



**ENGINEERING PRODUCT SPECIFICATION**

**DATE ISSUED:** 04/25/2012

**CCS-12001**

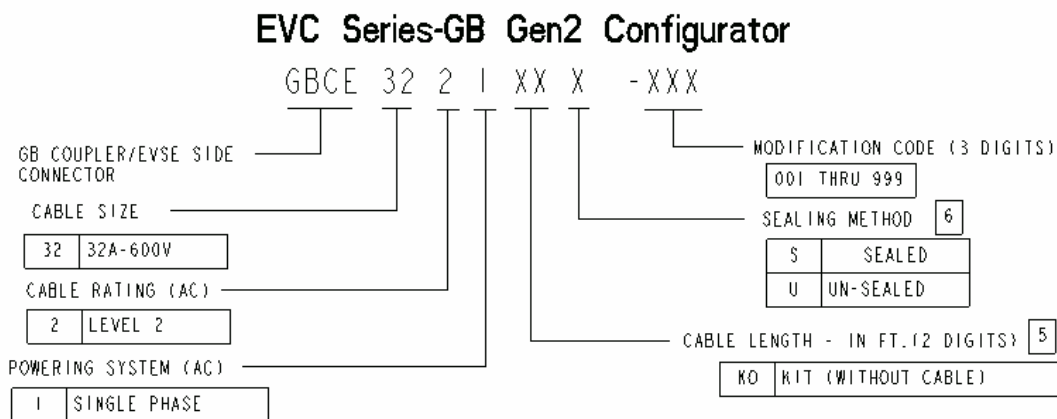
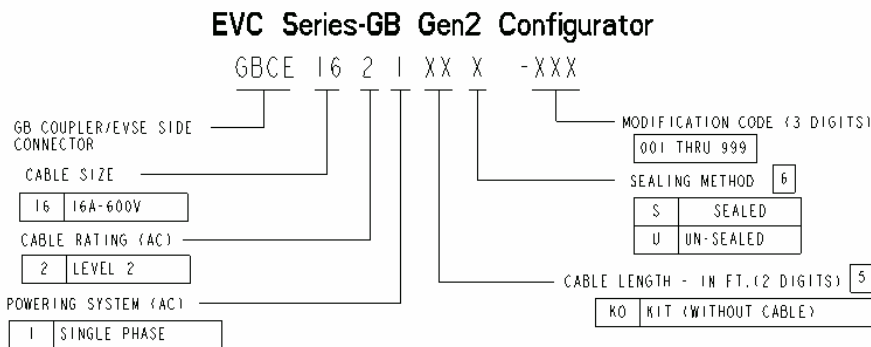
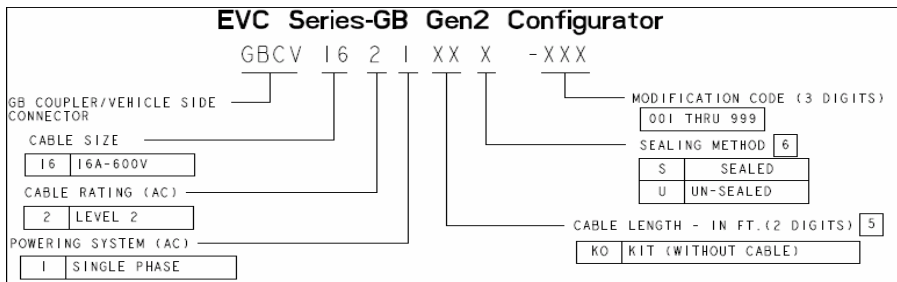
**Page 1 of 8**

**SUBJECT / TITLE**

**GB COUPLER/INLET CABLE ASSEMBLY**

**GB coupler/inlet cable assembly**

This is a connector/cable assembly for EV charger station or EV car according to GB/T 20234-1,2,3-2011, Operation temperature -30°C to +50°C; IP54 mating /IP55 mating



<b>ECR/ECO NUMBER</b>	<b>TBD</b>				
<b>REVISED BY:</b>	<b>George Xiang</b>				
<b>DATE</b>	<b>04/25/2012</b>				
<b>REVISION</b>	<b>A</b>				



