

**Documents regarding Approval of**

**CNG Receptacle of class 0**

**Of BMT Co. Ltd. Make**

Approval number: **E4-110R-000310-00**

Report No: **IN110-A0-120037** Dated **16-July-2012**

**Name of technical service**

**TÜV NORD Mobilität GmbH & Co. KG  
Institut für Fahrzeugtechnik und  
Mobilität  
Adlerstr. 7  
D-45307 Essen**

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RDW

Vehicle Technology Division

**THE NETHERLANDS**  
(N E D E R L A N D)



**COMMUNICATION**

Concerning <sup>(1)</sup>:

- approval granted
- ~~- approval extended~~
- ~~- approval refused~~
- ~~- approval withdrawn~~
- ~~- production definitely discontinued~~

of a type of CNG component pursuant to Regulation number 110.

**Approval number: E4-110R-000310**

**Extension number: 00**

1. CNG component considered:

- ~~Container(s) or cylinder(s)~~<sup>(1)</sup>
- ~~Pressure indicator~~
- ~~Pressure relief valve~~
- ~~Automatic valve(s)~~
- ~~Excess flow valve~~
- ~~Gas tight housing~~
- ~~Pressure regulator(s)~~
- ~~Non return valve(s)~~
- ~~Pressure relief device~~
- ~~Manual valve~~
- ~~Flexible fuel lines~~
- Filling unit or receptacle
- ~~Gas injector(s)~~
- ~~Gas flow adjuster~~
- ~~Gas/air mixer~~
- ~~Electronic control unit~~
- ~~Pressure and temperature sensor(s)~~
- ~~CNG filter(s)~~

2. Trade name or mark

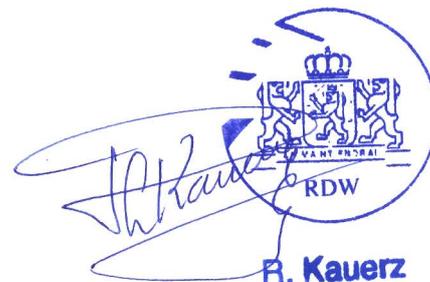
:  **SUPERLOK T&S VALVES**  
Receptacle  
SRCT Series



Approval number: E4-110R-000310

Extension number: 00

- Manufacturer's name and address : BMT CO., LTD  
21-1, Bukjeong-dong, Yangsan-si,  
Gyeongsangnam-do,  
626-110 S.Korea
4. If applicable, name and address of manufacturer's representative : NA
5. Submitted for approval on : December'2011
6. Technical service responsible for conducting approval tests : TÜV NORD Mobilität GmbH & Co. KG  
Institut für Fahrzeugtechnik und Mobilität  
Adlerstr. 7  
D-45307 Essen
7. Date of report issued by that service : 16-July-2012
8. Number of report issued by that service : IN110-A0-120037
9. Approval : granted/~~refused/extended/withdrawn~~<sup>(1)</sup>
10. Reason(s) of extension (if applicable) : NA
11. Place : ZOETERMEER
12. Date : 06-NOV-2012
13. Signature :
14. The documents filed with the application or extension of approval can be obtained upon request.




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<sup>(1)</sup> Strike out what does not apply.

## ADDENDUM

1. Additional information concerning the type-approval of a type of CNG components pursuant to Regulation number 110.
  - 1.1. Container(s) or cylinder(s)
    - 1.1.1. Dimensions : Not Applicable
    - 1.1.2. Material : Not Applicable
  - 1.2. Pressure indicator
    - 1.2.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.2.2. Material : Not Applicable
  - 1.3. Pressure relief valve (discharge valve)
    - 1.3.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.3.2. Material : Not Applicable
  - 1.4. Automatic valve(s)
    - 1.4.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.4.2. Material : Not Applicable
  - 1.5. Excess flow valve
    - 1.5.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.5.2. Material : Not Applicable
  - 1.6. Gas-tight housing
    - 1.6.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.6.2. Material : Not Applicable
  - 1.7. Pressure regulator(s)
    - 1.7.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.7.2. Material : Not Applicable
  - 1.8. Check valve(s) or non-return valve(s)
    - 1.8.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.8.2. Material : Not Applicable
  - 1.9. Pressure relief device (temperature triggered)
    - 1.9.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.9.2. Material : Not Applicable
  - 1.10. Manual valve
    - 1.10.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.10.2. Material : Not Applicable
  - 1.11. Flexible fuel lines
    - 1.11.1. Working pressure(s) <sup>(2)</sup> : Not Applicable
    - 1.11.2. Material : Not Applicable
  - 1.12. Filling unit or receptacle
    - 1.12.1. Working pressure(s) <sup>(2)</sup> : 250 bar
    - 1.12.2. Material : 316 Stainless steel



