MATERIAL AND EQUIPMENT STANDARD

FOR

ATMOSPHERIC ABOVE GROUND WELDED STEEL

STORAGE TANKS

ORIGINAL EDITION

MAY. 1993

This standard specification is reviewed and updated by the relevant technical committee on Jul. 1998. The approved modifications are included in the present issue of IPS.

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APPENDICES:

0. INTRODUCTION

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

STANDARD CODE	STANDARD TITLE
IPS-M-ME-100	"Atmospheric Above Ground Welded Steel Storage Tanks"
IPS-M-ME-110	"Large Welded Low Pressure Storage Tanks"
IPS-M-ME-120	"Aviation Turbine Fuel Storage Tanks"
IPS-M-ME-130	"Pressure Storage Spheres"

However when construction, Engineering or periodic inspection are concerned, reference is made to IPS types C, E and I Standards.

The requirements given in this standard supplement those of API Standard 650 "Welded Steel Tanks for Oil Storage" 1988 edition.

For ease of reference, the clause or section numbering of API STANDARD 650 for the items supplemented is given at the begining of each paragraph. Clauses or paragraphs of API Standard 650 not mentioned remain unaltered.

For the purpose of this specification, the following definitions shall hold:

Sub. (Substitution) **:**The API Std. Clause is deleted and replaced by a new clause.

Del. (Deletion) **:**The API Std. Clause is deleted without any replacement .

Add. (Addition) **:**A new clause with a new number is added.

Mod. (Modification) **:**Part of the API Std. Clause is modified, and/or a new description and/or condition is added to that clause.

1. SCOPE

1.1 This supplementary material and equipment standard, covers the minimum requirements for atmospheric, above ground, welded storage tanks designed and constructed in accordance with API 650 and its appendices.

1.2 (1.1.1 Mod.) This Standard gives general requirements to be met by a vendor when submitting quotations for and when supplying the materials and equipment to be incorporated into the above ground atmospheric welded storage tanks.

Furthermore, the terms and conditions laid down in the inquiry and in the purchase order and any attachment thereto shall apply.

Note:

This standard specification is reviewed and updated by the relevant technical committee on Jul. 1998. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No 27 on Jul. 1998. These modifications are included in the present issue of IPS.

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 Vendor.

API (AMERICAN PETROLEUM INSTITUTE)

API 650 "Welded Steel Tanks For Oil Storage"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

A-307 "Specification for Carbon Steel Bolts and Studs, 354 MPa (60000 Psi) Tensile Book 01.01"

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

ANSI B.1.1 "Unified Inch Screw Threads"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-ME-100 "Engineering Standard for Atmospheric Storage Tanks"

IPS-C-ME-100 "Construction Standard for Atmospheric Storage Tanks"

3. UNITS

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

4. SERVICE CONDITIONS

4.1 Quotation (Add.)

Refer to Appendix A for general information to be submitted in the quotation.

4.2 Secrecy (Add.)

Refer to Appendix B for secrecy requirements.

5. DESIGN

5.1 General

Vertical cylindrical atmospheric steel storage tanks shall be designed in accordance with section 3 of API Standard 650 "Welded Steel Tanks for Oil Storage" 8th edition and its relevant appendices.

The requirements of Iranian Petroleum Standard for Storage Tanks (IPS-E-ME-100) shall also be fulfilled. Supplementary requirements are stated in the following paragraphs:

5.2 (section 3 Add.) Any parts for which no drawing have been prepared shall be designed by vendor on the basis of the above mentioned reference standards.

6. MATERIAL

6.1 Material selection for atmospheric welded storage tanks shall be in accordance with section 2 of API Standard 650. The following clauses are supplementary:

6.2 (2.1.3 Add.) Materials other than those specified in API 650 may be used while their chemical analysis and physical properties are identified and upon approval of the company.

6.3 (2.1.4 Add.) Mill chemical analysis and mechanical test certificate are required for bottom and shell plates, wind girders, pipes and flanges. Roof plates and other materials require mill certificates only.

6.4 (2.7 Add.) Bolt and nut threads shall conform to ANSI B1.1 coarse series class 2A and 2B respectively.

6.5 (2.6.3 Add.) Where connections are made to external piping the material and all other requirements for nozzles, bolting, gasketing and pipe shall be met as specified in that piping class.

