-supported. Complete description with dimensions and thickness must be shown in quotation. To ensure a frangible joint in the event of excessive internal pressure, the fillet weld between the roof plates and the top angle on fixed roof tanks shall not exceed 5mm on either leg.

3-8 Manhole-Nozzle-Manway

Nozzle and manway opening shall not be made in weld seams, nor shall reinforcement pads overlap plate joints. Shell manway 600mm ID. All shell manholes shall be equipped with door davit, for operator's safety reasons. A roof

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
12 Page of 21			

manway 500mm ID on cone roof tanks shall be fitted. Roof nozzles 3” and over shall have reinforced pads.

3-9 Material

Material shall conform to latest edition of ASTM specifications and shall be in accordance with, API standard 650. Material for reinforcing pads shall be the same as the base plate. Mill, chemical analysis and mechanical test certificates are required for bottom and shell plates, wind girders, pipes and flanges. Roof plates and other material require mill certificate only.

All carbon steel bolting for flanged connections shall conform to ASTM A307, Grade B as a minimum. Bolts shall consist of regular unfinished machine bolts with one heavy semifinished hex nut.

3-10 Corrosion Allowance

Unless otherwise specified on individual tank datasheet, corrosion allowance shall be 2.5 mm for plates 12.5 mm and less, and 1.5 mm for plates more than 12.5 mm thickness.

3-11 Cathodic Protection

In accordance with “Cathodic Protection System Criteria and related Layouts”, the underside of above ground storage tanks shall be provided with cathodic protection (by CONTRACTOR). The cathodic protection anode attachments to the tank base shall be supplied by the tank VENDOR.

Where indicated on the tank data sheet, the VENDOR shall make provision for the installation of internal sacrificial or impressed current cathodic protection system.

Manholes, Nozzles and Inspection Openings Manhole covers, blanked connections and other connections where specified on the tank data sheet shall be

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
13 Page of 21			

provided with one service and two spare gaskets. The Vendor shall supply all bolting for these connections, including 10% spares (minimum 4) for each size. Flanges on internal piping may be of built-up construction. Light plate flanges may be used with machined flat face.

4- Accessories

4-1 General

Vendor shall furnish and install all appurtenances as specified on the individual tank drawings.

4-2 Stairways

For tanks with diameters 7.5m and larger, and heights greater than 6m, stairways shall be spiral on fixed roof tanks. Tanks with heights less than 6m, shall be provided with caged ladder and one landing midway.

4-3 Ladders

Ladders greater than 3.6 m in height shall be provided with safety cage. The bottom rung shall be minimum of 100 mm and maximum of 300 mm above top of bottom plate.

4-4 Roof Handrail

Unless otherwise specified, handrails shall be provided around the top landing and shall extend from the stairway a distance of 2m beyond any nozzle and man hole.

4-5 Vents

Tank vents shall be sized in accordance with API recommended practice 2000. A minimum of two vents shall be provided for each fixed roof tank over 9m in diameter.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
14 Page of 21			

Emergency venting devices shall be provided as required by API recommended practice 2000. Vents shall be positioned so that in the event of a fire the vent does not cause flame impingement on the tank surface and increase the fire hazard.

4-6 Nameplates

Nameplates shall be stainless steel. The data called for here below must be legibly stamped or preferably engraved on the plate which shall be fixed to an accessible part of the equipment. The data on the nameplate and its location are to be submitted for approval to the purchaser.

Order Number.....Item Number.....

Date of Order.....

Manufacturer's Name.....

Design Code.....

Capacity.....

Diameter.....Height.....

Total Empty WeightKg

5- Fabrication and Erection

5-1 General

Fabrication and erection of tanks shall be in accordance with API standard 650. Vendor shall provide all materials as specified on the tank drawing required for the complete fabrication of storage tanks. Vendor shall be responsible for providing adequate clearances for all appertences and internals and for the total structural adequacy and mechanical operation of the complete tank.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			15 Page of 21

Unless otherwise specified, vendor shall supply all plates rolled, bevelled, unblasted and unpainted for site erection. Plates shall be new and in corroded. Vendor shall supply all welding rods required to fabricate the tank.

Erector shall completely fabricate each tank including all accessories, regardless of who supplies the accessories. Tank gauging shall be installed and calibrated under the direct supervision of the vendor of the tank gauging equipment or strictly per his recommendation. Tanks will be erected on ring wall or compacted foundations. Stress relieving of storage tank plates shall be made as necessary for the particular materials used and shall be carried out at site after welding on of all appurtenances.

All tanks shall be earthed at not less than two points. Each connection shall be of sufficient cross section to earth the whole tank. All cut surfaces on manway necks, nozzle necks, reinforcing plates and shell plate openings shall be made uniform and smooth, with corners rounded.

