



Power Planning & Monitoring Company

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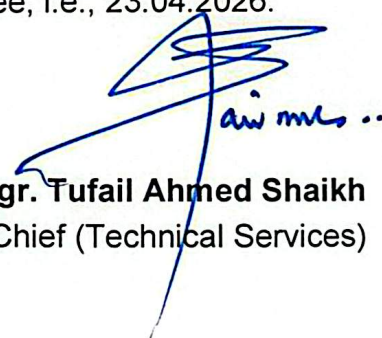
No. 183-208 / TS / PPMC / 12

Dated: 27 / 04 / 2026

All Chief Executive Officers DISCOs
CEO K-Electric, Karachi
CEO Barqiat, AJK Electricity Department
CEO Water & Power Department, Gilgit Baltistan

Subject: REVISED PPMC SPECIFICATION NO. PPMC-DS-01:2026 OF ASSET PERFORMANCE MANAGEMENT SYSTEM (APMS) FOR POLE MOUNTED DISTRIBUTION TRANSFORMERS

Enclosed please find herewith a copy of revised PPMC Specification No. PPMC-DS-01:2026 of Asset Performance Management System (APMS) for pole mounted Distribution Transformers, duly approved by Managing Director PPMC for your information, record and implementation. The same shall be applicable with effect from the date of approval by Specification Review Committee, i.e., 23.04.2026.


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10. All Industrial Panel manufacturers
11. All LT CT manufacturers
12. SO to MD PPMC

POWER PLANNING AND MONITORING COMPANY



SPECIFICATION (PPMC-DS-01:2026)

Asset Performance Management System (APMS) for Pole
Mounted Distribution Transformers

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Document Change Record

NGC document change record

Version	Document No.	Dated	Effective date of Application	Remarks
1.0	DDS-76:2007	2007	2007	1 st Release
1.1	Amendment-1	2010	2010	Amendment
2.0	DDS-76:2023	2023	2023	2 nd Release
2.1	Amendment-1	2024	2024	Amendment

PPMC document change record

Version	Document No.	Dated	Effective Date of Application	Remarks
1.0	PPMC-DS-01	2026	23-04-2026	1 st Release





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This specification has been prepared with due deliberations with technical working groups of DISCOs and Manufacturers.

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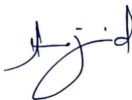
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Signed to the extent of UDIL Compliance as National Interoperability Standard, only.

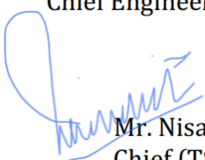

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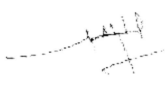

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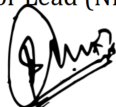

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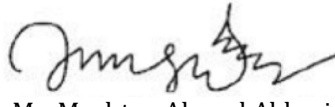

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FOREWORD

The Federal Cabinet, Government of Pakistan vide its decision dated 27.10.2021 ratified the decision of Cabinet Committee on Energy (CCoE) meeting held on 08.10.2021, as per which the development of uniform Design & Standards for distribution sector of Pakistan is one of the core functions of PPMC.

Subsequently, in pursuance of Federal Cabinet decision, the Ministry of Energy (Power Division) vide notification dated 06.02.2026 has transferred the functions relating to the design, standards and specifications of 11 kV and below from NGC to PPMC.

In pursuance of the Ministry of Energy (Power Division) Notification dated 06.02.2026, whereby the functions related to development of uniform design, standards and specifications for distribution sector of Pakistan have been entrusted to Power Planning and Monitoring Company (PPMC) as it was performing before 2011 under then PEPCO (now PPMC).

Subsequent to this transition, Lahore Electric Supply Company (LESCO) vide its letter No. 1729-36 dated 11.02.2026, carried out a proof of concept (PoC) of the Asset Performance Management System (APMS) with additional features of oil temperature and oil level monitoring on distribution transformers. The PoC was undertaken through educational purchase orders to evaluate field performance, operational effectiveness and integration aspects of the enhanced system. Furthermore, LESCO through DG (MIRAD) letter No. 2508-14 dated 14.04.2026, proposed amendments and highlighted key technical and operational considerations based on field experience, including system integration challenges, monitoring limitations and the need for improved control and protection coordination.

Accordingly, the agenda for revision of the APMS specification was placed before the 1st Specification Review Committee (SRC) meeting vide No. TS/PPMC/DS/02-001 dated 18.02.2026. During the meeting held on 19.02.2026, and in line with the approved Minutes of Meeting, the initiation of the revision of the Asset Performance Management System (APMS) specification was duly considered and formally approved by the competent forum, taking into account LESCO's requirements and the need to strengthen existing standards. Thereafter, the draft specification was extensively deliberated with Technical Working Groups (TWGs) comprising representatives from all Distribution Companies (DISCOs), PITC, and K-Electric, ensuring incorporation of collective field experience, operational requirements, and practical considerations across utilities. Also, in alignment with the Ministry of Energy (Power Division) letter No. 12(23)/2018-DISCO-I dated 24.06.2025 regarding adoption of e-SIM technology in smart energy meters, provision for both embedded SIM (eSIM) and conventional physical SIM-based communication modules have been incorporated. However, mechanism of adoption e-SIM needs to be developed and implemented.

Following detailed consultations and incorporation of stakeholder inputs, the specification was subsequently approved in the 3rd SRC meeting held on 22.04.2026 held vide No DS-SRC-02 dated 22-04-2026.

This specification, titled "*Asset Performance Management System (APMS) for Pole Mounted Distribution Transformers*," has then been developed in continuation of the earlier specification DDS-76:2023 (amended to date), incorporating necessary improvements in light of field feedback and evolving sectoral needs.





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The present revision introduces enhanced functionalities, including optional oil temperature and oil level monitoring through dedicated sensor assemblies, improved control philosophy through coordinated operation of MCCB and magnetic contactor, and clearly defined requirements for installation, operation, and safety. A significant addition is the introduction of a structured ordering code framework, enabling DISCOs and K-Electric to select configurations in line with their specific operational requirements. This modular approach provides flexibility in procurement while maintaining standardization and interoperability across the power distribution network.

The revised specification has been formulated in response to the evolving needs of Pakistan's power distribution sector, with particular emphasis on improved monitoring, protection, control, and reduction of technical and commercial losses. In this context, APMS is envisioned as a critical tool for transformer-level energy audit, enabling enhanced visibility of system performance and facilitating a gradual transition from feeder-level to transformer-level load management. This targeted approach supports more efficient network operation, minimizes indiscriminate interventions, and helps safeguard compliant consumers.

While earlier specifications established a foundational framework, certain limitations were identified in terms of flexibility, feature integration, clarity of requirements, and alignment with current international practices. The present revision addresses these gaps through the introduction of structured ordering codes, enhanced monitoring capabilities and alignment with relevant IEC and international standards, while also accounting for local environmental and operational conditions.

The specification emphasizes standardization, safety, reliability, and lifecycle performance, while ensuring adaptability to future technological advancements and avoiding vendor-specific dependencies. However, the effective realization of APMS benefits is contingent upon proper and continuous monitoring by utilities. Timely analysis of system data and appropriate operational response are essential for achieving improvements in loss reduction, asset protection, and service delivery. It is imperative that all protection features integrated within the APMS remain enabled and fully functional at all times.

This document has been developed through extensive consultations with DISCOs, K-Electric, and industry stakeholders. Recognizing that field conditions and technologies continue to evolve, the specification is intended to remain a dynamic document. All utilities are strongly encouraged to provide feedback based on field performance, particularly regarding operational effectiveness, reliability, load management outcomes, and impact on losses.

PPMC adopts an inclusive approach towards standard development and welcomes input from all stakeholders, including utility personnel, manufacturers, and field engineers. Feedback and suggestions may be shared with the office of Design and Standards, PPMC, through the designated email address (feedback.pds@ppmc.gov.pk), with reference to relevant clauses and supporting data where available. This collaborative approach will ensure that the specification continues to evolve as a robust, practical, and forward-looking document aligned with international best practices.





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1. SCOPE

- 1.1 This specification covers Asset Performance Management System (APMS) for Pole Mounted Distribution Transformers
- 1.2 APMS shall provide following salient features and services for Distribution Transformers on their LT side after incorporating other components of Advance Metering Infrastructure (AMI) network:
 - a. Real time monitoring and Operation/Controlling
 - b. Preventive actions against damage of distribution transformers
 - c. Load disconnection during Fault/ Abnormal Conditions
 - d. Energy auditing
 - e. Scheduling of Load Management
 - f. Human/Equipment Safety
- 1.3 This specification covers APMS to be used on the LT side of following distribution transformers:
 - a. 25 kVA Pole Mounted Distribution Transformer
 - b. 50 kVA Pole Mounted Distribution Transformer
 - c. 100 kVA Pole Mounted Distribution Transformer
 - d. 200 kVA Pole Mounted Distribution Transformer
 - e. 250 kVA Pole Mounted Distribution Transformer
 - f. 400 kVA Pole Mounted Distribution Transformer
 - g. 500 kVA Pole Mounted Distribution Transformer
 - h. 630 kVA Pole Mounted Distribution Transformer
- 1.4 This specification introduces an optional Oil Temperature and Oil Level Monitoring feature for the Asset Performance Management System (APMS) installed on pole mounted distribution transformers; The feature shall be realized through integration of a dedicated Oil Temperature and Oil Level Sensor Assembly connected to the SMCD directly or through a suitable controller
- 1.5 This specification introduces:
 - a. Ordering code provisions,
 - b. Sensor installation requirements,
 - c. Controller technical requirements (if used)
- 1.6 This specification also introduces use of Magnetic Contactor with MCCB for switching operations only.





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2. APPLICABLE SPECIFICATIONS AND STANDARDS

- 2.1 The APMS shall be designed, manufactured, tested and supplied in accordance with (PPMC-PPMC-DS-01:2026 and latest IEC/International/National standards listed in **clause 2.3**.
- 2.2 In case the requirements laid down herein differ from those given in International/IEC Standards or other local specifications, the requirements listed herein shall prevail.
- 2.3 Following specifications and latest IEC/ International standards shall be applied:

DDS-50:2007 (amended to date)	3-Phase Multi-rate (TOD/TOU) Solid-State LT/HT Static Energy Meter
DDS-98:2011 (amended to date)	Specification for Advance Metering Infrastructure
DDS-110:2012 (amended to date)	Meter Data Collection (MDC) Server to be used in AMI
UDIL (latest version)	Universal Data Integration Layer-Multivendor compliant AMI in Pakistan
DDS-80:2007 (amended to date)	LT Current Transformer for metering
IEC 62052-11	Electricity Metering Equipment- General requirements
IEC 62053-21	Electricity Metering Equipment- Static Meters for AC Active Energy (classes 0.5, 1 and 2)
IEC 60947-2	Low voltage switchgear and control-gear – Part 2
IEC 61869-2	Instrument Transformers – Part 2: Additional requirements for current transformers
IEC 60076-22-1	Power transformer and reactor fittings – Protective devices
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60068-2-2	Environmental testing – Dry heat test
IEC 61439-1	Low-voltage switchgear and control gear assemblies- General Rules
DDS-84:2020	Distribution transformers
IEC-60947-4-1	Low voltage switchgear: contactors and motor starters-electromechanical contactors and motor starters
ISO 2859-1	Sampling procedures for inspection by attributes
IEC 60751	Industrial platinum resistance thermometers and platinum temperature sensors
ISO/IEC 17025	International standard for testing and calibration laboratories





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3. ORDERING CODE

3.1 Following ordering codes are applicable for procurement of APMS.

Ordering Code	Description
APMS-CB-S-***	Standard APMS with motorized MCCB
APMS-CB-OTL-***	APMS with motorized MCCB and with oil Temperature and level monitoring
APMS-MC-S-***	Standard APMS with Magnetic Contactor and non-motorized MCCB
APMS-MC-OTL-***	APMS with Magnetic Contactor, non-motorized MCCB and with oil Temperature and level monitoring

*** 025, 050, 100, 200, 250, 400, 500 & 630 (025 depicts 25 kVA, 050 depicts 50 kVA, 100 depicts 100 kVA, 200 depicts 200 kVA, 250 depicts 250 kVA, 400 depicts 400 kVA, 500 depicts 500 kVA and 630 depicts 630 kVA)

4. DEFINITIONS

4.1 **Molded case circuit-breaker (MCCB):**

A mechanical switching device capable of making, carrying and breaking currents under normal circuit conditions and under pre-defined conditions, making, carrying for a given time, and breaking currents under abnormal conditions such as those of short circuits

4.2 **Rated voltage for MCCB:**

The rated voltage of a circuit breaker is the value of voltage which designates it and to which the operating conditions during making or breaking of current.

4.3 **Rated nominal current for MCCB:**

The rated nominal current of a circuit breaker is the value of current which the circuit breaker can carry under test conditions.

4.4 **Rated frequency for MCCB:**

The rated frequency of a circuit breaker is the service frequency for which the circuit breaker is designed.

4.5 **Ambient temperature:**

The average temperature of the air surrounding the complete APMS Unit.





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4.6 Rated short time current of MCCB:

The rated short time current of a circuit breaker is the value of prospective short circuit current which the circuit breaker shall be required to carry in the closed position for a specified time and under the test conditions specified.

4.7 Breaking capacity of MCCB:

A value of prospective breaking current that a switching device can break at a stated voltage under prescribed condition of use and behavior.

4.8 Making capacity of MCCB:

A value of prospective making current that a switching device can make at a stated voltage under prescribed condition of use and behavior.

4.9 Short time withstand current:

Current that a circuit or a switching device in the closed position can carry during a specified short time under prescribed conditions of use and behavior.

4.10 Rated short-circuit breaking capacity for MCCB:

The rated short-circuit breaking capacity (I_{cs}) for an MCCB, is the maximum prospective symmetrical fault current that the MCCB can safely interrupt under specified test conditions without sustaining damage.

4.11 Rated short-circuit making capacity MCCB:

The rated short-circuit making capacity (I_{cm}) for an MCCB, is the maximum prospective symmetrical fault current that the MCCB can withstand for a brief period without sustaining damage during the circuit closing operation.

4.12 Short time delay:

Any intentional delay in operation within the limits of the rated short time withstand current.