6.6 (2.8.3 Add.) Vendor shall supply all welding rods required to fabricate the tank. Consideration shall be given to Iranian supply of rods where these conform to the materials required.

7. FABRICATION

7.1 All works of fabrication of materials intended to be incorporated into the atmospheric welded storage tanks shall be in accordance with section 4 of API Standard 650. The followings shall be considered as supplementary:

7.2 (4.1.0 Add.) Vendor shall submit the following drawings for approval within the time specified by purchaser and before start of fabrication.

7.2.1 All shop fabrication drawings.

7.2.2 A general arrangement drawing for each tank. This drawing shall be to scale and shall show the position of all mountings and accessories required, with reference to the relevant detail drawings.

7.2.3 Static calculations for all members of the tank for which the sizes are not shown on the reference drawings.

7.2.4 Marking diagram

7.2.5 In the event that any departure from the reference drawings is proposed with regard to the materials to be incorporated, detail drawings showing the proposed changes shall be submitted for approval.

7.2.6 Detail drawings of any additional materials to be supplied, such as heating coils, suction heaters, side entry mixers, foam equipment, etc., shall also be submitted for approval.

7.2.7 Four copies of each drawing shall be submitted for approval.

A separate set of drawings for each requisition is required.

7.3 (4.1.1.3 Add.) If holes are manually flame cut, the edges shall be machine cut, tool cut or ground smooth.

7.4 (4.1.2 Add.) The dimension of cut shell plates shall meet with the specified dimensions within the following tolerances:

on plate length	±1.5 mm
on plate width	±1.5 mm
difference in diagonals	3 mm

7.5 (4.1.2 Add.) Shell plate edges on completion of machining shall be straight. Deviations, if any, shall not be in excess of 1 mm.

7.6 (4.1.5 Add.) All roof structural members, stairways and hand railing manufactured from carbon steel shall be thoroughly cleaned and freed from rust and scale by pickling, or blast cleaning, and painted immediately after cleaning with a primer coat of paint.

The method and extent of surface cleaning and painting for all other materials if needed will be specified by the purchaser.

7.7 (4.1.5 Add.) Special consideration shall be given to the need to protect welding margins, machined surfaces, nuts and bolts, etc. from corrosion during shipment and construction.

7.8 (4.1.4 Add.) All plates and structural members shall be marked in accordance with a marking diagram to be supplied by the manufacturer which shall also bear such other marks as may be required to facilitate erection.

Erection marks shall be painted clearly on plates and structural members in symbols at least 50 mm high, where practicable, and in the case of curved plates, such marks shall be on the inside surface.

When required, erection marks may be hard stamped in symbols not less than 13 mm high which in the case of plates shall be in the corner approximately 150 mm from either edge.

7.9 (4.1.4 Add.) Painted or stenciled markings shall not be applied until the priming coat is thoroughly dry.

8. ERECTION AND PREPARATION FOR SITE ERECTION

8.1 Field erection of atmospheric welded storage tanks shall be in accordance with section 5 of API standard 650. The following shall be considered as supplementary:

8.2 (5.1.2 Mod.) Unless otherwise specified, the responsibility for supplying welding electrodes and/or key plating equipment and necessary erection tools lies with the manufacturer (fabricator). The responsibility for the supply of site erection equipment, labor, false work, etc. lies with the erection contractor.

8.3 (5.1.6 Add.) Erection holes shall not be permitted in plate work.

8.4 For more amendments on field erection of storage tanks reference is made to Iranian Petroleum Standard Construction Standard for Atmospheric Storage Tank (IPS-C-ME-100).

9. WELDING

9.1 Welding shall be done according to section 5.2 and section 7 of API Standard 650. The following clauses are supplementary:

9.2 (7.2.1 Add.) Fabricator shall submit for purchaser's approval prior to material supply his weld preparation procedure including details of beveled plates to be supplied.

9.3 (7.2.1 Add.) All welding procedures submitted shall be identified with the specific item and purchase order numbers.

9.4 (7.2.1 Add.) The fabricator shall show on a drawing the applicable welding procedure and non destructive tests required.

9.5 (5.2.1.8 Add.) Tack welds shall be made with the same type of electrode that is used for depositing the root pass.

9.6 (5.2.1.11 Add.) Back up rings or strips, when permitted shall be of the same chemical analysis as the base plate. Except for low alloy base plate, the back up strip shall be low carbon steel.

