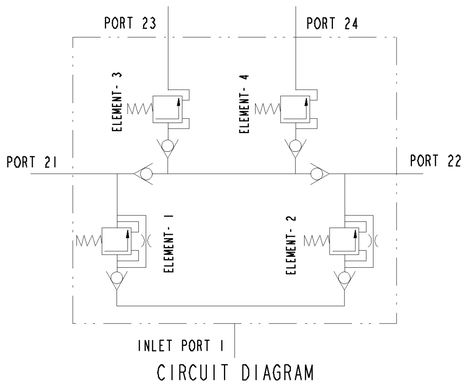
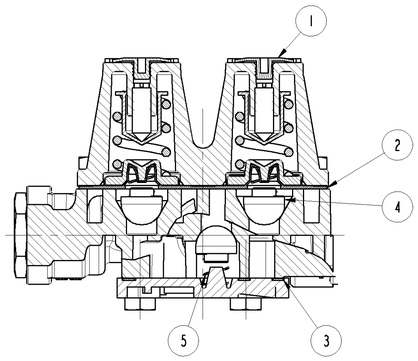
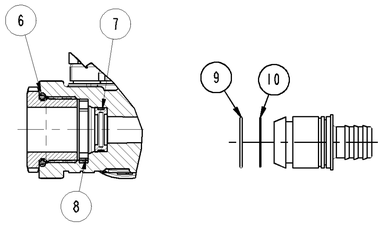
PART No.
M307090 GA

ENGINEERING CHANGES			
ECN No.	DATE	REV	SIGN
11328	14.11.08	New	PSK
11499	10.06.09	1	PSK
Drawing pictorially modified inline with valve body. Drawing redrawn.			
12041	11.02.11	2	SSH
Note added regarding "Corrosion resistance" PS 334C was PSSC 192C. Drawing pictorially modified inline with parts. Template WABCO was WABCO-TVS (INDIA) LIMITED. Drawing redrawn.			
12206	11.11.11	3	RAR
In notes point no.10 added. Two mounting holes M8 X 1.25 through shown. Drawing redrawn.			
12577	02.07.13	4	RAR
Drawing pictorially modified inline with Base Cover. Drawing redrawn.			



