



उत्पाद मैनुअल
आई एस 3224: 2021 के अनुसार
द्रवित पेट्रोलियम गैस (एल पी जी) सिलिंडरों को छोड़कर सम्पीड़ित गैस सिलिंडरों के
लिए वाल्व के लिए

दस्तावेज संख्या - पी एम/आई एस 3224/3/ जनवरी 2022

भारतीय मानक ब्यूरो की स्कीम-I (अनुरूपता मूल्यांकन) विनियम , 2018 के तहत यह उत्पाद मैनुअल प्रमाणीकरण के प्रचालन में रीति और पारिशिष्ट की सुसंगतता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस प्रमाणीकरण लाइसेंस/ प्रमाणपत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज का उपयोग किया जा सकता है ।

PRODUCT MANUAL FOR
VALVE FITTINGS FOR COMPRESSED GAS CYLINDERS EXCLUDING
LIQUEFIED PETROLEUM GAS (LPG) CYLINDERS
ACCORDING TO IS 3224: 2021

Document No.- PM/IS 3224/3/January 2022

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.



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1.	Product	:	IS 3224: 2021
	Title	:	Valve Fittings for Compressed Gas Cylinders excluding Liquefied Petroleum Gas (LPG) Cylinders
	No. of Amendments	:	Nil
2.	Sampling Guidelines:		
a)	Raw material	:	As per Cl. 5 of IS 3224
b)	Grouping guidelines	:	Each design of valve shall be tested for Grant of Licence /Change in Scope of Licence. Manufacturer shall inform every change in material/design. Whenever there is a change in material or design of the valve it shall be retested and shall conform to all the applicable requirements of the specification. Applicability of various tests in case of change in material/design shall be decided with approval of statutory authority as given in Cl. 10.1.4 and Cl. 10.1.5 of IS 3224: 2021.
c)	Sample Size	:	(a) Assembled valves- 11 pieces/ 20 Pieces (For Valves equipped with PRD)/ 30 pieces (For PRD equipped CNG Valves) (b) Samples for material testing, Izod and tensile- 3 pieces each (c) Valve body piece for chemical test- 3 pieces (d) Other metallic and non-metallic components in sufficient quantity
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

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

Tests Used in with Clause Reference	Test Equipment
Tensile strength and % Elongation, 5.3.1	Tensile testing machine
Izod impact test, Cl. 5.3.2	Izod Impact testing machine
<i>Tests for protective finish of valves to be fitted with medical cylinders, Cl. 5.5 and Table 3 of IS 1068 :</i> Coating thickness as per Cl. 7.2.3, Cl. 7.2.4, Cl. 9.1 of IS 1068; Adhesion as per Cl. 7.3 and Cl. 9.2 of IS 1068; Ductility test as per Cl. 7.2.3.2 and Cl. 9.4 of IS 1068; Corrosion resistance test as per Cl. 7.4 and Cl. 9.3 of IS 1068	Electrolytic cell and test solution as per Annex G of IS 1068 or Test solution and Instrument as per IS 3203 for coating thickness; File or Oven for Adhesion test; Mandrel for Ductility test; Salt spray chamber with atomizer and pressure gauge as per IS 6009 for Corrosion resistance test
Valve inlet connections, Cl. 8	Thread Plug Gauges and Ring gauges of suitable sizes
Valve outlet connections, Cl. 9	Thread Plug Gauges and Ring gauges of suitable sizes
Hydraulic Burst Pressure, Cl. 10.4.1	Test bench with pressure gauge
Valve Impact test, Cl. 10.4.2	Suitable fixture with mass
Valving Torque test, Cl. 10.4.3	Torque wrench with fixture
Excessive Torque test, Cl. 10.4.4	Torque wrench with fixture
Internal/External leak tightness, Cl. 10.5	Test bench with pressure gauge
Endurance test, Cl. 10.6	Suitable fixture with pressure gauge and counter
Flame impingement (For hand wheel/ Knob operated Valves), Cl. 10.8	LPG Cylinder, blow pipe of specified length, Pyrometer,
Flow capacity of PRD, Cl. 10.9	Test fixture with rotameter or suitable measuring device
Bursting pressure test for Bursting disc of PRD, Cl. 7.2, Cl. 13.4.2	Test bench with pressure gauge as per IS 5903
Yield temperature of fusible plug, Cl. 13.4.3	Pressure gauge, Liquid bath and test set up as per IS 5903
Checking of other dimensions, Cl. 13.4.6, Cl. 13.4.7	Vernier caliper, micrometer
<i>Type tests for PRDs of CNG Valves</i>	
Resistance to extrusion test, Cl. 11.1.1	Test bench with pressure gauge
Accelerated life test, Cl. 11.1.2	Oven or Liquid bath, Pressure gauge
Continued Operation (Cyclic) test, Cl. 11.1.3	Suitable fixture with pressure gauge and counter
Thermal Cyclic test, Cl. 11.1.4	Liquid baths at -20 ⁰ C and 82 ⁰ C, Suitable fixture with pressure gauge and counter

