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~~Approval withdrawn~~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*0087*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]
~~Pressure relief device (PRD) (temperature triggered)~~[2]
~~Manual valve~~[2]
~~Flexible fuel lines~~[2]
Filling unit or receptacle[2] ***Type: DK-Lok Receptacle***
~~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*0087*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:	***10.10.2023***
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:	***23-00024-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	Approval granted/ ~~refused~~/ ~~extended~~/ ~~withdrawn~~[2]:	***Granted***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:	***25th October, 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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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]	***N/A***
1.8.2.	Material:	***N/A***

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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]	***341 bar @ 120°C***
1.12.2.	Material:	***SS 316***
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/***

[1] Specify the tolerance

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Approval No: ***E24*110R05/00*0087*00***

Index to the Information Package

Date of issue:	***25th 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):	***23-00024-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:	***23 pages***

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Approval No: ***E24*110R05/00*0087*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

23-00024-IS-MUC-00

About the Tests of CNG Receptacle 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*0087 “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:	CNG Receptacle
2.	Make:	DK-Lok Corporation
3.	Type: Variant(s):	DK-Lok Receptacle RCQA 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: 248,2 bar @ 15°C Maximum Working Pressure: 341 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_23-00024-IS-MUC-00_Application)
- Declaration by the Manufacturer, dated 2023.08.06
  (file: D02023.09.11_DK-Lok Corporation_23-00024-IS-MUC-00_decl. by manuf)
- Essential Characteristics acc. to ECE R 110, Annex 1A
  (file: BB2023.09.11_DK-Lok Corporation_23-00024-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 Receptacle test samples* (file: DO2023.09.11_DK-Lok Corporation_23-00024-IS-MUC-00_Test samples) and *Annex 1 – DK-Lok Receptacle test results* (file: PB2023.09.11_DK-Lok Corporation_23-00024-IS-MUC-00_Test results).

The DK-Lok Receptacle scope of approval includes all Variants listed in the present report in the various configurations as depicted in *Annex 4 – DK-Lok Receptacle catalogs* (file DO2023.09.11_DK-Lok Corporation_23-00024-IS-MUC-00_Catalogs).

IV Approval History

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

	Type	Variant(s)	Content of Extension(s)	MAWP (bar)	Temp (°C)	Report No. and Date
Initial testing	DK-Lok Receptacle	RCQA Series	N/A	341	-40 to +120	Annex 1_23-00024-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. 23-00024-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 Receptacle test results
- Annex 2 – DK-Lok Receptacle drawings
- Annex 3 – DK-Lok Receptacle test samples
- Annex 4 – DK-Lok Receptacle catalogs
- Annex 5 – DK-Lok Receptacle service instructions.

Annex 1 – DK-Lok Receptacle 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 Receptacle 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 341 bar = 511,5 bar	At hand.
Annex 5B	External leakage	3X Receptacle 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 511,5 bar	At hand.
Annex 5C	Internal leakage	3X Receptacle 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 511,5 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 Receptacle 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.

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 4F para 3.6	Durability	3X Receptacle of each Variant described in Annex 3 of this report	Leak free according to Annex 5B after gas cycling from 0 to 248,2 bar; 19200 cycles (Actual minimum required is 10000 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 Receptacle 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 Receptacle 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 511,5 bar	At hand.
Annex 4F para 4.	CNG Filling unit dimensions	3X Receptacle of each Variant described in Annex 3 of this report	Dimensional specifications shall meet the requirements	OK Dimensions are compliant	At hand.

The non-metallic materials tested and approved for the CNG DK-Lok Receptacle Variant(s) listed in the test report 23-00024-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

Auto Service

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.

E24*110R05/00*0087*00

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
	1.2.4.5.10. Filling unit or receptacle:	Yes
	1.2.4.5.10.1. Make(s):	DK-Lok Corporation
	1.2.4.5.10.2. Type(s):	DK-Lok Receptacle Variant(s): RCQA Series
	1.2.4.5.10.3. Working pressure(s):	341 bar @ 120ºC
	1.2.4.5.10.4. Description and drawings:	Filling unit or receptacle for CNG RCQA Series (ECER110) Rev. 0
	1.2.4.5.10.5. Material:	SS 316
	1.2.4.5.10.6. Operating temperatures:	-40ºC to 120ºC

