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~~Approval withdrawn~~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*0085*00***

1. CNG/LNG component considered:
~~Container(s) or cylinder(s)~~[2]
~~Tank(s) or vessel(s)~~[2]
~~CNG accumulator(s)~~[2]
~~Pressure indicator~~[2]
~~Pressure relief valve~~[2]
~~Automatic valve(s)~~[2]
~~Excess flow valve~~[2]
~~Gas-tight housing2~~
~~Pressure regulator(s)~~[2]
Non-return valve(s) or check valve(s)[2] ***Type: DK-Lok Check Valve***
~~Pressure relief device (PRD) (temperature triggered)~~[2]
~~Manual valve~~[2]
~~Flexible fuel lines~~[2]
~~Filling unit or receptacle~~[2]
~~Gas injector(s)~~[2]
~~CNG Compressor~~[2]
~~Gas flow adjuster~~[2]
~~Gas/air mixer~~[2]
~~Electronic control unit~~[2]
~~Pressure and temperature sensor(s)~~[2]
~~CNG filter(s)~~[2]
~~PRD (pressure triggered)~~[2]
~~Fuel rail~~[2]
~~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]

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Approval No: ***E24*110R05/00*0085*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:	***28.09.2023***
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:	***23-00022-IS-MUC-00***
9.	Approval granted/ ~~refused~~/ ~~extended~~/ ~~withdrawn~~[2]:	***Granted***
10.	Reason(s) of extension (if Applicable):	***N/A.***
11.	Place:	***Dublin.***
12.	Date:	***29th September, 2023.***
13.	Signature:	

NATIONAL STANDARDS AUTHORITY OF IRELAND
NSAI Certification
TRANSPORT DEPARTMENT

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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Approval No: ***E24*110R05/00*0085*00***

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:	***N/A***
1.1.2	Material:	***N/A***
1.1.2.	Tank(s) or vessel(s) (for LNG system)	
1.1.2.1.	Capacity:	***N/A***
1.1.2.2.	Material:	***N/A***
1.1.3.	CNG accumulator	
1.1.3.1.	Dimensions:	***N/A***
1.1.3.2.	Material:	***N/A***
1.1.3.3.	Capacity:	***N/A***
1.2.	Pressure indicator	
1.2.1.	Working pressure(s):[1]	***N/A***
1.2.2.	Material:	***N/A***
1.3.	Pressure relief valve (discharge valve)	
1.3.1.	Working pressure(s):[1]	***N/A***
1.3.2.	Material:	***N/A***
1.32.	CNG Compressor	
1.32.1.	Working pressure(s):[1]	***N/A***
1.32.2.	Material:	***N/A***
1.4.	Automatic valve(s)	
1.4.1.	Working pressure(s):[1]	***N/A***
1.4.2.	Material:	***N/A***
1.5.	Excess flow valve	
1.5.1.	Working pressure(s):[1]	***N/A***
1.5.2.	Material:	***N/A***
1.6.	Gas-tight housing	
1.6.1.	Working pressure(s):	***N/A***
1.6.2.	Material:	***N/A***
1.7.	Pressure regulator(s)	
1.7.1.	Working pressure(s):[1]	***N/A***
1.7.2.	Material:	***N/A***
1.8.	Non-return valve(s) or check valve(s)	
1.8.1.	Working pressure(s):[1]	***274 bar @ 120°C – Class 6***
1.8.2.	Material:	***SS 316***

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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]	***N/A***
1.10.2.	Material:	***N/A***
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	***N/A***
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/A*

[1] Specify the tolerance

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Approval No: ***E24*110R05/00*0085*00***

Index to the Information Package

Date of issue:	***29th September, 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):	***23-00022-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:	***28 pages***

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Approval No: ***E24*110R05/00*0085*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.

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TÜV SÜD Auto Service
10040 Mesa Rim Road
San Diego, CA 92121 USA

T E S T R E P O R T

23-00022-IS-MUC-00

About the Tests of CNG Check 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	
☑	Granting of a type approval – E24 110R05/00*0085 “C”
☐	Extension/correction to type approval no. – N/A

0 Reason of Extension:

N/A. New type approval.

I General and Description

The Specific Component:

1.	CNG-component considered:	Check Valve
2.	Make:	DK-Lok Corporation
3.	Type: Variant(s):	DK-Lok Check Valve VCH36 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(s): 200 bar @ 15°C Maximum Working Pressure(s): 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.

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_23-00022-IS-MUC-00_Application)
- Declaration by the Manufacturer, dated 2023.08.06 (file: D02023.09.11_DK-Lok Corporation_23-00022-IS-MUC-00_decl. by manuf)
- Essential Characteristics acc. to ECE R 110, Annex 1A (file: BB2023.09.11_DK-Lok Corporation_23-00022-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 Check Valve test samples* (file: DO2023.09.11_DK-Lok Corporation_23-00022-IS-MUC-00_Test samples) and *Annex 1 – DK-Lok Check Valve test results* (file: PB2023.09.11_DK-Lok Corporation_23-00022-IS-MUC-00_Test results).

The DK-Lok Check Valve scope of approval includes all Variants listed in the present report in the various configurations as depicted in *Annex 4 – DK-Lok Check Valve catalogs* (file DO2023.09.11_DK-Lok Corporation_23-00022-IS-MUC-00_Catalogs).

IV Approval History

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

	Type	Variant(s)	Content of Extension(s)	MAWP (bar)	Temp (°C)	Report No. and Date
Initial testing	DK-Lok Check Valve	VCH36 Series	N/A	274	-40 to +120	Annex 1_23-00022-IS-MUC-00 dated 2023.09.11

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. 23-00022-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.

Technischer Dienst Technical Service TÜV SÜD Auto Service GmbH 179

André Frégeau
The Authorized Signatory

Annexes:

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

Annex 1 – DK-Lok Check Valve test results

TÜV SÜD Auto Service GmbH
10040 Mesa Rim Road
San Diego, CA 92121

Test Report

Test Results:

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5A	Overpressure	3X Check Valve 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 Check Valve of each Variant described in Annex 3 of this report	Leakage <15cm³/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 Check Valve of each Variant described in Annex 3 of this report	Leakage <15cm³/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.

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.

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5E	Corrosion Resistance	3X Check Valve 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.

