

Technischer Bericht
Nr. 07-7109-00-01

Manufacturer's name and address: Hy-Lok Corporation
1467-1, Songjeong-Dong
Gangseo-Gu, Busan 618-817
South Korea

Trade name or mark: Hy-Lok

Type: QC2CB-XXX

CNG component: receptacle
Class according to R110: 0

Applicable regulation(s): ECE R110, CORRIGENDUM 2
State of the art


Test report: Test report 02-6/07 of TÜV Saarland automobil GmbH


Final statement:

The requirements of the ECE R 110 are met. There are no safety related technical objections.
The use of the manual valve in CNG driven vehicles is supported.

Laboratory „Technologiezentrum Typprüfstelle Lambsheim des TÜV Pfalz Verkehrswesen GmbH“ of the
„Akkreditierungsstelle des Kraftfahrt-Bundesamtes“, Bundesrepublik Deutschland.
DAR-Registrier-Nr.: KBA-P 00008-95

Lambsheim, 05/14/2007


Dipl.-Ing. S. Bauermann
Der amtlich anerkannte Sachverständige
für den Kraftfahrzeugverkehr



The circular stamp contains the following text: 'Technologiezentrum Typprüfstelle', 'Lambsheim', 'Sachverständiger', 'für Laboratorium', 'EN 45001', and 'TÜV Pfalz Verkehrswesen GmbH'.



Kraftfahrt-Bundesamt

DE-24932 Flensburg



MITTEILUNG

ausgestellt von:

Kraftfahrt-Bundesamt

über die Genehmigung
für einen Typ eines CNG-Bauteils nach der Regelung Nr. 110

COMMUNICATION

issued by:

Kraftfahrt-Bundesamt

concerning approval granted
of a type of CNG component pursuant to Regulation No. 110

Nummer der Genehmigung: **000166**
Approval No.

Erweiterung:
Extension No.

1. Betreffendes CNG-Bauteil:
CNG component considered:
Einfüllleinrichtung oder -behälter
Filling unit or receptacle
2. Fabrik- oder Handelsmarke:
Trade name or mark:
Hy-Lok
Typ/type: QC2CB-XXX
3. Name und Anschrift des Herstellers:
Manufacturer's name and address:
Hy-Lok Corporation
Gangseo-Gu, Busan 618-817, South Korea
4. Gegebenenfalls Name und Anschrift des Vertreters des Herstellers:
If applicable, name and address of manufacturer's representative:
entfällt
not applicable
5. Zur Genehmigung vorgelegt am:
Submitted for approval on:
21.05.2007



Kraftfahrt-Bundesamt

DE-24932 Flensburg

2

Nummer der Genehmigung: 000166
Approval No.:

6. Technischer Dienst, der die Prüfungen für die Genehmigungen durchführt:
Technical service responsible for conducting approval tests:
Technischer Überwachungs-Verein Pfalz Verkehrswesen GmbH
DE-67245 Lamsheim
7. Datum des Gutachtens des Technischen Dienstes:
Date of report issued by that service:
14.05.2007
8. Nummer des Gutachtens des Technischen Dienstes:
Number of report issued by that service:
07-7109-00-01
9. Die Genehmigung wird **erteilt**
Approval **granted**
10. Grund oder Gründe für die Erweiterung der Genehmigung:
Reason(s) of extension of approval:
entfällt - not applicable
11. Ort - Place: **DE-24932 Flensburg**
12. Datum - Date: **30.05.2007**
13. Unterschrift: **Im Auftrag**
Signature:

(Hansen)



14. Die mit dem Antrag auf Erteilung einer Genehmigung oder Erweiterung eingereichten Unterlagen sind auf Anforderung erhältlich.
The documents filed with the application or extension of approval can be obtained upon request.