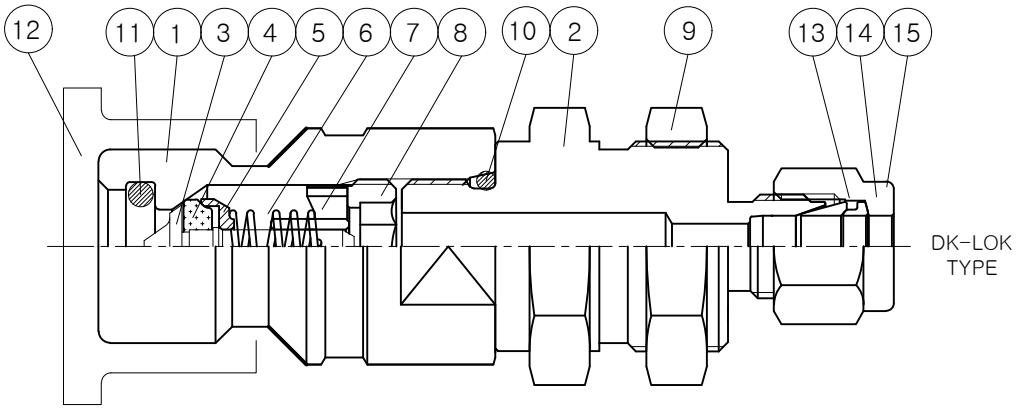
2023.09.11.

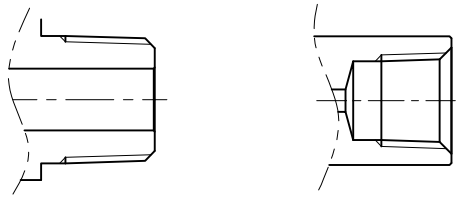
Technischer Dienst Technical Service TÜV SÜD Auto Service GmbH 179

Annex 2 – DK-Lok Receptacle drawings

DWG. NO.	RCQA SERIES

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

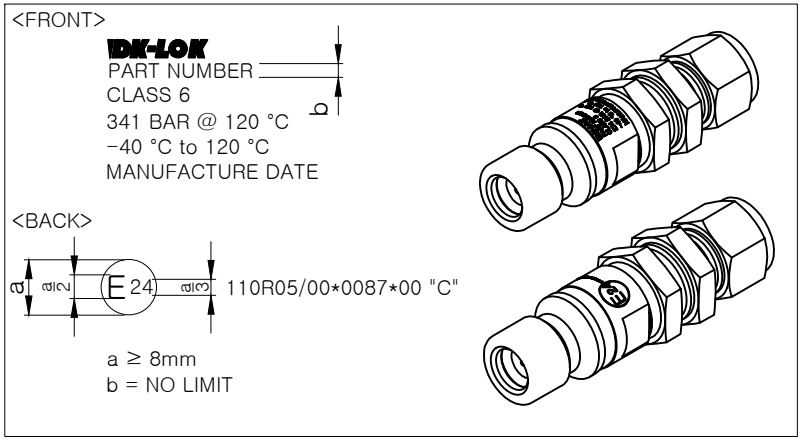




MALE THREAD TYPE

FEMALE THREAD TYPE

MARKING



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

*TECHNICAL DATA

VALVE SERIES		MP PRESSURE RATING at 38°C(100°F)	TEMPERATURE RATING °C (°F)
RCQA	P30	3,000 psig (200 bar)	-40 to 120°C (-40 to 250°F)
	P36	3,600 psig (250 bar)	

NO.	DESCRIPTION	MATERIAL	Q'TY
15	NUT	ASTM A 276 TYPE316	1
14	BACK FERRULE	ASTM A 479 TYPE316	1
13	FRONT FERRULE	ASTM A 479 TYPE316	1
12	DUST CAP	SBR	1
11	O-RING	HNBR	1
10	O-RING	HNBR	1
9	PANEL NUT	ASTM A 276 TYPE316	1
8	INSERT	ASTM A 276 TYPE316	1
7	SUPPORT	ASTM A 276 TYPE316	1
6	SPRING	STAINLESS STEEL 302	1
5	SEAL COVER	ASTM A 276 TYPE316	1
4	SEALING	HNBR	1
3	STOPPER	ASTM A 276 TYPE316	1
2	CONNECTOR	ASTM A 276 TYPE316	1
1	BODY	ASTM A 276 TYPE316	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

APPROVED	S.H.Cho	TITLE
REVIEWED		RCQA SERIES RECEPTACLE
DESIGNED	K.H.Lee	
SCALE	N/S	
DATE	2023.01.27	
DWG. NO.	RCQA SERIES (ECER110)	DK-LOK Fittings & Valves

