CONSTRUCTION STANDARD

FOR

AVIATION TURBINE FUEL STORAGE TANKS

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0. INTRODUCTION

"Storage Tanks" are broad and contain variable types and usages of paramount importance therefore, a group of construction standards are prepared to cover the subject. This group includes the following standards.

STANDARD CODE	STANDARD TITLE
IPS-C-ME-100-92	Atmospheric Above Ground Welded Steel Storage Tanks
IPS-C-ME-110-92	Large Welded Low Pressure Storage Tanks
IPS-C-ME-120-92	Aviation Turbine Fuel Storage Tanks
IPS-C-ME-130-92	Pressure Storage Spheres (for LPG)

This Construction Standard Specifies the minimum requirements for the construction of "Aviation Turbine Fuel Storage Tanks".

However when purchasing and quality control of materials to be incorporated into storage tanks, engineering and design or periodic inspection is concerned, reference is made to types M, E and I Standards.

1. SCOPE

This Construction Standard, covers the minimum requirements for site erection of aviation turbine fuel storage tanks, the type of floating roof with a fixed roof at the top of its shell.

The requirements of this specification are supplementary to Appendix H of API Standard 650, 8th edition and take precedence where differ from those outlined in the afore mentioned specifications.

This specification is to be used in conjunction with IPS-C-ME-100 "Construction Standard for Atmospheric above ground welded steel storage tanks" and Appendix H of API Standard 650.

It should be noted that when only purchasing of materials and equipment to be incorporated into the storage tanks are involved, the requirements of Iranian Petroleum Material and Equipment Standard for Aviation turbine fuel Storage tanks (IPS-M-ME-120) shall be met.

Design and engineering of storage tanks shall be in accordance with Iranian Petroleum Engineering and Design Standard for Aviation turbine fuel Storage Tanks (IPS-E-ME-120).

For pipe size, the international nomenclature diameter nominal sizes written as DN 15, 25, 40, 50, etc., (see Appendix A) have been used in accordance with ISO 6708-1980, ANSI/ASME B 16.5-1981 and ANSI/ASME B313-1983. For pipe flanges, pressure temperature ratings, the international nomenclature pressure nominal written as PN 20, 50, etc. (see Appendix B) have been used.

2. SOURCES AND REFERENCES

2.1 Sources

In preparation of this Standard, in addition to the standards mentioned in 2.2 the following standards and publications have also been considered.

NIOC(NATIONAL IRANIAN OIL COMPANY)

Engineering Standard SP-41-1 "Specification for Storage Tank Field Erected" Nov. 1976.
Engineering Standard SP-41-2 "Specification for Aviation Turbine Fuel Storage Tanks" June 1976.

API (AMERICAN PETROLEUM INSTITUTE)

Standard 650 Appendix H "Internal Floating Roofs" Nov. 1988.

BSI (BRITISH STANDARD INSTITUTION)

BS 2654 Appendix E "Recommendation for Internal Floating Covers" 1989.

2.2 References

Throughout this Standard the following standards and codes are referred to. The editions of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard. The applicability of changes in standards and codes that occur after the date of this standard shall be mutually agreed upon by the Company and the erection Contractor.

API (AMERICAN PETROLEUM INSTITUTE)

API Standard 650 1988 "Welded Steel Tanks for Oil Storages"

IPS (IRANIAN PETROLEUM STANDARDS)

E-CE-120	"General Requirements for Foundations"
M-ME-120	"Material and Equipment Standard for Aviation Turbine Fuel Storage Tanks"
E-ME-120	"Engineering and Design Requirements for Aviation Turbine Fuel Storage Tanks"
E-TP-100	"General Requirements for Paints"

3. UNITS

International system of units (SI) in accordance with IPS-E-GN-100 shall be used.

Whenever reference is made to API/ASME or any other standard, equivalent SI unit system for dimensions, fasteners and flanges shall be substituted.

