Annex L
(normative)

API Standard 650 Storage Tank Data Sheet

L.1 Introduction

L.1.1 Purpose

This Annex provides guidance to Purchasers (owners, engineering contractors, and other designated agents) and Manufacturers (fabricators and erectors) for the preparation and completion of the *Atmospheric Storage Tank Data Sheet* (hereafter referred to as the **Data Sheet**). The Data Sheet shall be prepared in conjunction with this standard such that comprehensive proposals (bids) may be made and subsequent contracts may be placed for the fabrication and erection of tanks.

L.1.2 Scope

This Annex explains information to be placed on the Data Sheet primarily by Purchasers for use by Manufacturers. However, some of the instructions apply to either the Purchaser or the Manufacturer, depending on which party assumes certain responsibilities.

L.2 Use of This Annex

L.2.1 Data Sheet Purpose

The Data Sheet (attached to this Annex) shall be part of a complete tank specification. The Data Sheet provides space for defining specific technical information such as geometry, design loads, materials, and appurtenances, as well as an outline sketch of the tank. The Data Sheet may be used as part of the Owner's permanent record describing the tank. Because some information on the Data Sheet may be determined by the Manufacturer, the Data Sheet may also be used to facilitate gathering of the complete design requirements. The floating roof section of the Data Sheet may be omitted if no floating roof is required for the tank.

L.2.2 Purchaser's Responsibility

The preparer(s) of the Data Sheet shall have tank design experience and shall ensure that the requirements are both accurate and complete. The Purchaser is primarily responsible for initiating and completing the Data Sheet.

L.2.3 Manufacturer's Responsibility

The Manufacturer shall complete the Data Sheet as required to describe the proposal and shall provide the relevant information required on all lines marked with an asterisk (*) that have not been provided by the Purchaser. The Data Sheet shall be submitted at various times during the project as described in W.1.2(2).

L.2.4 Text Legibility

All text placed on the Data Sheet shall be of size and quality to be readable and reproducible. Use additional sheets or extend the form electronically for more space or necessary additions.

L.3 Specific Instructions

L.3.1 Line-by-Line Instructions

Each place for data entry (numbered lines, boxes, table cells, etc.) on the Data Sheet shall be completed. In no case should a line be left blank. Marking “NA” (not applicable), “Later,” “TBD” (to be determined), or other such terminology can be used. The “Later” and “TBD” notations shall be edited to reflect subsequent decisions and as-built configurations (see W.1.2).

Use consistent units for all dimensions and other data on the Data Sheet. *Show appropriate units for every appropriate numerical entry.*

The following numbered items correspond to the numbered lines and numbered tables on the Data Sheet:

Heading:

Data Sheet Status: Typical entries include: For Quotation, Bid, For Design Review, For Design Revision, and As-Built. Revise to suit the status when submitted by the Purchaser or by the Manufacturer.

General:

— Special Documentation Package Requirements: List any exceptions to the default requirements listed in Annex W.

— Measurement Units to be used in API 650: Identify the set of units to be used when applying the rules in API 650.

1. Tank Manufacturer

— Manufacturer’s name.*

— Contract number*: Enter proposed or assigned number.

— Address*: Enter physical address, not a post office box.

— Manufacturer’s serial number for tank.*

— Year built.*

— Edition and Addendum of API 650 used for design and fabrication.*

2. Purchaser

— Purchaser’s name.

— Contract number or designation.

— Address: Enter physical address, not a post office box.

— Tank designation: For example, item number, equipment tag number, or other description.

3. Owner/Operator

— Owner/operator name.

— Location of facility where tank will be operated.

- 4. Tank Dimensions

  — Size Limitations*: Specify size limitations only when exact dimensions are to be determined by the Manufacturer (e.g. maximum and minimum diameters, shell heights, overall heights, etc.).

  — Tank Diameter*: Specify diameter and indicate ID, OD, or CL/BSC (centerline diameter of bottom shell course).

  — Shell Height*: Specify the distance from the top surface of the bottom plate or annular ring to the upper edge of the cylindrical shell including top angle, if any.

  — Maximum Capacity* and Net Working Capacity*:

  — Criteria*: Method used to determine capacity of tank: An example would be *API 2350.*

- 5. Products Stored

  — Liquid: Specify liquid(s) to be stored in the tank.

  — Design Specific Gravity: Enter the maximum specific gravity of the stored liquid(s) at designated temperatures. Use greatest value of all products when tanks are to be designed for multiple products.

  — Minimum Design Specific Gravity for floating roof design: Enter specific gravity of the stored liquid(s) at designated temperatures. Use lowest value of all products when tanks are to be designed for multiple products.

  — Blanketing Gas: Specify blanketing gas in the space above the liquid.

  — Vapor Pressure: Specify absolute vapor pressure at the maximum operating temperature. Use the largest value for tanks designed for multiple products.

  — % Aromatic: Specify percentage by weight of aromatic hydrocarbons in tank. Refer to any supplemental specification for protecting the materials of construction, as applicable.

  — Hydrogen Sulfide Service? (Yes/No): If “Yes,” a supplemental specification for material selection and hardness shall be required. See 5.3.4.

  — Other Special Service Conditions: Include any conditions that may require further consideration. Consider thermal expansion or shock, cyclic vibratory fatigue, and issues or regulations concerning the product stored, e.g. chloride, caustic, amine, or ethanol corrosion, hydrogen blistering or embrittlement, oleum, sulfuric acid, or ammonia service, RCRA (Resource Conservation and Recovery Act), HON (Hazardous Organic National Emission Standard for Hazardous Air Pollutants), RMP (Clean Air Act Risk Management Plan), etc. Provide supplemental specifications as needed. See 5.3.3.

Design and Testing:

Purchaser to Review Design Prior to Ordering Materials: Indicate if the Manufacturer is free to order materials prior to Purchaser reviewing the design documents. Schedule may be affected. See W.1.3.

6. Applicable Annexes*: See 1.1.6. Annex E may be selected on Line 8 of the Data Sheet. If no Annexes are chosen, the basic design of this standard is intended.

7. Design Parameters

  — Maximum Design Temperature: See 3.22 for definition. This differs from the operating temperature. For temperature limits, see 1.1.1, and Annex M and Annex S. If the roof design temperature is different than the

shell temperature, as in the case of an uninsulated roof on an insulated shell, then use Line 23 to specify the roof maximum design temperature.

— Design Metal Temperature*: Enter either lowest 1-day mean temperature plus 8 ºC (15 ºF) or a lower temperature as specified by the Purchaser if operating conditions and/or local atmospheric conditions control fracture toughness issues.

— Design Liquid Level*: See 5.6.3.2, C.3.1.1, and E.2.2.

— Design Internal Pressure: Specify internal pressure and units in the vapor space. See 5.2.1 c).

— Design External Pressure: Specify external pressure and units in the vapor space. See 5.2.1 b).

— Internal Pressure Combination Factor (F_{pe}): This factor is a modifier for the design internal pressure when used in load combinations with other variable loads. Value equals normal operating internal pressure/design internal pressure or a minimum of 0.4. Manufacturer to use 0.4 when not specified.

— External Pressure Combination Factor (F_{pe}): This factor is a modifier for the design external pressure when used in load combinations with other variable loads. Value equals normal operating external pressure/design external pressure or a minimum of 0.4. Manufacturer to use 0.4 when not specified.

— Maximum Fill Rate: Specify rate and units (e.g. 100 gallons per minute).

— Maximum Emptying Rate: Specify rate and units (e.g. 75 gallons per minute).

— Flotation Considerations (Yes/No): Include design consideration that advise the Manufacturer about tank flotation anchorage, bottom uplift, and partial submersion pressures arising out of flood or dike impoundment.

— Flotation Supplemental Specifications*: Refer to any that may describe external liquid depth, external fluid specific gravity, minimum internal liquid level, and any other information necessary for design.

— Section 5.2.4 makes the design criteria here a matter of agreement between the Purchaser and the Manufacturer.

— Applied Supplemental Load Specification: Refer to supplemental specifications that provide concentrated loads applied to the shell, such as openings or appurtenances from attached equipment, valves, or piping, or reactions from stairs and platforms for determination of strength and stiffness issues by the Manufacturer. If this information is not provided, the requirements of W.2(5) still apply.

