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**BHEL ELECTRONICS DIVISION  
PES-TRACTION ENGG  
DC-DC POWER SUPPLY****PS4452709****REV. No. 03****PAGE 1 OF 4****PURCHASE SPECIFICATION****OF****DC-DC POWER SUPPLY****REVISION HISTORY SHEET**

Rev. No.	DATE	Nature of Change	Reason	Prepared	Checked	Approved
00	21.01.2021	FIRST ISSUE	-	SRM	SKS	AJL
01	21.01.2021	Revision	Description and Scope of supply edited.	SRM	SKS	AJL
02	24.03.2021	Revision	Indicative dimensions included.	SRM	SKS	AJL
03	27.07.2021	Revision	Specs modified	GS	PS	AJL

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DC-DC POWER SUPPLY****PS4452709****REV. No. 03****PAGE 2 OF 4****1. General Instructions:****1.1 The supplier shall submit the offer / bids in two parts:**

**Part 1:** Techno-commercial bid (without pricing). Unpriced price bid to be enclosed in the technical bid.

List of type tests shall be clearly indicated in the technical bid. The type tests are to be performed in any NABL certified laboratories.

**Part 2:** Price bid

**2. General description and Scope of supply:** The scope of this specification covers Design, manufacture, testing at supplier's works, supply and commissioning of DC-DC Power supplies for Traction Applications.**3. Technical Specification of Power Supply**

- |       |   |   |  |
|-------|---|---|--|
| i.    | No-load current                                   | : | To be specified by supplier along with quotation   |
| ii.   | Output voltage                                    | : | 24V DC $\pm$ 1%,   |
| iii.  | Response time                                     | : | $\leq$ 10mS  |
| iv.   | Nominal power                                     | : | 200-300W   |
| v.    | Efficiency  | : | $\geq$ 87% at 110V-Full load   |
| vi.   | Output current (max)                              | : | 15A  |
| vii.  | Ambient temperature                               | : | -40°C to +85°C   |
| viii. | Storage temperature                               | : | -40°C to +50°C /short term 85°C  |
| ix.   | Isolation test voltage                            | : | Input – PE<br>Output – PE<br>Input – Output  |
| x.    | Input polarity protection                         | : | To be provided   |
| xi.   | Connection Type                                   | : | Suitable for Traction application  |
| xii.  | Cooling   | : | Natural Convection   |
| xiii. | Potential free contacts                           | : | One C/O contact to indicate healthiness status of output   |
| xiv.  | Mounting arrangement                              | : | DIN rail mounted, Supplier to provide dimensional drawing and 3D model (STEP format) to check for dimensional compatibility with BHEL make traction converter cubicle. |
| xv.   | Alarms  | : | Under/Over Voltage protections to be provided.   |
| xvi.  | Supplier shall submit MTBF of the DC power supply | : | To be specified  |
| xvii. | Dimensions  | : | Supplier to provide the dimensions. Should be as compact as possible to fit in BHEL make cubicle.<br>Maximum space including clearances (w x d x h):<br>250x150x150mm. |

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**4. List of tests to be conducted for Vendors without Railways approval****4.1 Routine Tests**

4.1.1	Visual inspection
4.1.2	Line regulation
4.1.3	Load Regulation
4.1.4	Output ripple measurement at different load conditions
4.1.5	Input under Voltage/Over Voltage, Output Fault
4.1.6	LED indication-input, output, fault
4.1.7	Temperature Measurement
4.1.8	Input reverse voltage test
4.1.9	Short circuit test
4.1.10	Full Load test
4.1.11	Efficiency Calculation

**4.2 Type Test**

4.2.1	Visual inspection Test
4.2.2	Performance Test
4.2.3	Cooling Test
4.2.4	Supply over voltage test
4.2.5	Dry heat test as per IEC 60571, IEC60068-2-2.
4.2.6	Cold start test as per IEC 60571, IEC60068-2-1
4.2.7	Damp heat test IEC 60571, IEC60068-2-30
4.2.8	Electrostatic discharge test as per IEC 61000-4-4
4.2.9	Insulation Test
4.2.10	Vibration & Shock Test as per IEC61373, Class B, Category-1 body mount
4.2.11	Burst Immunity Tests as per IEC61000-4-4
4.2.12	Surge Immunity Tests as per IEC61000-4-5
4.2.13	Burn in Test

**4.3 All the above mentioned tests shall be conducted by Suppliers, without railways approval. For suppliers with railway approval, Test Certificates to be provided.**

**5. Test Protocol:**

Supplier without railway approval, shall provide test protocol for Routine and Type tests along with Techno-commercial offer, for approval.

For suppliers with railway approval, Test Certificates to be provided.

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For supplier without railway approval, BHEL will witness routine & type tests as per test protocol before dispatch.

**7. Documentation**

Information required along with techno commercial offer without which offer is liable for Rejection.

- i. Supplier shall furnish clause wise confirmation/comments to the technical specification. Deviation, if any, shall be clearly brought out indicating the clause number, original specification, deviation sought with proper technical backup (catalogue, technical brochure, international standards, calculations etc.). If no deviations required, then supplier shall furnish certificate indicating "NO DEVIATIONS REQUESTED" and we comply fully with all the technical requirements of this specification no.
- ii. Dimensional drawing for BHEL approval
- iii. Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer.
- iv. Test protocol for BHEL approval for suppliers without railway approval.
- v. Test certificates for railway approved suppliers
- vi. BHEL engineer/Indian Railways witnessed Pre inspection report for suppliers without railway approval.

**8. Reference Standards**

IEC61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
IEC61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC61373	Railway applications - Rolling stock equipment - Shock and vibration tests
IEC60571	Railway applications – Electronic equipment used on rolling stock
IEC60068	Environmental testing of Electro technical products

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