MATERIAL AND EQUIPMENT STANDARD

FOR

LARGE WELDED LOW PRESSURE STORAGE TANKS

ORIGINAL EDITION

MAY 1993

This standard specification is reviewed and updated by the relevant technical committee on Dec. 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 Material Standards are prepared to cover the subject. This group includes the following standards:

STANDARD CODE	STANDARD TITLE
IPS-G-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"

The requirements given in this Standard supplement those of API Standard 620 "Large Welded Low Pressure Storage Tanks" Sep. 1985 edition. For ease of reference, the clause or section numbering of API 620 for items supplemented is given at the beginning of each paragraph.

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 Material and Equipment Standard, covers the minimum requirements for large, welded, low pressure, above ground storage tanks designed and constructed in accordance with API Standard 620 and its appendices. Storage tanks for refrigerated products which conform to Appendix Q of API 620 and those for liquefied hydrocarbon gases which conform to Appendix R of API 620 are also within the scope of this Standard specification.

1.2 This Standard gives general requirements to be met by a vendor when submitting quotations for and where supplying the materials to be incorporated into the large, low pressure, welded storage tanks.

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

Note:

This standard specification is reviewed and updated by the relevant technical committee on Dec. 1998. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No 44 on Dec. 1998. These modifications are included in the present issue of IPS.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

API (AMERICAN PETROLEUM INSTITUTE)

API 620	"Recommended Rules for Design and Construction of Large Welded, Low Pressure Storage Tanks"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)

ANSI B1.1	"Unified Inch Screw Threads"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-C-ME-110	"Construction Standard for Large Welded Low Pressure Storage Tanks"
IPS-E-ME-110	"Engineering Standard for Large Welded Low Pressure Storage Tanks"
IPS-E-GN-100	"Engineering Standard for Units"

3. UNITS (Add)

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

4. QUOTATION (Add)

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

5. SECRECY (Add)

5.1 See Appendix B for secrecy requirements.

6. DESIGN

6.1 Large, Welded, Low Pressure Storage Tanks shall be designed according to Section 3 of API Standard 620" Recommended Rules for Design and Construction of Large, Welded, Low Pressure Storage Tanks" 7th edition and its relevant appendices. Also the requirements of Iranian Petroleum Engineering Standard for Large Welded Low Pressure Storage Tanks (IPS-E-ME-110) shall be fulfilled.

6.2 (3.1.6 Add)

6.3 Any part for which no drawing have been prepared shall be designed by vendor on the basis of the above mentioned reference standards.

7. MATERIAL

7.1 Material selection for large, welded, low pressure storage tanks shall be in accordance with Section 2 of API Standard 620 or as specified in its relevant appendices. The followings shall be considered as supplementary.

7.2 (2.1 Mod)

Materials other than those specified in API 620 may be used while their chemical analysis, physical and mechanical properties are identified and upon approval of the company.

7.3 (2.1 Add)

Mill chemical analysis and mechanical test certificates for all major parts of the storage tanks are required.

7.4 (2.2 Add)

Where reference is made to ASTM Standard steel specifications other equivalent steels may be supplied with the prior approval of the purchaser.

7.5 (2.4 Add)

Bolt and nut threads shall conform to ANSI B1.1 coarse series class 2A and 2B respectively.

7.6 (2.1 Add)

Vendor shall provide all materials as specified on the tank and accessories data sheets required for the complete fabrication of storage tanks.

Purchaser may supply instrumentation, fire fighting attachments, etc. Vendor shall make provisions for proper attachments of such items.

7.7 (2.3 Add)

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

7.8 (2.7 Add)

Consideration shall be given to Iranian supply of rods where those conform to the materials required.

7.9 (2.2.5 Add)

In selection of materials for storage tanks to be erected at sites with low ambient temperatures (sub zero temperatures) and also for tanks designed and constructed according to Appendices Q and R of API 620, special considerations shall be given to charpy V-notch impact test requirements.

7.10 (2.2.5 Add)

For storage tanks described in 7.9 above permanent attachments like reinforcement pads, nozzle bodies, flanges, etc.

shall meet the notch ductility requirements of tank shell plates.

