



ECE TYPE-APPROVAL CERTIFICATE

E24

- Communication concerning:²
- Approval granted
 - Approval extended
 - Approval refused
 - Approval withdrawn
 - Production definitely discontinued

of a type of CNG/LNG component pursuant to Regulation No. 110.

Approval No: **E24*110R05/00*0083*00**

1. CNG/LNG component considered:

- ~~Container(s) or cylinder(s)²~~
- ~~Tank(s) or vessel(s)²~~
- ~~CNG accumulator(s)²~~
- ~~Pressure indicator²~~
- ~~Pressure relief valve²~~
- ~~Automatic valve(s)²~~
- ~~Excess flow valve²~~
- ~~Gas tight housing²~~
- ~~Pressure regulator(s)²~~
- ~~Non return valve(s) or check valve(s)²~~
- ~~Pressure relief device (PRD) (temperature triggered)²~~
- ~~Manual valve²~~
- ~~Flexible fuel lines²~~
- ~~Filling unit or receptacle²~~
- ~~Gas injector(s)²~~
- ~~CNG Compressor²~~
- ~~Gas flow adjuster²~~
- ~~Gas/air mixer²~~
- ~~Electronic control unit²~~
- ~~Pressure and temperature sensor(s)²~~
- ~~CNG filter(s)²~~
- ~~PRD (pressure triggered)²~~
- ~~Fuel rail²~~
- ~~Heat exchanger(s) / vaporizer(s)²~~
- ~~Natural gas detector(s)²~~
- ~~LNG filling receptacle(s)²~~
- ~~LNG pressure control regulator(s)²~~
- ~~LNG pressure and/or temperature sensor(s)²~~
- ~~LNG manual valve(s)²~~
- ~~LNG automatic valve(s)²~~
- ~~LNG non return valve(s)²~~
- ~~LNG pressure relief valve(s)²~~
- ~~LNG excess flow valve(s)²~~
- ~~LNG fuel pump(s)²~~

Type: ***DK-Lok Manual Valve***



Approval No: E24*110R05/00*0083*00

2. Trade name or mark: **DK-Lok Corporation**
3. Manufacturer's name and address: **DK-Lok Corporation
7,Golden root-ro 129beon-gil,
Juchon-myeon Gimhae-si,
Gyeongsangnam-do 50969
Republic of Korea**
4. If applicable, name and address of manufacturer's representative: **N/A.**
5. Submitted for approval on: **06.06.2023**
6. Technical service responsible for conducting approval tests: **TÜV SÜD Auto Service
10040 Mesa Rim Road San Diego,
CA 92121
USA**
7. Date of report issued by that service: **11.09.2023**
8. No. of report issued by that service: **23-00011-IS-MUC-00**
9. Approval granted/ refused/ extended/ withdrawn²: **Granted**
10. Reason(s) of extension (if Applicable): **N/A**
11. Place: **Dublin.**
12. Date: **02nd October, 2023.**
13. Signature: 
14. The documents filed with the application or extension of approval can be obtained upon request.

¹ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

² Strike out what does not apply.





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Annex 2B – Addendum

1. Additional information concerning the type approval of a type of CNG/LNG components pursuant to Regulation No. 110

1.1	Container(s) or cylinder(s)	
1.1.1	Dimensions:	<i>N/A</i>
1.1.2	Material:	<i>N/A</i>
1.1.2.	Tank(s) or vessel(s) (for LNG system)	
1.1.2.1.	Capacity:	<i>N/A</i>
1.1.2.2.	Material:	<i>N/A</i>
1.1.3.	CNG accumulator	
1.1.3.1.	Dimensions:	<i>N/A</i>
1.1.3.2.	Material:	<i>N/A</i>
1.1.3.3.	Capacity:	<i>N/A</i>
1.2.	Pressure indicator	
1.2.1.	Working pressure(s): ¹	<i>N/A</i>
1.2.2.	Material:	<i>N/A</i>
1.3.	Pressure relief valve (discharge valve)	
1.3.1.	Working pressure(s): ¹	<i>N/A</i>
1.3.2.	Material:	<i>N/A</i>
1.32.	CNG Compressor	
1.32.1.	Working pressure(s): ¹	<i>N/A</i>
1.32.2.	Material:	<i>N/A</i>
1.4.	Automatic valve(s)	
1.4.1.	Working pressure(s): ¹	<i>N/A</i>
1.4.2.	Material:	<i>N/A</i>
1.5.	Excess flow valve	
1.5.1.	Working pressure(s): ¹	<i>N/A</i>
1.5.2.	Material:	<i>N/A</i>
1.6.	Gas-tight housing	
1.6.1.	Working pressure(s):	<i>N/A</i>
1.6.2.	Material:	<i>N/A</i>
1.7.	Pressure regulator(s)	
1.7.1.	Working pressure(s): ¹	<i>N/A</i>
1.7.2.	Material:	<i>N/A</i>
1.8.	Non-return valve(s) or check valve(s)	
1.8.1.	Working pressure(s): ¹	<i>N/A</i>
1.8.2.	Material:	<i>N/A</i>



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1.9.	Pressure relief device (temperature triggered)	
1.9.1.	Working pressure(s): ¹	N/A
1.9.2.	Material:	N/A
1.10.	Manual valve	
1.10.1.	Working pressure(s): ¹	274 bar @ 120 °C
1.10.2.	Material:	SS 316
1.11.	Flexible fuel lines	
1.11.1.	Working pressure(s): ¹	N/A
1.11.2.	Material:	N/A
1.12.	Filling unit or receptacle	
1.12.1.	Working pressure(s): ¹	N/A
1.12.2.	Material:	N/A
1.13.	Gas injector(s)	
1.13.1.	Working pressure(s): ¹	N/A
1.13.2.	Material:	N/A
1.14.	Gas flow adjuster	
1.14.1.	Working pressure(s): ¹	N/A
1.14.2.	Material:	N/A
1.15.	Gas/air mixer	
1.15.1.	Working pressure(s): ¹	N/A
1.15.2.	Material:	N/A
1.16.	Electronic control unit	
1.16.1.	Basic software principles:	N/A
1.17.	Pressure and temperature sensor(s)	
1.17.1.	Working pressure(s): ¹	N/A
1.17.2.	Material:	N/A
1.18.	CNG filter(s)	
1.18.1.	Working pressure(s): ¹	N/A
1.18.2.	Material:	N/A
1.19.	PRD (pressure triggered)	
1.19.1.	Working pressure(s): ¹	N/A
1.19.2.	Material:	N/A
1.20.	Fuel rail(s)	
1.20.1.	Working pressure(s): ¹	N/A
1.20.2.	Material:	N/A



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1.21.	Heat Exchanger(s) / Vaporizer(s)	
1.21.1.	Working pressure(s): ¹	N/A
1.21.2.	Material:	N/A
1.22.	Natural gas detector(s):	
1.22.1.	Working pressure(s): ¹	N/A
1.22.2.	Material:	N/A
1.23.	LNG filling receptacle(s)	
1.23.1.	Working pressure(s): ¹	N/A
1.23.2.	Material:	N/A
1.24.	LNG pressure control regulator(s)	
1.24.1.	Working pressure(s): ¹	N/A
1.24.2.	Material:	N/A
1.25.	LNG pressure and/or temperature sensor(s)	
1.25.1.	Working pressure(s): ¹	N/A
1.25.2.	Material:	N/A
1.26.	LNG manual valve(s)	
1.26.1.	Working pressure(s): ¹	N/A
1.26.2.	Material:	N/A
1.27.	LNG automatic valve(s)	
1.27.1.	Working pressure(s): ¹	N/A
1.27.2.	Material:	N/A
1.28.	LNG non-return valve(s)	
1.28.1.	Working pressure(s): ¹	N/A
1.28.2.	Material:	N/A
1.29.	LNG pressure relief valve(s)	
1.29.1.	Working pressure(s): ¹	N/A
1.29.2.	Material:	N/A
1.30.	LNG excess flow valve(s)	
1.30.1.	Working pressure(s): ¹	N/A
1.30.2.	Material:	N/A
1.31.	LNG fuel pump(s)	
1.31.1.	Working pressure(s): ¹	N/A
1.31.2.	Material:	N/

¹ Specify the tolerance



Approval No: E24*110R05/00*0083*00

Index to the Information Package

Date of issue: **02nd October, 2023.**

Date of latest amendment: **N/A**

Reason for extension/revision: **N/A**

1. Additional conditions, and advisory notes on legal alternatives.

2. Test report(s)

- numbers(s): **23-00011-IS-MUC-00**

- date of issue: **11.09.2023**

- date of latest amendment: **N/A**

3. Information document

- number(s): ***Essential Characteristics of the CNG-Component acc. Annex 1A of ECE R 110***

- date of issue: **11.09.2023**

- date of latest amendment: **N/A**

Documentation: **49 pages**



Approval No: **E24*110R05/00*0083*00**

Appendix: Additional conditions, and advisory notes on legal alternatives

A: Additional conditions:

1. The attached technical report, with any of its attachments, forms part of this Type Approval certificate.
2. Each type from series production shall be to the measurements specified in the attached drawings, and shall be manufactured only from the materials specified in the Approval documents.
3. Changes in the type are permitted only with the explicit permission of NSAI. Breaches of this requirement will lead to a withdrawal of the Type Approval, and in addition may be subject to criminal prosecution.
4. At regular intervals, any tests or associated checks prescribed by the applicable legislation to verify continued conformity with the approved type shall be carried out. The manufacturer shall demonstrate compliance with this by submitting to NSAI evidence of adequate arrangements and documented control plans for each type approved.
5. Any set of samples or test pieces showing evidence of non-conformity shall give rise to further sampling and testing and all steps shall be taken to restore conformity of production.
6. This Type Approval will expire when it is surrendered by the holder, or withdrawn by NSAI, or when the approved type no longer conforms to legal requirements. The recall of the Type Approval can be issued by NSAI when the conditions required for the issuing or continuation of the Type Approval are no longer current, or when the Approval holder is in breach of the duties attached to the Type Approval, or when it is established that the approved type no longer meets the requirements of traffic safety.
7. Changes in the company name, address or manufacturing site, as well as in any of the sales or other agents specified in the issuing of the approval must immediately be notified to NSAI.
8. The duties imposed by the issuing of this certificate are not transferable. The legal protection of third parties is not affected by this certificate.
9. When the manufacture or sale of the system, component or separate technical unit has not been started within one year of the date of issue of this certificate, then NSAI is to be informed. This requirement also applies when the manufacture or sale has been halted for more than one year, or when it ought to have been halted for more than one year. The initial commencement of manufacture or sale, or the resumption of manufacture or sale, shall then be notified to NSAI within one month of commencement or resumption.

B: Legal Options:

Any objection to the requirements set out in this certificate shall be made within one month of the date of issue. The objection shall be made, in writing, to NSAI in Dublin.

Technical Report No.:	23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Type:	DK-Lok Manual Valve	Page 1 of 4

TEST REPORT

23-00011-IS-MUC-00

About the Tests of CNG Manual Valve for CNG-Vehicles

According to:

ECE-Regulation No. 110

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF:

- I. SPECIFIC COMPONENTS OF MOTOR VEHICLES USING COMPRESSED NATURAL GAS (CNG) OR/AND LIQUIFIED NATURAL GAS (LNG) IN THEIR PROPULSION SYSTEM;
- II. VEHICLES WITH REGARD TO THE INSTALLATION OF SPECIFIC COMPONENTS OF AN APPROVED TYPE FOR THE USE OF COMPRESSED NATURAL GAS (CNG) OR/AND LIQUIFIED NATURAL GAS (LNG) IN THEIR PROPULSION SYSTEM

Revision 6 – amendment 4

05 series of amendments

Approval status
<input checked="" type="checkbox"/> Granting of a type approval – E24 110R05/00*0083 “C”
<input type="checkbox"/> Extension/correction to type approval no. – N/A

Technical Report No.:	23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Type:	DK-Lok Manual Valve	Page 2 of 4

0 Reason of Extension:

N/A. New type approval.

I General and Description

The Specific Component:

1.	CNG-component considered:	CNG Manual Valve
2.	Make:	DK-Lok Corporation
3.	Type: Variant(s):	DK-Lok Manual Valve 1. VC86 Series 5. VCT86 Series 2. VCH86 Series 6. VCT863 Series 3. VH86 Series 7. VBV Series 4. VH86-3B Series
4.	Name and address of the manufacturer:	DK-Lok Corporation 7, Golden root-ro 129beon-gil, Juchon-myeon Gimhae-si, Gyeongsangnam-do 50969 Republic of Korea
5.	Name and Address of Manufacturing plant:	Same as manufacturer above
6.	Operating Conditions:	Maximum Service Pressure: 200 bar @ 15°C Maximum Working Pressure: 274 bar @ 120°C – Class 6 Operating Temperatures: -40°C to +120°C
7.	Drawings:	Various. See description in Annex 2

was tested according to the requirements of the mentioned test basis.

Technical Report No.:	23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Type:	DK-Lok Manual Valve	Page 3 of 4

II Information Folder

This Test Report is based on the following information:

- Application for a new type approval by DK-Lok Corporation, dated 2023.08.06
(file: VG2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Application)
- Declaration by the Manufacturer, dated 2023.08.06
(file: D02023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_decl.by manuf)
- Essential Characteristics acc. to ECE R 110, Annex 1A
(file: BB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Annex 1A).

III Test Samples, Performed Tests and Test Results

The test samples, the performed tests, and the test results are described and summarized in *Annex 3 – DK-Lok Manual Valve test samples* (file: DO2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test samples) and *Annex 1 – DK-Lok Manual Valve test results* (file: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results).

The DK-Lok Manual Valve scope of approval includes all Variants listed in the present report in the various configurations as depicted in *Annex 4 – DK-Lok Manual Valve catalogs* (file DO2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Catalogs).

IV Approval History

Overview of the variants / extensions for the Type DK-Lok Manual Valve – Class 6.

	Type	Variant(s)	Content of Extension(s)	MAWP (bar)	Temp (°C)	Report No. and Date
Initial testing	DK-Lok Manual Valve	1. VC86 Series 2. VCH86 Series 3. VH86 Series 4. VH86-3B Series 5. VCT86 Series 6. VCT863 Series 7. VBV Series	N/A	274	-40 to +120	Annex 1_23-00011-IS-MUC-00 dated 2023.09.11

Technical Report No.:	23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Type:	DK-Lok Manual Valve	Page 4 of 4

V Statement of conformity

The information folder as mentioned under item II and the type described therein are in compliance with the test specification mentioned above. The worst-case was selected in accordance with document "Preparation of Test Reports".

The test report may be reproduced and published in full and by the client only. It can only be reproduced partially with the written permission of the test laboratory.

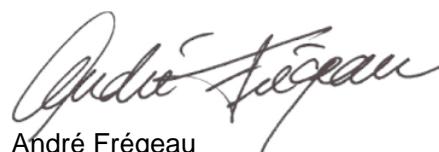
Test report no. 23-00011-IS-MUC-00 and the previous test reports issued by the Technical Service of TÜV SÜD Auto Service GmbH plus all documents and measurement results necessary for evaluation had been submitted. The above test reports continue to apply to the type of vehicle/vehicle component. This test report provides a summary of, and covers the full scope of, type testing, including the documentation of the vehicle/vehicle component.

TÜV SÜD Auto Service GmbH is designated as Technical Service by:

Approval authority	Country	Registration-number
Kraftfahrt-Bundesamt (KBA)	Germany	KBA-P 00100-10
Vehicle Certification Agency (VCA)	United Kingdom	VCA-TS-006
Approval Authority of the Netherlands (RDW)	The Netherlands	RDWT-082-xx
National Standards Authority of Ireland (NSAI)	Ireland	Technical Service Number: 49
Vehicle Safety Certification Center (VSCC)	Taiwan/Taiwan	DE04-06-2
Société Nationale de Certification et d'Homologation S.A.	Luxembourg	13/B(g)

San Diego, California USA

2023.09.11.



André Frégeau
The Authorized Signatory.

Annexes:

- Annex 1 – DK-Lok Manual Valve Test results
- Annex 2 – DK-Lok Manual Valve drawings
- Annex 3 – DK-Lok Manual Valve test samples
- Annex 4 – DK-Lok Manual Valve catalogs
- Annex 5 – DK-Lok Manual Valve service instructions.

Annex 1 – DK-Lok Manual Valve test results

Test Report

Test Report No.:	Annex 1 – 23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Component / Type:	Manual Valve / DK-Lok Manual Valve	Page 1 of 6

Test Results:

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5A	Overpressure	3X Manual Valve samples of each Variant described in Annex 3 of this report	No visible evidence of rupture or distortion at 1,5 times the working pressure for 3 minutes at ambient temperature	OK No rupture or distortion at 1,5 X 274 bar = 411 bar	At hand.
Annex 5B	External leakage	3X Manual Valve samples of each Variant described in Annex 3 of this report	Leakage <15cm ³ /h at 20°C at -40°C at +120°C Conditioning time of 8 hours Leakage pressure hold of 3 minutes	OK No leakage at ambient, -40°C, and +120°C from 0 to 411 bar	At hand.
Annex 5C	Internal leakage	3X Manual Valve samples of each Variant described in Annex 3 of this report	Leakage <15cm ³ /h at 20°C at -40°C at +120°C Conditioning time of 8 hours Leakage pressure hold of 3 minutes	OK No leakage at ambient, -40°C, and +120°C from 0 to 411 bar	At hand.

Form Name: PB-2015-07-22_Template5_Annex1-TestResults-Rev4.docx
File Name: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results.docx

Test Report

Test Report No.: Annex 1 – 23-00011-IS-MUC-00
 Manufacturer: DK-Lok Corporation
 Component / Type: Manual Valve / DK-Lok Manual Valve

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ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5D	CNG Compatibility	Non-metallic specimens tested (5 samples each) 1) NBR N8614AA 2) HNBR H7000AA 3) EPDM E7050-AA 4) KETRON PK1000 5) PTFE TF1641 6) ITAflon IT-1-10S	Resistance to n-pentane according to ISO 1817 for 72 hours while at 23°C. a) Max. change in volume: 20% b) Max mass decrease: < 5%	OK The change of volume or weight observed on all materials are within the requirements 1-a) -1,12% 1-b) -2,55% 2-a) -1,03% 2-b) -2,25% 3-a) -5,29% 3-b) -4,47% 4-a) -0,16% 4-b) -0,30% 5-a) -0,20% 5-b) 0,27% 6-a) -2,78% 6-b) 0,52%	At hand.

Form Name: PB-2015-07-22_Template5_Annex1-TestResults-Rev4.docx
 File Name: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results.docx

Test Report

Test Report No.:	Annex 1 – 23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Component / Type:	Manual Valve / DK-Lok Manual Valve	Page 3 of 6

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5E	Corrosion Resistance	3X Manual Valve samples of each Variant described in Annex 3 of this report	ISO 15500-2 salt spray for 144 hours with all connections closed. Leak free according to Annex 5B+C	OK Leak free. Components remained fully functional	At hand.
Annex 5F	Resistance to Dry Heat	Non-metallic specimens tested (5 samples each) 1) NBR N8614AA 2) HNBR H7000AA 3) EPDM E7050-AA 4) KETRON PK1000 5) PTFE TF1641 6) ITAflon IT-1-10S	Air exposure of non-metallic samples to +120°C for 168 hours per ISO 188 a) Δ-tensile strength: < +25% b) Δ-ultimate elongation: < +10 %, < -30 %	OK 1-a) -7,13% 1-b) -3,16% 2-a) -1,25% 2-b) -1,55% 3-a) 8,22% 3-b) -22,88% 4-a) 16,64% 4-b) -20,03% 5-a) -11,45% 5-b) -16,28% 6-a) -1,02% 6-b) 2,04%	At hand.