CIRCUIT DIAGRAM

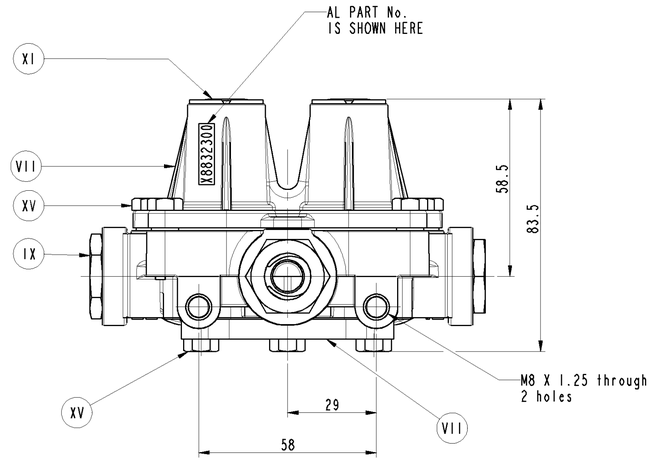


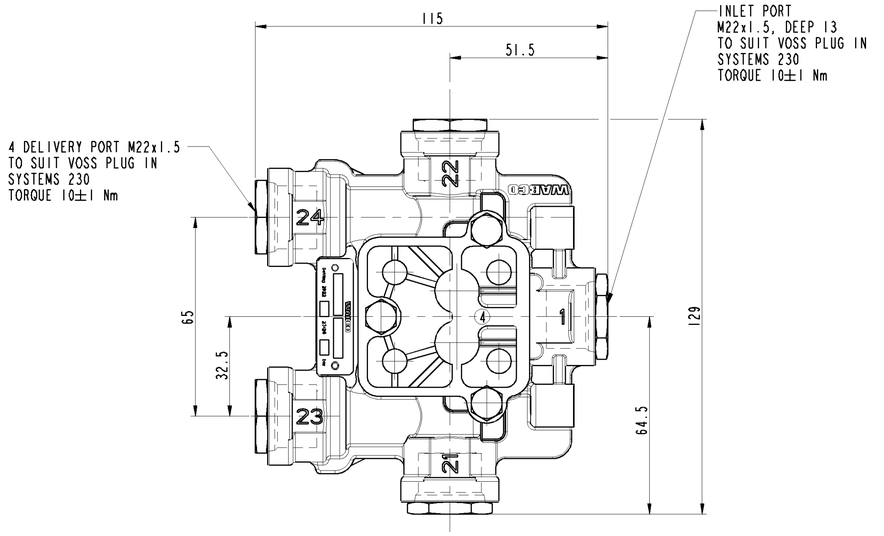


MSP 3/65 REPAIR KIT CONSISTS OF ITEM SHOWN

SL No.	AL PART No.	WABCO PART No.	DESCRIPTION	QTY
1		M336990	DUST COVER	4
2		M311290	DIAPHRAGM ASSEMBLY	1
3		M336970	GASKET	1
4		M311280	VALVE	6
5		M336900	SPRING	6
6		M932700	SEALING RING NG-12	5
7		M932720	SPRING ELEMENT NG-12	5
8		M932730	RETANING CLIP NG-12	5
9		M935980	SEALING RING NG-12	5
10		M935990	SEALING RING NG-12	5
		M919710	GREASE SACHET	1

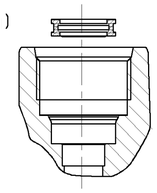
DO NOT SCALE IF IN DOUBT ASK





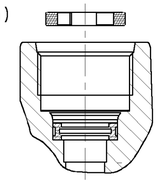
ASSEMBLY PROCEDURE

(a)



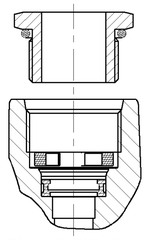
THE SPRING ELEMENT IS INSERTED INTO THE CHAMBER UNDER THE THREAD ROOT OF THE CONNECTION BORE (a) AND (b).

(b)

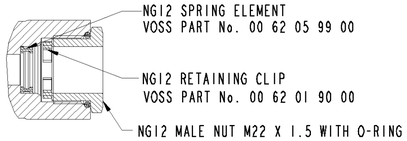


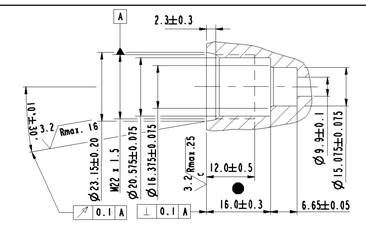
THE RETAINING CLIP IS INTRODUCED SO THAT IT RESTS FLAT ON THE THREAD ROOT (b) AND (c). THE SPRING ELEMENT AND RETAINING CLIP ARE SYMMETRICAL.

(c)

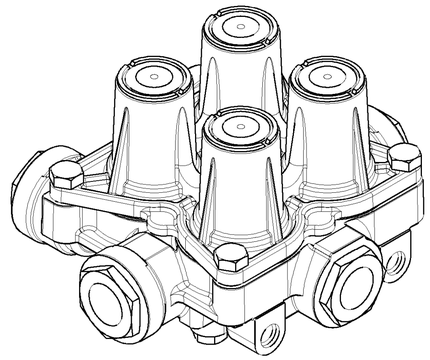


THE MALE FITTING PRE-ASSEMBLED WITH THE PRE-GREASED O-RING TO SEAL THE THREAD IS SCREWED BY HAND INTO THE TAPPED BORE (c) AND TIGHTENED.





