



**PRODUCT MANUAL FOR
MULTI – FUNCTION VALVE ASSEMBLY FOR PERMANENTLY FIXED
LIQUIFIED PETROLEUM GAS (LPG) CONTAINERS FOR AUTOMOTIVE USE
ACCORDING TO IS 15100**

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 15100:2018
	Title	:	Multi – function Valve Assembly for Permanently Fixed Liquefied Petroleum Gas (LPG) Containers for Automotive Use
	No. of amendments	:	Nil
2.	Sampling Guidelines		
a)	Raw material	:	Clause 4 of IS 15100
b)	Grouping Guidelines	:	Each variety of Valves shall be Tested for GoL/CSoL.
c)	Sample Size	:	6 Valves
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	:	a) Dimensional test b) Thread checking c) Over pressure test d) External leakage test e) Seat leakage test
6.	Scope of the Licence	:	Please refer Annex - C

BUREAU OF INDIAN STANDARDS
Manak Bhawan, 9, Bahadur Shah Zafar Marg,
New Delhi – 110002

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

Sl. No.	Test Equipment	Tests used in with clause Reference
1.	Universal Testing Machine	Tensile Strength and Elongation (Clause 4.1.1)
2.	Leakage Test bench with pressure gauge	Over pressure Test (Clause 9.2), External leakage Test (Clause 9.3), Seat Leakage Test (Clause 9.6)
3.	Hot air oven	High temperature Test (Clause 9.4)
4.	Deep freezer	Low temperature Tests (Clause 9.5)
5.	Pointed Micrometer	Dimensional Check (Clause 5 and Clause 8.1)
6.	Micrometer	
7.	Vernier Caliper	
8.	Gauges	
9.	Endurance Test bench	Endurance Test (Clause 9.7)
10.	Operational Test bench	Operation Test (Clause 9.8)
11.	Corrosion resistance Test arrangement	Corrosion resistance Test (Clause 9.10)
12.	Screw thread gauges	Threads (Clause 5.4 and 5.5)
13.	LPG compatibility Test set up	LPG compatibility Test (Clause 9.9)
14.	Impact Tester	Impact Test (Clause 4.1.2)
15.	Ozone ageing Test set up	Ozone ageing Test (Clause 9.12.1)
16.	Creep Test set up	Creep Test (Clause 9.13)
17.	Bone fire Test arrangement	Bone fire Test (Clause 8.3)
18.	Flow capacity Test arrangement	Flow capacity (Clause 9.8.1.3)
19.	Electrical over voltage Test arrangement	Electrical over voltage Test (Clause 9.8.3.1)
20.	Insulation resistance Test arrangement	Insulation resistance Test (Clause 9.8.3.2)
21.	Minimum operating voltage Test arrangement	Minimum operating voltage Test (Clause 9.8.3.3)

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 furnace - Once in six months

1.1.4 Izod Impact testing machine – Once in three years

1.2 The firm shall procure a set of certified gauges for inspection of different components and get them calibrated periodically. Master gauge against which inspection gauge are checked periodically shall be sent for rechecking in an independent laboratory once in three years.

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

3. LABELLING AND MARKING - As per the requirements of IS 15100: 2018.

4. CONTROL UNIT– One lot of forged valve bodies of the same type and size forged in a day from the material of the same supplier under similar process of production shall constitute a control unit.

5. LEVELS OF CONTROL – Each control unit of finished valves shall be offered for inspection to BIS before dispatch (See Table 2). Valves failing to meet the requirements of the specification shall not be marked with BIS Standard Mark.

5.1 A certificate as per Annex-IA & IB shall be issued by BIS in respect of valves approved for marking with BIS Standard Mark.

5.2 The manufacturer shall maintain a system of works inspection at all stages of manufacture to ensure that the individual valve fittings are free from all manufacturing defects and comply in all respects with the requirements of the Indian Standard Specification.

5.3 FORGING & MACHINING

The licensee shall possess all the requisite infrastructure for the forging and machining of the valve housing in their own premises. Under no circumstances, the forgings of valve housing (body) or machining there of shall be permitted to be sub-contracted or bought from outside.

5.4 BOUGHT OUT COMPONENTS

All other components manufactured/bought from outside shall be inspected by the licensee as per details given in Table 2 and records maintained by the licensee.