Form Name: PB-2015-07-22_Template5_Annex1-TestResults-Rev4.docx
File Name: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results.docx

Test Report

Test Report No.:	Annex 1 – 23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Component / Type:	Manual Valve / DK-Lok Manual Valve	Page 4 of 6

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5G	Ozone Ageing	Non-metallic specimens tested (5 samples each) 1) NBR N8614AA 2) HNBR H7000AA 3) EPDM E7050-AA 4) KETRON PK1000 5) PTFE TF1641 6) ITAflon IT-1-10S	No cracking allowed	OK None of the samples exhibited signs of cracking	At hand.
Annex 5L & Annex 4A para 6.5	Durability	3X Manual Valve samples of each Variant described in Annex 3 of this report	Leak free according to Annex 5B after gas cycling from 0 to 200 bar; 19200 cycles at ambient with air, and 400 cycles at each -40°C and +120°C with GN2 Leak free according to Annex 5B after gas cycling from 0 to 274 bar for 2000 cycles at ambient with air	OK Leak free. Components remained fully functional post testing and able to open/close with a torque less than the maximum allowed.	At hand.
Annex 5N	Vibration resistance	3X Manual Valve samples of each Variant described in Annex 3 of this report	Vibrate for 2 hours at 17Hz with amplitude of 1,5mm in each three axis for a total of 6 hours Leak free according to Annex 5C after vibration	OK No damage. Leak free. Components remained fully functional post testing	At hand.

Form Name: PB-2015-07-22_Template5_Annex1-TestResults-Rev4.docx
File Name: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results.docx

Test Report

Test Report No.: Annex 1 – 23-00011-IS-MUC-00
Manufacturer: DK-Lok Corporation
Component / Type: Manual Valve / DK-Lok Manual Valve

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ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5O	Operating Temperature	3X Manual Valve samples of each Variant described in Annex 3 of this report	Components to be fully functional to operate from -40°C to +120°C	OK Components remained fully functional and leak free at ambient, -40°C, and +120°C from 0 to 411 bar	At hand.

The non-metallic materials tested and approved for the CNG DK-Lok Manual Valve Variant(s) listed in the test report 23-00011-IS-MUC-00 are the following:

- 1) NBR N8614AA, 90 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
- 2) HNBR H7000AA, 70 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
- 3) EPDM E7050-AA, 70 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
- 4) KETRON PK1000, >100 HRM, manufactured by Mitsubishi Chemical Advanced Materials Korea, LTD
- 5) PTFE TF1641, >56 HRD, manufactured by 3M Advanced Materials Division
- 6) ITAflon IT-1-10S, >60 HRD, manufactured by ITAflon S.r.l..

Test Report

Test Report No.:	Annex 1 – 23-00011-IS-MUC-00	2023.09.11
Manufacturer:	DK-Lok Corporation	USA-AF
Component / Type:	Manual Valve / DK-Lok Manual Valve	Page 6 of 6

Testing was performed in the following laboratories under supervision of the TÜV SÜD Auto Service GmbH inspector: #1878224 (Overpressure, External & Internal Leakage, CNG Compatibility, Resistance to Dry Heat, Ozone Ageing, Durability, Operating Temperature); #2238319 (Vibration); #1913520 (Corrosion Resistance).

The measurement uncertainties were considered according to the test basis and the Process Description of TÜV SÜD Auto Service “AS-AM-PB-CRC-006”. The technical expert confirms that the tests have been performed as required by ECE Regulation No. 110 and have yielded the results as described above.

San Diego, CA USA
2023.09.11



The Technical Expert and Signatory
André Frégeau.

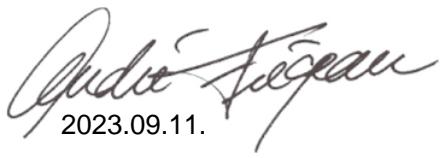


Form Name: PB-2015-07-22_Template5_Annex1-TestResults-Rev4.docx
File Name: PB2023.09.11_DK-Lok Corporation_23-00011-IS-MUC-00_Test results.docx

E24*110R05/00*0083*00

DK-Lok Corporation / DK-Lok Manual Valve

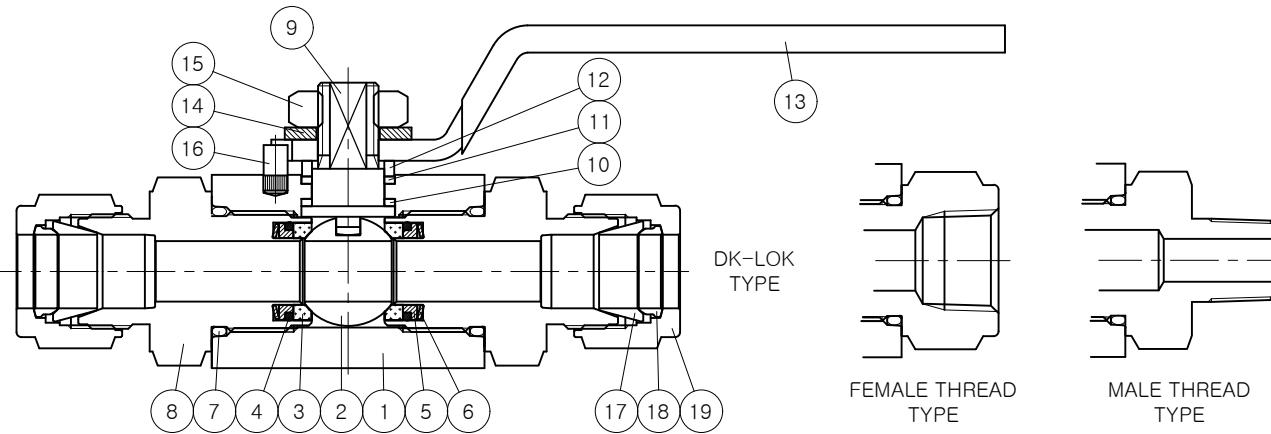
Essential Characteristics of the CNG-Component acc. Annex 1A of ECE R 110		
	Name and address of the manufacturer:	DK-Lok Corporation 7,Golden root-ro 129beon-gil, Juchon-myeon Gimhae-si, Gyeongsangnam-do 50969 Republic of Korea
	Name and address of the manufacturing plant:	DK-Lok Corporation 7,Golden root-ro 129beon-gil, Juchon-myeon Gimhae-si, Gyeongsangnam-do 50969 Republic of Korea
	Test Specification:	ECE-Regulation No. 110 with the 05 series of amendments – date of entry into force of 22 June 2022
	1.2.4.5.8.6. Manual valve:	Yes
	1.2.4.5.8.6.1. Make(s):	DK-Lok Corporation
	1.2.4.5.8.6.2. Type(s):	DK-Lok Manual Valve Variant(s): 1. VC86 Series 2. VCH86 Series 3. VH86 Series 4. VH86-3B Series 5. VCT86 Series 6. VCT863 Series 7. VBV Series
	1.2.4.5.8.6.3. Drawings:	1. VC86 Series (ECER110), Rev. 0 2. VCH86 Series (ECER110), Rev. 0 3. VH86 Series (ECER110), Rev. 0 4. VH86-3B Series (ECER110), Rev. 0 5. VCT86 Series (ECER110), Rev. 0 6. VCT863 Series (ECER110), Rev. 0 7. VBV Series (ECER110), Rev. 0
	1.2.4.5.8.6.4. Working pressure(s):	274 bar @ 120°C
	1.2.4.5.8.6.5. Material:	SS 316
	1.2.4.5.8.6.6. Operating temperatures:	-40°C to 120°C


2023.09.11.



Annex 2 – DK-Lok Manual Valve drawings

DWG. NO. VC86 SERIES

REV. NO. REVISION NOTES DATE
0 ISSUED FOR APPROVAL 2023.01.27

VALVE SERIES	End Connections Type	SIZE
VC86 SERIES 2-WAY BALL VALVES	DK-LOK	1/4", 3/8", 1/2", 5/8", 3/4", 1", 12mm, 16mm
	NPT, PT, PF, METRIC, UNIFIED	1/4", 3/8", 1/2", 3/4", 1"

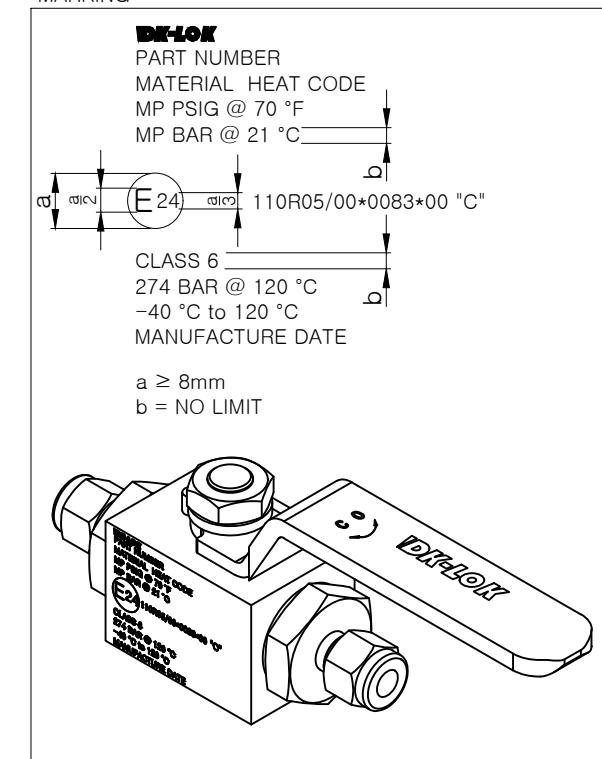
*TECHNICAL DATA

VALVE SERIES	SEAT MATERIAL	MAXIMUM MP PRESSURE at -54 to 21°C(-65 to 70°F)	TEMPERATURE RATING °C (°F)
VC86A	PEEK	10,000 psig (689 bar)	-54 to 260°C (-65 to 500°F)
VC86B	PEEK	6,000 psig (413 bar)	-40 to 210°C (-40 to 410°F)
VC86C	PEEK	6,000 psig (413 bar)	-40 to 210°C (-40 to 410°F)

10	BEARING	PEEK	1
9	STEM	ASTM A 276 TYPE316	1
8	END CONNECTOR	ASTM A 276 TYPE316	2
7	END SEAL	HNBR	2
6	DISC SPRING	ASTM A 564 TYPE630	2
5	SEAT GLAND	ASTM A 276 TYPE316	2
4	O-RING	HNBR	2
3	SEAT	PEEK	2
2	BALL	ASTM A 276 TYPE316	1
1	BODY	ASTM A 276 TYPE316	1
NO.	DESCRIPTION	MATERIAL	Q'TY

19	NUT	ASTM A 276 TYPE316	2
18	BACK FERRULE	ASTM A 479 TYPE316	2
17	FRONT FERRULE	ASTM A 479 TYPE316	2
16	STOP PIN	STAINLESS STEEL 316	1
15	STEM NUT	STAINLESS STEEL 316	1
14	WASHER	STAINLESS STEEL 304	1
13	LEVER HANDLE	STAINLESS STEEL 304 WITH VINYL SLEEVE(BLUE)	1
12	GLAND	STAINLESS STEEL 316	1
11	PACKING	PTFE	1
NO.	DESCRIPTION	MATERIAL	Q'TY

MARKING



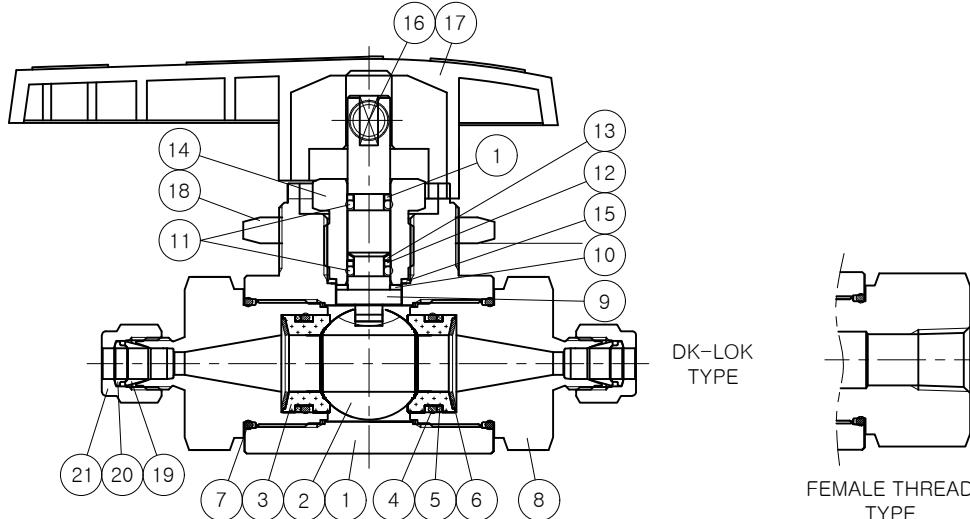
- * SPECIFICATION
 1. DK-LOK TYPE : DK-LOK STANDARD
 2. NPT : ASME B1.20.1
 3. PT : ISO 7/1
 4. PF : ISO 228/1
 5. METRIC : ISO 261
 6. UNIFIED : ASME B1.1

APPROVED	<i>S.H. Lee</i>	TITLE VC86 SERIES BALL VALVE
REVIEWED		
DESIGNED	<i>X.H. Lee</i>	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	VC86 SERIES (ECER110)	

DK-LOK
Fittings & Valves

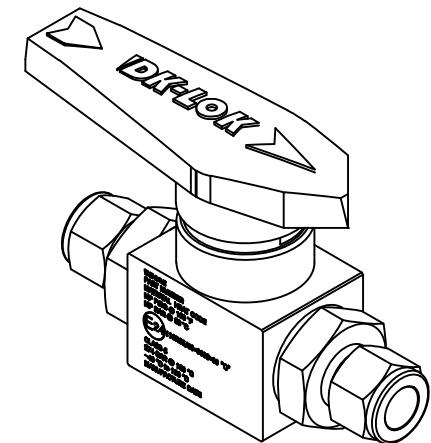
E24*110R05/00*0083*00

DWG. NO. VCH86 SERIES

REV. NO. REVISION NOTES DATE
0 ISSUED FOR APPROVAL 2022.03.07

MARKING

DK-LOK
 PART NUMBER
 MATERIAL HEAT CODE
 MP PSIG @ 100 °F
 MP BAR @ 38 °C
 E24 110R05/00*0083*00 "C"
 CLASS 6
 274 BAR @ 120 °C
 -40 °C to 120 °C
 MANUFACTURE DATE
 a ≥ 8mm
 b = NO LIMIT



*TECHNICAL DATA

VALVE SERIES	End Connections Type	SIZE	MAXIMUM MP PRESSURE					TEMPERATURE RATING °C (°F)
			DK-LOK TUBE FITTING		FEMALE PIPE			
VCH86 SERIES BALL VALVES	DK-LOK NPT, PT, PF, METRIC, UNIFIED	3/8", 1/2", 3/4", 1" 10mm, 12mm, 16mm 3/8", 1/2", 3/4"	3/8" 1/2" 12mm	3/4" 16mm	1"	3/8" 1/2"	3/4"	-40 to 93°C (-40 to 200°F)
			6,000 psig (413 bar)	5,800 psig (400 bar)	4,680 psig (323 bar)	6,000 psig (413 bar)	5,520 psig (381 bar)	121°C (250°F)

* SPECIFICATION

1. DK-LOK TYPE : DK-LOK STANDARD
2. NPT : ASME B1.20.1
3. PT : ISO 7/1
4. PF : ISO 228/1
5. METRIC : ISO 261
6. UNIFIED : ASME B1.1

		21	NUT	ASTM A 276 TYPE316	2
10	STEM SEAT BEARING	PEEK	1	20 BACK FERRULE	ASTM A 479 TYPE316
9	STEM	ASTM A 276 TYPE316	1	19 FRONT FERRULE	ASTM A 479 TYPE316
8	END CONNECTOR	ASTM A 276 TYPE316	2	18 PANEL NUT	ASTM A 276 TYPE316
7	CONNECTOR O-RING	HNBR	2	17 HANDLE	NYLON WITH ZINC INSERT
6	DISC SPRING	ASTM A 240 TYPE316	2	16 SET SCREW	STAINLESS STEEL
5	SEAT BACK UP RING	PTFE	2	15 PACKING BOLT GASKET	ASTM A 276 TYPE316
4	SEAT O-RING	HNBR	2	14 PACKING BOLT	ASTM A 276 TYPE316
3	SEAT	PEEK	2	13 STEM BACK UP RING	PEEK
2	BALL	ASTM A 276 TYPE316	1	12 STEM GUIDE RING	PTFE
1	BODY	ASTM A 276 TYPE316	1	11 STEM O-RING	HNBR
NO.	DESCRIPTION	MATERIAL	Q'TY	DESCRIPTION	MATERIAL
					Q'TY

APPROVED	S.H.Geo	TITLE VCH86 SERIES BALL VALVE
REVIEWED		
DESIGNED	X HLee	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	VCH86 SERIES (ECER110)	

DK-LOK
Fittings & Valves

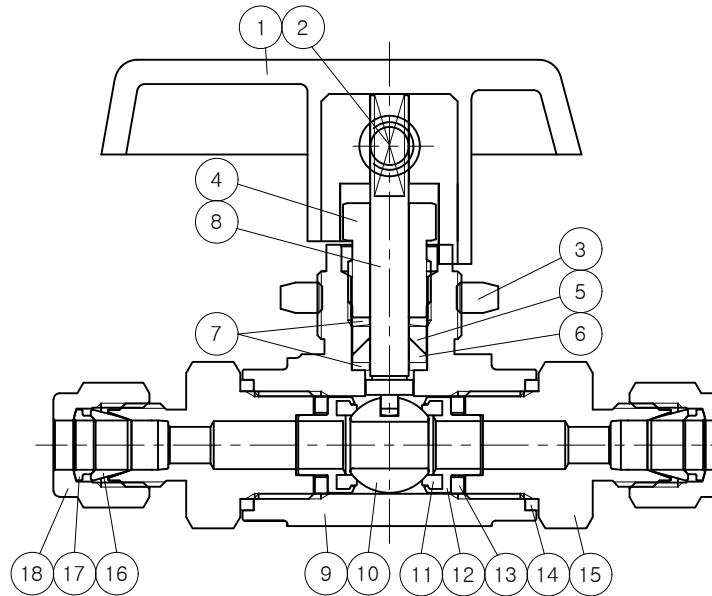
E24*110R05/00*0083*00

DWG. NO. VH86 SERIES

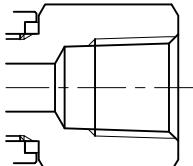
REV. NO. 0 REVISION NOTES ISSUED FOR APPROVAL DATE 2022.03.07

*TECHNICAL DATA

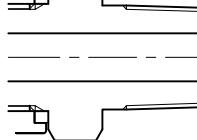
VALVE SERIES	SEALING MATERIALS			MP PRESSURE RATING @-27 to 37°C (-20 to 100°F)	TEMPERATURE RATING °C (°F)
	SEAT	STEM PACKING	RETAINER /END SEAL		
VH86A	PCTFE	PTFE	PTFE	6,000 psig (413 bar)	-30 to 180°C (-22 to 356°F)
VH86B	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230°C (-65 to 446°F)
VH86C	PTFE	PTFE	PTFE	1,500 psig (103 bar)	-30 to 176°C (-22 to 349°F)



