



**PRODUCT MANUAL FOR
LOW PRESSURE REGULATORS FOR USE WITH
LIQUEFIED PETROLEUM GAS (LPG)
ACCORDING TO IS 9798: 2013**

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 9798: 2013
	Title	:	Low pressure Regulators for use with Liquefied Petroleum Gas (LPG)
	No. of Amendments	:	Three
2.	Sampling Guidelines:		
a)	Raw material	:	As per clause 4 of IS 9798:2013
b)	Grouping guidelines	:	Each Variety of regulator shall be tested for GoL/CSoL.
c)	Sample Size	:	Please refer ANNEX - A
3.	List of Test Equipment	:	Please refer ANNEX - B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	Possible tests in a day:	:	Please refer ANNEX – D
6.	Scope of the Licence:		
	“Licence is granted to use Standard Mark as per IS 9798: 2013 with the following scope:		
	Name of the product	Low Pressure Regulators for use with Liquefied Petroleum Gas (LPG)	
	Type	Single/Two Stage Regulators	
	Sizes	_____ mm (Inlet Diameter),	
	End connection	Quick coupling/ Threaded	
	Any other aspect	PESO approved drawing number and approval number	

ANNEX – A

Sample Size

- 3 Nos. of complete assembled Regulators
- 1 Piece of cast body for body leakage test
- 5 pieces of each, all rubber components with test buttons.
- 5 pieces of each brass components.
- Sample of zinc ingot (raw material)
 - Sample of die cast body and cover for chemical testing.

ANNEX B**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	Construction and workmanship, Cl.5	Vernier Caliper, Flat Point Micrometer, Pointed Micrometer, Dial thickness Gauge, Radius Gauge, Slip gauge Box, Dial indicator
2	Mechanical strength of connections, Cl. 8.11	Torque Wrench, Stop Watch, Digital Load Cell with display (S-type), Dynamometer
3	High Temp Test at (65° C), Cl. 8.10.2	Oven for high temperature and ageing test
4	Low Temp Test at (-20° C) Cl. 8.10.1	Deep Freezer for Low Temperature Test
5	Immersion Test , Cl. 4.3 .5 & 4.4.2 Annex-C	Immersion test for rubber components with N-pentane gas, leak proof bottle, balance arrangement.
6	Ageing Test, Cl. 4.3.2, Cl. 4.4.3	Ageing Test apparatus for rubber components with Oven and shore hardness tester.
7	Compression set test for Rubber components, Cl. 4.3.7 & 4.4.5 , Annex. 'E'	Compression set test for Rubber components with space & fixture
8	Pressure Gauge Calibration	Dead weight tester for pressure gauge calibration
9	Load Test	Spring load tester for compression and tension load testing
10	hardness Test	Rock well hardness tester for hardness testing.
11	Profile	Profile projector with micro meter for micro components checking
12	Bend Test, 8.11	LEVER Bend test fixture.
13	Mercurous nitrate test Cl. 4.1.1	Mercurous nitrate test arrangement with Mercurous nitrate
14	Test for adhesion of paint, Cl. 4.2.1 (Annex-B)	Adhesion tape test with pointed sharp instrument for powder coating resistance.
15	Finish, Cl. 4.2.1	Salt spray test for corrosion test
16	BODY LEAKAGE TEST AS PER CLAUSE 5.7.2	BODY LEAKAGE TEST BENCH
17	Soundness, Cl. 6	SOUNDNESS TEST BENCH with pressure gauges of adequate range.

18	Performance test, Cl. 8.9.1	Performance test bench with rotameter and pressure gauges
19	Chattering test, Cl. 8.9.2	Chattering test bench
20	Pneumatic, Interchangeability and leak proof test Cl. 6.4	PNEUMATIC, INTERCHANGEABILITY & LEAK PROFF TEST BENCH
21	Cycle Test, Cl. 8.10.1	Cycle test bench
22	Hydrostatic test, Cl. 6.3	H.S.T. TEST BENCH
23	Clamping test, Cl. 4.3.3	DIAPHARAGM CLAMPING TEST BENCH
24	Pull out and Burst test, Cl. 4.3.4	Test Bench as per Annex C
25	Regulator Inlet sealing test, Cl. 5.5.4, Annex K	Test Bench as per Annex K