4.13 Magnetic contactor:

A Magnetic Contactor is an electrically controlled switch that uses an electromagnet to open and close a circuit.

4.14 Static meter:

A type of electronic energy meter that measures energy consumption using solid-state electronic components, without any moving parts.





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4.15 APMS-CB-OTL:

Configuration of APMS with MCCB incorporating an Oil Temperature and Oil Level Monitoring System consisting of a sensor assembly and controller (if used).

4.16 APMS-MC-OTL:

Configuration of APMS with Magnetic Contactor and MCCB incorporating an Oil Temperature and Oil Level Monitoring System consisting of a sensor assembly and controller (if used)

5. SERVICE CONDITIONS

5.1 System Conditions:

System Nominal Voltage	415 V
System Highest Voltage	10% of Nominal Voltage
Nominal Frequency	50 Hz

5.2 Climate Conditions:

Ambient Temperature	Maximum	55°C
	Maximum mean over any 24 Hours	40°C
	Mean in any year	30°C
	Minimum	-25°C
Relative Humidity	Up to 100%	
Altitude (above sea level)	Up to 3000 meters	

6. MAJOR COMPONENTS OF APMS

6.1 Asset Performance Management System (APMS) shall be comprised of following components

- a. Smart Metering and Controlling Device (SMCD)
- b. Current Transformers (CTs)
- c. Molded Case Circuit Breaker (MCCB)
- d. Magnetic Contactor (optional as per ordering code)
- e. APMS Enclosure

7. SMART METERING AND CONTROLLING DEVICE (SMCD)

7.1 Smart Metering and Controlling Device (SMCD) shall be in accordance with Specifications DDS-50:2007, DDS-98:2011, DDS-110:2012 (all amended to-date).





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- 7.2 It shall measure, record and display MDI, kWh, kVARh, Power Factor and other specified quantities in compliance with the specifications given in Clause 7.1.
- 7.3 Metering Accuracy Class shall be 0.5S for kWh and 1.0 for kVARh.
- 7.4 In addition to above, it shall fulfill following specified requirements:
- It shall have Communication Module with minimum 4G/GSM/GPRS technology incorporating a SIM card/e-SIM.
 - It shall be able to communicate metering and other data stored in its memory and receive commands/write operations from Head-End System / MDM in accordance with the specifications mentioned in Clause 2 and the requirements stated herein.
 - Auxiliary components/ports essentially required for its Communication with both Head-End System / MDM and MCCB or Magnetic Contactor (whichever is applicable) shall also be provided.
 - It shall have optical communication port which shall perform functions of data reading/writing and parameterization of data. It should be disabled by default however, it can be enabled remotely through HES/MDM as per requirement of concerned utility.
- 7.5 It should be equipped with a battery. The battery type shall be lithium thionyl chloride (LiSOCI₂) having minimum capacity of 2000 mAh.
- Battery manufacturing origins shall be:
 - Japan (Toshiba, Maxell, Mitsubishi and Panasonic)
 - USA (Tadiran, Ultralife and Sonnenchein)
 - Germany (Geyer and Varta)
 - France (Saft)
 - South Korea (Xeno)
 - Operational Life of battery shall be minimum five (05) years.
 - Without any Power, the backup battery shall maintain the time, calendar and multi-rate program for a continuous period of at least 5 years.
 - Low Battery indication shall be displayed when minimum 25% battery life is left.
 - Storage/Shelf life of battery shall be more than 15 years.
 - The manufacturing year of Battery should not be more than eighteen (18) Months at the time of offering APMS.
- 7.6 Super capacitor will be provided for Real-Time Clock (RTC) to maintain date and time for at least 07 days in absence of power.
- 7.7 In the absence of power, LCD display shall be 'On demand' through scroll buttons.





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7.8 It shall have provision for following abnormal conditions:

- a. Over Voltage
- b. Under Voltage
- c. Phase Over Current
- d. Overload Condition
- e. Voltage Unbalance
- f. Current Unbalance
- g. High Apparent Power
- h. High Oil Temperature
- i. Low Oil Level
- j. Sensor Fault

7.9 Write provision for two (02) setting levels i.e., Alarm and Tripping shall be available for conditions specified in Clause 7.8, Sr. No. (a to d and h). Write provision for one (01) setting level i.e., Alarm shall be available for Sr. No. (e to g and i to j).

7.10 Threshold values of Alarm and Tripping functions and corresponding time settings shall be user programmable locally through optical port or remotely through head-End system/MDM. Once programmed, these function values shall be stored in its memory.

7.11 It shall perform normal operations and tripping operations of MCCB on the basis of programmed threshold values. Events, i.e., Alarm and Tripping shall be communicated to Head-End System/MDM.

7.12 At least 20 events, Alarm and Tripping, for each abnormal condition given in clause 7.8 and normal switching of MCCB/ Magnetic Contactor with date and time stamp shall be provided before rollover.

7.13 It shall be DLMS/COSEM compliant.

7.14 PCB must have conformal coating.

7.15 SMCD manufacturers shall possess valid prototype approval after fulfilling the requirements of this specification and qualifying prototype testing from Design & Standards department, PPMC.

8. CURRENT TRANSFORMER (CT)

8.1 Current Transformers used in APMS shall have following technical parameters as per IEC 61869-2:





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Transformer Ratings	CT Ratio	Accuracy Class	VA Burden
25 kVA	50/5A	0.5	2.5 VA (min)
50 kVA	100/5A	0.5	2.5 VA (min)
100 kVA	200/5A	0.5	2.5 VA (min)
200 kVA	400/5A	0.5	2.5 VA (min)
250 kVA	400/5A	0.5	2.5 VA (min)
400 kVA	600/5A	0.5	2.5 VA (min)
500 kVA	800/5A	0.5	2.5 VA (min)
630 kVA	1000/5A	0.5	2.5 VA (min)

8.2 CT error limits shall be as under:

Ratio Error ($\pm$ %) at Current (% of Rated)				Phase Displacement ($\pm$ Minutes) at Current (% of Rated)			
5	20	100	120	5	20	100	120
1.5	0.75	0.5	0.5	90	45	30	30

- 8.3 The temperature rise test shall be performed at 120% of rated current as per IEC 61869-2 (latest available)
- 8.4 Dimensional requirements for the base plate are given in the drawings. Other CT dimensions should be so that they can be adequately fixed on bus bars.
- 8.5 Other than the requirements stated above, the technical parameters and testing criteria shall be in accordance with DDS-80:2007 (amended to date).
- 8.6 CT manufacturers shall possess valid prototype approval after fulfilling the requirements of this specification and qualifying for prototype testing from the office of Design & Standards (D&S) PPMC.

9. MOLDED CASE CIRCUIT BREAKER (MCCB)

FOR MOTORIZED MCCB WITH RESIDUAL CURRENT (ORDERING CODES APMS-CB)

9.1 MCCB shall provide protection for the following protection functions:

- Adjustable Overload Protection with long inverse time delay trip and trip characteristic with inverse time curves.





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- b. Adjustable Short Circuit Protection with definite trip time delay.
 - c. Adjustable Short Circuit with instantaneous trip
 - d. Adjustable Residual Current Protection.
- 9.2 MCCB shall be 3P+N type in compliance of latest IEC-60947-2 standard and the requirements given in this specification.
- 9.3 It can have thermal-magnetic mechanism or electronic/Microprocessor based mechanism.
- 9.4 It should be equipped with a motor-operated mechanism for switching purpose.
- 9.5 The motor-operated mechanism shall have quick make, quick break action. The charging time will not be counted in making time.
- 9.6 Two position indications ON-OFF shall be available on MCCB or its Motor Operator.
- 9.7 An "Auto/Manual" switch shall be provided on MCCB or its Motor Operator. When set to "manual" position it shall lock out the remote control.
- 9.8 Necessary auxiliary contacts/communication ports/control circuits etc. shall be used between MCCB and SMCD for communication between them.
- 9.9 The communication cables shall be carried through PVC spiral/flexible conduits. These shall have proper tagging and ferruling for easy traceability through cable ducts.
- 9.10 It shall have adjustable long time pick up current (overload/thermal) settings from at-least 0.7 to 1.0 times of MCCB current rating and also adjustable long-time delay settings.
- 9.11 It shall have adjustable short time pick up current (short circuit/ magnetic) settings of the current rating and definite time trip delay/setting. The magnetic pickup range is $5-10 \times I_n$.
- 9.12 It shall have adjustable Instantaneous pick-up current settings and MCCB shall trip instantaneously within 50msec.
- 9.13 The minimum pick up settings value of adjustable residual current shall be $\leq 30\text{mA}$. Its operating characteristics shall be as per IEC 60947-2 (clause B.4.2.4.1).
- 9.14 MCCB technical parameters are given below: -

Rated Voltage:	415/430 V
Rated Frequency:	50 Hz
Rated Nominal Current:	
25 kVA APMS:	50-60 A
50 kVA APMS:	100 A
100 kVA APMS:	200 A
200/250 kVA APMS:	400 A
400/500 kVA APMS	800 A





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630 kVA APMS	1200 A
Rated Symmetrical Breaking Capacity:	25 kA (minimum)
Rated Making Capacity:	2x Rated Symmetrical Breaking Current (min)

Note: If higher rating is to be used considering the unavailability of said ratings, approval from Design and Standards (D&S) is to be sought.

- 9.15 Type test reports from independent ILAC accredited international labs or STL approved labs shall be provided. The type test report will be as per latest IEC standard IEC-60947-2 (latest) with additional characteristics given herein.

NON-MOTORIZED MCCB (ORDERING CODES APMS-MC)

- 9.16 MCCB shall provide protection for the following protection functions:
- Overload Protection with long inverse time delay trip and trip characteristic with inverse time curves.
 - Short Circuit protection with instantaneous trip.
- 9.17 MCCB shall be 3P type in compliance with the latest IEC-60947-2 standard and the requirements given in this specification.
- 9.18 The MCCB shall be manually operated by quick make and quick break mechanism.
- 9.19 The MCCB shall be mechanically trip-free. ON-OFF breaker position shall be provided with breaker handle/ knob.
- 9.20 To minimize the effect of arcing, the breaker shall be fitted with arc quenching chamber.
- 9.21 MCCB technical parameters are given below: -

Rated Voltage:	415/430 V
Category	A
Rated Frequency:	50 Hz
Rated Nominal Current:	
25 kVA APMS:	50-60 A
50 kVA APMS:	100 A
100 kVA APMS:	200 A
200/250 kVA APMS:	400 A
400/500 kVA APMS	800 A
630 kVA APMS	1200 A
Rated Symmetrical Breaking Capacity:	25 kA (minimum)
Rated Making Capacity:	2x Rated Symmetrical Breaking Current (min)





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Note: If higher rating is to be used considering the unavailability of said ratings, approval from Design and Standards (D&S) is to be sought.

- 9.22 The breaker shall be equipped with adjustable magnetic/instantaneous /electronic (microprocess based) trip units/Fixed at $10I_n$ as mentioned in table below. The magnetic/instantaneous (I_i) or electronic settings shall be in steps or continuously be adjustable in range specified below

Rated Current (Amps)	Magnetic Trip Setting Range (Amps)
40	Fixed- 400A
60	Fixed- 600A
80	Fixed- 800A
160	Min 800-1600A
200	Min 1000-2000A
250	Min 1250-2500A
400	Min 2000-4000A
800	Min 4000-8000A
1200	Min 6000-12000A

- 9.23 The adjustable and instantaneous time lag release settings shall be completely independent of each other.
- 9.24 MCCB shall trip instantaneously within 50msec.
- 9.25 Type test reports from independent ILAC accredited international labs or STL approved labs shall be provided. The type test report will be as per latest IEC standard IEC-60947-2 (latest) with additional characteristics given herein.

10. MAGNETIC CONTACTOR

- 10.1 The Magnetic Contactor shall be used only with ordering codes APMS-MC along with non-motorized MCCB.
- 10.2 Magnetic Contactor shall be of industrial grade suitable for 415-430 V, 50 Hz system, 3P configuration and coil Voltage of 220-240V AC.





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- 10.3 The Magnetic Contactor shall be rated, Type-2 co-ordination and the AC-6a rating shall be demonstrated either by direct transformer switching test or by derivation from AC-3 rating in accordance with IEC 60947-4-1
- 10.4 Minimum durability should be mentioned in following quantities in type test reports,
- Mechanical: minimum 1,000,000 operations.
 - Electrical durability at AC 6a duty: according to IEC standard.
- 10.5 The contactor shall comply with making and breaking performance requirements as per IEC 60947-4-1 for AC-6a duty.
- The device shall be capable of safely making and breaking currents under:
 - Normal operating conditions
 - Inductive load switching
 - The making and breaking capacities shall be verified through type tests in accordance with IEC provisions.
- 10.6 Other technical parameters shall match or exceed Transformer rating and be electrically interlocked with control logic to prevent chattering. Interlocking is required between control logic and switching devices to prevent unintended repeated operations (chattering). This applies to SMCD–contactor–MCCB interaction.
- 10.7 Contactor should not be used as a protective device. Short-circuit and Overload shall be provided by MCCB and operational based control and voltage based control shall be provided by contactor in ordering codes APMS-MC. It is recommended that LT line should be well protected where ordering codes APMS-MC are used and avoided where frequent faults occur on LT lines.
- 10.8 Contactor coil shall be protected by surge suppressor / RC snubber and contactor coil shall be controlled through an intermediate control interface (relay/driver circuit). Direct energization is avoided to protect SMCD output contacts.
- 10.9 Type test reports from independent ILAC accredited international labs or STL approved labs shall be provided. The type test report will be as per latest IEC standard IEC-60947-4-1 (latest) with additional characteristics given herein.





