



13-SDMS-08

REV. 00

**MATERIAL SPECIFICATION
FOR
TELECOMMUNICATION RACKS AND CABINETS**

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1 Scope

This Distribution Material Specification describes the minimum technical requirements for design, engineering, construction, manufacture, inspection, testing and performance of racks and cabinets used to house active telecommunications equipment and ancillary components used in Distribution FTTx network deployments within Saudi Electricity Company (SEC).

The racks and cabinets will typically be installed as stand-alone units in special purpose telecommunications equipment or collocation facilities however, the relevant requirements also apply to racks and/or sub-racks installed in outdoor equipment enclosures.

Racks and cabinets may be installed at various locations within the FTTx network, including but not limited to;

- i. Telecom facilities at NG substations
- ii. Telecom facilities at Distribution MDNs
- iii. Within outdoor enclosures provisioned at LV Transformer locations
- iv. Building telecom facilities e.g. the telecom room in an office building

Typically, Racks and Cabinets will house FTTx related telecommunications equipment belonging to and operated by SEC however, the same standards will apply to any racks that may be provided for the use of Other Telecom Operators (OLO).

2 Applicable Codes and Standards

This Distribution Material Standard Specification shall be read in conjunction with the latest revision of Distribution General Specification 01-SDMS-01 which shall be considered as an integral part of this standard.

The latest revision/amendments of the following codes and standards shall apply to the equipment/material covered in this Specification and shall be considered as forming an integral part of this Specification

DIN 41494	Equipment practices for electronic equipment; mechanical structures of the 482.6 mm (19 inch) series
DIN 41494-7	Dimensions of cabinets and suites of racks
DIN 41494-8	Components on front panels; mounting conditions, dimensions
EIA-310-D	Horizontal spacing of the vertical rows of holes
ETS 300 019	Environmental conditions and environmental tests for telecommunications equipment
ETS 300 119-2	Equipment Engineering (EE); European Telecom Standard for equipment practice Part 2: Engineering requirements for racks and cabinets



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ETS 300 119-4	Engineering requirements for sub-racks in miscellaneous racks/cabinets
ETS 300 753	Acoustic noise emitted by telecommunications equipment
IEC 60297-3-100	Basic dimensions of front panels, sub-racks, chassis, racks and cabinets
IEC 60297-3-101	Sub-racks and associated plug-in units
IEC 60297-3-102	Injector/extractor handle
IEC 60297-3-103	Keying and alignment pin
IEC 60297-3-104	Connector dependent interface dimensions of sub-racks and plug-in units
IEC 60297-3-105	Dimensions and design aspects for 1U chassis
IEC 60529	Degree of Protection provided by closure (IP Code)
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts
ITU-T R.K.35	Bonding configurations and earthing at remote electronic sites

3 Definitions & Abbreviations

3.1 Definitions

- 3.1.1 Rack: A standardised structure providing a means to locate, support and organise various telecommunications equipment.
- 3.1.2 Cabinet: A telecommunications enclosure that can either accommodate a rack or is constructed with an integrated rack and that also provides additional protection by means of side and rear panels and doors. SEC may use the terms rack and cabinet are used interchangeably.
- 3.1.3 Sub-rack: A module that can be installed into a standardised rack to accommodate telecommunications equipment that cannot be directly located in the standard rack. For example, blade servers, optical splitters etc.
- 3.1.4 Equipped: A rack or cabinet delivered from the supplier with the telecommunications equipment and any necessary ancillary systems pre-installed in the rack or cabinet. Equipped racks may typically be provided as part of a telecom turnkey implementation.
- 3.1.5 Miscellaneous: rack or cabinet delivered without associated telecommunication equipment but which may be configured with internal compartments, sub-racks, rails and mounting hardware necessary for subsequent equipment installation.