Kraftfahrt-Bundesamt

DE-24932 Flensburg

3

Nummer der Genehmigung: 000166
Approval No.:

Anlage Appendix

zur ECE-Typgenehmigungs Mitteilung Nr. 000166
to ECE type-approval certificate No.

1. Zusätzliche Angaben zur Typgenehmigung eines Typs eines CNG-Bauteils nach der
Regelung Nr. 110
Additional information concerning the type approval of a type of CNG components
pursuant to Regulation No. 110

- 1.12. Füllanschluß
Filling unit or receptacle

- 1.12.1 Arbeitsdruck (Arbeitsdrücke): 273 bar; 27,3 MPa bei/at 120°C
Working pressure(s):

- 1.12.2 Werkstoff:
Material: Gehäuse: Edelstahl 316
Body: Stainless Steel 316

Dichtungen: NBR
Seals: NBR



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Nr. der Genehmigung: 000166

Approval No.:

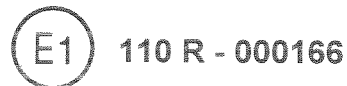
- Anlage -

Nebenbestimmungen und Rechtsbehelfsbelehrung

Nebenbestimmungen

Jede Einrichtung, die dem genehmigten Typ entspricht, ist gemäß der angewendeten Vorschrift zu kennzeichnen.

Das Genehmigungszeichen lautet wie folgt:



Die Einzelerzeugnisse der reihenweisen Fertigung müssen mit den Genehmigungsunterlagen genau übereinstimmen. Änderungen an den Einzelerzeugnissen sind nur mit ausdrücklicher Zustimmung des Kraftfahrt-Bundesamtes gestattet.

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Das Kraftfahrt-Bundesamt kann jederzeit die ordnungsgemäße Ausübung der durch diese Genehmigung verliehenen Befugnisse, insbesondere die genehmigungsgerechte Fertigung, nachprüfen. Es kann zu diesem Zweck nach den Regeln der zugrundeliegenden Vorschriften Proben entnehmen oder entnehmen lassen.

Die mit der Erteilung der Genehmigung verliehenen Befugnisse sind nicht übertragbar. Schutzrechte Dritter werden durch diese Genehmigung nicht berührt.

Rechtsbehelfsbelehrung

Gegen diese Genehmigung kann innerhalb eines Monats nach Bekanntgabe Widerspruch erhoben werden. Der Widerspruch ist beim **Kraftfahrt-Bundesamt, Fördestraße 16, DE-24944 Flensburg**, schriftlich oder zur Niederschrift einzulegen.



Kraftfahrt-Bundesamt

DE-24932 Flensburg

2

Nummer der Genehmigung: 000166

Approval No.:

- Attachment -

Collateral clauses and instruction on right to appeal

Collateral clauses

All equipment which corresponds to the approved type is to be identified according to the applied regulation.

The approval identification is as follows: - see German version -

The individual production of serial fabrication must be in exact accordance with the approval documents. Changes in the individual production are only allowed with express consent of the Kraftfahrt-Bundesamt.

Changes in the name of the company, the address and the manufacturing plant as well as one of the parties given the authority to delivery or authorised representative named when the approval was granted is to be immediately disclosed to the Kraftfahrt-Bundesamt.

Breach of this regulation can lead to recall of the approval and moreover can be legally prosecuted.

The approval expires if it is returned or withdrawn or if the type approved no longer complies with the legal requirements. The revocation can be made if the demanded requirements for issuance and the continuance of the approval no longer exist, if the holder of the approval violates the duties involved in the approval, also to the extent that they result from the assigned conditions to this approval, or if it is determined that the approved type does not comply with the requirements of traffic safety or environmental protection.

The Kraftfahrt-Bundesamt can at any time check the proper exercise of the conferred authority taken from this approval, in particular the approving standards. For this purpose, samples can be taken or have taken according to the rules of the underlying regulations.

The conferred authority contained with issuance of this approval is not transferable. Trade mark rights of third parties are not affected with this approval.