- 8. Seismic Design Data

— Seismic Design? (Yes/No): Indicate whether design for earthquakes is required. The Purchaser may specify Annex E, or an alternate criterion.

— Annex E: Mark the box provided if this Annex shall be used for seismic design.

— Alternate Seismic Criteria: Refer to any supplemental criteria different from this standard that shall be followed. All required design factors shall be included in this supplemental specification.

— Seismic Use Group: See E.3.1.

— Site Class: See Table E.4-B.

— Vertical Seismic Design: Indicate if this design is required.

— Vertical Ground Motion Accelerator: Provide per E.6.1.3.

— Basis of Lateral Acceleration: Select one of the three methods listed, and specify the appropriate parameters. See E.4.

— Freeboard: For SUG I designs, indicate if freeboard is required. See E.7.2.

— Roof Tie Rods @ Outer Ring?* (Yes/No): See E.7.5

- 9. Design Wind Issues

— Top Wind Girder Style*: See 5.9, and Figure 5.24, for open-top and external floating roofs.

— Dimensions of Top Wind Girder*: For example, if style were “Curb Angle,” the dimension might be $3 \times 3 \times {}^{3}/_{8}$ (in.).

— Use Top Wind Girder as Walkway? (Yes/No): See 5.9, and Figure 5.25, and note 3 ft-6 in. dimension preference of 5.9.5.5 if choice is “Yes.”

— Intermediate Wind Girders* (Yes/No): Specify “Yes” whenever wind girders shall be added to the shell to satisfy shell stability stiffening predicated by wind loads. Specify “No” if shell stiffening is to be accomplished by increasing the shell thickness. If not specified by the Purchaser, the Manufacturer must select between the two alternatives and indicate the choice here.

— Intermediate Wind Girder Style*: See 5.9 and Figure 5.24, for all kinds of tanks whenever wind girders are specified.

— Dimensions of Intermediate Wind Girders*: For example, if style were “formed plate,” dimension might be b = 30 in. per Figure 5.24.

— Check Buckling in Corroded Condition? (Yes/No): If “Yes,” the wind load shall be applied to the corroded shell (an option covered in 5.9.6.1) to establish the adequacy of the thicknesses and/or stiffening rings to resist the applied forces.

- 10. Shell Design

— 1-Foot Method?* (Yes/No): The Purchaser may select this shell thickness design method. The method is subject to the applicable limitations noted in 5.6.3, A.4, J.3.3, and S.3.2. If not selected by the Purchaser, the Manufacturer may select either this design method or one of the other two methods that this standard lists, subject to the restrictions of this standard and the Purchaser’s approval.

— Variable-Design-Point Method?* (Yes/No/Alternate): The Purchaser may select this shell thickness design method. This method is subject to the restrictions detailed in 5.6.4. If the 1-Foot Method or Elastic Analysis Method is selected by the Purchaser and the Variable-Design-Point Method is also selected as an “Alternate” by the Purchaser, the Variable-Point Design Method may be used in addition to the Purchaser-selected method, but the resulting proposal must be clearly marked as an “Alternate.” If the method is not selected by the Purchaser, the Manufacturer may select either this design method or one of the other two methods that this standard lists, subject to the restrictions of this standard and the Purchaser’s approval.

— Elastic Analysis Method?* (Yes/No/Alternate): The Purchaser may select this shell thickness design method. This method is subject to the restrictions detailed in 5.6.5. Cases when this method is mandatory are named in 5.6.5 as well as requirements on the analysis boundary conditions. When it is not mandatory, the

Purchaser may select this shell design method. If the 1-Foot or Variable-Design-Point Method is selected by the Purchaser and the Elastic Analysis Method is also selected as an “Alternate” by the Purchaser, the Elastic Analysis Method may be used in addition to the Purchaser-selected method, but the resulting proposal must be clearly marked as an “Alternate.” If the method is not selected by the Purchaser, the Manufacturer may select either this design method or one of the other two methods that this standard lists, subject to the restrictions of this standard and the Purchaser’s approval.

— Plate-Stacking Criteria* Centerline-Stacked? (Yes/No) or Flush-Stacked on the Inside or Outside? (Yes/No)?

— Plate Widths (Shell Course Heights) and Thicknesses*: Specify nominal shell course heights and thicknesses. The first course is attached to the bottom.

— Joint Efficiency*: Specify in percentage. Applicable only to Annex A, Annex AL, Annex J, Annex S, and Annex X designs. Mark “NA” for all other designs.

— Shell-to-Bottom Weld Type*: See Figure 5.3A (inside and outside corner fillets), Figure 5.3C (inside and outside partial penetration corner welds with fillet weld reinforcement), and J.3.2.4 (full penetration butt weld to flanged flat bottom).

— Shell-to-Bottom Weld Examination Method*: Choose among the options listed in accordance with 7.2.4.

— Exceptions to Seal-welded Attachments (see Section 5.1.3.7): Specify where intermittent welding is permitted.

- 11. Open-Top and Fixed-Roof Data (see page 6 of the Data Sheet for Floating Roofs)

— Open Top?* (Yes/No) Specify “Yes” if tank has no fixed roof or has an external floating roof. Specify “No” for all other tanks.

NOTE The remaining entries in this line apply to fixed roofs ONLY:

— Fixed Roof Type*: Enter description, such as supported cone with internal structure, supported cone with external structure, structurally-supported aluminum geodesic dome, self-supporting cone, self-supporting dome, self-supporting umbrella, flanged only flat top, or other. See 5.10.1 or Annex G.

— Roof Support Columns*: Specify pipe or structural shape. If structural shape is specified, indicate the kind (e.g. wide flange, back-to-back channel, etc.).

NOTE Pipe-type roof columns are preferred for internal floating roof tanks. In many cases the openings are $^{3}/_{4}$ NPT threaded couplings that allow the user to plug the openings when the tank is in service, to minimize corrosion of the supports and reduce emission from the tank. The openings are needed to allow the free drainage and cleaning of the columns when the tank is out of service.

— Cone Slope*: Specify rise to run as a dimensionless ratio, e.g. “$^{3}/_{4}$:12”.

— Dome or Umbrella Radius*: See 5.10.6 for self-supporting approximate spherical radius of roof.

— Weld Joints*: Describe the type of roof plate weld joint, which may be lap joint, butt joint, or some combination thereof.

NOTE DELETED

— Seal Weld Underside of Lap Joints? (Yes/No): May be required for roof plates with internal lining or to prevent crevice corrosion.

— Seal Weld Underside of Wind Girder Joints? (Yes/No): See 5.1.5.8.

— Gas-tight? (Yes/No): See 7.3.8.

— Joint Efficiency*: Use only for Annex F, Section F.6 roofs.

— Thickness*: Provide nominal thickness of roof plates.

— Snow–Load*: Purchaser to provide the snow load for non-U.S. Sites. For non-US sites, the Manufacturer should indicate the 50-year ground snow load selected. See 5.2.1e. For instructions on combining loads, see 5.10.2.1.

— Applied Supplemental Loads Specification*: Indicate supplementary specifications for both dead and live roof loads that are concentrated or have local distributions (e.g. the personnel loads of 5.8.6.2 and H.4.2.2). Specify any reactions from platforms or walking surfaces as well as loads applied by equipment, valves, and piping.

— Column Lateral Load: Purchaser may optionally specify lateral loads imposed upon roof-supporting columns in accordance with 5.10.2.9.

— Venting Devices*? Enter type and quantity of devices for normal venting per API Standard 2000, and pressure settings. Also, enter type(s) and quantity of emergency venting devices that meet either API Standard 2000, circulation venting per Annex H, or a frangible roof design per 5.10.2.6, as applicable. Also enter any special requirements for vents in areas where ice and snow may block vents. The frangibility of tanks less than 50 ft in diameter may require additional design considerations beyond those required by this standard.

— For Non-Frangible Roofs:

— Seal Weld Roof Plates to Top Angle on the Inside? (Yes/No): When “Yes” is selected, the shell-to-roof-joint shall be seal-welded on the inside. For certain designs, this may adversely affect frangibility.