DETAILS OF PORT MACHINING FOR M22x1.5



DYNAMIC OPENING PRESSURE (bar) ELEMENTS				RETAINED PRESSURE (bar)			
PORT 21	PORT 22	PORT 23	PORT 24	PORT 21	PORT 22	PORT 23	PORT 24
7.35±0.15	7.35±0.15	7.05±0.15	7.05±0.15	0	≥ 6.8	≥ 6.6	≥ 6.6
				≥ 6.8	0	≥ 6.6	≥ 6.6
				≥ 4.7	≥ 4.7	0	≥ 6.6
				≥ 4.7	≥ 4.7	≥ 6.6	0

SL No.	NOTES	
1	ELEMENTS ARE SET WITH AIR FLOW RATE OF 90 l/min	
2	PRODUCT SPECIFICATION No. (ISSUE No. 1 DATED 09.02.11)	PS 334C (Refer sheet 2)
3	WEIGHT	1.06 kg
4	THERMAL RANGE OF OPERATION	-40°c TO +80°c
5	EQUIVALANT FLOW DIAMETER	7mm
6	CORROSION RESISTANCE	240 HOURS OF NSS IS APPLICABLE FOR FASTNERS,BODY & COVER
7	OPEN PORTS ARE FITTED WITH CLOUSER PLUGS FOR STORAGE AND TRANSIT PURPOSE	
8	QUALITY COMPLIANCE TESTS WILL BE CARRIED OUT REGULARLY AS PER CLAUSE No. 13 OF PS 334C	
9	SERVICE LIFE TO FIRST OVERHAUL 2 YEARS/180000 KM WHICHEVER IS EARLIER FOR AIR DRYER OR DDU FITTED VEHICLE.1 YEAR/80000 KM WHICHEVER IS EARLIER FOR NON AIR DRYER OR DDU FITTED VEHICLE	
10	PRESSURE FILLING SEQUENCE IS 21/22 ⟶ 23/24	

● CRITICAL
◐ MAJOR
NO SYMBOL - MINOR

PART CODE	MATERIAL	SURFACE PROTECTION
XVII	STEEL	NO TREATMENT
XVI	CAST IRON	PLATED
XV	STEEL	ZINC IRON PLATED
XIV	CAST IRON	NO TREATMENT
XIII	ZINC ALLOY	ANODISED
XII	PLASTIC	NO TREATMENT
XI	RUBBER	NO TREATMENT
X	STAINLESS STEEL	NO TREATMENT
IX	BRASS	NO TREATMENT
VIII	ZINC ALLOY	CHROMATED
VII	ALUMINIUM ALLOY	ANODISED
VI	ALUMINIUM ALLOY	CHROMATED
V	CAST IRON	PAINTED
IV	STEEL	POWDER COATED
III	STEEL	PAINTED
II	STEEL	PHOSPHATED
I	STEEL	ZINC PLATED

	SIGN	DATE	MATERIAL	----
DRN	RAR	02.07.13	ALTERNATE MATERIAL	----
CHD	SSH	02.07.13	SURFACE PROTECTION	REFER TABLE
APD	KPN	02.07.13	RAW PART No.	----

CONFIDENTIAL DRAWING

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN mm.

REMOVE BURRS AND SHARP EDGES FROM FINISHED PARTS. ALL DIMENSIONS ARE AFTER SURFACE PROTECTION/ TREATMENT

MALE THREAD TO IS 14962 (PART3) 6h : 2001
FEMALE THREAD TO IS 14962 (PART3) 6H : 2001

GENERAL TOLERANCES

RANGE OF NOMINAL DIMENSIONS (± mm)					FORCE, POWER, PRESSURE etc.,
≤ 50	> 50 ≤ 180	> 180 ≤ 400	> 400	(± °)	(± %)
1	2	3	4	3	10

100 mm

SCALE 1:1

WABCO
AMBATTUR, CHENNAI - 600058, INDIA

QUDRUPLE SYSTEM PROTECTION VALVE

PART No.
M307090
Sheet 1 of 2
GA

WABCO AMBATTUR CHENNAI-600058 INDIA	PRODUCT SPECIFICATION	No. :PS 334C
	Product: QUDRUPLE SYSTEM PROTECTION VALVE	

1 Scope:

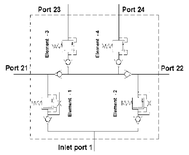
This specification covers the function, technical data and also lays down the endurance test, environmental tests and various other tests, which the product should pass.