3.2 Abbreviations and Acronyms

Abbreviations and acronyms used in this Specification shall have the following meanings:

EIA/TIA	Electronics Industries Alliance/Telecom Industries Association
ETSI	European Telecommunications Standards Institute



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ETS	European Telecommunications Standard
FTTH	Fiber to the home
FTTI	Fiber to the internet
FTTP	Fiber to the premises
FTTX	Fiber to the terminal
LSZH	Low Smoke Zero Halogen
PDU	Power distribution unit (also known as power strip or power list)
PON	Passive Optical Network
PSU	Power supply unit
RoHS	Restrictions on Hazardous Substances

4 Requirements

4.1 General

- 4.1.1 Unless otherwise stated, the requirements of this specification apply to both Equipped and Miscellaneous racks and cabinets.
- 4.1.2 Enclosures shall be designed and manufactured to be:
 - i. Used in protected environments e.g. indoor or within protected enclosures
 - ii. Mounted in fixed (stationary) locations
- 4.1.3 Suppliers shall provide to SEC a comprehensive manufacturer's drawing or set of specifications for proposed products, fully dimensioned and describing the materials and construction used. The manufacturers drawing and specification shall also reference compliance to the relevant industry standards.
- 4.1.4 The manufacturer shall also provide SEC with test results and compliance certificates relevant to the design and routine tests referenced in this specification.
- 4.1.5 SEC may specify racks and cabinets conforming to the 19-inch standard (IEC 60297-3) or the ETSI standard (ETS 300119-2) relating to the spacing between the rack mounting rails and the overall dimensions of the rack. In general, ETSI standard racks and cabinets shall be specified for FTTx telecommunications equipment, **Error! Reference source not found..**

4.2 Construction & Finish

- 4.2.1 Basic dimensions of front Telecom racks shall fully meet the design and dimensional requirements specified in IEC-60297-3-100 and ETS 300 119-2.
- 4.2.2 Racks and cabinets shall be capable of withstanding minimum static loading of 500kgs and capable of supporting an additional dynamic load of 800 N during installation. The



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loading capability of swing frame rack or sub-racks shall be depending upon the requirements specified in the data schedule.

- 4.2.3 Main frame of rack shall consist of cold rolled steel with minimum thickness of 2 mm. surfaces shall be powered coated and colour finished to RAL 7038 (Agate grey). An additional coat of fire retardant paint shall be applied (per PTS requirements) on inside surface of racks and on inside of front and back doors of the rack.
- 4.2.4 Racks shall have solid steel top & base plates of minimum 1.2mm thickness, with knock-out holes for cable inlets. Top plates shall be provided with ventilation grilles compatible with the rack mounted fan trays supplied with the rack (para 4.3.1).
- 4.2.5 Racks shall be provisioned with removeable side panels consisting of solid or perforated steel of minimum thickness of 1.2mm.
- 4.2.6 Front & rear doors of racks and cabinets, where fitted shall be perforated steel, solid steel, tempered glass or Acrylic glass.
- 4.2.7 Cabinet doors shall be secured with a suitable locking or access control. Any handles or other opening arrangements shall not project from the door when in the closed and locked position to discourage tampering. Options shall be provided different methods of access control including;
- i. Key based locks
 - ii. Manual combination locks with a minimum of 4 digits (9999 combinations)
 - iii. Electronic access control e.g. key fob and NFC
- 4.2.8 Door hinges shall be internal to the cabinet and shall not be accessible when the door is in the closed position.
- 4.2.9 All racks and cabinets shall be designed to work with both underfloor and overhead cable distribution arrangements.

4.3 Internal Arrangement

- 4.3.1 Racks shall be delivered with rack mounted fan trays mounted in the topmost mounting location in the rack. Individual fan trays shall occupy not more than 1U of height and shall contain fan units sufficient for a minimum airflow of 200 cfm (375 m³/h).
- 4.3.2 Racks shall be delivered with dual power distribution units (PDUs) of the rear or side vertical mounting (0U) type that do not occupy space on the main equipment frame. Each PDU shall be rated for 220V AC and shall be fitted with at least one 20A circuit breaker.
- 4.3.3 The number and types of power outlets provided by the PDU shall be as specified in the Data Schedule. Power outlets shall be provided with a retention mechanism to prevent accidental removal of equipment power leads.