TÜV SÜD Auto Service GmbH
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San Diego, CA 92121

Test Report

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 3.2.3	Durability	3X Check Valve 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	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 Check Valve 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.

ECE R-110	Test Procedure	Test Sample	Requirement	Test Result	Remarks
Annex 5O	Operating Temperature	3X Non-Return Valve or Check Valve 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 Check Valve Variant(s) listed in the test report 23-00022-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..

TÜV SÜD Auto Service GmbH
10040 Mesa Rim Road
San Diego, CA 92121

Test Report

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.

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
	1.2.4.5.14. Non-return valve(s) or check valve(s):	Yes
	1.2.4.5.14.1. Make(s):	DK-Lok Corporation
	1.2.4.5.14.2. Type(s):	DK-Lok Check Valve Variant(s): VCH36 Series
	1.2.4.5.14.3. Description:	Non-return valve or check valve for CNG VCH36 Series (ECER110), Rev. 0
	1.2.4.5.14.4. Working pressure(s):	274 bar @ 120°C
	1.2.4.5.14.5. Material:	SS 316
	1.2.4.5.14.6. Operating temperatures:	-40°C to 120°C

2023.09.11.

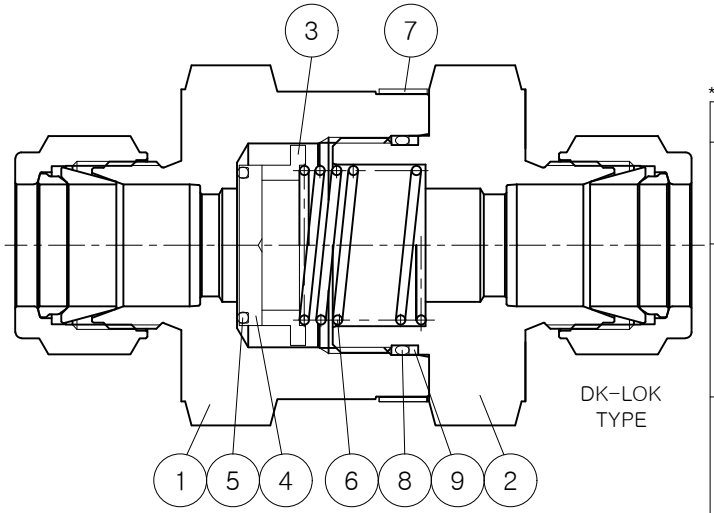
Technischer Dienst Technical Service TÜV SÜD Auto Service GmbH 179

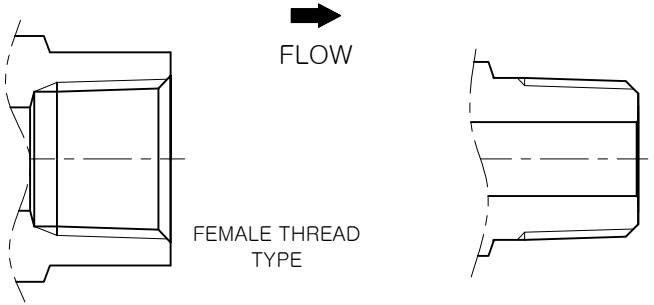
E24*110R05/00*0085*00

Annex 2 – DK-Lok Check Valve drawings

DWG. NO.	VCH36 SERIES

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

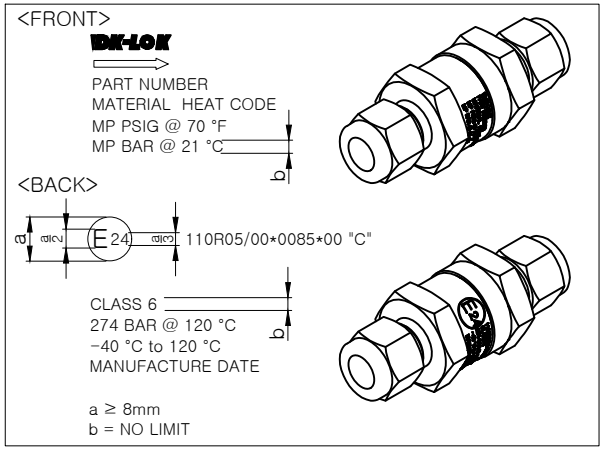




*TECHNICAL DATA

VALVE SERIES	END CONNECTION	MAXIMUM MP PRESSURE at 21°C(70°F)	TEMPERATURE RATING °C (°F)
VCH36A	1/8", 1/4",6mm, FEMALE NPT 1/4", MALE NPT 1/8", MALE NPT 1/4"	6,000 psig (413 bar)	−40 ~ 250°F (−40 ~ 120°C)
VCH36B	3/8", 1/2" 8mm, 10mm, 12mm	6,000 psig (413 bar)	
	FEMALE NPT 3/8"	5,300 psig (365 bar)	
	FEMALE NPT 1/2"	4,900 psig (337 bar)	
	MALE NPT 3/8", MALE NPT 1/2"	6,000 psig (413 bar)	
VCH36C	3/4"	5,000 psig (344 bar)	
	1"	4,700 psig (323 bar)	
	22mm	4,900 psig (337 bar)	
	25mm FEMALE NPT 3/4"	4,600 psig (316 bar)	
	FEMALE NPT 1"	4,400 psig (303 bar)	
	MALE NPT 3/4", MALE NPT 1"	5,000 psig (344 bar)	

MARKING



VALVE SERIES	End Connections Type	SIZE
VCH36 SERIES CHECK VALVES	DK-LOK	1/8", 1/4", 3/8", 1/2", 3/4", 1" 6mm, 8mm, 10mm, 12mm, 22mm, 25mm
	NPT, PT, PF, METRIC UNIFIED	1/8", 1/4", 3/8", 1/2", 3/4", 1"

* 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

*SPRING CRACKING , RESEAL AND BACK PRESSURE @ 70°F(21°C)

CRACKING PRESSURE		CRACKING PRESSURE RANGE				RESEAL PRESSURE psig (bar)
		MIN.		MAX.		
psig	bar	psig	bar	psig	bar	
1/3	0.02	0	0	3	0.21	UP TO 6(0.41) BACK PRESSURE
1	0.07	0	0	4	0.28	UP TO 5(0.35) BACK PRESSURE
5	0.34	3	0.21	9	0.62	UP TO 2(0.14) BACK PRESSURE
10	0.69	7	0.48	15	1.03	MINIMUM 3(0.21) RESEAL PRESSURE
25	1.72	20	1.38	30	2.07	MINIMUM 17(1.2) RESEAL PRESSURE