1.13.	Gas injector(s)	
1.13.1.	Working pressure(s) <sup>(2)</sup>	: Not Applicable
1.13.2.	Material	: Not Applicable
1.14.	Gas flow adjuster	
1.14.1.	Working pressure(s) <sup>(2)</sup>	: Not Applicable
1.14.2.	Material	: Not Applicable
1.15.	Gas/air mixer	
1.15.1.	Working pressure(s) <sup>(2)</sup>	: Not Applicable
1.15.2.	Material	: Not Applicable
1.16.	Electronic control unit (CNG-fuelling)	
1.16.1.	Basic software principles	: Not Applicable
1.17.	Pressure and temperature sensor(s)	
1.17.1.	Working pressure(s) <sup>(2)</sup>	: Not Applicable
1.17.2.	Material	: Not Applicable
1.18.	CNG filter(s)	
1.18.1.	Working pressure(s) <sup>(2)</sup>	: Not Applicable
1.18.2.	Material	: Not Applicable

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<sup>(2)</sup> Specify the tolerance



 **BMT CO., LTD**

21-1, Bukjeong-dong, Yangsan-si, Gyeongsangnam-do, 626-110 S.Korea

Tel: 82-55-783-1000 Fax: 82-55-783-1110

<http://www.superlok.com>

PAGE 1 OF 6

This is for Type Approval of ECE Regulation 110 (CNG) for Specific Components of Vehicles

**INFORMATION DOCUMENT No : BMT-CNG-120717-04**

Essential Characteristics of the CNG Component

- 1.1 Trade Name or Mark :  SUPERLOK T&S VALVES
- 1.2 Maker name and Address: BMT CO., LTD  
21-1, Bukjeong-dong, Yangsan-si, Gyeongsangnam-do, 626-110 South Korea
- 1.3 Type/General commercial description:  
SRCT SERIESE / RECEPTACLE
- 1.4 Working Pressure(s) :

Valve Name	Working Pressure for ECE R110 TYPE
Receptacle	250 bar

- 1.5 Description and Drawings: See attached document
- 1.6 Material: 316 Stainless steel
- 1.7 Operating temperatures: -40°C to 120°C

Valve Name	Temperature rating
Receptacle	-40°C to 120°C

- 1.8 Remarks: Filling Unit or Receptacle



Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Attachment 01 to Approval No. : E4-110R-000310


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PAGE 2 OF 6

**3. Features of Receptacles**

## Receptacle

- Receptacle designs to meet the NGV1 profiles and delivered with integrated non-contact check valve
- Receptacle complies with NGV1 in dimension and performance

**4. Description**

## Receptacle

	SRCT SERIES
Working Pressure for ECE R110 TYPE	250bar
Temperature rating	-40°C to 120°C
Body material	316 Stainless Steel
Port Connection	1/4" to 1/2" and 6mm to 12mm
Rate Flow	1500 scfm
Internal Orifice Area	0.48cm <sup>2</sup>

**5. Working Pressure and MAWP**

Valve Name	Working Pressure for ECE R110 TYPE
Receptacle	250 bar

**6. Material Standard**

Material Grade	Bar Stock	Forgings
316 Stainless Steel	ASTM A276, A479 ASME SA479	ASTM A182 ASME SA182



Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
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**8. Non-Metallic Materials**

## 8.1 O-ring

Elastomer base	EPDM
Hardness Shore A Durometer	70 +/-5
Tensile Strength	7.5 MPa

## 8.2 Seat &amp; Packing

Chemical Designation	Tensile Strength
Polyterafluoroethylene (PTFE)	20MPa
Poly ether ether ketone (PEEK)	80MPa



Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Attachment 01 to Approval No. : E4-110R-000310

## BMT CO., LTD

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### 9. Manufacturer's Statement

The samples, which have been presented for evaluation, are made during mass production according to the presented documents.

We, as the producer of SUPERLOK T&S VALVE, carry on our own responsibility - the production process guarantees the parameter stability & unchanging and outlet inspection guarantee. SUPERLOK T&S VALVE will accomplish permanently the requirements which are specified by our instruction.

### 10. Pictures of Receptacles



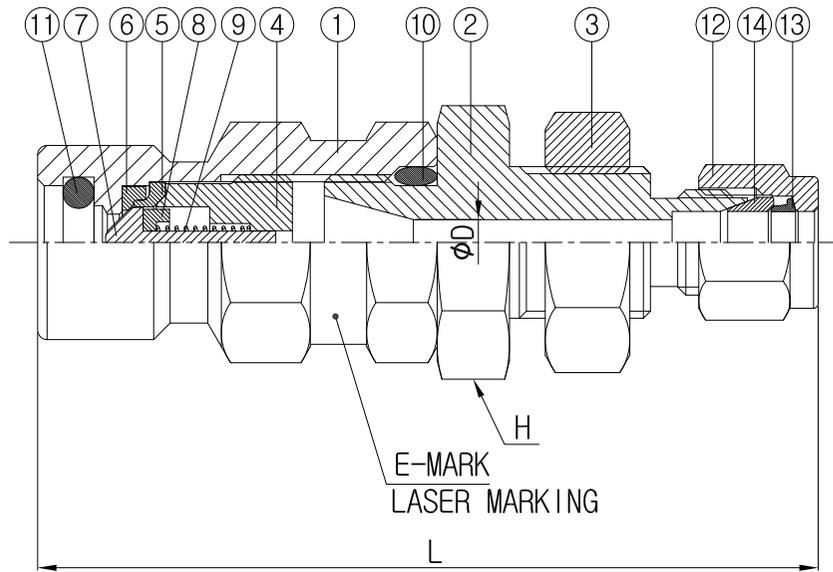
Picture 1. Receptacle

### 11. Drawings

NO	TITLE	DWG No.
1	Receptacle	111124-01-114-05 (Rev.A)
2	Type Approval Mark	111124-01-114-07 (Rev.A)

Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Attachment 01 to Approval No. : E4-110R-000310





Unit : mm

PART NO.	END CONNECTION	L	H (HEX)	D	Q' TY	WORKING PRESSURE for ECE R110 TYPE	MAX WORKING PRESSURE
SRCT-S4	1/4" SUPERLOK	83.0	25.0	4.8	6 EA	250 bar	250 bar
SRCT-S8	1/2" SUPERLOK	87.3	25.0	7.5	6 EA	250 bar	250 bar

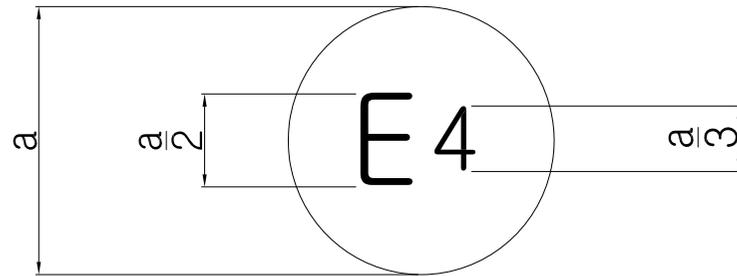
NO	DESCRIPTION	MATERIAL	Q' TY	REMARK
1	BODY	SS 316	1	
2	EMD CONNECTOR	SS 316	1	
3	LCOK NUT	SS 316	1	
4	INSERT	BRASS	1	
5	GALND	BRASS	1	
6	SEAT	EPDM	1	
7	POPPET	SS 316	1	
8	POPPET STOPPER	SS 316	1	
9	SPRING	SS 304	1	
10	O-RING	EPDM	1	
11	O-RING	EPDM	1	
12	NUT	SS 316	1	
13	FRONT FERRULE	SS 316	1	
14	BACK FERRULE	SS 316	1	

**SPECIFICATIONS**

1. SRCT series Receptacle complies with NGV1 in dimension and performance.
2. Maximum pressure rating : 3600 psig (250 bar)
3. Temperature rating : -40 to 250° F (-40 to 121° C)

Rev.	Issue Date	Description	Originator	Checked	Approved
A	24.NOV.11	Issued for Approval	C.S.RA	S.M.LEE	J.H.LIM
PURCHASER					
CLIENT					
PROJECT NAME					
PROJECT NO.					
PO. NO.					
MFR. MODEL/TYPE					
VALVE NAME					
TAG NO.					
DRAWING NO.					
GENERAL ARRANGEMENT DRAWING for RECEPTACLE					

NO.	DESCRIPTION	MATERIAL	Q'TY	REMARK



\*Approval mark Drawing\*

110 R-XXXXXX

$a \geq 8\text{mm}$



Rev.	Issue Data	Description	Originator	Checked	Approved
A	24.NOV.11	Issued for Approval	C.S.RA	S.M.LEE	J.H.LIM
PURCHASER					
CLIENT					
PROJECT NAME		-			
PROJECT NO.		-			
PO. NO.		-			
MFR. MODEL/TYPE		-			
VALVE NAME		-			
TAG NO.		-			
DRAWING NO.		111124-01-114-07			
GENERAL ARRANGEMENT DRAWING for VALVE					

**Test Report**  
**No.:** IN110-A0-120037

Dated: 16/07/2012

ECE Regulation No.110



Type : Receptacle-SRCT Series  
 Manufacturer : BMT CO., LTD

**Test Report**

AGREEMENT CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF THESE PRESCRIPTIONS

**UNIFORM PROVISIONS CONCERNING THE APPROVAL OF:  
 SPECIFIC COMPONENTS OF MOTOR VEHICLES USING COMPRESSED NATURAL  
 GAS (CNG) IN THEIR PROPULSION SYSTEM**

**ECE-R 110**

as last amended

Revision 1 – Amendment 1 - Amendment 2  
 Including Supplement 9 to Regulation No.  
 110 – Date of entry into force: 19 August  
 2010

Approval status	
	Number of approval
	Previous Approval: Nil
ECE	Current Approval No. E4-110R-000310

**Test Report**  
**No.:** IN110-A0-120037

Dated: 16/07/2012  
 ECE Regulation No.110



Type : Receptacle-SRCT Series  
 Manufacturer : BMT CO., LTD

- 0.0 General
- 0.1 Make :  SUPERLOK T&S VALVES
- 0.2 Manufacturer's name and address : BMT CO., LTD  
 21-1, Bukjeong-dong, Yangsan-si,  
 Gyeongsangnam-do,  
 626-110 S.Korea
- 0.3 Type and commercial Description : Receptacle  
 SRCT Series
- 0.4 Working Pressure : 250 bar  
 Class 0
- 1.0 Test information
- 1.1 Test Objects : Receptacle
- 1.2 Test dates : May'2012-June'2012
- 1.3 Equipment /facilities used : The test equipment and facilities used were in compliance with the requirements of the Standards