6 MATERIAL:

The manufacturer shall declare in their scheme of manufacture/drawing the relevant specification/chemical composition of the raw material (Brass) used for valve body and shall meet the requirement of forgings as given in IS 15100.

6.1 One sample from each consignment of raw material received in the factory shall be analysed for chemical composition. The composition shall be such that the material is compatible under the conditions of service with LPG. If the material is accompanied by a test certificate, further testing is not required. The manufacturer of the valve shall establish means to identify the valve with the raw material certificate. Material with seams, cracks, lamination or other injurious defects shall not be used.

6.2 The relevant specification for the raw material for other components shall also be declared by the manufacturer and clearly indicated in their drawings and scheme of manufacture.

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 R:required (or) S: Subcontracting permitted	LEVELS OF CONTROL		
Cl.	Requirement	Test Methods			No. of samples	Frequency	Remarks
		Clause	Reference				
TESTS ON COMPONENTS							
3.1.3	Excess Flow Check Valve	3.1.3	IS 15100	S	One	Each Consignment	In case the material is ISI marked or accompanied with a Test certificate, no further Testing is required
3.1.4.1	Pressure Relief Valve	3.1.4.1	IS 15100	S	One	Each Consignment	
3.1.4.2	Fusible Plug	3.1.4.2	IS 15100 IS 5903	S	Three	Each Consignment	
3.1.5	Contents Gauge (<i>Pressure Test of Float at 3 MPa</i>)	3.1.5.3	IS 15100	S	One	Each Consignment	
3.2	Filler Connector	3.2	IS 15100	R	One	Each Consignment	Leak Test to be conducted at 2 MPa
3.2.1	Filler Cap	3.2.1	IS 15100	R	One	Each Consignment	
3.2.2	Filler Non-Return Valve	3.2.1	IS 15100	R	Each Valve		Leak Test to be conducted at 0.05 MPa and 2 MPa

4	MATERIAL						
4.1, 4.2	Material	As declared		S	One	Each Consignment	In case the material is ISI marked or accompanied with a Test certificate, no further Testing is required
	Forgings						
	Tensile Strength and Elongation	4.1.1	IS 15100	R	As per sampling plan provided in 4.2 of IS 15100	Each Control Unit	If any of the sample fails, re -testing shall be done as per <i>clause 4.2.2.2</i> of IS 15100
	Impact Strength	4.1.2	IS 15100				
4.3	LPG compatibility Test for rubber and moulded parts	9.9	IS 15100	S	One	Each Consignment	In case the material is accompanied with a Test certificate, no further Testing is required.
4.4	Test for susceptibility to season cracking	4.4	IS 15100	S	One	Each Consignment	
5	CONSTRUCTION AND WORKMANSHIP						
5.2	Dimensions of both in-house and bought out components	As per approved drawings		R	Sampling as per IS 2500	Each Consignment	—
5.3	Minimum finished wall thickness	5.3	IS 15100	R	One	Each Control Unit	—
5.4	Screw Threads	5.4	IS 15100	R	One Valve	Each Control Unit	Valve threads having burrs shall be cleaned for burrs and then checked.

5.5	CONNECTIONS						
5.5.1	Mounting of Multi-function Valve	5.5.1	IS 15100	R	Table 2 of SIT	Each Control Unit	The mounting dimensions to checked with the approved drawings
5.5.2	Inlet Connections	5.5.2	IS 15100	R	Table 2 of SIT	Each Control Unit	To be checked on assembled valve.
5.5.3	Outlet Connections	5.5.3	IS 15100	R	Table 2 of SIT	Each Control Unit	To be checked on assembled valve.
	Visual Smoothness free from cuts and burrs	General Checking with magnifying glass		R	Each Valve	—	Valve housing having cuts, burrs or other defects on the seat shall be rejected
7,8,9	TESTS, TYPE APPROVAL TEST						
7.1(a)	Over Pressure Test	9.2	IS 15100	R	One	Each Control Unit	—
7.1(b)	External Leakage Test at room temperature	9.3	IS 15100	R	Each Valve		—
	External Leakage Test at minimum and at maximum operating temperature	9.3	IS 15100	R	One	Each Control Unit	—
7.1(c)	High temperature Test	9.4	IS 15100	R	One	Each Lot	—
7.1(d)	Low temperature Test	9.5	IS 15100	R			