Instruction on right to appeal

This approval can be appealed within one month after notification. The appeal is to be filed in writing or as a transcript at the **Kraftfahrt-Bundesamt, Fördestraße 16, DE-24944 Flensburg.**

Test Report 02-6/07

Manufacturer's name and address: Hy-Lok Corporation
1467-1, Songjeong-Dong
Gangseo-Gu, Busan 618-817
South Korea

Trade name or mark: Hy-Lok

Type: QC2CB-XXX

CNG component: receptacle
Class according to R110: 0

Applicable regulation(s): ECE R110, CORRIGENDUM 2
State of the art

CONTENTS

1	Considered specific component	3
2	receptacle, type QC2CB-XXX	3
2.1	Intended use	3
2.2	Design	3
2.3	Materials	3
3	Documents to the approval	3
4	Applicable regulations	4
5	Performed Tests	4
6	Conclusion	6

1 Considered specific component

With its request dated 04/17/2007 the manufacturer Hy-Lok Corporation, 1467-1, Songjeong-Dong, Gangseo-Gu, Busan 618-817, South Korea, applies for the approval of the specific component "receptacle", type QC2CB-XXX, according to the ECE regulation 110.

The mandatory tests are based on the requirements of the ECE R110 including CORRIGENDUM 2. They were performed by TÜV Saarland automobil GmbH and witnessed by the authorized Technical Service TÜV Pfalz Verkehrswesen GmbH.

2 receptacle, type QC2CB-XXX

2.1 Intended use

The receptacle is a device fitted in the vehicle external or internal (engine compartment) used to fill the container in the filling station.

Operating Temperatures:	-40°C <—> +120°C
Service Pressure:	200 bar / 20 MPa at 15°C
Working Pressure:	273 bar / 27.3 MPa at 120°C
Class according to R110:	0

2.2 Design

The specific component „receptacle“ is designed as a NGV1 filling unit with an integrated check-valve and CNG filter, see technical drawing 2006K02L01, rev. 0. The filter was separately tested (see report 02-1/07 TÜV Saarland automobil GmbH).

The following table shows the possible variants:

type	extension	end connections dimensions	
		tube diameter [mm]	description
QC2CB	-8	12.7	1/2"
	-10	15.9	3/8"
	-12M	12	12 mm
	-16M	16	16 mm

2.3 Materials

The materials to be used including material data and the manufacturing/production parameters are fixed in the manufacturer's documentation and, if adequate, the technical drawings respectively. Reference is made to the technical drawing 2006K02L01, rev. 0. and the related parts list.

Body and components in contact with gas:	Stainless Steel 316
Seals:	NBR

3 Documents to the approval

The test report includes the following documents:

Application form for type approval
Technical Drawing with parts list

4 Applicable regulations

ECE R110 including CORRIGENDUM 2

State of the art

5 Performed Tests

Subsequent to a detailed design verification the following test plan was defined and the tests performed. The relevant annex is 4F of the ECE R110.

Table1: Test plan

No.	Test	Annex ECE R110	Result
0	Designprüfung design review	--	successful
1	Überdruckprüfung - Festigkeitsprüfung overpressure test	5A	successful
2	Äußere Dichtheitsprüfung external leakage test	5B	successful
3	Innere Dichtheitsprüfung internal leakage test	5C	successful
4	CNG-/LPG-Beständigkeit CNG / LPG compatibility	5D	successful
5	Korrosionsbeständigkeit corrosion resistance test	5E	successful
6	Beständigkeit gegen trockene Hitze resistance to dry heat	5F	successful
7	Ozonbeständigkeit Ozone ageing	5G	successful
8	Dauerhaltbarkeitsprüfung durability test (continued operation)	5L	successful
9	Schwingungsfestigkeit vibration resistance test	5N	successful

Table no. 1) Überdruckprüfung – Festigkeitsprüfung (overpressure test)

A sample part was tested using 1.5 times the working pressure.

temperature: 20°C

test pressure: 410 bar / 41 MPa

hold time: 60 s

Subsequently a visual inspection and an external / internal leakage tests were done.

result: without objections, successful

Table no. 2) Äußere Dichtheitsprüfung (external leakage test)

The external leakage tests were done according to the provisions given in annex 5B, 2. and 5O at room temperature, the minimum operating temperature and the maximum operating temperature. The pressures used are given in the table below. The hold time was 180 s, the test gas used was Nitrogen.