**2.0 Equipment used**

	<b>Equipment</b>	<b>Make/Model</b>	<b>Calibration Validity</b>
2.1	Salt Chamber	CM Enviro	Jan'13
2.2	Over Pressure Test	Praj	Dec'12
2.3	Hot Chamber	S A Electrical	Feb'13
2.4	Cold Chamber	Praj	Dec'12
2.5	Ammonia Chamber	Praj	Dec'12
2.6	Temperature cyclic test setup	ARAI	Dec'12

**Test Report**  
**No.: IN110-A0-120037**

Dated: 16/07/2012  
 ECE Regulation No.110



Type : Receptacle-SRCT Series  
 Manufacturer : BMT CO., LTD

**Receptacle:**

PART NO.	END CONNECTION	L	H (HEX)	D	Q'TY	WORKING PRESSURE for ECE R110 TYPE	MAX WORKING PRESSURE
SRCT-S4	1/4" SUPERLOK	83.0	25.0	4.8	6 EA	250 bar	250 bar
SRCT-S8	1/2" SUPERLOK	87.3	25.0	7.5	6 EA	250 bar	250 bar

**Conclusion of matrix:**

BMT produces Receptacles as provided in the matrix. Based on the above information and analyzing, both SRCT-S8 and SRCT-S4 are taken for testing.

**List of enclosures:**

Enclosure 1: Information document and drawing.  
 Enclosure 2: Results of Test.

**Test Report**  
**No.: IN110-A0-120037**

Dated: 16/07/2012  
 ECE Regulation No.110



Type : Receptacle-SRCT Series  
 Manufacturer : BMT CO., LTD

**3.0 Statement of conformity:**

The type described in this test report and the appendices attached are in compliance with the Test Specification mentioned above.

The Test Report comprises pages 1 to 7.

The Test Report shall be reproduced and published in full only and by the client only. It shall be reproduced partially with the written permission of the Test Laboratory only.

**TEST LABORATORY**

TÜV NORD Mobilität GmbH & Co. KG  
 IFM - Institut für Fahrzeugtechnik und Mobilität,  
 Adlerstr. 7, 45307 Essen

Designated Technical Service  
 RDW No. 99050016

Pune, India. 16.07.2012

Yeshwant Ambure  
 Project Leader

M. S. Ogale  
 Head Homologation



**Test Report**  
**No.:** IN110-A0-120037  
 Dated: 16/07/2012  
 ECE Regulation No.110



Type : Receptacle-SRCT Series  
 Manufacturer : BMT CO., LTD

**List of modifications**

<b>Appendix 1</b>
-------------------

**More details for application of** : **Date** :

Correction of : -

Modification of : -

Addition of : -

Deletion of : -

 **BMT CO., LTD**

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PAGE 1 OF 6

This is for Type Approval of ECE Regulation 110 (CNG) for Specific Components of Vehicles

**INFORMATION DOCUMENT No : BMT-CNG-120717-04**

Essential Characteristics of the CNG Component

- 1.1 Trade Name or Mark :  SUPERLOK T&S VALVES
- 1.2 Maker name and Address: BMT CO., LTD  
21-1, Bukjeong-dong, Yangsan-si, Gyeongsangnam-do, 626-110 South Korea
- 1.3 Type/General commercial description:  
SRCT SERIESE / RECEPTACLE
- 1.4 Working Pressure(s) :

Valve Name	Working Pressure for ECE R110 TYPE
Receptacle	250 bar

- 1.5 Description and Drawings: See attached document
- 1.6 Material: 316 Stainless steel
- 1.7 Operating temperatures: -40°C to 120°C

Valve Name	Temperature rating
Receptacle	-40°C to 120°C

- 1.8 Remarks: Filling Unit or Receptacle

Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Enclosure 01 to Report No. : IN110-A0-120037

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**3. Features of Receptacles**

## Receptacle

- Receptacle designs to meet the NGV1 profiles and delivered with integrated non-contact check valve
- Receptacle complies with NGV1 in dimension and performance

**4. Description**

## Receptacle

	SRCT SERIES
Working Pressure for ECE R110 TYPE	250bar
Temperature rating	-40℃ to 120℃
Body material	316 Stainless Steel
Port Connection	1/4" to 1/2" and 6mm to 12mm
Rate Flow	1500 scfm
Internal Orifice Area	0.48cm <sup>2</sup>

**5. Working Pressure and MAWP**

Valve Name	Working Pressure for ECE R110 TYPE
Receptacle	250 bar

**6. Material Standard**

Material Grade	Bar Stock	Forgings
316 Stainless Steel	ASTM A276, A479 ASME SA479	ASTM A182 ASME SA182

Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Enclosure 01 to Report No. : IN110-A0-120037

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**8. Non-Metallic Materials**

## 8.1 O-ring

Elastomer base	EPDM
Hardness Shore A Durometer	70 +/-5
Tensile Strength	7.5 MPa

## 8.2 Seat &amp; Packing

Chemical Designation	Tensile Strength
Polyterafluoroethylene (PTFE)	20MPa
Poly ether ether ketone (PEEK)	80MPa

Vehicle / Component Model : RECEPTACLE (SRCT Series)  
 Information Document No. : BMT-CNG-120717-04  
 Date : 01-12-2011  
 Description : CNG Component approval as per ECE R110  
 Enclosure 01 to Report No. : IN110-A0-120037

## BMT CO., LTD

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PAGE 4 OF 6

### 9. Manufacturer's Statement

The samples, which have been presented for evaluation, are made during mass production according to the presented documents.