List of gauges for checking dimensions as per Clause 5

Sr No	Gauge	Measurement/limits
1.	PLUG GAUGE	$\varnothing 1.5 + 0.1/-0$
2.	SP. PLUG GAUGE	$\varnothing 15.5 + 0.1$
3.	PLUG GAUGE	$\varnothing 7.6 + 0.1/-0$
4.	PLUG GAUGE (GO'L-30. NGO-25)	$\varnothing 2.5 \pm 0.05$
5.	PLUG GAUGE (GO'L-30. NGO-25)	$\varnothing 5.1 \pm 0.05$
6.	SP. PLUG GAUGE	Concentricity Between 5 & 6 bore of inlet stub
7.	SP. PLUG GAUGE	Concentricity Between 25.75x11.95x5
8.	SP. PLUG GAUGE	Concentricity Between 25.75x11.95x6
9.	SP. PLUG GAUGE	Gauge to check angular area between W.R. Bush & 3 of W.R After Stub Crimping
10	SP. GAUGE	(Go) 6.5/7.0(NGO)
11	PLUG GAUGE	$\varnothing 9 \pm 0.2$
12	PLUG GAUGE	$\varnothing 4.4 \pm 0.01$
13	RING GAUGE	$\varnothing 10 \pm 0.25$
14	PLUG GAUGE (GO'L-30. NGO-30)	$\varnothing 5 \pm 0.25$
15	SP. PLUG GAUGE	$\varnothing 42 \pm 0.3$
16	PLUG GAUGE	$\varnothing 5 \pm 0.1$
17	SP. GAUGE	$\varnothing 18 \pm 0.2$
18	SNAPGAUGE	4.9+0.0/-0.05
19	SLOT GAUGE	2.5±0.05

20	SLOT GAUGE	2.6+0.1/-0
21	SNAPGAUGE	32.3 ±0.3
22	SNAP GAUGE	3.7 ±0.1
23	SLOT GAUGE	9.5±0.01
24	SNAPGAUGE (Thck-2 mm)	2.5±0.1
25	SNAP GAUGE	3.15+0.05/-0
26	SNAP GAUGE	18.55±0.2
27	SNAP GAUGE	1.2±0.1
28	SP. GAUGE	Concentricity (dia 5,3.15 &3)
29	PLUG GAUGE	Ø 2.6±0.13
30	PLUG GAUGE	Ø 3.3±0.1
31	PLUG GAUGE	Ø 4.3+0.05/-0
32	PLUG GAUGE (GO'L-30. NGO-35)	Ø 6.0+0.1/-0
33	PLUG GAUGE (GO'L- 30NGO'L-20)	
34	PLUG GAUGE (GO'L-40,NGO- L-35)	
35	SP. PLUG GAUGE (GO'L DEP- 16.3)	
36	RING GAUGE	
37	SP. P.C.D GAUGE (14.2mm PIN)	

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

ANNEX C

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.

1.2 QUALITY CONTROL- All units manufacturing and supplying regulators shall obtain and hold valid Quality Management System certification in accordance with IS/ISO 9001 from BIS to ensure that the manufacturer adheres to various steps during each stage of manufacturing process constantly.

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

3. LABELLING AND MARKING – In addition to the requirements of IS 9798:2013, each Regulator shall be marked with the Serial Number. The location and size of Licence Number marked on Regulators shall be as given in the approved drawing.

4. CONTROL UNIT – A Lot of Regulators of same Type and Size manufactured in a day from body and cover cast in a day from material of the same consignment/supplier under similar process of production shall constitute a control unit. (Body and Cover can be cast on different days i.e. Body on one day and Cover on another day; but both from same consignment of material)

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 Each control unit of finished regulators shall be offered for inspection to BIS before dispatch. The sampling and criteria of conformity for the lot inspection given in Annex 1 of this scheme shall be followed; Regulators failing to meet the requirements of the specification shall not be marked with the BIS Standard Mark.

5.1.1 A certificate shall be issued by the Bureau in respect of regulators approved for marking with BIS Standard Mark as per Proforma given at Annex 2.

5.2 At the time of approval of prototype, the regulator shall be checked for conformity to all the requirements of IS 9798:2013. Whenever there is a change in material or design of the regulator, it shall be retested and shall conform to all the requirements of the specification. A drawing giving outline dimensions and materials of construction shall be provided along with the prototypes.