In total 5 components were tested (a virgin sample and subsequent to the tests according to annex 5A, annex 5E, annex 5L, and annex 5N).

step	temperature [°C]	pressure [bar/MPa]
1	-40	1/0,1 – 27/2,7 – 273/27,3
2	+20	1/0,1 – 27/2,7 – 273/27,3
3	+120	1/0,1 – 27/2,7 – 273/27,3

result: without objections, successful

Table no. 3) Innere Dichtheitsprüfung (internal leakage test)

The tests were conducted on samples which have previously been subjected to the external leak test of annex 5B. The test set-up was according to the provisions given in annex 5C. When in the closed position, the check valve shall not leak when subjected to any aerostatic pressure between 0 and 1.5 times the working pressure.

result: without objections, successful

Table no. 4) CNG-Beständigkeit (CNG compatibility)

The synthetic parts of the filter in contact with CNG, VITON and PTFE, shall not show excessive volume change or loss of weight. Resistance to n-pentane according to ISO 1817 was tested with the following conditions:

- (i) medium: n-pentane
- (ii) temperature: 23 C (tolerance acc. to ISO 1817)
- (iii) immersion period: 72 hours

Requirements: maximum change in volume 20 per cent. After storage in air with a temperature of 40 C for a period of 48 hours the mass compared to the original value may not decrease more than 5 per cent.

result: without objections, successful

Table no. 5) Korrosionsbeständigkeit (corrosion resistance test)

According to the provisions of ISO CD 15500-2 a sample (openings plugged) was tested to prove corrosion resistance.

Subsequently a visual inspection and an external / internal leakage tests were done.

result: without objections, successful

Table no. 6) Beständigkeit gegen trockene Hitze (resistance to dry heat)

The test was done in compliance with ISO 188. The synthetic sample was exposed to air at a temperature equal to the maximum operating temperature for 168 hours. The allowable change in tensile strength should not exceed + 25 per cent. The allowable change in ultimate elongation shall not exceed a maximum increase of 10 per cent and a maximum decrease of 30 per cent.

result: without objections, successful

Table no. 7) Ozonbeständigkeit (Ozone ageing)

The test was in compliance with ISO 1431/1. The synthetic sample, which was stressed to 20 per cent elongation was exposed to air at 40C with an ozone concentration of 50 parts per hundred million during 120 hours. No cracking of the test piece is allowed.

result: without objections, successful

Table no. 8) Dauerhaltbarkeitsprüfung (durability test (continued operation))

The component was connected to a source of pressurised dry air by means of a suitable fitting and subjected to a total of 20,000 cycles: 96% of the cycles were done at room temperature, 2% of the cycles at the maximum operating temperature and the minimum operating temperature respectively. A cycle consisted of one opening and one closing of the component within a period of not less than 10 ± 2 seconds.

Subsequently a visual inspection and an external / internal leakage tests were done.

result: without objections, successful

Table no. 9) Schwingungsfestigkeit (vibration resistance test)

The sample was secured in an apparatus and vibrated for 2 hours at 17 Hz with an amplitude of 1.5 mm (0.06 in.) in each of three orientation axes. On completion of 6 hours of vibration the sample was visually inspected and an external leakage test was done.