E24*110R05/00*0087*00

Annex 3 – DK-Lok Receptacle test samples

Annex 3 of Test Report 23-00024-IS-MUC-00		
Type	**Variant(s)**	**Test samples (3 units in each configuration)**
DK-Lok Receptacle	RCQA Series	- RCQA 6mm DK-Lok - P36 - RCQA 7/8-14 SAE - P30

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

NGV Products

RCQ series Receptacle RCQB is not in the approval scope

Catalog No. RCQ-3
March 2023

DK-LOK RCQ series receptacles fully comply with and are certified to the ANSI/AGA/CGA/ NGV1 and ECE R110 standards for Compressed Natural Gas Vehicles (NGV) fueling connection devices.

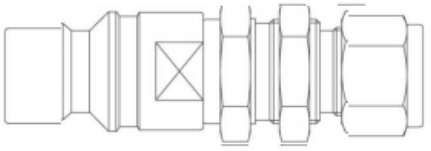
DK-LOK RCQ series receptacle is designed for permanent mounting on a compressed natural gas vehicle (NGV).

DK-LOK RCQA receptacle utilizes the NGV 1 profile which allows a)mplete interchangeability to any fueling nozzles conforming to the NGV 1 standard.

Features

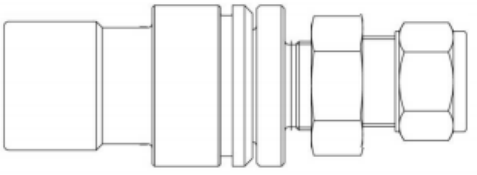
- RCQA series Receptacle design to meet the NGV1 profiles and delivered with integrated non-contact check valve.
- RCQA series Receptacle complies with NGV1 in dimension and performance.
- RCQB series is specifically designed for CNG refueling of bus and truck and delivered with integrated particle filter of 50 micron and non-contact check valve.
- RCQA and RCQB series are for fast-fill and time-fill dispensing.

RCQA Series Profile



RCQA series is designed for CNG refueling of cars.

RCQB Series Profile



RCQB series is specifically designed for CNG refueling of buses and trucks.

Pressure - Temperature Rating for CNG Service

Valve Series	Certificates	ECE R110	ANSI/CSA NGV 1-2017
RCQA Series Receptacle	Certificate No.	E24*110R05/00*0083	72160895-NGV1
	Classification	Class 6	manual valve
	Temperature	-40 to 120 °C (-40 to 250 °F)	-40 to 120 °C (-40 to 250 °F)
	Pressure	W.P 341bar @ 120 °C	S.P 250 bar @ 21 °C

Factory Test

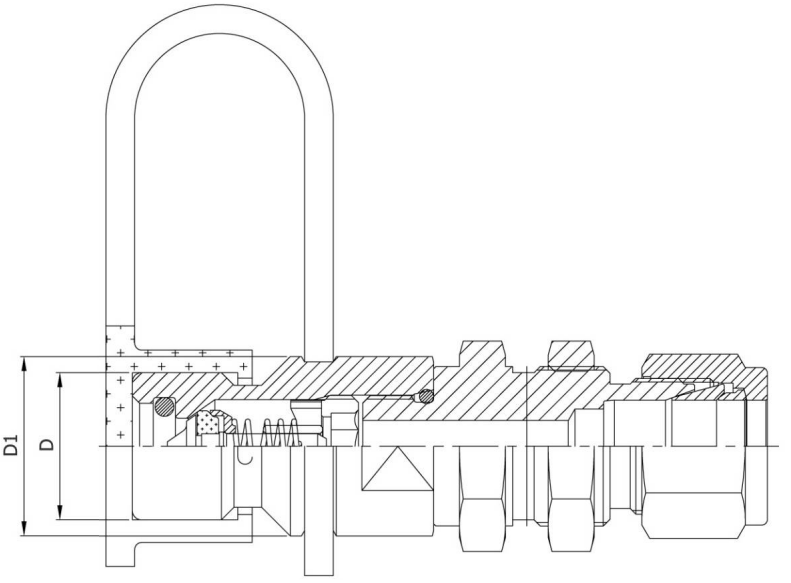
Every receptacle is factory tested with nitrogen @ 1000 psig (68 bar) for no detectable leakage on sealing and shell integrity.

Cleaning

Every receptacle is cleaned and packaged in accordance with the requirements of our cleaning standard of DC-01.