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10.10 Drawings shall be approved with consultation with DISCOs and OEMs while considering for induction into the system against respective ordering codes (APMS-MC)

11. APMS ENCLOSURE

11.1 Enclosure body and door shall be made from high grade steel sheet of 1.6 mm and 2.3 mm thickness respectively.

11.2 Copper Busbars shall have 98% IACS conductivity and tin plated with minimum thickness of 20 microns.

11.3 Busbars shall have rectangular cross-section with

- a. 050mm² (min) area for 25 kVA
- b. 100mm² (min) area for 50 kVA
- c. 150mm² (min) area for 100 kVA
- d. 300mm² (min) area for 200/250 kVA
- e. 600mm² (min) area for 400/500 kVA (2x riveted busbars per phase may be used)
- f. 800mm² (min) area for 630kVA (2x riveted busbars per phase may be used)

11.4 Busbars shall be covered with heat shrink LV grade insulation sleeves except the connection points.

11.5 Busbars shall be mounted on Bakelite/ polymer insulators.

11.6 Following clearances shall be maintained in air within the enclosure:

- a. Phase to phase 50 mm
- b. Phase to earth 25 mm

(where such clearances cannot be maintained like MCCB/Contactor terminals, insulated separators/sleeves shall be used)

11.7 Gland sizes are,

- a. For 025 kVA APMS PG-16 (8 Nos)
- b. For 050 kVA APMS PG-21 (8 Nos)
- c. For 100 kVA APMS PG-30 (8 Nos)
- d. For 200/250 kVA APMS PG-42 (8 Nos)
- e. For 400/500 kVA APMS PG-42 (16 Nos)
- f. For 630 kVA APMS PG-42 (16 Nos)





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- 11.8 Type tested Bimetallic Lugs (Not provided with APMS) shall be used for incoming and outgoing cable connections corresponding to the size/cross sectional area of the cables used by DISCOs,
- 11.9 Mounting of SMCD shall be made on two mounting brackets as per dimensions given in the attached drawings
- 11.10 Mounting of components i.e., MCCB, contactor (if used) and busbars shall be made on the back plate. No equipment shall be directly mounted on enclosure walls.
- 11.11 A window of 150x100mm shall be provided and placed on the front door for SMCD display reading. Transparent polycarbonate sheet of 5 mm thickness overlapped on the window by 15mm on all sides shall be fixed on the inner side. It shall be made dust/waterproof using Neoprene Rubber packing.
- 11.12 Interior and exterior of enclosure surface shall be painted with powder coating paint. Finished color shall be light grey (RAL 7032) and paint thickness shall be 0.100mm minimum at any point on surface. The paint shall be applied as,
- The surfaces of the MS plate shall be thoroughly cleaned and sand blasted to prepare the metal surface for painting.
 - All the interior and exterior surfaces of the enclosure shall be thoroughly cleaned through the process of degreasing and phosphating to prepare the metal surface for painting. Good quality pretreatment is a mandatory requirement.
 - Oven baked powder coating paint having durable weather resistant properties suitable to be used in coastal area shall be applied.
- 11.13 Steel sheets and all structural joints shall be welded/bolted together so that entire enclosure is rigid and self-supporting.
- 11.14 Two MS bolted connectors shall be provided on the outside of enclosure for earthing purposes.
- 11.15 A flexible tinned copper strap of 6mmSq shall be used for electrical connectivity between door and body for earthing purposes.
- 11.16 Enclosure door shall have strong hinges, gutter arrangement and Neoprene rubber gasket. Louvers shall be provided on both sides of the APMS enclosure for cross ventilation as per attached drawings. Vermin proofing shall also be ensured.
- 11.17 Locking and sealing arrangement of enclosure shall be provided on the outside of door. The earthing terminal of hot dip galvanized MS material with zinc coating of minimum 30 microns.





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11.18 Color coding for phase/neutral wiring, CT output wiring, Busbar sleeves shall be red, yellow, blue and black.

11.19 Control and Power circuit diagrams shall be engraved and printed with black color on stainless steel/powder coated Al plate fixed inside the APMS door. All the components shall be shown through symbols in the diagram.

11.20 Following information shall be painted on the APMS enclosure:

- a. "APMS for 25 kVA/ 50 kVA/ 100 kVA/ 200kVA/ 250 kVA/ 400 kVA/ 500 kVA/ 630 kVA Transformer" with black color paint on the front door
- b. "Danger Symbol" with red color paint on both side walls.

11.21 Following information shall be engraved and printed with black color on a stainless-steel/powder coated Al nameplate and fixed on the front of APMS enclosure:

- a. APMS Designed for 25 kVA/ 50 kVA/ 100 kVA/ 200kVA/ 250 kVA/ 400 kVA/ 500 kVA/ 630 kVA Distribution Transformer.
- b. Serial No.
- c. Rated Voltage (V)
- d. Rated Current (A)
- e. MCCB Rating (A)
- f. Magnetic Contactor Rating (A) (if applicable)
- g. CT Ratio
- h. Year of Manufacturing
- i. P.O No. & Date
- j. Warranty Expiry Date
- k. Name of Supplier/ Manufacturer
- l. Name of DISCO
- m. Manufacturer of OTL (for OTL ordering codes only)
- n. Low Oil level and Normal Recovery Point (for OTL ordering codes only)
- o. Ordering Code

11.22 Enclosure Tests

Following tests shall be carried out on the enclosure.

11.22.1 Visual Inspection

APMS enclosure shall be visually inspected for any defects mentioned below:





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Examination	Defects
Material	Enclosure components not made from specified material.
Finish	Nuts, bolts and washers not galvanized. Busbars not tin-plated. There shall be no dents/rust on the enclosure.
Construction & Dimensions	Enclosure design not in accordance with the drawings. Component missing, improper fittings or not fulfilling Dimensional requirements.
Markings	Markings/ name plate is incomplete or missing.

11.22.2 Galvanizing Test of Nuts & Bolts and Earthing Terminal

Nuts, bolts, DA bolts and washers shall be tested in accordance with WAPDA Specification P-82:81 (amended to-date)

11.22.3 Bus bar Test

Copper Bus bars shall have electrical conductivity of 98% IACS and Tin coating of 20microns.

11.22.4 Bakelite/polymer Insulation Tests

Bakelite/polymer insulator shall withstand 8kV (min) for one minute.

11.22.5 Temperature rise test

The temperature rise test shall be carried out on completely assembled APMS enclosure according to IEC 61439-1

11.22.6 IP class test

The verification of IP class (IPx5) shall be tested according to IEC 60529.

11.22.7 Paint Thickness test

Paint thickness shall be tested using paint thickness gauge and it shall not be less than 0.100mm minimum at any point on surface.

11.23 4x double arming bolts DA-14 (As per PD 56b) along with 2X powder coated channels (As per drawing) for mounting arrangement shall be provided along with the enclosure by APMS manufacturer.

12. APMS-OTL

12.1 In case of APMS-***-OTL, followings conditions are to be met by sensor and controller:

Parameter	Requirement
Operating Temperature Range of sensor	-20 °C to + 125 °C
Temperature Accuracy of sensor	Minimum ± 2 °C (or class C or better)
Pressure Withstand of sensor	Minimum 6 PSI continuous (Part inside transformer). 15 PSI (30 minutes)
Sensor IP class	IP65
Controller enclosure IP Class (if used)	IP54





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Oil Compatibility	Parts inside transformer must be compatible with transformer mineral oil
Max power consumption of sensor & controller (if used)	≤ 5 W
Protection requirements (for controller)	Reverse polarity protection Overvoltage protection (120% of U_n)
Protection breaker (for controller if used)	≤ 1 A
PCB requirement (controller)	Conformal coating
Environmental compliance	IEC 60068-2-2 (Dry Heat test)

- 12.2 The sensor assembly shall be installed through the transformer oil filling plug and shall fit the oil plug arrangement specified in DDS-84:2020 without modification to the transformer tank.
- 12.3 Sensor installation shall ensure oil sealing using oil resistant gasket compatible with transformer mineral oil
- 12.4 Manufacturer shall define:
- Low Oil Level Alarm Point
 - Normal Oil Level Recovery Point
- 12.5 In case of sensor failure, wiring disconnection or controller malfunction, APMS shall generate a sensor fault event.
- 12.6 Temperature sensor accuracy shall be ± 2 °C or as per class C or better.
- 12.7 Installation of the sensor shall not reduce BIL of transformers. Transformers shall remain compliant with IEC 60076-3.
- 12.8 The external sensor wiring (pilot wires) connecting the Oil Temperature and Oil Level Sensor Assembly to the APMS/SMCD shall be provided in the form of a robust flexible capillary-type conduit/tubing (5 meters). The capillary conduit shall be metallic, flexible and mechanically protected. It should come inside APMS enclosure from below through a suitable gland.
- 12.9 The sensor assembly/body should be grounded with transformer body (1.5-meter flexible copper wire of 6mmsq shall also be provided).





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13. FUNCTIONAL REQUIREMENTS OF APMS

- 13.1 This specification covers minimum level of functional requirements for design, materials, manufacturing, testing and performance of APMS for 25 kVA, 50 kVA, 100 kVA, 200 kVA, 250 kVA, 400 kVA, 500 kVA and 630 kVA rated Distribution transformers.
- 13.2 APMS shall have functional characteristics as mentioned in clause 13.3 to 13.11.
- 13.3 It shall communicate all metering data and events as per latest specifications and must be stored inside meter which will be communicated to HES/MDM upon connection as per requirement (As per clause 17.1).
- 13.4 It shall be able to record, report and perform following switching operations of MCCB or Magnetic Contactor (as per respective ordering code requirements) i.e., disconnection/reconnection:
- Operation Remotely through Head-End / MDM
 - Operation through SMCD (Independent of Head-End System / MDM)
 - Operation through local electrical means (Push buttons)
 - Operation through local mechanical means (Toggle/Operating Handle) only for MCCB.
- 13.5 It shall record, report and perform specified functions against following abnormal conditions through Head-End / MDM for testing purposes, range of testing values are specified with each condition:
- Over Voltage (up to 20%, higher than Transformer rated voltage)
 - Under Voltage (up to 20%, lower than Transformer rated voltage)
 - Phase Over Current (up to 20%, higher than per phase rated current)
 - Overload Condition (up to 20%, higher than Transformer rated load)
 - Voltage Unbalance (up to 20%, of Transformer rated voltage between phases)
 - Current Unbalance (up to 20%, of per phase rated current between phases)
 - High Apparent Power (up to 20%, higher than Transformer rated kVA rating)
 - High Temperature (100°C)
 - Low Oil Level (binary values)
 - Sensor fault (binary values)





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- 13.6 Write provision for two (02) setting levels i.e., Alarm and Tripping against conditions specified in Clause 13.5, Sr. No. (a to d & h) shall be available. For conditions specified in Clause 13.5, Sr. No. (e to g & i to j) write provision for one (01) setting level i.e., Alarm shall be available.
- 13.7 Threshold values of these Alarm and Tripping functions and their corresponding time settings shall be user programmable from Head-End system/MDM. Alarm and Tripping shall occur based on these threshold values. Default Values against different parameters mentioned in clause 7.8 shall be provided by the respective utility/DISCO at the time of placing purchase order.
- 13.8 Performing Load shedding according to preset time schedule shall be provided.
- 13.9 SMCD shall be programmed bi-directional by default (in white color).
- 13.10 Tripping events shall be recorded and reported for short circuit and Residual protection (for ordering codes APMS-CB).
- 13.11 The APMS with OTL feature shall:
- Measure transformer oil temperature
 - Monitor transformer oil level
 - Generate alarms for sensor fault condition
 - Transmit parameters to backend system
 - Integrate with HES and MDM systems
 - All sensors shall have temperature accuracy certificate from ISO/IEC17025 Lab and functional test reports on oil level monitoring (OEM/APMS provider).

14. PROTOTYPE APPROVAL

- 14.1 Supplier/manufacturer shall submit one (01) complete APMS unit, technical data and three (03) sets of drawings for prototype approval in the office of Design and Standards, PPMC.
- 14.2 All the testing arrangements including boarding, lodging and daily allowance shall be borne by manufacturer.
- 14.3 All the type testing shall be carried out at an independent accredited laboratory under witnessing of D&S PPMC engineer(s).
- 14.4 Testing Lab instruments should be calibrated from ILAC/PNAC/STL accreditation bodies.
- 14.5 Manufacturers shall submit satisfactory field performance of APMS from end user for renewal of prototype (if product is provided to DISCOs). If no product is provided to DISCOs, prototype test compliance can be submitted.





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- 14.6 Following tests shall be performed during prototype testing on complete enclosure: -
- Visual Examination & Verification of dimensions (as per specified drawings)
 - Verification of Components (as per specified drawings)
 - Power Frequency Test of 2.5 kV shall be applied between all four busbars and between ground for one (01) minute.
 - Enclosure Tests as per Clause 11.22.
 - Complete Functionality Tests of APMS as per Clause 13 (10 Nos. operations against each pre-defined operating condition, Normal and abnormal).
- 14.7 The firm shall possess testing setup for functionality tests of APMS including three phase Current Injection set with adjustable features. The routine tests can be performed In-House.
- 14.8 For APMS-OTL, manufacturer shall demonstrate compatibility with DDS-84:2020 (amended to date) oil plug arrangement, successful communication with MDC and compliance with all certification requirements.
- 14.9 Following prototype tests shall be carried out on APMS-OTL sensor and controller assembly only with condition given in clause 14.3.

Sr. No.	Test Name	Standard / Reference	Test Description	Acceptance Criteria
1	Temperature Measurement Accuracy Test	Comparison with calibrated standard	Sensor tested across full operating temperature range	Accuracy within $\pm 2^{\circ}\text{C}$
2	Oil Level Functional Test	Visual method	Verification of oil level alarm and recovery levels using a small sealed tank	Correct Low Oil Alarm and Normal Recovery Point as per datasheet
3	Pressure Withstand Test	Calibrated pressure Gauge	Sensor exposed to internal pressure conditions using a small sealed tank (simulation of transformer pressure conditions)	Withstand 15 PSI for 30 minutes then 6 PSI for 24hours without leakage
4	IP Class verification Test (Sensor)	IEC 60529	Verification of ingress protection of sensor	Minimum IP65
5	IP Class verification Test (Controller)	IEC 60529	Verification of controller enclosure's IP class	Minimum IP54
7	Environmental Temperature Test	IEC 60068 series	Operation under extreme temperature conditions (temperature range is for part inside transformer.	Reliable operation between -20°C to $+125^{\circ}\text{C}$





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			Test to be conducted using a small sealed tank.	
8	Dry Heat Test	IEC 60068-2-2	Controller subjected to elevated temperature	No degradation in performance
9	Power Consumption Test	Power analyser	Measurement of OTL assembly power consumption	≤ 5 Watts

- 14.10 Compatibility certificate is required for sensor assembly with different transformer manufacturers stating that this does not reduce BIL.
- 14.11 Only PPMC approved sensor assemblies shall be used. (protocols attached in Annex-A).
- 14.12 Prototyped APMS-CB-OTL doesn't require re-prototyping for APMS-CB-S. However, APMS-CB-S cannot be used as APMS-CB-OTL unless prototyped so. Likewise, APMS-MC-OTL doesn't require re-prototyping for APMS-MC-S. However, APMS-MC-S cannot be used as APMS-MC-OTL unless prototyped so
- 14.13 For APMS-MC ordering codes, if manufacturer(s) offers their product, the drawings shall be approved as per components and dimensions shall be decided accordingly.
- 14.14 The validity of Prototype approval will be five (5) years unless there is any change in design or as per PPMC Prototype/Type test Policy.
- 14.15 The manufacturer must be ISO-9001 and ISO 14001 certified.