DK-LOK TYPE

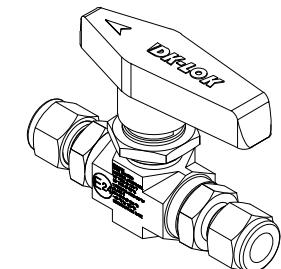
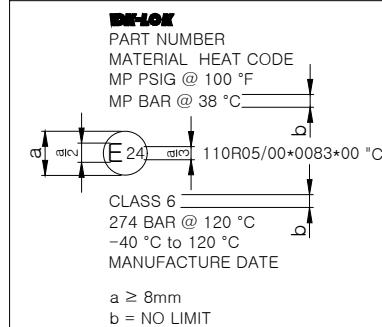


FEMALE THREAD TYPE



MALE THREAD TYPE

MARKING



VALVE SERIES	End Connections Type	SIZE
VH86 SERIES 2-WAY BALL VALVES	DK-LOK	1/16", 1/8", 1/4", 3/8", 1/2", 3/4", 3mm, 6mm, 8mm, 10mm, 12mm, 16mm
	NPT, PT, PF, METRIC, UNIFIED	1/8", 1/4", 3/8", 1/2", 3/4"

9	BODY	ASTM A 182 F316	1
8	STEM	ASTM A 276 TYPE 316	1
7	GLAND	ASTM A 276 TYPE 316	2
6	LOWER PACKING	PTFE	1
5	UPPER PACKING	PTFE	1
4	PACKING BOLT	ASTM A 276 TYPE 316	1
3	PANEL NUT	ASTM A 276 TYPE 316	1
2	SET SCREW	STAINLESS STEEL	1
1	HANDLE	NYLON WITH ZINC INSERT	1
NO.	DESCRIPTION	MATERIAL	Q'TY

18	NUT	ASTM A 276 TYPE316	2
17	BACK FERRULE	ASTM A 479 TYPE316	2
16	FRONT FERRULE	ASTM A 479 TYPE316	2
15	END CONNECTOR	ASTM A 276 TYPE 316	2
14	END CONNECTOR SEAL	PTFE	2
13	RETAINER SEAL	PTFE	2
12	RETAINER	ASTM A 276 TYPE 316	2
11	SEAT	PCTFE / PTFE / PEEK	2
10	BALL	ASTM A 276 TYPE 316	1
NO.	DESCRIPTION	MATERIAL	Q'TY

* SPECIFICATION

- DESIGN PRESSURE : 3,960 psig@250°F (273 bar@121°C)
- TEMPERATURE RANGE : -40 ~ 250°F (-40 ~ 121°C)
- DK-LOK TYPE : DK-LOK STANDARD
- NPT : ASME B1.20.1
- PT : ISO 7/1
- PF : ISO 228/1
- METRIC : ISO 261
- UNIFIED : ASME B1.1

APPROVED	<i>S.H.cho</i>	TITLE VH86 SERIES HIGH PRESSURE MULTI PURPOSE BALL VALVE
REVIEWED		
DESIGNED	<i>X.H.lee</i>	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	VH86 SERIES (ECER110)	

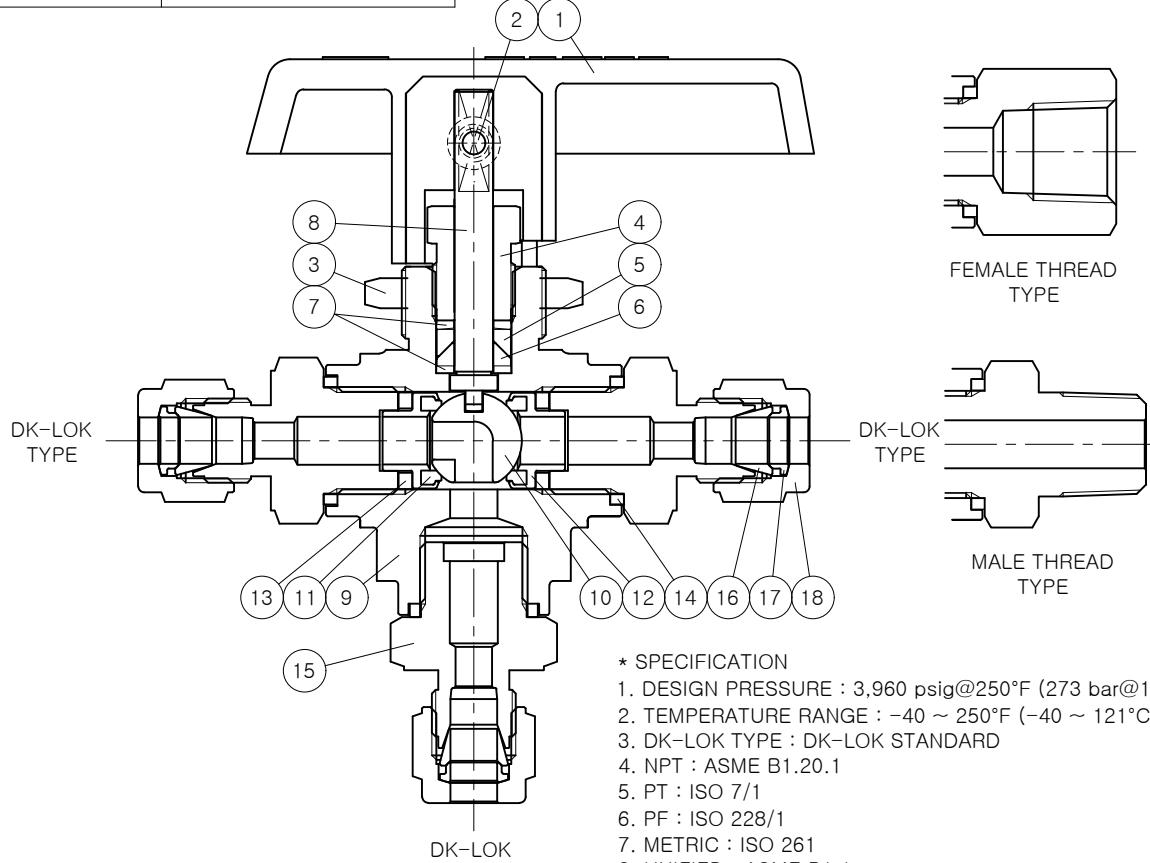
DK-LOK
Fittings & Valves

E24*110R05/00*0083*00

DWG. NO. VH86-3B SERIES

REV. NO. REVISION NOTES DATE

0 ISSUED FOR APPROVAL 2022.03.07

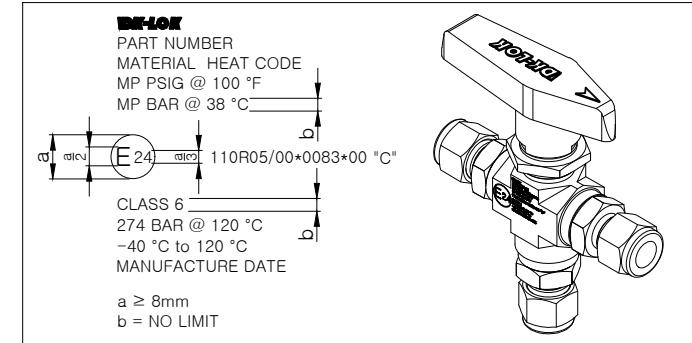


VALVE SERIES	End Connections Type	SIZE
VH86 SERIES 3-WAY BALL VALVES	DK-LOK	1/16", 1/8", 1/4", 3/8", 1/2", 3/4", 6mm, 8mm, 10mm, 12mm, 16mm
	NPT, PT, PF, METRIC, UNIFIED	1/8", 1/4", 3/8", 1/2"

*TECHNICAL DATA

VALVE SERIES	SEALING MATERIALS			MP PRESSURE RATING @-27 to 37°C(-20 to 100°F)	TEMPERATURE RATING °C (°F)
	SEAT	STEM PACKING	RETAINER /END SEAL		
VH86A-3B	PCTFE	PTFE	PTFE	6,000 psig (413 bar)	-30 to 180°C (-22 to 356°F)
	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230°C (-65 to 446°F)
	PTFE	PTFE	PTFE	1,500 psig (103 bar)	-30 to 176°C (-22 to 349°F)
VH86B-3B VH86C-3B	PCTFE	PTFE	PTFE	4,000 psig (276 bar)	-50 to 180°C (-58 to 356°F)
	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230°C (-65 to 446°F)
	PTFE	PTFE	PTFE	1,500 psig (103 bar)	-30 to 176°C (-22 to 349°F)

MARKING



NO.	DESCRIPTION	MATERIAL	Q'TY
APPROVED	S.H.Cao		
REVIEWED			
DESIGNED	X.H.Lee		
SCALE	N/S		
DATE	2023.01.27		
DWG. NO.	VH86-3B SERIES (ECER110)		

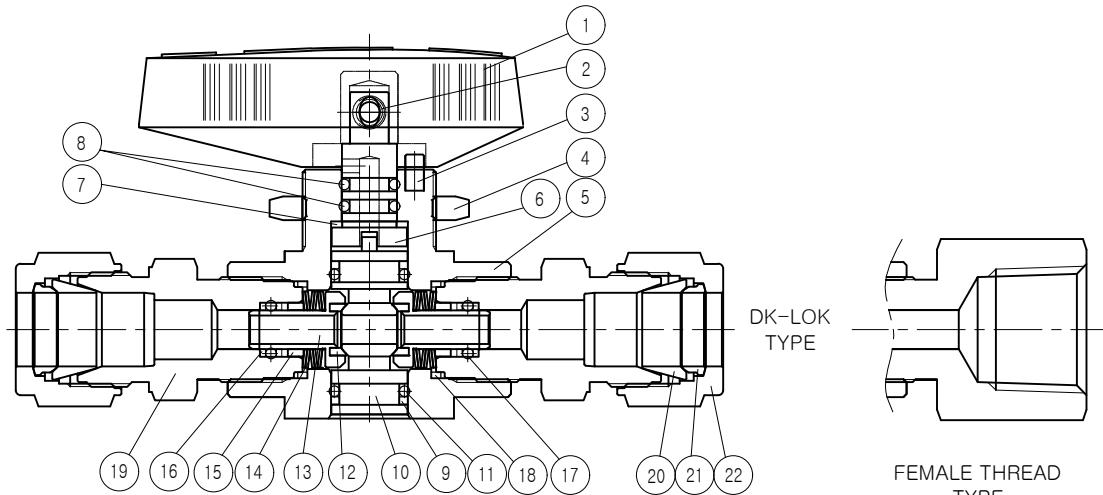
TITLE
VH86 SERIES
HIGH PRESSURE MULTI
PURPOSE 3-WAY DIVERTER
BALL VALVE

DK-LOK
Fittings & Valves

E24*110R05/00*0083*00

DWG. NO. VCT86 SERIES

REV. NO. 0 REVISION NOTES ISSUED FOR APPROVAL DATE 2022.03.07



VALVE SERIES	End Connections Type	SIZE
VCT86 SERIES 2-WAY BALL VALVES	DK-LOK	1/4", 3/8", 1/2" 6mm, 8mm, 10mm, 12mm
	NPT, PT, PF, METRIC, UNIFIED	1/4", 1/2"

*TECHNICAL DATA

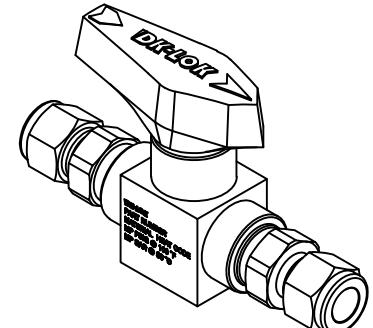
VALVE SERIES	SEAT MATERIAL	MAXIMUM MP PRESSURE at 37°C(100°F)	TEMPERATURE RATING °C (°F)
VCT86	PAI PEEK	6,000 psig (413 bar)	-17 to 232°C (0 to 450°F)

NO.	DESCRIPTION	MATERIAL	Q'TY	NO.	DESCRIPTION	MATERIAL	Q'TY
11	O-RING	HNBR	2	22	NUT	ASTM A 276 TYPE316	2
10	TRUNNION BALL	ASTM A 276 TYPE316	1	21	BACK FERRULE	ASTM A 479 TYPE316	2
9	BACK UP RING	PTFE	2	20	FRONT FERRULE	ASTM A 479 TYPE316	2
8	STEM O-RING	HNBR	2	19	END CONNECTOR	ASTM A 276 TYPE316	2
7	STEM BEARING	PEEK	1	18	END PACKING	PTFE	2
6	STEM	ASTM A 276 TYPE316	1	17	SEAT CARRIER O-RING	HNBR	2
5	BODY	ASTM A 276 TYPE316	1	16	BACK UP RING	PTFE	4
4	PANEL NUT	STAINLESS STEEL	1	15	SEAT CARRIER GUIDE	ASTM A 276 TYPE316	2
3	STOP PIN	STAINLESS STEEL	2	14	SEAT SPRING	ALLOY X-750	12
2	SET SCREW	STAINLESS STEEL 304	1	13	SEAT CARRIER	ASTM A 276 TYPE316	2
1	HANDLE	NYLON WITH ZINC INSERT	1	12	SEAT	PEEK / PAI	2
NO.	DESCRIPTION	MATERIAL	Q'TY	NO.	DESCRIPTION	MATERIAL	Q'TY

MARKING

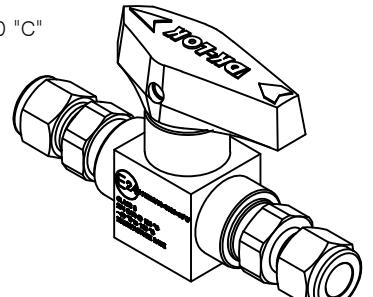
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DK-LOK
PART NUMBER
MATERIAL HEAT CODE
MP PSIG @ 100 °F
MP BAR @ 38 °C



<BACK>

E 24
110R05/00*0083*00 "C"
CLASS 6
274 BAR @ 120 °C
-40 °C to 120 °C
MANUFACTURE DATE



a ≥ 8mm
b = NO LIMIT

* SPECIFICATION

1. DK-LOK TYPE : DK-LOK STANDARD
2. NPT : ASME B1.20.1
3. PT : ISO 7/1
4. PF : ISO 228/1
5. METRIC : ISO 261
6. UNIFIED : ASME B1.1

APPROVED *S.H.Lee*

REVIEWED

DESIGNED *X.H.Lee*

SCALE N/S

DATE 2023.01.27

DWG. NO. VCT86 SERIES
(ECER110)

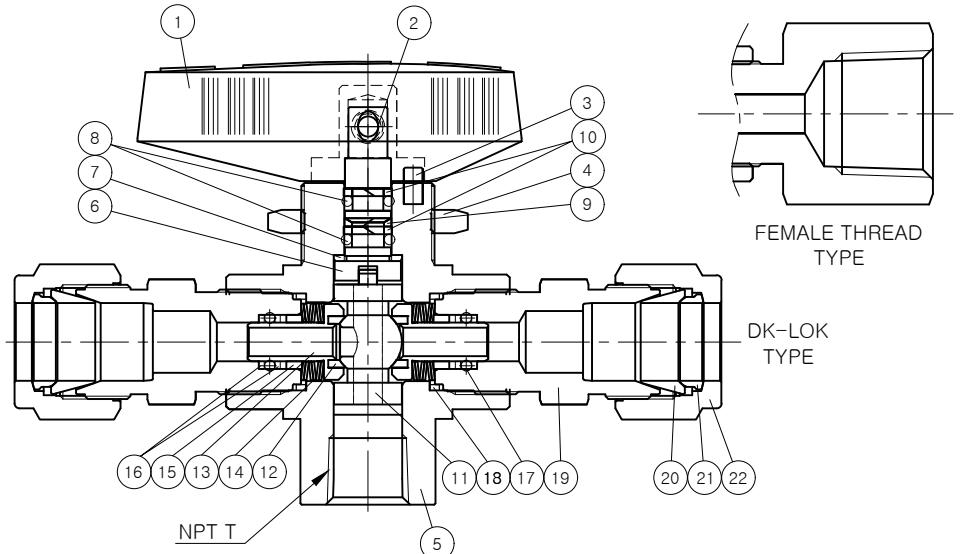
TITLE
VCT86 SERIES
TRUNNION BALL VALVE

DK-LOK
Fittings & Valves

E24*110R05/00*0083*00

DWG. NO. VCT863 SERIES

REV. NO. 0 REVISION NOTES ISSUED FOR APPROVAL DATE 2022.03.07



VALVE SERIES	End Connections Type	SIZE
VCT863 SERIES 3-WAY BALL VALVES	DK-LOK	1/4", 3/8", 1/2" 6mm, 8mm, 10mm, 12mm
	NPT, PT, PF, METRIC, UNIFIED	1/4"

*TECHNICAL DATA

VALVE SERIES	SEAT MATERIAL	MAXIMUM MP PRESSURE at 37°C(100°F)	TEMPERATURE RATING °C (°F)
VCT863	PAI PEEK	6,000 psig (413 bar)	-17 to 232°C (0 to 450°F)

NO.	DESCRIPTION	MATERIAL	Q'TY	NO.	DESCRIPTION	MATERIAL	Q'TY
11	O-RING	HNBR	2	22	NUT	ASTM A 276 TYPE316	2
10	TRUNNION BALL	ASTM A 276 TYPE316	1	21	BACK FERRULE	ASTM A 479 TYPE316	2
9	BACK UP RING	PTFE	2	20	FRONT FERRULE	ASTM A 479 TYPE316	2
8	STEM O-RING	HNBR	2	19	END CONNECTOR	ASTM A 276 TYPE316	2
7	STEM BEARING	PEEK	1	18	END PACKING	PTFE	2
6	STEM	ASTM A 276 TYPE316	1	17	SEAT CARRIER O-RING	HNBR	2
5	BODY	ASTM A 276 TYPE316	1	16	BACK UP RING	PTFE	4
4	PANEL NUT	STAINLESS STEEL	1	15	SEAT CARRIER GUIDE	ASTM A 276 TYPE316	2
3	STOP PIN	STAINLESS STEEL	2	14	SEAT SPRING	ALLOY X-750	12
2	SET SCREW	STAINLESS STEEL 304	1	13	SEAT CARRIER	ASTM A 276 TYPE316	2
1	HANDLE	NYLON WITH ZINC INSERT	1	12	SEAT	PEEK / PAI	2
NO.	DESCRIPTION	MATERIAL	Q'TY	NO.	DESCRIPTION	MATERIAL	Q'TY

MARKING

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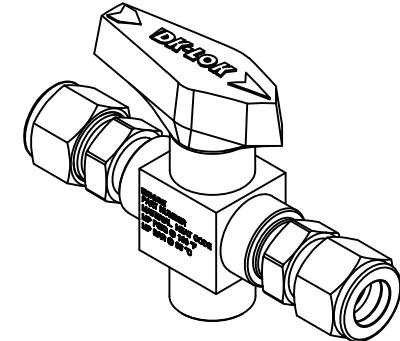
DK-LOK

PART NUMBER

MATERIAL HEAT CODE

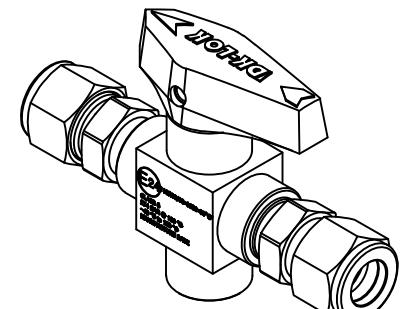
MP PSIG @ 100 °F

MP BAR @ 38 °C



<BACK>

F 24
 $a = 8\text{mm}$
 $b = \text{NO LIMIT}$
 CLASS 6
 274 BAR @ 120 °C
 -40 °C to 120 °C
 MANUFACTURE DATE



* SPECIFICATION

1. DK-LOK TYPE : DK-LOK STANDARD
2. NPT : ASME B1.20.1
3. PT : ISO 7/1
4. PF : ISO 228/1
5. METRIC : ISO 261
6. UNIFIED : ASME B1.1

APPROVED	S.H. Cho	TITLE VCT863 SERIES TRUNNION BALL VALVE
REVIEWED		
DESIGNED	X H. Lee	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	VCT863 SERIES (ECER110)	

DK-LOK
Fittings & Valves

E24*110R05/00*0083*00

DWG. NO.