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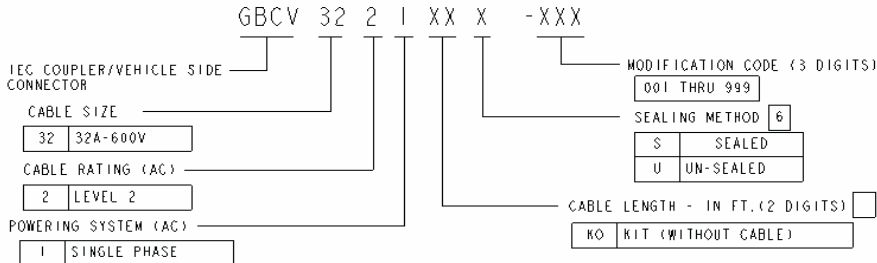
**CCS-12001**

Page 2 of 8

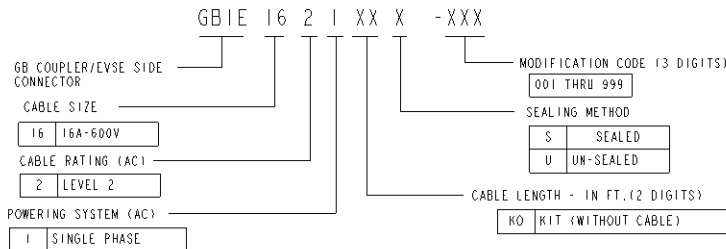
**SUBJECT / TITLE**

**GB COUPLER/INLET CABLE ASSEMBLY**

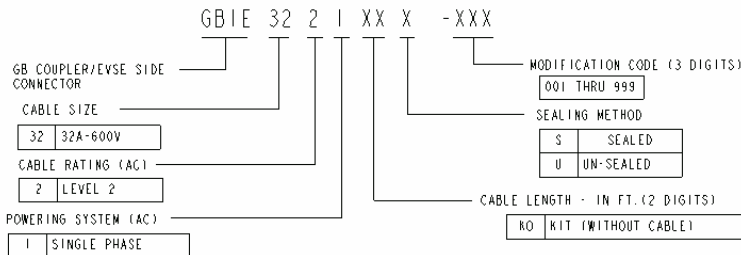
**EVC Series-GB Gen2 Configurator**



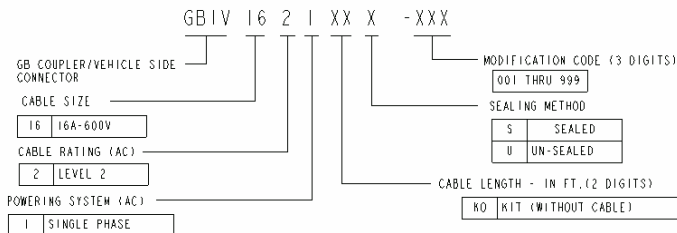
**EVC Series-GB Gen2 Configurator**



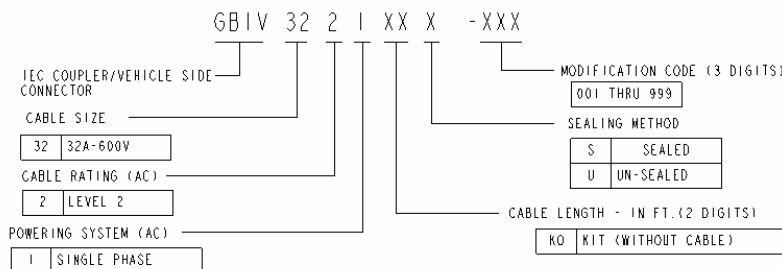
**EVC Series-GB Gen2 Configurator**



**EVC Series-GB Gen2 Configurator**



**EVC Series-GB Gen2 Configurator**



**ENGINEERING PRODUCT  
SPECIFICATION**

DATE ISSUED: 04/25/2012

**CCS-12001**

Page 3 of 8

SUBJECT / TITLE

**GB COUPLER/INLET CABLE ASSEMBLY****1.1 Materials****Metallic Parts:**

Female Contact body: C14500

Contact Sleeve: C34500

Male contact: C14500

latch: ZAMAK 5, Zinc alloy

Spring: Beryllium copper wire

**Plastic Parts:**

Handle : PBT/PC

Inlet: PA

SR: TPE

Cable: GB compliance

**2 Electrical Characteristics****2.1 Low Level Contact Resistance**

Measurements shall be performed using a four wire method with a maximum open circuit voltage of 20 mV and a maximum test current of 100 mA.

Maximum contact resistance after environmental exposure shall not exceed 20 mΩ.