2 Function:

The functions of the QSPV are:

- To distribute airflow from the compressor to four separate circuits.
- To protect individual sound circuits from air loss in the event of failure in another circuit
- To ensure that following a circuit failure, the supply is maintained to the sound circuits, even when the total system has depleted.

The valve has one inlet port1 and four delivery ports namely P21, P22, P23 and P24. The schematic representation of QSPV is shown in the following figure.



3 Technical data:

Parameter	Specification
Working medium	Air
Opening pressure for individual circuits	As per GA drawing
Normal working pressure	8 bar
Maximum working pressure	10 bar
Thermal range of operation	–40°C to +80°C
Short term exposure to high temperature	110 °C for 1 h
Flow diameter – Inlet to outlet	7mm
Installation dimensions	As per GA drawing
Weight, kg	As per GA drawing

4 Functional tests

Following are the leak checks to be done on QSPV

a. External leak:
Check for leak in the assembly with the unit pressurized to 8.0 bar at inlet.

b. Internal leak:

Internal leaks should be checked under the following failed conditions after the initial charging of 8.0 bar:

I. Inlet port failed
II. Inlet port and P21 failed
III. Inlet port and P22 failed
IV. Inlet port, P21, P22 and P24 failed
V. Inlet port, P21, P22 and P23 failed

4.1 Leak test at room temperature:

Test	Maximum permissible leak rate (cm3/min)
External leak	8
Internal leak	8

4.2 Leak test at - 40°C:

Test	Maximum permissible leak rate (cm^3/min)
External leak	1500
Internal leak	1500

4.3 Leak test at + 80°C:

Test	Maximum permissible leak rate (cm^3/min)
External leak	8
Internal leak	8

4.4 Leak test after short time exposure to high temperature:

The product shall be soaked at +110°C for 1 hour. Then the unit shall be pressurized to 8.bar pressure after bringing down the test unit to room temperature. Maximum permissible leak rate is 8 cm^3/min.

5 Performance tests:

Before commencing the tests, the valve should be cycled three times through full pressure.

5.1 Dynamic opening pressure:

The pressure at the inlet port, when an element opens and allows airflow of 100 (normal) l/ min with the corresponding delivery port open to atmosphere is called the dynamic opening pressure of the respective element. The nominal values corresponding to elements 1, 2, 3 and 4 are denoted by P01, P02, P03 and P04 respectively and they are indicated in the respective GA drawings.

5.2 Distribution test:

When a pressure P higher than maximum opening pressure is applied at the inlet port, pressures reached in the ports P21 and P22 should not be less than P-0.15 bar and the pressures reached in ports P23 and P24 should not be less than P-0.30 bar with all the ports closed.

5.3 Retained pressure test in sound circuits:

When all the circuits are charged to 8.0 bar, then the inlet port is cut-off and if one of the circuits fails at the rate of 4 bar/second pressure drop, the pressures retained in the sound circuits should be as per GA drawing.

5.4 Recharging test:

With all delivery ports depleted and closed, fail a delivery circuit. The pressure reached in the sound circuits when inlet port is supplied with an air flow of 100 l/min should as per the following table:

Failed circuit		Pressure reached in ports- bar			
	Inlet	P21	P22	P23	P24
P21	P01+0.3	0	>=P01-0.15	>=P01-0.3	>=P01-0.3
P22	P02+0.3	>=P02-0.15	0	>=P02-0.3	>=P02-0.3
P23	P03+0.3	>=P03-0.15	>=P03-0.15	0	>=P03-0.3
P24	P04+0.3	>=P04-0.15	>=P04-0.15	>=P04-0.3	0

6 Endurance test:

6.1 Ambient endurance test:

Total number of cycles to be completed: 1,00,000

Test cycle sequence:

I. Close all delivery ports
II. Charge inlet to 8 bar
III. Exhaust inlet port
IV. Exhaust all delivery ports

Rate of cycling: 8 cycles / min maximum.