8. FABRICATION

8.1 All works of fabrication of materials intended to be incorporated into the large, welded, low pressure storage tanks shall be in accordance with section 4 of API Standard 620 "Recommended rules for design and construction of large, welded, low pressure storage tanks" 7th edition and its relevant appendices. The following paragraphs shall be considered as supplementary.

8.2 (4.1 Add)

Vendor shall submit the following drawings and documents for approval within the time specified by purchaser and before start of fabrication:

8.2.1 All shop fabrication drawings

8.2.2 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.

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

8.2.4 Marking diagram.

8.2.5 In the event that only 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.

8.2.6 Detail specifications or drawings of any additional materials to be supplied such as pressure and vacuum relieving devices shall be also submitted for approval.

8.2.7 Four copies of each drawing shall be submitted for approval. A separate set of drawings for each requisition is required.

8.3 (4.2.3 Add)

Shell plate edges on completion of machining shall be straight. Deviations, if any, shall not be in excess of ±1 mm.

8.4 (Add)

Stairways, hand railing and all structural members manufactured from carbon steel shall be thoroughly cleaned and freed from rust and scale by picking, 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 will be specified by the purchaser.

8.5 (Add)

Special consideration shall be given to the need to protect welding margins, machined surfaces, etc. from corrosion during shipment and construction.

8.6 (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 practical, 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.

8.7 (Add)

Painted or stenciled markings shall not be applied until the priming coat is thoroughly dry.

9. ERECTION AND PREPARATION FOR SITE ERECTION

9.1 (Add)

Field erection of welded low pressure storage tanks shall be in accordance with Iranian Petroleum Construction and Quality Control Standard for Large Welded Low Pressure Storage Tanks (IPS-C-ME-110) the following shall be considered as supplementary.

9.2 (Add)

Unless otherwise specified, the responsibility for supplying welding electrodes and/or key plating equipments 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.

9.3 (4.2.2 Add)

Erection holes shall not be permitted in plate work.

10. WELDING

10.1 (Add)

Low pressure storage tanks and their parts shall be welded according to sections 4.6 through 4.19 and 3.22 through 3.25 of API Standard 620, as modified and amplified by the following clauses.

10.2 (4.7 Add)

Fabricator shall submit to the purchaser his welding procedure specification, procedure qualification record and welders qualification test records for approval prior to start of fabrication.

10.3 (4.6 Add)

Fabricator shall submit for purchaser's approval prior to material supply his weld preparation procedure including details of beveled plates to be supplied. This should also conform to API Standard 620.

10.4 (4.7 Add)

All welding procedures submitted shall be identified with the specific item and purchase order numbers.

10.5 (4.6 Add)

The fabricator shall show on a drawing the applicable welding procedure and non destructive tests required.

10.6 (4.9 Add)

Tack welds shall be made with the same type of electrode that is used for depositing the root pass.

10.7 (4.9.2 Mod)

Plates shall be welded so that the vertical joints in the adjacent shell course are staggered at least 1/3 of the length of this plate, where practicable, and are off set from each other at least 5 times the thickness of the thicker plate.

10.8 (4.9 Add)

Back up rings or strips, when permitted shall have the same chemical analysis and mechanical properties as the base plate.

10.9 (4.11 Add)

If not specified, the necessity and the extent of preheat for any of the conditions should be determined and shall receive purchaser's approval.

10.10 (4.6 Add)

For storage tanks designed and constructed according to Appendix Q and R of API 620 and those of sub zero design metal temperature, charpy V-notch impact test of weld and heat affected zone shall meet the minimum requirements for the base material.

10.11 (4.9.12 Mod)

Peening of welds may be permitted for purposes other than that to be a substitute for thermal stress relief. Reference is made to Section 4.19 and Appendix I of API Standard 620.

10.12 (4.18.2.6 Add)

Where required by the provisions of section 3.25 of API 620, thermal stress relief shall be done taking into consideration the provisions of section 4.18 of API 620. Stress relief procedure specification and certificates shall be submitted for purchaser's approval.

