सत्यमेव जयते

वर्गीय आवश्यकताओं के लिए मानक
टीईसी 66xxx:2025
STANDARD FOR GENERIC REQUIREMENTS
TEC 66xxx:2025

Outdoor Weather Proof Rack For Telecom Applications

ISO9001:2015

दूरसंचार अभियांत्रिकी केंद्र
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FOREWORD

Telecommunication Engineering Centre (TEC) is the technical arm of the Department of Telecommunications (DOT), Government of India. Its activities include:

- Framing of Standards for Generic Requirements for a Product/Equipment, Standards for Interface Requirements for a Product/Equipment, Standards for Service Requirements
- Formulation of Essential Requirements (ERs) under Mandatory Testing and Certification of Telecom Equipment (MTCTE) Policy
- Field evaluation of Telecom Products and Systems
- Designation of Conformity Assessment Bodies (CABs)/Testing facilities
- Testing & Certification of Telecom products
- Adoption of Standards
- Support to DoT on technical/technology issues

For the purpose of testing, four Regional Telecom Engineering Centers (RTECs) have been established which are located in New Delhi, Bangalore, Mumbai, and Kolkata.

ABSTRACT

This document contains the generic requirements of Outdoor weatherproof racks for Telecom Applications to accommodate **telecom equipments.** As most of the telecom sites are now becoming outdoor, there are telecom equipments which are temperature and dust sensitive. To house such equipments, there is a need of rack which can provide suitable temperature controlled and dust free environment.

CONTENTS

HISTORY SHEET

Sl. No.	Standard/ Document *No.*	*Title*	*Remarks*
1	TEC 66xxx:2025	Outdoor Temperature controller racks For Telecom equipments.	First issue

REFERENCE

S.No.	Document No.	Title/Document Name
1.	CISPR 32 (2015) with A1(2019)	Electromagnetic compatibility of multimedia equipment – Emission requirements.
2.	QM-115	Quality standard for calculation/verification of MTBF
3.	QM-118	Quality reliability in product design.
4.	QM-202	Pictorial guidelines for Visual assessment of quality of printed board assemblies (PBA) & discrete terminal assemblies.
5.	QM-204	Guidelines for workmanship standards for repair & modification of printed wiring board assemblies.
6.	QM-205	Guidelines for standard of workmanship for printed boards.
7.	QM-206	Guidelines for standard of workmanship for printed boards assemblies
8.	QM-207	Guidelines for soft solder and fluxes for Telecom Equipments.
9.	QM 210	Guidelines for standard of workmanship for surface Mounting Devices.
10.	TEC 14016:2010 (old no. QM-333:2010)	Standard for Environmental testing of Telecommunication equipment.
11.	ITUT Rec. O.41	Psophomeric noise requirements.
12.	IS: 5	Standard on colors & shades.
13.	IS: 101	Methods of Sampling & Test for Paints, Varnishes & Related Products.
14.	IS: 168	Ready Mixed Paint, Air Drying, For General Purpose-Specification
15.	IS: 613	Standard on Bus-bars
16.	IS: 1248	Standard on Shunts.
17.	IS: 1359	Specification for Tinning requirements.
18.	IS: 1554 with Amend. -1 (June 1994)	Standard for Cables & Wires.
19.	IS 10437(1986)	Safety requirements for radio transmitting equipments" (equivalent to IEC 60215).
20.	ISO-9001-2000	Quality Management Systems Requirements.

21.	EN 61643 – 11 / A11	Low Voltage Surge Protective Device – Part 11: Surge Protective Device connected to low voltage power system – Requirement and Tests
22.	IEC 61000-4-18	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test
23.	IEC 60215	Safety requirements for radio transmitting equipment - General requirements and terminology
24.	IEC 62305 – 1	Protection Against Lightening – Part 1: General Principle
25.	IEC 62305 – 2	Protection Against Lightening – Part 2: Risk Mgmt.
26.	IEC 62305 – 3	Protection against lightning – Part 3: Physical damage to structures and life hazard
27.	IEC 62305 – 4	Protection Against Lightining – Part 4: Electrical & Electronic System Within Structure
28.	IEC 60364 – 5 – 53	Electrical Installation Of Building – Part 5 – 53: Selection & Erection of Electrical Equipments
29.	IEC 61643- 1 (Second Edition 2005 – 03)	Low-voltage surge protective devices – Part 1: Surge protective devices connected to low-voltage power distribution systems – Requirements and tests
30.	IEC 60364-5-53: 2001 Amendment-1 2002 – 04	Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control
31.	TEC10009: 2024	Audio/video, information and communication technology equipment – Part 1: Safety requirements 'SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT":

Note:

Unless otherwise explicitly stated, the latest approved issue of the standard/GR/IR, with all amendments in force, listed in references, shall be applicable.