7.1(e)	Seat Leakage Test	9.6	IS 15100	R	Each Valve	—	—
7.1(f)	Endurance Test	9.7	IS 15100	R	One	Every 10000 pieces or minimum once in a month	—
7.1(g), 9.8	OPERATIONAL TEST						
	Operation Test for Pressure Relief Valve	9.8.1	IS 15100	R	Three	Each Control Unit	—
	Operation Test for Excess Flow Valve	9.8.2	IS 15100	R	Three	Each Control Unit	—
	Operation Test for Remotely Controlled Service Valve	9.8.3	IS 15100	R	One	Every 1000 pieces	—
	Charging speed Test	9.8.4	IS 15100	S	One	Once in a year	—
	Endurance Test for Fill Limiter	9.8.5	IS 15100	R	One	Every 1000 pieces	Test is applicable for automatic fill limiter
	Vibration Test Procedure	9.8.6.1(a)	IS 15100	R	Three	Each control unit	—
7.1(h), 9.9	LPG Compatibility Test	9.9, Annex B	IS 15100	R	Three	Each lot	—
7.1(j), 9.10	Corrosion Resistance Test	9.10, Annex C	IS 15100	S	One	Once in a year	—
7.1(k), 9.11	Resistance to Dry Heat Test	9.11	IS 15100	R	0.25% subject to minimum of 8	Each Consignment	
7.1(m), 9.12	Ozone Ageing Test	9.12	IS 15100	R		Each Consignment	

7.1(n), 9.13	Creep Test	9.13	IS 15100	R	One	Every 5000 valves or minimum once in a month	
7.1(p), 9.14	Temperature Cycle Test	9.14	IS 15100	S	One	Once in a year	
8.2	Cycle Test	8.2	IS 15100	R	One	Every 10 000 valves or minimum once in a month whichever is earlier	
8.3	Bonfire Test	10.6.1	IS 14899	S	One	Once in three year for each design/size or in case of change in design.	
TYPE TESTS ON ASSEMBLED VALVES							
9.4	High Temperature Test	9.4	IS 15100	R	One	Once in a week on assembled valve	
9.5	Low Temperature Test	9.5	IS 15100	R	One		
9.8.6	Vibration Test procedure	9.8.6	IS 15100	S	One	Once in a year	The Test is performed on assembled and Tested valve.
5.5.1	Mounting	5.5.1	IS 15100	R	According to sampling plan given in Table 2 of SIT	Each control unit	The mounting dimension to be checked with the approved drawing of the manufacturer.

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 as decided by the Bureau are obligatory to which the licensee shall comply with.

TABLE 2**INSPECTION OF FINISHED LOT:**

After testing and inspection by the firm, each lot shall be offered to BIS for release. Number of valves shall be selected by BIS officer as per sampling plan given below. The selected valves shall be tested for the requirements given in *clause* 5.1, 5.5.2, 5.5.3, 9.3.1, 9.3.2(a), 9.3.3, 9.3.4, 9.6 & 10.1 of IS 15100.

Lot Size	No. of valves to be Tested	Remarks
Upto 500 valves	20	In case of any failure observed the lot shall be reoffered by the manufacturer after complete recheck. Any repeat failure shall result in the rejection of the whole lot. Lot can be reoffered only once. All rejected valves shall be scrapped.
501-1000	32	
1001-3000	50	
3001-10000	80	
10001-25000	125	
25001 and above	125 + 2 (each additional thousand or part thereof)	


NOTE:

- a) One valve from the selected samples shall be tested for Over Pressure Test (Hydro-static Test) at 4.5 MPa as per *clause* 9.2 of IS 15100.
- b) One valve from the selected sample shall be tested for High Temperature Test as per *clause* 9.4 and Low Temperature Test as per *clause* 9.5 of IS 15100.
- c) Three valves from the selected sample shall be tested for Operation Test for Pressure Relief Valve as per *clauses* 9.8.1.2, 9.8.1.3, 9.8.1.4 and Operation Test for Excess Flow Check Valve as per *clause* 9.8.2.1 to 9.8.2.10 of IS 15100.
- d) One valve per lot of 1000 nos. or part thereof shall be tested for Operation Test of Remotely Controlled Service Valve as per *clause* 9.8.3.1, 9.8.3.2, 9.8.3.3 and Endurance Test for Fill Limiter as per *clause* 9.8.5 of IS 15100.
- e) Also, once in a year, one valve shall be tested for Vibration Test of Fill Limiter as per *clause* 9.8.6.
- f) During inspection by BIS, if valves are found with defects like burrs on valve inlet or outlet connection etc., which may likely to effect the results of inspection, the firm may be advised to segregate/rectify such valves and reoffer for inspection.
- g) All those tests which licensee is carrying out as per SIT and are not carried out by BIS during lot inspection shall be conducted in presence of BIS officer as far as possible.
- h) BIS officer shall witness testing of valve forgings for physical requirement as per *clause* 4.1.1 and 4.1.2 of IS 15100, if carried out during the visit.

