Technical Specification for the delivery and Installation of two Formaline storage tanks

V620 and V630

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1.0 INTRODUCTION

The minimum requirements for design, materials, fabrication, examination, testing, inspection, transportation, lifting and final installation of hereunder listed equipment are part of this Technical Specification .The equipment is to be supplied and installed on the Hexion Botlek B.V. location in the Netherlands.

Quantity	Tank Number	Description of tank
1	V620	Formaline storage tank 700 m^3
1	V630	Formaline storage tank 700 m^3

2.0 REFERENCE DOCUMENTS

The equipment shall be in accordance with the requirements defined in this specification, the P&ID and the datasheet, including those referred to therein.

For all documents without indicated issue/date, the latest version at the contract signature date is applicable. Any correction or change to Contractor documentation or equipment, caused by Contractor's failure to meet the requirements of the referenced documents, shall be at the expense of the Contractor.

2.1 Responsibility

It is the responsibility of the Contractor to become familiar with the requirements of all applicable Directives, Regulations, local Authority rules, Codes & Standards and specifications to ensure full compliance with the same for all supplied equipment, services and documentation.

Making assumptions to cover lack of information is not allowed. In such case, the Contractor is obliged to obtain reliable information or confirmation from Client.

2.2 Contractors and sub-Suppliers

As the Contractor is responsible for co-ordination of any sub-contracted activities and for overall guarantees related to mechanical integrity of all equipment-parts, the Contractor shall invoke all referenced specifications as applicable to each sub-supplier/contractor.

2.3 Revisions

In case of new revisions of the referenced documents, the Contractor shall inform Client about the consequences on performance, costs and delivery dates immediately, if any.

2.4 Order of precedence

In case different requirements are referred for the same subject, the compound of them shall be valid unless otherwise specified in writing by Client.
In case of different requirements, the order of precedence shall be taken as follows.

- National and Local Laws and Regulations (incl. CE Directives).
- The contract.
- The Construction code
- National Standards & International Industrial standards
- Client's requirements, procedures and guidelines
- Contractor Standards
- Good engineering practice.

2.5 European Directives

It is the responsibility of the Contractor to ensure that the supplied equipment does meet and satisfy the minimum safety requirements of the European Directives, so far applicable.

As applicable, the equipment shall be supplied with the appropriate marking, the required certificates & declarations of conformity and the associated documentation in Dutch language as prescribed by the Dutch regulations. A copy of Contractor's completed Risk Analysis shall be furnished in advance for information.

Next to the European directives, the equipment shall also comply with the PGS 29.

2.6 National and International Industry Standards

STANDARD	TITLE	ISSUE/DATE
EN 14015	Specification for the design and manufacture of site built, vertical, cylindrical, flat-bottomed, above ground, welded, steel tanks for the storage of liquids at ambient temperature and above	Latest revision
EN14122-1 u/i EN14122-4	Safety of machinery - Permanent means of access to machinery	Latest revision
EN 1991	Eurocode - Action on structures	Latest revision
EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods	Latest revision
EN ISO 28300	Petroleum, petrochemical and natural gas industries - Venting of atmospheric and low-pressure storage tanks	Latest revision
EU/305/2011	Construction Products Regulation	Latest revision
EN-1990	Eurocode- Basis of structural design	Latest revision
EN-1090-1	Requirements for conformity assessment for structural components	Latest revision
EN-1090-2	Technical requirements for the execution of the steel structures	Latest revision
EN-1092-1	Pipe flanges and flanged fittings	Latest revision
CINI 4.5.00	Tanks: (overzicht), details isolatie/afwerking voor tanks.	Latest revision
EEMUA 183	Prevention of tank bottom leakage - a guide for the design and repair of foundations and bottoms of vertical, cylindrical, steel storage tanks	Latest edition
EN-1993-4-2	Eurocode for storage tanks	Latest edition
PGS 29	Richtlijn voor de veilige bovengrondse opslag van brandbare vloeistoffen in verticale cilindrische tanks	Latest edition, (incl. concept version, 2020)

3.0 SCOPE OF SUPPLY

Contractor shall deliver two (2) stainless steel storage tanks with a nominal capacity of 700 m3, a diameter of 9,5 m and a height of 10 m.

These shop fabricated tanks shall be built of Duplex steel quality 1.4462. In these tanks there is stored Formaldehyde as described in the tank datasheet.

3.1 Contractor supply shall include, but shall not be limited to:

Tank design and walkways according datasheet.

- Walkways to be as follows
  - One walkway between tank V630 and the existing platform of tank V603.
  - One walkway between tank V630 and V620.
  - One cage ladder on tank V620.
  - Railing around roof.
  - Design of all walkways according EN14122-1 u/I 14122-4 and Eurocode
  - Walkable insulation on tank roof as per datasheet/CINI including supports.