VBV SERIES

REV. NO.

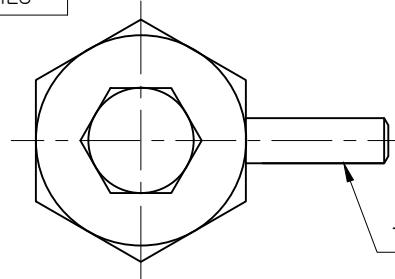
REVISION NOTES

DATE

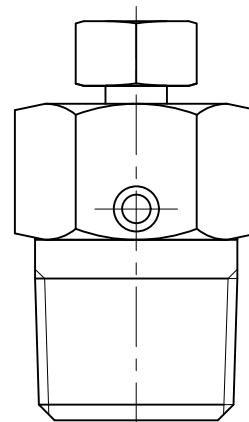
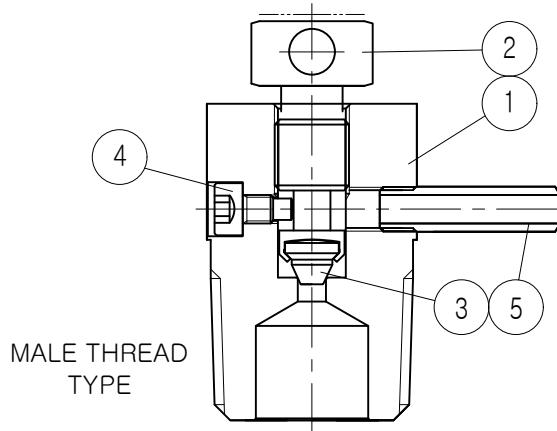
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ISSUED FOR APPROVAL

2022.03.07

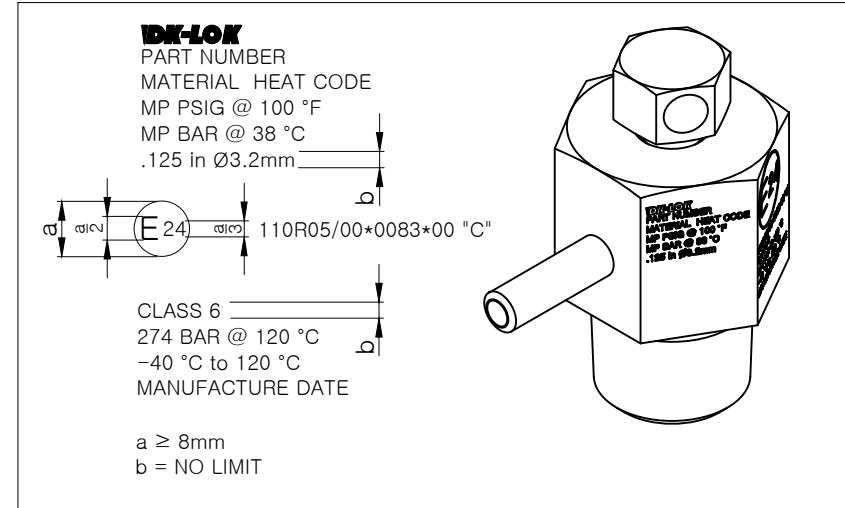


TUBE O.D 3/16" x 0.035"



VALVE SERIES	End Connections Type	SIZE
VBV SERIES BLEED VALVE	NPT, PT, PF, METRIC UNIFIED	1/8", 1/4", 3/8", 1/2"

MARKING



*TECHNICAL DATA

VALVE SERIES	MAXIMUM MP PRESSURE at 38°C(100°F)	TEMPERATURE RATING °C (°F)
VBV	10,000 psig (689 bar)	-54 to 454°C (-65 to 850°F)

5	VENT TUBE	ASTM A 269 TP316	1
4	BACK STOP SCREW	ASTM A 276 TYPE316	1
3	STEM DISC	ASTM A 564 TYPE630	1
2	STEM	ASTM A 276 TYPE316	1
1	BODY	ASTM A 276 TYPE316	1
NO.	DESCRIPTION	MATERIAL	Q'TY

* SPECIFICATION

1. DK-LOK TYPE : DK-LOK STANDARD
2. NPT : ASME B1.20.1
3. PT : ISO 7/1
4. PF : ISO 228/1
5. METRIC : ISO 261
6. UNIFIED : ASME B1.1

APPROVED	S.H. Cho	TITLE VBV SERIES BLEED VALVE
REVIEWED		
DESIGNED	X H Lee	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	VBV SERIES (ECER110)	

DK-LOK
Fittings & Valves

E24*110R05/00*0083*00

Annex 3 – DK-Lok Manual Valve test samples

DK-Lok Corporation / DK-Lok Manual Valve

Annex 3 of Test Report 23-00011-IS-MUC-00		
Type	Variant(s)	Test samples (3 units in each configuration)
DK-Lok Manual Valve	1. VC86 Series	- VC86A 1/4" MNPT - VC86B 16mm-end 1, 5/8" DK-Lok-end 2 - VC86C 3/4" DK-Lok-end 1, 3/4" FNPT-end 2 - VC86D 1"FNPT
	2. VCH86 Series	- VCH86 3/8" DK-Lok - VCH86 12mm DK-Lok - VCH86 1" DK-Lok
	3. VH86 Series	- VH86A 1/16" DK-Lok - VH86B-3B 1/4 MNPT - VH86C 16mm DK-Lok
	4. VH86-3B Series	- VH86B-3B 1/4 MNPT
	5. VCT86 Series	- VCT86 1/8" FNPT - VCT86 1/2" DK-Lok
	6. VCT863 Series	- VCT863 3/8" DK-Lok - VCT863 6mm DK-Lok
	7. VBV Series	- VBV 1/8" MNPT - VBV 1/2" MNPT

The non-metallic materials tested and approved for the CNG DK-Lok Manual Valve Variant(s) listed above are the following:

1. NBR N8614AA, 90 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
2. HNBR H7000AA, 70 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
3. EPDM E7050-AA, 70 +/-5 Shore A, manufactured by GE MAO Rubber Industrial Co., LTD
4. KETRON PK1000, >100 HRM, manufactured by Mitsubishi Chemical Advanced Materials Korea, LTD
5. PTFE TF1641, >56 HRD, manufactured by 3M Advanced Materials Division
6. ITAflon IT-1-10S, >60 HRD, manufactured by ITAflon S.r.l.

Annex 4 – DK-Lok Manual Valve catalogs

V86 Series Ball Valves VC86 Series CNG/NGV Valves

No . V 86 -10
Mar. 2023

Pressure Rating up to 689 bar (10,000psig)



Features

- High pressure up to 10,000 psi (689 bar).
- Blowout proof design with internally loaded stem.
- Handle indicates the flow direction.
- Positive stop with a robust stop pin.
- High flow rate with maximum orifice.
- Various end ports including DK-Lok tube port.
- Various flow control with side and bottom inlet port on 3-way diverter valves.

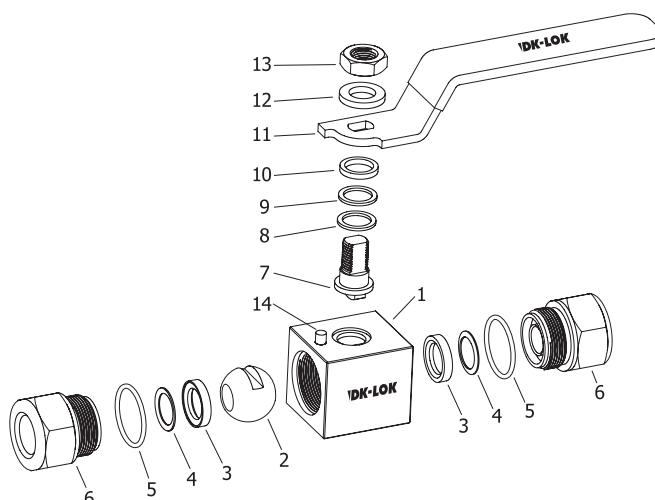


Table 1. Materials of Construction

Component		Materials Grade/ASTM Specification
1	Body	SS316/A276 or A479
2	Ball	
3	Seat (2)	PVDF, standard for V86 Series Optional PCTFE PEEK, standard for VC86 Series
4	Disc Spring (2)	Type 630/A564, applicable to VC86 Series
5	End Seal (2)	FKM O-ring for V86 Series HNBR O-ring for VC86 Series
6	End Connector (2)	SS316/A276 or A479
7	Stem	
8	Bearing	PTFE
9	Packing	
10	Gland	SS316/ ASTM A276 or ASTM A479
11	Lever Handle	
12	Optional Oval Handle	SS304 handle with vinyl sleeve
13	Washer	SS304
14	Stem Nut	SS304
15	Stop Pin	SS304

- Wetted parts and lubricants listed in blue.
- Fluorinated-based lubricant

CNC/NGV Certifications

VC86 Series with PEEK seat and HNBR O-rings are available with CNG/NGV certifications.

The sealing material of seat and O-rings are selected for compatible with CNG.

VC86 Series with the live loaded compensation disc spring reacts on ball movement in both low and high pressure systems in CNG and NGV applications.

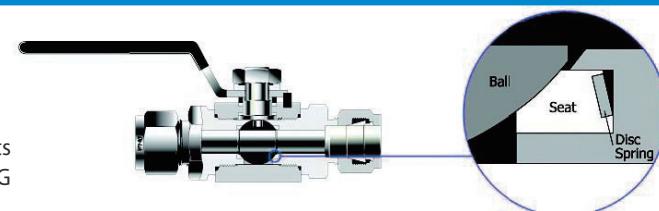


Table 2. Pressure - Temperature Rating for CNG Service

Valve Series	Certificates	ECE R110	ANSI / CSA NGV 3.1:20	ANSI / CSA NGV 4.6:20	ISO 15500
VC86 Series 2-way ball valves	Certificate No.	E24 110R05/00*0083*00	72160895 - NGV 3.1	72160895-NGV4.6	72160895-ISO 15500-4
	Classification	Class 6	manual valve	manual valve (Class B)	manual valve
	Temperature	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)	-40 to +65 °C (-40 to 150 °F)	-40 to +120 °C (-40 to 250 °F)
	Pressure	W.P 274 bar @ 120 °C	S.P 273 bar @ 21 °C	S.P 293 bar @ 21 °C	W.P 274 bar @ 120 °C



DK-LOK Corporation
www.dklok.com

Operation

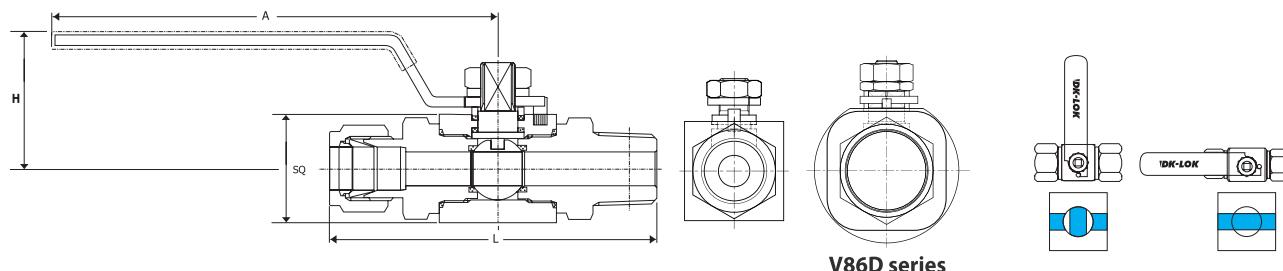
- 2-way positive shut off and 3-way directional control of fluids in process, power and instrument application.
- Valves are designed to control fluids in full open or full closed position.

- Valves that have not been actuated for a period of time may have a higher initial actuation torque.
- Valves must be in open position during system test not to damage the valve seat.
- Sour Gas Service NACE MR0175 available.

Factory Test

Every valve is tested with nitrogen gas @1,000 psig (68 bar) for leakage at the seat to a maximum allowable leak rate of 0.1 SCCM. The stem packing is tested with nitrogen gas @1,000 psig for no detectable leakage.

2-Way On-off Valves



Ordering Information and Dimensions

Basic Ordering Number	End Connections Inlet & Outlet	Orifice mm (in.)	Cv	Dimensions mm (in.)					
				A	H	L	SQ		
V86A- VC86A-	D-4T	1/4 in. DK-Lok	4.8 (0.19)	1.2	108.3 (4.26)	38.4 (1.52)	97.12 (3.82)		
	D-6T	3/8 in. DK-Lok	7.1 (0.28)	3.7			104.5 (4.11)		
	D-8T	1/2 in. DK-Lok	10.0 (0.39)	7.5			109.6 (4.31)		
	F-4N	1/4 in. Female NPT					74.0 (2.91)		
	F-6N	3/8 in. Female NPT					77.0 (3.03)		
	F-8N	1/2 in. Female NPT					85.0 (3.35)		
	M-4N	1/4 in. Male NPT	7.1 (0.28)	3.7			95.4 (3.76)		
	M-6N	3/8 in. Male NPT	10.0 (0.39)	7.2			95.4 (3.76)		
	M-8N	1/2 in. Male NPT		7.5			100.2 (3.94)		
V86B- VC86B-	F-8N	1/2 in. Female NPT	12.7 (0.50)	10.1	149.0 (5.86)	50.8 (2.00)	89.0 (3.50)		
	F-12N	3/4 in. Female NPT					90.0 (3.54)		
	D-12M	12mm DK-Lok					112.6 (4.43)		
	D-16M	16mm DK-Lok					115.0 (4.53)		
	D-8T	1/2 in. DK-Lok					114.6 (4.51)		
	D-10T	5/8 in. DK-Lok					114.4 (4.50)		
	D-12T	3/4 in. DK-Lok					114.8 (4.52)		
V86C- VC86C-	F-12N	3/4 in. Female NPT	19.0 (0.75)	30.0	149.0 (5.86)	56.0 (2.20)	96.0 (3.78)		
	F-16N	1 in. Female NPT					111.0 (4.37)		
	D-12T	3/4 in. DK-Lok					125.0 (4.92)		
	D-16T	1 in. DK-Lok					134.0 (5.27)		
	M-12N	3/4 in. Male NPT					119.0 (4.68)		
	M-16N	1 in. Male NPT					129.0 (5.07)		
	VC86D-	F-16N	1 in. Female NPT	25.0 (0.98)	Full Bore	193.7 (7.62)	84.1 (3.31)		

CNG valve ordering number :

The basic ordering number listed in black are not for CNG/NGV applicable valves.

Table 3. 2-Way Valve Actuation Torque

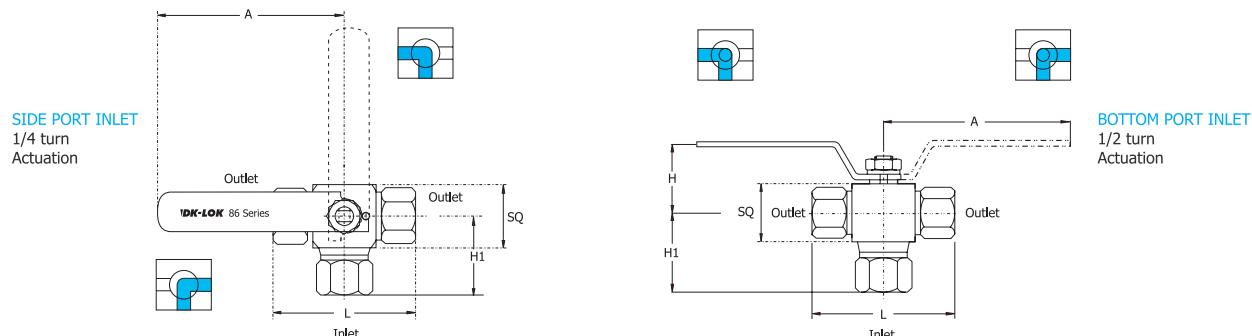
Standard Valves

Valve Series	System Pressures, bar (psig)		
	0 (0)	334 (5000)	413 (6000)
V86A	3.92 (2.89)	-	6.37 (4.69)
V86B	7.35 (5.42)	10.30 (7.59)	-
V86C	12.26 (9.04)	19.61 (14.46)	-

CNG/NGV Valves

Valve Series	System Pressures, bar (psig)	
	0 (0)	344 (5000)
VC86B	5.19	10.59
VC86C	2.15	5.88
VC86D	7.35	9.80

3-Way Diverter Valves



V86 3-way ball valve is designed to switch media through the inlet port and direct it to out of two outlet ports.

Ordering Information and Dimensions

Basic Ordering Number	End Connections	Orifice mm (in.)	Dimensions mm (in.)				SQ
			A	H	H1	L	
V86A-	3*-D-4T-	4.8 (0.19)	108.3 (4.26)	38.4 (1.52)	50.9 (2.0)	97.12 (3.82)	32.0 (1.26)
	3*-D-6T-	7.1 (0.28)			53.0 (2.09)	104.5 (4.11)	
	3*-D-8T-	1/2 in. DK-Lok			55.8 (2.20)	109.6 (4.31)	
	3*-F-4N -	1/4 in. Female NPT			40.0 (1.57)	74.0 (2.91)	
	3*-F-6N-	3/8 in. Female NPT			41.5 (1.64)	77.0 (3.03)	
	3*-F-8N-	1/2 in. Female NPT			45.5 (1.79)	85.0 (3.35)	
V86B-	3*-F-8N-	1/2 in. Female NPT	12.7 (0.50)	149.0 (5.86)	50.8 (2.00)	55.0 (2.17) 89.0 (3.50)	40.0 (1.57)
	3*-F-12N-	3/4 in. Female NPT			55.0 (2.17)	90.0 (3.54)	
	3*-D-10T-	5/8 in. DK-Lok			67.2 (2.66)	114.4 (4.50)	
	3*-D-12T-	3/4 in. DK-Lok			67.7 (2.66)	115.0 (4.53)	
V86C-	3*-D-12T-	3/4 in. DK-Lok	15.7 (0.62)	149.0 (5.86)	75.3 (2.96)	125.0 (4.92)	50.0 (1.97)
	3*-D-16T-	1 in. DK-Lok			80.0 (3.15)	134.0 (5.27)	
	3*-F-12N-	3/4 in. Female NPT	19.0 (0.75)	56.0 (2.20)	59.5 (2.34)	96.0 (3.78)	
	3*-F-16N-	1 in. Female NPT			67.0 (2.64)	111.0 (4.37)	

All dimensions shown are for reference only and are subject to change.