ANNEX – IA

(Para 5.1 of the Scheme of Inspection and Testing)


Test Certificate for Multifunction Valve Assembly for Permanently Fixed Liquefied Petroleum Gas (LPG) Containers for Automotive Use as per IS 15100

Name of the Manufacturer		IS 15100  CM/L---	
Certificate No:	Date:		
Purchaser:			
Order No.			
Control Unit No:	Batch No		
Quantity offered for inspection			
VALVE FITTINGS DESCRIPTION			
This is to certify that the valve fittings as mentioned below were inspected at M/s. ----- and these meet the requirements of IS 15100 and Drawing. No:			
RESULTS OF INSPECTION			
	No. of Valves		
	Inspected	Passed	Rejected
a) Visual inspection of construction and workmanship (Clause 5.1)			
b) Valve inlet connection (Clause 5.5.2)			
c) Valve outlet connection (Clause 5.5.3)			
d) External leakage (Clause 9.3)			
e) Seat leakage Test (Clause 9.6)			
f) Operational Test (Clause 9.8)			
g) Overpressure Test (Clause 9.2)			
h) Marking Details (Clause 10.1)			
(i) Cycle Test of Batch No.			
From the Test records of manufacturer			
(i) Tensile Strength			
(ii) % elongation			
(iii) Impact strength			
Quantity Passed :			
Quantity of Rejected valve fittings and the method for their disposal			
Signature:	Signature:		
Name & Designation of the representative of Licensee	Name and Designation Inspecting Officer of BIS		
NOTE: A copy of the certificate may be sent to PESO, Nagpur			

ANNEX – IB

(Para 5.1 of the Scheme of Inspection and Testing)

Test Certificate for Filler Connector used with Multifunction Valve Assembly for Permanently Fixed Liquefied Petroleum Gas (LPG) Containers for Automotive Use as per IS 15100

Name of the Manufacturer		IS 15100	
			
		CM/L---	
Certificate No:	Date:		
Purchaser:			
Order No.			
Control Unit No:	Batch No		
Quantity offered for inspection			
VALVE FITTINGS DESCRIPTION			
This is to certify that the filler connector as mentioned below were inspected at M/s. ----- and these meet the requirements of IS 15100 and Drawing. No:			
RESULTS OF INSPECTION			
	No. of Valves		
	Inspected	Passed	Rejected
a) Visual inspection of construction and workmanship (Clause 5.1)			
b) Leak Test for joint of Filler Cap with Connector at 2 MPa (Clause 3.2.1)			
c) Leak Test of non-return valve of Filler Connector at 0.05 and 2 MPa. (Clause 9.6.3)			
d) Overpressure Test (Clause 9.2)			
e) Cycle Test of Batch No.			
From the Test records of manufacturer			
(i) Tensile Strength			
(ii) % elongation			
(iii) Impact strength			
Quantity Passed :			
Quantity of Rejected filler connector and the method for their disposal			
Signature:	Signature:		
Name & Designation of the representative of Licensee	Name and Designation of Inspecting Officer of BIS		
NOTE: A copy of the certificate may be sent to PESO, Nagpur			

ANNEX - C**Scope of the Licence**

Licence is granted to use Standard Mark as per IS 15100:2018 with the following scope:	
Name of the product	Multifunction Valve Assembly for Permanently Fixed Liquefied Petroleum Gas (LPG) Containers for Automotive Use
Type	a) 'Liquid withdrawal' type` b) 'Vapour withdrawal' type
Any Other Aspect required as per Standard	a) Drawing number duly approved by PESO b) Approval Letter number and date