— Weld Rafters to Roof Plates? (Yes/No):

— Roof-to-Shell Detail*: See Figures 5.3A and F.3, J.3.5, and API 620, Figure 5-6.

— Radial Projection of Horizontal Component to Top Angle*: Specify inward or outward projection.

• 12. Required Bottom Data

— Thickness*: Enter nominal thickness, including corrosion allowance.

— Style*: Enter one of the following: flat, cone up to center, cone down to center, side to side (tilted plane), cone down to off-center. Enter all sump requirements (number, size, location, etc.) in Data Sheet (Table 3, Line 23, or on the Tank Plan).

— Slope*: Enter rise versus run. For the off-center style above, the slope specified is the maximum slope.

— Weld Joint Type*: Enter one of the following: single-welded full-fillet lap joint, single-welded butt with backing strip that remains in place, double-welded butt without backing strip, double-welded full-fillet lap joints, or other, to be detailed on Data Sheet Line 23 if necessary.

— Provide Drip Ring (Yes/No): If required, a drip ring shall be provided per 5.4.5. Unless the following Alternate Specification is provided, the default drip ring shall be provided.

— Alternate Specification: Refer to an acceptable drip ring design specification if the Purchaser requires a drip ring but declines the default design of 5.4.5.

— Annular Ring* (Yes/No): The Purchaser may stipulate this type of detail even if not required by this standard. A Purchaser's choice of "No" does not relieve the Manufacturer from complying with the requirements of this standard in this regard.

— Annular Ring Minimum Radial Width* and Thickness*: Specify width and thickness.

• 13. Foundation Information

— Furnished by*: Indicate Purchaser, Manufacturer, or others.

— Type*: Indicate materials and form. See Annex B and Annex I (e.g. concrete ring-wall or steel wide flange grillage on concrete pile cap).

— Soil Allowable Bearing Pressure*: Estimate pressure from geotechnical report, experience with similar tanks in the same area, etc.

— Per Specification*: Refer to any specification that describes soil allowable bearing pressure.

— Anchor Size*: See 5.3.1.1 and 5.12. Provide materials of construction, geometric forms, and corrosion allowance for anchors in Table 2 of the Data Sheet.

— Anchor Quantity*: Indicate the total number of anchors or anchor bolts to be provided.

— Foundation Design Loads: See W.3(15). These loads are unfactored after the manner of the Allowable Stress Design methodology. (Sign convention is as follows: positive acting downward, negative acting upward.)

— Base Shear*: Indicate the values for the wind and seismic conditions in units of force.

— Overturning Moment*: Indicate in units of force-distance. See 5.11 for wind, and Annex E, or alternate seismic criteria as specified on Line 8 of the Data Sheet**,** for seismic criteria.

— Ring Forces*: Indicate loads delivered by the shell in units of force per circumference of shell.

NOTE 1 Note: The uniformly distributed loads are shell plus roof weight (both new and corroded), roof live load, internal pressure, and partial vacuum.

NOTE 2 Note: The non-uniform loads are the peak magnitudes of the longitudinal compressive distributed force derived from the wind and seismic-overturning moments without regard to any other compressive or tensile loads in the shell.

— Bottom Forces*: Indicate support loads that are the uniformly applied forces to the bottom away from the shell ring in units of force per unit area. These include weight of bottom plates, product and test liquid weights, and pressure/vacuum loads. Mark all inapplicable entities as "NA." For the hydrostatic test exemption, product load shall be based on 1.1 times the specific gravity of the stored product or 1.0, whichever is greater.

— Other Foundation Loads*: Provide an attachment to describe these loads such as lateral soil pressure, overburden, roof column reactions, pore pressure, uplift anchor forces, etc.

— Minimum Projection of Foundation Above Grade: Specify the minimum required projection of the foundation above grade, if any.

• 14. Pressure Test (See 7.3.6)

— Responsibility for Heating Test Water, if Required: Select one.

— Hydrostatic-Test Fill Height*: See 7.3.6, F.4.4, and F.8.3. Hydrostatic Test Exemption (Yes/No): Purchaser may waive hydrostatic test with water per 7.3.6, Item 2).

— Welded joints to be coated after hydrostatic testing is performed, unless otherwise specified (see 7.3.7.2).

— Settlement Measurements (Yes/No): Purchaser may waive the measurement of foundation settlement during the hydro-test in accordance with 7.3.7.7.

— Extended Duration of Hydro-Test: Provide the number of hours or days if the tank is to be kept full of water for an extended period.

— Predicted Settlement Profile is Attached: Check if the Purchaser elects to inform the Manufacturer of relevant settlement predictions.

— Responsibility for Setting Water Quality: Specify party responsible for setting water quality standards. Refer to supplemental specifications as required. For guidance, see 7.3.7.4.

— Test Water Source and Disposal Tie-In Locations: Provide the location of the supply and disposal points for hydro-test water that the Manufacturer shall use.

— Test Requirements for Annex J Tanks: Hydrostatic Testing (Yes/No): If “No” is selected, the Purchaser must specify the required Alternative Test from J.4.2.2.

— Penetrant Testing Allowed in lieu of Hydro-Testing: Check if there is no means of providing test water at the tank site, e.g. very remote tank sites. See 7.3.6.

— Post-Pressure-Test Activities Required of the Manufacturer: Select the activities desired according to 7.3.7.3, Item 4).

• 15. Optional Fabrication, Erection, Inspection, and Testing Requirements

— Inspection by: Designate Purchaser’s inspectors. See 7.3.1.1.

— Supplemental NDE (Non Destructive Examination) Responsibility and Supplemental NDE Specifications: Specify NDE options (e.g. see 8.3.5) or indicate additional NDE options, such as weld hardness testing or additional radiographs. For possible additional responsibilities, see 7.3.2.3.

— Positive Material Identification (Yes/No): Include criteria to be followed.

— Maximum Permissible Plate Thickness for Shearing: Specify the thickest plate to be butt-welded that may be sheared in accordance with 6.1.2.

— Must Welds not exceeding 6 mm ($^1/_4$ in.) or welds greater than 6 mm ($^1/_4$ in.) be Multi-Pass? (Yes/No): See 5.1.3.6

— Leak Test Method*: Describe leak tests for each component. For example, see 7.3.3, 7.3.5, 7.3.6, 7.3.8, C.3.6, and H.6.2.

— Modify or Waive API Dimensional Tolerances (see 7.5)? (No/Yes/Specify): If the API tolerances are not adequate, specify the required tolerances here.

— Specify Additional Tolerances, if any, and Circumferential and Vertical Measurement Locations: Indicate any supplemental tolerances for plumbness and roundness, giving the tolerance limit and the locations for the tolerance readings.

NOTE If Additional Radial Tolerance measurements are specified, radial tolerances measured higher than 0.3 m (1 ft) above the shell-to-bottom weld shall be three times the tolerances given in 7.5.3, unless specified otherwise by the Purchaser.

- 16. Coating Data

— Internal Linings by: Describe responsible party or indicate “Not Req’d.”

— Per Specification*: Refer to supplemental specifications to address the detailed coating/galvanizing requirements for items such as internal structural supports, inside surface of roof, bottom, piping flanges, stairs, platforms, ladders, underside of bottoms, and top surface of foundation. Ensure that all requirements address issues such as joint contour preparation (e.g. shell-to-bottom, sharp edges of laps, crevices, etc.) and reduced weld build-up or undercut. For guidance on internal bottom linings, see API 652.

— External Coating by: Describe responsible party or indicate “Not Req’d.”

— Per Specification*: Refer to any supplemental specification fully describing the process.

— Under-Bottom Coating by: Describe responsible party or indicate “Not Req’d.”

— Per Specification*: Refer to a supplemental specification fully describing the process.

- 17. Cathodic Protection

— Cathodic Protection System? (Yes/No): See API 651 for guidance.

— Per Specification*: Describe requirements and responsible parties.

- 18. Leak Detection System

— Leak Detection System? (Yes/No): Provide a passive leak detection system as described in Annex I. Active elements may be specified; however, the system must also provide leak detection by passive means. If active leak detection schemes (e.g. volumetric inventory records, mass change, acoustic emissions sensing, and tracer element detection) are required, describe the requirements by means of a specification herein.