Side and Bottom Port Valve Ordering Information

To order side port entry valve, replace * with S, to order bottom port entry valve, replace * with B.

Examples : V86A-3S-D-4T-S, V86A-3B-D-4T-S.

Table 5. 2-way Valve Pressure and Temperature Rating

Valve Series	Seat Material	Maximum Working Pressure at -54 ~ 21°C (-65 ~ 70°F) psig(bar)	Temperature Rating °C(°F)
V86A	PVDF	6,000 (413)	-30 to 130 (-22 to 266)
	PCTFE		-30 to 180 (-22 to 356)
	PEEK	10,000 (689)	-54 to 260 (-65 to 500)
V86B V86C	PVDF	5,000 (344)	-30 to 110 (-22 to 230)
	PCTFE		-30 to 160 (-22 to 320)
	PEEK	6,000 (413)	-40 to 210 (-40 to 410)
V86D	PCTFE	6,000 (413)	-40 to 160 (-40 to 320)

Note : Refer to table 2 for VC86 series's Pressure and Temperature Rating

Table 4. 3-way Valve Actuation Torque

Valve Series	System Pressures, bar (psig)		
	0 (0)	206 (3000)	275 (4000)
Torque		Unit: Nm	
V86A	3.92	-	4.90
V86B	7.35	7.85	-

Table 6. 3-way Valve Pressure and Temperature Rating

Valve Series	Seat	Maximum Working Pressure at -54~21°C (-65~70°F) psig (bar)	Temperature Rating °C(°F)
V86A-3*	PVDF	4,000 (275)	-30 to 130 (-22 to 266)
	PCTFE		-30 to 180 (-22 to 356)
	PEEK	6,000 (413)	-40 to 230 (-40 to 446)
V86B-3* V86C-3*	PVDF	3,000 (206)	-30 to 110 (-22 to 230)
	PCTFE		-30 to 160 (-22 to 320)
	PEEK	4,000 (275)	-40 to 210 (-40 to 410)

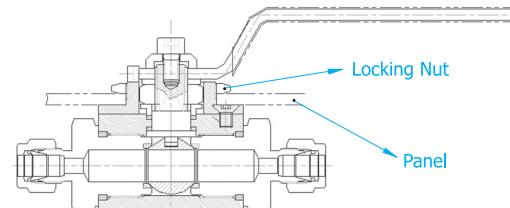
Options

Locking Nut & Panel Mounting

Ordering designator : P1

Addition locking nut below handle makes the valve panel mountable.
Disassemble the handle prior to panel mounting.

Valve Series	Panel Hole Drill	Panel Thickness mm (in.)
V86A	30.0 (1.18)	Max. 4.0 (0.157)
V86B	38.0 (1.50)	
V86C	38.0 (1.50)	

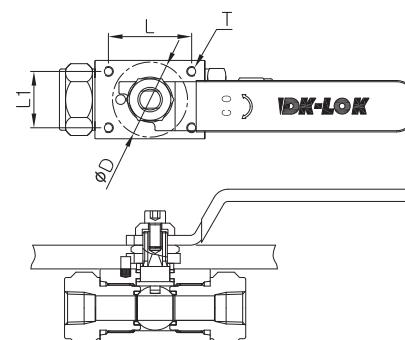


Screw Hole for Panel Mounting

Ordering Designator : P2

Additional four (4) screw holes on the top of valve makes the valve panel mountable.
Disassemble the handle prior to panel mounting.

Valve Series	L	L1	T	D mm (in.)
V86A	34.0 (1.33)	23.0 (0.91)	M4x0.7P	30.0 (1.18)
V86B	36.0 (1.42)	29.0 (1.14)	M5x0.8P	38.0 (1.50)
V86C	40.0 (1.57)	35.0 (1.37)	M6x1.0P	38.0 (1.50)



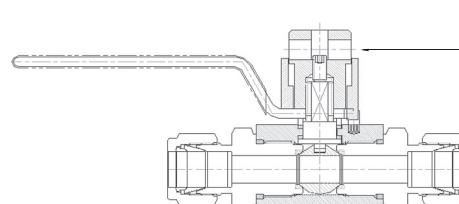
"Lift-Turn" Locking Device

Ordering Designator : LD

Dk Tech patented "Lift-Turn" safety locking device allows you to lock the valve manually either in open or close position.

The locking device consists of sturdy upper and lower locking detents made out of stainless steel.

Note : LD option applicable to 2-way valves.



Pad-Lock applicable
7.2mm (0.28in) hole
constructed on upper
locking detent.

You may apply a pad-lock to
secure the valve in the open
or close position.

Ordering Information

Select the desired basic ordering number, and options from designators listed below.

V86A-D-4T	-PC		-LD	-OH	-S
V86B-F-12N					-S
VC86B-D-12M		-PC			-S
Seat	Panel Mounting	Locking Device	Handle	Body Material	
Nil : PEEK, standard for VC86 series Nil : PVDF, standard for V86 series PC : PCTFE PK : PEEK PV : PVDF	P1 : Locking nut & panel mounting P2 : Screw hole for panel mounting	LD : Locking Device	Nil : Standard Lever Handle OH : Oval Handle OH option is applicable to 2-way V86A Series valves.	S : SS316	

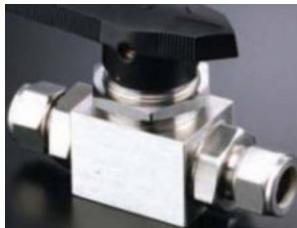
Safe Valve Selection

The selection of a valve for any application or system design must be considered to ensure safe performance. Valve function, valve rating, material compatibility, proper installation, operation and maintenance remain the sole responsibility of the system designer and the user. DK-Lok accepts no liability for any improper selection, installation, operation or maintenance.

CNG/NGV Valves

VCH86 Series Alternative Fuel Service Ball Valve

Catalog No. VCH86-6
Jan. 2023



Features

- Wetted components are compatible with compressed natural gas (CNG), liquid petroleum gas, gaseous and liquid hydrogen.
- Sturdy body and end connections made out of stainless 316 barstock.
- Maximum pressure rating: 413 bar (6000 psig).
- Temperature rating: - 40 to 121°C (-40 to 250°F).

Pressure-Temperature Ratings

End Connections	DK-LOK Tube Fitting			Female Pipe	
	3/8 in. 1/2 in. 12 mm	3/4 in. 16 mm	1 in.	3/8 in. 1/2 in.	3/4 in.
Temperature °C (°F)	Working Pressure			bar (psig)	
- 40 to 93 (-40 to 200)	413 (6000)	400 (5800)	323 (4680)	413 (6000)	381 (5520)
121 (250)	413 (6000)	395 (5720)	320 (4640)	413 (6000)	381 (5520)

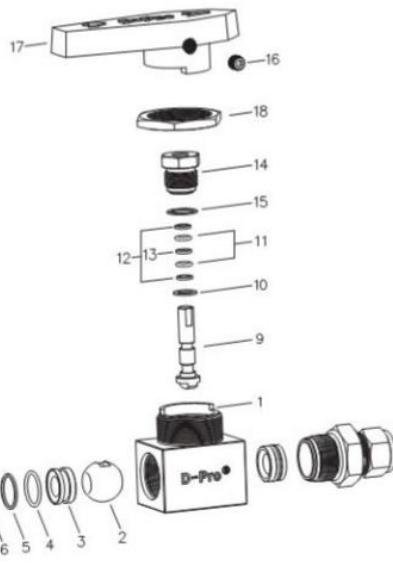
CNG/NGV Certifications

Certificates	ECE R110	ANSI/CSA NGV3.1:20	ANSI/CSA NGV 4.6:20	ISO 15500 - 4:2020
Certificate No. Classification Temperature Pressure	E24 110R05/00*0083*00 Class 6 -40 to +120°C (-40 to 150°F) W.P 274 bar @ 120 °C	72160895-NGV 3.1 manual valve -40 to +120°C (-40 to 250 °F) S.P 273 bar @ 21 °C	72160895-NGV 4.6 manual valve (Class B) -40 to +65°C (-40 to 150 °F) S.P 293 bar @ 21 °C	72160895-ISO 15500-4 manual valve -40 to +120 °C (-40 to 250 °F) W.P 274 bar @ 120 °C

Materials of Construction

Component		Grade / ASTM specification
1	Body	SS316/A276, A479
2	Ball	SS316/A276, A479
3	Seat(2)	PEEK
4	Seat O-ring (2)	HNBR
5	Seat Backup Ring (2)	PTFE /D1710
6	Disc Spring (2)	SS316/A240
7	Connector O-ring (2)	HNBR
8	End Connector (2)	SS316/A276, A479
9	Stem	SS316/A276, A479
10	Stem Seat Bearing	PEEK
11	Stem O-ring (2)	HNBR/D2000
12	Stem Guide Ring	PTFE /D1710
13	Stem Backup Ring (2)	PEEK
14	Packing Bolt	SS316/A276, A479
15	Packing Bolt Gasket	SS316/A240 Silver-plated
16	Set Screw	SS316 Stainless steel
17	Handle	Nylon with brass insert
18	Panel Nut	SS316
19 20,21	Dk-Lok Nut and Ferrule set (2)	SS316 Stainless steel

• Wetted components are listed in BLUE.



E

Its have a maximum allowable leak rate of 0.1 std cm³/min.

The stem packing is tested with nitrogen @ 1000 psig (68 bar) for no detectable leakage.

Cleaning and Packaging

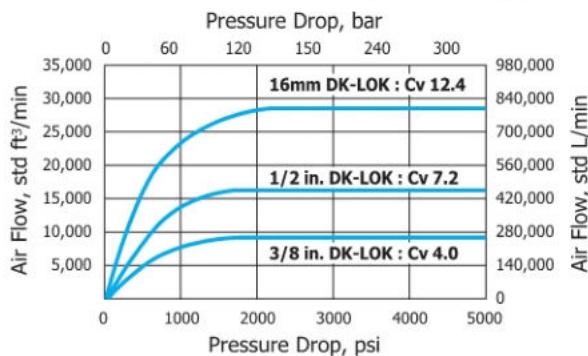
Valves are cleaned and packaged in accordance with DK-LOK cleaning standard DC-01. Special cleaning and packaging in accordance with DK-LOK DC-11 ensures compliance with product cleaning of ASTM G93 Level C is available on request.

Operation

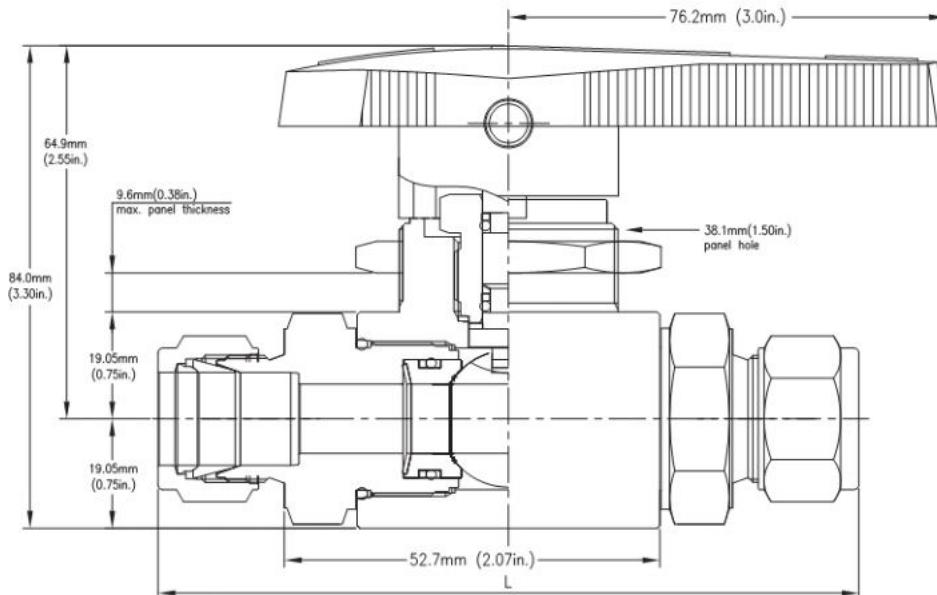
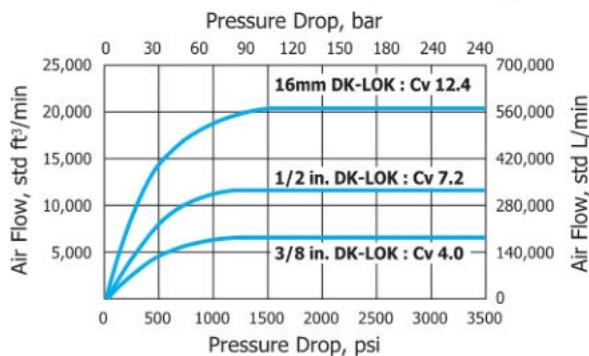
- VCH86 ball valves are designed for fully open and close operation.
- Valves that have not been actuated for a period of time may have a higher initial actuation torque.

Flow Data @ 21°C (70°F)

Air Pressure 350 bar (5000 psig)



Air Pressure 250 bar (3600 psig)



Ordering information and Table of Dimensions

Ordering Number	End Connections	Orifice		Cv	Dimensions L
		mm	in.		
VCH86-	D-6T-S	3/8 in. DK-LOK	7.1	4.0	116 mm (4.57 in.)
	D-8T-S	1/2 in. DK-LOK	10.3	7.2	122 mm (4.8 in.)
	D-12T-S	3/4 in. DK-LOK	12.0	7.1	130 mm (5.10 in.)
	D-16T-S	1 in. DK-LOK (1)	12.0	6.5	116 mm (4.57 in.)
	D-10M-S	10 mm DK-LOK	7.1	4.0	112 mm (4.40 in.)
	D-12M-S	12 mm DK-LOK	10.3	5.2	122 mm (4.80 in.)
	D-16M-S	16 mm DK-LOK	12.0	12.4	102 mm (4.00 in.)
	F-6N-S	3/8 in. Female pipe	12.0	11.0	
	F-8N-S	1/2 in. Female NPT	12.0	13.8	
	F-8R-S	1/2 in. Female PT	12.0	13.8	
	F-12N-S	3/4 in. Female NPT (1)	12.0	7.8	

All dimensions shown are for reference only and are subject to change. Dimensions with DK-LOK nuts are in finger-tight position.

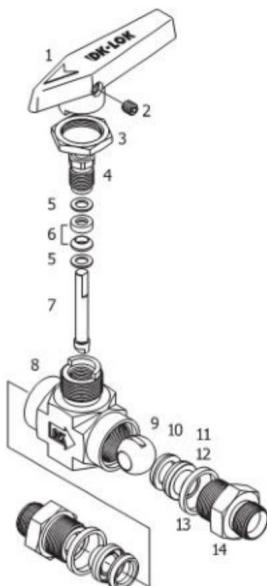
(1) Not recommended for panel mounting.

Safe Valve Selection

The selection of a valve for any application or system design must be considered to ensure safe performance. Valve function, valve rating, material compatibility, proper installation, operation and maintenance remain the sole responsibility of the system designer and the user. DK Tech accepts no liability for any improper selection, installation, operation or maintenance.

Features

- High flow in a compact design.
- High pressure capacity designed for blow-out proof with internally loaded ball stem.
- Micro-finished ball provides a positive seal.
- 90 degree actuation for 2-way and 180 degree actuation for 3-way ball valves.
- Panel mounting as standard.
- Chevron stem seal, adjustable with the handle disassembled.
- Handle indicates flow direction.
- Low operating torques and positive handle stops.
- Optional pneumatic actuation.



Material of Construction

Components	Valve Body Material Stainless Steel Grade/ASTM Specification
1. Handle	Nylon with brass insert
2. Set Screw	Stainless steel
3. Panel Nut	
4. Packing bolt*	SS316/A276
5. Upper / Lower Gland	
6. Stem Chevron Packing	PTFE/D1710 type 1, Grade 1, Class B
7. Stem	SS316/A276
8. Body	SS316/A182Type F316
9. Ball	SS316/A276
10. Seat (2)	Standard PCTFE (Kel-F), optional PTFE, PEEK
11. Retainer (2)	SS316/A276
12. Retainer Seal (2)	
13. End Connector Seal (2)	PTFE/D1710 type 1, Grade 1, Class B
14. End Connector (2)	SS316/A276

* Molybdenum disulfide with hydrocarbon coating

• Wetted parts and lubricants are listed in blue.

• Lubricant is Fluorinated-based.

Operation and Packing Adjustment

- VH86 valves are designed to control fluid in full open and closed position, using VH86 valves to throttle the flow may reduce the valve life.
- Stem packing can be adjustable with the handle disassembled. Tighten packing bolt clockwise to tighten the stem packing.
- Valves that have not been actuated for a period of time may have a higher initial actuation torque.
- If the valve system needs to be tested at higher pressure than the valve maximum pressure, the valve must be in open position during the test so as not to damage the valve seat.
- Optional Sour Gas Service applicable.

Application

VH86 series ball valve offers a safe and reliable performance in a wide range of onshore and offshore applications: Water, oil, gas, petrochemical in heavy duty applications.

Factory Test, Cleaning and Packaging

- Every valve is factory tested with nitrogen gas at 1,000 psig (68.9 bar) for leakage at seat to a maximum allowable leak rate of 0.1 SCCM. The packing is tested with nitrogen gas for no detectable leakage.
- Every valve is cleaned and packaged in accordance with DK cleaning standard DC-01.

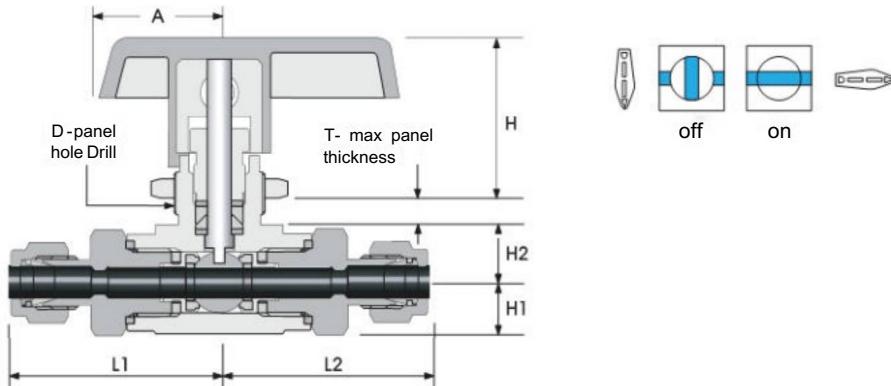
Pressure - Temperature Rating for CNG Service

Valve Series	Certificates	ECE R110	ANSI/CSA NGV3.1:20	ANSI/CSA NGV4.6:20	ISO 15500-4:2020
VH86 Series 2-way ball valves	Certificate No.	E24 110R05/00*0083*00	72160895 - NGV 3.1	72160895-NGV 4.6	72160895-ISO 15500-4
	Classification	Class 6	manual valve	manual valve (Class B)	manual valve
	Temperature	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)	-40 to +65 °C (-40 to 150 °F)	-40 to +120 °C (-40 to 250 °F)
	Pressure	W.P 274 bar @ 120 °C	S.P 273 bar @ 21 °C	S.P 273 bar @ 21 °C	S.P 273 bar @ 21 °C

E24*110R05/00*0083*00

Bi-directional 2-way Ball Valves

In-line pattern



Technical Data

Valve Series	Sealing Materials			Pressure Rating @ -27 to 37 °C (-20 to 100 °F)	Temperature Rating
	Seat	Stem Packing	Retainer / End Seal		
VH & 86 A , VH 86 B, and VH86C series	PCTFE	PTFE	PTFE	6,000 psig(413bar)	-30 to 180 °C (-22 to 356 °F)
	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230 °C (-65 to 446 °F)
	PTFE	PTFE	PTFE	L500psig(103 bar)	-30 to 176 °C (22 to 349 °F)

* PCTFE is standard seat material.