- a) Test Voltage - 20 mVDC maximum open circuit
- a) Test Current - Not to exceed 100 mA

**2.2 Insulation Resistance**

With a mated pair of connector assemblies, measure the insulation resistance shall be more than 100 MΩ


The following details shall apply:

- b) Test Voltage - 500 VDC
- c) Electrification Time – 5S
- d) Points of Measurement – from conductor to conductor and from conductor to shell

**2.3 Dielectric Withstanding Voltage**

There shall be no evidence of arc-over, insulation breakdown or excessive leakage current (> 3 mA) when the connectors are mated. The following details shall apply:

- a) Test Voltage - 2000 VAC
- b) Test Duration – 5S.
- c) Points of Measurement – from conductor to conductor and from conductor to shield

		<b>ENGINEERING PRODUCT SPECIFICATION</b>	
<b>DATE ISSUED:</b>	04/25/2012	<b>CCS-12001</b>	<b>Page 4 of 8</b>
<b>SUBJECT / TITLE</b>		<b>GB COUPLER/INLET CABLE ASSEMBLY</b>	

## 2.4 Temperature rise

The electrical contacts shall be designed for a maximum temperature rise of 50°C above ambient at rated load. The wiring insulation shall be rated for 105°C. For couplers rated less than 200A, the load is to be applied continuously, For connectors rated 200A or greater, the load is to be applied for 20 min followed by a no-load period of 10 min and repeated until peak temperature stabilize.

## 3 Mechanical Characteristics

### 3.1 Mating/Un-mating Force

The force to mate a connector pair shall not exceed 100N total mating force.

- a) Cross Head Speed – 10 mm/minute.
- b) Lubrication - None

Utilize free-floating fixtures.

### 3.2 Locking Latch Un-mating Force

The force required to Lock the locking latch should be Min 200N. The coupler shall have a latching mechanism to prevent inadvertent or accidental decoupling. The latching mechanism should provide a means in the connector to open the proximity detection conductor when disengaging from the vehicle inlet.

### 3.3 Contact retention force

The contact retention force between contacts and inlet or housing should be Min 44N.

## 4 Environmental Characteristics


After exposure to the following environmental conditions as specified in “Table 1 - Test Sequences” in accordance with the specified test procedure and/or details, the product shall show no physical damage and shall meet the electrical and mechanical requirements in Sections 2 and 3. Unless specified otherwise, product shall be mated during exposure.

### 4.1 Thermal Shock

With the connectors mated the samples should be subjected to 5 consecutive cycles of thermal shock under the following conditions:

- a) -40°C for 1 hour
- b) +80°C for 1 hour

Changeover time maximum 5 minutes

		<b>ENGINEERING PRODUCT SPECIFICATION</b>	
<b>DATE ISSUED:</b>	04/25/2012	<b>CCS-12001</b>	<b>Page 5 of 8</b>
<b>SUBJECT / TITLE</b>		<b>GB COUPLER/INLET CABLE ASSEMBLY</b>	

#### 4.2 Humidity

Unmated samples are to be condition dried in an oven at 40°C+/-5°C for 24 hours. The connector samples should then be mated and subjected to steady state humidity at the following settings:

- a) Relative humidity: 90 to 95% RH.
- b) Temperature: 40°C+/-2°C

Test duration 96 hours

#### 4.3 High Temperature Life test

Placed mated connector assemblies in a temperature chamber and subject them to a temperature of 107°C for 96 hours. Apply a 460VDC potential between conductors throughout the test

#### 4.4 Vibration

The mated test samples are to be subjected to the following vibration profile:


- a) Frequency-Varied from 10 to 55 Hz and return to 10 Hz at a linear sweep period of 2 min/complete sweep cycle.
- b) Excursion-1.0+0.1/-0.0 mm peak over the specified frequency range.
- c) Direction of Vibration- Vertical axis of the vehicle inlet as it is mounted on the vehicle
- d) Test duration-60+1/-0min
- e) pass/Fail Criteria-After completion of the test, there shall be no observed rotation, displacement, cracking or rupture of parts of the device that could result in failure to operate as intended or cause to fail any of the other test requirements specified in this document. Cracking or rupture of the parts of the device that affect mounting shall constitute a failure.