— Per Specification*: Describe requirements and responsible parties.

- 19. Release Prevention Barrier (See Annex I, I.1.1, Note, for definition.)

— Release Prevention Barrier? (Yes/No): Examples of barriers are vault floors, double bottoms, and impermeable membranes.

— Per Specification*: Describe requirements and responsible parties.

- 20. Tank Measurement System

— Required? (Yes/No): Examples are float gauge, differential pressure level indicator, level alarm, radar, and level gauge.

— Type: Float and tape gauge, servo gauge, radar gauge, hydrostatic gauge, MTG multifunction gauge, and/or other gauge.

— Remote Capability Required? (Yes/No): Indicate whether level measurements are required to be relayed to remote control stations.

— By*: Designate the provider of the measurement system.

— Per Specification*: Refer to supplemental specification.

- 21. Tank Weights and Lifting Requirements

— Full of Water*: Indicate weight filled with water to design liquid level.

— Empty*: Indicate weight when empty. For specification of lift lugs, see Data Sheet, Line 28. For tanks that are to be lifted, rigging and handling instructions and temporary bracing may be required. Provide reference to a supplemental specification as required.

— Shipping*: Specify weight for Annex J tanks only.

— Brace/Lift Specification*: Refer to any supplemental bracing/lifting specifications.

- 22. References: Include relevant documents.

- 23. Remarks: Use this for issues not adequately covered elsewhere. Include any alternate shell opening designs specified by the Purchaser in accordance with 5.7, with reference to the alternate criteria (e.g. API Standard 620).

- **Table 1 Materials of Construction:**

List material specifications (e.g. CSA G40.21M-260W, ASTM A573-65, ISO 630 Gr E355-C, etc.), and supplied thickness of items in the left column only.

State corrosion allowance for each component. See 5.3.2. For internals, indicate if the corrosion allowance is to be applied to each exposed surface. Unless indicated otherwise, it applies to the total thickness specified. Show units of measure.

Any materials that either have received any heat treatment, such as normalizing, beyond the minimum heat-treating requirements of the material specification or have been qualified by impact tests shall be identified by reference to notes located under the “remarks” lines. The notes shall define the heat treatment received and/or the energy acceptance levels, test temperature, and specimen orientation for impact tests.

When thermal stress relief is applied to a part in accordance with the requirements of 5.7.4, the part shall be identified by a note under the “remarks” lines.

- **Table 2 Bolts and Anchors:**

Complete all bolting and anchorage information (see 4.7, 5.12, E.6.2.1.2, and J.3.9), including head and nut shape and material specifications. Show units of measure for the corrosion allowance and see 5.3.2. Corrosion allowance may be marked “NA” for galvanized, special corrosion-resistant coated, or stainless steel anchor bolts.

- **Table 3 Nozzle and Manhole Schedule* (for Fixed Roof, Shell, and Bottom):**

Include nozzles (e.g. both blanked and piped-to connections), equipment and instrument attachment and access openings, sumps, inspection ports, and manholes in the fixed roof, shell and bottom.

The description of, and examples for, the information that may be specified in Table 3 is as follows:

Entry Field	Comments	Representative Example
Mark	Purchaser's mark or designation	Nozzle "A-1" in shell
Service	Stated service or purpose	Product Out
Size, NPS, or Diameter (in.)	Conventional size description of pipe and tube	NPS 24
Neck Schedule or Wall Thickness	Pipe schedule or wall thickness	Sch 40S
Reinf. Plate Dimensions	Circular, Diamond, etc.	49.5 in. OD × 0.188 in.
Full Pen. On Open. (Y/N)	See 5.7.2.2	Yes
Flange Type	Fabricated, S.O., WN, LJ, etc.	ASME B16.5 Lap Joint
Flange Class or Thickness	ASME, ANSI, API Standard 650 Table	Cl 150
Gasket Bearing Surface Dimension and Finish	Dimension and finish of bearing surface in contact with gasket	27.25 in. OD, 125 to 250 R_a μ-in.
Gasket Thickness and Dimension		0.125 in. × 24 in. ID × 28.25 in. OD
Gasket Material and Description	Generic, Brand, ANSI Std, etc.	Non-asbestos sheet, per Manufacturer
Proj. to FF or CL or from Datum Lines	See paragraph below	18" FF

ASME B16.47 flanges are not available in all sizes, materials, and flange types (see 5.7.6.1).

NOTE Lap joint nozzle flanges should be avoided in connections where the combined stresses (such as bending, cyclic, and seismic) in the nozzle where attached to the lap joint stub-end exceed the API 650 basic allowable stress at the maximum design temperature. Lap joint nozzle flanges should also be avoided in connections with vibration or when susceptible to environmental stress corrosion cracking.

Nozzle projections shall be measured from the outside of the shell to the face of the shell flange (FF) and from datum line to the face of the flange for roof and floor openings, unless otherwise specified. Shell opening elevations shall be from the datum line to the centerline of the opening, unless otherwise specified. Roof opening locations shall be measured radially from the centerline of the tank. Specify datum line and elevations with orientations on the "Tank Plans and Sketch" of the Data Sheet.

For fabricated flanges requiring ASME *Boiler and Pressure Vessel Code,* Section VIII, Division 1, UG-34 and Annex 2 calculations, place the "m" and "y" values for the gasket in the "Remarks" section of the Data Sheet, Line 23. Clearly indicate to which gaskets these values apply.

Consider listing in Table 3, items such as:

— water draw-offs;

— thermowells (make, model, stem length);

— suction trough (size, reference drawing);

— couplings (number, size);

— sump;

— inspection hatches for observation of floating roofs (as specified on Line 34).

Some items require that supplemental information be supplied, such as reference drawings, model numbers, and other specifications. Provide any supplemental information on Line 23.

Other Tank Appurtenances:

- 24. Platform, Stairway and Railing: See 5.8.10 and C.3.14.6.

    — Galvanizing Required? (Yes/No)*: Examples are stairways, platforms, and handrails to be galvanized. Identify components in Remarks, Line 23. See S.2.1.3.

    — Stairway Style*: Specify whether straight along a radius or helical.

    — Walking Surface Type*: Describe type of walking surface on platform and stairs (e.g. diamond-checkered pattern plate, bar and rod grating, expanded metal grating, fiberglass reinforced plastic, carbon fiber, or other nonmetallic composites, etc.).

    — Handrail height*: If required, specify a separate handrail height from 760 mm to 970 mm (30 in. to 38 in.).

    — Tread rise/run*: Specify tread rise and run for the stairway.

    — Stairway and Walkway Clear Width*: See 5.9.5.5, Table 5.17, and Table 5.18.

    — National Safety Standards*: Indicate all standards that shall be observed for ladders, stairs, walkways, platforms, and other architectural/structural items (e.g. OSHA 1910).

    — Architectural/Structural Specification*: Provide details for material (fiberglass reinforced plastic, carbon fiber, steel specification, shapes, fasteners, coating, etc.). When specifying a nonmetallic composite material as a structural component (e.g. stairway, platform, walkway, handrail), consider its fire rating.

    — Gauger’s Platform Required? (Yes/No).

    — Quantity of Gauger’s Platforms Required*.

    — Per Specification*: Refer to any supplemental specification, if gauger’s platform specification differs from the architectural/structural reference specification above.

- 25. Jackets and Other Heaters or Coolers

    — Is a Jacket Required? (Yes/No)*: If Yes, a supplemental specification may be required to address some or all of the following items.

        a) Should the jacket be integral (utilize the shell as one boundary wall) or stand-alone (able to hold pressure when detached from shell).

        b) How should the jacket be attached to the shell? Specify whether welded, bolted, or otherwise attached.

        c) What type of jacket is required? Consider annular cylinder, pipe coil, half-pipe helix, panel coil, or other types to be described.

— Are Other Heaters or Coolers Required? (Yes/No)*: If Yes, a supplemental specification may be required to address some or all of the following items.

a) Specify the type of heater or cooler. For example, internal coils, bayonet heat exchangers, or below bottom piping.

b) Provide specifications for any other heaters or coolers.

c) Specify design pressures for jacket or heaters or coolers, both internal pressure and partial vacuum.

d) Specify design temperatures for jackets and heaters/coolers.