Ordering Information and Dimensions

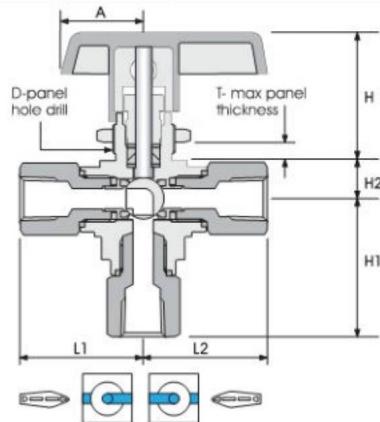
Basic Ordering Number	End Connections		Orifice		Dimensions mm (in.)	A	D	T
	Inlet	Outlet	mm	inch				
VH86A-	D-1T-	1/16" DK-Lok	1.3	0.052	0.06	33.0(130)	9.5 (0.37)	8.5 (0.33)
	D-2T-	1/8" DK-Lok	2.4	0.0945	0.21	34.5(136)	34.5(136)	34.5(136)
	F-2N-	1/8" Female NPT	4.2	0.165	0.43	27.2(1.07)	27.2(1.07)	27.2(1.07)
	M-2N-	1/8" Male NPT	4.2	0.165	0.43	30.0(1.18)	30.0(1.18)	30.0(1.18)
	D-4T-	1/4" DK-Lok	4.2	0.165	0.43	37.6(1.48)	37.6(1.48)	37.6(1.48)
	M-4N-	1/4" Male NPT	4.2	0.165	0.43	343(135)	34.3(135)	34.3(135)
	D-3M-	3mm DK-Lok	2.2	0.086	0.18	34.8(137)	34.8(1.37)	34.8(1.37)
VH86B-	D-2T-	1/8" DK-Lok	2.4	0.0945	0.26	41.9(1.65)	41.9(1.65)	44.2(1.74)
	D-4T-	1/4" DK-Lok						
	MD-4N4T-	1/4" Male NPT	4.7	0.185	1.04	442(1.74)	41.1(1.62)	
	FD-4F4T-	1/4" Female NPT					38.4(1.51)	
	F-4N-	1/4" Female NPT				38.4(1.51)	38.4(1.51)	
	M-4N-	1/4" Male NPT				41.1(1.62)		
	MF-4N-	1/4" Male NPT				38.4(151)	41.1(1.62)	10.7 (0.42)
VH86C-	MD-4N6T-	1/4" Male NPT	6.4	0.252	234	45.7(1.8)	38.4(1.51)	11.9 (0.47)
	FD-4N6T-	1/4" Female NPT				45.7(1.8)	45.7(1.8)	38.9 (1.53)
	D-6T-	3/8" DK-Lok						25.4 (100)
	M-6N-	3/8" Male NPT						19.6 (0.77)
	D-6M-	6 mm DK-Lok	4.7	0.185	1.04		82.2(3.24)	6.4 (0.25)
	D-8M-	8 mm DK-Lok	6.4	0.252	234		89.0(3.5) 90.4(1.56)	
	D-10M-	10mm DK-Lok					92.0(3.62)	
VH86C-	F-6N-	3/8" Female NPT					99.0(3.90)	
	F-8N-	1/2" Female NPT					109.2(X4.3)	
	D-8T-	1/2" DK-Lok	10.3	0.406	6.42		118.8(4.68)	175 (0.69)
	M-8N-	1/2" Male NPT					112.8(4.44)	17.8 (0.70)
	D-12T-	3/4" DK-Lok					118.4(4.66)	44.2 (1.74)
	D-12M-	12 mm DK-Lok	9.5	0.375	5.57		116.68(4.59)	38.1 (.5)
	D-16M-	16mm DK-Lok	10.3	0.406	6.42		118.4(4.66)	22.9 (0.90)

All dimensions shown are for reference only and are subject to change. Dimensions with DK-Lok nuts are in finger-tight position.

DK"LOK Ball Valves

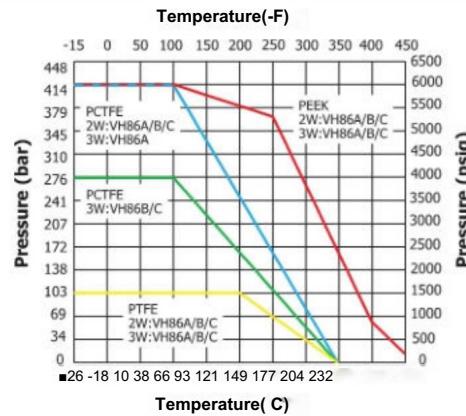
VH86 Series Multi Purpose Ball Valves

3-way Diverter Ball Valves



VH86 3-way Ball Valve is designed to switch media through the bottom port and direct it to out of two outlet ports.

Pressure-Temperature Curve



Technical Data

Valve Series	Sealing Materials			Pressure Rating @ -27 to 37 °C (-20 to 100 °F)	Temperature Rating °C (°F)	
	Seat	Stem Packing	Retainer / End Seal			
VH86A-3B	PCTFE	PTFE	PTFE	6,000 psig (413 bar)	-30 to 180 °C (-22 to 356 °F)	
	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230 °C (-65 to 446 °F)	
	PTFE	PTFE	PTFE	1,500 psig (103 bar)	-30 to 176 °C (-22 to 349 °F)	
VH86B-3B VH86C-3B	PCTFE	PTFE	PTFE	4,000 psig (276 bar)	-50 to 180 °C (-58 to 356 °F)	
	PEEK	PTFE	PTFE	6,000 psig (413 bar)	-54 to 230 °C (-65 to 446 °F)	
	PTFE	PTFE	PTFE	1,500 psig (103 bar)	-30 to 176 °C (-22 to 349 °F)	

Ordering Information and Dimensions

Basic Ordering Number	End Connections	Orifice		Cv	Dimensions mm (in.)					
		mm	Inch		L1	L2	H1	H2	A	D
VH86A-3B-	D-1T-	1/16" DK-Lok	1.3	0.052	0.06	33.0(130)	33.0 <1.3	35.3(1.39)	8.4 (0.33)	24.8 (0.98)
	D-2T-	1/8" DK-Lok	2.4	0.093	0.21	34.5(136)	34.5 (136)	36.8(1.45)		
	F-2N-	1/8" Female NPT	4.2	0.165	0.63	27.2(1.07)	27.2(1.07)	29.2(1.15)		
	M-2N-	1/8" Male NPT	4.2	0.165	0.59	30.0(1.18)	30.0(1.18)	32.0(1.26)		
	D-4T-	1/4" DK-Lok	4.2	0.165	0.63	37.6(1.48)	37.6(1.48)	39.6(1.56)		
	M-4N-	1/4" Male NPT	4.2	0.165	0.59	34.3(135)	34.3(1.35)	36.3(1.43)		
VH86B-3B-	D-2T-	1/8" DK-Lok	2.4	0.093	0.21	41.9(1.65)	41.9(1.65)	45.5(1.79)	11.9 (0.47)	38.9 (1.53)
	D-4T-	1/4" DK-Lok	4.7	0.187	0.70	44.2(1.74)	44.2(1.74)	47.8(1.88)		
	F-4N-	1/4" Female NPT	5.0	0.196	0.87	38.4(1.51)	38.4(1.51)	41.9(1.65)		
	DDM-T4N-*	1/4" DK-Lok 1/4" Male NPT	4.7	0.187	0.70	44.2(1.74)	44.2(1.74)	47.8(1.88)		
	M4N-	1/4" Male NPT				41.1 (1.62)	41.1 (1.62)	44.7(1.76)		
	D-6T-	3/8" DK-Lok	5.0	0.196	0.87	45.7(1.8)	45.7(1.8)	49.3(1.94)		
VH86C-3B-	M-6N-	3/8" Male NPT				41.1(1.62)	41.1 (1.62)	44.7(1.76)	11.9 (0.47)	25.4 (1.00)
	D-6M-	6 mm DK-Lok	4.7	0.187	0.70	44.5(1.75)	44.5(1.75)	47.8(1.88)		
	D-8M-	8 mm DK-Lok	5.0	0.196	0.87	45.2(1.78)	45.2 p.78	48.5 1.9		
	D-10M-	10 mm DK-Lok				46.0(1.81)	46.0(1.81)	49.5(1.95)		
	F-6N-	3/8" Female NPT				49.5(1.95)	49.5 (1.95)	58.2 (2.29)		
	F-8N-	1/2" Female NPT				54.6(2.15)	54.6 (2.15)	63.2 (2.49)		
VH86C-3B-	D-8T-	1/2" DK-Lok						68.1 (2.68)	12.8 (0.70)	44.2 (1.74)
	DDF-8T8F-*	1/2" DK-Lok, 1/2" Female NPT	10.3	0.406	3.62	59.4(234)	59.4 (234)	63.2(2.49)		
	M-8N-	1/2" Male NPT				56.4(222)	56.4 (2.22)	65.8 (2.59)		
	D-12T-	3/4" DK-Lok						68.1 (2.68)		
	D-12M-	12 mm DK-Lok	9.5	0.375	3.46	58.9(2.32)	58.9 (2.32)	67.8(2.67)		
	D-16M-	16 mm DK-Lok	103	0.406	3.62	59.2(234)	59.2 (2.34)	65.5 (2.58)		

- All dimensions shown are for reference only and are subject to change.
- Dimensions with DK-Lok nuts are in finger-tight position.

- ' VH86 3-way ball valves are described by first the outlet ports 1 and 2 and next the bottom inlet port 3.

DK_LOK Ball Valves

VH86 Series Multi Purpose Ball Valves

P series Rack and Pinion Pneumatic Actuator

A Type



Model shown: VH86B/C series
 A dimension
 VH86B:25.00
 VH86C:22.50
 B dimension(Unit mm)
 VH86B:62.00
 VH86C:90.90

B Type



Model shown : VH86B series
 2-PF1/8"

Table I. Actuator Material of Construction

Parts	Standard AAaterial
Body	Extruded Aluminum Alloy with external & internal corrosion protection.
Piston (Rack)	Die Cast Aluminum Alloy Anodized.
Drive Shaft (Pinion)	Steel Alloy Nickel Plated.
Spring	Spring Alloy Steel Nickel Plated. (min. 5, max. 12 spring)
End Cap	Die Cast Aluminum Alloy Polyester Coated.
O-Ring	NBR is standard. Optional FKM and Silicon.

- Body: Stainless Steel structure
 Standard - Stainless Steel 304L
 Option - Stainless Steel 316L

Technical Information

Actuator operating temperature (X)

- Standard: NBR O-Ring - 20 to 80.
- Low Temperature: Silicon O-Ring -40 to 80 (Designator: LT).
- High Temperature: FKM O-Ring -15 to 150 (Designator: HT).
- Air-pressure: Min. 2.5 bar, Max. 8 bar.
- Air supply end connection: Female G 1 / 8 inch (ISO 228-1).
- Position indicator is standard.

Actuator operating temperature (°C)

- 10 to 60
- For TWISTMax actuators wider temperature range please refer to DK-LOK representative
- Air-pressure: Min. 4 bar, Max. 8 bar.
- Air supply end connection: Female G 1 / 8 inch (ISO 228-1).
- Position indicator is optional.

Table 2. Single Return 90 Deg. Actuator

Actuator Type	Valve series	Ordering Number		Dimensions LxHxW unit: mm	Weight Kg	Moment Values P=6 bar Nm	Air Consumption Liter	Mounting Bracket Ordering Number	Actuator Operating Temperature Options
		Normal Close	Normal Open						
A Type	VH86A	PCS1	P0S1	118x86x62	0.9	3.5	01	VH86A-SMB	Nil: Standard Temp. LT: Low Temp. HT: High Temp.
	VH86B		PD1					VH86B-SMB	
	VH86C	PCS2	P0S2			5.0		VH86C-SMB	
BType	VH86A/B/C	TCS1	T0S1	041x104	0.5	7.5	0.04	VH86A/B/C-TMB	-

Mount bracket: Field assembly kit includes mount bracket, valve to actuator, bracket bolts and assembly manual.

Table 3. Double Return 90 Deg. Actuator

Actuator Type	Valve series	Ordering Number	LxHxW unit: mm	Weight Unit: Kg	Moment Values P=6 bar Nm		Air Consumption Liter	Mounting Bracket Ordering Number	Actuator Operating Temperature Options
					P=6 bar Nm	Air Consumption Liter			
A Type	VH86A	PD1	118x86x62	0.75	14.4	0.1	VH86A-DMB	Nil: Standard Temp. LT: Low Temp. HT: High Temp.	
	VH86B								
	VH86C								
BType	VH86A/B/C	TD1	041x104	0.4	203	0.1	VH86A/B/C-TMB	-	

How to Order

Select applicable valve pattern, seat options, pneumatic actuator, and the actuator temperature option from designator listed below.

VH86B-D-6T- -PK				-PCS1			-HT		-S
VH86C-D-12T		-SG							-S
Seat Material	Sour Gas	Factory Assembled Actuator		Actuator Temperature Options	Valve Body Material				
NikPCTFE PK:PEEK PE:PTFE	SG: Sour Gas	For single return, see Table 2. For double return, see Table 3.		Nil: Standard Temp. U: Low Temp. HT: High Temp.	S:S316				

Safe Valve Selection

The selection of a valve for any application or system design must be considered to ensure safe performance. Valve function, valve rating, material compatibility, proper installation, operation and maintenance remain the sole responsibility of the system designer and the user. DK-Lok accepts no liability for any improper selection, installation, operation or maintenance.

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VT86 Series Trunnion Ball Valves

No.VT86-4
Mar. 2023

~~VT86 Series Pressure Rating up to 413bar (6,000 psig) VT86 is not in the approval scope~~

~~VTH86 Series pressure Rating up to 689bar (10,000 psig) VTH86 is not in the approval scope~~

VCT86 Series CNG/NGV Valves



Features

- The Trunnion ball valve is featured by blowout-proof design with cylindrical extensions at the top and bottom of the ball.
- The trunnion prevents the ball from shifting and permits the ball to rotate on a vertical axis.
- Integral ball stem machined from single piece of bar stock eliminates the backlash during handle actuation.
- Panel mounting nut is standard permitting valve to panel or actuator.

Technical Data

Valve Series	Seat Material	Temperature Rating °C (°F)	Pressure Rating at 37 °C (100°F)
VT86	PCTFE	-17 to 121 (0 to 250)	413bar (6,000psig)
	PEEK	-17 to 232 (0 to 450)	413bar (6,000psig)
	PTFE	-17 to 232 (0 to 450)	103bar (1,500psig)
VTH86	PEEK	-17 to 232 (0 to 450)	413 to 689bar (6,000 to 10,000psig)

Operation

- Valves that have not been actuated for a period of time may have a higher initial actuation torque.
- VT86 Series ball valves are designed to control fluid in full open and full closed position.

Factory Test

Every valve is factory tested with nitrogen gas at 68.9bar (1,000psig) for leakage to a maximum allowable leak rate of 0.1 SCCM at seat. Hydraulic shell test is optionally performed at 1.5 times the working pressure to a requirement of no detectable leakage with a liquid leak detector.

Cleaning and Packaging

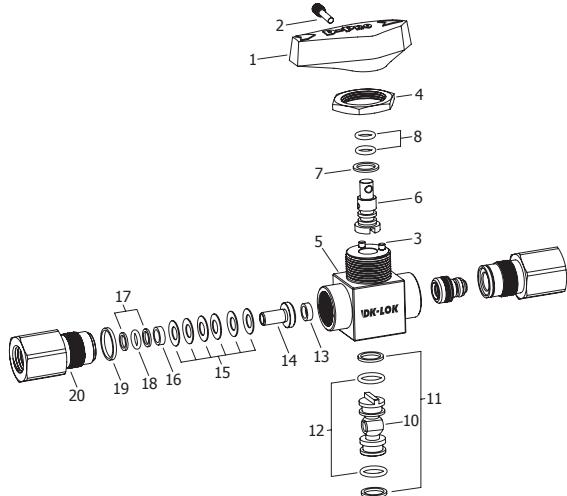
Every valve is cleaned and packaged in accordance with DK-Lok cleaning standard DC-01. Special cleaning and packaging in accordance with DK-Lok standard DC-11 ensures compliance with product cleaning of ASTM G93 Level C is available on request for valves with PCTFE and PTFE seats.

CNG/NGV Certifications

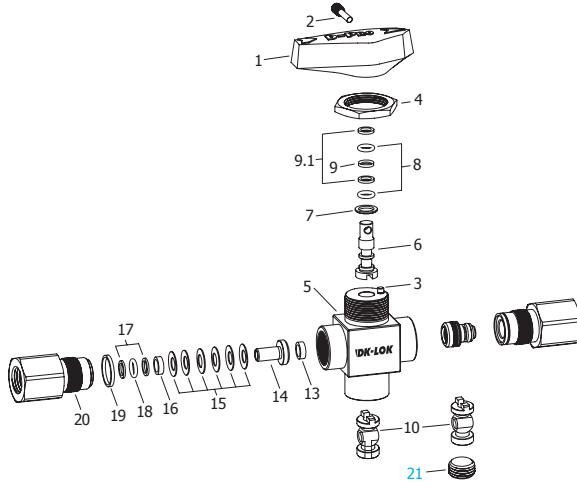
VCT86 and VCT863 Series valve provides leak-tight integrity in both low and high pressure systems in CNG and NGV applications. Valve with PAI, PEEK, PTFE and HNBR O-ring are compatible with CNG fluid

Valve Series	Certificates	ECE R110	ANSI / CSA NGV 3.1:20	ANSI /CSA NGV 4.6:20	ISO 15500 - 4:2020
VCT86 Series 2-way ball valves	Certificate No.	E24 110R05/00*0083*00	72160895-NGV 3.1	72160895-NGV 4.6	72160895-ISO 15500-4
	Classification	Class 6	manual valve	manual valve (Class B)	manual valve
	Temperature	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)	-40 to +65 °C (-40 to 150 °F)	-40 to +120 °C (-40 to 250 °F)
	Pressure	W.P 274 bar @ 120 °C	S.P 273 bar @ 21 °C	S.P 293 bar @ 21 °C	W.P 273 bar @ 120 °C
VCT863 Series 3-way ball valves	Certificate No.	E24*110R05/00*0083	72160895-NGV 3.1	72160895-NGV 4.6	72160895 - ISO 15500-4
	Classification	Class 6	manual valve	manual valve (Class B)	manual valve
	Temperature	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)	-40 to +65 °C (-40 to 150 °F)	-40 to +120 °C (-40 to 250 °F)
	Pressure	W.P 274 bar @ 120 °C	S.P 273 bar @ 21 °C	S.P 293 bar @ 21 °C	W.P 274 bar @ 120 °C

VT86 / VCT86 Series For 2-Way



VT86 / VCT86 Series For 3-Way & VTH86 Series For 2-Way, 3-Way



VTH86 Series For 2-Way



3-Way valve with an arrow marking on the top of 6. stem.

