



**PRODUCT MANUAL FOR
WELDED LOW CARBON STEEL CYLINDERS FOR
LOW PRESSURE LIQUEFIABLE GASES
NOT EXCEEDING 5 LITRE WATER CAPACITY
ACCORDING to IS 7142:1995**

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 7142:1995
	Title	:	Welded low carbon steel cylinders for low pressure liquefiable gases not exceeding 5 litre water capacity
	No. of Amendments	:	1
2.	Sampling Guidelines:		
a)	Raw material	:	Clause 4 of IS 7142
b)	Grouping guidelines	:	Each variety of Cylinders shall be tested for GoL/CSoL. [Please see clause 16 and 17 of IS 7142 also]
c)	Sample Size	:	As per clause 16 and 17 of IS 7142
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	:	Please refer ANNEX – C
6.	Scope of the Licence	:	Please refer ANNEX - D

BUREAU OF INDIAN STANDARDS

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ANNEX A**List of Test Equipment*****Major test equipment required to test as per the Indian Standard***

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Agreed Finish Thickness, Profile regularity, circularity, offset at the joint, Straightness (Clause 8)	a) Dial Vernier caliper, b) Ultrasonic mini thickness gauge, c) Goose Neck Gauge, Micrometer, d) Profile Gauge, e) Circularity gauge, f) Straightness gauge fixture g) Height Gauge
2	Valves and Bungs (Clause 9 and 10)	a) Thread Gauges, b) Torque wrench
3	Heat treatment (Clause 11)	a) Pyrometer, b) Temperature Controller, c) Temperature recorder and d) Temperature indicator
4	Water capacity (Clause 13)	a) Weighing Balance
5	Proof Test (Clause 14)	b) Hydrostatic Test Bench (non-Jacket method) c) Hydrostatic Test Bench
6	Hydrostatic Stretch Test and Bursting Test (Clause 16)	
7	Pneumatic Leakage Test (Clause 15)	a) Pneumatic Test facility, b) Pressure Gauge
8	Acceptance Test (Clause 17)	a) Universal Testing Machine b) Marker and Punch c) Scale d) Vernier

The above list is indicative only and may not be treated as exhaustive.

ANNEX B

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. The following equipments shall be calibrated at a frequency shown against each and records kept:

1.1.1 Tensile Testing Machine - Once in a year

1.1.2 Pressure Gauges - At least once in a month

1.1.3 Pyrometer used for heat treatment furnace - Once in six months

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity. Records of all the tests made at the cylinder manufacturer's work shall be kept for the life time of the cylinder and shall be made available to the inspecting authority and purchaser of cylinder. Copies of test certificates shall be forwarded to the statutory authority, purchaser of the cylinder and the inspecting authority.

3. LABELLING AND MARKING - As per the requirements of IS 7142:1995.

4. BATCH - For the purpose of this scheme, Cylinders of identical type and design constructed from steel of similar analysis made by the same steel manufacturer and heat treated during one continuous production run in the same manner and under similar conditions shall constitute a Batch.

4.1 The identity of each batch shall be maintained. Each batch conforming to all the requirements shall be accompanied by a Certificate in accordance with clause 21 of IS 7142.

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.

6. HEAT TREATMENT - The heat treatment of the cylinders shall be done as per clause 11 of IS 7142. The cylinders shall be punched with serial number before heat treatment to maintain traceability throughout manufacturing process.

6.1 Adequate care shall be taken to ensure the consistency of heat treatment cycle. The deviation of temperature shall be within the specified temperature range. In case the temperature goes outside the specified limits, furnace shall be stopped and all such cylinders shall be segregated. Heat treatment shall be resumed only after attaining the requisite temperature and the furnace temperature is maintained between the specified limits. The complete records of heat treatment cycle and interruptions of cycle shall be maintained.

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.