Condensate corrosion resistance test, Cl. 11.1.5	Test solution, liquid bath
Vibration test, Cl. 11.1.6	Test fixture as per Cl. 11.1.6
Activation test, Cl. 11.1.8	Oven, Test bench with pressure gauge
<i>Type test for excess flow valve for CNG Valves</i>	
Type test for excess flow valve for CNG Valves, Cl. 12	Test bench with pressure gauges, Leak detector,

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 Universal Testing Machine - Once in a year

1.1.2 Impact Testing Machine- Once in three years

1.1.3 Pressure Gauges - Once in a month

1.1.4 Pyrometer used for heating furnace- Once in six months

1.1.5 Master gauges against which inspection gauges are checked periodically shall be sent for rechecking in an independent laboratory once in three years.

1.2 The firm shall procure a set of certified gauges for inspection of different components.

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 valve manufacturer's work shall be kept and copies of test certificates shall be forwarded to the purchaser of the valve and the inspecting authority.

3. LABELLING AND MARKING – As per the requirements of IS 3224: 2021.

4. CONTROL UNIT – A Batch shall consist of forged valve blanks of the same type and size manufactured from the material of the same supplier or blanks from the same heat number, whichever is later, under similar process of production.

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 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 the BIS Standard Mark.

5.2 A certificate as per Annexure -I shall be issued by the BIS in respect of every batch of Valves marked with BIS Standard Mark.

5.3 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 respect with the requirements of the Indian Standards Specification.

5.4 One sample of each consignment from raw materials received in the factory shall be analyzed for chemical composition. The composition shall be such that the material shall be compatible under the conditions of service with the gas to be contained in the cylinder and complies with the declaration submitted at the time grant of license or change in Scope of licence.

5.5 The material shall conform to the requirements specified in 5.1 to 5.5 of IS 3224:2021. A test certificate shall be supplied by the supplier with the supply of the material for the valve fabrication. BIS shall be given the opportunity of making an independent check test, if necessary. The manufacturer of the valves should establish means to identify the valves with the certificate. Material with seams, cracks, lamination or other injurious defects shall not be used.

5.6 DESIGN - At the time of design approval the valves shall be checked for conformity to all the requirements of the specification. Whenever there is a change in material or design of the valve it shall be retested and shall conform to all the applicable requirements of the specification. Applicability of various tests in case of change in material/design shall be decided with approval of statutory authority as given in Cl. 10.1.4 and Cl. 10.1.5 of IS 3224: 2021.

5.7 DRAWING- The manufacturer shall submit assembly drawing for a given valve design as per Cl. 10.2 of IS 3224: 2021 for approval of statutory authority through BIS.

5.8 In respect of all other clauses of the specification at all stages of production, appropriate controls and checks shall be maintained by the factory so as to ensure that the product conforms to the various requirements of the specification.

6. 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.

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

PM/ IS 3224/ 3/ January 2022

(1)				(2)	(3)		
Test Details				Test equipment Requirement: Required (R) or Sub-contracting permitted (S)	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
5.5	Requirements for electroplating (on medical cylinder valves only)						
	Coating requirement						
	Appearance	7.1	IS 1068	R	Each Valve		
	Thickness	7.2, 7.2.3, 7.2.4,9.1	IS 1068	R	1 of 1000 valves or less electroplated at a time		
	Ductility	7.2.3.2, 9.4	IS 1068	R	1 of 1000 valves or less electroplated at a time		
	Adhesion	7.3, 9.2	IS 1068	R	1 of 1000 valves or less electroplated at a time		
	Corrosion resistance	7.4, 9.4	IS 1068	R	1 of 1000 valves or less electroplated at a time		