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- 4.3.4 The supplier shall propose additional options for the power distribution units including, without limitation;
- Network enabled devices capable controlling each outlet and measuring the power utilisation per outlet.
 - Programmable (switched) devices that, upon start-up apply power to sequentially to each outlet or group of outlets on the PDU.
- 4.3.5 Racks shall be provided with a cable management solution for the best practice routing and retention of equipment cables in the rack including;
- Fiber optic patch cables and other cables interconnecting equipment in the rack
 - Fiber optic patch cables and/or fan-outs cross connecting the rack with other racks or systems.
 - Power cables into PDU and power cables between PDU and equipment.
- 4.3.6 Racks and cabinets shall be fitted with a name plate in accordance with ASTM D709 and shall be made of stainless steel, laminated plastic (melamine) or any other non-corrodible material 3 mm thick. Surface shall be white matte and the corners shall be square.
- 4.3.7 Size of nameplates shall be 25mm by 65 mm. Lettering shall be a minimum of 6.35 mm. Nameplates shall be fastened to the racks with stainless steel screws or rivets. Engraved labels in Gravoply or equivalent shall also be acceptable. Unless otherwise specified name plates shall be labelled in accordance with the Data Schedule.

4.4 Environment

- 4.4.1 Unless otherwise specified, telecommunication racks and cabinets shall be designed for use in an internal environment but shall be capable of operating over the temperature range -5°C to +55°C

5 Testing and inspection

5.1 Type (Design) Approval

- 5.1.1 The following type (design) approval tests shall be conducted in accordance with relevant IEC Standards or other equivalent ITU-T & EIA/TIA Standards. The appropriate tests shall be applied to each separate design covered by this specification. In Lieu of SEC specific design tests, suppliers may submit certified test reports on design tests previously conducted on identical product.
- Environmental Testing: Environmental tests for telecommunications equipment shall be performed in accordance with ETSI EN 300 019.
 - Vibration (Sinusoidal) Test: This test shall be performed on telecom cabinets & racks per IEC 61300-2-1.



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- iii. Change of Temperature Test: This test shall be performed on telecom cabinets & racks as per IEC 61300-2-22.
- iv. Damp heat (Steady State): It shall be carried out on telecom cabinets & racks as per IEC 61300-2-19.
- v. Salt Mist Test: It shall be carried out on telecom cabinets & racks as per IEC 61300-2-26.
- vi. Mechanical Impact resistance test for the degree of protection provided by enclosures for electrical equipment against external mechanical impacts, shall be performed in accordance with IEC 62262
- vii. Ingress Protection (Water & Dust Ingress): Dust ingress and liquid protection test shall be carried out on cabinets as per IEC 60529.

6 Packaging and Marking

- 6.1.1 All product shall be individually shall be individually packed and wrapped in a protective re-sealable plastic and placed in a box together with any required test results or inspection data. The quantity of product in each shipping carton shall be either;
- i. Specified by SEC through the contract or purchase order, or
 - ii. Proposed by the supplier for approval by SEC.
- 6.1.2 Each individual package and multi-packed carton shall be marked in Arabic and English on at least two sides of the package with the information stated in Table 1. The package markings shall also include a standard QR code with the same information.

Table 1 – Packaging Information

Parameters	Requirements
Company	SEC Distribution
Category	FTTx Equipment
Item description	Description of the component
DMSS document Number	DMSS "xxxxxxxx"
Manufacturer Name	"xxxxxxxx"
Manufacturer Part Number	"xxxxxxxx"
SEC Part Number	xxxx
Type Approval Certificate Number	00/00
SEC Contract/PO Number	"xxxxxxxx"
Manufacturer Order Number	"xxxxxxxx"
Production Date (mmm-yyyy)	"Month - Year"