- Support for cables Agitator
- Contractor and client shall agree on all items listed in Annex A1 and A2 of EN 14015 and put these agreements in writing.
- Engineering, detail design, purchasing of materials, structural integrity assessment and strength and stability calculations.
- Contractor shall perform all necessary tank calculations, such as:
  - Tank shell calculation based on liquid load and internal pressure,
  - Tank shell calculation based on wind load and vacuum,
  - Tank shell calculation based on axial load,
  - Overturning calculation,
  - Anchor (chair) calculation (sizes and amount) including uplift forces,
  - Venting calculation,
  - Calculation walkways,
  - Lifting calculation,
  - Transport provisions,
  - Etc.

NOTE: For all necessary calculations insulation weight and installed Agitator shall be included.

- Lifting lugs to be removed after installation of tanks,
- Request from Design Appraisal Document (D.A.D.) storage tank.
- Approval and certification by NoBo.
- Quality assurance and Control (QA/QC).
- All necessary materials for fabrication and erection.
- Shop fabrication of the storage tanks.
- Hydrostatic testing of the tanks including spare parts necessary for the hydrostatic test.
- Delivery of hydrostatic testing procedure according EN14015.
- Testing and Inspection according EN14015.

- Non Destructive Testing according EN14015.
- Surface treatment as per section 4.9.
- All necessary documentation and certifications according EN 14015.

- Checking measurements of anchor position before and after installation by civil contractor.
- After the foundation is finished there shall be agreement between civil contractor and tank contractor about height, shape, geometry, slope, surface finish and cleanliness of the tank foundation before start of installation of the new tank.
- Delivery of tank uplift forces (anchors) to civil contractor.
- Checking measurements of foundations prior to tank installation
- Delivery and transport from prefabricated tanks from contractor site to the Hexion site in the Botlek including all measures necessary for transporting, lifting and installation of the tanks.
- Provision of all necessary crane equipment, shackles, keys lifting tools, lifting plans and possible lifting site preparation for the completion of the project.
- Delivery of required equipment and material(s).

- Client meetings.
- Site management and supervision including subcontracting.

- Shop hydrotest shall be considered as long as contractor confirms that after transporting the material stresses in the tanks are still within the elastic region.
- Certified calibration of the tanks.
- Tank cleaning and drying after hydrotest. The equipment shall be cleaned in and outside; free from slag, welding scale, oxidation, discoloration, weld spatter, grit or sand, debris, oil, grease, paint, sodium. Contractor shall give prove of above by means of certificate.

- Contractor shall specify design of tanks during bid phase, such as:
    - Thickness of used bottom, shell and roof plates,
    - Roof beam profile,
    - Top curb profile,
    - Type of insulation including provisions, such as insulation rings around nozzles and manholes, supporting, etc.
    - Details for installation of supports for walkways, cage ladders and shall think about minimizing the amount of supports.

- In case of any scope changes, works shall not be started before written approval by Client on estimate cost and planning consequences.

3.2 Exclusions

- Civil works (concrete foundation and tank pit).
- Foam glass and sand/bitumen layers between tank bottom and foundation.
- Installation and delivery of anchors.
- Anchors delivery
- Piping works in tank pit.
- Electrical works.
- Commissioning after hydrotest and after cleaning of the tank.

3.3 Guarantee

Contractor shall provide Mechanical design guarantee for the equipment ensuring that each equipment component shall meet all requirements on this requisition and the datasheet, including safe, flexible and reliable operation of the equipment/components.

4.0 GENERAL DESIGN DATA

4.1 General

Prior to fabrication start, Client must approve calculations, drawings, material specifications, WPS, PQR and welding qualifications.

Contractor is fully responsible for all of the strength and stability calculations necessary for this work.

Roof Load combination according EN14015, art.9.3.3.9:
Live Load* + Vacuum = 1,0 + 0,6 = 1,6 KN/m^2

* Live Load according NEN-EN 1991-1-1 (table NB.4-6.10)

Roof load for roof structure calculation:
Weight roof plates and agitator + Live Load + Vacuum = t.b.d. + 1,0 + 0,6 = t.b.d. KN/m^2

Bottom plates shall be sufficient to resist uplift due to the design internal negative pressure (EN14015, 8.2.3)

Nozzle necks shall protruding through the 100 mm thick insulation. Free spacing between the flange and insulation shall be 50 mm, necessary for bolting.

All manholes (shell and roof) shall be provided with a davit.
Earthing points shall not be installed underneath the manholes and nozzles.

4.2 Transport

Tanks including all attachments shall be capable to withstand the forces during transportation and contractor shall give proof by means of design calculations.