5	MATERIAL						
	Valve Body (Chemical composition)	5.2	IS 3224	S	One	Each Consignment	No further testing is required, if accompanied with test certificate or ISI marked. The approved material as per drawing shall only be used.
	Tensile Strength and Elongation	5.3.1, 13.1	IS 3224 IS 1608 (Part 1)	R	As per Table 21 of IS 3224	Each Batch	In case of failure in any test, procedure given in Cl. 13.4.8.3 shall be followed.
	Impact Strength	5.3.2 13.2	IS 3224 IS 1598	R			
	Other metallic and Non-metallic components	5.1, 5.2, 5.2.1.2, 5.2.1.3, 8.3.2	IS 3224 IS/ISO 11114-1, IS/ISO 11114-1, IS 319, IS 6912	S	One	Each Consignment	No further testing is required, if accompanied with test certificate or ISI marked. The approved material as per drawing shall only be used

10	Valve design Qualification tests (Type Tests)					
	Hydraulic Burst Pressure	10.4.1 Table 3	IS 3224	R	One	These are design qualification tests and are carried out at initially the time of design approval. Whenever there is a change in material or design of the valve it shall be retested and shall conform to all the applicable requirements of the specification. Applicability of various tests in case of change in material/design shall be decided with approval of statutory authority as given in Cl. 10.1.4 and Cl. 10.1.5 of IS 3224: 2021.
	Valve Impact test	10.4.2 Table 3	IS 3224	R	One from each category	
	Valving Torque test	10.4.3 Table 3	IS 3224	R	One from each category	
	Excessive Torque test	10.4.4 Table 3	IS 3224	R	Four	
	Internal/External leak tightness	10.5 Table 3	IS 3224	R	Five	
	Endurance test	10.6 Table 3	IS 3224	R	Five	
	Visual examination	10.7 Table 3	IS 3224	R	Five	
	Flame impingement (For hand wheel Knob operated Valves)	10.8 Table 3	IS 3224	R	One	
	Flow capacity of PRD	10.9 Table 3	IS 3224	R	Three	
11	Type tests for PRD of CNG Valves					
	Resistance to extrusion test	11.1.1	IS 3224	R	Three	These are design qualification tests and are carried out at initially the time of design approval. Whenever there is a change in material or design of the PRD it shall be retested and shall conform to all the applicable requirements of the specification. Applicability of various tests in case of change in material/design shall be decided with approval of statutory authority as given in Cl. 10.1.4 and Cl. 10.1.5 of IS 3224: 2021.
	Accelerated life test	11.1.2	IS 3224	R	Five	
	Continued Operation (Cyclic) test	11.1.3	IS 3224	R	Four	
	Thermal Cyclic test	11.1.4	IS 3224	R	One	

	Condensate corrosion resistance test	11.1.5	IS 3224	R	One	These are design qualification tests and are carried out at initially the time of design approval. Whenever there is a change in material or design of PRD it shall be retested and shall conform to all the applicable requirements of the specification. Applicability of various tests in case of change in material/design shall be decided with approval of statutory authority as given in Cl. 10.1.4 and Cl. 10.1.5 of IS 3224: 2021.	
	Vibration test	11.1.6	IS 3224	R	One		
	Leakage test	11.1.7	IS 3224	R	Seven		
	Activation test	11.1.8	IS 3224	R	One		
12	Type test for excess flow valve for CNG Valves						
12	Type tests for excess flow valve for CNG Valves	12	IS 3224	R	One	These are design qualification tests and are carried out at initially the time of design approval. Whenever there is a change in material or design of excess flow valve it shall be retested and shall conform to all the applicable requirements of the specification.	
13	Production Inspection and Testing						
	Internal and External leak tightness test	13.3	IS 3224	R	Each valve		
	Bursting pressure of Bursting disc of PRD	7.2, 13.4.2	IS 3224 IS 5903	R	As per Table 22 of IS 3224	Each Batch	
	Yield temperature of fusible plug	7.1.5, 13.4.3	IS 3224 IS 5903	R	As per Table 22 of IS 3224	Each Batch	
	Valve inlet connection	8 13.4.5	IS 3224 IS 15894 IS 9122 IS 7202	R	Each valve		
	Valve Outlet connection	9 13.4.6	IS 3224 IS	R	Each valve		

13	Checking of other dimensions	13.4.7	IS 3224	R	As per Table 21 of IS 3224	Each Batch	
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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 as decided by the Bureau are obligatory, to which the licensee shall comply with.