NO.	DESCRIPTION	MATERIAL	Q'TY
12	NUT	ASTM A276 TYPE316	2
11	BACK FERRULE	ASTM A479 TYPE316	2
10	FRONT FERRULE	ASTM A479 TYPE316	2
9	BACK-UP RING	PTFE	1
8	O-RING	HNBR	1
7	INDICATOR RING	ASTM A276 TYPE316	1
6	SPRING	STAINLESS STEEL 302	1
5	BONDED SEAL	HNBR	1
4	POPPET	ASTM A276 TYPE316	1
3	POPPET STOP	ASTM A276 TYPE316	1
2	CONNECTOR	ASTM A276 TYPE316	1
1	BODY	ASTM A276 TYPE316	1

APPROVED	S.H.Cho
REVIEWED	
DESIGNED	K.H.Lee
SCALE	N/S
DATE	2023.01.27
DWG. NO.	VCH36 SERIES (ECER110)

TITLE

VCH36 SERIES CHECK VALVE

DK-LOK
Fittings & Valves

E24*110R05/00*0085*00

Annex 3 – DK-Lok Check Valve test samples

Annex 3 of Test Report 23-00022-IS-MUC-00		
Type	**Variant(s)**	**Test samples (3 units in each configuration)**
DK-Lok Check Valve	VCH36 Series	- VCH36A 1/8" DK-Lok (25 psi) - VCH36B 3/8" MNPT (5 psi) - VCH36C 22mm-end 1, 25mm DK-Lok-end 2 (1/3 psi)

The non-metallic materials tested and approved for the CNG DK-Lok Check 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 Check Valve catalogs

Check Valves

No.V336-11
March 2023

~~V33, VP33, VA33, VDA33, VH36 and VL36~~ V33, VP33, VA33, VDA33, VH36, and VL36 are not in the approval scope

Series VCH36 Series for CNG/NGV applications

Pressures up to 3,000 psig (206 bar) and 6,000 psig (413 bar)

Features

- Fixed cracking pressure valves : V33, VP33, VH36, VCH36 Series
- Adjustable cracking pressure valves : VA33, VDA33 Series
- Lift Check valves : VL36 Series

Technical Information

Valve Series	V33 Series			VP33 Series	VA33 & VDA33 Series	VH36 Series	
	V33A, V33B, V33C, V33D	V33E, V33F		VP33A, VP33B	VA33A, VA33B, VDA33	VH36A, VH36B	VH36C
Materials	SS316 & Brass	SS316	Brass	SS316 & Brass	SS316 & Brass	SS316	SS316
Maximum Working Pressure @70°F (21°C) Unit : psig (bar)	3000 (206)	2000 (137)	1500 (103)	3000 (206)	3000 (206)	6000 (413)*	5000 (344)*
Temperature Ratings °F (°C)	Seal Material	Designator		Rating	Seal Material	Designator	Rating
	FKM O-ring	VT		-10 to 375 (-23 to 190)[a]	EPDM O-ring	EP	-50 to 300 (-45 to 148)
	NBR O-ring	BN		-10 to 250 (-23 to 121)	FFKM O-ring	KZ	-10 to 600 (-23 to 315)
	(a)VH36 Series with FKM O-ring : -10 to 400 °F (-23 to 204 °C) · FKM is standard for SS316 valves. · NBR is standard for Brass valves.						
Cracking Pressure	Refer to spring table of each valve series						

- Poppet Check Valves, V33 Series : 2, 3 page
- One-Piece Check Valves, VP33 Series : 3 page
- One-Piece Adjustable Check Valves, VA33 Series : 4, 5 page
- In-Line Adjustable Check Valves, VDA33 Series : 4, 5 page
- CNG/NGV Check Valves, VCH36 Series : 6, 7 page
- High Pressure Check Valves, VH36 Series * : 6, 7 page
- Lift Check Valves, VL36 Series : 8 page

Cracking, Reseal and Back Pressure @ 70°F(21°C)

- Cracking Pressure : Valve poppet is actuated when the pressure difference between the inlet (upstream) and the outlet (downstream) reaches the range of cracking pressure.
- Reseal Pressure : Valves that have higher cracking pressure can be resealed to bubble-tight by the spring force. The reseal pressure is the pressure at the same flow direction, but lower than the cracking pressure.
- Back Pressure : Valves that have cracking pressure of 5 psig (0.34 bar) and lower may not be able to return to the bubble-tight seal. This may require back pressure to press the seal to form a bubble-tight contact in addition to the spring force.

Class Ratings

Valve Series	V33 Series				VP33, VA33, VDA33 Series		VH36 Series	
	V33A, V33B, V33C, V33D		V33E, V33F		VP33A, VP33B, VA33A, VA33B, VDA33		VH36A, VH36B	VH36C
Temperature, °F (°C)	Working Pressure, psig (bar)							
	SS316	Brass	SS316	Brass	SS316	Brass	SS316	SS316
-18 to 100 (-28 to 38)	3000 (206)	3000 (206)	2000 (137)	1500 (103)	3000 (206)	3000 (206)	6000 (413)	5000 (344)
200 (93)	2575 (177)	2600 (179)	1715 (118)	1300 (89)	2575 (177)	2600 (179)	5160 (355)	4290 (295)
225 (175)	2510 (172)	2500 (172)	1670 (115)	1250 (86)	2510 (172)	2500 (172)	5030 (346)	4180 (288)
250 (121)	2450 (168)	2405 (165)	1630 (112)	1200 (82)	2450 (168)	2405 (165)	4910 (338)	4080 (281)
300 (148)	2325 (160)	-	1545 (106)	-	2325 (160)	-	4660 (321)	3875 (267)
350 (176)	2255 (155)	-	1490 (102)	-	2255 (155)	-	4470 (308)	3720 (256)
375 (190)	2185 (150)	-	1450 (99)	-	2185 (150)	-	4375 (301)	3640 (250)
400 (204)	-	-	-	-	-	-	4280 (294)	3560 (245)

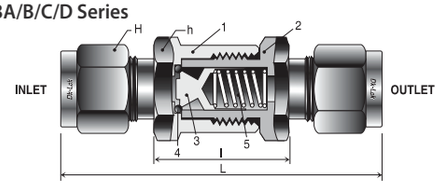
* VH36 & VCH36 Series is Pressure ratings may be limited by the end connection. See Page 7, Dimensions Table.

