

**COMPILING TERMINOLOGY DATABASE ON THE BASIS OF API 650
"WELDED STEEL TANKS FOR OIL STORAGE" TRANSLATION**

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Our work concerns the translation of American Petroleum Institute standard API 650 "Welded Steel Tanks for Oil Storage". This standard is based on the accumulated knowledge and experience of purchasers and manufacturers of welded steel oil storage tanks of various sizes and capacities for internal pressures not more than 21/2 pounds per square inch gauge. This standard is meant to be purchase specification to facilitate the manufacture and procurement of storage tanks for the petroleum industry.

It is in own way unique – there is no State Standard Specification completely covering oil tank design – from selection of materials before design calculation in our country. Also there is no competent translation of this standard into Russian.

Relevance of this work consists not only in uniqueness of this standard, but in the recommendation equipment, materials and facility. Taking into account the fact the modern enterprises of oil industry in Russia often use foreign producers equipment, availability of their characteristics and a scope is simply necessary. In addition aspiration of leading companies of branch to an exchange of experience is cause of knowledge of modern requirements in other states are an important aspect of successful cooperation.

Our translation also will be useful for students in our institute, and in particular for chair of fuel supply and combustible – as a reference point at designing.

At this stage the translation of state standard specification is in process. Any translation of technical documentation is a hard task, but the full-fledged translation of this standard, including schemes, formulas and tables of correspondences becomes a result of our work. We are going to compile oil gas terms databank for students, teachers and employees dealing with oil industry.

This standard covers material, design, fabrication, erection, and testing requirements for vertical, cylindrical, aboveground, closed- and open-top, welded steel storage tanks in various sizes and capacities for internal pressures approximating atmospheric pressure (internal pressures not exceeding the weight of the roof plates), but a higher internal pressure is permitted when additional requirements are met.

This standard is designed to provide the petroleum industry with tanks of adequate safety and reasonable economy for use in the storage of petroleum, petroleum products, and other liquid products commonly handled and stored by the various branches of the industry. This standard does not present or establish a fixed series of allowable tank sizes; instead, it is intended to permit the purchaser to select whatever size tank may best meet his needs. This standard is intended to help purchasers and manufacturers in ordering, fabricating, and erecting tanks; it is not intended to prohibit purchasers and manufacturers from purchasing or fabricating tanks that meet specifications other than those contained in this standard. It includes following paragraphs:

- SCOPE (including limitations and compliance);
- MATERIALS (including description of plates, sheets, structural shapes, flanges, bolting and welding electrodes);
- DESIGN (including description of joints, design considerations, bottom plates, shell design, shell attachments and tank appurtenances, top and intermediate wind girders, wind load on tanks, tank anchorage and roofs);

- FABRICATION (including description of shop inspection);
- ERECTION (including description of details of welding, inspection, testing, and repairs)
- METHODS OF INSPECTING JOINTS (including description of radiographic method, magnetic particle examination, ultrasonic examination, liquid penetrant examination, visual examination, vacuum testing);
- WELDING PROCEDURE AND WELDER QUALIFICATIONS (including information about definitions, qualification of welding procedures, qualification of welders and identification of welded joints);
- MARKING (information about nameplates, division of responsibility and certification)

This standard also includes appendices. The appendices of this standard provide a number of design options requiring decisions by the purchaser, standard requirements, recommendations, and information that supplements the basic standard.

Appendix A provides alternative simplified design requirements for tanks where the stressed components.

Appendix B provides recommendations for the design and construction of foundations for flat-bottom oil storage tanks.

Appendix C provides minimum requirements for pan-type, pontoon-type, and double-deck-type external floating roofs.

Appendix D provides requirements for submission of technical inquiries on this standard.

Appendix E provides minimum requirements for tanks subject to seismic loading.

Appendix F provides requirements for the design of tanks subject to a small internal pressure.

Appendix G provides requirements for an optional aluminum dome roof.

Appendix H provides minimum requirements that apply to an internal floating roof in a tank with a fixed roof at the top of the tank shell.

Appendix I provides acceptable construction details that provide leak detection and subgrade protection in the event of tank bottom leakage, and provides for tanks supported by grillage.

Appendix J provides requirements covering the complete shop assembly of tanks that do not exceed 6 m (20 ft) in diameter.

Appendix K provides a sample application of the variable-design-point method to determine shell-plate thicknesses.

Appendix L provides data sheets listing required.

Appendix M provides requirements for tanks specified and designed to operate at temperatures.

Appendix N provides requirements for the use of new or unused plate and pipe materials.

Appendix O provides recommendations for the design and construction of under-bottom connections for storage tanks.

Appendix P provides minimum recommendations for design of shell openings .

Appendix S provides requirements for stainless steel tanks.

Appendix T summarizes the requirements for inspection by method of examination and the reference sections within the standard.

Appendix U provides detailed rules for the use of the ultrasonic examination (UT) method for the examination of tank seams.

Examples of translation formulas, tables and image are given below.

Formula

In SI units:

$$\frac{215t_b}{(HG)^{0.5}}$$

where

t_b = thickness of the annular plate (see 3.5.3), in mm,

H = maximum design liquid level (see 3.6.3.2), in m,

G = design specific gravity of the liquid to be stored.

In US Customary units:

$$\frac{390t_b}{(HG)^{0.5}}$$

where

t_b = thickness of the annular plate (see 3.5.3), (in.),

H = maximum design liquid level (see 3.6.3.2), (ft),

G = design specific gravity of the liquid to be stored.

В системе СИ:

$$\frac{215t_b}{(HG)^{0.5}}$$

где t_b – толщина кольцевой окрайки (мм);

H – максимальный расчетный уровень жидкости (м);

G – расчетная удельная масса хранящейся жидкости.

В американских общепринятых единицах:

$$\frac{390t_b}{(HG)^{0.5}}$$

где t_b – толщина кольцевой окрайки (дюймы);

H – максимальный расчетный уровень жидкости (футы);

G – расчетная удельная масса хранящейся жидкости.

Table

Nominal Plate Thickness ^a of First Shell Course (mm)	SI Units			
	Hydrostatic Test Stress ^b in First Shell Course (MPa)			
	≤ 190	≤ 210	≤ 230	≤ 250
$t \leq 19$	6	6	7	9
$19 < t \leq 25$	6	7	10	11
$25 < t \leq 32$	6	9	12	14
$32 < t \leq 38$	8	11	14	17
$38 < t \leq 45$	9	13	16	19

Система СИ:				
Номинальная толщина ^a листа первого пояса обечайки (мм)	Испытание гидростатическим давлением ^b первого пояса обечайки (Мпа)			
	≤190	≤210	≤230	≤250
t ≤ 19	6	6	7	9
19 < t ≤ 25	6	7	10	11
19 < t ≤ 32	6	9	12	14
32 < t ≤ 38	8	11	14	17
38 < t ≤ 45	9	13	16	19

Image