TABLE 1

(1)			(2)	(3)			
Test Details			Test Equipment Requirement	Levels of Control			
Cl.	Requirement	Test Methods		R: required (or) S: Sub contracting permitted	No. of Sample	Frequency	Remarks
		Clause	Reference				
4	MATERIAL						
4.1	Steel for cylinder	4.1	IS 7142	S	One	Each cast/heat	The cylinder manufacturer shall obtain certificates of cast (heat) analysis of steel.
4.2	Bung/Valve pad	4.2	IS 7142	S	Two	Each Consignment	No further testing is required, if accompanied with test certificate or ISI marked.
4.3	Backing Strip Material	4.3	IS 7142	S	Two		
4.4	Foot-rings	4.4	IS 7142	S	Two		
7	Welding	7.1 to 7.8	IS 7142	R	Each Cylinder	–	–
8	Manufacture	8	IS 7142	R	Each Cylinder	–	–
9	Valves and Valves Pad	9	IS 7142	R	Each Valve and Valve Pad	–	–

10	Test of Handle or other suitable arrangement	10.1	IS 7142	R	One cylinder from each lot of 403 cylinders or less (consisting of two consecutive batches)		–
	Foot- ring	10.2	IS 7142	R	Each Foot- ring	–	–
	Bung	10.3	IS 7142	R	Each Bung		
11	Heat Treatment	11	IS 7142	R	Each Cylinder	–	–
12	Inspection	12.1.3	IS 7142	R	Each Cylinder/Component		–
13	Checking of Water Capacity	13	IS 7142	R	Each Cylinder	–	–
14	Proof Test	14	IS 7142	R			
15	Pneumatic Leakage Test	15	IS 7142	R			
16	Hydrostatic Stretch Test	16.1	IS 7142	R	As per clause 16.1 of IS 7142		–
	Bursting Test	16.2	IS 7142	R	As per clause 16.2 of IS 7142		–
17	Acceptance Tests	17	IS 7142	R	As per clause 17 of IS 7142		–
18	Marking	18	IS 7142	R	Each cylinder		–
19	Colour Identification	19	IS 7142	R	Each Cylinder		–

20	Preparation of Despatch	20	IS 7142	R	Each Cylinder	—
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Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: The control unit and levels of control given in column 3 are obligatory in nature to which the licensee shall comply with.

Note-3: The Stage Inspection for manufacturing of cylinders shall be as per *Annex I*.

Note-4: The Test Certificate for cylinders shall be as per *Annex II*.

ANNEX-I**STAGE INSPECTION FOR MANUFACTURING OF LPG CYLINDERS****1. Material:**

- a) Check physical and chemical properties of each cast/heat.
- b) Check dimensions and surface defects (visual).

2. Manufacturing of Components:

Body (Upper half and lower half)	Bung	Foot Ring	Back strips (wherever provided)
Check pressing for thickness and surface defects such as cracks and laminations.	Check blanks, forging for cracks and other surface defects.	Check for dimensions and other defects.	Check for dimensions and surface defects.
Random check of height to maintain water capacity.	After manufacturing check dimensions and threading by gauges.	Random check for data stamped.	

3. Assembly:

- a) Check top and bottom halves for defects and traces of oil.
- b) Inspect welding defects of body, bungs and foot ring.
- c) Inspect tack welding of back strip, if provided.
- d) Check for permanent volumetric expansion.
- e) Check for defects/leakage after hydraulic test and pneumatic test.
- f) Select cylinders for acceptance, burst test and hydrostatic stretch test.
- g) Check bung threads, leakage between valve and bung and leakage of the cylinder (pneumatically).
- h) Check all cylinders for water capacity.
- i) Check for internal cleaning and drying.
- j) Check for weight of each empty cylinder with valve.
- k) Inspect fitting of cap on cylinders and details stamped on the cylinder.
- l) Check for coating thickness after metallizing and painting.
- m) Final visual inspection after painting.

ANNEX-II

GAS CYLINDER CERTIFICATE

Certificate No.....
Date.....