We, as the producer of SUPERLOK T&S VALVE, carry on our own responsibility - the production process guarantees the parameter stability & unchanging and outlet inspection guarantee. SUPERLOK T&S VALVE will accomplish permanently the requirements which are specified by our instruction.

### 10. Pictures of Receptacles

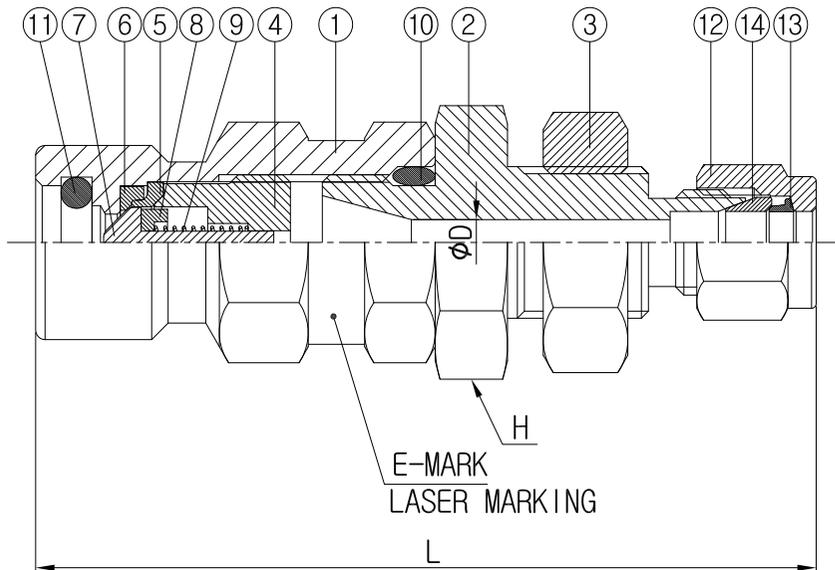


Picture 1. Receptacle

### 11. Drawings

NO	TITLE	DWG No.
1	Receptacle	111124-01-114-05 (Rev.A)
2	Type Approval Mark	111124-01-114-07 (Rev.A)

Vehicle / Component Model	: RECEPTACLE (SRCT Series)
Information Document No.	: BMT-CNG-120717-04
Date	: 01-12-2011
Description	: CNG Component approval as per ECE R110
Enclosure 01 to Report No.	: IN110-A0-120037



NO	DESCRIPTION	MATERIAL	Q'TY	REMARK
1	BODY	SS 316	1	
2	EMD CONNECTOR	SS 316	1	
3	LCOK NUT	SS 316	1	
4	INSERT	BRASS	1	
5	GALND	BRASS	1	
6	SEAT	EPDM	1	
7	POPPET	SS 316	1	
8	POPPET STOPPER	SS 316	1	
9	SPRING	SS 304	1	
10	O-RING	EPDM	1	
11	O-RING	EPDM	1	
12	NUT	SS 316	1	
13	FRONT FERRULE	SS 316	1	
14	BACK FERRULE	SS 316	1	

**SPECIFICATIONS**

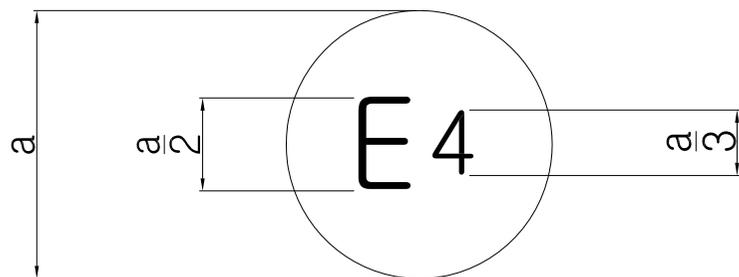
1. SRCT series Receptacle complies with NGV1 in dimension and performance.
2. Maximum pressure rating : 3600 psig (250 bar)
3. Temperature rating : -40 to 250° F (-40 to 121° C)

Unit : mm

PART NO.	END CONNECTION	L	H (HEX)	D	Q'TY	WORKING PRESSURE for ECE R110 TYPE	MAX WORKING PRESSURE
SRCT-S4	1/4" SUPERLOK	83.0	25.0	4.8	6 EA	250 bar	250 bar
SRCT-S8	1/2" SUPERLOK	87.3	25.0	7.5	6 EA	250 bar	250 bar