After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 1500 cm^3/min. Allowable change in drift pressure is ± 0.5 bar

6.2 Temperature range endurance test:

Total number of cycles to be completed: 60,000

Test cycle sequence:

V. Close all delivery ports
VI. Charge inlet to 8 bar
VII. Exhaust inlet port
VIII. Exhaust all delivery ports

At –40° C ambient condition : 20,000 cycles
Rate of cycling: 4 cycles / min maximum.

At room temperature : 20,000 cycles
Rate of cycling: 8 cycles / min maximum.

At : +80° C : 20,000 cycles
Rate of cycling: 8 cycles / min maximum.

After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 1500 cm^3/min. Allowable change in setting pressure is . ± 0.6 bar

7 Pressurization test :

Keep the valve with inlet and delivery ports at 8.0 bar for 500 hours. Then keep the inlet port open to atmosphere and delivery ports at 8 bar for 100 hours.
After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 8 cm^3/min. Allowable change in setting pressure is ± 0.5 bar

8 Environmental test:

8.1 Dry heat test:

Store the unit in a hot chamber maintained at +80°C without pressure for 16 hours.
After this period, leak shall be checked with the unit pressurized to 8 bar pressure.
The valve should meet leak rate specification as per clause 4.3 and performance test specification as per clause 5.0 before and after the tests.

8.1 Low temperature test:

Store the unit in a chamber maintained at -40°C without pressure for 16 hours.
After the test, leak shall be checked with the unit pressurized to 8 bar pressure.
The valve should meet leak rate specification as per clause 4.3 and performance test specification as per clause 5.0 before and after the tests.

8.2 Vibration:

This test shall be conducted as per JIS D 1601.

Frequency: 67 Hz
Vibration level: ± 7 g
Duration: 8 h – 3 mutually perpendicular orientations (4+2+2) h
Mounting: Line mounting
The assembly shall be subjected to the above vibration level with out air pressurization. At the end of the test there shall be no abnormality or structural failure of the components.
The assembly shall be tested for leak performance and dynamic opening pressure before and after the test and it should meet clause 4.1 and 5.1

9 Corrosion resistance test:

The assembly shall be subjected to neutral salt spray test 240 hours of NSS.
At the end of test there shall be no parent metal corrosion of major components. Corrosion of fasteners where the protective treatment may be damaged due totightening is acceptable.The assembly shall be tested for leak performance and dynamic opening pressure before and after the test and it should meet clause 4.1 and 5.1

10 Protection against dust and water:

The assembly shall be subjected to water splash test as per JED 285, water jet test as per JED 286 and dust test as per JED 287. No penetration of dust and water in

quantities detrimental to the function of the product is allowed.
The assembly shall be tested for leak performance and dynamic opening pressure before and after the test and it should meet clause 4.1 and 5.1

11 High pressure test:

The assembly should with stand hydraulic pressure of 21 bar minimum and no structural failure is allowed. The test unit shall meet the leak and performance test requirements as per clause No. 4.1 and 5.1 before and after the test.

12 Port strength test:

The ports of assembly should be subjected to repeated tightening test with customer mating adaptors for 25 times with the recommended tightening torque. Each tightening shall be done with fresh sealing element. At the end of the test, there shall not be any thread stripping and leakage through the threaded joint.