Manufacturer:
Purchaser:
Order No.:
Batch No.:
Cylinder Descriptionlitre water capacity. Two piece welded Cylinder working pressure 16.9 kgf./cm² at 65 °C

This is to certify that the cylinders manufactured, inspected and tested as mentioned below during the period from to at M/s meet the requirements of IS 7142: 1995, Drawing No -----

The Cylinders have been fitted with self-closing type of valves as per -----

METHOD OF MANUFACTURE	
1. Welding Process:	
2. Method of Support:	
3. Heat Treatment:	
INSPECTION :	TESTS:
4. Bung & Bung Welding :OK 5. Foot ring welding & Marking :OK 6. Internal examination before closing-in-operation: OK 7. i) Circumferential & Longitudinal welding :OK ii) Serial No. Stamping :OK 8. Check for: i. Liquid Penetration Examination of Bung welding: OK ii. Bung threads :OK iii. Cap Threads :OK 9. Leakage with valve fitted; No leakage to cylinder :ok 10. Valve Caps :OK 11. Finishing & Painting :OK	12. Hydrostatic stretch test atkgf/cm ² 13. Hydraulic Pressure test at kgf/cm ² 14. Leakage test atkgf/cm ² (using air) 15. Acceptance test: Report No.....dt..... (Annex-III A) 16. Burst test: a. Cylinder No..... b. Burst Pressure..... kgf/cm ² c. Nominal hoop stress.....kgf/cm ² d. Cylinder bursted without fragmentation : Yes

QUANTITY PASSED: CYLINDERS PASSED -----NOS

Tested/Rejected:..... Cylinder Nos (Annex III B)

Cast No. of Steel	Cast No. of Steel
i. Tensile..... kgf/mm ²	i. Tensile..... kgf/mm ²
ii. Yield..... kgf/mm ²	ii. Yield..... kgf/mm ²
iii. Elongation.....%	iii. Elongation.....%
Steel used IS.....Gr.....	Steel used IS.....Gr.....
C% Si% Mn% S% P%	C% Si% Mn% S% P%

Representative of Licensee

Inspecting Officer (BIS)

ANNEX IIIA

ACCEPTANCE TESTS

Certificate No.....

Date.....

Tested Cylinder Nos:

Batch No.:

Cylinder Nos

Tested at:

Particulars	Longitudinal with Weld (W)	Circumferential parent metal (C)	Longitudinal parent metal (L)
Width (mm)			
Thickness (mm)			
Cross-sectional area (mm ²)			
Gauge Length (mm)			
Yield load (kgf)			
Yield Stress (kgf/mm ²)			
Tensile load (kgf)			
Tensile Strength (kgf/mm ²)			
Final Length (mm)			
Elongation (mm)			
% Elongation			
Position of Fracture			

Bend Test:

- a) Root ---
- b) Face ----

Macro and Micro Examination:

- a) Neck -----
- b) Body ----

Minimum Thickness Test ... mm

Representative of Licensee

Inspecting Officer (BIS)

ANNEX III B

DETAILS OF REJECTION/TESTING

Certificate No.....

Date.....

Batch No.:

Cylinder No. : Tested/Rejected Cylinders

Acceptance Test	Burst Test	Burnout	Cracks

Welding Offset	Lamination	Localized thinning	Others

Total tested/rejected cylinders.....Nos. as detailed above

Representative of Licensee
Officer (BIS)

Inspecting

ANNEX C

Possible Tests in a day

- i) Acceptance Tests
- ii) Burst Test
- iii) Hydrostatic Stretch Test
- iv) Pneumatic Leakage Test
- v) Wall thickness and other dimensions/requirements as per approved drawing
- vi) Water Capacity

ANNEX D**Scope of the Licence**

Licence is granted to use Standard Mark as per IS 7142:1995 with the following scope:	
Name of the product	WELDED LOW CARBON STEEL CYLINDERS FOR LOW PRESSURE LIQUEFIABLE GASES NOT EXCEEDING 5 LITRE WATER CAPACITY
Type	Water Capacity (litre)
Any Other Aspect required as per Standard	PESO approved drawing number and approval number