4. MATERIAL

4.1 The erection contractor shall inspect and keep stock of all materials delivered and be fully responsible for their safekeeping.

All fittings, valves, plates, etc. shall be properly laid down on wooden supports clear of soil. Special care shall be taken that damage does not occur to joint faces of valves or flanges or to beveled ends of fittings.

4.2 Any damage to materials shall be corrected to the satisfaction of the owner prior to erection, particular attention shall be paid to the removal of buckles and distortions in the shell and bottom plates.

4.3 Welding electrodes shall be stored in their original packets or cartons in a dry place adequately protected from weather effects. If the electrodes become damp but are not otherwise damaged they may be used only after being dried out in a manner approved by the electrode manufacturers. Any of the electrodes which have areas of the coating broken away or damaged shall be discarded. Hydrogen controlled electrodes shall be stored and baked in accordance with the electrode manufacturer's recommendations.

4.4 The responsibility for the supply of site erection equipment, labor, false work, etc. lies with the erection contractor.

5. FOUNDATION

5.1 For general requirements on foundation, refer to Section 5 of IPS-C-ME-100 "Construction Standard for Atmospheric above Ground Welded Steel Storage Tanks".

6. SITE ERECTION

6.1 General

6.1.1 Site erection of aviation fuel storage tanks shall be in accordance with Appendix H of API Standard 650 and the following supplementary requirements.

6.1.2 Erection contractor shall supply all labor, supervision, materials, tools and inspection materials in addition to the requirements in the condition of contract to erect the storage tank(s).

6.1.3 Temporary attachments to assist in erection may be attached to the tank plates by welding provided all such attachments shall ultimately be removed without any noticeable projection of weld metal remaining or any indentation.

6.1.4 Erection holes shall not be permitted in plate work.

6.2 Erection Methods

6.2.1 Any proposed method may be used provided the proposed method is approved by the owner.

6.3 Bottom Plating

6.3.1 Bottom plating shall be in accordance with the storage tank constructional drawing. Attention shall be paid to erection marks made on bottom plates according to a marking diagram which is supplied by the tank plate fabricator for the use of tank erector.

6.3.2 Unless otherwise specified,after the bottom plates are laid down and tacked, they shall be joined by welding the joints in a sequence that the erector has found to result in the least distortion from shrinkage and thus to provide as nearly as possible a plane surface.

6.3.3 Manual gas cutting may be used for trimming the corners of bottom plates where two lapped joints intersect and for cutting openings for fittings positioned on site.

6.3.4 Lap jointed bottom plates shall be laid, commencing with the center plate and with subsequent plates lapped towards the center of the tank. Layout shall be as indicated in Fig. 1.

6.4 Shell Plating

6.4.1 Shell plating and protection of shell during erection for aviation fuel storage tanks shall be as stated in Sub-section 6.4 of IPS-C-ME-100 "Construction Standard for Atmospheric above ground Welded Steel Storage Tanks".