V33 series

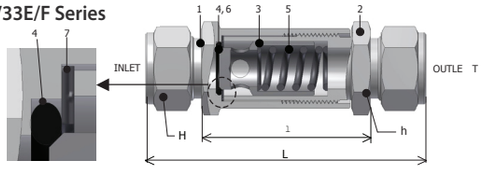
Features

- Working pressure up to 3,000 psig (206 bar)

V33A/B/C/D Series



V33E/F Series



Material of Construction

Component	Valve Body Materials	
	Stainless Steel	Brass
	Material Grade/ASTM	
1. Body	SS316 /A276, A479	Brass 360 /B16
2. Connector		
3. Poppet		
4. O-ring*	FKM	NBR
5. Spring	SS302/A313	
6. O-ring seal	FKM	NBR
7. Washer	SS316 With PTFE Coting	

Wetted parts are listed in blue.

4. O-ring* on V33E & V33F Series is secured in poppet groove.

Lubrication :

- Silicon-based Lubricant for Poppet.
- Molybdenum Dry Film Lubricant for SS316 Body Threads.

Operation

- Valves that have not been actuated for a period of time may require a higher cracking pressure than the set cracking pressure.
- DK-Lok check valves prevent reverse flow in circuits. Do not use them as relief valves.
- DK-Lok check valves are designed to prevent loss of media caused by failed connections and for uni-directional flow control of fluids in chemical processing, power generation, oil and gas industries.

Factory Test, Cleaning and Packaging

- Every valve is factory tested for cracking and reseals performance.
- Every valve is cleaned, and packaged in accordance with DK-Lok cleaning standard of DC-01.
- Special cleaning and packaging in accordance with DK-Lok DC-11 in compliance with ASTM G93 Level C is available on request.

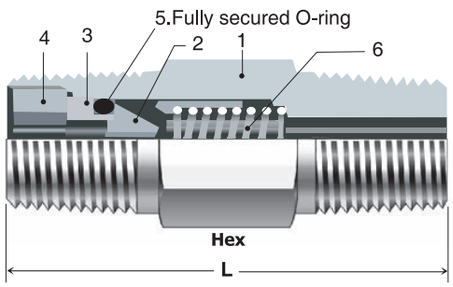
Ordering Information and Dimensions

Basic Ordering Number		End Connections Inlet	End Connections Outlet	Orifice mm (in.)	Cv	Dimensions mm (in.) h-Hex	H-Hex	L	l
V33A-	D-2T-	1/8 in. DK-Lok		4.8 (0.19)	0.16	15.88 (5/8)	11.11 (7/16)	55.60 (2.19)	25.00 (0.98)
	M-2N-	1/8 in. Male NPT			0.47		-	44.40 (1.75)	-
	F-2N-	1/8 in. Female NPT					-	46.50 (1.83)	25.00 (0.98)
	D-4T-	1/4 in. DK-Lok					14.29 (9/16)	60.00 (2.36)	
	D-6M-	6 mm DK-Lok					14.00		
	MD-4N4T-	1/4 in. Male NPT	1/4 in. DK-Lok				14.29 (9/16)	56.40 (2.22)	
	M-4N-	1/4 in. Male NPT					-	53.40 (2.10)	
V33B-	F-4N-	1/4 in. Female NPT		7.1 (0.28)	1.48	19.05 (3/4)	-	56.80 (2.24)	-
	D-6T-	3/8 in. DK-Lok					17.46 (11/16)	65.50 (2.58)	27.10 (1.07)
	D-10M-	10 mm DK-Lok					19.00		
	M-6N-	3/8 in. Male NPT					-	55.50 (2.19)	
V33C-	F-6N-	3/8 in. Female NPT		10.0 (0.39)	1.7	22.22 (7/8)	-	63.80 (2.51)	-
	D-8T-	1/2 in. DK-Lok					22.22 (7/8)	80.20 (3.16)	36.20 (1.43)
	D-12M-	12 mm DK-Lok					22.00		
	M-8N-	1/2 in. Male NPT					-	74.40 (2.93)	
V33D-	F-8N-	1/2 in. Female NPT		13.5 (0.53)	2.6	28.58 (1-1/8)	-	84.70 (3.33)	-
	D-10T-	5/8 in. DK-Lok					25.40 (1)	91.80 (3.61)	48.10 (1.89)
V33E-	D-12T-	3/4 in. DK-Lok		16.0 (0.63)	5.2	31.75 (1-1/4)	28.58(1-1/8)	110.70 (4.35)	66.1 (2.6)
	M-12N-	3/4 in. Male NPT					-	105.30 (4.15)	
	F-12N-	3/4 in. Female NPT					-	103.00 (4.06)	-
V33F-	D-16T-	1 in. DK-Lok		18.0 (0.71)	8.0	34.93 (1-3/8)	38.1 (1-1/2)	120.8 (4.75)	68 (2.68)
	M-16N-	1 in. Male NPT					-	115.8 (4.56)	
	F-16N-	1 in. Female NPT				41.28 (1-5/8)	-	111 (4.37)	

Table 1. **Spring Cracking, Reseal and Back Pressure @ 70 °F (21 °C) (for V33)**

Spring Nominal Cracking Pressure Designator		Cracking Pressure Ranges				Reseal Pressures psig (bar)
		Min. Pressure		Max. Pressure		
psig	bar	psig	bar	psig	bar	
1/3	0.02	0	0	3	0.21	Up to 6 (0.41) Back pressure
1	0.07	0	0	4	0.28	Up to 6 (0.41) Back pressure
3	0.21	2	0.14	7	0.48	Up to 4 (0.28) Back pressure
10	0.69	7	0.48	15	1.03	Minimum 3 (0.21) Reseal pressure
25	1.72	20	1.38	30	2.07	Minimum 17 (1.17) Reseal pressure
50	3.45	40	2.76	60	4.14	Minimum 35 (2.41) Reseal pressure
75	5.17	60	4.14	90	6.20	Minimum 53 (3.65) Reseal pressure
100	6.89	80	5.51	120	8.27	Minimum 70 (4.82) Reseal pressure

VP33 Series One-Piece Check Valves



Features

- O-ring seal blow-out proof design
- O ne piece body construction.
- Working pressure up to 3,000 psig (206 bar)

Materials of Construction

Component	Valve Body Materials	
	Stainless Steel	Brass
	Material Grade/ASTM	
1. Body	SS316 / A276, A479	Brass 360 / B16
2. Poppet		
3. O-ring Holder		
4. Locking Screw		
5. O-ring	FKM	NBR
6. Spring	SS302/A313	

Wetted parts are listed in blue.