5-2 Welding

Both vertical and horizontal joints shall be butt joints and shall have complete fusion and complete penetration. Cleaning, preheating, tack welding, undercutting, repair welding and other requirements for welding works shall be in accordance with section 5 of API 650.

Semi-automatic welding shall not be used. Automatic submerged arc welding may be used only when the procedure is approved by the purchaser. The attachments of all external lugs, clips, structural members and etc., welded to the shell proper shall be completely seal-welded to prevent corrosion. All reinforcing pads shall have 6 mm Dia. Vent hole.

Erector shall submit his weld procedure and qualification test for approval after receiving full data to fabrication.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			16 Page of 21

This shall conform to API 650 and the requirements of ASME sec. IX. The erector shall specify the application of each welding procedure, for example, for welding the vertical shell joints, or circumferential joints, nozzles, etc.

All major weld repairs shall be submitted for approval before repair is performed. Erector shall define the extent of the repair with regard to location, size, type of defect, etc. and shall submit the qualified weld procedure intended for use in making the repair.

Full penetration welds shall be used for all nozzle and manway attachments. No restraint of bottom plates by weights during welding is permitted. Post weld heat treatment (PWHT) shall be carried out when required by the code or when specified on tank drawing.

Back-up rings or strips, when permitted, shall be of the same chemical analysis as the baseplate. Except for low alloy baseplate, the back-up strip be low carbon steel.

After the removal of any temporary back-up rings or strips, the weld area shall be dressed and examined using magnetic particle or liquid penetrant.

Welding procedure requalification will be required for:

Individual weld layer thickness shall not be greater than that used in the procedure qualification tests. Electrodes not of the same size and AWS classification as that in the procedure qualification test. Nominal preheat and interpass temperatures shall be the same as those in the procedure qualification tests.

Automatic welding if flux composition is changed or if speed and heat input are changed beyond the range specified. Fillet welds connecting the lowest shell course and bottom plates to the annular bottom plate shall be made with low-hydrogen electrodes equivalent to AWS classification EXX16 or EXX18. Steels with minimum specified yield strengths greater than 262 MPa (38,000 psi) and mechanical properties enhanced by heat treatment shall have a minimum of two

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
17 Page of 21			

layers of weld metal on all scars, pickups, structural attachments or other welds made on the plate surface.

Hardness surveys across the procedure qualification welds and heat-affected zones shall be as follows:

1. Made with an instrument having an indenter of 1.6 mm (1/16 in) maximum diameter.
2. Hardness shall not exceed 225 HB (238 HV10) except that peak hardness of up to 250 HB (260 HV10) is acceptable in the heat affected zone (HAZ).
3. For steels with minimum yield strengths equal to or greater than 345 MPa (50,000 psi), peak HAZ hardness shall not exceed 310 HB (325 HV10).

A hardness test shall be made on each 30.5 m (100 ft) of the shell weld seams and on main nozzle welds, and it shall not exceed 225 HB (238 HV10).

5-3 Weld Inspection

Weld inspection shall be in accordance with API STD 650 and the following Requirements:

- Horizontal Joints

One radiograph in the first 3 m (10 ft) of each seam plus one for each 15.2 m (50 ft) of seam length.

- Vertical Joints

Complete radiographing for all welds in plates thicker than 19 mm (3/4 in).

For plates 19 mm (3/4 in) and less, radiographing of all intersections plus one additional radiograph for each 7.6 m (25 ft) of vertical seam length in each course.

Structural attachment welds and welds attaching the lowest shell course to the annular bottom plates shall be examined by the magnetic particle or dye penetrant method to detect cracks and other linear discontinuities.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			18 Page of 21

Longitudinal welds in shell and floor nozzles and manways shall be examined by radiography in accordance with the requirements for vertical shell joints. There shall be at least one spot radiograph for each weld.

5-4 Filler Metal

The use of carbon ½ moly filler metal for welding carbon steel is not permitted. Electrode classified as E6012, E7014, E7020 and E7024 are not acceptable for making shell or bottom welds. Tack welds shall be made with the same type of electrode that is used depositing the root pass.

5-5 Tolerances

- Shell

Shell plates shall have dimensional tolerances as follows:

On plate width =+1.5 mm

On plate length =+1.5mm

Difference in diagonals =+3 mm

Shell plate edges on completion of machining shall be straight. Deviation, if any, shall not be in excess of plus and minus 1 mm.

- Erection Tolerance

Deviations both inside and outside the tank of shell plate vertical joints from a true circle generated by tank radius, over a 1 m horizontal span centred on the weld, (Peaking) shall be within plus and minus 10 mm. Deviations both inside and outside the tank of horizontal joints over 1 m vertical span centred on the weld, from a vertical line (banding) shall be within plus and minus 10 mm. The actual radius measured at the lower edge of the base course shall be within plus and minus 10 mm of the nominal radius of the tank.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			19 Page of 21

The maximum permissible out of plumbness at the top of the tank relative to the bottom of the shell shall be within plus and minus 50 mm. Put-of plumbness both inside and outside the tank of each single shell course shall be within plus and minus 10 mm.

