

**Bharat Heavy Electricals Ltd**  
Electronics Division  
Mysore Road, Bangalore – 560026

**Amendment to Tender Document for  
PROCUREMENT OF MATERIALS  
RFQ REF: RCRSCPV100**

Technical Bid Opening Date: 21<sup>st</sup> September, 2012 (Friday)

This is to inform that purchase specifications: **PS-439-267** (Sl. No. 2 - 156-mm PSQ Mono Solar Cells) & **PS-439-170** (Sl. No. 3 - 156-mm Square Multi Solar Cells) have been revised as per the enclosure.

<b>Item Sl. No.</b>	<b>Item Name/Description</b>	<b>Material Code</b>	<b>PS No / Rev</b>	<b>Estimated Qty</b>
2.	<b>156-mm PSQ Mono Solar Cells</b>	PV0679038051	<b>PS-439-267 REV 02</b>	9,00,000 Nos
3.	<b>156-mm Square Multi Solar Cells</b>	PV0679035613	<b>PS-439-170 REV 02</b>	9,00,000 Nos

All other terms & conditions remain same as before.

**Contact Person at BHEL: Sr. Manager (SC&PV-MM)**  
Ph: 0091-80-26998476, Mob: 0091- 9980958476  
Mail ID: ramachandra@bheledn.co.in



A4-10

**PURCHASE SPECIFICATION  
GROUP : PHOTOVOLTAICS**

**PS- 439 - 170**

REV.02

PAGE 01 OF 02

**ITEM: 156 mm Square Multi Crystalline Silicon Solar Cell**

**1.0 PHYSICAL CHARACTERISTICS**

- 1.1 MATERIAL : Multi Crystalline Silicon.
- 1.2 DIMENSIONS : 156± 1 mm (Side to Side)
- 1.3 SHAPE : Square
- 1.4 THICKNESS : 200 microns (Typical)
- 1.5 METALISATION : Front – Silver  
Back – Silver busbars  
(Continuous/Discontinuous)  
with Aluminum BSF.  
Number of Bus bars : Three (Front and Back)
- 1.6 AR Coating : PECVD Silicon Nitride (Deep blue color)

**2.0 ELECTRICAL CHARACTERISTICS**

- 2.1 POWER OUTPUT (Pmax) : 4.00 Watts (Minimum)
- 2.2 VOLTAGE AT MAX.POWER POINT : 500 mV (Typical)
- 2.3 OPEN-CIRCUIT VOLTAGE : 610 mV (Typical)
- 2.4 SHORT-CIRCUIT CURRENT : 8.50 A (Typical)
- 2.5 FILL FACTOR : 0.75 (Typical)

COPY RIGHT AND CONFIDENTIAL

The information on this document is the property of Bharat Heavy Electrical Limited and must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISION (02)  
Back busbars revised for continuous / discontinuous.

APPROVED BY :

SR

PREPARED

SM

ISSUED

Engg.

DATE

10.09.2012



**PURCHASE SPECIFICATION  
GROUP : PHOTOVOLTAICS**

**PS- 439 - 170**

REV.02

A4-10

PAGE 02 OF 02

COPY RIGHT AND CONFIDENTIAL

The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company.

**3.0 VISUAL CHARACTERISTICS :**

- 3.1 Cells shall not have any edge chips or cracks or deep scratches on the surface.
- 3.2 Cells shall not have any misalignment in the front grid pattern.
- 3.3 Cells shall not have any finger prints or stains or paste smudges on the surface.
- 3.4 Cells shall not have Silicon Nitride coating colour variations or inhomogeneity.

**4.0 PACKING CONDITIONS**

- 4.1 Cells shall be packed tightly with heat shrinkable sleeves, then in foam or thermocole boxes, carton box / plywood box suitable for air-freight.
- 4.2 Manufacturer name, Cell type, lot number, wattage / efficiency quantity in each packet, date of manufacture to be identified on each packet.
- 4.3 Test certificate shall be provided along with each consignment.
- 4.4 BHEL Purchase Order (PO) Number shall be mentioned on the plywood Boxes.