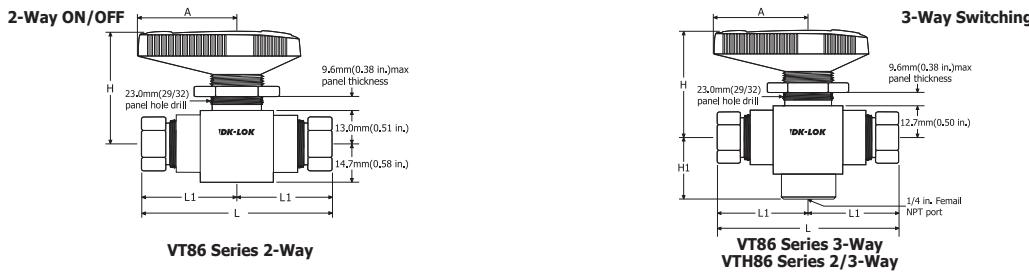
The arrow marking helps set a direction of the valve handle after the handle is removed from its mounting panel.

Materials of Construction

Component	VT86/VCT86 Series		VTH86 Series	
	2-Way	3-Way	2-Way	3-Way
	Grade/ASTM Specification			
1. Handle		Nylon with brass insert		
2. Set screw		SS316/A276		
3. Stop pin (2-Way - 2, 3-Way - 1)		SS316		
4. Panel nut		SS316/A479 or A276		
5. Body		SS316/A479 or A276		
6. Stem		SS316/A479 or A276		
7. Stem bearing		PEEK		
8. Stem O-rings (2)	FKM O-ring (HNBR for VCT86/VCT863 Series)		FKM O-ring	
9. Stem support ring	-		PEEK	
9.1. Stem backup rings (2)	-		PTFE/D1710, type 1	
10. Trunnion ball			SS316/A479 or A276	
11. Trunnion ball back-up rings (2)	Reinforced PTFE		-	
12. Trunnion ball O-rings (2)	FKM O-ring (HNBR for VCT86 Series)		-	
13. Seats (2)	PCTFE, optional PTFE, PEEK (PAI for VCT86/VCT863 Series)			PEEK
14. Seat carriers (2)		SS316/A479 or A276		
15. Seat springs (12)		Alloy X-750/AMS 5542		
16. Seat carrier guides (2)		SS316/A479 or A276		
17. Seat carrier back-up rings (4)		Reinforced PTFE		
18. Seat carrier O-rings (2)	FKM O-ring (HNBR for VCT86/VCT863 Series)		FKM O-ring	
19. End connector seals (2)		PTFE/D1710,type 1		
20. End connectors (2)		SS316/A479 or A276		
21. Plug	-	SS316/A479 or A276	-	

- Wetted components and lubricants are listed in **BLUE**.

- Lubricants** : Molybdenum disulfide and fluorinated based.



Ordering Information and Dimensions

VT86 Series Basic Ordering Number	Cv	Orifice mm (in.)	VTH86 Series Basic Ordering Number	Cv	Orifice mm (in.)	End Connection	Dimensions, mm (in.)			
							L	L1	H	A
VT86-VCT86-	2-Way	4.75 (0.187)	VTH86-	4.75 (0.187)	1/8 in. Female NPT	76.2(3) 3.81(1.5)	46.7 (1.83) 38.0 (1.50)			
	F2N-	1.2								
	F4N-	1								
	-	-								
	F8N-	1.2								
	D4T-	1.6								
	D6T-	1.4								
	D8T-	1								
	D6M-	1.6								
	D8M-	1.5								
	D10M-	1.3								
	D12M-	1								
VT863-VCT863-	3-Way	0.75 (0.187)	VTH863-	0.75 (0.187)	1/8 in. Female NPT	76.2(3) 3.81(1.5)	46.7 (1.83) 38.0 (1.50)			
	F2N-	-								
	F4N-	-								
	-	-								
	D4T-	-								
	D6T-	-								
	D8T-	-								
	D6M-	-								
	D8M-	-								
	D10M-	-								
	D12M-	-								

All dimensions shown are for reference only and are subject to change. Dimension with DK-Lok nuts are in finger-tight position.

* CNG/NGV valve ordering number : Basic ordering numbers listed in blue are for CNG/NGV valves as well.

Flow Rate

VT86 series Flow Data @ 21 °C (70 °F)

Flow Rate	Pressure Drop to Atmosphere (ΔP) in bar (psig)	3-Way		2-Way					
		Cv 0.75	Cv 1	Cv 1.2	Cv 1.3	Cv 1.4	Cv 1.5	Cv 1.6	
Water L/min (U.S.GPM)	0.68 (10)	9.0(2.4)	12.1 (3.2)	14.3 (3.8)	15.5 (4.1)	17.8 (4.4)	17.8 (4.7)	19.3 (5.1)	
	3.4 (50)	20.0 (5.3)	26.8 (7.1)	32.1 (8.5)	34.8 (9.2)	37.4 (9.9)	40.1 (10.6)	42.7 (11.3)	
	6.8 (100)	28.3 (7.5)	37.8 (10.0)	45.4 (12.0)	49.2 (13.0)	53.0 (14.0)	56.7 (15.0)	60.5 (16.0)	
Air std L/min (SCFM)	0.68 (10)	226 (8.0)	311 (11.0)	396 (14.0)	424 (15.0)	453 (16.0)	481 (17.0)	509 (18.0)	
	3.4 (50)	651 (23.0)	849 (30.0)	1019 (36.0)	1104 (39.0)	1189 (42.0)	1274 (45.0)	1359 (48.0)	
	6.8 (100)	1132 (40.0)	1500 (53.0)	1812 (64.0)	1953 (69.0)	2095 (74.0)	2265 (80.0)	2406 (85.0)	

VTH86 series Flow Data @ 21 °C (70°F)

Flow Rate	Pressure Drop to Atmosphere (ΔP) in bar (psig)	3-Way		2-Way					
		Cv 0.75	Cv 1	Cv 1.2	Cv 1.3	Cv 1.4	Cv 1.5	Cv 1.6	
Water L/min (U.S.GPM)	10.3 (150)	34.8 (9.2)	45.4 (12)	56.7 (15)	60.5 (16)	64.3 (17)	68.1 (18)	74.1 (19.6)	
	41.3 (600)	69.1 (18)	94 (25)	109 (29)	121 (32)	128 (34)	140 (37)	147 (39)	
	68.9 (1000)	90.8 (24)	143 (38)	143 (38)	155 (41)	166 (44)	178 (47)	189 (50)	
Air std L/min (SCFM)	10.3 (150)	1614 (57)	2152 (76)	2805 (92)	2803 (99)	3029 (107)	3256 (115)	3454 (122)	
	41.3 (600)	5946 (210)	8070 (285)	9627 (340)	10 505 (371)	11 298 (399)	12 119 (428)	12 912 (456)	
	68.9 (1000)	9912 (350)	13 308 (470)	16 140 (570)	17 272 (610)	18 688 (660)	19 821 (700)	21 321 (750)	

VT86 Series Pressure-Temperature Ratings

Body material		316 Stainless steel					
Seat material		PCTFE		PTFE		PEEK	
Temperature		bar	psig	bar	psig	bar	psig
°C	°F	Working Pressure					
-17 to 37	0 to 100	413	6000	103	1500	413	6000
65	150	206	3000	77.5	1125	399	5800
93	200	137	2000	51.6	750	344	5000
121	250	69	1000	43	625	282	4100
148	300	-	-	34.4	500	220	3200
176	350	-	-	25.8	375	158	2300
204	400	-	-	17.2	250	96.4	1400
232	450	-	-	8.6	125	34.4	500

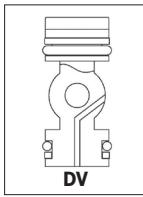
VTH86 Series Pressure-Temperature Ratings

Body material		316 Stainless steel							
End Connection	DK-Lok	6M, 1/4 in.		8M, 3/8 in.		12M, 1/2 in.		10M	
Female NPT	1/8, 1/4 in.	-	-	-	-	-	-	-	-
Seat Material		PEEK							
Temperature		Working Pressure							
°C	°F	bar	psig	bar	psig	bar	psig	bar	psig
-17 to 37	0 to 100	689	10000	516	7500	454	6600	413	6000
65	150	516	7500	516	7500	454	6600	406	5900
93	200	344	5000	344	5000	344	5000	344	5000
121	250	282	4100	282	4100	282	4100	282	4100
148	300	220	3200	220	3200	220	3200	220	3200
176	350	158	2300	158	2300	158	2300	158	2300
204	400	96.4	1400	96.4	1400	96.4	1400	96.4	1400
232	450	34.4	500	34.4	500	34.4	500	34.4	500

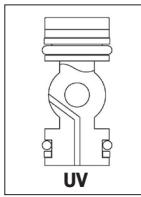
Options

VT86 Series 2-Way Valve External Vent Options

A downstream or upstream vent option on VT86 Series 2-Way ball valve is available. The vent port is constructed on trunnion ball. The vent port activates when the valve is in closed position. This option reduces the valve pressure rating to 34.4bar (500 psig).

Downstream Vent
Ordering designator - DV

When a downstream vent valve in closed position, shutoff at the upstream seat occurs. Downstream system media flows into the vent hole and vents out to atmosphere through the valve bottom.

Upstream Vent
Ordering designator - UV

When a upstream vent valve in closed position, shutoff at the downstream seat occurs. Upstream system media flows into the vent hole and vents out to atmosphere through the valve bottom.

Service Kit

For field assembly, service kit with a maintenance instruction is available. Service kit contains wetted parts including trunnion ball, stem assembly and seat carrier assembly.

To order the service kit, prefix SK- to the valve series. i.e., SK-VCT863, SK-VTH863.



How to Order

Select applicable valve basic ordering number, options and body material designator listed below.

VT86-D4T
VTH86-D12M
VCT86-F4N

-PK

-DV

-S

-S

-S

Seat Materials
Nil : Standard PCTFE for VT86 Series
Nil : Standard PEEK for VTH86 Series
Nil : Standard PAI for VCT86 Series

O-ring Materials
Nil : Standard FKM for VT86 and VTH86 Series
Nil : Standard HNBR for VCT86 Series

External Vent Options

DV : Downstream Vent
UV : Upstream Vent

Note :
Optional O-rings applicable to;
8. Stem O-rings
12. Trunnion ball O-rings
18. Seat carrier O-rings

Body Material

S : Stainless steel 316

Safe Valve Selection

The selection of a valve for any application or system design must be considered to ensure safe performance.

Valve function, valve rating, material compatibility, proper installation, operation and maintenance remain the sole responsibility of the system designer and the user. DK-Lok accepts no liability for any improper selection, installation, operation or maintenance.



DK-LOK Corporation

Mailing Address

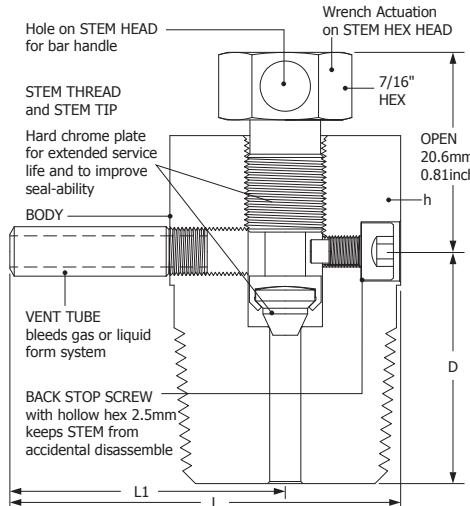
7, Golden root-ro 129beon-gil, Juchon-myeon,
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Design and Applications



DK-Lok VBV Series Bleed Valves are designed to vent the signal line pressure to atmosphere before an instrument is removed and to assist in calibration of control devices.

These are for use on instrumentation devices such as gauge root valves and multi-valve manifolds. Optional barbed vent tube enables containment of fluid vented. The VBV Series are also ideal in bleeding hydraulic systems.

Installation and Operation

Position the vent tube so that system fluid is not directed to personnel operating. Slowly open the valve. This valve has no stem seal packing; small amounts of fluid will go through the stem thread when they are opened. Therefore suitable measures should be taken to protect personnel operating.

Materials of Construction

Components	VALVE BODY MATERIALS	
	SS316 Stainless	Carbon Steel
GRADE / ASTM and JIS SPECIFICATION		
Stem	SS316 / A 276	
Stem Tip	S630 / A564	
Body*	SS316 / A 276	S20C-S45C / G4051
Back Stop Screw	SS316 / A 276	
Vent Tube	SS316 / A 269	

* Carbon Steel bodies are white galvanized for corrosion resistance.

Technical Data

Material	Temperature Rating	Pressure Rating
SS316	-65°F to 850°F (-54°C to 454°C)	10,000 psi (689 bar) @ 100°F (38°C)
	-20°F to 450°F (-29°C to 232°C)	

Basic Ordering No.	End Connection		Orifice in.(mm)	Cv	Dimensions in. (mm)			
	Inlet	Outlet			L	L1	D	h Hex
VBV-M-2N-	1/8" Male NPT				1.34 (34.03)	0.94 (23.87)	0.75 (19.05)	5/8 (15.87)
VBV-M-4N-	1/4" Male NPT	O.D. 3/16"	0.125 (3.2)		1.47 (37.33)	1.03 (26.16)	0.75 (19.05)	7/8 (22.22)
VBV-M-6N-	3/8" Male NPT	Tube Stub						
VBV-M-8N-	1/2" Male NPT							

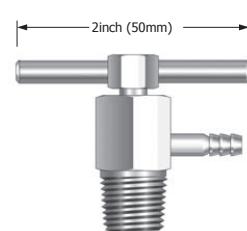
All dimensions shown are for reference only and are subject to change.

CNG Certifications

Certificates	ECE R110	ANSI / CSA NGV 3.1:20	ISO 15500-4:2020
Certificate No	E24 110R05/00*0083*00	72160895-NGV 3.1	72160895-ISO 15500-4
Classification	Class 6	CNG - VBV	CNG-VBV
Temperature	-40°C to +120°C (-40°F to 250°F)	-40°C to +120°C (-40°F to 250°F)	-40°C to +120°C (-40°F to 250°F)
Pressure	W.P 274 bar @ 120°C	S.P 273 bar @ 21°C	W.P 274 bar @ 120°C

How to Order

To order, add the valve body material as a suffix to the basic ordering number. S: Stainless, C: Steel. Example: VBV-M-2N-S



Options

- Bar handle : Optional bar handle allows wrench-less actuation
 - Bar handle ordering number : BH
 - Barbed Vent Tube : Optional barbed vent tube enables containment of fluid vented.
 - 3/16" OD barbed vent tube ordering number : HT
- To order, use the option ordering number as a suffix to the valve basic ordering number.
Examples: VBV-M-2N-BH-S, VBV-M-2N-HT-S.

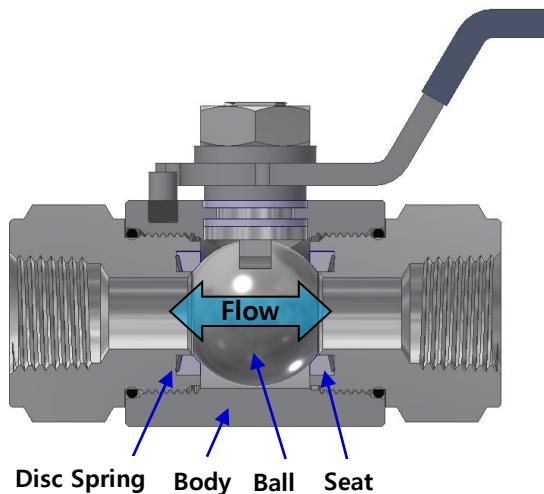
Factory Test

Every valve is tested with the nitrogen @ 68 bar (1,000 psi) for leakage at the seat to a maximum allowable leak rate of 0.1 scc/min.

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Annex 5 – DK-Lok Manual Valve service instructions

V86, VC86 Series Ball Valve, Service Instructions

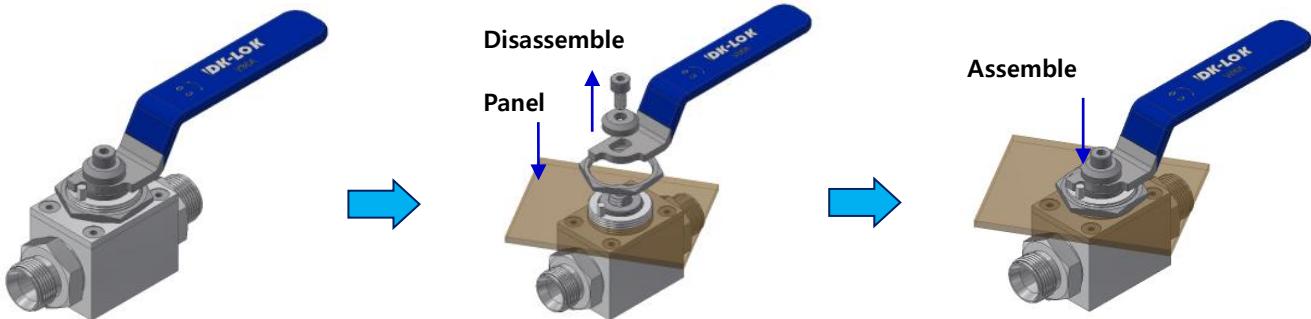


<Features>

- High pressure up to 10,000 psi (689 bar).
- Blowout proof design with internally loaded stem.
- High flow rate with maximum orifice.
- Various flow control with side and bottom inlet port on 3-way diverter valves.
- VC86 Series with PEEK seat and HNBR O-rings are available with CNG/NGV certifications.

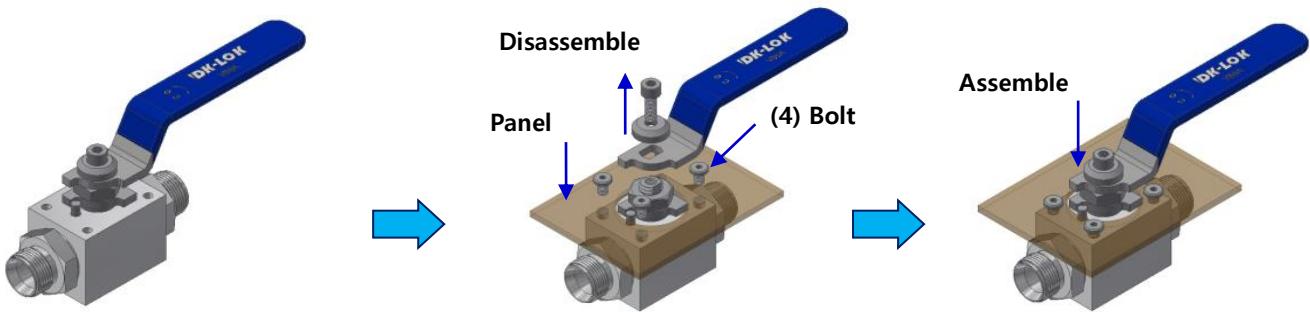
<Option> - Locking Nut & Panel Mounting[P1 Type]

- Addition locking nut below handle makes the valve panel mountable.
- Disassemble the handle prior to panel mounting.