9.7 (5.3.1.6 Add.) After removal of any temporary back up rings or strips the weld area shall be dressed and examined using magnetic particle or liquid penetrant.

9.8 (5.2.1 Add.) The parts to be joined by fillet welds shall be brought together as closely as practicable. The gap between laying surfaces of lap joints should not exceed 1.5 mm.

If the separation is greater than 1.5 mm after straightening and assembly, the leg of the fillet weld shall be increased by the amount of separation but shall not exceed 4.5 mm gap. The use of filler material is prohibited.

9.9 (5.2.1 Add.) The necessity and the extent of preheat for any of the conditions shall be determined and receive purchaser's approval.

9.10 (5.2.1 Add.) Peening of butt welds shall not be permitted.

9.11 When required by 3.7.4 of API standard 650, thermal stress relief shall be done. Thermal stress relieving documents and certificates shall receive purchaser's approval.

10. INSPECTION AND TEST

10.1 Shop inspection of materials shall be in accordance with section 4.2 of API standard 650. Inspection of welding joints shall be in accordance with section 6 of API 650. Supplementary requirements are as follows:

10.2 (5.3.1 Add.) Materials for storage tanks including fabricated materials are subject to inspection as specified in purchase order.

10.3 (5.3.1.1 Mod.) It shall be the responsibility of the fabricator to maintain adequate inspection in his own or his sub contractor's works, to ensure that the requirements of specified standards are met. Purchaser however reserves the right of access at all times to monitor or complement any such inspection.

10.4 (5.3.1 Add.) Brinell hardness tests of all welds including semi automatic gas metal arc welding and automatic welding processes shall be performed on a test plate. The results, with a maximum allowable of 225 BHN, shall be recorded on applicable welding procedure specification.

10.5 (7.2.2 Add.) When required by the API standard 650 charpy V-notch impact tests of weld and heat affected zone shall meet the minimum requirements specified for the base material.

11. SUPPLEMENTARY REQUIREMENTS (Add.)

11.1 Vendor shall send final issues of all drawings mentioned under 7.2 together with dispatch lists of materials to the purchaser. The same numbers of copies as stated in 7.2.7 are required.

11.2 All drawings etc. mentioned under 7.2 and 11.1 will, in every respect, be the property of purchaser who shall have the right to use and reuse them for any purpose what so ever without any obligation to vendor.

11.3 Papers used for drawings and prints shall be suitable for the purpose, according to TAPPI T1 0404-36-87, Paper Grade Classification, or, as approved by the company.

12. PACKAGING

12.1 General requirements for packaging are covered in Appendix C of this Standard.

13. SHIPMENT

13.1 Refer to Appendix D of this Standard for general requirements for shipment.

14. GUARANTEE

14.1 For guarantee requirements see Appendix E of this Standard.

APPENDICES

APPENDIX A
QUOTATION

A.1 The following information shall be submitted in the quotation:

A.1.1 Price

A.1.2 Estimated total shipping weight of materials for each tank with accessories.

A.1.3 Delivery time of the materials

A.1.4 Steel grades offered

A.1.5 Plate thicknesses

A.1.6 Any deviations or exclusions from the stipulations referred to in this Specification if no deviations or exclusions are mentioned in the quotation, it will be deemed to be fully in compliance with said stipulations.

Vendor is free to offer as an alternative, before the purchase order is placed, deviations from the required standards, if these result in a reduction in costs.

A.1.7 The names of subcontractors, if any for the fabrication or any part thereof. Such subcontractors shall be subject to acceptance by purchaser.

A.2 Any purchase order will be subject to all terms, conditions, etc. forming part of the inquiry and any agreed amendments to it.

APPENDIX B

SECRECY

Vendor shall not disclose or issue to third parties without the written consent of purchaser any documents, etc. placed at his disposal by purchaser or any documents prepared by himself in connection with inquiries and purchase orders for purposes other than the preparation of a quotation or carrying out such purchase orders.

APPENDIX C

PACKAGING

C.1 When considering the following instructions, due regards shall be paid to handling facilities in transit and at the destination, and also to any special packaging instruction given in the purchase order.

C.2 Structural materials and plates shall be treated as follows:

C.2.1 To prevent damage in transit all roof plates shall be bundled by welded clips as shown in Appendix C Fig.1 attached.

The maximum weight of a single bundle shall not exceed approximately 1. 1/2 tons.

Bundling shall not take place until the paint is thoroughly dry.