Technical Data

Subjects	RCQA series	RCQB series
D	20.5 mm	32 mm
DI	P30: 25 mm P36: 24 mm	35 mm
Working Pressure	P30 and P36 NGV1 profiles P30 (3000 psi, 200 bar) P36 (3600 psb 250 bar) Working pressure is maintained both in connection and disconnection position.	3900 psi (273 bar) Working pressure is maintained both in connection and disconnection position.
Temperature	- 40 to 120 °C (-40 to 250 °F)	
Rated Flow	1500 scfm	3600 scfm
Internal Orifice Area	0.075 in^2 (0.48 cm^2)	0.23 in^2 (1.49 cm^2)
Weight	90 gram (0.20 lbs)	450 gram (0.99 lbs)
Internal Check Valve	Included as standard.	Included as standard.
Particle Filter	Not applicable	Particle Filter of 50 micron included as standard.



Materials of Construction

Body: 316 Stainless steel
Connector: 316 Stainless steel

Internal components: stainless steel
Seals: Natural gas compatible HNBR

Dust protection cap:
Low temperature Nitrile compound.

- Receptacle is constructed out of high strength cold drawn 316 stainless steel bar.
- Internal check valve provides unidirectional flow to vehicle from dispenser.
- Self-centering check valve poppet makes sure of positive sealing.
- Non-barrel type design of check valve poppet reduces sticking caused by icing or contamination in the valve.
- Delivered with standard dust protection cap.

Safety

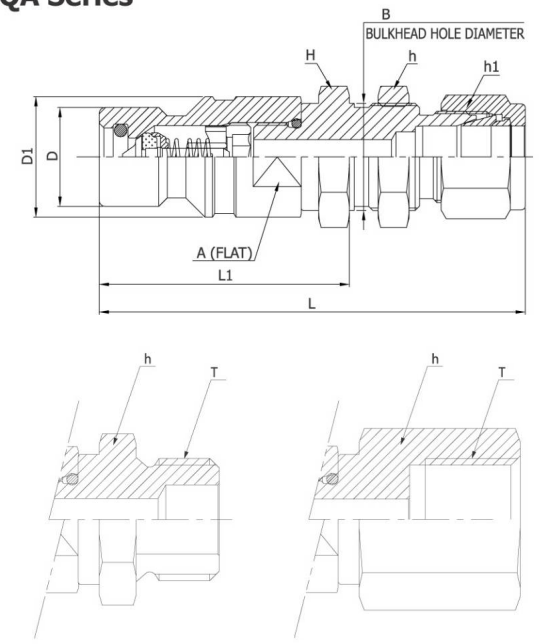
Key system prevents higher pressure fueling nozzle from connecting onto lower pressure receptacle.

Fueling nozzle for higher pressure P36 (3600 psi) receptacle mechanically not accepts connection with lower pressure P30 (3000 psi) receptacle. However fueling nozzle for lower pressure P30 receptacle accepts mechanically connection with higher pressure P36 receptacle.

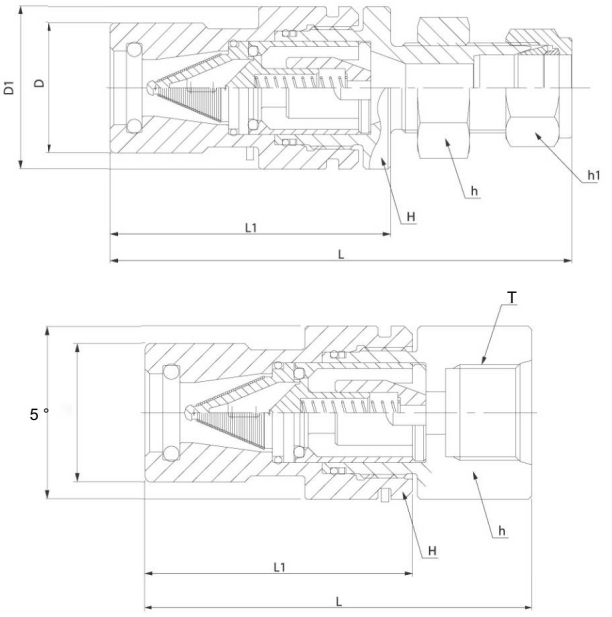
Operation

- RCQA series receptacle is compatible with any fueling nozzle conforming to the NGV1 standard.
- RCQA series is available in different service pressures of 3000 psi and 3600 psi.
- Internal check valve prevents flow while fueling nozzle is disconnected.
- Designed for time-fill and fast-fill.
- Cycle tested to withstand more than 20,000 connections.
- RCQB is recommended for refueling of heavy vehicles.