CHAPTER 1

1 INTRODUCTION:

1.1 This document contains the generic requirements of Outdoor weatherproof rack for Telecom/ Telecommunications applications, which shall be suitable for operation from 48V power source like SMPS, Batteries, Solar Charge controller etc. It shall be IP55 protected and suitable for outdoor environment.

2 FUNCTIONAL REQUIREMENTS:

The Outdoor rack shall be equipped with

a) Air-conditioner or Heat Exchanger
b) Controller (Integrated with cooling unit)
c) 19” channels / Purchaser specific mounting arrangement
d) Purchaser specific DCDB
e) Smoke sensor
f) Door open sensor
g) LED light for rack illumination

3 OPERATIONAL REQUIREMENTS

The operational requirements of an outdoor rack for telecom equipment are critical to ensuring the efficient and reliable functioning of the telecom infrastructure in outdoor environments. These requirements address the performance, maintenance, and management aspects of the outdoor rack. Here are some key operational requirements:

The requirements of the setup are as specified below:

3.1 Operational requirements of Outdoor rack:-

3.1.1 Weatherproof Rack: The outdoor rack shall be designed to provide protection against environmental elements such as rain, dust, and temperature fluctuations. It shall be typically constructed with materials that offer durability and weather resistance. The ingress protection for Outdoor rack shall be of IP-55 or above as per IEC60529.

3.1.2 Usable space requirement for Telecom Equipment in Rack: A 19-inch rack suitable for telecom equipment with usable space 21U or specified by purchaser. The depth of the Rack shall be of 800mm or specified by purchaser. The ETSI (or equivalent Indian standard) mounting channel is to be provided to install and secure telecommunications Equipment in rack cabinets.

Usable space does not include the space occupied by DCDB.

Usable U space can also be defined by purchaser at the time of purchase. For TSEC approval purpose 21U space shall be considered.

3.1.3 Outdoor-Rated Smoke Detectors: The OEM shall ensure to choose the smoke detectors, which operates at 48V DC and explicitly designed and rated for outdoor use. The detectors are of good quality & built to withstand harsh environmental conditions, including temperature fluctuations, moisture and dust.

3.1.4 Cabinet lifting arrangement:
Four number of Cabinet lifting hooks are to be provided for installing and removing equipment racks safely and efficiently.

3.1.5 Lock: The outdoor rack shall be equipped with 4-point locking system.

3.1.6 Rack material: The outdoor rack shall be made of GI (Galvanized Iron) sheet duly powder coated.

3.1.7 Door & Cable entry: There should be only one door of the rack and that should be on the front side. Rack should be closed and sealed from all other sides to avoid cooling loss.

Cable entry shall be provided at bottom of the cabinet with IP65 PG glands or Sealing. Size and number of cable glands or sealings shall be decided by purchaser.

For TSEC approval purpose, total 6 nos. of cable glands should be provided in the rack as per following size and number: -

PG29 – 1 no.
PG16 – 1 no.
PG21 – 4nos.

3.1.8 Thermal insulation: Foam type XLPE (cross linked polymer) with minimum thickness of 20mm for Air conditioner and 6mm for Heat exchanger is required to minimize solar gain.

3.1.9 DCDB: It should be 19" in width. Following MCBs shall be provided:-

(a) **MCB for cooling unit** – OEM to ensure appropriate rating of MCB shall be provided for cooling unit DC input according to the power rating of cooling unit.

(b) **DC Load MCBs** – Rating and no. of MCBs shall be decided by purchaser.

For TSEC approval purpose, following MCBs shall be provided:-

MCB 16A – 2nos.

MCB 10A – 6 nos.

For +ve termination, suitable busbar or terminal block shall be provided.

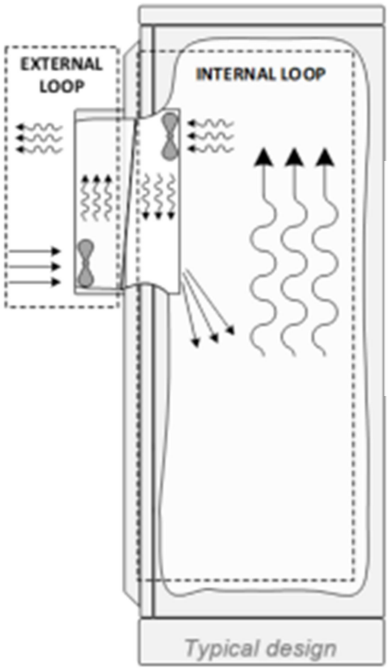
3.1.10 Door open detection: The rack shall have provision to detect door open status and if door is open, rack light shall be automatically switch ON and cooling unit shall go in standby mode.