Lubrication :

- Silicon-based Lubricant on Poppet
- Molybdenum Dry Film Lubricant on SS316 Locking Screw.

Ordering Information and Dimensions

Basic Ordering Number		End Connections		Cv	Dimensions mm (in.)	
		Inlet	Outlet		L	Hex.
VP33A-	M-4N-	1/4 in. Male NPT		0.35	41 (1.62)	14.28 (9/16)
	M-4R-	1/4 in. ISO Male Tapered				
	F-4N-	1/4 in. Female NPT			61 (2.41)	19.05 (3/4)
	F-4R-	1/4 in. ISO Female Tapered			64 (2.54)	
	MF-4N-	1/4 in. Male NPT	1/4 in. Female NPT		44 (1.75)	
	FM-4N-	1/4 in. Female NPT	1/4 in. Male NPT		58 (2.28)	
VP33B-	M-8N-	1/2 in. Male NPT		1.20	58 (2.28)	22.22 (7/8)
	F-8N-	1/2 in. Female NPT			94 (3.71)	26.98 (1-1/16)
	MF-8N-	1/2 in. Male NPT	1/2 in. Female NPT		72 (2.83)	

Table 2. **Spring Cracking, Reseal and Back Pressure @ 70°F (21°C)**

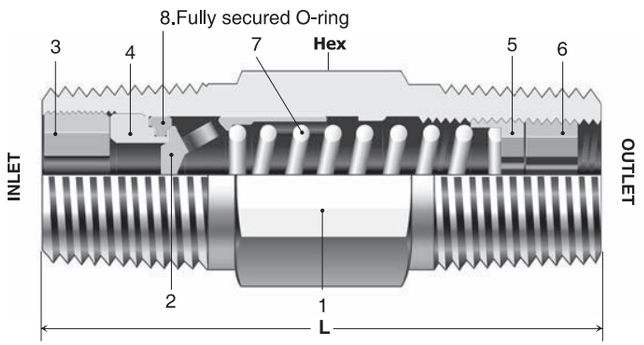
Spring Nominal Cracking Pressure Designator		Cracking Pressure Ranges				Reseal Pressures psig (bar)
		Min. Pressure		Max. Pressure		
psig	bar	psig	bar	psig	bar	
1/3	0.02	0	0	3	0.21	6 to 20 (0.41 to 1.38) back pressure
1	0.07	0	0	4	0.28	5 to 20 (0.34 to 1.38) back pressure
10	0.69	7	0.48	13	0.90	3 to 10 (0.21 to 0.69) back pressure
25	1.72	21	1.45	29	2.00	Minimum 5 (0.34) Reseal pressure

VA33 Series One-Piece Adjustable Check Valves / VDA33 Series In-Line Adjustable Check Valves

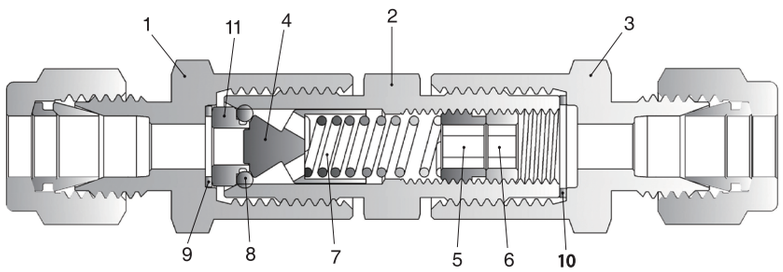
Features

- Cracking pressure adjustable from 3 to 600 psig (0.2 to 41.3 bar)
- Working pressure up to 3,000 psig (206 bar)
- Temperature up to 190°C (375°F)with FKM O-ring
- Standard materials : 316 stainless steel and brass.

VA33 Series



VDA33 Series



Materials of Construction

Component		Valve Body Materials	
		Stainless Steel	Brass
		Material Grade/ASTM	
VA33 Series	VDA33 Series		
1. Body	1. Inlet body 2. Center body 3. Outlet body	SS316 /A276, A479	Brass 360 / B16
2. Poppet 360 / B16	4. Poppet		
3. Insert locking screw	-		
4. Insert	11. Insert		
5. Adjustable screw	5. Adjustable screw		
6. Locking screw	6. Locking screw		
7. Spring	7. Spring	SS302/A313	
8. O-ring	8. O-ring	FKM, Optional FFKM	NBR
	9. Inlet gasket 10. Outlet gasket	TFE coated SS316	

Wetted parts are listed in blue.

Lubrication :

- Silicon-based Lubricant on Poppet
- Molybdenum Dry Film Lubricant on SS316 Locking Screw and Insert Locking Screw.