#### 4.5 Mechanical Shock

The test samples were subjected to the following shock:

- a) 100g pk Acceleration
- b) 8.5ms duration
- c) 3 shocks in each axis
- d) 6 directions

#### 4.6 Durability

		<b>ENGINEERING PRODUCT SPECIFICATION</b>	
<b>DATE ISSUED:</b>	04/25/2012	<b>CCS-12001</b>	<b>Page 6 of 8</b>
<b>SUBJECT / TITLE</b>		<b>GB COUPLER/INLET CABLE ASSEMBLY</b>	

The coupler shall be designed to a minimum of 10 000 cycles of mechanical operation. Run a pair of connector assemblies through 10000 mate/pull – apart cycles at room temperature, after each pull-apart , manually mate the connector assemblies, the mate forces must never increase to the point that a normal human being has difficulty coupling the connectors

#### **4.7 Salt Spray Mist**

With the connectors mated, the test should be conducted under the following conditions:

- a) Salt concentration 5%
- b) Test duration 48 Hours
- c) Test conditions: Atomization
- d) Temperature: 35°C

## **5 Quality Assurance Provisions**

### **5.1 Equipment Calibration**

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ISO 9000.


### **5.2 Inspection Conditions**

Unless otherwise specified herein, all inspections shall be performed under the following conditions:

- Temperature: 25± 5°C
- Relative humidity: 30% to 60%
- Barometric pressure: Local ambient

### **5.3 Sample Quantity and Description**

The test sequence for the qualification testing of the connectors, and sample size are shown in Table 1. The minimum connections to be tested are specified in the descriptions of each test.

		<b>ENGINEERING PRODUCT SPECIFICATION</b>	
<b>DATE ISSUED:</b>	04/25/2012	<b>CCS-12001</b>	<b>Page 7 of 8</b>
<b>SUBJECT / TITLE</b>		<b>GB COUPLER/INLET CABLE ASSEMBLY</b>	

**5.4 Acceptance**

Electrical and mechanical requirements placed on test samples as indicated in the sections of this specification shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with the product specification shall meet the stated requirements.

Failures attributed to equipment, test set-up or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

**5.5 Qualification Testing**

Qualification testing shall be performed on sample units with equipment and procedures normally used in production. The test sequence shown in Table 1.

**5.6 Qualification Test Sequence Per Table 1**

The following connection points are to be tested for low-level contact resistance in Test Groups 1 to 5 per Section 6.1 when called for in Table 1. Visual examination before any testing should confirm that the sample is not damaged or missing features. Visual examination after testing should confirm that the sample has not been damaged during testing except for the effects of the testing itself. All resistance measurements that are outside the limits should be confirmed before additional testing to assure that the measurements are correct.

**Table 1 - Test Matrix**

		<b>TEST GROUP</b>			
		1	2	3	4
<b>No of Connector samples</b>		<b>2 Pairs</b>	<b>2 Pairs</b>	<b>1 Pairs</b>	<b>2 Pairs</b>
<b>TEST SEQUENCE</b>					
<b>TEST</b>	<b>PARA</b>	Mating/ Un-mating Force & Salt Spray Mist	Thermal Shock & Humidity	Vibration & Mech. Shock	Hi-Temp Life & Temp rise
EXAMINATION OF PRODUCT		1,6,12,18	1,17	1,11	1,7,16
MATE CONNECTOR		2,7,13	2	2	2,8
UN-MATE CONNECTOR		11,17	16	10	6,15

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**CCS-12001**

Page 8 of 8

**SUBJECT / TITLE****GB COUPLER/INLET CABLE ASSEMBLY**

<b>ELECTRICAL CHARACTERISTICS</b>					
LOW LEVEL CONTACT RESISTANCE <sup>1</sup>	2.1	3,8,10,14,16	3,5,9,13	3,5,7,9	3,5,10,12,14
INSULATION RESISTANCE <sup>1</sup>	2.2		6,10,14		
DIELECTRIC WITHSTANDING VOLTAGE <sup>1</sup>	2.3		7,11,15		13
TEMPERATURE RISE (POWER CONTACTS)	2.4				11
<b>MECHANICAL CHARACTERISTICS</b>					
MATING/UNMATING FORCE – 3 CYLCES	3.1	4			
LOCKING LATCH MATING/UNMATING FORCE – 3 CYCLES	3.2	5			
<b>ENVIRONMENTAL CONDITIONS</b>					
THERMAL SHOCK	4.1		4		
HUMIDITY	4.2		12		
HIGH TEMPERATURE LIFE	4.3				4
VIBRATION	4.4			6	
MECHANICAL SHOCK	4.5			8	
DURABILITY CYCLES	4.6	9	8	4	9
SALT SPRAY MIST	4.7	15			

<sup>1</sup> Insulation resistance, dielectric withstanding voltage and low level contact resistance are to be measured on different contacts