- 26. Mixer/Agitator

— Quantity: Indicate number required.

— Size*:

— Per Specification*: Provide reference to supplemental specification.

- 27. Insulation Data

— Required? (Yes/No).

— Thickness*: Indicate thickness of insulation in inches.

NOTE If not uniform for entire tank shell and roof, defer to Purchaser-supplied supplemental insulation specification.

— Material*: Designate material and density of insulation.

— Per Specifications*: Provide references to insulation and insulation support specifications.

— Responsibility for Insulation and Installation: Indicate Purchaser, Manufacturer, or others.

- 28. Structural Attachments

— Lift Lugs for Maintenance or Installation?* (Yes/No): Specify projection if insulation is required.

— Description*: Describe the type of lifting lugs required.

— Shell Anchorage?* (Yes/No): Wind or seismic loading may require anchorage. See 5.11, 5.12, and Annex E and Annex F.

— Type*: Specify type of shell anchorage (e.g. chairs, lugs, sleeves, rings, straps, etc.).

— Scaffold Cable Supports? (Yes/No): Indicate if required. See Figure 5.22.

- 29. Various Other Items

— Flush-Type Shell Connection and Flush-Type Cleanout Fitting: Mark the blocks indicating which type(s) is required. See Figure 5.12 and Figure 5.14.

— Waive Application of Annex P: Indicate if the Manufacturer is required to analyze nozzle loads in accordance with Annex P. It is not intended that this Annex necessarily be applied to piping connections similar in size

and configuration to those on tanks of similar size and thickness for which satisfactory service experience is available. See Annex P for limitations.

— Enter miscellaneous items not found elsewhere on the Data Sheet.

- **Table 4 Other Tank Appurtenances Schedule*:**

Include all appurtenances not described elsewhere on the Data Sheet.

Consider listing in Table 4 such items as the following:

— ladders;

— overflow openings (number and size), see H.5.3;

— circulation vents (number and size), see H.5.2.2;

— pressure-vacuum relief valves (nominal size, model number, etc.);

— free vent/flame arrestor;

— grounding clips (quantity and style);

— inlet Diffusers (if Purchaser specified, include details or design criteria).

Some items require supplemental information, such as reference drawings, model numbers, and other specifications. Provide any supplemental information on Line 23.

- **Floating Roof Data:**

30. Floating Roof Selection

— Design Basis: Check which API Annex is to be applied?

— Type of Roof*: Specify the option listed in Annex C or H. Only the Purchaser may specify “Other” and describe another option.

- 31. Seals

— Primary Seal: Select from types listed, or specify “Other” and supply necessary details or reference specification. Foam seal material may absorb some products over time, becoming a potential safety issue. See C.3.13 and H.4.4.

— Shoe Mechanism: Indicate mechanism required for mechanical primary seal. Select the Manufacturer’s standard, or specify a particular type (e.g. pantograph, leaf spring, safety-pin spring, coil spring scissors, etc.).

— Electrically Isolate Mechanism from Shoes? (Yes/No): Indicate if required to insulate to prevent possible arcing.

— Wax Scrapers Required? (Yes/No): Such devices remove wax-like substances from the tank shell as the roof descends to provide a cleaner sealing surface.

— Nominal Shoe Thickness*: Include units. See C.3.13 and H.4.4.4.

— Carbon Steel Shoes to be Galvanized? (Yes/No): This option cannot be selected for stainless steel shoes.

— Secondary Seal: Indicate the need for a secondary seal.

— Supplementary Specification: Refer to supplementary specification for secondary rim seal.

• 32. Data for All Floating Roofs:

— Overflow Openings in Shell Acceptable? (Yes/No): See C.3.1.1.

— Shell Extension? (Yes/No): Select a windskirt per C.3.1.1. If Yes is selected, this may affect capacity, design liquid level, and the need for an overflow indicator (alarm), requiring a Purchaser-supplied supplemental specification under Line 20. See API 2350.

— Roof-Drain Check Valves Required? (Yes/No): See C.3.8.1.

— Roof-Drain Isolation Valves Required? (Yes/No): See C.3.8.1.

— Freeze Protection for Roof Drains Required? (Yes/No): See C.3.8.1. Freeze protection is not required in all climates.

— Roof-Drain Piping to External Nozzles: Select the type of piping from the blocks provided. If “Other” is selected, provide description or reference supplemental specification. The number of roof drains required and sump details shall be shown on the construction drawings.

— Foam Dam? (Yes/No): See C.3.16.2.

— Supplementary Specification: Provide supplementary foam dam specification reference.

— Nominal Deck Thickness*: Specify a nominal deck thickness greater than that stated in C.3.3.2. If not specified, the Manufacturer shall insert the thickness stated in the above reference.

— Bulkhead Top Edges to be Liquid-Tight? (Yes/No): See H.4.1.8. This is mandatory for external floating roofs but is a Purchaser’s option for internal floating roofs.

— Seal-Weld Underside of Roof?: Select “Yes” to provide increased corrosion protection or additional stiffness. This applies to seal welds in addition to the seal welding required in C.3.3.3 and H.4.3.5.

— Electrical Bonding: Indicate if either shunts or cables will be used to bond the roof electrically to the shell, and provide a supplemental specification to designate any technical requirements.

— Quantity of Non-Guide Pole Gauge Wells Required: See C.3.14.1(2), for manual gauging apparatus in wells not associated with a guide pole.

— Quantity of Sample Hatches Required: See C.3.16.3 for sample hatches without gauging apparatus.

— Guide Pole for Gauging? (Yes/No): Indicate whether the guide pole (anti-rotation device) shall be used for gauging.

— Slots in Guide Pole? (Yes/No): Indicate whether guide pole, if used for gauging, shall be slotted.

— Datum Plates? (Yes/No): Indicate if required. See C.3.14.4.

— Striking Plates? (Yes/No): Indicate if required. See C.3.14.5.

— Guide Pole Emissions-Limiting Devices: Indicate any required by regulation or any additional devices requested by the Purchaser for guide poles from the list provided. See C.3.14.1(1).

— Quantity of Roof Manholes*: See C.3.5, C.3.11, and H.5.5.

— Alternative Roof Clearances Above Bottom: Indicate elevations above the bottom to the landed floating roof for both the minimum operating level and the minimum maintenance level. These choices affect access and capacity. See C.3.10.3, H.4.6.2, and API 2350.

— Removable Leg Storage Racks? (Yes/No): Indicate if required.

— Leg Sleeves or Fixed Low Legs: Mark the block that specifies whether the leg-supported floating roof shall be provided with a sleeve through the roof plate or with fixed low legs.

- 33. Additional Data for External Floating Roofs (See Annex C):

— Weather Shield? (Yes/No): Indicate the need for a weather shield on external floating roofs. If secondary rim seals serve as weather shields, they shall not be additionally requested here.

— Supplementary Specification: Provide references for weather shield specifications.

— Rolling Ladder Required?* (Yes/No): Unless the Purchaser specifically declines here, a rolling ladder is to be provided in accordance with C.3.7.

— Must Each Leg be Field-Adjustable? (Yes/No): Indicate if required. If potential bottom settlement is an issue, the Purchaser has the option to require a two-position removable leg that can accommodate local adjustments that may differ for each leg. This option is for all floating roofs and is specifically discussed in C.3.10.3.

— Design Rainfall Intensity: Specify a rainfall rate, a minimum period of duration, and an association with a statistically occurring storm such as that found in Technical Report No. 40 (e.g. 0.5 in. per hour for 5 minutes for the 2-year storm).

— Design Accumulated 24-hour Rainfall: Specify height of water accumulated in 24 hours associated with a statistically occurring storm (e.g. 12 in. in 24 hours for the 100-year storm). See C.3.4 for minimum requirements.

— Out-of-Service Drains Required (Yes/No): Purchaser may choose to not have these drains installed. See C.3.8.3.

— Distortion and Stability Determinations Required? (Yes/No): List option per C.3.4.2.

— Supplemental Specification: Document any established methodology chosen by agreement between the Purchaser and the Manufacturer.