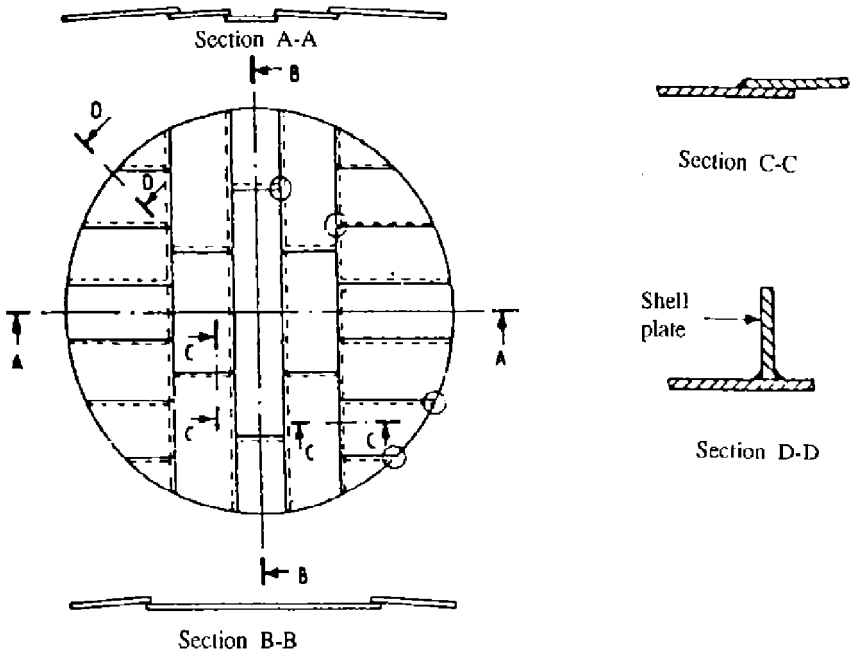
6.4.2 Lugs or other projections on the interior shell surface shall be removed and any sharp-edged projections of weld metal chipped or ground from the plate. Any sharp-edged scars shall be filled with weld metal and ground smooth.

6.5 Roof Erection

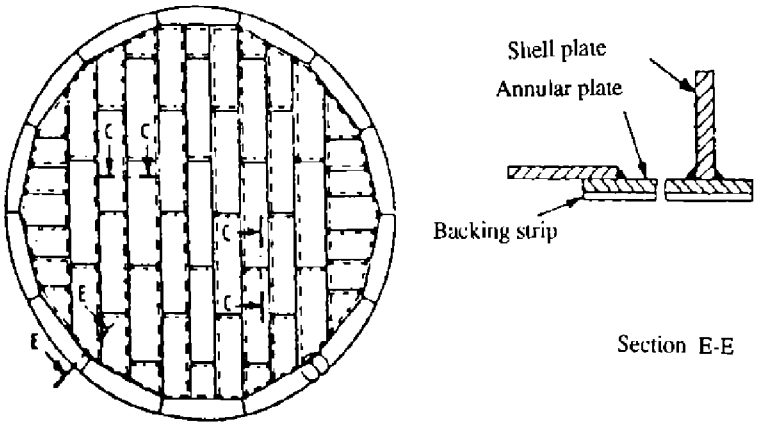
6.5.1 The method of erection for the internal floating cover shall be submitted to the owner for approval.

6.5.2 The requirements of Section 6.5 of IPS-C-ME-100 for the erection of fixed roof and internal floating cover shall apply.

6.5.3 In the construction of the floating cover, every care should be taken to minimize distortion or lack of circularity due to welding or other reasons. The clearance between the periphery of the cover and the tank shell should be uniform and comply with the dimensional requirements specified for the seal.



a) Typical bottom layout for tanks up to and including 12.5m diameter



b) Typical bottom layout for tanks over 12.5m diameter. For layout of plates similar to Section A-A and B-B see a).

TYPICAL BOTTOM LAYOUTS FOR TANKS

Fig. 1

7. WELDING

7.1 All welding, including repair, tack and attachment welding, shall be carried out according to the welding procedure established, and by approved welders.

7.2 All seams in the cover shall be vapor tight.

7.3 Shell plates shall have inside seams which are sufficiently smooth to prevent interference with the movement of the internal floating cover.

7.4 All requirements stated in Section 7 of IPS-C-ME-100 shall also be met.

8. TOLERANCES

8.1 The tank shell shall be carefully checked for circularity, dimensions and level before the roof members of fixed roof are erected.

8.2 Seals shall be above product level and shall not dip into the product during upward travel of the roof. Seals shall contact the shell above the liquid level for at least 90% of the tank circumference. Maximum permissible gap between the seal and the tank shell is 6 mm.