6. 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. The rejected/ non-conforming product shall be reshaped/ scrapped off beyond use.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-Contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
4	Material						
4.1, 4.2	Body & Cover of Regulator	4.1, 4.2	IS 9798	S	One	Each consignment	Pl. see Note 1
4.1	Components material	4.1	IS 9798	S	One	Each consignment	
4.1.1	Brass Parts	4.1.1	IS 9798	S	One	Each consignment	
5.2, 5.3	Construction	5.2, 5.3	IS 9798	R	Each Regulator		
9	Sealing	9	IS 9798	R	Each Regulator		
TYPE TEST							
4.3	Diaphragm Material						
4.3.1	Porosity and surface smoothness	4.3.1	IS 9798	R	0.25% subject to a minimum of 8 pieces from each consignment		Pl. see Note 2
4.3.2	Ageing/ Hardness	3 or 4	IS 3400 (Part 4)	R	One	Each consignment	Test to be carried out on representative slab/button Pl. see Note 2 also
4.3.3	Clamping test	4.3.3	IS 9798	R	One	Each consignment	Pl. see Note 2

4.3.4	Pull out and Burst	Annex C	IS 9798	R	One sample daily out of 1000 Regulators or part thereof assembled in a day		Pl. see Note 2
4.3.5	Immersion test for diaphragm	Annex D	IS 9798	R	1 piece out of 1000 diaphragms from each consignment		Pl. see Note 2
4.3.6	Flexible test	4.3.6	IS 9798	R	1 piece out of 1000 diaphragms from each consignment		Pl. see Note 2
4.3.7	Compression test	4.3.7, Annex E	IS 9798	R	3 pieces	Each consignment	Test to be carried out on representative slab/button Pl. see Note 2 also
4.4	Valve pad material						
4.4.1	Porosity, pits, Surface smoothness, Low cold flow, creep characteristics	4.4.1	IS 9798	R	0.25% subject to a minimum of 8 pieces from each consignment		Pl. see Note 2
4.4.2	Immersion test for valve pad	4.4.2 Annex D	IS 9798	R	1 piece out of 1000 valve pad from each consignment		Pl. see Note 2
4.4.4	Immersion test for valve fitted in the lever	4.4.4	IS 9798	R	1 piece out of 1000 valve pad fitted in its lever from each consignment		Pl. see Note 2
4.5	Seals	4.5	IS 9798	R	0.25% subject to a minimum of 8 pieces from each consignment		Pl. see Note 2
5.5.1, 6.3	Hydrostatic test	5.5.1, 6.3	IS 9798	R	3 pieces	Each control unit	Pl. see Note 3
5.7	Body	5.7	IS 9798	R	3 pieces	Each control unit	
5.9, 8.10	Excess flow valve	5.9, 8.10, Annex-F	IS 9798	R	1piece	Once in a month	

5.10	Valve pad fitting	5.10	IS 9798	R	1piece	Once in 6 months	The test shall be carried out during type approval or whenever there is change in design
5.11, 8.11	Strength of connection	5.11,8.11	IS 9798	R	1piece	Once in 6 months	The test shall be carried out during type approval or whenever there is change in design
5.12	Strength of Regulator	5.12,8.11	IS 9798	R			
8.10.1	Cycle test	8.10.1	IS 9798	R	4 pieces	Once in 6 months	The test shall be carried out during type approval or whenever there is change in design
8.10.2	Low temp test	8.10.2	IS 9798	R	4 pieces	Weekly	
8.10.3	High temp test	8.10.3	IS 9798	R	4 pieces	Weekly	
ROUTINE TESTS							
4.2.1	Finish - Corrosion resistance	4.2.1 6	IS 9798 IS 9844 IS 6009	R	1 piece	Weekly	
4.2.1	Finish - Adhesion test for painted or Powder coated surface	4.2.1, Annex-B	IS 9798	R	1 piece	Each control unit	
4.4.5	Compression test	4.4.5	IS 9798	R	3 piece	Each consignment	
4.4.3	Ageing test/ Hardness	3 or 4	IS 3400 (Pt 4)	R	1 piece	Each consignment	Test to be carried out on representative slab/button
4.5	Porosity, Ageing hardness, compression test	4.4.1 4.4.3 4.4.5	IS 9798	R	0.25% subject to a minimum of 8 pieces from each consignment		Test to be carried out on representative slab/button
5.4, 5.5.3	Screwed ends	Annex-E	IS 9798	R	Each regulator		