— Landed Live Load*: See C.3.10.2. This space gives the Purchaser the option of specifying a larger live load for external floating roofs and for specifying the stated live load for internal floating roofs even if drains are provided that may normally negate the need for such live load design.

- 34. Additional Data for Internal Floating Roofs

— Two-Position Legs Required? (Yes/No): See H.4.6.2. If the two positions shall be field-adaptable to account for bottom settlement, indicate this in Line 23 of the Data Sheet.

— Cable-Supported Floating Roof? (Yes/No): Indicate if required. This is an internal floating roof option as found in H.4.6.5.

— Fixed-Roof Inspection Hatches Required? (Yes/No): Indicate number required for evaluation of condition of floating roof without having to enter the vapor space. See H.5.5.3.

— Internal Roof Drain Required? (Yes/No): See H.4.1.10

— Omit Distribution Pads Supporting Uniform Live Loads? (Yes/No): See H.4.6.6

— Corrosion Gauge Required? (Yes/No): See H.5.8.

— Fixed Ladder Required? (Yes/No): This applies to vertical ladders attached to the shell, which will also require a manhole in the fixed roof to be specified in Table 3.

— Modified Minimum Point Load? (Yes/No): Point or concentrated loads are stated in H.4.2.2 for internal floating roofs, but may be waived for tanks 9 m (30 ft) or smaller in diameter.

— Mfr. to Leak Test Compartments: Indicate the percentage of compartments to be tested by the Manufacturer and the location of the tests. If unknown prior to the Purchaser doing a field inspection, special contract terms may be required to cover the additional costs.

— Roof Erector's Flotation Test: Indicate when this test is to be performed: See H.6.5, H.6.6 for restrictions on these options.

— Flotation Test Media: Indicate the media to be used and the water quality. See H.6.6. Provide a separate specification, if required, to stipulate requirements.

— Flotation Test Duration, Fill Height,: See H.6.6.

— Flotation Test Items provided by Purchaser: List any items being supplied including those (gaskets, fasteners, test blanks, etc.) after the test is completed. See H.6.6.

— Responsible Party for Conducting Flotation Test and Inspecting Roof during Test: Purchaser can delegate these. See H.6.6.

- **Table 5 Floating Roof Materials:**

According to C.3.1.2, the application of corrosion allowances (C.A.) shall be a matter of agreement between the Purchaser and the Manufacturer. Document this agreement on the Data Sheet "Remarks" Line 23 (e.g. "Manufacturer affirms that the nominal thicknesses chosen for floating roof components include the corrosion allowances shown in the Table for Floating Roof Materials on page 7 of the Data Sheet").

• L.3.2 Tank Plan and Sketches (Page 8 and Supplements)

L.3.2.1 General

Page 8 of the Data Sheet shall be used to show the shell and roof appurtenance orientations. A single sheet is normally adequate for this purpose; however additional sheets may be necessary to show special details or configurations. All sheets shall be identified and sequenced as part of the Data Sheet. Sketches may be made with CAD or manual drafting. All sheets shall be identified by revision date or other means of record change.

NOTE Consider the prevailing wind direction when locating equipment requiring personnel access.

L.3.2.2 Sketch Views

The sketch view shall include an orthographic “Plan View” that may be used for the orientation of shell, roof, and bottom openings. Other views may be added.

L.3.2.3 Drafting Practices for Data Sheet Sketches

Drafting practices shall be consistent with the following items.

— Where practicable, sketches shall be to scale, but the scale need not be shown on the sketches.

— Bottom views are not allowed.

— Plant north or geographic north arrow shall point upward on the sketch.

— Plant north or geographic north shall be at the “0 degrees” orientation, as applicable.

— Component thicknesses need not be shown on the sketch.

— Internal details shall be identified and located. Provide only enough information to describe the item, or provide reference to standard details. These items shall also be itemized in the appropriate tables in the Data Sheet.

— External appurtenances may be omitted from the sketch; however they must be itemized in the appropriate tables in the Data Sheet.

— Foundation or anchorage details not clearly defined elsewhere shall be shown in the Data Sheet. This may require that an “Elevation View” be provided.

API	API Std 650 Storage Tank Data Sheet	Data Sheet Status: _____ Page 1 of 8

* For boxes marked with *, if blank, Mfr. shall determine and submit as per Annex L. For all lines, see Annex L for line-by-line instructions.

GENERAL Special Documentation Package Requirements: _____

Measurement Units to be used in API Std 650: SI ❑ US Customary ❑

1. Manufacturer* _____ Contract No.* _____
   Address* _____
   Mfg. Serial No.* _____ Year Built* _____ Edition & Addendum to *API 650** _____
2. Purchaser _____ Contract No. _____
   Address _____
   Tank Designation _____
3. Owner/Operator _____ Location _____
4. Size Limitations* _____ Tank Diameter* _____ Shell Height* _____
   Capacity: Maximum* _____ Net Working* _____ Criteria:* _____
5. Products Stored:
   Liquid _____ Design Specific Gravity: _____ at _____ °__
   Minimum Design Specific Gravity: _____ at _____ °__
   Blanketing Gas_____ Vapor Pressure _____ PSIA at Max. Operating Temp.
   % Aromatic _____ Suppl. Spec. _____ H_2S Service? Yes ❑ No ❑ Suppl. Spec. _____
   Other Special Service Conditions? Yes ❑ No ❑ Suppl. Specs._____

DESIGN AND TESTING Purchaser to Review Design Prior to Ordering Material? Yes ❑ No ❑

6. Applicable API Standard 650 Appendices:* A ❑ B ❑ C ❑ F ❑ G ❑ H ❑ I ❑ J ❑ L ❑ M ❑ O ❑ P ❑ S ❑ U ❑ V ❑ W ❑
7. Max. Design. Temp. _____°__ Design Metal Temp.* _____°__ Design Liquid Level* _____
   Design Internal Pressure _____ Design External Pressure _____ Internal Pressure Combination Factor _____
   External Pressure Combination Factor_____ Maximum Fill Rate _____ Maximum Emptying Rate _____
   Flotation Considerations? Yes ❑ No ❑ Flot. Suppl. Spec:* _____ Applied Supplemental Load Spec._____
8. Seismic Design? Yes ❑ No ❑ Annex E ❑ Alternate Seismic Criteria _____ Seismic Use Group _____
   MBE Site Class _____ Vertical Seismic Design? Yes ❑ No ❑ Vertical Ground Motion Accelerator A_V: _____
   Basis of Lateral Acceleration (Select one): ❑ Mapped Seismic Parameters? S_s ____S_1 ____ S_0 ____; ❑ Site-Specific Procedures?: MCE
   Design Required? Yes ❑ No ❑; ❑ Other (Non-ASCE) Methods _____
   ❑ Freeboard Required for SUG I Design Roof Tie Rods @ Outer Ring?* Yes ❑ No ❑
9. Wind Velocity for non-U.S. sites, 50-yr wind speed (3-sec Gust)* _____
   Top Wind Girder Style* _____ Dimensions* _____ Use Top Wind Girder as Walkway? Yes ❑ No ❑
   Intermediate Wind Girders?* Yes ❑ No ❑ Intermediate Wind Girder Style* _____ Dimensions*_____
   Check Buckling in Corroded Cond.? Yes ❑ No ❑
10. Shell Design: 1-Ft Mthd?* Yes ❑ No ❑ ; Variable-Des-Pt Mthd?* Yes ❑ No ❑ Alternate ❑; Elastic Anal. Mthd?* Yes ❑ No ❑ Alternate
    Plate Stacking Criteria* Centerline-Stacked? Yes ❑ No ❑ Flush-Stacked? Yes ❑ No ❑ Inside ❑ Outside ❑
    Plate Widths (Shell course heights) and Thicknesses * Numbers below Indicate Course Number.
    1. _____ 2. _____ 3. _____ 4. _____ 5. _____
    6. _____ 7. _____ 8. _____ 9. _____ 10. _____
    11. _____ 12. _____ 13. _____ 14. _____ 15. _____
    Joint Efficiency* _____% Shell-to-Bottom Weld Type* _____ Shell-to-Bottom Weld Exam Mthd* _____
    Exceptions to Seal-welded Attachments (see Section 5.1.3.7): _____

Approvals:	Revisions:	Title:
		By: Ck'd: Date:
		Drawing No.: Sheet ___ of ___

API	API Std 650 Storage Tank Data Sheet	Page 2 of 8

* If box is blank, Manufacturer shall determine and submit as per Annex L.