VA33 Series Ordering Information and Dimensions

Basic Ordering Number		End Connections	Cv	L		Hex
				mm	in.	
VA33A-	F-4N	1/4 in. Female NPT	0.35	75.7	2.98	3/4
	M-4N-	1/4 in. Male NPT		41.1	1.62	9/16
	M-4R-	1/4 in. ISO Male Tappered		41.1	1.62	9/16
VA33B-	M-8N-	1/2 in. Male NPT	1.2	65.0	2.56	7/8
	M-8R-	1/2 in. ISO Male Tappered		65.0	2.56	7/8

VDA33 Series Ordering Information and Dimensions

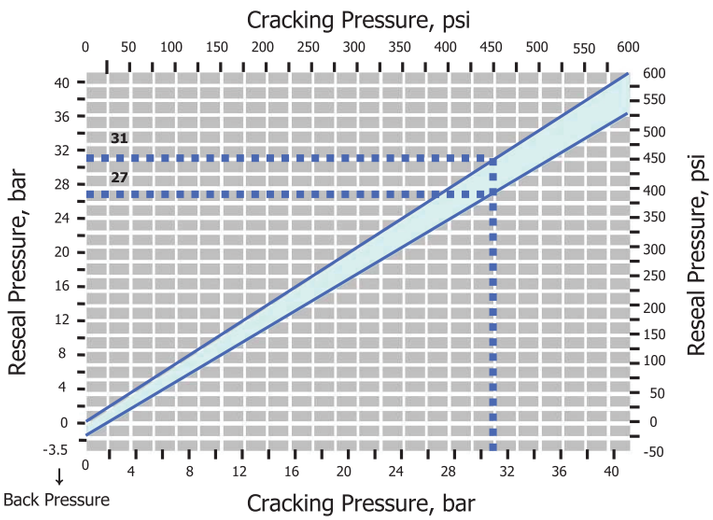
Basic Ordering Number		End Connections		Cv	Dimensions mm(in.)		
		Inlet	Outlet		L	H	h
VDA33	D-4T-S	1/4 in. DK-Lok		0.37	82.0(3.23)	9/16 in.	5/8 in.
	D-6M-S	6mm DK-Lok			82.0(3.23)	14mm	
	D-8M-S	8mm DK-Lok			84.3(3.32)	16mm	
	MD-4N4T-S	1/4 in. Male NPT	1/4 in. DK-Lok		79.2(3.12)	9/16 in.	

Table 3. **Spring Cracking Pressure Range Designator**

Cracking Pressure Range @21 °C (70 °F)		Designator
psig	bar	
3 to 50	0.2 to 3.4	3
50 to 150	3.4 to 10.3	50
150 to 350	10.3 to 24.1	150
350 to 600	24.1 to 41.3	350

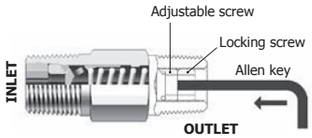
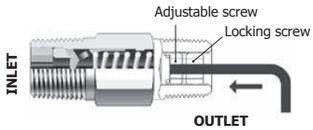
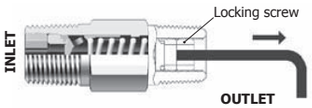
Cracking Pressure vs. Reseal pressure

VA33 and VDA33 Series valves set to crack at 20 psig(1.3 bar) or lower may require back pressure(downstream pressure) to reseal the valve bubble tight.



Example shown : For a valve set to crack at 31 bar (450 psig), the minimum reseal pressure would be 27 bar (390psig).

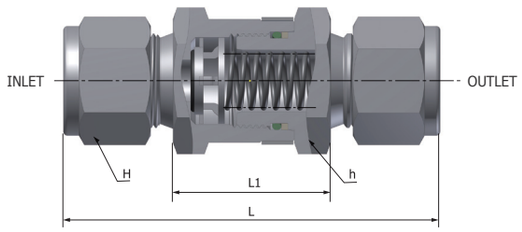
How to adjust cracking pressure

Step 1	Step 2	Step 3
		
Sllghtly unscrew the locking screw counter-clockwise.	1. Gently slide the allen key up to adjustable screw position. 2. Adjust cracking pressure. • To increase cracking pressure, turn adjustable screw clockwise. • To decrease cracking pressure, turn adjustable screw counter-clockwise.	1. Move out the allen key up to the locking screw position. 2. To lock out the locking screw, turn the allen key clockwise.

VH36 Series High Pressure Check Valves / VCH36 Series CNG/NGV Check Valves

Features

- High pressure 6,000 psig (413 bar)
- Seal blow-out proof design with the bonded seal on poppet.



Materials of Construction

Component	Valve Body Material Stainless Steel Material Grade/ASTM
1. Body	SS316 /A479, A276
2. Connector	
3. Poppet stop	
4. Poppet with bonded seal	Poppet: SS316 /A479, A276 Bonded Seal : FKM, optional EPDM & Kalrez HNBR standard for VCH36 Series
5. Spring	SS302 /A313
6. Indicator ring*	SS316 /A276
7. O-ring	FKM / HNBR standard for VCH36 Series
8. Backup ring	PTFE /D1710
9. 10, 11. DK-Lok Front & Back Ferrule and Nut	SS316 /A479, A276

Wetted parts are listed in blue.
* Indicator ring bears the information of spring designator.

Lubrication :

- Silicon-based Lubricant on Poppet
- Molybdenum Dry Film Lubricant on SS316 Connector threads

CNG Certifications

VCH36 Series check valve with CNG compatible HNBR / PTFE O-ring are availble with CNG certifications.

Certificates	ECE R110	ANSI / CSA NGV 3.1:20	ISO 15500 - 3 : 2016
Certificate No.	E24 110R05/00*0085*00	72160895-NGV 3.1	72160895 - ISO 15500-3
Classification	Class 6	Check valve	Check valve
Temperature	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)	-40 to +120 °C (-40 to 250 °F)
Pressure	W.P 274 bar @ 120 °C	S.P 273 bar @ 21 °C	W.P 274 bar @ 120 °C

Table 4. **Spring Cracking, Reseal and Back Pressure @ 70 °F (21 °C)**

Spring Nominal Cracking Pressure Designator		Cracking Pressure Ranges				Reseal Pressures psig (bar)
		Min. Pressure		Max. Pressure		
psig	bar	psig	bar	psig	bar	
1/3	0.02	0	0	3	0.21	Up to 6 (0.41) back pressure
1	0.07	0	0	4	0.28	Up to 5 (0.35) back pressure
5	0.34	3	0.21	9	0.62	Up to 2 (0.14) back pressure
10	0.69	7	0.48	15	1.03	Minimum 3 (0.21) Reseal pressure
25	1.72	20	1.38	30	2.07	Mini mum 17 (1.2) Reseal pressure

Sour Gas Service

Materials of VH36 series valves for sour gas service are selected in accordance with the requirements of NACE MR0175

- Spring : alloy X-750/AMS5699
- Nominal Cracking Pressure : 1/3, 1, and 5 psig (0.03, 0.07 and 0.035 bar)
- Seal : ethylene propylene.