A	24.NOV.11	Issued for Approval	C.S.RA	S.M.LEE	J.H.LIM
Rev.	Issue Data	Description	Originator	Checked	Approved
PURCHASER					
CLIENT					
PROJECT NAME		-			
PROJECT NO.		-			
PO. NO.		-			
MFR. MODEL/TYPE		SRCT SERIES			
VALVE NAME		RECEPTACLE			
TAG NO.		-			
DRAWING NO.		111124-01-114-05			
GENERAL ARRANGEMENT DRAWING for RECEPTACLE					

NO.	DESCRIPTION	MATERIAL	Q'TY	REMARK



\*Approval mark Drawing\*

110 R-XXXXXX

$a \geq 8\text{mm}$

Rev.	Issue Data	Description	Originator	Checked	Approved
A	24.NOV.11	Issued for Approval	C.S.RA	S.M.LEE	J.H.LIM
PURCHASER					
CLIENT					
PROJECT NAME		-			
PROJECT NO.		-			
PO. NO.		-			
MFR. MODEL/TYPE		-			
VALVE NAME		-			
TAG NO.		-			
DRAWING NO.		111124-01-114-07			
GENERAL ARRANGEMENT DRAWING for VALVE					

Manufacturer: BMT CO., LTD

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IN110-A0-120037  
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SRCT Series

**RECORD OF TEST ON**  
CNG Receptacle as regards to  
Test and performance requirements, as per standard ECE R 110

0.1	Observer: Mr. M.S. Ogale Mr. Yeshwant Ambure	Place : ARAI, Pune and Praj Lab
0.2	Operator :- Mr. Dekate, ARAI Ashok Bhagat, Praj Lab	Test date:- May'2012-June'2012
0.3	Customer	BMT CO., LTD 21-1, Bukjeong-dong, Yangsan-si, Gyeongsangnam-do, 626-110 S.Korea
1.0	Component under test	Receptacle SRCT-S8(D20.5mm) and SRCT-S4(D20.5mm)
<b>2.0</b>	<b>Manufacturer's Specification</b>	
2.1	Trademark or Trade name	 SUPERLOK T&S VALVES
2.2	Model name and number	Receptacle SRCT Series
2.3	Manufacturers Specification	As attached at Enclosure 1
3.0	<b>Results of Tests</b>	
	<b>General Requirements of standard</b>	<b>Observations</b>
3.1	Filling units designed in accordance with ISO 14469-1 first edition 2004-11-01 1/ or ISO 14469-2:2007 2/ and meeting all the requirements therein are deemed to fulfill the requirements of paragraphs 3. and 4.of this annex.	Meets the Requirement Satisfactory
3.2	The filling unit shall be conform to the requirements of Class 0 and follow the test procedures in Annex 5 with the following specific requirements.	Meets the Requirement Satisfactory
3.3	The material constituting the filling unit which is in contact with the CNG when the device is in service shall be compatible with the CNG. In order to verify this compatibility, the procedure of Annex 5D shall be used.	Meets the Requirement Satisfactory

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3.4	The filling unit shall be free from leakage at a pressure of 1.5 times the working pressure (MPa) (see Annex 5B).	Meets the Requirement Satisfactory
3.5	The filling unit shall withstand a pressure of 33 MPa.	Meets the Requirement Satisfactory
3.6	The filling unit shall be so designed as to operate at temperatures as specified in Annex 5O.	Meets the Requirement Satisfactory
3.7	The filling unit shall withstand a number of 10,000 cycles in the durability test specified in Annex 5L.	Meets the Requirement Satisfactory

4.0	<b>Specific test requirements</b>							
4.1	<b>Overpressure Test:</b>							
	A CNG containing component shall withstand without any visible evidence of rupture or permanent distortion a hydraulic pressure of 1.5 times the working pressure (MPa) during minimal 3 minutes at room temperature with the outlet of the high-pressure part plugged. Water or any other suitable hydraulic fluid may be used as a test medium.	<b>Observations:</b> Water used as test medium. No leakage observed at 1.5 times working pressure of 375 bar  Meets the Requirement Satisfactory						
	<table border="1"> <thead> <tr> <th>Class</th> <th>Working pressure</th> <th>Test pressure</th> </tr> </thead> <tbody> <tr> <td>Class 0</td> <td>3000&lt;P&lt;26000</td> <td>1.5times working pressure</td> </tr> </tbody> </table>	Class	Working pressure	Test pressure	Class 0	3000<P<26000	1.5times working pressure	
Class	Working pressure	Test pressure						
Class 0	3000<P<26000	1.5times working pressure						
	1. Working pressure: 250 bar 2. Test Pressure: 375 bar							

4.2	<b>EXTERNAL LEAKAGE TEST</b>	
	A component shall be free from leakage through stem or body seals or other joints, and shall not show evidence of porosity in casting when tested as described in the tests below.	
	The test shall be performed at the following conditions: (a) at room temperature at pressure of 375 bar (b) at the minimum operating temperature: -40°C at pressure of 375 bar (c) at the maximum operating temperature: +120°C at pressure of 375 bar	
	Equipment under test will be connected to a source of aerostatic pressure. An automatic valve and a pressure gauge having a pressure range of not less than 1.5 times nor more than 2 times the test pressure is to be installed in the pressure supply piping. The sample is subjected to the gas pressure equal to working pressure. The sample should be submerged in water to detect leakage or any other equivalent test method Test carried out under following conditions	