**5.0 SAMPLING SIZE FOR INSPECTION AT BHEL**

**I. Visual Inspection:**

Single Sampling Plan as per IS: 10673-1983, General Inspection Level I, AQL 2.5 %

**II. Physical & Electrical Measurement:**

Single Sampling Plan as per IS: 10673-1983, Special Inspection Level S-4, AQL 2.5 %



**PURCHASE SPECIFICATION**

**GROUP: PHOTOVOLTAICS**

Spec. No	PS-439-267
Rev. No	02
Page	1 of 2

**ITEM : 156-mm PSEUDO SQUARE MONO CRYSTALLINE SILICON SOLAR CELLS WITH 3-BUSBARS**

**1.0 PHYSICAL CHARACTERISTICS**


- 1.1 MATERIAL : Mono Crystalline Silicon.
- 1.2 DIMENSIONS : 156± 1 mm (Side to Side)  
200± 1 mm (Corner to Corner)
- 1.3 SHAPE : Pseudo Square
- 1.4 THICKNESS : 200 ± 20 microns
- 1.5 METALISATION : Front – Silver  
Back – Silver busbars  
(Continuous/Discontinuous) with Aluminum BSF.  
Number of Bus bars : Three (Front and Back)
- 1.6 AR Coating : PECVD Silicon Nitride (Deep blue color)

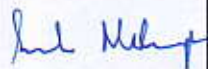
**2.0 ELECTRICAL CHARACTERISTICS**


- 2.1 POWER OUTPUT (Pmax) : >=4.30 Watts
- 2.2 VOLTAGE AT MAX.POWER POINT : 500 mV (Typical)
- 2.3 OPEN-CIRCUIT VOLTAGE : 610 mV (Typical)
- 2.4 SHORT-CIRCUIT CURRENT : 8.80 A (Typical)
- 2.5 FILL FACTOR : 0.75 (Typical)

**COPYRIGHT AND CONFIDENTIAL**  
 The information on this document is the property of Bharat Heavy Electricals Ltd.  
 It must not be used directly or indirectly in anyway detrimental to the interest of the company

**REVISION (02)**  
**Back busbars revised for continuous/ Discontinuous**

**APPROVED BY**  
 SR 

PREPARED	ISSUED	DATE
 SM	Engg	10-09-12

		 <p>भारत भारती एल A4-11</p>	<p><b>PURCHASE SPECIFICATION</b></p> <p><b>GROUP: PHOTOVOLTAICS</b></p>	<p><b>Spec. No</b></p> <p><b>Rev. No</b></p> <p><b>Page</b></p>	<p><b>PS-439-267</b></p> <p><b>02</b></p> <p><b>2 of 2</b></p>
		<p><b>3.0 VISUAL CHARACTERISTICS :</b></p> <p>3.1 Cells shall not have any edge chips or cracks or deep scratches on the surface.</p> <p>3.2 Cells shall not have any misalignment in the front grid pattern.</p> <p>3.3 Cells shall not have any finger prints or stains or paste smudges on the surface.</p> <p>3.4 Cells shall not have Silicon Nitride coating colour variations or inhomogeneity.</p>			
<p><b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document is the property of Bharat Heavy Electricals Ltd. It must not be used directly or indirectly in anyway detrimental to the interest of the company</p>		<p><b>4.0 PACKING CONDITIONS</b></p> <p>4.1 Cells shall be packed tightly with heat shrinkable sleeves, then in foam or thermocole boxes, carton box / plywood box suitable for air-freight.</p> <p>4.2 Manufacturer name, Cell type, lot number, wattage / efficiency quantity in each packet, date of manufacture to be identified on each packet.</p> <p>4.3 Test certificate shall be provided along with each consignment.</p> <p>4.4 BHEL Purchase Order (PO) Number shall be mentioned on the plywood Boxes.</p> <p><b>5.0 SAMPLING SIZE FOR INSPECTION AT BHEL</b></p> <p>I. Visual Inspection:</p> <p>Single Sampling Plan as per IS: 10673-1983, General Inspection Level I, AQL 2.5 %</p> <p>II. Physical &amp; Electrical Measurement:</p> <p>Single Sampling Plan as per IS: 10673-1983, Special Inspection Level S-4, AQL 2.5 %</p>			