15. MASS PRODUCTION TESTS

Following routine and sample tests shall be performed on APMS

15.1 Routine Tests

The supplier/manufacturer of APMS shall perform following routine tests on each APMS at their premises and shall maintain its proper record to submit on demand: -

- Visual Examination & Verification of dimensions (as per approved drawings)
- Verification of Components (as per approved drawings)
- Power Frequency Test
- Complete Functionality Tests of APMS as per Clause 13.
- For APMS-OTL, following tests are added,





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Sr. No.	Test Name	Test Description	Acceptance Criteria
1	Visual Inspection	Inspection of sensor, controller and enclosure	No physical defects
2	Wiring Inspection	Inspection of internal wiring arrangement	Proper dressing and routing in wiring ducts
3	Functional Test	Verification of sensor output and controller response	Correct readings and signal transmission
4	Alarm Generation Test	Verification of alarm signals	Correct alarm for low oil level and temperature
5	Fail-Safe Test	Simulation of sensor disconnection or failure	Distinct Sensor Fault Alarm generated
6	Communication Test	Verification of data transmission	Successful communication with APMS controller

15.2 Sample Tests

Following sample tests of APMS during mass production shall be carried out by Material Inspection, PPMC:-

- Visual Examination & Verification of dimensions, components (as per approved drawings) and calibration certificates (equipment, sensor assemblies)
- Power Frequency Test (2.5KV)
- Conductivity test of busbars.
- Wiring inspection.
- Fail safe test.
- Communication verification on MDC.
- Paint thickness test (0.100mm minimum at any point on surface)
- Galvanizing test
- Tin plating test. (≥ 20 Microns)
- Bakelite dielectric test. (8kV)
- Alarm generation test

16. SAMPLING, ACCEPTANCE AND REJECTION

16.1 General:

- 16.1.1 All inspections shall be carried out under the supervision of the Purchaser/Inspection Authority (MI, PPMC) unless otherwise specified.





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16.1.2 Sample Quantities.

Offered Quantity	No of Samples
Up-to 25	3
Up-to 50	5
Up-to 90	8
Up-to 150	13
Up-to 280	20
Up-to 500	32
Up-to 1200	50
Up-to 3200	80
Up-to 10000	125
Up-to 35000	200

16.2 Inspection & Acceptance Table:

Sr. No.	Test Description	Remarks	Acceptance/rejection
1	Visual Examination & Verification of Dimensions	As per approved drawings	i. If more than one sample fails, then the lot shall be rejected. ii. If only one sample out of the selected samples fails, then re-sampling of double size shall be made. The failure shall be documented and with reasons and acknowledgement from all parties. iii. In case, if any other sample from re-sampling fails, whole LOT shall be rejected and it would be documented and acknowledged by all parties.
2	Power Frequency Test (2.5 kV)	No breakdown or flashover	
3	Complete Functionality Test of APMS along with alarm generation	Full operational verification	
4	Wiring Inspection	Ferruling, termination, routing	
5	Fail Safe Test	Mandatory zero failure	
6	Communication Verification on MDC	Data transmission & integration	
7	Paint Thickness Test	Corrosion protection	
8	Galvanizing Test (1 item from each sample)	Zinc coating compliance	
9	Tin Plating Test ($\geq 20 \mu\text{m}$) (1 item from each APMS)	Conductivity & corrosion	
10	Bakelite Dielectric Test (1 item from each APMS)	No breakdown / puncture	

Note: The rejected sample during first sampling shall be rectified before acceptance of LOT.





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17. INTEROPERABILITY

17.1 For the purpose of ensuring interoperability, the APMS shall be fully compliant with DLMS/COSEM. Furthermore, for deployments where metering data is managed through the Meter Data Management (MDM) system of Power Information Technology Company, the APMS, associated MDC and communication interfaces shall mandatorily comply with the requirements of the Universal Data Integration Layer (UDIL) latest version and shall be duly certified by PITC ensuring seamless integration, standardized data exchange and avoidance of vendor-specific dependencies.

18. PACKING

Each APMS Unit shall be supplied duly packed to withstand rigors of rail/road transportation. The Glands shall not be damaged. DA bolts, Channels for mounting arrangements shall also be provided. Moreover, it shall be protected against entry of moisture, rainwater and dust by covering with suitable bubble wrap sheet.

19. WARRANTY

- 19.1 The complete APMS, including all associated components such as MCCB, SMCD, Magnetic Contactor, OTL sensor assembly, and enclosure (as applicable per the ordering code), shall be warranted for a period of five (05) years from the date of supply or completion of the specified duty cycles (for MCCB and Magnetic Contactor), whichever comes earlier. In the absence of recorded duty cycle data, the warranty period shall be considered five (05) years from the date of supply.
- 19.2 During the warranty period, the manufacturer/supplier shall be responsible for rectification or replacement of any defective components arising due to design, material or workmanship issues at no additional cost to the purchaser. The fault evaluation report shall jointly be made with representative of DISCO, MI and D&S to ascertain the root cause.
- 19.3 The warranty shall cover all electrical, mechanical and communication components including battery performance as per specified operational life.





	Asset Performance Management System PPMC-DS-01:2026				
	PPMC-DS-01	1	23-04-2026	23-04-2029	32 of 36
	Document No.	Version	Date of Revision	Next Revision	Page No.

Annex – A

PPMC APPROVAL PROTOCOL FOR SENSOR ASSEMBLY

A- Type Approval (Mandatory Before OTL Prototype for OTL OEM)

Documents Required:

1. Design drawings
2. Mounting arrangement (DDS-84 compatibility)
3. Material specifications
4. Calibration procedure

Type Tests (Mandatory)

Test	Standard	Purpose
Accuracy test ($\pm 2^{\circ}\text{C}$) (Sensor & controller)	ISO/IEC 17025	Standard governing calibration of equipment against a traceable reference standard.
Pressure test (6 PSI / 15 PSI)	DDS-84:2020 (to date)	Tank conditions
Temperature endurance (-20 to 125°C)	IEC 60068-2-1 / 2-2	Environmental suitability (correct readings)
IP test (IP65)	IEC 60529	Dust + water protection
Vibration test	IEC 60068	Field robustness

Impulse test (with sensor installed) on at-least 2x Transformers (25kVA) of different manufacturers or as per D&S PPMC requirements	IEC 60076-3
Functional test (low level / high temp alarms)	Operational
Fitment verification	OEM certification

PPMC APPROVAL PROTOCOL FOR CONTROLLER (if used)

Test	Standard	Purpose
Power consumption	IEC 60076-22-1 <5Watts	Efficiency
Dry heat test	IEC 60068-2-2	Thermal endurance
IP test (IP54)	IEC 60529	Enclosure protection
EMC test	IEC 61000 series	Interference immunity

Note: All tests shall be performed at an independent Lab





	Asset Performance Management System PPMC-DS-01:2026				
	PPMC-DS-01	1	23-04-2026	23-04-2029	33 of 36
	Document No.	Version	Date of Revision	Next Revision	Page No.

Annex-B

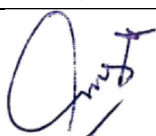
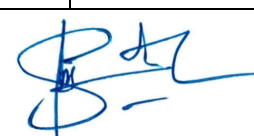
SCHEDULE OF TECHNICAL DATA

1. APMS:

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Type / Model / Designation			
3	Applicable Standards (DDS / IEC)			
4	Rated Voltage (V)			
5	Rated Frequency (Hz)			
6	APMS Rating (25/50/100/200/400/630 kVA)			
7	Degree of Protection (Enclosure IP)			
8	Ambient Temperature Range			
9	Maximum Altitude			
10	Functional Compliance (as per Clause 13)			
11	Alarm & Tripping Logic Details			
12	Field Performance Evidence			
13	Compliance with PPMC-DS-01:2026			
14	Weight			

2. MCCB MOTORIZED WITH EARTH LEAKAGE PROTECTION.

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Model / Frame Size			
3	Standard (IEC 60947-2) compliance			
4	Rated Voltage (V)			
5	Rated Current (In)			
6	Number of Poles (3P / 3P+N)			
7	Breaking Capacity (Icu, kA)			
8	Service Breaking Capacity (Ics, % of Icu)			
9	Making Capacity (Icm)			
10	Thermal Setting Range (Ir)			
11	Magnetic Setting Range (Im)			
12	Short Time Delay (if applicable)			
13	Residual Protection (Yes/No, value)			

	Asset Performance Management System PPMC-DS-01:2026				
	PPMC-DS-01	1	23-04-2026	23-04-2029	34 of 36
	Document No.	Version	Date of Revision	Next Revision	Page No.

14	Type of Trip Unit (Thermal-Magnetic / Electronic)			
15	Motorized Operation (Yes/No)			
16	Auto/Manual Mode Availability			
17	Auxiliary Contacts / Communication Interface			
18	Mechanical Endurance			
19	Electrical Endurance			
20	Type Test Reports (ILAC Lab)			
21	Compliance with PPMC-DS-01:2026			
22	Weight			

3. MCCB NON-MOTORIZED.

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Model / Frame Size			
3	Standard (IEC 60947-2) compliance			
4	Rated Voltage (V)			
5	Rated Current (In)			
6	Number of Poles (3P)			
7	Breaking Capacity (Icu, kA)			
8	Service Breaking Capacity (Ics, % of Icu)			
9	Making Capacity (Icm)			
10	Thermal Setting Range (Ir)			
11	Magnetic Setting Range (Im)			
14	Type of Trip Unit (Thermal-Magnetic / Electronic)			
18	Mechanical Endurance			
19	Electrical Endurance			
20	Type Test Reports (ILAC Lab)			
21	Compliance with PPMC-DS-01:2026			
22	Weight			





	Asset Performance Management System PPMC-DS-01:2026				
	PPMC-DS-01	1	23-04-2026	23-04-2029	35 of 36
	Document No.	Version	Date of Revision	Next Revision	Page No.

4. MAGNETIC CONTACTOR

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Model / Type			
3	Standard (IEC 60947-4-1)			
4	Rated Operational Voltage (V)			
5	Rated Frequency (Hz)			
6	Rated Current (AC 6a duty)			
7	Utilization Category (AC 6a)			
8	Coil Voltage (V)			
9	Mechanical Endurance (operations)			
10	Electrical Endurance (AC 6a duty)			
11	Making Capacity			
12	Breaking Capacity			
13	Surge Protection (RC / MOV)			
14	Electrical Interlocking with MCCB			
15	Coordination Type (Type 2)			
16	Type Test Reports (ILAC Lab)			
17	Compliance with PPMC-DS-01:2026			
18	Weight			

5. SMCD

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Model / Type			
3	Standards (DDS-50, 98, 110 / IEC 62052/53) compliant			
4	Accuracy Class (kWh / kVARh)			
5	Communication Technology			
6	DLMS/COSEM Compliance (Yes/No)			
7	Optical Port Availability			
8	Auxiliary Ports (MCCB Interface)			
9	Battery Type & Capacity			
10	Battery Backup Duration			
11	RTC Backup (Supercapacitor)			
12	Event Logging Capacity			
13	Alarm & Trip Configurability			
14	Remote Operation Capability			
15	Firmware Upgrade Capability			





	Asset Performance Management System PPMC-DS-01:2026				
	PPMC-DS-01	1	23-04-2026	23-04-2029	36 of 36
	Document No.	Version	Date of Revision	Next Revision	Page No.

16	PTA Compliance (for communication)			
17	Type Approval (PPMC)			
18	DLMS Certification Attached			
19	Weight			

6. OTL (OIL TEMPERATURE & LEVEL ASSEMBLY)

Sr. No.	Description	Offered Value	Compliance	Remarks
1	Manufacturer Name			
2	Model / Type			
3	Applicable Standards (IEC 60751, IEC 60068, IEC 60529)			
4	Temperature Measurement Range (°C)			
5	Temperature Accuracy ($\pm$ °C)			
6	Drift over Time			
7	Oil Level Detection Method			
8	Pressure Withstand (PSI)			
9	Sensor IP Rating			
10	Controller IP Rating			
11	Operating Temperature Range			
12	Power Consumption			
13	Mounting Arrangement (DDS-84 compatible)			
14	Fail-Safe Feature (Yes/No)			
15	Calibration Certificate (ISO/IEC 17025 lab)			
16	Type Test Reports			
17	Transformer Compatibility Certificate			
18	PPMC Approval Status			
19	Weight			





LIST OF DRAWINGS

Sr No.	Drawing No.	Drawing Title
01	APMS/PPMC/D&S/01	Enclosure Unit for 25/50/100 kVA
02	APMS/PPMC/D&S/02	Enclosure Unit for 200/250 kVA
03	APMS/PPMC/D&S/03	Enclosure Unit for 400/500,630 kVA
04	APMS/PPMC/D&S/04	Internal Components Arrangement
05	APMS/PPMC/D&S/05	Base Plate for 25/50/100 kVA
06	APMS/PPMC/D&S/06	Base Plate for 200/250 kVA
07	APMS/PPMC/D&S/07	Base Plate for 400/500,630 kVA
08	APMS/PPMC/D&S/08	Air Vent for 25/50/100 kVA
09	APMS/PPMC/D&S/09	Air Vent for 200/250,400/500,630 kVA
10	APMS/PPMC/D&S/10	Meter Support Channel
11	APMS/PPMC/D&S/11	Rating Plate
12	APMS/PPMC/D&S/12	Earthing Terminal
13	APMS/PPMC/D&S/13	Current Transformer
14	APMS/PPMC/D&S/14	Insulator
15	APMS/PPMC/D&S/15	Circuit Diagram with magnetic Contactor
16	APMS/PPMC/D&S/16	Circuit Diagram with magnetic Contactor
17	APMS/PPMC/D&S/17	Magnetic Contactor Arrangement
18	APMS/PPMC/D&S/18	Tolerance Sheet

Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)

Drawn By:	Checked By:	Verified By:	Scale:	NTS
ENGR. AMIR HAMZA ASST. SPECIALIST (D&S)	ZARYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	Revision Nos:	0/0
			Date :	17/04/2026



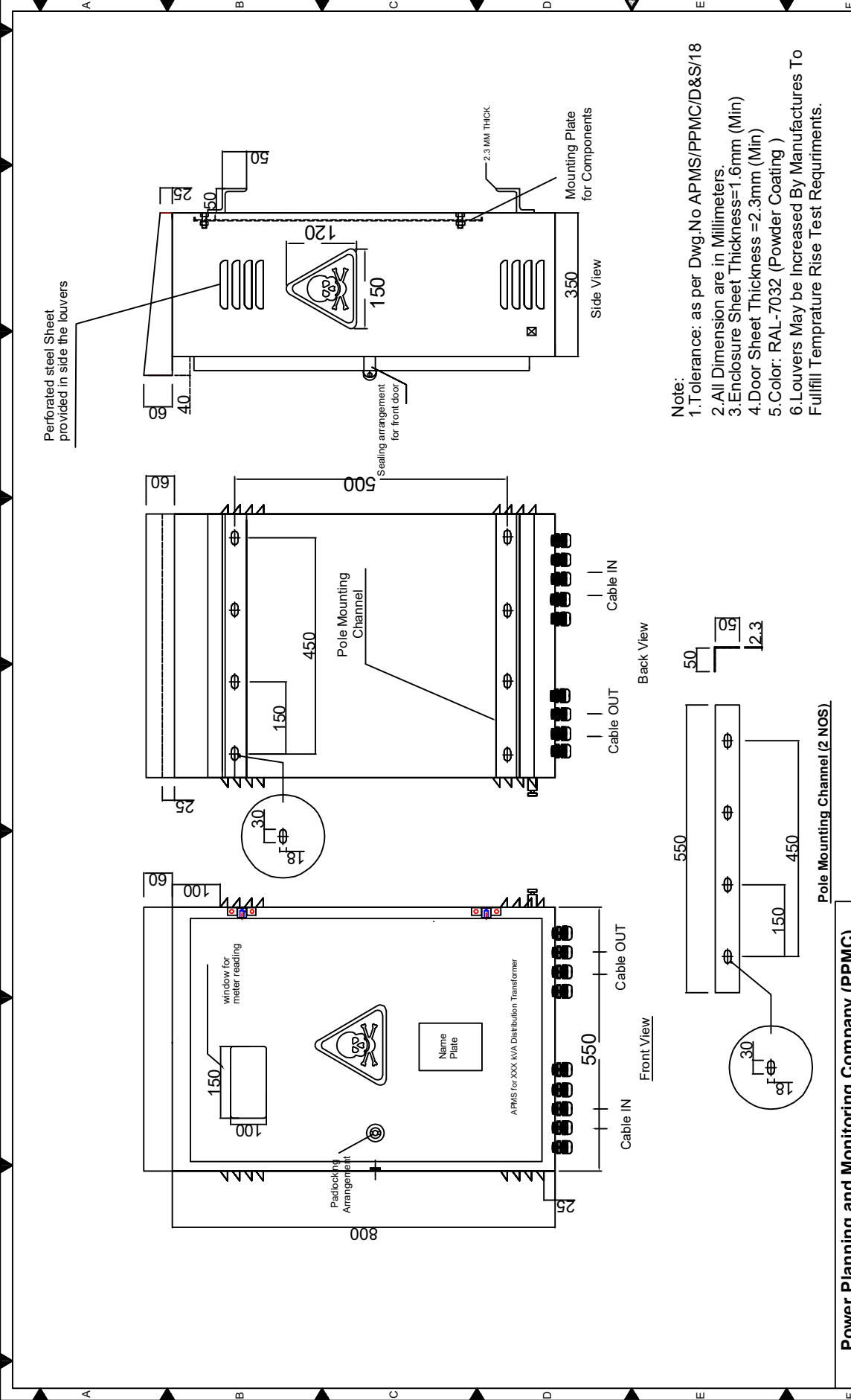
PPMC

Product : Asset Performance Management System For 25kVA,50kVA,100kVA,200/250kVA,400/500kVA and 630kVA Transformer

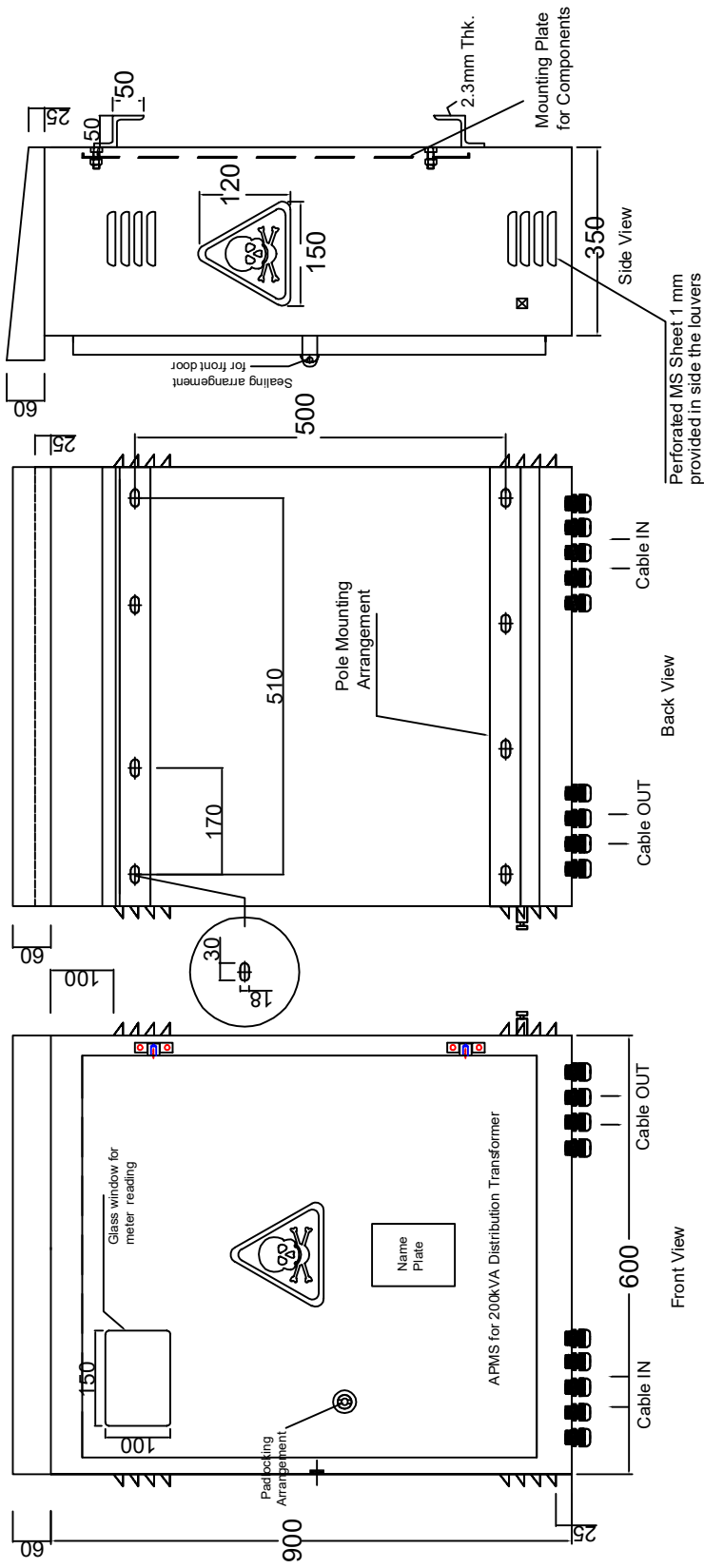
Drawing Title: LIST OF DRAWINGS

Reference : PPMC-DS-01

Drawing No. APMS/PPMC/D&S/00 OF 18

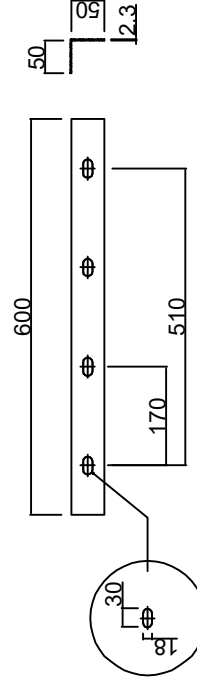


Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)				PPMC				Asset Performance Management System For 25kVA,50kVA,100kVA Transformer	
Drawn By:	Checked By:	Verified By:	Scale:	NTS		Product :			Drawing Title:
ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	ZARYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	0/0	17/04/2026		Reference :			Enclosure Unit
					Drawing No.			APMS/PPMC/D&S/01 OF 18	



Note:

- Note:
1. Tolerance: as per Dwg.No APMS/PPMC/D&S/18
 2. All Dimension are in Millimeters.
 3. Enclosure Sheet Thickness=1.6mm (Min)
 4. Door Sheet Thickness =2.3mm (Min)
 5. Color: RAL-7032 (Powder Coating)
 6. Louvers May be Increased By Manufacturers To Fulfill Temperature Rise Test Requirements.



Pole Mounting Channel (2 NOS)

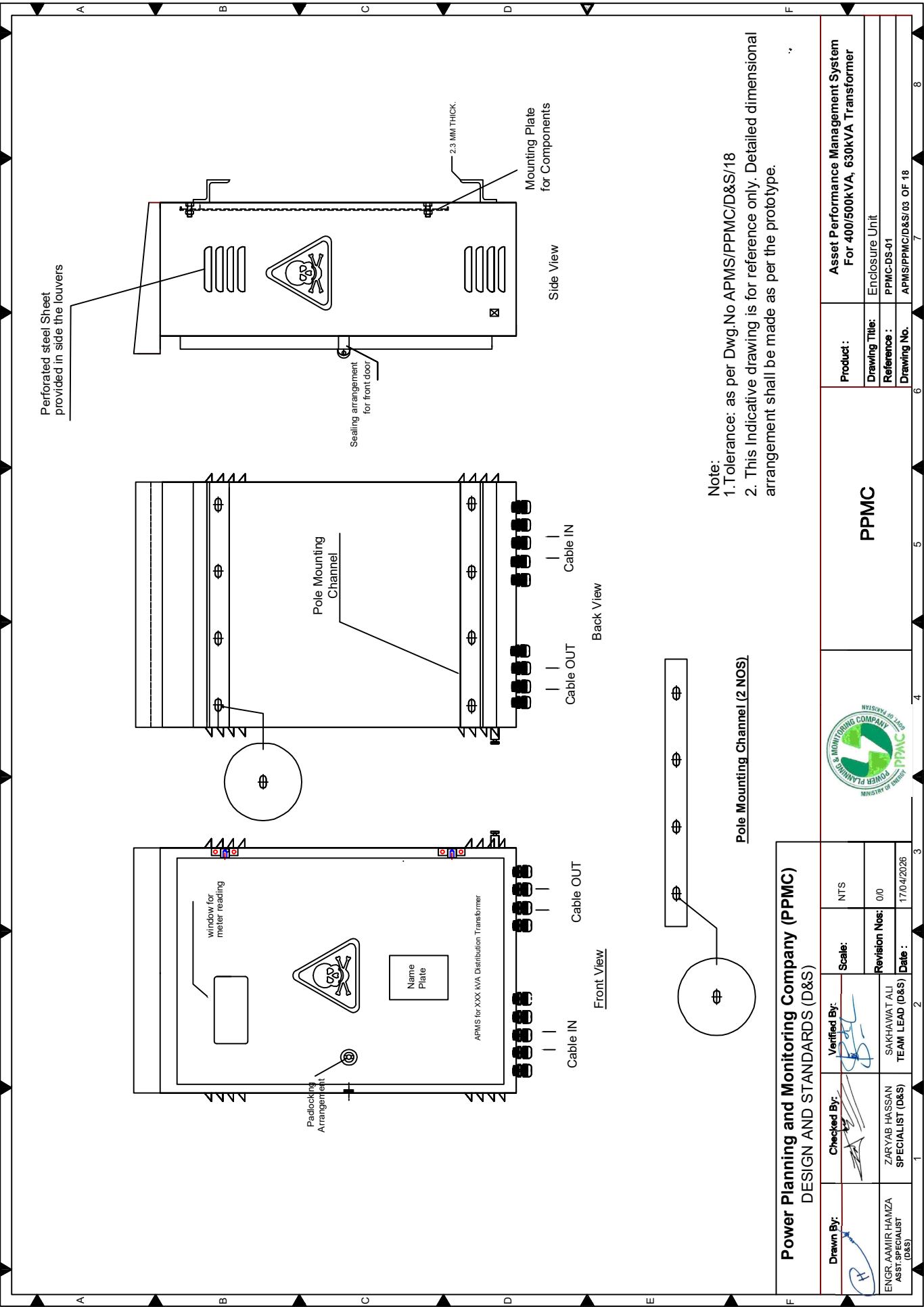
Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

 Drawn By: ENGR. AMIR HAMZA ASSISTANT (S&S)	 Checked By: ZARYAB HASSAN SPECIALIST (D&S)	 Verified By: SAKHAWATI ALI TEAM LEAD (D&S)	Scale: Revision Nos: 0/0 Date: 17/04/2026	NTS
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PPMC

Product :	Asset Performance Management System For 200/250 kVA Transformer
Drawing Title:	Enclosure Unit
Reference :	PMMC-DS-01
Drawing No.	APMS/PPM/CDS/ 02 OF 18