11. Open-Top and Fixed Roofs: (See Sheet 6 for Floating Roofs) Open Top? * Yes ❑ No ❑

Fixed Roof Type* _____ Roof Support Columns*: Pipe ❑ Or Structural Shape ❑ _____

Cone Slope* _____. Dome or Umbrella Radius* _____ Weld Joints* _____
(Lap, Butt, Other)

Seal Weld Underside of: Lap-Joints? Yes ❑ No ❑; Seal Weld Underside of Wind Girder Joints? Yes ❑ No ❑

Gas-tight? Yes ❑ No ❑ Joint Efficiency* _____%

Thickness* _____In. Snow Load * _____ App. Suppl. Load Spec.* _____ Column Lateral Load _____

Normal Venting Devices*_____ Emergency Venting Devices* _____

Free Vents in Areas Where Snow and Ice May Block Vent* _____

For Non-Frangible Roofs: Seal Weld Roof Plates to Top Angle on the Inside? Yes ❑ No ❑ ; Weld rafters to Roof Plates Yes ❑ No ❑

Roof-to-Shell Detail* _____ Radial Projection of Horizontal Component of Top Angle* Inward ❑ Outward ❑

12. Bottom: Thickness* _____ Style* _____ Slope* _____. Weld Joint Type* _____

Provide Drip Ring? Yes ❑ No ❑ Alternate Spec. _____

Annular Ring? Yes ❑ No ❑ Annular Ring: Minimum Radial Width* _____ Thickness* _____

13. Foundation: Furnished by*_____ Type* _____

Soil Allow. Bearing Pressure* _____ Per Spec.* _____ Anchors: Size* _____ Qty* _____

Foundation Design Loads: Base Shear Force: Wind* _____ Seismic* _____ Overturning Moment: Wind* _____ Seismic* _____\

Ring Forces: Weight of Shell + Roof New* _____ Corroded* _____ Roof Live Load* _____ Internal Pressure* _____

Partial Vacuum* _____ Wind* _____ Seismic* _____ Hydrotest Exemption design per 7.3.6, Item 2) a) _____

Bottom Forces: Floor Wt. New* _____ Corroded* _____ Product Wt.* _____ Water Wt.* _____ Internal Pressure* _____

Partial Vacuum* _____ Other Foundation Loads* _____ Min. Projection of Fdn. Above Grade: _____

14. Exemption from hydrotest? Yes ❑ No ❑ Responsibility for Heating Water, if Required: Purchaser ❑ Manufacturer ❑

Hydro-Test Fill Height* _____ Settlement Measurements Required? Yes ❑ No ❑ Extended Duration of Hydro-Test:_____

❑ Predicted Settlement Profile is Attached

Application of coating on weld joints shall be performed after hydrostatic testing is performed, unless otherwise specified to be

❑ before hydrostatic testing is performed.

Responsibility for Setting Water Quality: Purchaser ❑ Manufacturer ❑ Supplemental Test Water Quality Spec. _____

Test Water Source & Disposal Tie-In Locations _____ Hydro-Test Annex J Tank? Yes ❑ No ❑

Post-Pressure-Test Activities Required of the Manufacturer: Broom Clean ❑ Potable Water Rinse ❑ Dry Interior ❑

Other ❑ _____

15. Inspection by _____ in Shop; _____ in Field

Supplemental NDE Responsibility _____ Supplemental NDE Spec. _____
(Purch., Mfg., Other)

Positive Material Identification? Yes ❑ No ❑ PMI Requirements:_____

Max. Plate Thickness for Shearing _____

Must Welds not exceeding 6 mm ($^1/_4$ in.) Be Multi-Pass? Yes ❑ No ❑ Must Welds greater than 6 mm ($^1/_4$ in.) Be Multi-Pass? Yes ❑ No ❑

Leak Test Mthd: Roof* _____ Shell* _____ Shell Noz./Manhole Reinf. Plt.* _____

Bottom* _____ Floating Roof Components* _____

Modify or Waive API Dimensional Tolerances (see 7.5)? No ❑ Yes ❑ Specify: _____

Specify Additional Tolerances, if any, and Circumferential and Vertical Measurement Locations:

- Allowable Plumbness: _____ Measure and Record at a Minimum of ____ Locations or Every ____ m (ft) around the Tank, at the Following Shell Heights: (select one box): ❑ $^1/_3$ H, $^2/_3$ H and H ❑ Top of Each Shell Course ❑ Other: _____
- Allowable Roundness: **_____ Measure Radius and Record at a Minimum of _____ Locations or Every _____ m (ft) around the Tank, at the Following Shell Heights (select one box):

❑ Top of Tank, H ❑ $^1/_3$ H, $^2/_3$ H and H ❑ Top of Each Shell Course ❑ Other: _____

**See Data Sheet Instructions for the Maximum Allowable Additional Radial Tolerance.

Approvals:	Revisions:	Title:
		By: Ck'd: Date:
		Drawing No.: Sheet ___ of ___

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16. Coatings:
    Internal Coatings by: _____ Per Spec.* _____
    (Not Req'd., Others, Tank Mfg.)
    External Coating by: _____ Per Spec.* _____
    (Not Req'd., Others, Tank Mfg.)
    Under-Bottom Coating by: _____ Per Spec.* _____
    (Not Req'd., Others, Tank Mfg.)
17. Cathodic Protection System? Yes ❑ No ❑ Per Spec.* _____
18. Leak Detection System? Yes ❑ No ❑ Per Spec.* _____
19. Release Prevention Barrier? Yes ❑ No ❑ Per Spec.* _____
20. Tank Measurement System: Required? Yes ❑ No ❑ Type: Float and tape gauge _____
    Servo gauge: _____ Hydrostatic gauge: _____ MTG multifunction gauge: _____ Other gauge: _____
    Remote Capability Required? Yes ❑ No ❑
    By:* _____ Per Spec.* _____
21. Weight of Tank: Full of Water* _____ Empty* _____ Shipping* _____ Brace/Lift Spec.* _____
22. References*: *API Std 650, Annex L*
    _____
    _____
23. Remarks*:

Approvals:	Revisions:	Title:
		By: Ck'd: Date:
		Drawing No.: Sheet ___ of ___

API	API Std 650 Storage Tank Data Sheet	Page 4 of 8

* If box is blank, Manufacturer shall determine and submit as per Annex L.

TABLE 1 MATERIALS OF CONSTRUCTION

Component	Material*/Thickness*	C.A.	Component	Material*	C.A.
Shell, Course __ to __			Reinforcing Pads		
Shell, Course __ to __			Manhole/Nozzle Necks		
Shell, Course __ to __			Manhole/Nozzle Flanges		
Shell, Course __ to __			Flange Covers		
Shell, Course __ to __			Anchor Attachments		
Roof			Submerged Piping		
Bottom			Wetted Structurals		+
Annular Ring			Non-wetted Structurals		+

+ Check here if C.A. is to apply to each exposed surface ❑.

TABLE 2 BOLTS AND ANCHORS

Component	Head Type*	Bolt or Anchor Material*	Nut Material*	Thread Series*	C.A.
Flange Bolting					++
Structural Bolting					++
Anchor Bolts					++

++ Total C.A., on the nominal diameter.

TABLE 3 NOZZLE AND MANHOLE SCHEDULE* (for Fixed Roof, Shell, and Bottom)

Mark	Service	Size, NPS, or Dia. (In.)	Neck Sch or Wall Thick.	Reinf. Plate Dimensions	Full Pen. On Open. (Y/N)	Flange Type	Flange Class or Thick.	Gasket Bearing Surf. Dimen. and Finish	Gasket Thick. and Dimen.	Gasket Mat'l. and Descript.	Proj. to FF or CL or from Datum Lines

Approvals:	Revisions:	Title:		
		By:	Ck'd:	Date:
		Drawing No.:	Sheet ___ of ___	

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* If box is blank, Manufacturer shall determine and submit as per Annex L.