Parameters	Requirements
Items Quantity	(Numbers) Each
Weight (Kg)	"xxxxxxx" kg

7 Figures and Illustrations

Figure 1 – 19 inch and ETSI internal dimensions

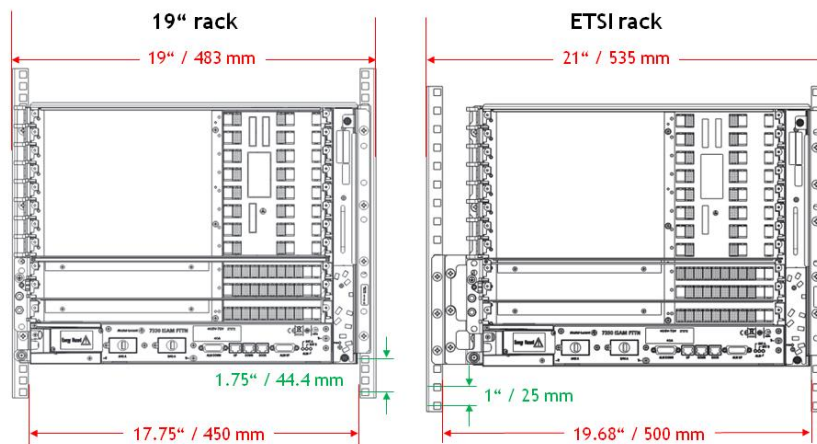
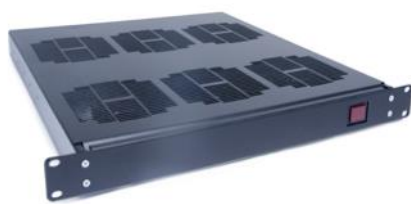


Figure 2 – Rack mounted cooling fans (Illustrative example)



Tray type

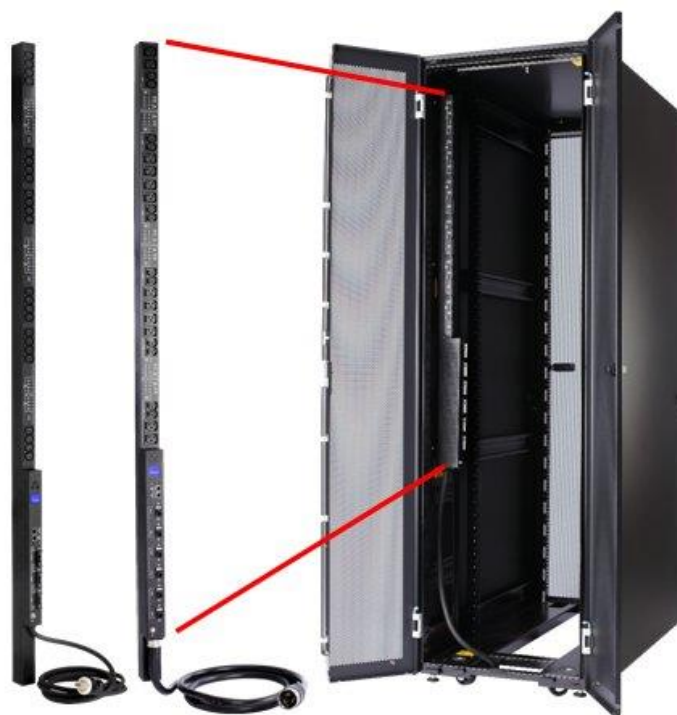


Panel type

Figure 3 – Vertical mount (0U) Power distribution unit (Illustrative example)



Figure 4 – Example of 0U PDU location in rack/cabinet





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TECHNICAL DATA SCHEDULE**TELECOM RACKS AND CABINETS**

Enquiry No. _____

Item No. _____

Ref No.	Description	Unit	Specified values	Vendor proposed values
	Rack type	19inch/ETSI	*	
	Cabinet Type	Floor, Wall, Moveable	*	
	Construction materials used		*	
	Surface finishes		*	
	Dimensions	W x H x D mm	*	
	Drawing supplied	yes/no	*	
	Static loading – Free standing cabinet	kg	500	
	Static loading – Other cabinet types		*	
	Dynamic loading	N	≥800	
	Earthing bar and bonding	Yes/no	*	
	ESD attachment	Yes/no	*	
	Security locking system and type		*	
	Cabinet base	Castors, adjustable feet, fixed mount	*	
	Fan tray installed	Yes/no	*	
	Fan tray capacity	cfm or m ³ /h	*	
	PDU's installed	Yes/no, Qty		



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TECHNICAL DATA SCHEDULE**TELECOM RACKS AND CABINETS**

Enquiry No. _____

Item No. _____

Ref No.	Description	Unit	Specified values	Vendor proposed values
	PDU type	Basic, switched, network	*	
	PDU outlet type and Qty per PDU		*	
	Total rack capacity	Rack unit (U)	*	
	Cable management system	Yes/no	*	