3.1.11 Earthing: The outdoor rack system must be diagonal earthing. Additionally, proper Earthing provisions shall be extended to the doors.

3.1.12 Potential free contacts: Following potential free contacts must be available in outdoor cabinet:

(a) Cooling unit fail
(b) High temperature inside the cabinet
(c) Cabinet door open
(d) Smoke alarm

3.2 Operational requirement of Air conditioner cooling unit:



Cooling system does not allow exchange of air between ambient and cabinet interior

There are two separated loops

- External loop
- Internal loop

The air between them is separated by physical barrier

3.2.1 Air Conditioning Unit: An air conditioner suitable for outdoor deployment is to be supplied based on the cooling requirements of the Telecom equipment. The air-conditioner shall operate with 48V DC power source. Factors such as capacity, energy efficiency, and environmental suitability are considered during the design Process.

3.2.2 Air Compressor: Compressors of air conditioning system shall be hermetically sealed type of high quality, very reliable, trouble free and with long operating life. Valves shall be provided for charging / topping up of refrigerant. The Bidder shall furnish the details of their compressors indicating the MTBF, life of the compressor and continuous run time of the compressors without failure.

3.2.3 Microprocessor-based Controller: The operational requirements of a microprocessor-based controller are essential for ensuring efficient and effective control of the cooling system. Some of the key operational requirements are Temperature Control and Regulation, Energy Efficiency, display of Mode of operation, temperature setting and status of operation and various system alarms.

The air conditioning system shall have a microprocessor-based controller. The Controller shall be capable of displaying the real-time parameters.

3.2.4 Derating performance feature in air conditioner: In the context of cooling systems and air conditioning system, during occasional ambient temperature spikes, higher altitude levels, voltage fluctuations or environmental and installation conditions, a safety margin shall be incorporated into the system's design. For example, this means that the compressor shall continue to be in running condition at derating/ reduced cooling capacity even if the ambient temperature slightly exceeds the upper limit of 48°C, for a short time without compromising the safety of the compressor.

3.2.5 Monitoring and Control: Isolated RS485 port shall be available in cooling unit. Modbus communication is given in Annexure:-

3.2.6 Input Voltage working range: Cooling unit shall work satisfactorily from 42Vdc to 58Vdc.

3.2.7 Capacity: Suitable capacity of Aircon shall be provided to maintain the desired temperature inside the cabinet as per mutual agreement of purchaser and OEM.

Purchaser shall clearly define following parameters for design: -

1) Heat load inside the cabinet
2) $\boldsymbol{Desired}\ \Delta \boldsymbol{T}$ inside the cabinet
3) Maximum ambient temperature
4) Total space required inside the cabinet

$$\Delta \boldsymbol{T} = \boldsymbol{T_i} - \boldsymbol{T_a}$$

$$\Delta T : Temperature\ difference$$

$$T_i : Internal\ temperature$$

$$T_a : Ambinet\ temperature$$

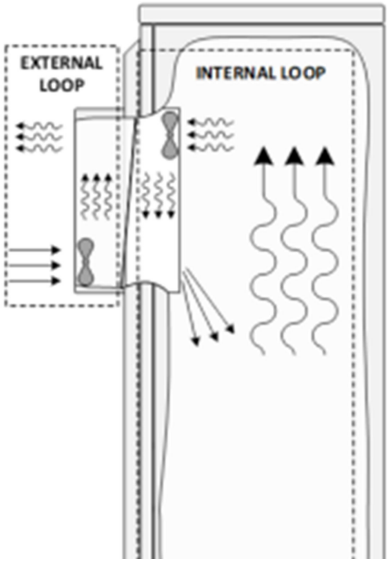
Air conditioner shall maintain lower temperature inside the cabinet w.r.t to ambient/outside cabinet temperature.

3.2.8 Unit operating temperature range: Unit shall operate satisfactorily from -5°C to 55°C

3.2.9 Refrigerant: Aircon shall have R134a or R410 refrigerant.

3.2.10 Alarms: Following alarms should be displayed on Aircon display:

(a) High Temperature
(b) Low Temperature
(c) Fan Fail
(d) Temperature sensor fail
(e) Over voltage
(f) Under voltage
(g) Compressor fail



3.3 Operational requirement of Heat Exchanger / Refrigerant based heat exchanger unit:

Cooling system does not allow exchange of air between ambient and cabinet interior

There are two separated loops

- External loop
- Internal loop

The air between them is separated by physical barrier

3.3.1 Heat Exchanger Unit: A heat exchanger suitable for outdoor deployment is to be supplied based on the cooling requirements of the Telecom equipment. The heat exchanger shall operate with 48V DC power source. Factors such as capacity, energy efficiency, and environmental suitability are considered during the design Process.