RCQA Series



RCQB Series



Ordering Numbers and Dimensions

Ordering Number			End Connection	Dimensions								Unit: mm
			Receptacle Bulkhead DK-LOK	D	D1	L	L1	A(Flats)	H	h	hi	B
RCQ	A-	P30-	D4T-S	1/4" DK-LOK	20.5	25	84.4	52	20.6	25.4	25.4	14.28	22.22
			D6T-S	3/8" DK-LOK			85.9					17.46	
			D8T-S	1/2" DK-LOK			88.4					22.22	
			D6M-S	6 mm DK-LOK			84.3					14	
			D8M-S	8 mm DK-LOK			85.2					16	
			D10M-S	10 mm DK-LOK			86.1					19	
			D12M-S	12 mm DK-LOK			88.6					22	
			Receptacle M ale Thread										
			M8G-S	1/2" Male ISO 228-1 (BSPP)	20.5	25	66.2	52	20.6	25.4	-	-	-
			M10U-S	7/8-14 SAE J514 Male with O-Ring			64.7				-	-	-
			MAN6-S	9/16-18 SAE J514 Male for 3/8" OD			67.1				-	-	-
			MAN6LH-S	9/16-18 SAE J514 Male left-handed thread for 3/8" OD			67.1				-	-	-
			Receptacle Female Thread										
			F8G-S	1/2" Female ISO 228-1 (BSPP)	20.5	25	71.9	52	20.6	25.4	-	-	-
		P36-	**Receptacle Bulkhead DK-LOK**										
			D4T-S	1/4" DK-LOK	20.5	24	84.4	52	20.6	25.4	25.4	14.28	22.22
			D6T-S	3/8" DK-LOK			85.9					17.46	
			D8T-S	1/2" DK-LOK			88.4					22.22	
			D6M-S	6 mm DK-LOK			84.3					14	
			D8M-S	8 mm DK-LOK			85.2					16	
			D10M-S	10 mm DK-LOK			86.1					19	
			D12M-S	12 mm DK-LOK			88.6					22	
			Receptacle Female Thread										
			F8G-P30-S	1/2" Female ISO 228-1 (BSPP)	2051 —24—r7L9 ~~52—| 20.6 | 25.4 | —"':—| —:—□——								-
			Receptacle Bulkhead DK-LOK										
		B-	D8T-S	1/2" DK-LOK	32	35	115	70	34	34	30	22.22	22.2
			D10T-S	5/8" DK-LOK			115					25.4	
			D12M-S	12 mm DK-LOK			115					22	
			D16M-S	16 mm DK-LOK			115					25	
			Receptacle Internal Thread										
			F10U-S	7/8-14 internal thread SAE Boss J1926	32	35	90	62	34	34	30	-	-

How to order

RCQB series is supplied with particle filter of 50 micron and internal check valve as standard. To order receptacle with no particle filter, insert NF in the ordering number. Example: RCQB-D16M-NF-S

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 Receptacle service instructions

RCQA Series Series Receptacle, Service Instructions

<Features>

DK-Lok RCQA series receptacles fully comply with and are certified to the ANSI/AGA/CGA/ NGV1 and ECE R110 standards for Compressed Natural Gas Vehicles (NGV) fueling connection devices.

DK-Lok RCQA series receptacle is designed for permanent mounting on a compressed natural gas vehicle (NGV).

DK-Lok RCQA receptacle utilizes the NGV 1 profile which allows complete interchangeability to any fueling nozzles conforming to the NGV 1 standard

RCQA series Receptacle design to meet the NGV1 profiles and delivered with integrated non-contact check valve.

RCQA series Receptacle complies with NGV1 in dimension and performance.

RCQA series are for fast-fill and time-fill dispensing.

<Safety>

Key system prevents higher pressure fueling nozzle from connecting onto lower pressure receptacle.

Fueling nozzle for higher pressure P36 (3600 psi) receptacle mechanically not accepts connection with lower pressure P30 (3000 psi) receptacle. However fueling nozzle for lower pressure P30 receptacle accepts mechanically connection with higher pressure P36 receptacle

<Operation>

- RCQA series receptacle is compatible with any fueling nozzle conforming to the NGV1 standard.
- RCQA series is available in different service pressures of 3000 psi and 3600 psi.
- Internal check valve prevents flow while fueling nozzle is disconnected.
- Designed for time-fill and fast-fill.
- Cycle tested to withstand more than 20,000 connections.

RCQA Series Series Receptacle, Service Instructions

<*Receptacle* 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 *Receptacle*>

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.