To order, insert-SG in the ordering number.
i.e., VH36B-D-8T-SG-S

Ordering Information and Dimensions

Basic Ordering Number		End Connections	Cv	Dimensions mm (in.)				Pressure Rating psig (bar)
				L	L1	H	h	
VH36A- VCH36A-	D-2T-	1/8 in. DK-Lok	0.67	57.7 (2.27)	26.4 (1.04)	11.11 (7/16)	11/16	6000 (413)
	D-4T-	1/4 in. DK-Lok		61.7 (2.43)	26.4 (1.04)	14.29 (9/16)		
	D-6M-	6 mm DK-Lok		61.7 (2.43)	26.4 (1.04)	14		
	F-4N-	1/4 in. Female NPT		54.1 (2.13)	-	-		
	M-2N-	1/8 in. Male NPT		45.5 (1.79)	26.4 (1.04)	-		
	M-4N-	1/4 in. Male NPT		55.1 (2.17)	26.4 (1.04)	-		
VH36B- VCH36B-	D-6T-	3/8 in. DK-Lok	1.8	69.9 (2.75)	31.2 (1.23)	17.46 (11/16)	1	6000 (413)
	D-8T-	1/2 in. DK-Lok		75.2 (2.96)	31.2 (1.23)	22.22 (7/8)	1	
	D-8M-	8 mm DK-Lok		68.6 (2.70)	31.2 (1.23)	16	1	
	D-10M-	10 mm DK-Lok		71.1 (2.80)	31.2 (1.23)	19	1	
	D-12M-	12 mm DK-Lok		75.2 (2.96)	31.2 (1.23)	22	1	
	F-6N-	3/8 in. Female NPT		64.8 (2.55)	-	-	1	5300 (365)
	F-8N-	1/2 in. Female NPT		77.0 (3.03)	-	-	1-1/16	4900 (337)
	M-6N-	3/8 in. Male NPT		59.9 (2.36)	31.2 (1.23)	-	1	6000 (413)
	M-8N-	1/2 in. Male NPT		69.3 (2.73)	31.2 (1.23)	-	1	
VH36C- VCH36C-	D-12T-	3/4 in. DK-Lok	4.7	89.4 (3.52)	45.2 (1.78)	28.58 (1-1/8)	1-5/8	5000 (344)
	D-16T-	1 in. DK-Lok		98.6 (3.88)	45.5 (1.79)	38.1 (1-1/2)		4700 (323)
	D-22M-	22 mm DK-Lok		88.4 (3.48)	45.5 (1.79)	32		4900 (337)
	D-25M-	25 mm Dk-Lok		98.6 (3.88)	45.5 (1.79)	40		4600 (316)
	F-12N-	3/4 in. Female NPT		82.0 (3.23)	82.0 (3.23)	-		4600 (316)
	F-16N-	1 in. Female NPT		97.3 (3.83)	97.3 (3.83)	-		4400 (303)
	M-12N-	3/4 in. Male NPT		83.6 (3.29)	45.5 (1.79)	-		5000 (344)
	M-16N-	1 in. Male NPT		93.2 (3.67)	45.7 (1.80)	-		

How to Order

Select valve basic ordering number, applicable seal, spring nominal cracking pressure, and body material.

V33A-D-4T- **BN-** **1/3-** **S**
VP33B-F-8N- **VT-** **1-** **B**
VH36C-D-16T- **EP-** **3-** **S**

Seal Material Designator	Spring Nominal Cracking Pressure Designator	Valve Body Material Designator
FKM : Nil for SS316 Valve **NBR** : Nil for Brass Valve **HNBR** : Nil for VCH36 CNG valves **FKM** : VT **NBR** : BN **EPDM** : EP **FFKM** : KZ	**1/3** : 1/3 psig **1** : 1 psig **3** : 3 psig **10** : 10 psig **25** : 25 psig **Note** : Select the spring designator from Table 1, 2, 3 and 4 of each valve Series.	**S** : 316 stainless steel **B** : Brass (exceptional VH36 Series)

Spare Kits for Field Assembly

Spring

Prefix "9SPR" and select an applicable valve series and the designator of the spring nominal cracking pressure.
9SPR-(Valve series)-(spring designator)-2
Example : 9SPR-V33A-1/3-2

How to order VH36 Series spring kit.

VH36 spring kit contains a spring and an indicator ring.
Select an applicable valve series and the designator of the spring nominal cracking pressure.
(Valve series)-RINGSPR-(spring designator)-SA
Example : VH36A-RINGSPR-5-SA

O-ring

Prefix "9ORG", select an applicable valve series and seal material designator.
Example : 9ORG-V33A-BN

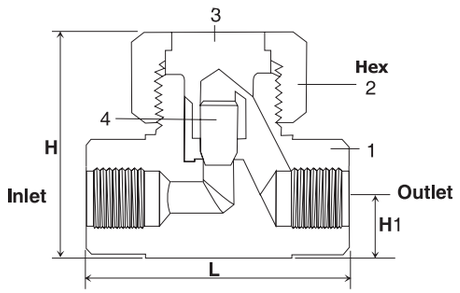
How to order VH36 Series seal kit.

VH36 seal kit contains (Refer to VH36 Materials of Construction) #4. Poppet with bonded seal, #7. O-ring and #8. Backup ring.
Select an applicable valve series and seal material designator
SK-(valve series)-(seal material designator)
Examples : SK-VH36A-VT, SK-VH36B-BN.

VL36 Series Lift Check Valves

Features

- Working pressure up to 6,000 psig (413 bar)
- Temperature up to 900 °F (482 °C)
- Metal to metal seat



Operation

- Operation of this valve heavily depends on gravity assistance. Thus mounting horizontally with bonnet nut upward to allow poppet to operate vertically.
- Reverse flow closes the valve, keeping poppet in the orifice.
- Forward flow opens the valve, lifting the poppet
- Lift check valve is primarily for use in liquid systems. If a slight amount of leakage can be tolerated it can be used with heavy gases.
- Reverse flow Cv is limited to less than 0.1% of forward Cv.