OTHER TANK APPURTENANCES

24. Platform, Stairway, and Railing: Galvanizing Req'd?* Yes ❑ No ❑ Stairway Style* _____ Walk Surf. Type* _____
(Straight or Helical)

Handrail height (if required)* (30 in.–38 in.) _____ Tread rise/run* _____

Stair and Walkway Clear Width* _____ National Safety Standards*_____

Architectural/Structural Specification* _____

Material Specification(s): _____

Gauger's Platform Req'd? Yes ❑ No ❑ Qty Req'd.* _____ Per Spec. *_____

25. Jacket Required?* Yes ❑ No ❑ Other Heaters/Coolers Required?* Yes ❑ No ❑

Supplemental Jacket, Heater, or Cooler Specifications* _____

26. Mixer/Agitator: Quantity _____ Size* _____ Per Spec.* _____

27. Insulation: Required? Yes ❑ No ❑ Thickness* _____ Material* _____

Per Specs*_____ Responsibility for Insulation and Installation _____
(Purchaser, Manufacturer, Others)

28. Structural Attachments: Lift Lugs?* Yes ❑ No ❑ Desc.*_____

Shell Anchorage?* Yes ❑ No ❑ Type* _____Scaffold Cable Support? Yes ❑ No ❑

29. Various Other Items: Welded Flush-Type: Shell Connection ❑ Cleanout Fitting ❑ Waive Application of Annex P? Yes ❑ No ❑

Miscellany #1 _____ Miscellany #2 _____

Miscellany #3 _____ Miscellany #4 _____

Miscellany #5 _____ Miscellany #6 _____

TABLE 4 OTHER TANK APPURTENANCES*

Mark	Quantity	Service or Description	Size	Orientation	Height from Datum	Material	Remarks

Approvals:	Revisions:	Title:
		By: Ck'd: Date:
		Drawing No.: Sheet ___ of ___

API	API Std 650 Storage Tank Data Sheet	Page 6 of 8

* If box is blank, Manufacturer shall determine and submit as per Annex L.

FLOATING ROOF DATA

30. **Floating Roof Selection**

Design Basis: Annex C ❑ Or Annex H ❑

Type of Roof: (External or Internal): Single Deck Pontoon* ❑ Double Deck* ❑

(Internal Only): Tubular Pontoon* ❑ Metallic Sandwich Panel* ❑

Other ❑ _____ Supplemental Spec.:_____

31. **Seals**

Primary Seal: Shoe ❑ Envelope ❑ Wiper/Compression Plate ❑ Other ❑ _____ Supplemental Spec: _____

Shoe Mechanism: Mfg. Std. ❑ Other ❑ _____

Electrically Isolate Mechanism from Shoes? Yes ❑ No ❑ Wax Scrapers Required? Yes ❑ No ❑

Minimum Shoe Thickness* _____ Carbon Steel Shoes to be Galvanized? Yes ❑ No ❑

Secondary Seal: Shoe ❑ Envelope ❑ Wiper ❑ None ❑ Other ❑ _____ Supplemental Spec: _____

32. **Data for All Floating Roofs:**

Overflow Openings in Shell Acceptable? Yes ❑ No ❑ Shell Extension? Yes ❑ No ❑

Roof-Drain Check Valves Required? Yes ❑ No ❑ Roof-Drain Isolation Valves Required? Yes ❑ No ❑

Freeze Protection for Roof Drains Required? No ❑ Yes ❑ Supplemental Requirements: _____

Roof-Drain Piping to External Nozzles: Mfg. Std. ❑ Armored Flexible Pipe ❑ Swivels in Rigid Pipe ❑ Other ❑ _____

Foam Dam? Yes ❑ No ❑ Supplemental Spec. _____

Minimum Deck Thickness* _____

Bulkhead Top Edges to be Liquid-Tight? Yes ❑ No ❑ Seal-weld Underside of Roof? Yes ❑ No ❑

Electrical Bonding: Shunts: Yes ❑ No ❑ Cables: Yes ❑ No ❑ Supplemental Spec. _____

Qty of Non-Guide-Pole Gauge Wells Required _____ Qty of Sample Hatches Required _____

Guide Pole for Gauging? Yes ○ No ❑ Slots in Guide Pole? Yes ❑ No ❑ Datum Plates? Yes ❑ No ❑ Striking Plates? Yes ❑ No ❑

Guide Pole Emissions-Limiting Devices: Sliding Cover ❑ Pole Wiper ❑ Pole Sleeve ❑ Float ❑ Float Wiper ❑ Pole Cap ❑

Qty. of Roof Manholes* _____ Alternative High-Roof Clearance Above Bottom: _____

Alternative Low-roof Clearance Above the Highest Obstruction and the Floating Roof: _____

Removable Leg Storage Racks? Yes ❑ No ❑ ; Leg Sleeves ❑ or Fixed Low Legs ❑

33. **Additional Data for External Floating Roofs:**

Weather Shield? Yes ❑ No ❑ Suppl. Spec. _____

Rolling Ladder Req'd? Yes ❑ No ❑ Field Adjustable Legs? Yes ❑ No ❑

Design Rainfall Intensity _____In./Hr. (mm/hr) Based on a _____ Minute Duration Associated with the _____ Storm

Design Accumulated 24-Hour Rainfall _____In. (mm) Based on the _____ Storm

Out-of-Service Drains Required? Yes ❑ No ❑ Supplemental Specification_____

Distortion and Stability Determinations Required? Yes ❑ No ❑ Supplemental Specification _____

Landed Live Load* _____

Approvals:	Revisions:	Title:		
		By:	Ck'd:	Date:
		Drawing No.:	Sheet ___ of ___	

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34. **Additional Data for Internal Floating Roofs:**

Two-Position Legs? Yes ❑ No ❑ Cable-Supported Roof? Yes ❑ No ❑ Fixed-Roof Inspection Hatches Required?: Yes ❑ No ❑

Internal Roof Drain Required? Yes ❑ No ❑ Omit Distribution Pads Supporting Uniform Live Loads? Yes ❑ No ❑

Corrosion Gauge Required? Yes ❑ No ❑ Fixed Ladder Required?: Yes ❑ No ❑ ; Type of Roof Vent: *_____

Modified Minimum Point Load? Yes ❑ No ❑ Supplemental Specification _____

Mfr. to Leak Test * ___ % of Compartments ❑ in Assembly Yard ❑ in Erected Position ❑ Unknown; see separate contract terms

Roof Erector's Flotation Test: w/ tank hydro ❑ at completion of roof ❑ at later date ❑ _____ Not required ❑

Flotation Test Media: Water ❑ Product ❑ (see H.6.6.1) Water Quality: Potable ❑ Other ❑ See Supplemental Spec _____

Flotation Test: Duration _____ Fill Height: _____

Flotation Test Items provided by Purchaser (see H.6.7): None ❑ List Attached ❑

Responsible Party for Inspecting Roof during Initial Fill: Purchaser ❑ Other ❑ _____

TABLE 5 FLOATING ROOF MATERIALS

Component	Material*/Thickness*	C.A./Coating*	Component	Material*/Thickness*	C.A./Coating*
Deck Plate			Datum Plate		
Inner Rim Plate			Tubular Pontoon		
Outer Rim Plate			Pontoon Bulkhead		
Foam Dam			Submerged Pipe		
Sandwich Panel Face Plate			Guide Pole		
Sandwich Panel Core			Secondary Seal		
Gauge Well			Secondary Seal Fabric		
Drain Sumps			Wiper Tip		
Opening Sleeves			Wax Scraper		
Floating Suction Lines			Weather Seal		
Primary Fabric Seal			Envelope Fabric		
Foam Log Core			Shoe Mechanisms		
Landing Legs			Primary Seal Shoe		
Landing Leg Bottom Pads			Removable Covers		
Manhole Necks			Rolling Ladder		
Vents			Inlet Diffusers		

Approvals:	Revisions:	Title:		
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* If box is blank, Manufacturer shall determine and submit as per Annex L.

Tank Plan and Sketches:

Notes:

Approvals:	Revisions:	Title:		
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