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

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 with price of 1 set (02 nos) of DC-DC power supply

2. Introduction

2.1 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.

Every basic unit uses two DC-DC power supplies to supply 24V DC to indication lights and control electronics.

The supplier shall supply two identical DC-DC power supplies to be used in parallel.

3. Technical Specification of Power Supply

i.	Input voltage range	:	Continuous 77V - 143V DC Dynamic 66V - 154V DC
ii.	No-load current/sleep mode	:	To be specified by supplier along with quotation
iii.	Output voltage	:	24V DC±2%,
iv.	Response time	:	< 5mS
v.	Nominal power	:	200-300W
vi.	Efficiency	:	≥ 90% at 110V-Full load
vii.	Output current (max)	:	15A
viii.	Converter principle	:	Buck + Push-pull or any better
ix.	Ambient temperature	:	-40°C to +85°C
x.	Build in position	:	Vertical, Free air convection
xi.	Storage temperature	:	Electrolytic Capacitors, -40°C to +50°C /short term 85°C
xii.	Isolation test voltage	:	1500VAC /50Hz 1 min, Input – PE 1500VAC /50Hz 1 min, Output – PE 1500VAC /50Hz 1 min, Input – Output
xiii.	Fuse (Internal)	:	Shall be intimated by supplier
xiv.	Input polarity protection	:	Active Diode
xv.	Connectors	:	Suitable for Traction application.
xvi.	Supplier required to explain the circuit operation		
xvii.	Cooling	:	Inbuilt
xviii.	Potential free contacts	:	One c/o contact to indicate healthiness status of output
xix.	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.
xx.	Indicator/Alarms	:	Defined below
xxi.	Supplier shall submit MTBF of the DC power supply		
xxii.	Dimensions	:	Supplier to provide the dimensions. Should be as compact as possible to fit in BHEL make cubicle. Maximum dimensions (l x b x h): 220x100x40mm.

4. Input voltage and output monitoring

4.1 Under voltage fault logic shall be as follows:

4.1.1	Input Voltage less than 62Volts	Shutdown all the outputs with an UV Fault LED Indication.
	Input Voltage reaches 76 to 77V after UV fault	Automatic resumption of all the outputs.
4.1.2	Output voltages less than specified range as per clause No. 3	Shutdown all the outputs with an UV Fault LED Indication. Automatic resumption of all the outputs when these output voltage reaches with in tolerance limits

4.2 Over voltage fault logic shall be as follows:

4.2.1	Input Voltage more than 154 Volts:	Shutdown all the outputs with an OV Fault LED Indication.
	Input Voltage reaches 143V after over voltage fault	Automatic resumption of all the outputs.
4.2.2	Output voltages more than specified range as per clause No. 3	Shutdown all the outputs with an OV Fault LED Indication. Automatic resumption of all the outputs when these output voltage reaches with in tolerance limits.

5. Output Currents are to be monitored. If output current exceeds the rated values, shutdown the output and indicator should be provided.

6. List of tests to be conducted

6.1 Routine Tests

6.1.1	Visual inspection
6.1.2	Line regulation
6.1.3	Load Regulation
6.1.4	Output ripple measurement at different load conditions
6.1.5	Input under Voltage/Over Voltage, Output Fault
6.1.6	LED indication-input, output, fault

6.1.7	Temperature Measurement
6.1.8	Input reverse voltage test
6.1.9	Short circuit test
6.1.10	Full Load test
6.1.11	Efficiency Calculation

6.2 Type Test

6.2.1	Visual inspection Test
6.2.2	Performance Test
6.2.3	Cooling Test
6.2.4	Supply over voltage test
6.2.5	Dry heat test as per IEC 60571, IEC60068-2-2.
6.2.6	Cold start test as per IEC 60571, IEC60068-2-1
6.2.7	Damp heat test IEC 60571, IEC60068-2-30
6.2.8	Electrostatic discharge test as per IEC 61000-4-4
6.2.9	Insulation Test
6.2.10	Vibration &Shock Test as per IEC61373, Class B, Category-1 body mount
6.2.11	Burst Immunity Tests as per IEC61000-4-4
6.2.12	Surge Immunity Tests as per IEC61000-4-5
6.2.13	Burn in Test for 80 Hrs.

6.3 All the above mentioned tests shall be conducted at Supplier's place.

7. Test Protocol:

Supplier shall submit test protocol for Routine and Type tests along with Techno-commercial offer.

8. Pre-shipment Inspection:

Will be carried out by BHEL engineer/user railways as per the approved test Protocol. BHEL engineers /user railways will witness routine & type tests before dispatch.

9. 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. Information required after the placement of order
v. Test protocol for BHEL approval.
vi. Information required along with material supply
vii. Two sets of Test certificates
viii. BHEL engineer/Indian Railways witnessed Pre inspection report.

10. Rating plate details

Weather proof Rating Plate (with following information) shall be fixed at a suitable position.

i. Rated voltage
ii. Rated current
iii. Serial no.
iv. Month & Year of manufacture
v. Weight

11. 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