C.2.2 All shell and bottom plates shall be bundled as described under C.2.1 above, except that maximum weight of a single bundle shall not exceed approximately 2 tons.

C.2.3 All structural members, such as roof framing, curb angles, wind girders, hand rails and stair treads, shall be bundled and secured by bolting or tack welding. To prevent the nuts from loosening during transit, either the threads must be damaged or the nuts spot welded to the bolts. The weight of a single bundle shall not exceed approximately one ton.

C.2.4 All gusset plates, cleats, etc.shall be securely bundled by bolting, each bundle weighing approximately ¼ ton.

C.2.5 All small parts such as bolts, nuts, erection key plates. shim plates, wedges, etc. shall be bagged and packed separately, and shall be enclosed in stout wooden cases. The minimum thickness of timber used for the cases shall be 22 mm. The total weight of each case shall not exceed approximately ½ ton.

C.3 Roof and shell manholes, nozzles, bottom sumps and clean outs, etc. may be shipped l oose. Manhole and clean out cover shall be bolted on with gasket in position. Flange of nozzles, etc. Shall be adequately protected to prevent damage in transit.

Roof vents dip hatches and similar small fittings shall be packed complete with gasket, etc. in stout wooden case,and shall be securely fixed there to prevent damage in transit.

Cases shall be made of timber not less than 22 mm thick strongly battened, and banded with tensioned steel strapping. The weight of any case shall not exceed ¼ ton

C.4 All welding electrodes, rods, wires and fluxes shall be packed in such a manner as to keep them in first class condition during transport and storage.

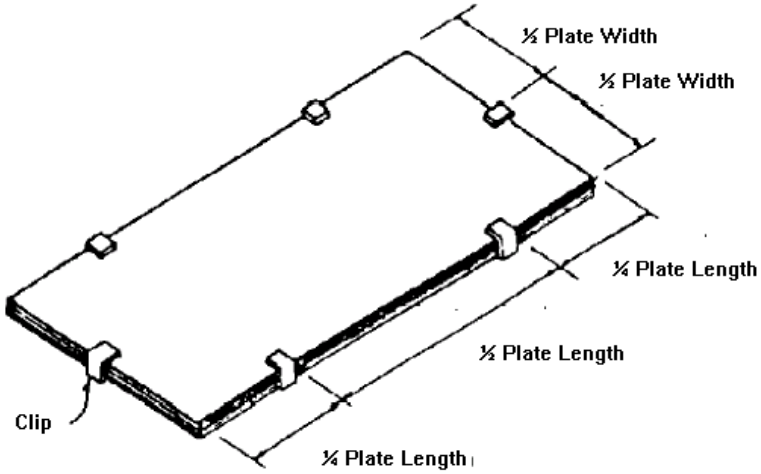
Welding electrodes shall be supplied in containers which give adequate protection against damage and moisture in transit and in storage on site.

The type of packing to be employed shall be specified by the electrode manufacturer.

(to be continued)

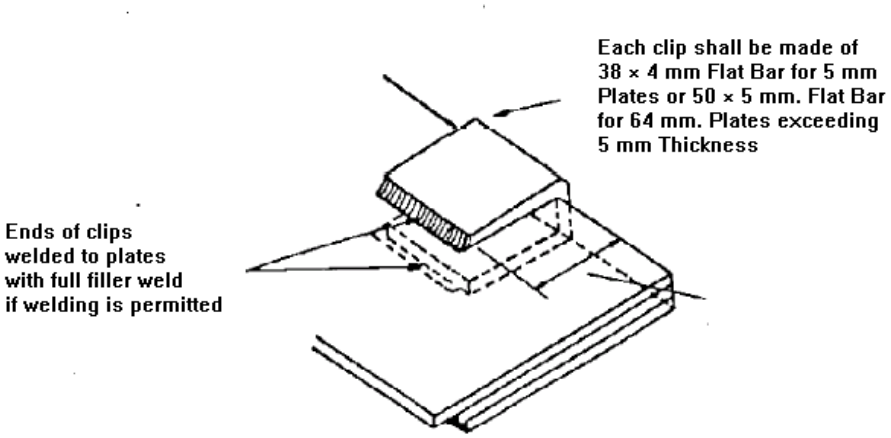
APPENDIX C (Continued)

BUNDLING METHOD



Note 1:

Use 6 numbers of clips for each bundle except where ½ plate length exceeds 4 m in that case use three clips on each side which is 8 clips per bundle.