3.3.2 Microprocessor-based Controller: The operational requirements of a microprocessor-based controller are essential for ensuring efficient and effective control of the cooling system. Some of the key operational requirements are Temperature Control and Regulation, Energy Efficiency, display of Mode of operation, temperature setting and status of operation and various system alarms.

The heat exchanger system shall have a microprocessor-based controller. The Controller shall be capable of displaying the real-time parameters

3.3.3 Derating performance feature in Heat exchanger: In the context of cooling systems, during occasional ambient temperature spikes, higher altitude levels, voltage fluctuations or environmental and installation conditions, a safety margin shall be incorporated into the system's design.

3.3.4 Monitoring and Control: Isolated RS485 port shall be available in cooling unit. Modbus communication is given in Annexure.

3.3.5 Input Voltage working range: Cooling unit shall work satisfactorily from 42Vdc to 58Vdc.

3.3.6 Capacity: Suitable capacity of heat exchanger to be provided to maintain temperature the desired temperature as per mutual agreement of purchaser and OEM.

Purchaser shall clearly define following parameters for design: -

1) Heat load inside the cabinet
2) $\boldsymbol{Desired}\ \Delta\boldsymbol{T}$ inside the cabinet
3) Maximum ambient temperature
4) Total space required inside the cabinet

$$\Delta \boldsymbol{T} = \boldsymbol{T_i} - \boldsymbol{T_a}$$

$\Delta T : Temperature\ difference$

$T_i : Internal\ temperature$

$T_a : Ambinet\ temperature$

Heat exchanger maintains higher temperature inside the cabinet w.r.t to ambient/outside cabinet temperature.

3.3.7 Unit operating temperature range: Unit shall operate satisfactorily from -5°C to 55°C

3.3.8 Refrigerant: Aircon shall have R134a (only applicable for refrigerant based heat exchanger)

3.3.9 Alarms: Following alarms should be displayed on hex display:

(a) High Temperature

(b) Low temperature

(c) Temperature sensor fail

(d) Over voltage

(e) Under voltage

(f) Fan fail

3.4 Operational life:

The outdoor rack unit shall have operational life of 10 years. These rack units shall be installed on the transmission tower on pan India basis in climatic conditions prevailing in India.

4 CONSTRUCTION

The outdoor rack system shall be completely self-contained, consisting of a single AC unit of rated capacity, which can be mounted on front door of the cabinet.

Good quality hinges shall be used for the doors to sustain the weight of the door and AC unit.

Door stoppers shall be provided to secure and control the movement of the doors of the rack enclosure.

The placement of air conditioning / Hex system should be such that the maintenance and repairing works of cooling unit shall be carried out without affecting the running of the telecom equipment.

The colour of the cabinet shall be of RAL 7035 colour.

The system shall be assembled, wired, piped, charged with refrigerant, and fully factory tested to ensure trouble-free installation.

4.1 Layout: The layout of outdoor rack equipped with air-conditioner/Hex system shall be designed in such a way that it provides better circulation of the air inside the cabinet to avoid any hot air pockets.

4.2 Cable & Wiring:

All the wires and cables including Uninyvin cables used shall be fire retardant as per IS 1554 with amendment 1 (June 94). All the cables & wires used shall also be Rodent & reptiles repellent. Uninyvin cables are also allowed to use in system.

4.3 Accessibility & Terminations

All the termination points shall be easily accessible from front with proper labelling and safety compliance.

4.4 Name Plate:

A name plate anodised, screen printed or any other better arrangement ensuring better life expectancy shall be suitably fixed inside / on shelf and contain following information:

1. TEC Standard Number:
2. Manufacturer's name:
3. Model No.:
4. Unit Serial No.:
5. TAC No.
6. Input Voltage:
7. Type of cooling and capacity:
8. Year & Month of manufacturing:

*Type of cooling shall be either “Air conditioner” or “Heat Exchanger”

4.5 Documentation:

Technical literature in English with complete layout, detailed block schematic and circuit diagrams of its assemblies shall be provided. All aspects of installation, operation, maintenance, trouble shooting and replacement shall be covered in this manual. This manual can be provided as a soft copy or QR code and/ or hard copy as specified by the purchaser. Label or suitable

arrangement for address and telephone numbers of Maintenance centre shall also be provided.