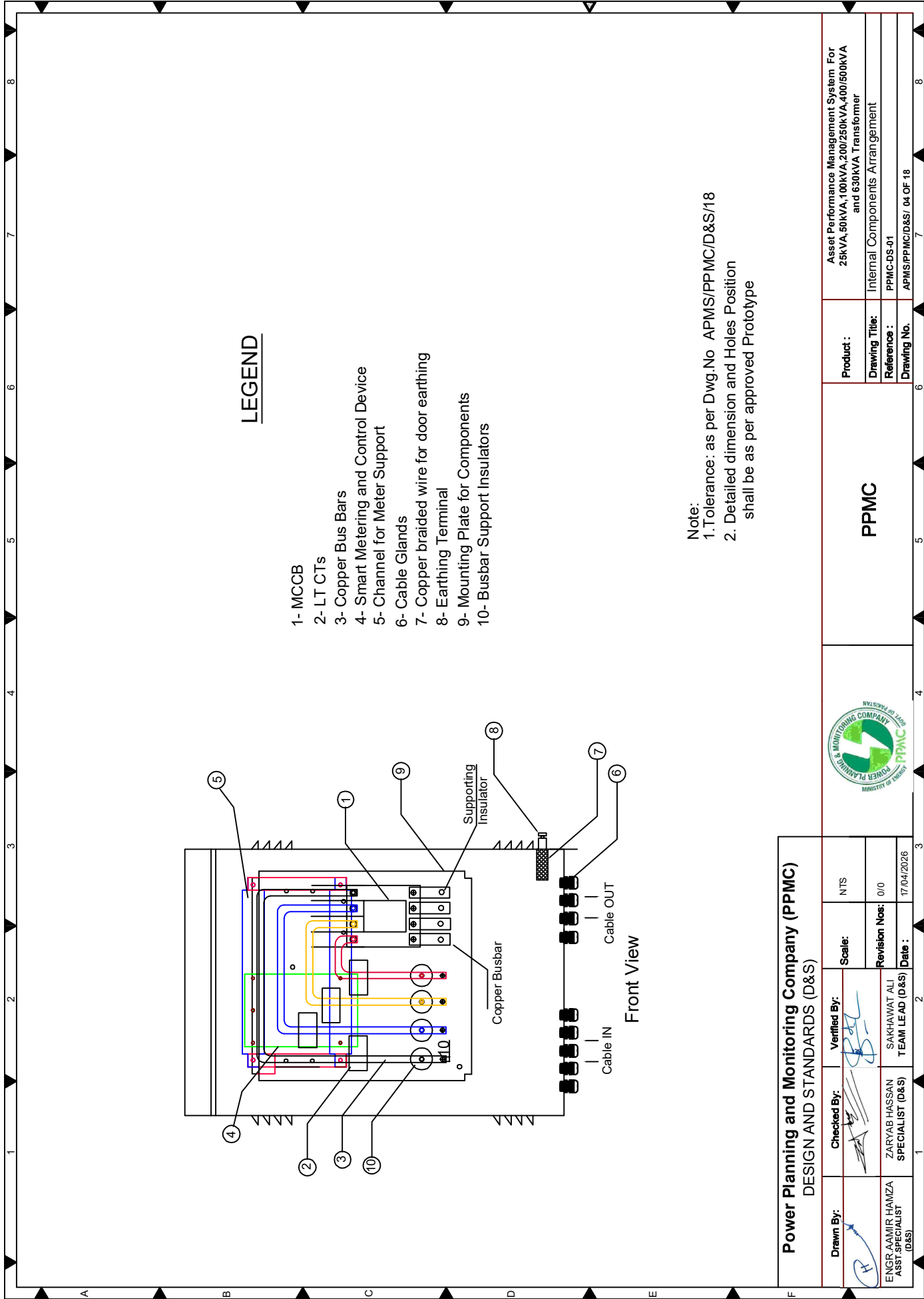
Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

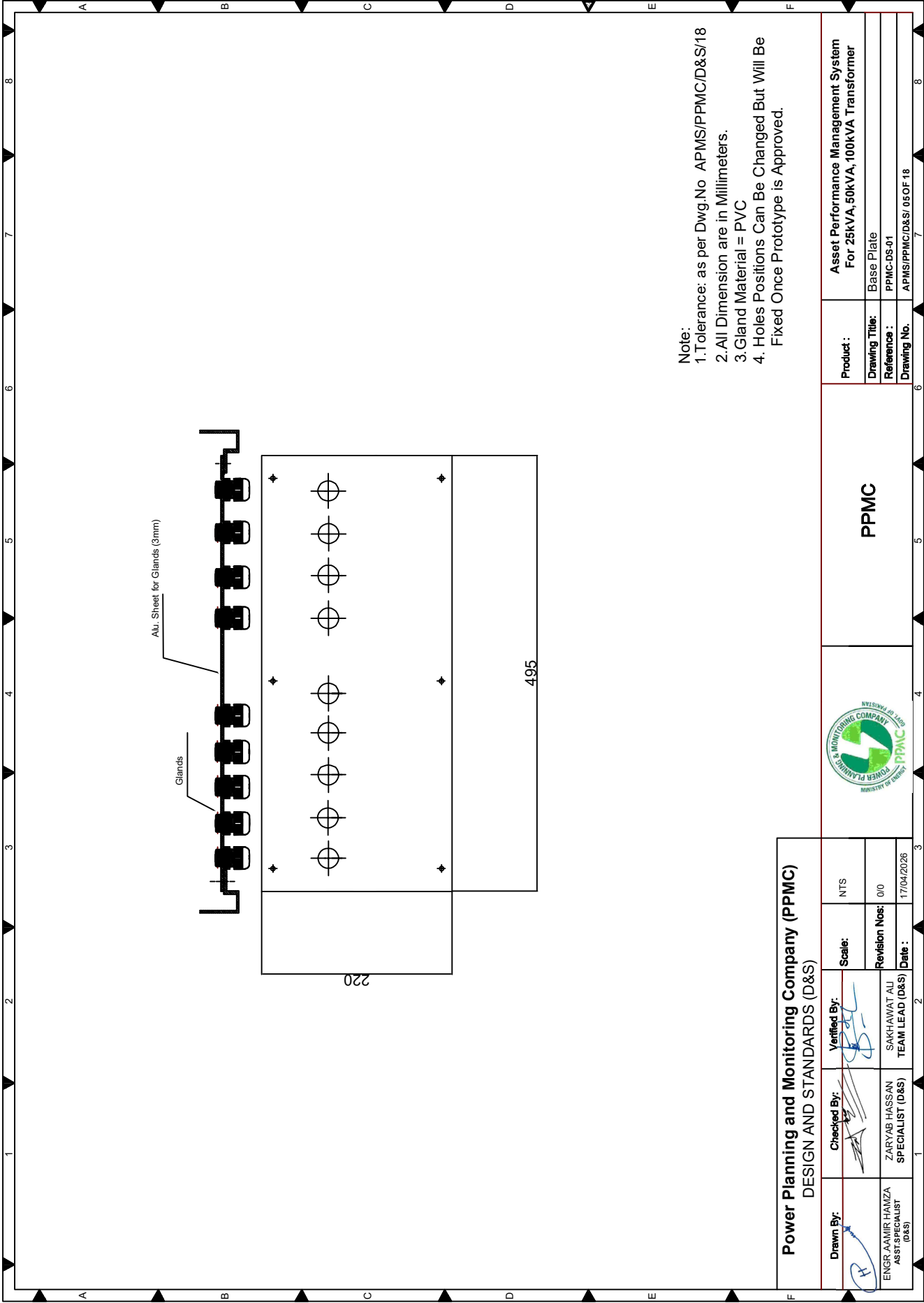
Drawn By:	Checked By:	Verified By:	Scale:	NTS
ENGR. AMIR HAMZA ASST. SPECIALIST (D&S)	ZARYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	Revision Nos:	0/0
			Date :	17/04/2026



PPMC

Product :	Asset Performance Management System For 400/500kVA, 630kVA Transformer
Drawing Title:	Enclosure Unit
Reference :	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/03 OF 18





Note:
1. Tolerance: as per Dwg.No APMS/PPMC/D&S/18
2. All Dimension are in Millimeters.
3. Gland Material = PVC
4. Holes Positions Can Be Changed But Will Be Fixed Once Prototype is Approved.

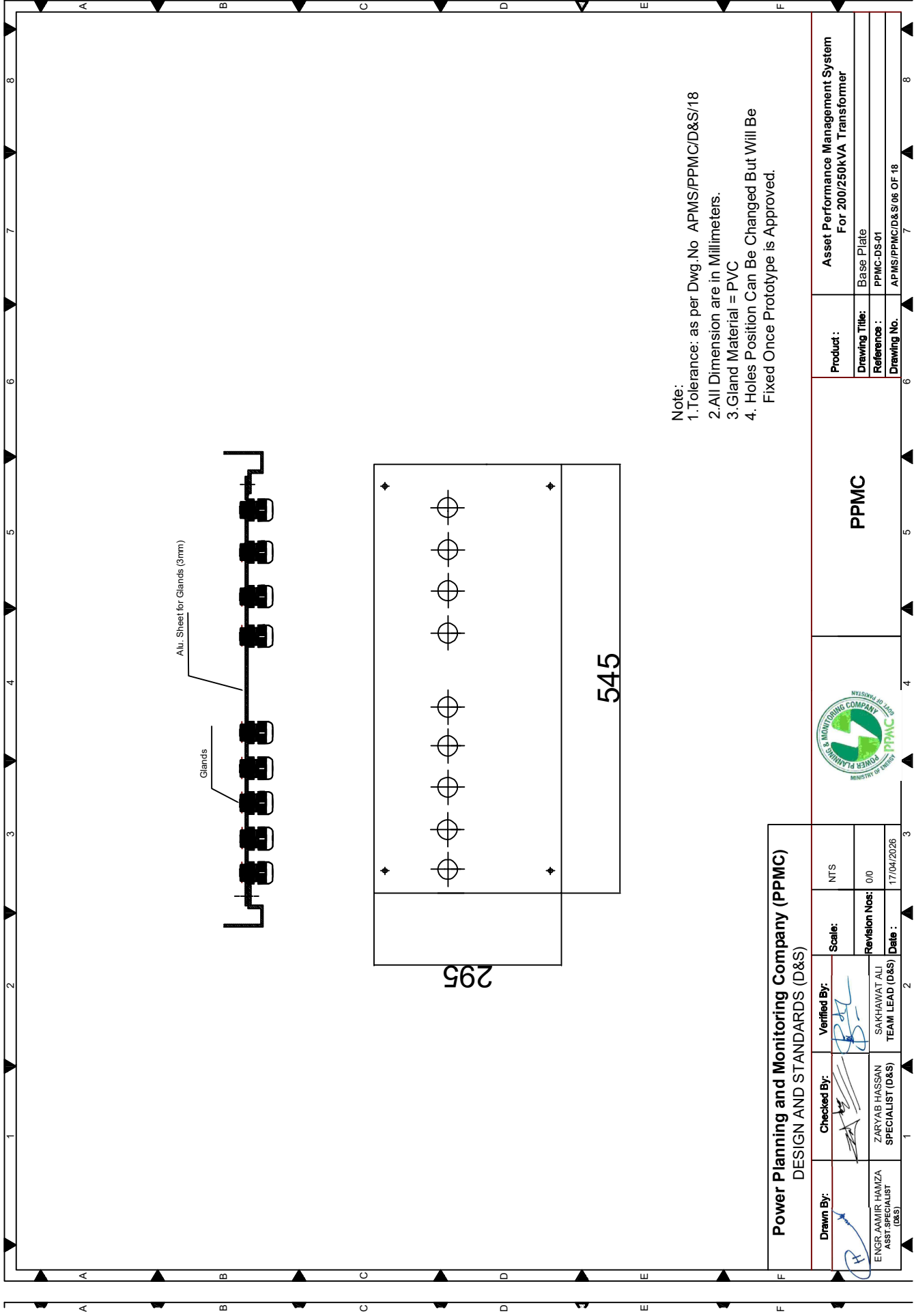
Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

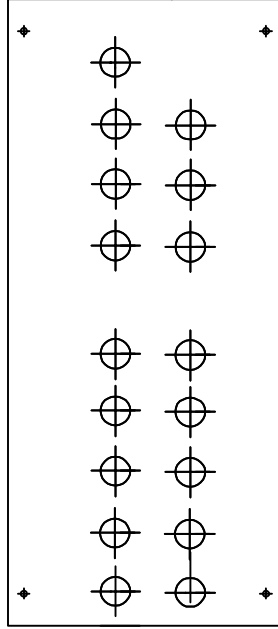
Drawn By: ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	Checked By: ZARYAB HASSAN SPECIALIST (D&S)	Verified By: SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS	Revision Nos: 0/0	Date : 17/04/2026
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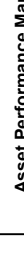
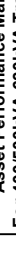
PPMC