5.5	Interchange ability & leak-proof test for Inlet Connection	Annex-3 of SIT	IS 9798	R	0.25 percentage subject to a minimum of 8 from all regulators assembled in a day		
5.5.2, 6.2, 6.4	Pneumatic test	5.5.2, 6.2 & 6.4	IS 9798	R	Each Regulator		Pl. see Note 4
5.5.4	Inlet sealing test	5.5.4 Annex K	IS 9798	R	Each Regulator		
5.6.1	Outlet connection (non-threaded)	5.6.1	IS 9798	R	3	Each control unit	Suitable gauges to be used
5.6.2	Outlet connection (Threaded)	5.6.2	IS 9798	R	Each Regulator		
5.8	Vent	5.8	IS 9798	R	Each Regulator		
5.9	Excess Flow valve	5.9 Annex-F (F2 & last para)	IS 9798	R	3	Each control unit	
8.2, 8.9	Chatter & performance	8.2,8.9	IS 9798	R	Each regulator		

Note 1: No further testing is required if the material received is with test certificate. However, testing shall be carried out once in three months for Zinc ingots/ body/cover and once in a year for material of other parts, for the purpose of cross-checking. BIS IOs visiting for lot inspections shall verify the test certificates and shall also write to supplier of material to confirm genuineness of test certificates selected randomly.

Note 2: If any sample fails, twice the number of samples shall be tested from the same consignment. In case of further failures, the entire consignment shall be rejected.

Note 3: In case of any change in back pressure it shall be construed as leakage through the pad/body and treated as failure of the regulator. In such case, thrice the number of fresh samples shall be tested from same lot. In case of further failures, the entire consignment shall be rejected.

Note 4: For clause 6.4, in case of any change in back pressure it shall be construed as leakage through the pad/body and treated as failure of the regulator. In such case, further investigation to be carried out to ascertain the reason for failure and action to be taken accordingly, and quality check to be strengthened in the affected area.

Note-5: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-6: The control unit and levels of control as decided by the Bureau are obligatory, to which the licensee shall comply with.

ANNEX 1

(Cl. 5.1 of SIT)

Subject: Sampling Plan for Lot Inspection for Certification of LPG regulators as per IS 9798:2013.

All the regulators of the same size manufactured from the same consignment of material under similar conditions of production shall be grouped together to constitute a lot. The lot may consist of one or more control units. Samples for lot inspection shall be selected depending on the number of regulators in a lot as given below:

Lot Size			Sample Size
Upto 500			20
501	to	1000	32
1001	to	3000	50
3001	to	10000	80
10001	to	25000	125
25001 & above			200

Note: When a lot consists of more than one control unit, the sample size shall be divided, as far as possible, equally between the control units

Criteria for Acceptance of a lot:

(i) Each of the regulator selected in the sample shall be subjected to the following tests:

- a) Construction and workmanship (clause 5.2).
- b) Inter-changeability (Cl. 5.3).
- c) Pneumatic test (Cl. 6.2, 6.4).
- d) Inlet sealing test (Cl. 5.5.4)
- e) Performance test (Cl. 8.9.1).
- f) Chatter (Cl. 8.9.2).

(ii) 2 regulators from the selected samples of each lot shall be tested for;

- a) Outlet connection: [2 for non-threaded (Cl. 5.6.1) & 10 % of sample size for threaded (5.6.2).
- b) Excess flow valve (5.9), if regulator is to be used with excess flow valve – (one Regulator)
- c) Hydrostatic test (Cl. 6.3).
- d) Mechanical Strength of Connection (8.11).

A regulator failing to meet any of the requirements of above tests shall be termed as defective. The lot shall be accepted if no defective is found in the sample size. In case of failure(s), the entire control unit(s) of the defective regulator(s) to be rechecked for the failed parameter and reoffered for inspection, after taking corrective action, wherever required.

If a control unit has been re-offered, then the same sampling criteria should be applied as indicated above; but with double the sample size.