13 Quality compliance plan:

S No	Type of test	Frequency	Quantity
1	Leak test at room temperature	100% of production lot	Not applicable
2	Performance test	100% of production lot	Not applicable
3	Ambient endurance test	12 months	1 Number
4	Temperature range endurance test	18 months	1 Number
5	Pressurization test	18 months	1 Number
6	Dry heat test	18 months	1 Number
7	Low temperature teat	18 months	1 Number
8	Corrosion resistance test	18 months	1 Number
9	Protection against dust and water	18 months	1 Number
10	High pressure test	18 months	1 Number
11	Port strength test	18 months	1 Number

WABCO AMBATTUR CHENNAI-600058 INDIA	PRODUCT SPECIFICATION	No. :PS 334C
	Product: QUDRUPLE SYSTEM PROTECTION VALVE	

1 Scope:

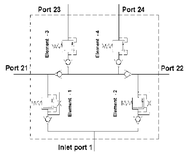
This specification covers the function, technical data and also lays down the endurance test, environmental tests and various other tests, which the product should pass.

2 Function:

The functions of the QSPV are:

- To distribute airflow from the compressor to four separate circuits.
- To protect individual sound circuits from air loss in the event of failure in another circuit
- To ensure that following a circuit failure, the supply is maintained to the sound circuits, even when the total system has depleted.

The valve has one inlet port1 and four delivery ports namely P21, P22, P23 and P24. The schematic representation of QSPV is shown in the following figure.



3 Technical data:

Parameter	Specification
Working medium	Air
Opening pressure for individual circuits	As per GA drawing
Normal working pressure	8 bar
Maximum working pressure	10 bar
Thermal range of operation	–40°C to +80°C
Short term exposure to high temperature	110 °C for 1 h
Flow diameter – Inlet to outlet	7mm
Installation dimensions	As per GA drawing
Weight, kg	As per GA drawing

4 Functional tests

Following are the leak checks to be done on QSPV

a. External leak:
Check for leak in the assembly with the unit pressurized to 8.0 bar at inlet.

b. Internal leak:

Internal leaks should be checked under the following failed conditions after the initial charging of 8.0 bar:

I. Inlet port failed
II. Inlet port and P21 failed
III. Inlet port and P22 failed
IV. Inlet port, P21, P22 and P24 failed
V. Inlet port, P21, P22 and P23 failed

4.1 Leak test at room temperature:

Test	Maximum permissible leak rate (cm3/min)
External leak	8
Internal leak	8

4.2 Leak test at - 40°C:

Test	Maximum permissible leak rate (cm^3/min)
External leak	1500
Internal leak	1500

4.3 Leak test at + 80°C:

Test	Maximum permissible leak rate (cm^3/min)
External leak	8
Internal leak	8

4.4 Leak test after short time exposure to high temperature:

The product shall be soaked at +110°C for 1 hour. Then the unit shall be pressurized to 8.bar pressure after bringing down the test unit to room temperature. Maximum permissible leak rate is 8 cm^3/min.

5 Performance tests:

Before commencing the tests, the valve should be cycled three times through full pressure.

5.1 Dynamic opening pressure:

The pressure at the inlet port, when an element opens and allows airflow of 100 (normal) l/ min with the corresponding delivery port open to atmosphere is called the dynamic opening pressure of the respective element. The nominal values corresponding to elements 1, 2, 3 and 4 are denoted by P01, P02, P03 and P04 respectively and they are indicated in the respective GA drawings.

5.2 Distribution test:

When a pressure P higher than maximum opening pressure is applied at the inlet port, pressures reached in the ports P21 and P22 should not be less than P-0.15 bar and the pressures reached in ports P23 and P24 should not be less than P-0.30 bar with all the ports closed.

5.3 Retained pressure test in sound circuits:

When all the circuits are charged to 8.0 bar, then the inlet port is cut-off and if one of the circuits fails at the rate of 4 bar/second pressure drop, the pressures retained in the sound circuits should be as per GA drawing.

