

**PRODUCT MANUAL FOR
Hot Rolled Steel Plate (up to 6mm),
Sheet and Strip for the Manufacture of
Low Pressure Liquefiable Gas Cylinders
according to IS 6240:2008**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	Product	:	IS 6240:2008
	Title	:	Hot Rolled Steel Plate (up to 6mm), Sheet and Strip for the Manufacture of Low Pressure Liquefiable Gas Cylinders
	No. of amendments	:	0
2.	Sampling Guidelines		
a)	Raw material	:	No specific requirement
b)	Grouping Guidelines	:	Sample of any form (plate, sheet and strip) of any dimensions may be drawn and tested to include steel of all form, dimensions as intended in licence scope, subject to availability of manufacturing capabilities and testing facilities with the firm. In case manufacturer is desirous of including steel with micro-alloying as well in licence scope the sample drawn as above shall be with micro-alloying.
c)	Sample Size	:	For physical tests: 500 X 500 mm For chemical tests : 50 gm drillings or 5 pcs each of length 5 pcs of 5cm (L)×5cm (W) for OES (ref:CL/OES, 15/7/19)
3.	List of Test Equipment	:	Please refer Annex – A
4.	Scheme of Inspection and Testing	:	Please refer Annex – B
5.	Possible tests in a day	:	All Physical and Chemical tests
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 6240:2008 with the following scope:		
	Name of the product	Hot Rolled Steel Plate (up to 6mm), Sheet and Strip for the Manufacture of Low Pressure Liquefiable Gas Cylinders	
	Shape((Dimensions)	Plates (Thickness from ...mm upto and including ...mm, Width from ...mm upto and including ...mm, Length from ...mm upto and including ...mm), Strips(Thickness from ...mm upto and including ...mm Width from ...mm upto and including ...mm),..	
	Grade	1	
	Optional Requirements	With or without micro-alloying	

ANNEXURE A
TO PRODUCT MANUAL FOR
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LIST OF TEST EQUIPMENTS

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Major test equipment essentially required to test as per requirements of Indian Standard.

Sl. No.	Test Equipment/Chemicals and Identification Numbers (Where applicable)	Tests Used in with Clause Reference
1.	Rough Polishing Machine, Cutting Machine, Fine Polishing Machine, Grinder Machine	Preparation of specimen
2.	Vernier Callipers	13 (Dimensions& Tolerances)
3.	Micrometer, Steel tape, Steel Scale, Flat surface, Straightedge	
4.	UTM (0-600 kN) class 1 accuracy or better	
5.	Steel Mandrels (for bend tests), UTM attachments/clamps/vice/Vernier Callipers	7 (Tensile Test) 8 (Bend Test)
6.	Analytical balance (0-200g, LC:0.1mg)	6 (Chemical Composition)
7.	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer	6.1,6.2 (C,S,P,Mn,Si,Al, Microalloying elements content) Mn,S,P,Si
8.	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water, Hot air oven, Oxygen - 99.5 percent minimum purity, ether or acetone Standard Reference Material (NML) with certificate Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate	6.1, 6.2 (C& S, chemical method, alternative to instrumental method)
9.	Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre, (Whatman) filter paper No. 040, Suction Filtration Facility, Filter paper pulp pad, Standard Reference Material (NML) with certificate	6.1, 6.2 (Phosphorus content, chemical method, alternative to instrumental method)

	Potassium Permanganate (KMnO ₄), Sodium Nitrite (Na ₂ NO ₃), Ammonium Molybdate [(NH ₄) ₂ Mo ₂ O ₇], Ammonium Phosphate [(NH ₄) ₃ PO ₄], Potassium Nitrate (K ₂ NO ₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO ₄), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable	
10.	Hot plate, Conical flask Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated Nitric Acid, NaCl Solution, Permanganic acid	6.1,6.2 (Manganese content, chemical method, alternative to instrumental method)
11.	Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid	6.1,6.2 (Silicon content, chemical method, alternative to instrumental method)
12.	Determination of Nitrogen by Thermal Conductivity Method/ By Inert gas fusion followed by thermal conductivity detection/ By Steam Distillation Method	6.1(Nitrogen Content)
13.	Steel Mandrels (for bend tests), UTM attachments/clamps/vice/Vernier Callipers, Hot air oven, Hammer	9 (Strainage Embrittlement test)
14.	ERICHSEN Sheet Metal Testing Machine, bench mounted unit with a cast iron machine body and a cylindrical test head (ϕ-20mm) with Drawing force: max. 45 kN, Blank holder force: 10 kN for Sheet thickness: 0.1 - 2.0 mm	10 (Erichsen Cupping test) For t<2.00mm
15.	Cupping machine comprising of: Die (with holding force of 10kN approx), blank holder and Punch (advancing at feed rate between 5 and 20mm/Min), graphite grease	10 (Erichsen Cupping test) For t>2.00mm