4.6 REMOTE MONITORING COMMUNICATION PROTOCOL

Details are given in Annexure-1.

5 QUALITY REQUIREMENTS

5.1 Components: The component parts of the equipment shall be of professional grade of reputed manufacturer to ensure prompt and continuous service and delivery of spare parts.

5.2 Power transformers and Chokes: Power transformers & chokes (if used) shall be class B or higher grade of insulation. The transformers and chokes shall be wound with copper wire and provided with adequate insulation.

5.3 Fuses or circuit breakers shall be provided wherever appropriate for the protection against failure of control/sensing circuit.

5.4 Quality and Workmanship: The equipment shall manufacture in accordance with international quality management systems ISO-9001-2015, for which the manufacturer shall be duly accredited. A quality plan describing the quality assurance system followed by the manufacturer would be required to be submitted.

5.4.1 The equipment shall be manufactured as per the latest Guidelines indicated in Quality Manuals QM-118 (Quality reliability in product design), Manuals QM-202 (Pictorial guidelines for Visual assessment of quality of printed board assemblies (PBA) and discrete terminal assemblies), QM-204 (Guidelines for workmanship standards for repair & modification of printed wiring board assemblies), QM-205 (Guidelines for standard of workmanship for printed boards), QM-206 (Guidelines for standard of workmanship for printed boards assemblies), QM-207 (Guidelines for soft solder and fluxes for Telecom Equipments) and QM 210 (Guidelines for standard of workmanship for surface Mounting Devices).

5.4.2 All wiring shall be neatly secured in position and adequately supported. Metal panel or cover holes through which the wires or cables pass shall be suitably bushed..

5.5 BURN IN TEST: The fully equipped rack shall be capable of withstanding a burn-in test for 72 hours at an ambient temperature of 50°C when the equipment is working at full rated load. This test may be performed in a temperature controlled room with free air flow. The ambient temperature shall be measured at a distance of 1 foot from the equipment under test. The necessary set-up for the purpose shall be provided by the manufacturer.

5.5.1 The temperature rise of the heat dissipating components above the ambient, measured directly or at heat sink in the first eight hours of the test, shall not be more than:

5.5.2 Transformers and Chokes: 70°C for Grade B insulation.

For higher grade of insulation, higher temperature rise may be permissible, subject to the following conditions:

i. It is at least 20°C below the permissible limit for the grade of insulation used.
ii. The temperature rise shall be at least 30°C below Curie temperature of the magnetic material.
iii. This temperature shall neither affect other components nor shall lead to fire hazard.

5.5.3 Semiconductor devices: 60°C or as per component spec.

5.6 Insulation Resistance Test : The insulation resistance of the complete System when tested with a 500V DC megger shall not be less than 5meg ohms for the following conditions :

- Interconnected Input terminals and Earth
- Interconnected Output terminals and Earth
- Interconnected Input terminals and Interconnected output terminals.

5.7 Voltage Proof Test: No breakdown or abnormal temperature rise shall occur,

when-after EMI/RFI capacitors and MOVs/Tranzorbs etc. removed from the circuit

- a test voltage of 2000V/50Hz is applied for one minute between :

- earth and interconnected output terminals.
- earth and interconnected input terminals.
- input and output terminals.

Alternatively, without removing EMI/RFI capacitors, the lightning protection circuitry and Tranzorbs etc., but with EMI/RFI discharge resistors removed:

a) A 2150V DC can be applied for one minute between shorted AC output & DC input terminals.
b) 650V DC can be applied for one minute between shorted AC Input terminals, shorted input
DC terminals, shorted DC output terminals & earth.

This DC voltage test is in accordance with UL950 & IEC 950 Standards.

Note: This Test is to be conducted on each of the basic units of the system.

5.8 Noise & Vibration:

The fully equipped power shelf at full load shall not contribute more than 15 dB (weighted) to the ambient noise level taken as 45dBA. It shall be measured at a distance of 1 metre from the unit & 1.25m above the floor level in the Acoustic Range. The correction factor for Total Noise when the ambient noise level is more than 45dBA, shall be as given below:

Ambient Noise	Correction Factor	Ambient Noise	Correction Factor	Ambient Noise	Correction Factor
45dBA	0dB	51dBA	1.41dB	57dB	3.69dB
46dBA	0.18dB	52dBA	1.73dB	58dB	4.17dB
47dBA	0.39dB	53dBA	2.07dB	59dB	4.68dB
48dBA	0.61dB	54dBA	2.43dB	60dB	5.21dB

49dBA	0.86dB	55dBA	2.82dB		
50dBA	1.12dB	56dBA	3.25dB		

Note: The correction Factor shall be added to the limit of 60 dBA to arrive at the limit when the ambient is greater than 45 dBA

5.9 Field Observations: For new products field observation may be carried out by purchaser for the period of one month.

5.10MTBF & MTTR:

I. **MTBF** of the system shall not be less than 100,000 hours. The MTBF for fans shall be better than 70,000 hours at 40°C. The concurrence of CACT in this regard is mandatory.