8.3 The peripheral seal and seals around column, etc., shall be such as to accommod at 125 mm out of plumb.

8.4 For the fixed roof tank, after completion, the shell shall not be out of vertical more than the followings:

Tanks < 12.5 m in diameter	1 in 400
Tanks > 12.5 m < 30 m in diameter	1 in 350
Tanks > 30 m < 45 m in diameter	1 in 300

These tolerances are mandatory for the tank shell as a whole and should also be used as a guidance for each individual course.

8.5 At horizontal and vertical shell seams, the shell profile shall not deviate from its design form by more than the following, measured over gage length of 1m.

Plates < 12.5 mm thk.	10 mm
Plates > 12.5 mm < 25 mm thk.	8 mm
Plates > 25 mm thk.	6 mm

9. INSPECTION

9.1 Site inspection of aviation fuel storage tanks shall be in accordance with applicable requirements of Section 9 of IPS-C-ME-100 and the following.

9.2 Before a floating cover is put into operation,it should be carefully tested for liquid tightness. Lap welded joints in floating covers may be tested by the vacuum box method or by the use of high penetrating oil.

9.3 Alternatively, when the compartments are completely welded, each completed compartment of pontoon roof shall be individually tested with an air pressure of 7 m bar gage, a soapy water solution being applied to all welded joints under pressure which have not been previously tested with penetrating oil.

9.4 All leaks detected during inspection shall be rectified to the satisfaction of the owner or his representative.

10. TANK TESTING

10.1 Testing of aviation fuel storage tanks shall be in accordance with the applicable requirements of Section 10 of IPS-C-ME-100 and the followings:

10.1.1 On completion, the tank should be filled with water, to check that the cover and seals travel freely to the full operating height and that the cover is free from leaks.

10.1.2 Manholes in the fixed roof should be kept closed during testing in wet weather, since any ingress of rainwater might lead to false conclusion on water tightness.

10.1.3 Any damp spot on the cover should be taken as an indication of a possible leak. Time may be necessary for leaks to become evident and checks should therefore be made at frequent intervals, particulary during the first meter of filling.

10.1.4 For aluminum covers, only water having less than 150 ppm chlorides shall be used for hydrostatic testing. Potable water will meet this requirement.

10.1.5 All leaks detected during testing should be rectified to the satisfaction of the owner or his representative.

11. PAINTING

11.1 If required, external or internal painting of aviation fuel storage tanks shall be in accordance with Table 1 and Appendix C of Iranian Petroleum Standard No. IPS-E-TP-100 "General Requirements for Paints".

12. SPACING AND DIKES

12.1 Spacing and dikes for aviation turbine fuel storage tanks shall be per Section 12 of IPS-C-ME-100 "Construction Standard for Atmospheric Above Ground Welded Steel Storage Tanks".

APPENDICES

APPENDIX A
PIPE COMPONENTS NOMINAL SIZE

The purpose of this Appendix is to present an equivalent identity for the piping components nominal size in imperial system and SI system.

TABLE

NOMINAL SIZE		NOMINAL SIZE		NOMINAL SIZE		NOMINAL SIZE	
DN (1)	NPS (2)	DN (1)	NPS (2)	DN (1)	NPS (2)	DN (1)	NPS (2)
15	½	100	4	500	20	1000	40
20	¾	125	5	600	24	1050	42
25	1	150	6	650	26	1100	44
32	1¼	200	8	700	28	1150	46
40	1½	250	10	750	30	1200	48
50	2	300	12	800	32	1300	52
65	2½	350	14	850	34	1400	60
80	3	400	16	900	36	1500	72

1) Diameter nominal (DN), mm.

2) Nominal pipe size (NPS), inch.

APPENDIX B
PIPE FLANGES, PRESSURE TEMPERATURE RATINGS

The purpose of this Appendix is to present an equivalent identity for the pipe flange nominal pressure temperature ratings in imperial system and SI system.

TABLE

PN (1)	ANSI EQUIVALENT (2)
20	150
50	300
68	400
100	600
150	900
250	1500
420	2500

1) Pressure nominal (PN), bar gage.

2) Pounds per square inch gage, (psig).