Note: The above is an indicative list for the purpose of guidance only

ANNEXURE B
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SCHEME OF INSPECTION AND TESTING

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LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING, MARKING & PACKING – The Standard Mark as given in Column (1) of the First Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification. In addition, details of BIS website as follows: “For details of BIS certification please visit www.bis.gov.in” shall be marked on metal tag or on top of each bundle or package of sheets, plates and strips.

4. CONTROL UNIT – All steel plates/sheets/strips representing the same cast, rolled to same dimensions and manufactured under uniform conditions of production in a day in the same place constitutes a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

5.2 General requirements relating to the supply of material shall conform to IS 8910. Material shall be manufactured as per Cl 5 of IS 6240:2008

6. TEST CERTIFICATE-For each consignment of BIS Certified material conforming to IS 6240:2008 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

7. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub-standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

ANNEXURE C
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TABLE 1: LEVELS OF CONTROL

(1)		(2)		(3)		(4)	
TEST DETAILS				LEVELS OF CONTROL			REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
6	Chemical Composition						
	Ladle Analysis	6.1 6.1.1, Table-1	IS 6240 & IS 228 (Various Parts) or any established Chem/Instr method. Alternatively method specified in relevant ISO/IEC may be used	R	One	Each Heat	Applicable for manufacturers with steel making facilities
	Product Analysis	6.2 ,11 Table-1 Table-2		i) R ii) S	Nil One	Nil Each Cast	Applicable for manufacturers with steel making facilities. Applicable for manufacturers without steel making facilities. No testing for check analysis is required if starting material being subjected to processing is ISI marked and received with test certificate.
7	Tensile Test	7.1 , 7.1.1, 7.2, 7.2.1, 11 & Table-3	IS 6240 IS 1608(Pt.1) IS 3803IPt.1)	R	2	Each Control Unit	For control unit of qty up to 100 Tonnes
					3	Each Control Unit	For control unit of qty between 100 and 200 Tonnes
					4	Each Control Unit	For control unit of qty above 200 Tonnes
8	Bend Test	8.1 to 8.2.2.1 , 11 & Table-3	IS 1599 IS 6240	R	1	10 tonnes or part thereof from each Control Unit	

(1)			(2)	(3)		(4)
TEST DETAILS				LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method	Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause Reference				
9	Strainage Embrittlement Test	9.1 to 9.1.5 11	IS 6240	R	1	Each Cast
10	Erichsen Cupping Test	10.1 to 10.3 11	IS 6240 IS 10175	R	1	10 tonnes or part thereof from each Control Unit
12	Freedom from Defects	12	IS 6240	R	Adequate inspection to ensure each item to be within the limits of the specification	
13	Dimensions & Tolerances	10.1, 10.2 & 11	IS 6240 IS 1730 IS 16160	R	Adequate inspection to ensure each item to be within the limits of the specification	
14	Condition of Delivery	14.1 14.2	IS 6240 IS 13566	R	As agreed between manufacturer and purchaser	

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

ANNEXURE I

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(Para 6 of the Scheme of Inspection and Testing)

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

**TEST CERTIFICATE FOR Hot Rolled Steel Plate (up to 6 mm), Sheet and Strip for the
Manufacture of Low Pressure Liquefiable Gas Cylinders**



TEST CERTIFICATE No. _____

DATE _____

TO M/s _____

We certified that the material described below fully conforms to IS 6240:2008 Chemical composition and Mechanical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No. CM/L _____ are as indicated below against each order No.

(PLEASE REFER TO IS 6240:2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Section (nom Size)	Control Unit No.	Grade	Quantity in tonnes	CHEMICAL COMPOSITION							MECHANICAL PROPERTIES					Delivery Condition	Remarks	
					C	S	P	Si	Mn	@Micro Alloying Elements %	Al %	Tensile strength	Elongation	Yield Stress	Bend test	Strainage Embrittlement Test			Cupping test
					%	%	%	%	%	%	%								

@Micro-alloying element(s) present should be indicated

REMARKS

WAGON NO.

TRUCK NO.

(It is suggested that size A4 paper be used for this test certificate)

FOR XYZ IRON AND STEEL COMPANY