6- Inspection and Tests

6-1 Radio graphic inspection

Radiographic inspection of butt joints shall be in accordance with API STD 650 and the following supplemental requirements:

1. The film for spot radiographs at junctions between vertical and horizontal joints shall be positioned with the greater length on the vertical seam.
2. For automatically welded horizontal joints, one spot radiograph shall be taken in the first 3 m (10 ft) of weld after each setup of the automatic welder.
3. For automatically welded vertical joints in API STD 650, Appendix A, the requirements of API STD 650, Paragraph 8.1.2.2.b shall apply.
4. For manually welded joints, radiographic inspection requirements shall apply to each welder.

6-2 Material identification

For stainless steels, this shall be in accordance with ASTM.

6-3 Testing

Tank bottom welds shall be tested using vacuum test equipment with a vacuum of 35 kPa to 48 kPa (5 psi to 7 psi). The bottom-to-shell weld(s) shall be tested using penetrating oil after completion of the inner fillet weld for 12 hours. The external fillet weld shall be either magnetic or dye penetrant tested.

Before any internal coating is applied, the complete tank shall be hydrotested, using fresh water, as follows:

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
			20 Page of 21

1. Complete all tank fabrication.
2. Perform nondestructive examinations, including a vacuum box test of new floor welds. Repair defects and retest.
3. Conduct a full hydrostatic test.
4. Conduct a Hydrostatic Tank Leak Test (API 650), if available, as the last part of the hydrostatic test, observe the level change of the full tank, as follows:

Tank Diameter	Holding Time
< 15 m (50 ft)	2 days
15 m to 21 m (50 to 70 ft)	3 days
>21 m to 30.5 m (70 to 100 ft)	5 days
>30.5 m (100 ft)	7 days

5. Repeat the vacuum box test of new floor welds. Repair and retest with vacuum box.
6. Abrasive-blast and apply a lining (if required).
7. Conduct a holiday pinhole test of the lining.
8. Fill tank with water.
9. Notes:

a) Where a floating roof is to be installed and the bottom is to be lined, the lining may be applied prior to roof installation with proper protection of the lining during roof installation. Alternatively, the lining may be applied after roof installation. The lining may be applied prior to roof perimeter seal installation to increase ventilation.

b) All welding or cutting in the tank shall be completed prior to conducting the hydrostatic test. Any welding or cutting performed after the above noted operations shall be done with The Company's supervision.

For austenitic stainless-steel tanks, the chloride content shall be less than 50 ppm.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev	Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor
	Document Title: Technical Specification for Welded Steel Tanks	02	00
21 Page of 21			

Tanks shall be tested for bottom leaks using The Company's Hydrostatic Tank Leak Test.

Hydrotest settlement readings shall be taken for every 2.4 m (8 ft) fill increment and just before draining is begun at the following number of equal spaces (N) around the tank:

- $N = D/3$ (D = diameter in meters)
- $N = D/10$ (D = diameter in feet)
- Round N to the nearest even integer but no less than four. If the allowable differential settlements are exceeded, filling shall be stopped and Client notified.

Hydrotest water shall be held for one day unless settlement is occurring.

All of the above tests shall be performed prior to any painting or coating

7- Documentation

Relevant drawings and documentation shall be provided by the VENDOR in accordance with

the requirements of the "VENDOR Documentation Requirement Schedule" (VDRS), contained in the Material Requisition. The documentation shall be submitted strictly in accordance with the timings indicated on the VDRS.

The VENDOR document type catalogue, which forms part of the VDRS, describes specific requirements regarding content, format and submission details for drawings, data sheets and

manuals etc. Review of VENDOR'S drawings, calculations and other documents by the CONTRACTOR does not relieve the VENDOR of the responsibility for correctness under the terms of the order.

All calculations shall be presented on A4 size calculation sheets and shall be clearly identifiable on each page with project number and title, equipment number and title of equipment. A reference to design methods or papers used shall be stated indicating the relevant text, including the relevant code section.

Contract No:	Document Number: 12002-D-ME-SPC-303-GNL-016	Rev		Date: 09/19/2023
Class: FA	Library Code: 303-E03-2120-00-ME-SPC-016-02	Client	Vendor	22 Page of 21
	Document Title: Technical Specification for Welded Steel Tanks	02	00	

All drawings and calculations prepared by the VENDOR shall be checked and signed as such before submission. The CONTRACTOR will return without review any documents not meeting these requirements.