5.4 Recharging test:

With all delivery ports depleted and closed, fail a delivery circuit. The pressure reached in the sound circuits when inlet port is supplied with an air flow of 100 l/min should as per the following table:

Failed circuit		Pressure reached in ports- bar			
	Inlet	P21	P22	P23	P24
P21	P01+0.3	0	>=P01-0.15	>=P01-0.3	>=P01-0.3
P22	P02+0.3	>=P02-0.15	0	>=P02-0.3	>=P02-0.3
P23	P03+0.3	>=P03-0.15	>=P03-0.15	0	>=P03-0.3
P24	P04+0.3	>=P04-0.15	>=P04-0.15	>=P04-0.3	0

6 Endurance test:

6.1 Ambient endurance test:

Total number of cycles to be completed: 1,00,000

Test cycle sequence:

I. Close all delivery ports
II. Charge inlet to 8 bar
III. Exhaust inlet port
IV. Exhaust all delivery ports

Rate of cycling: 8 cycles / min maximum.

After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 1500 cm^3/min. Allowable change in drift pressure is ± 0.5 bar

6.2 Temperature range endurance test:

Total number of cycles to be completed: 60,000

Test cycle sequence:

V. Close all delivery ports
VI. Charge inlet to 8 bar
VII. Exhaust inlet port
VIII. Exhaust all delivery ports

At –40° C ambient condition : 20,000 cycles
Rate of cycling: 4 cycles / min maximum.

At room temperature : 20,000 cycles
Rate of cycling: 8 cycles / min maximum.

At : +80° C : 20,000 cycles
Rate of cycling: 8 cycles / min maximum.

After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 1500 cm^3/min. Allowable change in setting pressure is . ± 0.6 bar

7 Pressurization test :

Keep the valve with inlet and delivery ports at 8.0 bar for 500 hours. Then keep the inlet port open to atmosphere and delivery ports at 8 bar for 100 hours.
After the test the valve should pass performance tests as per clauses 5.1 through 5.4 and the allowable leak rate is 8 cm^3/min. Allowable change in setting pressure is ± 0.5 bar

8 Environmental test:

8.1 Dry heat test:

Store the unit in a hot chamber maintained at +80°C without pressure for 16 hours.
After this period, leak shall be checked with the unit pressurized to 8 bar pressure.
The valve should meet leak rate specification as per clause 4.3 and performance test specification as per clause 5.0 before and after the tests.

8.1 Low temperature test:

Store the unit in a chamber maintained at -40°C without pressure for 16 hours.
After the test, leak shall be checked with the unit pressurized to 8 bar pressure.
The valve should meet leak rate specification as per clause 4.3 and performance test specification as per clause 5.0 before and after the tests.

8.2 Vibration:

This test shall be conducted as per JIS D 1601.

Frequency: 67 Hz
Vibration level: ± 7 g
Duration: 8 h – 3 mutually perpendicular orientations (4+2+2) h
Mounting: Line mounting
The assembly shall be subjected to the above vibration level with out air pressurization. At the end of the test there shall be no abnormality or structural failure of the components.
The assembly shall be tested for leak performance and dynamic opening pressure before and after the test and it should meet clause 4.1 and 5.1

9 Corrosion resistance test:

The assembly shall be subjected to neutral salt spray test 240 hours of NSS.
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The assembly should with stand hydraulic pressure of 21 bar minimum and no structural failure is allowed. The test unit shall meet the leak and performance test requirements as per clause No. 4.1 and 5.1 before and after the test.

12 Port strength test:

The ports of assembly should be subjected to repeated tightening test with customer mating adaptors for 25 times with the recommended tightening torque. Each tightening shall be done with fresh sealing element. At the end of the test, there shall not be any thread stripping and leakage through the threaded joint.

13 Quality compliance plan:

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4	Temperature range endurance test	18 months	1 Number
5	Pressurization test	18 months	1 Number
6	Dry heat test	18 months	1 Number
7	Low temperature teat	18 months	1 Number
8	Corrosion resistance test	18 months	1 Number
9	Protection against dust and water	18 months	1 Number
10	High pressure test	18 months	1 Number
11	Port strength test	18 months	1 Number