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	The external leakage must be lower than the requirements stated in the annexes or if no requirements are mentioned the external leakage shall be lower than 15 cm <sup>3</sup> /hour.	
4.2.1	<b>Room temperature test</b>	
	<b>Requirements:</b> A CNG containing component shall not leak more than 15 cm <sup>3</sup> /hour with the outlet plugged when submitted to a gas pressure, at room temperature	<b>Observations:</b> No leakage observed Meets the requirement Satisfactory
4.2.2	<b>Maximum operating temperature test</b>	
	<b>Requirements:</b> A CNG containing component shall not leak more than 15 cm <sup>3</sup> /hour with the outlet plugged when submitted to a gas pressure at the maximum operating temp of 120°C, after conditioning the component for 8 hours at 120°C	<b>Observations:</b> No Leakage Observed. Meets the Requirement Satisfactory
4.2.3	<b>Minimum operating temperature test</b>	
	<b>Requirements:</b> A CNG containing component shall not leak more than 15 cm <sup>3</sup> /hour with the outlet plugged when submitted to a gas pressure, at the minimum operating temp of -40°C , after conditioning the component for 8 hours at -40°C	<b>Observations:</b> No Leakage Observed. Meets the Requirement Satisfactory
<b>4.3</b>	<b>Durability Test</b>	
	The component shall be connected to a source of pressurized dry air or nitrogen by means of a suitable fitting and subjected to the number of cycles specified for that specific component. A cycle shall consist of one opening and one closing of the component within a period of not less than 10±2 seconds.	
4.3.1	<b>Room temperature cycling:</b>	
	<b>Requirements:</b> The component shall be operated through 96 percent of the total cycles at room temperature and at rated service pressure. During the off cycle the downstream pressure of the test fixture should be allowed to decay to 50 per cent of the test pressure. After that, the components shall comply with the leakage test of Annex 5B at room temperature. It is allowed to interrupt this part of the test at 20 per cent intervals for leakage testing.	<b>Observations:</b> No leakage Observed Meets the requirement Satisfactory

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4.3.2	<b>High temperature cycling:</b>	
	<p>The component shall be operated through 2 percent of the total cycles at the appropriate maximum temperature specified at rated service pressure. The component shall comply with the leakage test of Annex 5B at the appropriate maximum temperature at the completion of the high temperature cycles.</p>	<p><b>Observations:</b> No leakage Observed  Meets the requirement  Satisfactory</p>
4.3.3	<b>Low temperature cycling:</b>	
	<p><b>Requirements:</b> The component shall be operated through 2 per cent of the total cycles at the appropriate minimum temperature specified at rated service pressure. The component shall comply with the leakage test of Annex 5B at the appropriate minimum temperature specified at the completion of the low temperature cycles.</p>	<p><b>Observations:</b> No leakage Observed  Meets the requirement  Satisfactory</p>

<b>4.4</b>	<b>CNG Compatibility Test</b>																																					
	<p>A synthetic part in contact with CNG shall not show excessive volume change or loss of weight. Resistance to n-pentane according to ISO 1817 with the following conditions: (a) medium: n-pentane (b) temperature: 23 °C (tolerance acc. to ISO 1817) (c) immersion period: 72 hours</p>			<p><b>Requirements:</b> maximum change in volume 20 percent 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 percent.</p>																																		
	<p><b>Observations:</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Sr. No.</th> <th rowspan="2">Sample Identification Mark</th> <th colspan="2">Change in Volume in %</th> <th colspan="2">Change in Mass in %</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Specified Value</th> <th>Observed Value</th> <th>Specified Value</th> <th>Observed Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>PTFE</td> <td>20 Max.</td> <td>0.06</td> <td>- 5 % Max</td> <td>-0.2</td> <td>OK</td> </tr> <tr> <td>2</td> <td>PEEK</td> <td>20 Max</td> <td>0.07</td> <td>- 5 % Max</td> <td>-0.01</td> <td>OK</td> </tr> <tr> <td>3</td> <td>'O' ring</td> <td>20 Max</td> <td>2.5</td> <td>- 5 % Max</td> <td>- 3.48</td> <td>OK</td> </tr> </tbody> </table> <p>Meets the requirements Satisfactory</p>						Sr. No.	Sample Identification Mark	Change in Volume in %		Change in Mass in %		Remark	Specified Value	Observed Value	Specified Value	Observed Value	1	PTFE	20 Max.	0.06	- 5 % Max	-0.2	OK	2	PEEK	20 Max	0.07	- 5 % Max	-0.01	OK	3	'O' ring	20 Max	2.5	- 5 % Max	- 3.48	OK
Sr. No.	Sample Identification Mark	Change in Volume in %		Change in Mass in %		Remark																																
		Specified Value	Observed Value	Specified Value	Observed Value																																	
1	PTFE	20 Max.	0.06	- 5 % Max	-0.2	OK																																
2	PEEK	20 Max	0.07	- 5 % Max	-0.01	OK																																
3	'O' ring	20 Max	2.5	- 5 % Max	- 3.48	OK																																