ANNEX 2
(Cl. 5.1.1 of STI)

BUREAU OF INDIAN STANDARDS

Date:

..... BO/RO)

TEST CERTIFICATE FOR LPG PRESSURE REGULATORS

Certificate No.:

Name and address of the manufacturer:

Batch No.:

Order No. & Date:

Purchaser:

Description: Low Pressure LPG regulator (Max. working Pressure 16.87 kgf/cm²) 500 1/h outlet for 6.4/7mm Rubber Tubing to be used on SC valves with 22.0/25 6 mm outlet diameter.

This is to certify that the following regulators are inspected and tested on _____ at M/s _____ in accordance with Scheme Of Inspection and Testing attached with BIS License No. _____ meet the requirement of IS 9798: 2013 & drawing No. _____ approved by Chief Controller of Explosives vide letter No. _____ dated _____.

Raw Material Specification:

Supplier's Name:

Test Cert. No. & Date:

CHEMICAL COMPOSITION

Constituent	Al	Mg	Cu	Pb	Fe	Cd	Sn	Tl & In	Ni	Zn
Specified										
As per TC										
Remark										

Regulators bearing serial Nos from to covered by Lot no: and Control Unit no.
are checked/tested for the following:

Sr No	Parameter	Clause no.	Specified value/ or as per Cl.	No of pieces inspected	Result
1	Construction and workmanship	5.2	5.2		
2	Interchangeability	5.3	5.3		
3	Leak proof test for inlet connection	5.5	5.5		
4	Inlet sealing test	5.5.4	5.5.4		
5	Soundness test	6			
5 a)	Pneumatic test (at Kgf/Cm2)	6.4	17		
5 b)	Pneumatic test (at gf/Cm2)	6.2	150		
5 c)	Hydrostatic test (at Kgf/Cm2)	6.3	25.4		
6	Outlet connection	5.6	5.6		
7	Chatter	8.2, 8.9.2	8.2, 8.9.2		
8	Performance test	8.9.1	Delivery pressure (mm of water column)		
8 (a)	Inlet pressure: 0.5 Kgf/Cm2 and 100 % flow rate	8.9.1	225 min		
8 (b)	Inlet pressure: 17 Kgf/Cm2 and 10 % flow rate	8.9.1	400 max		
8 (c)	Inlet pressure: 0.5 Kgf/Cm2 and lock up	8.9.1	450 max		
9	Excess flow valve	5.9	5.9		
10	Mechanical strength of connection	8.11	8.11		

Quantity inspected:

Quantity Passed:

SR. NO. OF REGULATORS REJECTED:

(Include the Regulators tested for Hydrostatic test as per cl: 6.3)

Method of disposal of rejected regulators: De-shaped/Dismantled:

Signature with date Signature with date

Name & Designation Name & designation

Firm's QC Incharge BIS Inspecting Office

ANNEX 3

(Table 1 of SIT)

Interchangeability Procedure for Leak-proof test for inlet connection of LPG pressure regulator as per clause 5.5 IS 9798 and Table 1 of this Scheme.

The manufacturer shall provide to the inspector two self-closing spring-loaded LPG valves manufactured as per customer's requirements, one with all tolerances on the minimum side and another with all tolerances on the maximum side for this check

For checking proper fitment and locking up with self-closing spring loaded LPG valves, regulators to be coupled with the two pieces of valves provided as above and hydrostatic/pneumatic tests carried out with the valve in open position at the pressure of 25.4 kgf/cm^2 / 17.0 kgf/cm^2 to check that there is no leakage from the regulator inlet portion as also from the valve outlet and the regulator inlet joint (the regulator orifice to be closed to lock up position by applying pneumatic pressure greater than 450 mm of water column through outlet of regulator).

ANNEX D**Possible tests in a day**

Sl. No	Tests
1.	Construction and Workmanship (Cl.5.2)
2.	Hydro-Static Test (Cl. 6.3)
3.	Interchangeability & leak-proof test for Inlet Connection (Cl. 5.5)
4.	Outlet Connection (Cl. 5.6)
5.	Inlet Sealing test (Cl. 5.5.4)
6.	Excess Flow rate (Cl. 5.9)
7.	Mechanical Strength of connection (Cl. 5.11 & 8.11)
8.	Soundness Test (Cl. 6.2) (from Outlet Connection)
9.	Pneumatic Test (Cl. 6.4) (From Inlet Connection)
10.	Chatter (Cl.8.2)
11.	Performance test (Cl. 8.9.1)
12.	Cycle test (Cl. 8.10.1)