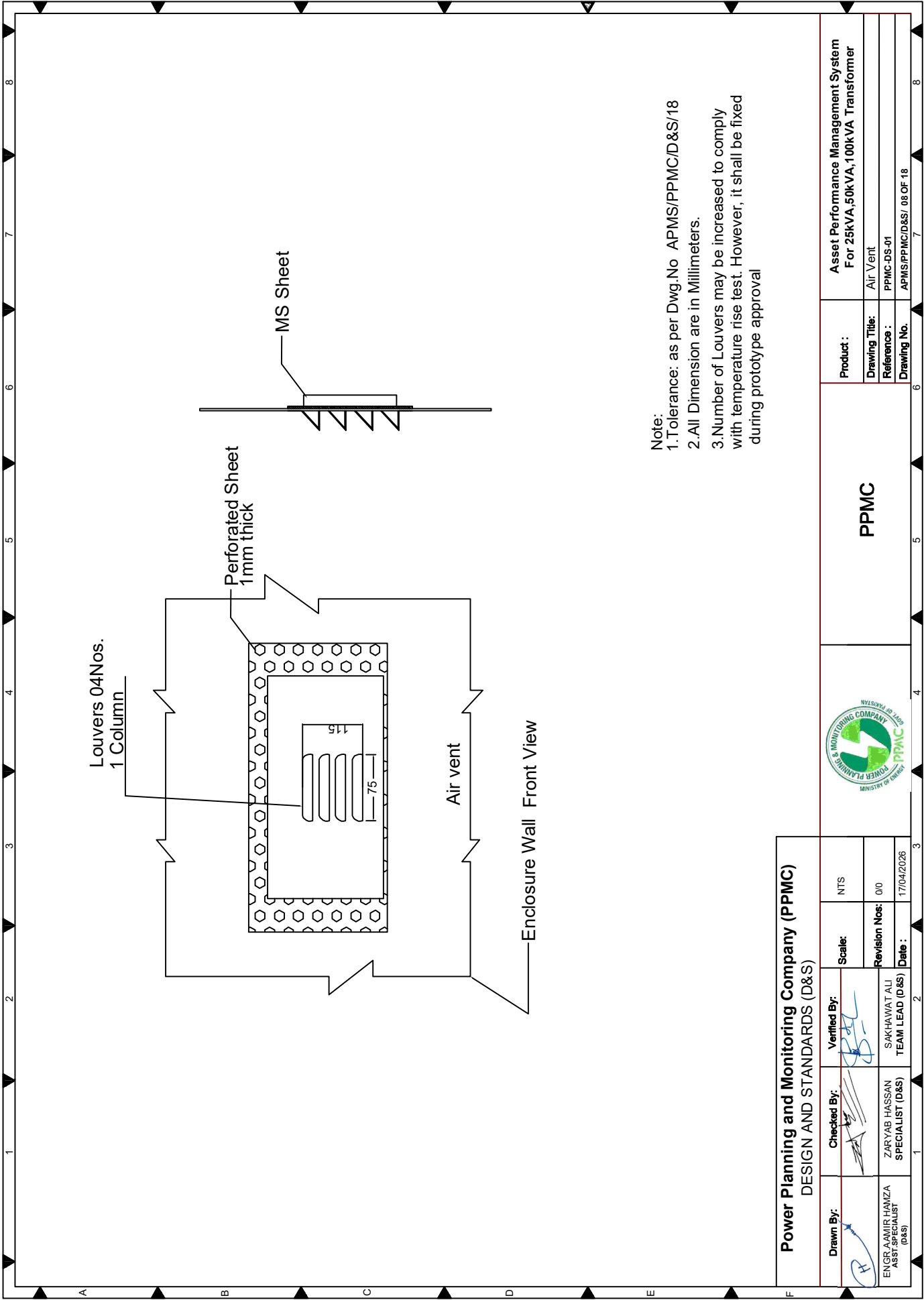
Product :	Asset Performance Management System For 25kVA, 50kVA, 100kVA Transformer
Drawing Title:	Base Plate
Reference :	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/ 05 OF 18

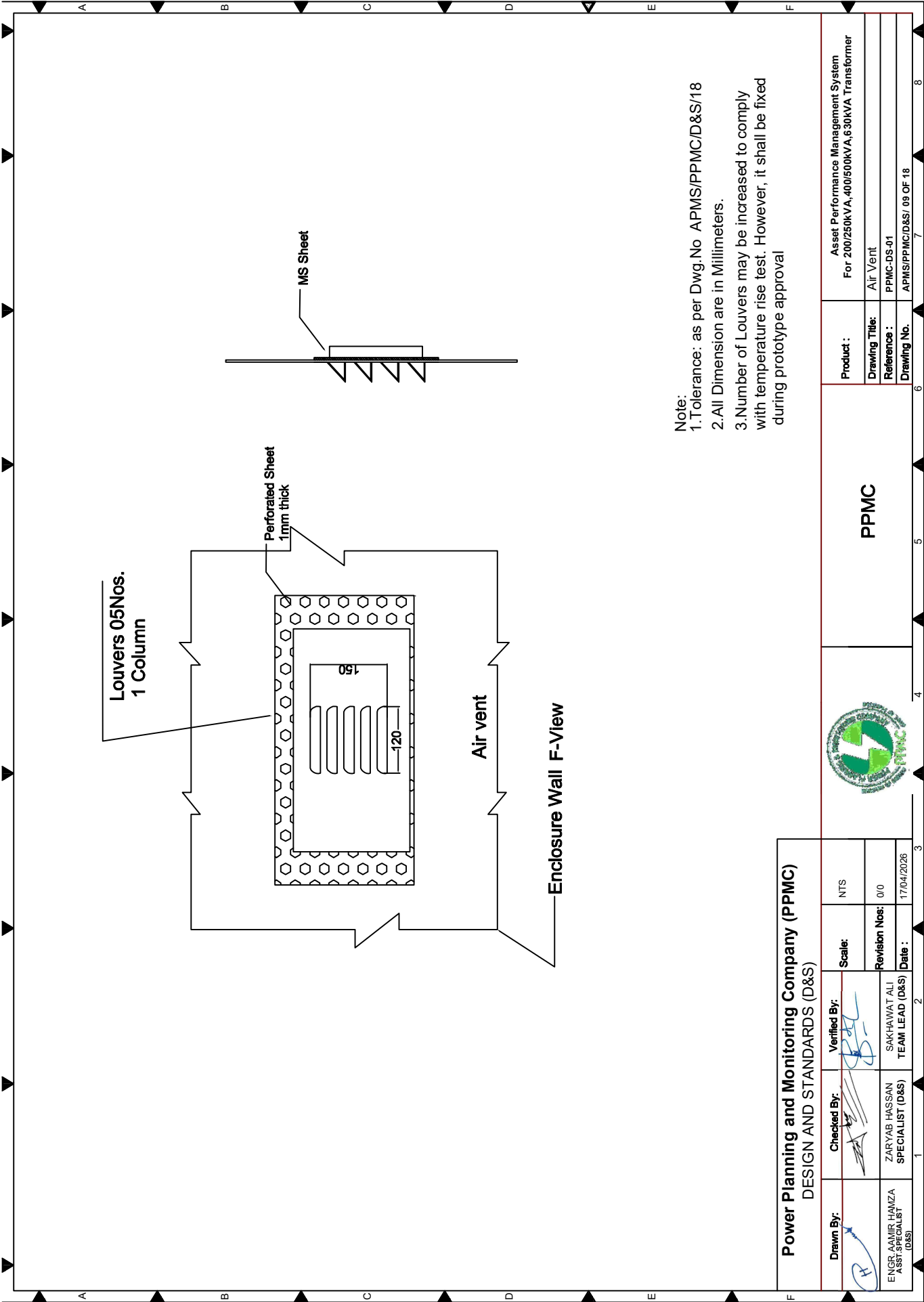




Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

		PPMC			Product : Asset Performance Management System For 400/500kVA, 630kVA Transformer	
Drawn By: ENGR AAMIR HAMZA ASST. SPECIALIST (D&S)		Checked By: 	Verified By: 	Scale: NTS	4 ▲ 5 ▲ 6 ▲ 8	
ZARYAB HASSAN SPECIALIST (D&S) TEAM LEAD (D&S)		Revision No: 0/0	Date : 17/04/2026			
		1 ▲ 2 ▲ 3				





Note:

- 1. Tolerance: as per Dwg.No APMS/PPMC/D&S/18
- 2. All Dimensions are in Millimeters.
- 3. Number of Louvers may be increased to comply with temperature rise test. However, it shall be fixed during prototype approval

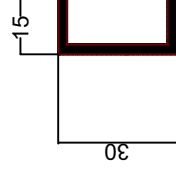
Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

Drawn By:	Checked By:	Verified By:	Scale:	NTS
ENGR. AAMIR HAMZA ASST. SPECIALIST (D&S)	ZARYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	Revision Nos:	0/0
			Date:	17/04/2026



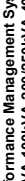
PPMC

Product:	Asset Performance Management System For 200/250kVA, 400/500kVA, 630kVA Transformer
Drawing Title:	Air Vent
Reference:	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/ 09 OF 18



Sectional View

3. Holes shall be made as per Requirement

	PPMC	Product :	Asset Performance Management System For 25kVA, 50kVA, 100kVA, 200/250kVA, 400/500kVA and 630kVA Transformer	
		Drawing Title:	Meter Support Channel	
		Reference :	PPMC-DS-01	
		Drawing No.	APMS/PPMC/DS/10 OF 18	
4	5	6	7	8

125 115	
Asset Performance Management System For XXX kVA Transformer Ordering Code-	
Sr No. Rated Voltage 415/240 V Rated Current MCCB Rating CT Ratio	P.O No P.O Date Warranty/Expiry Date Manufactured For Year of Manufacturing
MANUFACTURER NAME	

Note:

- Magnetic contactor Rating (A)
- Manufacturer of OTL (for OTL ordering codes only)
- Low Oil level and Normal Recovery Point (for OTL ordering codes only)

Power Planning and Monitoring Company (PPMC)
DESIGN AND STANDARDS (D&S)

Drawn By: ENGR AAMIR HAMZA ASST. SPECIALIST (D&S)	Checked By: ZARY AB HASSAN SPECIALIST (D&S)	Verified By: SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS Revision Nos: 0/0 Date : 17/04/2026
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Power Planning and Monitoring Company (PPMC)

Product : Asset Performance Management System For 25kVA, 50kVA, 100kVA, 200/250kVA, 400/500kVA and 630kVA Transformer	Drawing Title: Rating Plate	Reference : PPMC-DS-01
Drawing No. APMS/PPMC/D&S/11 OF 18		

1. Magnetic contactor Rating (A)

2. Manufacturer of OTL (for OTL ordering codes only)

3. Low Oil level and Normal Recovery Point (for OTL ordering codes only)

Power Planning and Monitoring Company (PPMC)

DESIGN AND STANDARDS (D&S)

Verified By:	
--------------	--

AITS

ENGR. AMIR HAMZA
ASST. SPECIALIST
(D&S)

**ZARYAB HASSAN
SPECIALIST (D&S)**

SAKHAWAT ALI
TEAM LEAD (D&S)

0/0
17/04

17/04/2026



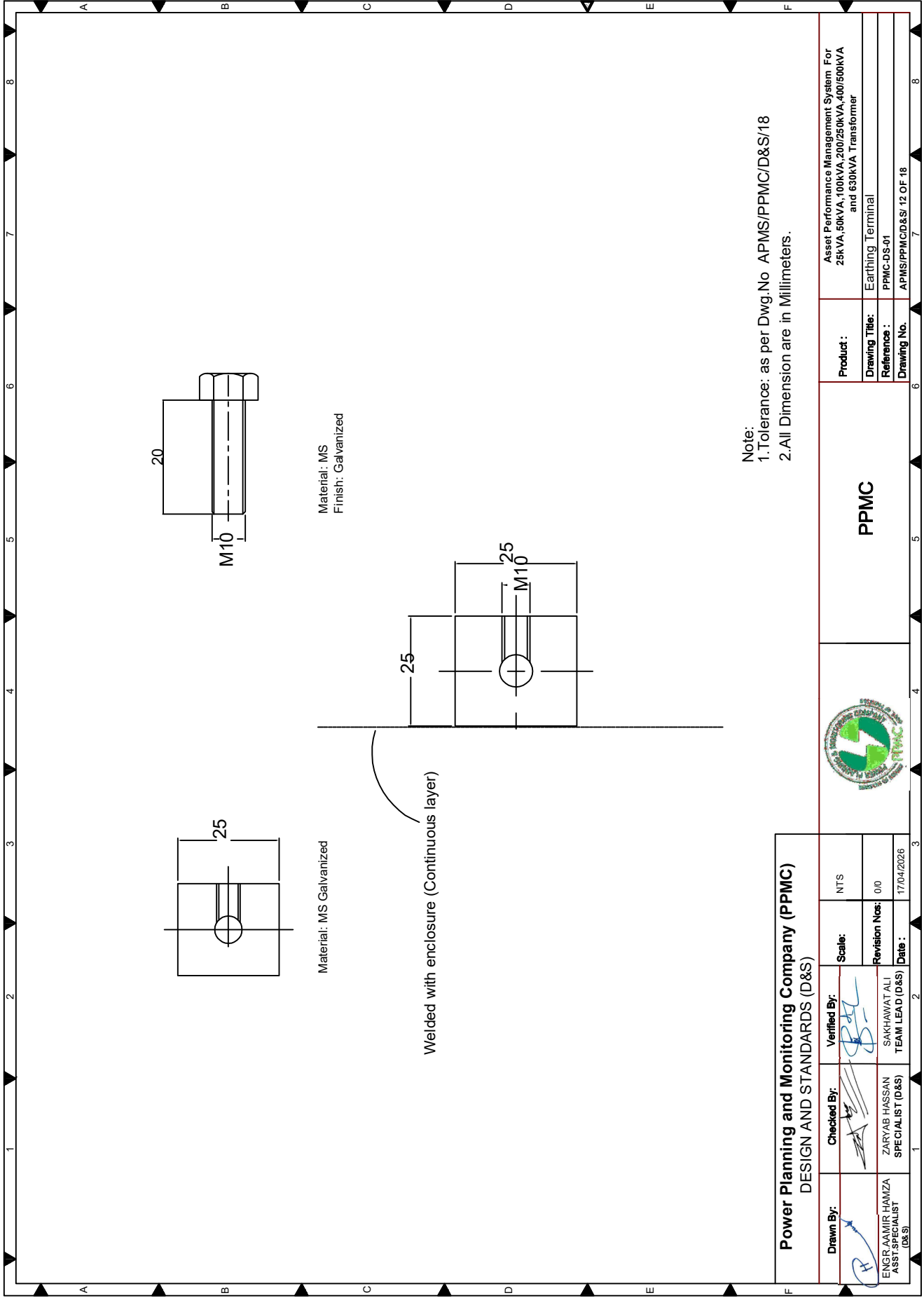
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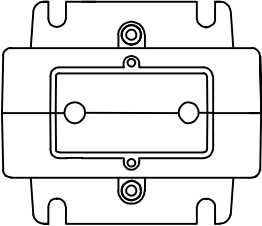
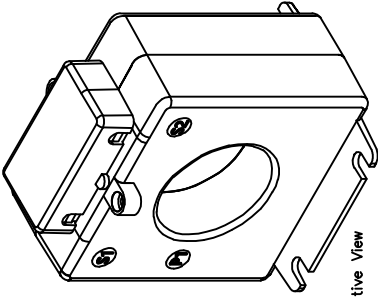
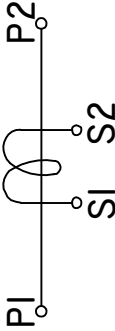
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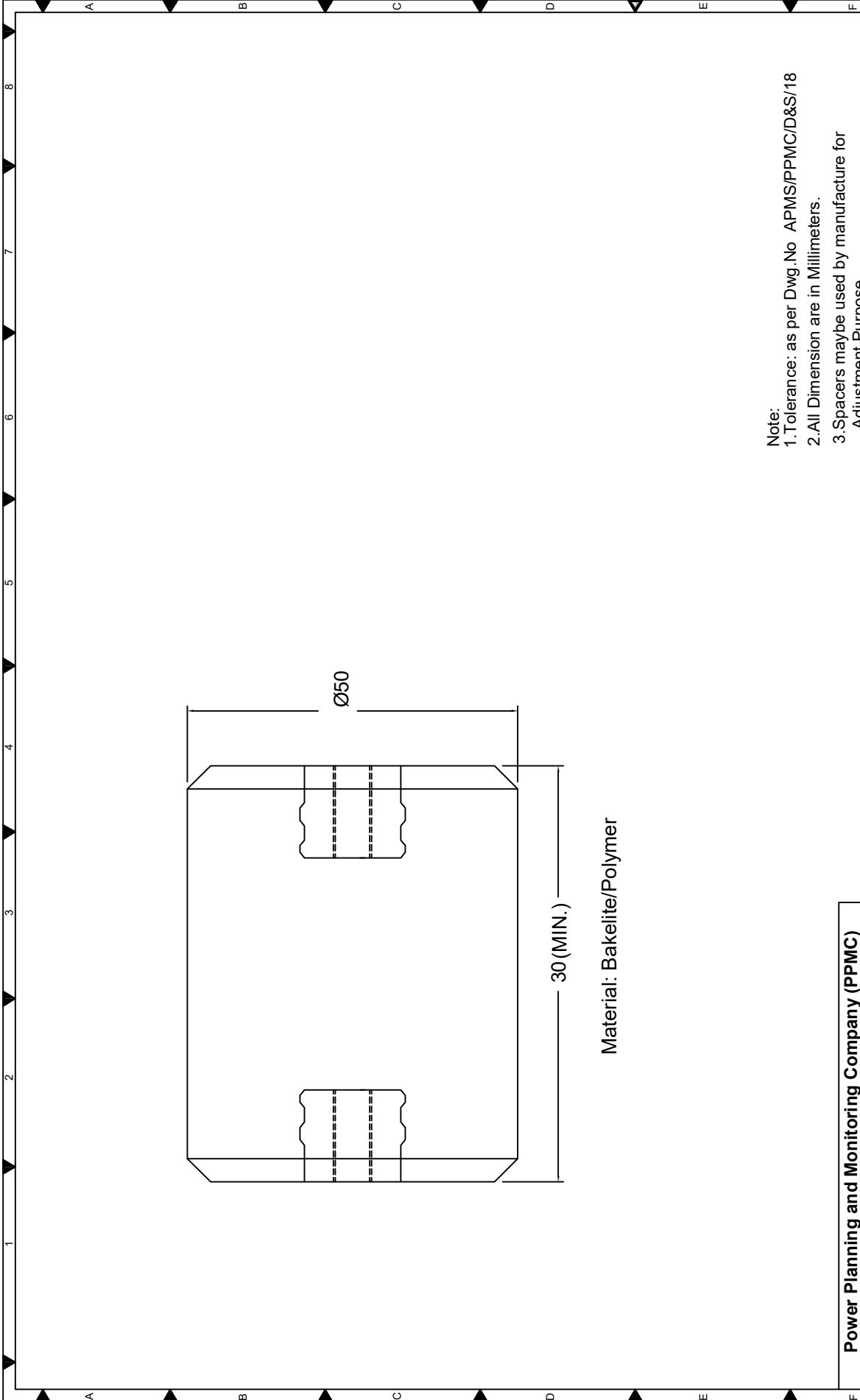
ing Plate