Note 2:

When welding is not permitted use other safe methods for bundling.

BUNDLING OF ROOF, SHELL AND BOTTOM PLATES

Fig. 1

APPENDIX D

SHIPMENT

D.1 Plates and storage tank material shall be loaded in such a manner as to ensure delivery without damage.

D.2 Shipping marks shall be provided as follows:

D.2.1 Whenever possible, the shipping marks and any other desired particulars shall be stenciled on each bundle, case or package. Stenciled marks shall be at least 50 mm high. If stenciling cannot be applied, the information shall be suitably stamped on a metal label, securely attached to the package. Stamped symbols shall be at least 13 mm high.

D.2.2 If any confusion is likely to arise in reception,storing or distribution of the materials (e.g. in the case of purchase orders comprising materials for more than one tank), all parts shall have painted on them a further distinctive mark in addition to any erection or shipping marks. Such additional marking shall consist of a colored band or other mark as agreed with purchaser.

D.2.3 All identification marks shall be applied on at least two sides of each package.

D.3 Each package, case and bundle shall be accompanied with a packing list.

APPENDIX E

GUARANTEE

E.1 Vendor shall guarantee that the materials delivered to be incorporated into storage tank(s) are in accordance with the purchase order and will be free from any defects in design, workmanship and material and that they will give proper service under the operating and design conditions as specified, for a period of 18 months, reckoned from the day on which the tanks are delivered.

E.2 The period of 18 months specified above shall be extended by any period(s) during which the tanks after delivery are out of action as a result of any defect covered by this guarantee.

E.3 In the event of defects covered by this guarantee purchaser shall notify vendor as soon as possible and vendor shall without delay remedy or repair free of charge (cost of labor and transportation not excluded) the tank(s) having such defects, or authorize purchaser to do so. In the latter event vendor shall reimburse to purchaser the actual out of pocket costs, excluding over heads and similar administrative costs.

E.4 Remedying and repairing may be effected by purchaser without prior approval by vendor in cases where it would be unreasonable to demand that prior approval be obtained. In such cases vendor and purchaser shall agree which party shall bear the costs and expenses thereof or in what proportion these costs and expenses shall be divided between them. This guarantee shall remain in effect, provided the remedying and repairing do not result in any detriment to the tank (s).

E.5 In no event will this guarantee cover defect due to normal wear and tear, disregard by purchaser or his consignee of operating instructions, excessive over loading by purchaser or his consignee or unsuitable operating conditions.

APPENDIX F

STORAGE TANK DATA SHEET FOR GENERAL INFORMATION

Date.....

By.....

File No.....

Page 1 of 6

General Information (To Be Completed by Purchaser)

1) Purchaser/agent…….....

Address .....

City..... State ..... Zip ..... Phone .....

2) User .....

3) Erection site Name of Plant .....

Location .....

4) Tank no.....Nominal capacity ..... barrels

Net working capacity .....barrels

5) Pumping rates: In ..... barrels/hour

Out ..... barrels/hour

6) Maximum operating temperature ..... Deg.C

7) Product stored .....

Design specific gravity ..... at ……..... Deg.C

Design metal temperature ..... Deg.C

Vapor pressure ..... kPa

8) Corrosion allowance: .....

Shell ..... mm Roof .....mm

Bottom ..... mm Structurals …….....mm

9) Shell design: Basic Standard 650 Appendix A Appendix F

Design pressure ..... kPa

10) Roof Design: Basic Standard 650

Appendix C (external Floating)

Appendix H (internal Floating)

Frangible roof joint? Yes No

Note:

All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988

(to be contiuned)

APPENDIX F (Continued)

STORAGE TANK DATA SHEET FOR GENERAL INFORMATION

Date.....

By.....

File No.....

11) Roof Loads: Uniform live …..... kPa

Special (provide sketch) ..... kPa

12) Earthquake design? Yes No (Appendix E)

Roof tie rods (3.10.4.5)? Yes No

Seismic zone (Figure E-1) .....

Essential facilities factor .....

Zone coefficient (Table E-1) .....

Site amplification factor (Table E-2) .....

13) Wind load: Velocity ..... km/hr

Provide intermediate windgirder (3.9.7)?