11. INSPECTION AND TEST

11.1 Shop inspection of materials shall be in accordance with section 5 of API Standard 620. Radiography examination of welds shall be in accordance with Sections 3.26, 3.27.11 and 5.15 of API 620. Supplementary requirements are as follows:

11.2 (5.6 Add)

Materials for large welded low pressure storage tanks including fabricated materials are subject to inspection as specified in this Standard purchase order.

11.3 (5.2.3 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.

11.4 (5.13 Add)

As mentioned in 10.5, non destructive inspection procedure and test requirements for each weld shall be shown on a drawing prepared by the fabricator. Such drawing shall be submitted for purchaser's approval.

12. SUPPLEMENTARY REQUIREMENTS (5.27 Add)

12.1 Vendor shall send final issues of all drawings mentioned under 8.2 together with dispatch lists of materials to the purchaser, the same number of copies as stated in 8.2.7 is required.

12.2 All drawings etc. mentioned under 8.2 and 12.1 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.

12.3 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.

13. PACKAGING (Add)

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

14. SHIPMENT (Add)

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

15. GUARANTEE (Add)

15.1 See Appendix E of this Standard for general requirements for guarantee.

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 specifications. 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 sub ject 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 1½ 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 1/4 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 1/2 ton.

C.3 Roof and shell manholes, nozzles, bottom sumps and clean outs, etc. may be shipped loose. 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 ½ 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.

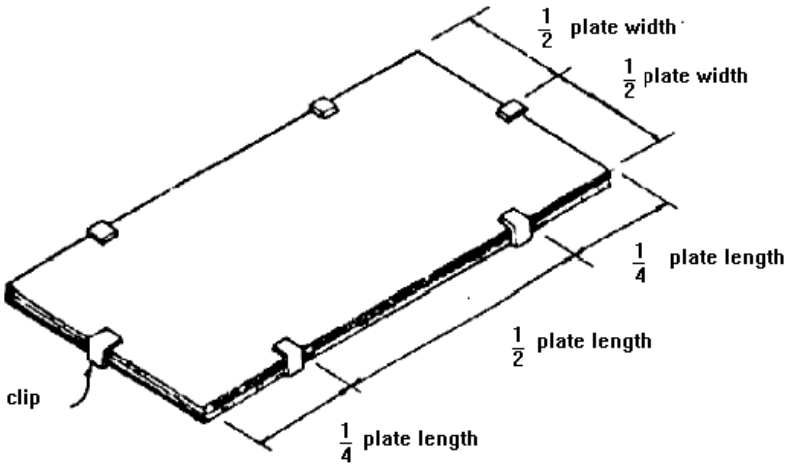
Welding electrodes shall be supplied in containers which give adequate protection against damage and moisture in transit and in storage on site.

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

(to be continued)

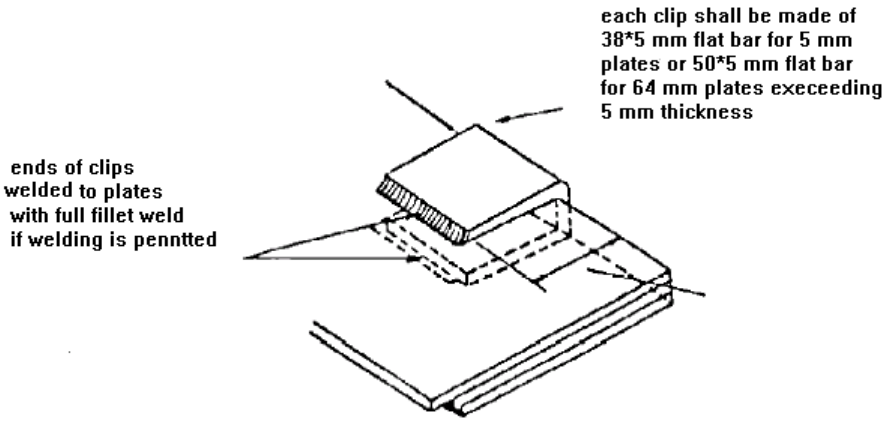
APPENDIX C (continued)

BUNDLING METHOD



Note 1:

Use 6 numbers of clips for each bundle except where 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 defects due to normal wear and tear, disregard by purchaser or his con signee of operating instructions, excessive over loading by purchaser or his consignee or unsuitable operating conditions.

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).