Table 2
(Cl. 5.1 of SIT)

INSPECTION OF FINISHED BATCH

1. Depending upon the size of the batch, samples shall be drawn at random and subjected to the test for valve inlet connections (Cl. 8), valve outlet connections (Cl. 9) and Internal and External tightness test (Cl. 13.3).
2. Number of samples for the above tests will be as follows:
 - a) Valve inlet connections (Cl. 8)- As per table 23 of IS 3224
 - b) Valve inlet connections (Cl. 9)- As per table 23 of IS 3224
 - c) Internal and External tightness (Cl. 13.3)- as given below

Batch Size	Sample Size
Up to 500	13
501 to 1000	20
Over 1000	32

In case of failure of a sample in any requirement mentioned under 1, all the valves in the batch should be tested by the licensee for the requirement where failure has occurred and segregated batch be reoffered for BIS Inspection as fresh batch. A batch can be reoffered only once. All rejected valves shall be scrapped.

3. Bursting Pressure of Bursting disc (Cl. 13.4.2) and Yield temperature for fusible plug (Cl. 13.4.3) shall be carried out on samples selected as per Table 22 of IS 3224, from each batch.
4. The batch may be considered as having passed the requirements of IS 3224:2021 if all the samples tested above are found to be conforming.

NOTES:

1. Tensile strength, Elongation and Impact Strength of the material of valve body as per frequency given in Table 1 of SIT shall be carried out by the licensee. BIS officer will verify the relevant test records before carrying out lot inspection. However, such tests to be witnessed by BIS officer whenever possible.

ANNEX – I

(Para 5.2 of the Scheme of inspection and Testing)

Test Certificate for Valve Fittings for Compressed Gas Cylinders excluding Liquefied Petroleum Gas (LPG) Cylinders - IS 3224

Manufacturer:		Certificate No.		
Purchaser:		Order No:		
Batch No:				
Valve fittings description / Outlet No.		Quantity offered for Inspection :		
This is to certify that the valve fittings as mentioned below were inspected at M/s _____ and _____ these meet the Requirements of IS 3224:2021 and Drawing No. _____.				
RESULTS OF INSPECTION :				
Sr. No	Requirements	Quantity Inspected	Quantity Passed	Quantity Rejected
1	Valve inlet Connection (Cl. 8)			
2	Valve outlet Connection (Cl. 9)			
3	Internal and External tightness test (Cl. 13.3)			
4	Bursting Pressure of Bursting disc (Cl. 13.4.2)			
5	Yield temperature for fusible plug (Cl. 13.4.3)			
6*	Tensile strength and elongation tests (Cl. 13.1)			
7*	Impact strength test (Cl. 13.1)			
* From manufacturer's test record.				
Quantity Passed				
Rejected valve fittings and the method of their disposal				
Signature:		Signature		
Name & Designation of the Officer representing the company		Certification Officer Bureau of Indian Standards		

ANNEX C**POSSIBLE TESTS IN A DAY**

Sr No	Tests	Clause reference
1.	Tensile Strength & Elongation	Cl. 5.3.1
2.	Impact Strength	Cl. 5.3.2
3.	Bursting pressure test on PRD	Cl.13.4.2
4.	Yield temperature of fusible plug	Cl. 13.4.3
5.	Valve inlet	Cl.8
6.	Valve outlet Connections	Cl 9
7.	Hydraulic Burst Pressure test	Cl. 10.4.1
8.	Valve impact test	Cl. 10.4.2
9.	Valving Torque test	Cl. 10.4.3
10.	Excessive Torque test	Cl. 10.4.4
11.	Leak tightness test	Cl. 10.5
12.	Flame impingement test	Cl. 10.8
13.	Flow capacity of PRD	Cl. 10.9

ANNEX D**Scope of Licence**

“Licence is granted to use Standard Mark as per IS 3224: 2021 with the following scope:	
Name of the product	Valve Fittings for Compressed Gas Cylinders excluding Liquefied Petroleum Gas (LPG) Cylinders
Classification	Classification of common (Standard) Valves: • Compression packed gland sealed Valves • Pressure seal valves • O-ring gland seal valves • Diaphragm gland seal valves Classification of other special types of Valves: • Ball valves • Quick release Valves • Squeeze grip valves
Type of threads on inlet connections and corresponding size	Taper Screw threads (Type 1/2/4) or Oversized thread on Valve stems (Type 1/4) or Parallel threads (M 18 X 1.5 / M25X2 / M30X2 / 3/4- 16 UNF/ 1 1/8- UNF/ 3/4- 14 NPSM)
Type of gas/mixture of gas	
Outlet No.	
Type of operation (Hand wheel/Knob operated), if applicable	
Any other aspect	PESO approved drawing number and approval number