Subsequently a visual inspection and an external / internal leakage tests were done.

result: without objections, successful

6 Conclusion

With its request dated 04/17/2007 the manufacturer Hy-Lok Corporation, 1467-1, Songjeong-Dong, Gangseo-Gu, Busan 618-817, South Korea, applies for the approval of the specific component "receptacle", type QC2CB-XXX, according to the ECE regulation 110.

The mandatory tests are based on the requirements of the ECE R110 including CORRIGENDUM 2. They were performed by TÜV Saarland automobil GmbH and witnessed by the authorized Technical Service TÜV Pfalz Verkehrswesen GmbH.

All tests were successful.

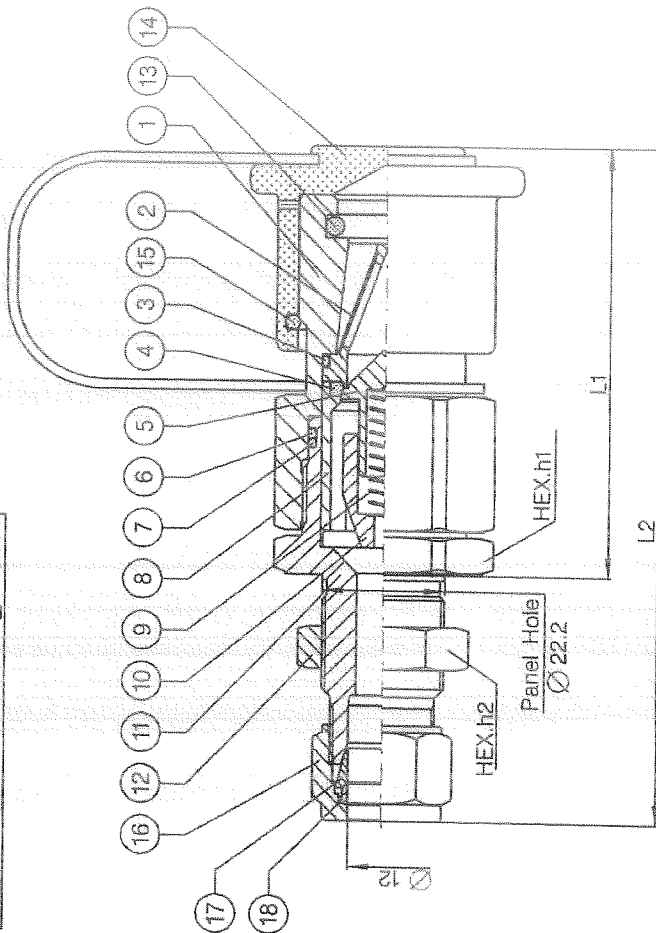
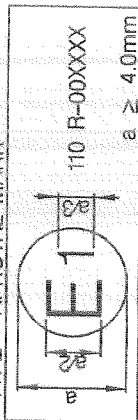
The requirements of the ECE R 110 are met. There are no safety related technical objections.

Saarbrücken, 02/28/2007

Dr.-Ing. Stefan Behrning
aaS, §17 GPSG
TÜV Saarland e.V.



* TYPE - APPROVAL MARK



(unit : mm)

Part No.	End Connections		Dimensions			
	Tube O.D	Description	h1	h2	L1	L2
QC2CB	-8	12.7	36.0	26.9	79.1	124.2
	-10	15.9				
	-12M	12				
	-16M	16				

Specification

1. HY-LOK Corp. Part No. : QC2CB-***
2. Design Pressure Rating : 26MPa(3770psi) @100°F(38°C)
3. Filter Element Filtration : 50Micron
4. ECE R 110 Classification of component : Class 0
5. ECE R 110 Working Pressure Rating : 26MPa(3770psi)
6. ECE R 110 Temperature Rating : -40°F to 248°F(-40°C TO 120°C)