II. **Module Replacement Time:** The mean time to replace / restore (MTTR) a faulty module (FR/FC, Inverter, CCU, Converter) shall be less than 2 minutes.

5.11 Environmental:

Each system shall be capable of operating in conditions conforming to TEC 14016:2010 (old no.QM-333:2010, category B2 or D whichever applicable). It shall also comply with vibration requirements of clause 12.0 of QM-333. The system shall also be capable of working in saline atmosphere of coastal areas and up to an altitude of 3000 Metres in compliance of QM-333.

6 EMI/ EMC

6.1 Radio Frequency Interference (RFI) Suppression

The system (FR/FC, CCU, INVERTER & DSCA modules) shall be designed to minimize the level of electromagnetic interference (EMI), both conducted and radiated, detected in its vicinity and generated by the module and shall comply the following clauses:

a) Conducted and Radiated Emission from the Power equipment.

b) Name of EMC Standard: CISPR 32 (2015) with A1(2019)
"Electromagnetic compatibility of multimedia equipment – Emission

requirements; Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".

Limits: -

a) To comply with Class A of CISPR 32 (2015) with A1(2019).

b) The values of limits shall be as per relevant tables under CISPR 32 (2015) with A1(2019).

III. **Conducted Susceptibility Limits**: Power equipment used in Telecom Network shall not malfunction when high voltage surge as specified below is superimposed at the input power mains to the power equipment, for more than two seconds as per IEC 61000- 4-18. The equipment shall also not fail or degrade in performance after the surge is withdrawn.

Test levels:

Voltage Rise time (First peak) : 75 nano sec +/- 20%.

Oscillation Frequencies : 100KHz & 1 MHz +/- 10%

Repetition rate : at least 40/s for 100KHz and 400/s for 1 MHz

Decaying : 50% of the peak value between the 3rd & 6th periods

Burst duration : not less than 2 s

Surge amplitude : 250V(-10%) to 2.5 KV(+10%)

Wave shape : Damped

IV. **Electrostatic discharge (ESD) immunity limits:** The limits shall be as per IEC 61000- 4-2, 9(1) (both Contact discharge method and Air discharge method) as given below:

Test level:

Contact discharge		**Air discharge**	
Level	**Test voltage (KV)**	**Level**	**Test voltage (KV)**
4	8	4	15

V. **Electrical fast transient/Burst immunity limits:** The limits shall be as specified in IEC 61000-4-4.

Test level:

Open–circuit output test voltage (+/-10%) &repetition rate of impulses (+/-20%)		
Level	On Power supply port, Protection Earth	
	Voltage peak KV	Repetition rate KHz
4	4	2.5
Rise time of one Pulse - 5 ns +/- 30% Impulse duration - 50 ns +/- 30%		

VI. **Radiated radio-frequency Electromagnetic field immunity limits:** The limits as per IEC 61000-4-3.

Test level:

Frequency range : 80 MHz to 1000 MHz.	
Level	Test field strength V/m
3	10

VII. **Surge immunity limits:** The limits as per IEC 61000-4-5.

Test level:

Level	Open circuit test voltage(+/- 10%) KV
1	0.5
2	1.0
3	2.0
4	4.0
Voltage surge - 1.2/50 μs Amplitude - 2 KV(DM) - 4 KV(CM) After testing for 4KV, the amplitude shall also be increased to 6 KV (1.2/50 μs) Combined wave form as per IEEE C62.41- 1991 to cover Lightening/ Surge protection test also. - Test results shall be in compliance of clause 9(b) of IEC 61000-4-5.	

Note: The rated voltage of the MOVs shall not be less than 320V.

VIII. **Radio-Frequency Conducted Susceptibility immunity limits:** The limits as per IEC 61000-4-6.

Test level:

Frequency range : 150 KHz- 80 MHz	
Level	Voltage level (e.m.f.)
3	10

7 SAFETY REQUIREMENTS

"The equipment shall conform to relevant safety requirements as applicable to category 'Outdoor rack with cooling unit ' as prescribed under Table no. 1 of the TEC document 'SAFETY REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT": TEC10009: 2024."