Materials of Construction

Component	Valve Body Material
	Stainless Steel
	Material Grade/ASTM
1. Body	SS316/A276 or A479
2. Bonnet Nut	SS316/A276 or A479
3. Bonnet	TYPE630/A564
4. Poppet	SS316/A276 or A479

Complete Ordering Number and Dimensions

Complete Ordering Number		End Connection	Orifice		Cv	Dimensions mm (in.)			
			mm	inch		L	H	H1	Hex
VL36A-	D4T-S	1/4 in. DK-Lok	4.0	0.156	0.30	61.0 (2.40)	37.3 (1.47)	9.9 (.39)	7/8
	D6M-S	6 mm DK-Lok							
	F2N-S	1/8 in. Female NPT				50.8 (2.00)			
	F4N-S	1/4 in. Female NPT				46.0 (1.81)			
	SW4T-S	1/4 in. Tube Socket Weld							
VL36B-	D6T-S	3/8 in. DK-Lok	6.4	0.250	0.64	71.9(2.83)	47.0 (1.85)	12.7 (.50)	1 1/4
	F4N-S	1/4 in. Female NPT				57.2 (2.25)			
	SW6T-S	3/8 in. Tube Socket Weld							
	SW8T-S	1/2 in. Tube Socket Weld							
VL36C-	D8T-S	1/2 in. DK-Lok	11.1	0.437	2.20	99.6 (3.92)	62.0 (2.44)	15.7 (.62)	1 1/2
	D12T-S	3/4 in. DK-Lok							
	F6N-S	3/8 in. Female NPT				79.2(3.12)			
	F8N-S	1/2 in. Female NPT							
	SW8T-S	1/2 in. Tube Socket Weld				79.5 (3.13)			

How to order : Select a complete ordering number. i.e., VL36A-D-4T-S.

Pressure-Temperature Ratings

ASME Class	2500
Material Group	2.2
Material Name	SS316
Temp. °F (°C)	Working Pressure psig (bar)
-65 to 100 (-53 to 37)	6000 (413)
200 (93)	5160 (355)
300 (148)	4660 (321)
400 (204)	4280 (294)
500 (260)	3980 (274)
600 (315)	3760 (259)
700 (371)	3600 (248)
800 (426)	3460 (238)
900 (482)	3280 (225)

All dimensions shown are for reference only and subject to change. Dimensions with DK-LOK are in finger-tight position.
We reserve the right to change specification stated in this catalog for our continuing program of product improvemenr.

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 responsibillty of the system designer and the user. DK-Lok accepts no liability for any improper selection, installation, operation or maintenance.

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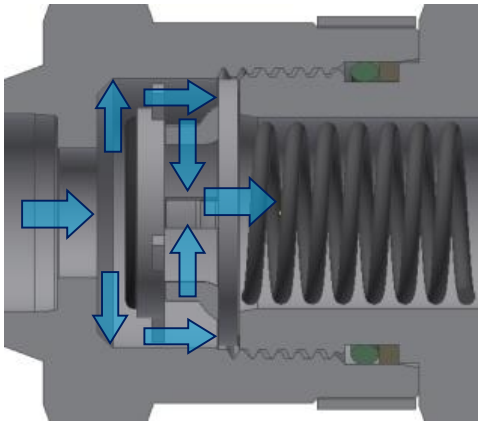
Annex 5 – DK-Lok Check Valve service instructions

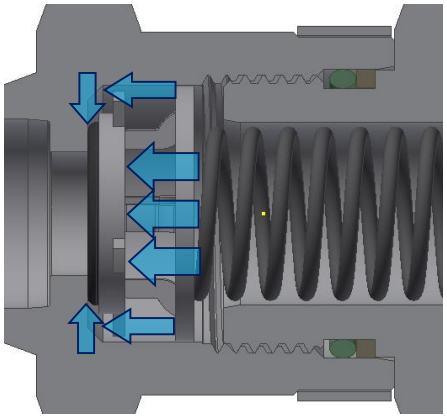
VCH36 Series Check Valves, Service Instructions

<Features>

- **Forward flow opens the poppet. [Spring force < cracking pressure].** ***<View 1>***
- **Poppet Reverse flow closes the valve, keeping poppet in the orifice.** ***<View2>***
- **Maximum working pressure 6,000 psig @100°F(413 bar @38°C) .**
- **Cracking Pressure : Valve poppet is actuated when the pressure difference between the inlet (upstream) and the outlet (downstream) reaches the range of cracking pressure.**
- **Reseal Pressure : Valves that have higher cracking pressure can be resealed to bubble-tight by the spring force. The reseal pressure is the pressure at the same flow direction, but lower than the cracking pressure.**
- **Back Pressure : Valves that have cracking pressure of 5 psig (0.34 bar) and lower may not be able to return to the bubble-tight seal. This may require back pressure to press the seal to form a bubble-tight contact in addition to the spring force.**



<View 1> Valve of Open position
[Spring force < Cracking pressure]



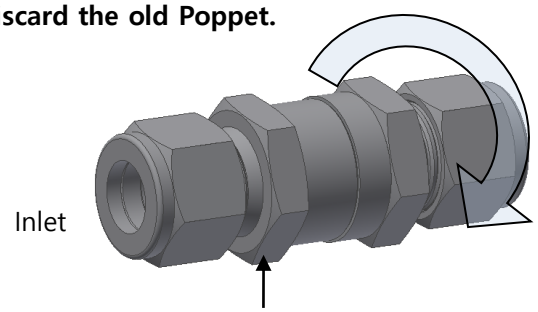
<View2> Valve of Close position
[Reverse pressure & Spring force > operating pressure]

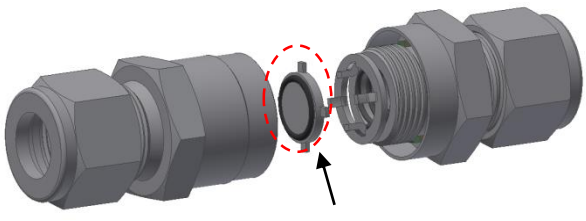
<Poppet Maintenance>

1. Isolate the Inlet Body from the Outlet Body.

2. Discard the old Poppet.

<Caution>
Be careful of the poppet surface.





Replace the poppet

*** Hex. Size of Inlet & Outlet Body [Reference]**

VCH36A	VCH36B	VCH36C
11/16[in.]	1[in.]	1-5/8[in.]

VCH36 Series Check Valves, Service Instructions

<Check Valves 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 figer-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 Check Valves >

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.**