For local loadings stress analysis shall be included, such as for:
- Reaction from lifting lugs,
- Reactions from insulation provisions,
- Nozzle forces and reactions from the installed agitator.

4.3 Tank bottom

The tank bottom is designed with a sloping tank bottom (1:100) with the sump at the side. Thickness of tank bottom 6 mm (minimum) and butt welded.

In the circumference of the tank there needs to be installed a Stainless Steel drip ring with dimensions 100x6 mm.

4.4 Tank shell

The minimum distance between vertical joints in adjacent courses shall be 1/3 of the shell plate length. The tank courses shall be installed inside flush.

It's not allowed to install supports directly on the tank shell.
Patch or reinforcing plates should have a minimum dimension of 100x100 mm with rounded corners R=10 mm.

There shall be installed one insulation ring for support of tank shell insulation. Lower part of insulation as described in section 4.10.

All welds shall be butt welded and shall have full penetration and complete fusion.

4.5 Tank roof

Tank roof shall be in and externally welded.

Connection between tank shell and roof (top corner) shall be designed without top corner profile according EN14015:2004 figure 8a).

There shall be taken into account extra length for the roof plates due to the insulation thickness.
To prevent that rain water is penetrating the insulation there shall be installed a vertical flat bar at the top of the tank shell in the circumference of the roof, see for detail datasheet page 13.

4.6 Walkways and platforms

Walkways and platforms shall be provided with grating; double anti-slip, Hot Dip Galvanized with four fastening points per m^2.

Design walkways and platforms according EN 1990, EN 1991, EN 14015 and EN 14122, for configuration see datasheet.

Contractor shall ensure by means of calculation that tank V-603 is sufficient to carry the extra load from the new walkway between tank V-630 and V-603 including the connection to the existing platform of tank V-603.

Contractor shall deliver and install isolation kits for preventing galvanic corrosion between Carbon Steel and Stainless Steel tank parts.

Hand railing (hand rail, knee rail, toe-board, stanchions) shall be of Carbon steel and Hot Dip Galvanized (HDG). It's not allowed to use hollow profiles (pipes) for handrailing.

Interconnecting walkways between the tanks shall be constructed with one sliding and one hinged point to allow free movement. These walkways shall be Hot Dip Galvanized (HDG) and shall have hand railings on both sides of the walkway.

It is not allowed to make the connection of the new interconnecting walkway on the existing top platform on top of tank V-603 by welding. This shall be a bolted construction or another alternative connection.

4.7 Flange gaskets

Gaskets for shell and roof nozzles shall be of the non-asbestos fire safe type. The gaskets must be compatible with products to be stored in the tank.

Type of gasket; Garlock Gylon 3501 (DIN) or similar.

4.8 Pickling and passivation

After construction completion of the stainless steel tank(s), but before the hydrostatic testing of the tank(s), all external welding seams, scratches and other places that are mechanically damaged shall be cleaned, pickled and passivated.

The inside of the tank shall be pickled and passivated by means of a special "tank-washing device" with continuous circulation of the liquids.

A specialized and experienced firm shall carry out the treatment.

Each passivating treatment shall be followed by rinsing using fresh water and containing < 25 mg/l chlorides.

4.9 Insulation

See datasheet for the type of insulation.

The lower part of the tank shell insulation shall be removable because of inspection purposes, proposal for details by contractor. Insulation and provisions will be carried out according the CINI guidelines.

5.0 ADDITIONAL FABRICATION REQUIREMENTS

5.1 Stainless steel

Special attention shall be paid to the storage of all stainless steel parts and plates. Wooden parts earlier used as separator of carbon steel parts shall not be used.

Stainless steel parts and plates shall be remain protected during fabrication as much as possible.

During tank construction carbon steel and stainless steel shall be separated.

Use of carbon steel tools for the fabrication of the stainless steel tanks is forbidden. If carbon steel slings or chains etc. are used for lifting, stainless steel protection plates shall be used.

It is not allowed to weld carbon steel lifting lugs, scaffolding supports etc. to any part of the tank at any time.

For welding, stainless steel spacer plates shall always be used to maintain the required root opening between the shell plates.

Cutting, grinding and welding of carbon steel nearby unprotected stainless steel shall be avoided. Cutting of stainless steel by means of an acetylene flame is not allowed.

5.2 Tank calibration

For each tank a certified calibration table should be produced, certified by the authorities.

Each (set of) table(s) must contain the amounts of liquid expressed in liters (l) for every millimeter (mm) of liquid level.

The Standards used for the measurement and calibration of tanks are API 2500 and 2501, and ASTM D 1200.

Calibration should be carried out using laser survey service.