CHAPTER 2

8 GUIDELINE FOR THE PUCHASER/USER

8.1 The purchaser shall specify the total required space inside the cabinet for any specific requirement. The type of rack – floor mounted or wall mounted – shall also be specified.

8.2 The purchaser may specify the requirement of field-trial. Feedback, if any, may be furnished to TEC for improvement in the GR.

8.3 Purchaser shall clearly define following parameters for design: -

1) Heat load inside the cabinet
2) $\boldsymbol{Desired}$ $\Delta \boldsymbol{T}$ inside the cabinet (Refer clause 3 above)
3) Maximum ambient temperature
4) Total space required inside the cabinet

8.4 Purchaser shall specify type of cooling required.

8.5 Purchaser shall specify DC distribution MCBs required inside the rack.

9 ORDERING INFORMATION

The following items need to be specified while ordering by Tendering Authority depending on the requirements.

I. Cooling capacity required
II. 19” equipment space required inside the rack
III. Type of cooling unit required
IV. DCDB required

10 SPECIFIC ITEMS TO BE MENTIONED IN THE CERTIFICATE

Following details of product shall be mentioned on TAC-

1) MAKE AND Model number of the major parts- Cooling unit, Outdoor cabinet

Annexure 1

Remote monitoring protocol – RS485 modbus

Baud Rate	9600
Data Bit	8
Stop Bit	1
Parity	None

TCU Protocol_V1.0

Sr. No.	Parameters	Units of Measurement	Data Type (Float/Hex etc.)	Size in byte	Conversion Multiplier to read the data	Type of Register	Read/Write	Modbus Register Address	No. of Registers required
INPUT REGISTER									
1	Internal fan1 revolution	RPM	Unsigned Integer	2	1	Input Register	Read Only	5	1
2	Internal fan2 revolution	RPM	Unsigned Integer	2	1	Input Register	Read Only	6	1
3	External fan1 revolution	RPM	Unsigned Integer	2	1	Input Register	Read Only	7	1
4	External fan2 revolution	RPM	Unsigned Integer	2	1	Input Register	Read Only	8	1
5	Compressor Speed	RPM	Unsigned Integer	2	1	Input Register	Read Only	9	1
6	Cabinet Air inlet temperature	Degree C	Unsigned Integer	2	0.1 x degC	Input Register	Read Only	10	1
7	Machine input voltage	Volt	Unsigned Integer	2	0.1 x volts	Input Register	Read Only	11	1
8	Cabinet inside return temperature	Degree C	Unsigned Integer	2	0.1 x degC	Input Register	Read Only	12	1
9	Condensing temperature	Degree C	Unsigned Integer	2	0.1 x degC	Input Register	Read Only	13	1
10	Run Hours of Only Hex	Hrs	Unsigned Integer	4		Input Register	Read Only	14~15	2
11	Run Hours of Only Aircon	Hrs	Unsigned Integer	4		Input Register	Read Only	16~17	2
INPUT STATUS (Alarm- 1, No Alarm - 0)									
1	Internal Fan1 alarm	NA	BIT	NA	NA	Input Status	Read Only	1	1
2	Internal Fan2 alarm	NA	BIT	NA	NA	Input Status	Read Only	2	1
3	External fan1 alarm	NA	BIT	NA	NA	Input Status	Read Only	3	1
4	External fan2 alarm	NA	BIT	NA	NA	Input Status	Read Only	4	1
5	Compressors fail alarm	NA	BIT	NA	NA	Input Status	Read Only	5	1
6	Cabinet inside temperature sensor / Return temp sensor alarm	NA	BIT	NA	NA	Input Status	Read Only	6	1
7	Ambient sensor alarm	NA	BIT	NA	NA	Input Status	Read Only	7	1
8	Cabinet inside high temperature alarm	NA	BIT	NA	NA	Input Status	Read Only	8	1
9	Cabinet inside low temperature alarm	NA	BIT	NA	NA	Input Status	Read Only	9	1
10	High voltage alarm	NA	BIT	NA	NA	Input Status	Read Only	10	1
11	Low voltage alarm	NA	BIT	NA	NA	Input Status	Read Only	11	1
12	Door Open Alarm	NA	BIT	NA	NA	Input Status	Read Only	12	1
13	F&S Alarm	NA	BIT	NA	NA	Input Status	Read Only	13	1
14	Condensation temperature sensor alarming	NA	BIT	NA	NA	Input Status	Read Only	14	1
15	Internal fan1 status	NA	BIT	NA	NA	Input Status	Read Only	15	1
16	Internal fan2 status	NA	BIT	NA	NA	Input Status	Read Only	16	1
17	External fan1 status	NA	BIT	NA	NA	Input Status	Read Only	17	1
18	External fan2 status	NA	BIT	NA	NA	Input Status	Read Only	18	1
19	Machine Status	NA	BIT	NA	NA	Input Status	Read Only	19	1
20	Compressor Status	NA	BIT	NA	NA	Input Status	Read Only	20	1
HOLDING REGISTER									
1	The external fan stopping temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	1	1
2	The external fan starting return temperature Difference	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	2	1
3	Internal fans are starting return temperature difference	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	3	1
4	The Internal fan stopping temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	4	1
5	Maximum Speed of Internal Fan	RPM	Unsigned Integer	2	0.1 x RPM	Holding Register	R/W	5	1
6	Minimum Speed of Internal Fan	RPM	Unsigned Integer	2	0.1 x RPM	Holding Register	R/W	6	1
7	Compressor setting Temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	7	1
8	Compressor difference temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	8	1
9	Heat Exchanger Starting temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	9	1
10	Heat Exchanger Stopping return difference temperature	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	10	1
11	High temperature alarm point	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	11	1
12	Low temperature alarm point	Degree C	Unsigned Integer	2	0.1 x degC	Holding Register	R/W	12	1
13	High DC Voltage alarm point	Volt	Unsigned Integer	2	0.1 x Volt	Holding Register	R/W	13	1
14	Low DC Voltage alarm point	Volt	Unsigned Integer	2	0.1x Volt	Holding Register	R/W	14	1