18	CFB-***	BACK FERRULE	ASTM A479 TYPE 316	1
17	OFF-***	FRONT FERRULE	ASTM A479 TYPE 316	1
16	CN-***	NUT	ASTM A479 TYPE 316	1
15	OR2-124	O-Ring	NBR	1
14	QC2DC	DUST CAP	NYLON	1
13	OR2-208	O-RING	NBR	1
12	CLN-10	LOCK NUT	ASTM A479 TYPE 316	1
11	QC2CH-***	CONNECTOR	ASTM A479 TYPE 316	1
10	QC2PPG	POPPET GUIDE	ASTM A479 TYPE 316	1
9	QC2SP	SPRING	ASTM A368 TYPE 302	1
8	QC2SG	SEAT GLAND	ASTM A479 TYPE 316	1
7	KP-U-022SS	BACK-UP RING	PTFE	1
6	OR2-022	O-RING	NBR	1
5	QC2PP	POPPET	ASTM A479 TYPE 316	1
4	OR2-114	O-RING	NBR	1
3	OR2-019	O-RING	NBR	1
2	QC2SE	FILTER	BRASS	1
1	QC2BF-30M	BODY	ASTM A479 TYPE 316	1

NO.	PART NO.	DESCRIPTION	MATL	QTY	REMARK
	MATL	S316	MATL SIZE	Hardness	
	Part No.	QC2CB-***			
	Date	2007.03.27			
	Scale	N / S			
	Approved by	C. M. Kim			
	Reviewed by	K. C. Song			
	Checked by				
	Prepared by	이 용 화			
		Dwg No.	2006K02L01	Rev. No.	0

ASSEMBLY
FOR RECEPTACLE

HY-LOK
HY-LOK CORPORATION

RECEPTACLE PARTS LIST

(Model No. QC2CB-***)

Date :2007.02.06

NO.	Description	Part No.	Mat'l	Size	Manufacturer
1	BODY	QC2BF-30M	ASTM A479 TYPE 316	HEX.36.0	HY-LOK CORPORATION
2	CONNECTOR	QC2CH-***	ASTM A479 TYPE 316	HEX.36.0	HY-LOK CORPORATION
3	FILTER	QC2SE	BRASS	-	HY-LOK CORPORATION
4	O-RING	OR2-019	N70R	I.D20.35 x 1.78T	INTERNATIONAL SEAL
5	O-RING	OR2-114	N70R	I.D15.54 x 2.62T	INTERNATIONAL SEAL
6	POPPET	QC2PP	ASTM A479 TYPE 316	φ 16	HY-LOK CORPORATION
7	O-RING	OR2-022	N70R	I.D25.12 x 1.78T	INTERNATIONAL SEAL
8	BACK-UP RING	KP-U-022SS	DYNEON TF4105 PTFE	-	DYNEON CORPORATION
9	SEAT GLAND	QC2SG	ASTM A479 TYPE 316	φ 23	HY-LOK CORPORATION
10	SPRING	QC2SP	ASTM A313 TYPE 302	φ 0.7	KOSWIRE LTD.
11	POPPET GUIDE	QC2PPG	ASTM A479 TYPE 316	φ 23	HY-LOK CORPORATION
12	LOCK NUT	CLN-10	ASTM A479 TYPE 316	HEX.26.9	HY-LOK CORPORATION
13	O-RING	OR2-208	N70R	I.D15.47 x 3.53T	INTERNATIONAL SEAL
14	DUST CAP	QC2DC	NYLON	-	SHIN SHIN CORPORATION
15	O-RING	OR2-124	N70R	I.D31.42 x 2.62T	INTERNATIONAL SEAL
16	NUT	CN-***	ASTM A479 TYPE 316	-	HY-LOK CORPORATION
17	FRONT FERRULE	CFF-***	ASTM A479 TYPE 316	-	HY-LOK CORPORATION
18	BACK FERRULE	CFB-***	ASTM A479 TYPE 316	-	HY-LOK CORPORATION



하이록코리아주식회사
HY-LOK CORPORATION