<Option> - Screw Hole for Panel Mounting [P2 Type]

- Additional four (4) screw holes on the top of valve makes the valve panel mountable.
- Disassemble the handle prior to panel mounting.



V86/VC86 Series Ball Valve, Service Instructions

<Ball Valve Installation>

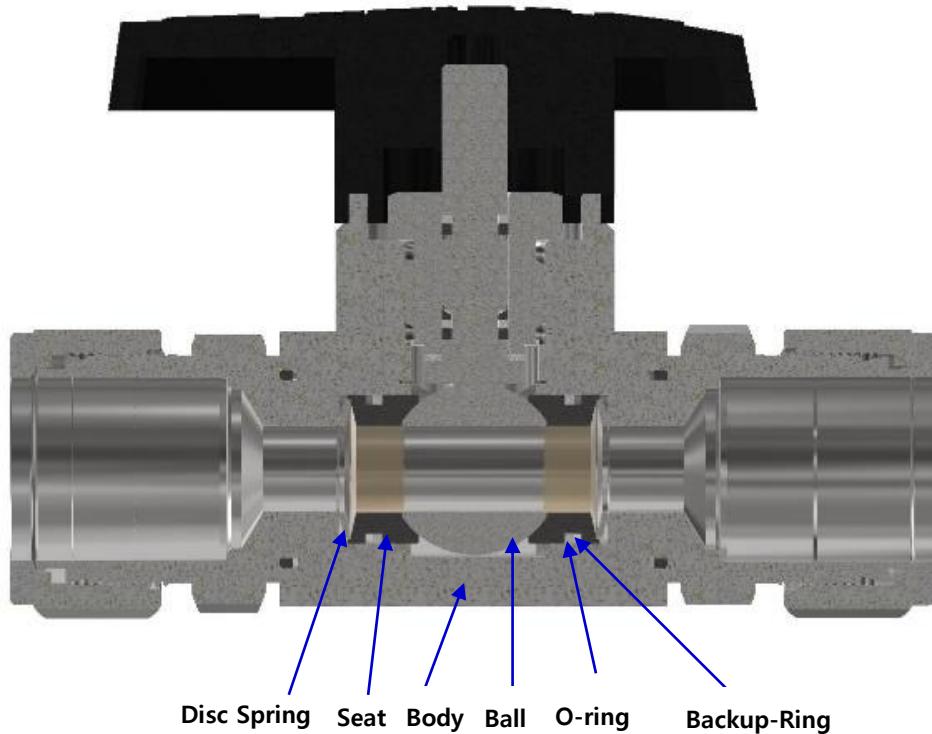
- * NPT, PT Thread Connector
- Wrap the PTFE tape onto the male threads.
: A thread tape acts as a lubricant allowing more thread engagement, prevent galling, and filling the gap between the crests and roots of mating threads to prevent formation of leak path.
- Thread the male threads onto the mating female threads until hand-tight and Using a wrench, tighten the male thread hex.

* Dk-Lok Tube Fitting Connector

1. prior to installation, make sure to have tube-end cut 90 degree, and remove burrs from inside and outside tube ends.
2. Use proper cutter and maintain a sharp cutting wheel on it.
3. Insert the tubing into the Dk-Lok tube fitting until the tubing end bottoms on the shoulder of the fitting body.
4. Make sure the nut finger-tight.
5. Scribe the nut at the 6 o'clock position and wrench-tighten the nut 1-1/4 turns to the 9 o'clock position, holding the body with a back up wrench.
6. Tighten the nut 3/4 turn to the 3 o'clock position for 1/16, 1/8 and 3/16 in.(2, 3 and 4mm)

<Good Practices for Operation of ball valve>

1. Use Screw protectors or dust caps on valve connector.
2. Align bodies and tube or pipe when install.
3. Installation at room temperature.
4. Support hanging tube or other equipment to prevent side load.

VCH86 Series Ball Valve, Service Instructions**<Features>**

- Wetted components are compatible with compressed natural gas (CNG), liquid petroleum gas, gaseous and liquid hydrogen.
- Sturdy body and end connections made out of stainless 316 barstock.
- Maximum pressure rating: 413 bar (6000 psig).
- Temperature rating: - 40 to 121°C (-40 to 250°F).

<Operation>

- VCH86 ball valves are designed for fully open and close operation.
- Valves that have not been actuated for a period of time may have a higher initial actuation torque.

V86 Series Ball Valve, Service Instructions

<Ball Valve Installation>

* NPT, PT Thread Connector

- Wrap the PTFE tape onto the male threads.
: A thread tape acts as a lubricant allowing more thread engagement, prevent galling, and filling the gap between the crests and roots of mating threads to prevent formation of leak path.
- Thread the male threads onto the mating female threads until hand-tight and Using a wrench, tighten the male thread hex.

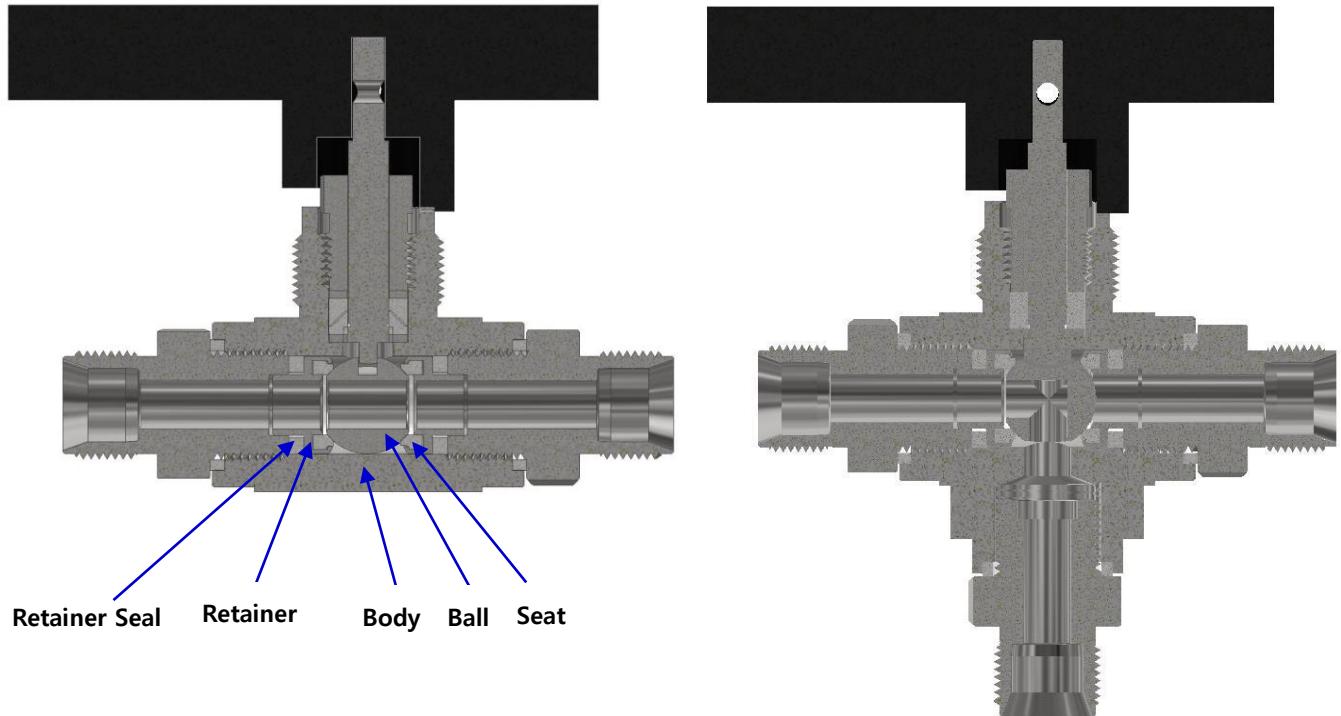
* Dk-Lok Tube Fitting Connector

1. prior to installation, make sure to have tube-end cut 90 degree, and remove burrs from inside and outside tube ends.
2. Use proper cutter and maintain a sharp cutting wheel on it.
3. Insert the tubing into the Dk-Lok tube fitting until the tubing end bottoms on the shoulder of the fitting body.
4. Make sure the nut finger-tight.
5. Scribe the nut at the 6 o'clock position and wrench-tighten the nut 1-1/4 turns to the 9 o'clock position, holding the body with a back up wrench.
6. Tighten the nut 3/4 turn to the 3 o'clock position for 1/16, 1/8 and 3/16 in.(2, 3 and 4mm)

<Good Practices for Operation of ball valve>

1. Use Screw protectors or dust caps on valve connector.
2. Align bodies and tube or pipe when install.
3. Installation at room temperature.
4. Support hanging tube or other equipment to prevent side load.

VH86/VHB86-3B Series Ball Valve, Service Instructions



<Features>

- High flow in a compact design.
- High pressure capacity designed for blow-out proof with internally loaded ball stem.
- Micro-finished ball provides a positive seal.
- 90 degree actuation for 2-way and 180 degree actuation for 3-way ball valves.
- Panel mounting as standard.
- Chevron stem seal, adjustable with the handle disassembled.
- Handle indicates flow direction.
- Low operating torques and positive handle stops.
- Optional pneumatic actuation.
- VH86 3-way Ball Valve is designed to switch media through the bottom port and direct it to out of two outlet ports.

VH86/VHB86-3B Series Ball Valve, Service Instructions**<Ball Valve Installation>***** NPT, PT Thread Connector**

- Wrap the PTFE tape onto the male threads.
: A thread tape acts as a lubricant allowing more thread engagement, prevent galling, and filling the gap between the crests and roots of mating threads to prevent formation of leak path.
- Thread the male threads onto the mating female threads until hand-tight and Using a wrench, tighten the male thread hex.

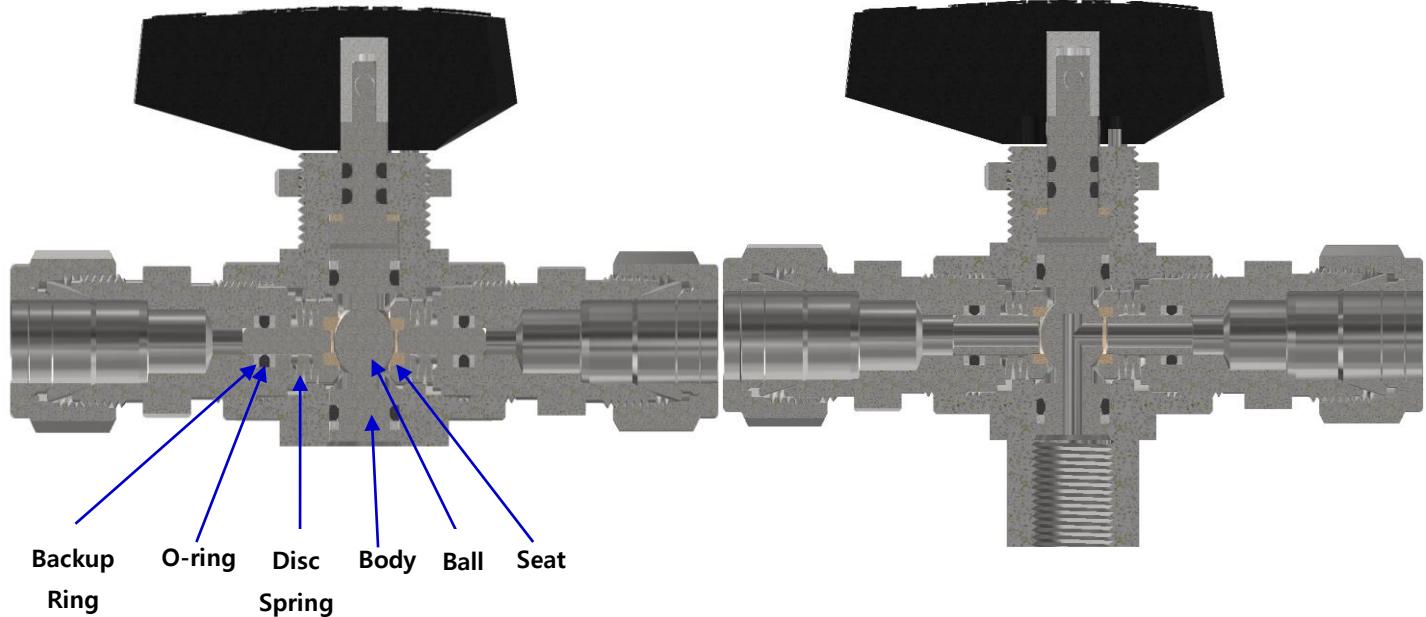
*** Dk-Lok Tube Fitting Connector**

1. prior to installation, make sure to have tube-end cut 90 degree, and remove burrs from inside and outside tube ends.
2. Use proper cutter and maintain a sharp cutting wheel on it.
3. Insert the tubing into the Dk-Lok tube fitting until the tubing end bottoms on the shoulder of the fitting body.
4. Make sure the nut finger-tight.
5. Scribe the nut at the 6 o'clock position and wrench-tighten the nut 1-1/4 turns to the 9 o'clock position, holding the body with a back up wrench.
6. Tighten the nut 3/4 turn to the 3 o'clock position for 1/16, 1/8 and 3/16 in.(2, 3 and 4mm)

<Good Practices for Operation of ball valve>

1. Use Screw protectors or dust caps on valve connector.
2. Align bodies and tube or pipe when install.
3. Installation at room temperature.
4. Support hanging tube or other equipment to prevent side load.

VCT86/VCT863 Series Ball Valve, Service Instructions



<Features>

- The Trunnion ball valve is featured by blowout-proof design with cylindrical extensions at the top and bottom of the ball.
- The trunnion prevents the ball from shifting and permits the ball to rotate on a vertical axis.
- Integral ball stem machined from single piece of bar stock eliminates the backlash during handle actuation.
- Panel mounting nut is standard permitting valve to panel or actuator.

<Operation>

- Valves that have not been actuated for a period of time may have a higher initial actuation torque.
- VT86 Series ball valves are designed to control fluid in full open and full closed position.

VCT86/VCT863 Series Ball Valve, Service Instructions**<Ball Valve Installation>***** NPT, PT Thread Connector**

- Wrap the PTFE tape onto the male threads.
: A thread tape acts as a lubricant allowing more thread engagement, prevent galling, and filling the gap between the crests and roots of mating threads to prevent formation of leak path.
- Thread the male threads onto the mating female threads until hand-tight and Using a wrench, tighten the male thread hex.

*** Dk-Lok Tube Fitting Connector**

1. prior to installation, make sure to have tube-end cut 90 degree, and remove burrs from inside and outside tube ends.
2. Use proper cutter and maintain a sharp cutting wheel on it.
3. Insert the tubing into the Dk-Lok tube fitting until the tubing end bottoms on the shoulder of the fitting body.
4. Make sure the nut finger-tight.
5. Scribe the nut at the 6 o'clock position and wrench-tighten the nut 1-1/4 turns to the 9 o'clock position, holding the body with a back up wrench.
6. Tighten the nut 3/4 turn to the 3 o'clock position for 1/16, 1/8 and 3/16 in.(2, 3 and 4mm)

<Good Practices for Operation of ball valve>

1. Use Screw protectors or dust caps on valve connector.
2. Align bodies and tube or pipe when install.
3. Installation at room temperature.
4. Support hanging tube or other equipment to prevent side load.

VBV Series Bleed Valve, Service Instructions



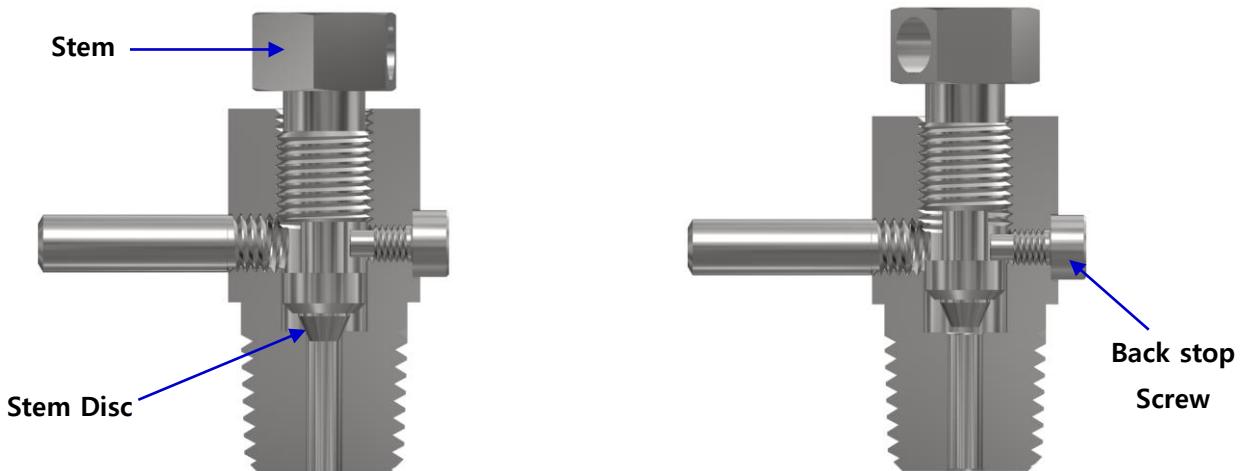
<Features>

DK-Lok VBV Series Bleed Valves are designed to vent the signal line pressure to atmosphere before an instrument is removed and to assist in calibration of control devices. These are for use on instrumentation devices such as gauge root valves and multi-valve manifolds. Optional barbed vent tube enables containment of fluid vented. The VBV Series are also ideal in bleeding hydraulic systems.

<Installation and Operation>

Position the vent tube so that system fluid is not directed to personnel operating. Slowly open the valve. This valve has no stem seal packing; small amounts of fluid will go through the stem thread when they are opened. Therefore suitable measures should be taken to protect personnel operating.

<Stem Position>



Close Position :

When the stem disc touches the body, the fluid is blocked.

Open Position :

Fluid is vented when the stem is lifted by the screw.

The stem is prevented from being disassembled by the back stop screw.

VBV Series Series Bleed Valve, Service Instructions**<*Bleed Valve Installation*>**

- * NPT, PT Thread Connector
- Wrap the PTFE tape onto the male threads.
 - : A thread tape acts as a lubricant allowing more thread engagement, prevent galling, and filling the gap between the crests and roots of mating threads to prevent formation of leak path.
- Thread the male threads onto the mating female threads until hand-tight and Using a wrench, tighten the male thread hex.

<*Good Practices for Operation of Bleed Valve* >

1. Use Screw protectors or dust caps on valve connector.
2. Align bodies and tube or pipe when install.
3. Installation at room temperature.
4. Support hanging tube or other equipment to prevent side load.