Yes No

14) Environmental effects:

Maximum rainfall ..... mm/hr

Total snow accumulation ….....mm

15) Size restrictions: Maximum diameter ..... meter

Maximum height ..... meter

16) Foundation type: Earth Concrete ringwall

Other

Remarks:

.....

.....

.....

.....

Note:

All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988.

(to be continued)

APPENDIX F (Continued)

STORAGE TANK DATA SHEET FOR CONSTRUCTION DETAILS

Date.....

By.....

File No.....

Construction Details (To Be Completed by Manufacturer and/or Purchaser)

1) Manufacturer .....

Address .....

City ..... State ..... ZIP ..... Phone .....

Serial No .....

2) Material specifications: Shell .....

Roof .....

Bottom .....

Structurals …….....

3) No. of shell courses .....

4) Plate widths and thicknesses (including corrosion allowance):

1..... 4 ..... 7 .....

2 ..... 5 ..... 8 .....

3 ..... 6 ..... 9 .....

5) Tank bottom: Plate thickness .....mm Lap Butt Seams

Slope .....mm per meter To From Center

6) Minimum width and thickness of bottom annular plates (3.5) .....

7) Roof to shell detail (Figure F-1) .....

8) Intermediate Windgirder? Yes No

Top windgirder for use as walkway? Yes No

9) Roof type: Supported Self supported floating

Slope or radius .....mm

10) Roof plate: Thickness .....mm Lap Butt Joint

Note:

All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988

(to be continued)

APPENDIX F (Continued)
STORAGE TANK DATA SHEET FOR CONSTRUCTION DETAILS

Date.....
By.....
File No.....

11) Paint:

Shell- Exterior? Yes No Interior? Yes No
Surface preparation.....

Bottom- Underside? Yes No Interior? Yes No
Surface preparation…….....

Structural Steel- Exterior? Yes No
Interior? Yes No
Specification.....

12) Tank Bottom coating: Interior? Yes No
Material …….....
Application specification .....

13) Inspection by: Shop ..... Field .....

14) Weld examination: Radiograph .....
Supplementary liquid penetrant or ultrasonic .....

15) Films..... Property of .....

16) Leak testing: Bottom ..... Roof .....
Shell .....

17) Mill test reports: Required? Yes No
Plate .....Structural shapes .....

18) Purchaser's reference drawing .....

19) Tank size : Diameter ..... meter Height ..... meter

20) Date of Standard 650 edition/revision .....

Remarks:

…….....
.....
.....

Note:

All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988.

(to be continued)

APPENDIX F (Continued)

STORAGE TANK DATA SHEET FOR APPURTENANCES

Date.....

By.....

File No.....

Appurtenances (To Be Completed by Manufacturer and/or Purchaser)

1) Stair way Style: Circular Straight

Angle to Horizontal ..... Degrees

Ladder .....

2) Walkway: Width ..... mm Length ..... mm

3) Drawoff sump: Standard …..... Special .....

4) Bolted door sheet: Yes No (Appendix A tanks only)

Raised Flush

5) Scaffold Hitch .....

6) Internal piping: Swing line ..... Suction Line .....

Heating coil surface area ..... m^2

7) Roof drain: Hose ..... jointed .....

Siphon .....

8) No. and size of shell manways .....

9) No. and size of roof manways .....

10) Shell nozzles

(see Figures 3-4B, 3-5, 3-6 & Tables 3-8,3-9,and 3-10)

		Flanged			**Threaded**							
Mark	Size	SGL	DBL	SPL	A	B	C	D	E	Orientation N=0	HGT From Bottom	Service

Note:

All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988.

(to be continued)

APPENDIX F (Continued)

STORAGE TANK DATA SHEET FOR APPURTENANCES

Date.....

By.....

File No.....

11) Roof nozzles, including venting connection

(see Figures 3-13 and 3-14 and Tables 3-16 and 3-17)

Mark	Size	Flanged	Threaded	Reinforcement	Orientation N=0	Distance From Center	Service

Notes:

1) Sketches and/or separate sheets may be attached to cover special requirements.

2) All figures, paragraphs, tables and appendices referred to in Appendix F are related to API-650-1988. Mark Size Flanged Threaded Reinforcement Orientation

APPENDIX G

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 G1

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	56
80	3	400	16	900	36	1500	60
90	3½	450	18	950	38	1800	72

1) Diameter Nominal (DN), mm.

2) Nominal Pipe Size (NPS), Inch.

APPENDIX H

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 H1

PN (1)	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).