

**PRODUCT MANUAL FOR  
High Tensile Strength Flat Rolled Steel Plate (up to 6 mm),  
Sheet and Strip for the Manufacture of Welded Gas Cylinder  
according to IS 15914:2011**

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.	<b>Product</b>	:	<b>IS 15914:2011</b>
	<b>Title</b>	:	High Tensile Strength Flat Rolled Steel Plate (up to 6 mm), Sheet and Strip for the Manufacture of Welded Gas Cylinder
	<b>No. of amendments</b>	:	1
2.	<b>Sampling Guidelines</b>		
a)	<b>Raw material</b>	:	No specific requirement
b)	<b>Grouping Guidelines</b>	:	Please refer Annex – A
c)	<b>Sample Size</b>	:	For physical tests: 1 m For chemical tests : 50 gm drillings or 5 pcs each of length 5 cm for OES (ref:CL/OES dated:15.07.2019)
3.	<b>List of Test Equipment</b>	:	Please refer Annex – B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex – C
5.	<b>Possible tests in a day</b>	:	All Physical and Chemical tests
6.	<b>Scope of the Licence:</b>		
	Licence is granted to use Standard Mark as per IS 15914:2011 with the following scope:		
	<b>Name of the product</b>	High Tensile Strength Flat Rolled Steel Plate (up to 6 mm), Sheet and Strip for the Manufacture of Welded Gas Cylinder	
	<b>Grade</b>	HS 235, HS 265, HS 295, ...	
	<b>Dimensions</b>	Thickness from ...mm upto and including ...mm Width from ...mm upto and including ...mm Length from ...mm upto and including ...mm (for plates/sheets)	
	<b>Optional Requirements</b>	With or without microalloying)	

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
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**GROUPING GUIDELINES**

1. Grouping has been considered as under based on mechanical properties\* specified for normalized / stress-relieved cylinders manufactured using the flat rolled steel:

<b>Group</b>	<b>Grade</b>	<b>Condition</b>	<b>Arrangement of Steel grades</b>	<b>Number of samples</b>
1	HS 235 HS 265 HS 295 HS 345	Hot Rolled, Hot Rolled and Pickled, Cold rolled, Cold rolled and annealed.	Grades arranged according to their increasing order of Minimum Yield Strength specified for cold formed and normalized / stress-relieved cylinders manufactured using the flat rolled steel.	One sample of any size shall be drawn from the group for higher grades of any delivery condition for considering all grades below within the group. If sample is tested for highest steel grade (i.e. HS 345) the recommendation for grant of licence / inclusion may include all the grades.

(\* Tensile properties of flat rolled plate/sheet/strip and the delivery condition are to be mutually agreed upon by the producer of steel and by the cylinder manufacturer)

3. The testing facility for micro alloying elements should be got declared and verified suitably. An undertaking to this effect may also be taken. Sample drawn for this purpose should also indicate whether micro alloyed.
4. It shall however be ensured that firm has necessary manufacturing capabilities and testing facilities for the entire grades/conditions proposed to be covered under scope of BIS Certification.
5. During the operation of license, BO shall ensure that all the sizes/grades/delivery conditions covered in the license are drawn for independent testing on rotation over a period of time.

**ANNEXURE B**  
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**LIST OF TEST EQUIPMENTS**

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, Lathe, notch cutter	Preparation of specimen
2.	Vernier Callipers	Dimensions and Tolerances (10)
3.	Micrometer, Steel tape, Steel Scale, Flat surface, Straightedge 1000, 2000 or 4000 mm	
4.	UTM (0-600KN) class 1 accuracy or better	
5.	Analytical balance (0-200g, LC:0.1mg)	Chemical Composition (6)
6.	<b>Instrumental methods</b> Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry.  Spectrophotometer	C,S,P,Mn,Si,Al, Microalloying elements content (6)  Mn,S,P,Si
7.	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	C& S (6) (chemical method, alternative to instrumental method)
8.	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	Phosphorus content (6) (chemical method, alternative to instrumental method)
	Potassium Permanganate (KMnO <sub>4</sub> ), Sodium Nitrite	

	(Na <sub>2</sub> NO <sub>3</sub> ), Ammonium Molybdate [(NH <sub>4</sub> ) <sub>2</sub> Mo <sub>2</sub> O <sub>7</sub> ], Ammonium Phosphate [(NH <sub>4</sub> ) <sub>3</sub> PO <sub>4</sub> ], Potassium Nitrate (K <sub>2</sub> NO <sub>3</sub> ), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO <sub>4</sub> ), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable	
9.	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	Manganese content (6) (chemical method, alternative to instrumental method)
10.	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	Silicon content (6) (chemical method, alternative to instrumental method)
11.	Determination of Nitrogen by Thermal Conductivity Method/ By Inert gas fusion followed by thermal conductivity detection/ By Steam Distillation Method	Nitrogen Content (6)

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

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
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**SCHEME OF INSPECTION AND TESTING**

**1. 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. PACKING AND MARKING** – 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.

**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 15914 and a record of orders supplied to be maintained comprising information as given in Cl 11 of IS 15914. The steels are weldable by the usually fusion welding processes

**6. TEST CERTIFICATE**-For each consignment of BIS Certified material conforming to IS 15914:2011 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.

**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  i) Ladle Analysis  ii) Product Analysis Product Analysis	7.1 Table-1  7.2 Table-1&2	IS 15914 & IS 228 (Various Parts) Or any established Chemical/ Instr. method Or relevant ISO/IEC std.	R  R	One  One	Each Heat  Each Cast	
7	Tensile test	7.1 to 7.2, 8 & Table- 3	IS 15914 IS 1608 Pt.1	R	One	For each 100 tonnes or part thereof of a control unit	
9	Freedom from defects	9	IS 15914	R	Adequate inspection to ensure each item is free from defects.		
10	Dimensions & Tolerances	10.1 10.2	IS 15914 IS 16160 IS 1730	R	Adequate inspection to ensure each item to be within the limits of the specification		

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**



(Para 6 of the Scheme of Inspection and Testing)  
 XYZ STEEL COMPANY  
 (Registered office Address and works address)

**TEST CERTIFICATE FOR** High Tensile Strength Flat Rolled Steel Plate (up to 6 mm), Sheet and Strip for the Manufacture of Welded Gas Cylinder  
 TEST CERTIFICATE No. \_\_\_\_\_ DATE \_\_\_\_\_

TO M/s \_\_\_\_\_

We certified that the material described below fully conforms to IS 15914:2011 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 15914:2011 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

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

@ 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 STEEL COMPANY