ABBREVIATIONS

A or Amps	Amperes
AC	Alternate Current
AH	Ampere Hour
AM	Air Mass
BIS	Bureau Of Indian Standards
CACT	Component Approval Centre of Telecommunication
CCU	Charge Controller Unit
CIGRE	International Conference on Large High Voltage Electric Systems
dB	Decibel
dBA	Decibel Absolute
DC	Direct Current
deg C	Degrees Celsius
DG	Diesel Generator
DI	Digital Input
DOT	Department of Telecommunication
DSCA	Distribution, Switching, Control, Alarm and Monitoring Unit
emf	Electro motive force
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
FET	Field Effect Transistor
gL/gG	General line/General Gracia (slow action fuses)
FSD	Full Scale Deflection
FR/FC	Float Rectifier cum Charger
FR/BC	Float Rectifier cum Battery Charger
GD	Gas Discharge
GR	Generic Requirements
IEC	International Electro-technical Commission
IS	Indian Standards
ISO	International Organisation for Standardisation

ITU-T	International Telecommunication Union-Transmission.
I-V	Current vs Voltage
Kg	Kilo Grams
KHz	Kilo Hertz
KW	Kilo Watts
LA	Flooded Type Lead Acid
LED	Light Emitting Diodes
LCD	Liquid Crystal Device
LM	Low Maintenance
MCB	Miniaturised Circuit Breaker
MHz	Mega Hertz
MIB	Management Information Base
MOV	Metal Oxide Varistor
MPPT	Maximum Power Point Tracking
MSL	Mean Sea Level
MTBF	Mean Time between Failures
MTTR	Mean Time To Restore
Ms	milli seconds
NPL	National Physical Laboraties
OTA	Over the Air
PCB	Printed Circuit Board
PF	Power factor
PIV	Peak Inverse Voltage
	Positive Temperature Co-efficient
PTC	Pulse Width Modultion
PWM	Pulse Width Modulation
QM	Quality Manual
RFI	Radio Frequency Interference
RTEC	Regional Telecom Engineering Centre
SMPS	Switch Mode Power Supply
SNMP	Simple Network Management Protocol
SPV	Solar Photo voltaic

SS	Self Supporting
T & D	Technical & Development
V	Volts
VDE	Verband Der Elektrootechniker
VRLA	Valve Regulated Lead Acid
W	Watts

ANNEXURE-II

NAME OF ……. (MANUFACTURER / / STAKEHOLDER)

I. **COMMENTS ON "Outdoor Weather Proof Rack For Telecom Applications, TEC 66XXX:2025" (Draft document TEC 66XXX:2025)**

Clause No.	Clause Description	Comments, if any	Remarks, if any

Note: The comments on the draft for New Standard on" Outdoor Weather Proof Rack For Telecom Applications," may be provided in the above format vide Email to adgfa-tec-dot@gov.in **with copy to** dirfa.tec@gov.in **and** ddgfla.tec@gov.in