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4.5		CORROSION RESISTANCE TEST			
4.5.1	<p><b>Requirements:</b> A metal CNG containing component shall comply with the leakage tests, after submitting it to 144 hours salt spray test with all connections closed. Solution: 5% NaCl in 95% distilled water by weight. External leakage test carried out at room temp/ at 120°C / at -40°C and internal leakage test carried out at room temperature</p>	<p><b>Observations:</b> No corrosion observed. Meets the Requirement Satisfactory</p>			
4.5.2	<p><b>Requirements:</b> A copper or brass CNG containing component shall comply with the leakage tests mentioned in Annexes 5B and 5C and after having been submitted to 24 hours immersion in ammonia according to ISO CD 15500-2 with all connections closed.</p>	<p><b>Observations:</b> No cracks observed at 25X Meets the Requirement Satisfactory</p>			
4.5.3	<b>External leakage test after corrosion resistance test.</b>				
	Test Conditions	Room Temp	Low Temp	High Temp	
		30° C at 375 bar	-40° C at 375 bar	+120°C at 375 bar	
	Observations	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>	
		Meets the Requirement Satisfactory			

4.6		Resistance to dry heat				
<p>1. The test has to be done in compliance with ISO 188. The test piece has to be exposed to air at a temperature equal to the maximum operating temperature for 168 hours.</p> <p>2. The allowable change in tensile strength should not exceed 25 per cent. The allowable change in ultimate elongation shall not exceed the following values: -Maximum increase 10 per cent -Maximum decrease 30 per cent</p>						
<b>Observations:</b>						
Sr. No.	Sample	Change in Tensile strength in %		Change in elongation %		Remark
		Specified Value	Observed Value	Specified Value	Observed Value	
1	PTFE	+25 Max	9.20	+10 -30	-0.64	OK
2	PEEK		2.61		-27.3	OK
3	O-Ring EPDM		12.37		-17.50	OK
Meets the requirements Satisfactory						

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<b>4.7</b>	<b>Temperature cyclic test</b>			
	<b>Requirements:</b> A non metallic part containing CNG shall comply with the leakage tests mentioned in Annexes 5B and 5C after having been submitted to 96 hours temperature cycle from the minimum operating temperature up to the maximum operating temperature with a cycle time of 120 minutes, under maximum working pressure			
	<b>Observations:</b>			
	<b>EXTERNAL LEAKAGE TEST</b>			
	Test conditions	Room Temp	Low Temp	High Temp
		30°C at 375 bar	-40° C at 375 bar	+120°C at 375 bar
	Observations	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>
		Meets the Requirement		
		Satisfactory		

<b>4.8</b>	<b>Vibration Resistance:</b>			
	All components with moving parts shall remain undamaged, continue to operate, and comply with the component's leakage tests after 6 hours of vibration in accordance with the following test method. <b>Test method</b> The component shall be 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 component shall comply with Annex 5C.		<b>Observations:</b> No Leakage observed.  Meets the requirements.  Satisfactory.	
<b>4.8.1</b>	<b>External leakage test</b>			
	Test Conditions	Room Temp	Low Temp	High Temp
		30° C at 375 bar	-40° C at 375 bar	+120°C at 375 bar
	Observations	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>	<b>No Leakage Observed</b>
		Meets the Requirement		
		Satisfactory		

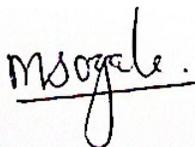
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<b>4.9</b>	<b>OZONE TEST</b>		
	Medium : Ozone	Duration: 72 Hours	Ref Standard: ISO 1431-1
	Test Temp: 40°C		
	<b>Requirement of Standard</b>		
	The test piece, which has to be stressed to 20 per cent elongation, shall be exposed to air at 40C with an ozone concentration of 50 parts per hundred million during 72 hours. No cracking of the test piece is allowed.	<b>Observation:</b> <b>No cracks observed at 10X Magnification.</b> <b>Satisfactory.</b>	

<b>4.10</b>	<b>The operating temperatures of the Receptacle shall be classified as per the table given below</b>			
	<b>ANNEX 50 - OPERATING TEMPERATURES</b>			
		Engine compartment	Assembled on the engine	On board
	Moderate	- 20 ° C ± 105 ° C	- 20 ° C ± 120 ° C	- 20 ° C ± 85 ° C
	Cold	- 40 ° C ± 105 ° C	- 40 ° C ± 120 ° C	- 40 ° C ± 85 ° C
	<b>Requirement:</b> The Receptacle should meet operating temperature require as given in the table annex 50		<b>Observation:</b> The Receptacle Type: SRCT-S8(D20.5mm) and SRCT-S4(D20.5mm) has the temperature range of -40°C to +120°C. The Receptacle meets the test requirements when subjected to all relevant tests with this temperature.	

<b>5.0</b>	<b>Conclusion:</b> Receptacle SRCT series as described in the information document as above meets the requirement of Regulation ECE R110.		
	 Yeshwant Ambure Project Leader	 M. S. Ogale Head Homologation	