PPMC-DS-01

APMS/PPMC/D&S/ 11 OF 18



A		B		C		D		E		F																	
1		2		3		4		5		6																	
8		7		6		5		4		3																	
A		B		C		D		E		F																	
1		2		3		4		5		6																	
8		7		6		5		4		3																	
 Top View  Perspective View Terminal Markings  NOTE: 1. TERMINAL MARKINGS a. Primary P1,P2 b. Secondary S1,S2 2. Dimensions shall be fixed according to the approved Prototype <table><tr><td colspan="4">Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)</td></tr><tr><td>Drawn By: ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)</td><td>Checked By:  ZARYAB HASSAN SPECIALIST (D&S)</td><td>Verified By:  SAKHAWAT ALI TEAM LEAD (D&S)</td><td>Scale: NTS Revision Nos: 0/0 Date: 17/04/2026</td></tr></table> <table><tr><td colspan="2">Product : Asset Performance Management System For 25KVA, 50KVA, 100KVA, 200/250KVA, 400/500KVA and 630KVA Transformer</td></tr><tr><td colspan="2">Drawing Title: Current Transformer</td></tr><tr><td colspan="2">Reference : PPMC-DS-01</td></tr><tr><td colspan="2">Drawing No. : APMS/PPMC/D&S/13 OF 18</td></tr></table> 												Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)				Drawn By: ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	Checked By:  ZARYAB HASSAN SPECIALIST (D&S)	Verified By:  SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS Revision Nos: 0/0 Date: 17/04/2026	Product : Asset Performance Management System For 25KVA, 50KVA, 100KVA, 200/250KVA, 400/500KVA and 630KVA Transformer		Drawing Title: Current Transformer		Reference : PPMC-DS-01		Drawing No. : APMS/PPMC/D&S/13 OF 18	
Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)																											
Drawn By: ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	Checked By:  ZARYAB HASSAN SPECIALIST (D&S)	Verified By:  SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS Revision Nos: 0/0 Date: 17/04/2026																								
Product : Asset Performance Management System For 25KVA, 50KVA, 100KVA, 200/250KVA, 400/500KVA and 630KVA Transformer																											
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Reference : PPMC-DS-01																											
Drawing No. : APMS/PPMC/D&S/13 OF 18																											

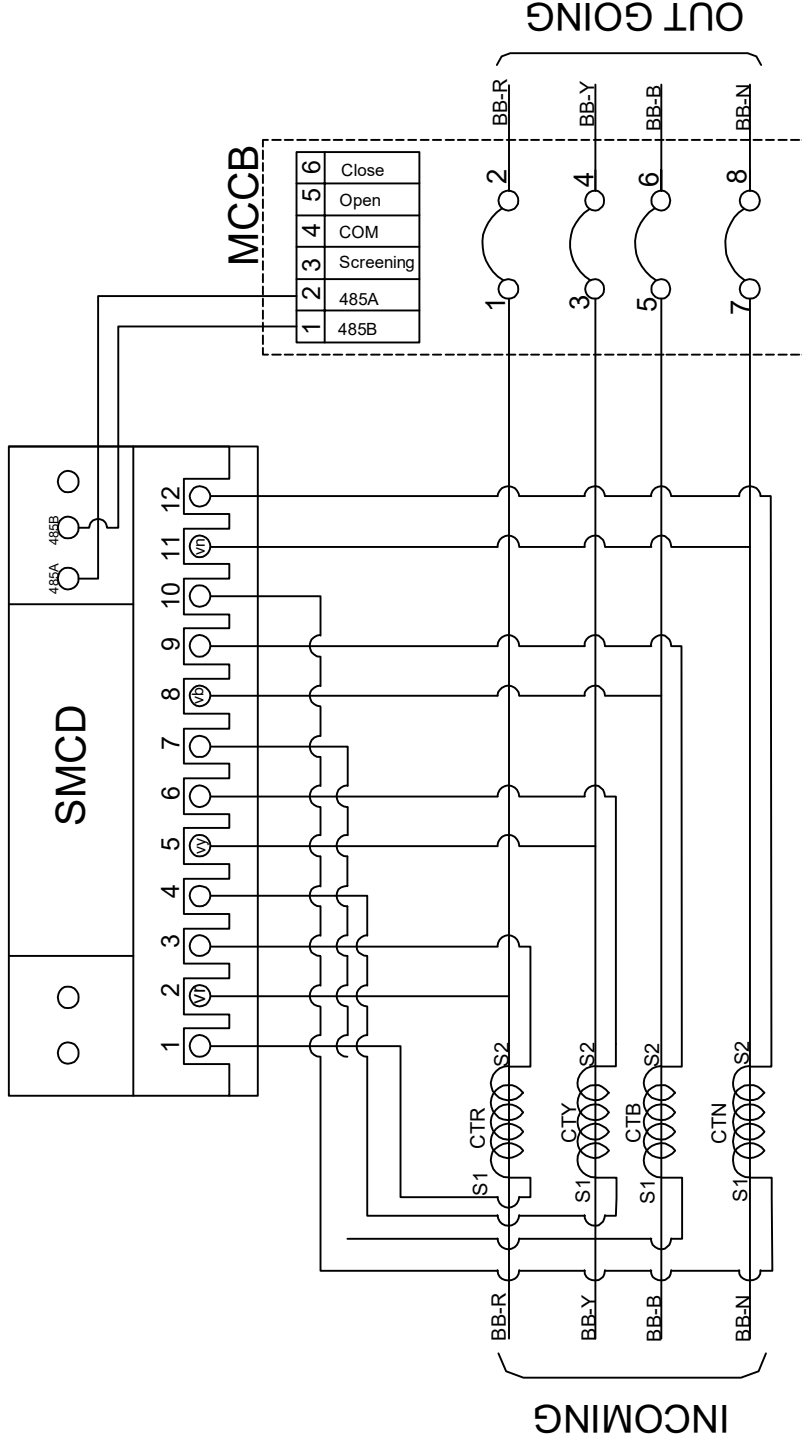


Note:
1.Tolerance: as per Dwg.No APMS/PPMC/D&S/18
2.All Dimension are in Millimeters.
3.Spacers maybe used by manufacture for Adjustment Purpose

Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)				
Drawn By: ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	Checked By: ZARYAB HASSAN SPECIALIST (D&S)	Verified By: SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS	Revision Nos: 0/0
			Date :	17/04/2026



Product :	Asset Performance Management System For 25kVA,50kVA,100kVA,200/250kVA,400/500kVA and 630kVA Transformer
Drawing Title:	Insulator
Reference :	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/14 OF 18



Legends

01	BB-R	Busbar For Red Phase	CTR	CT For Red Phase
02	BB-Y	Busbar For Yellow Phase	CTY	CT For Yellow Phase
03	BB-B	Busbar For Blue Phase	CTB	CT For Blue Phase
04	BB-N	Busbar For Neutral(Black)	CTN	CT For Neutral(Black)
05	MCCB	Molded Case Circuit Breaker	SMCD	Smart Metering and Controlling Device

Note:
Terminals are shown for Visualization purpose Only

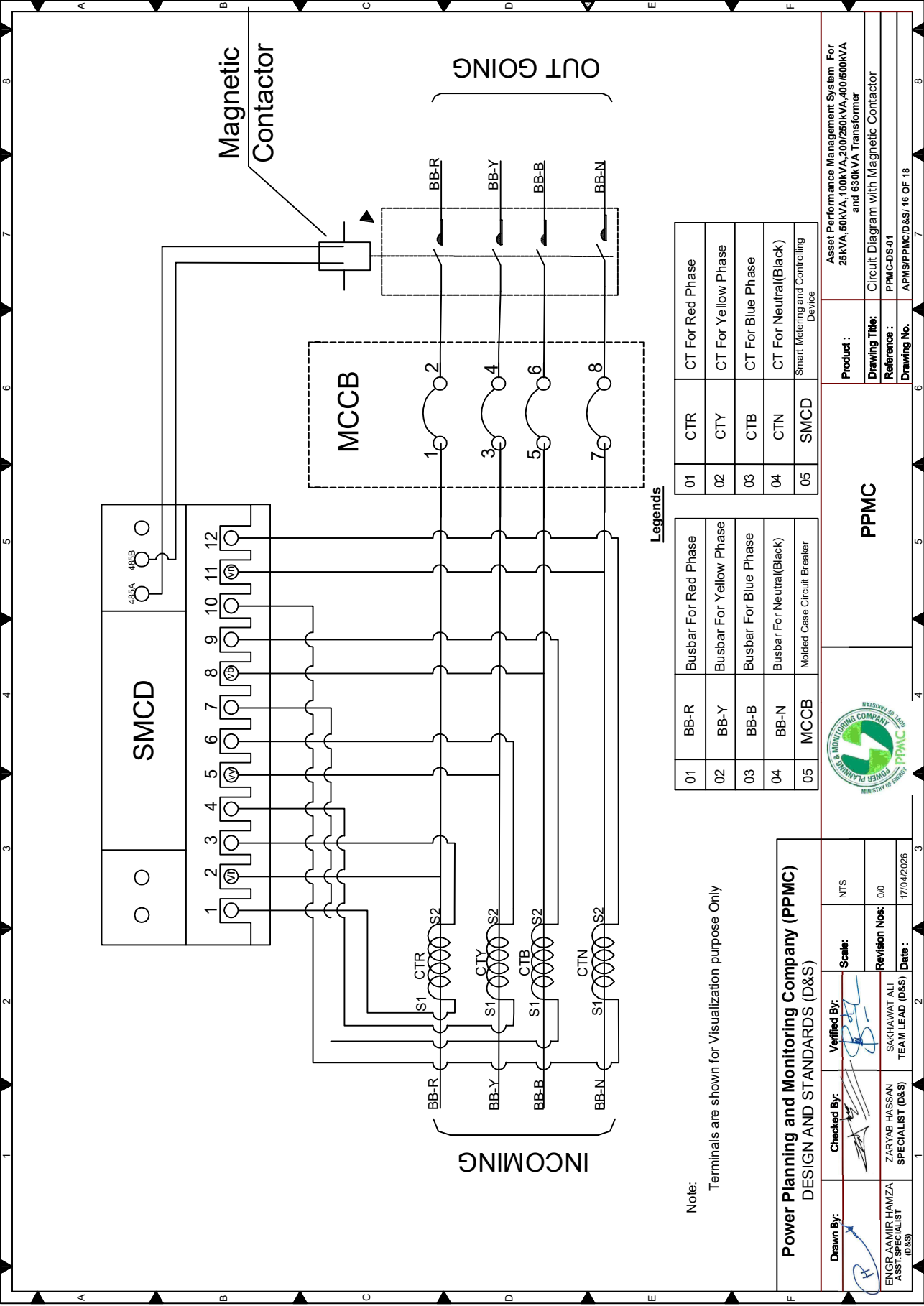
Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)

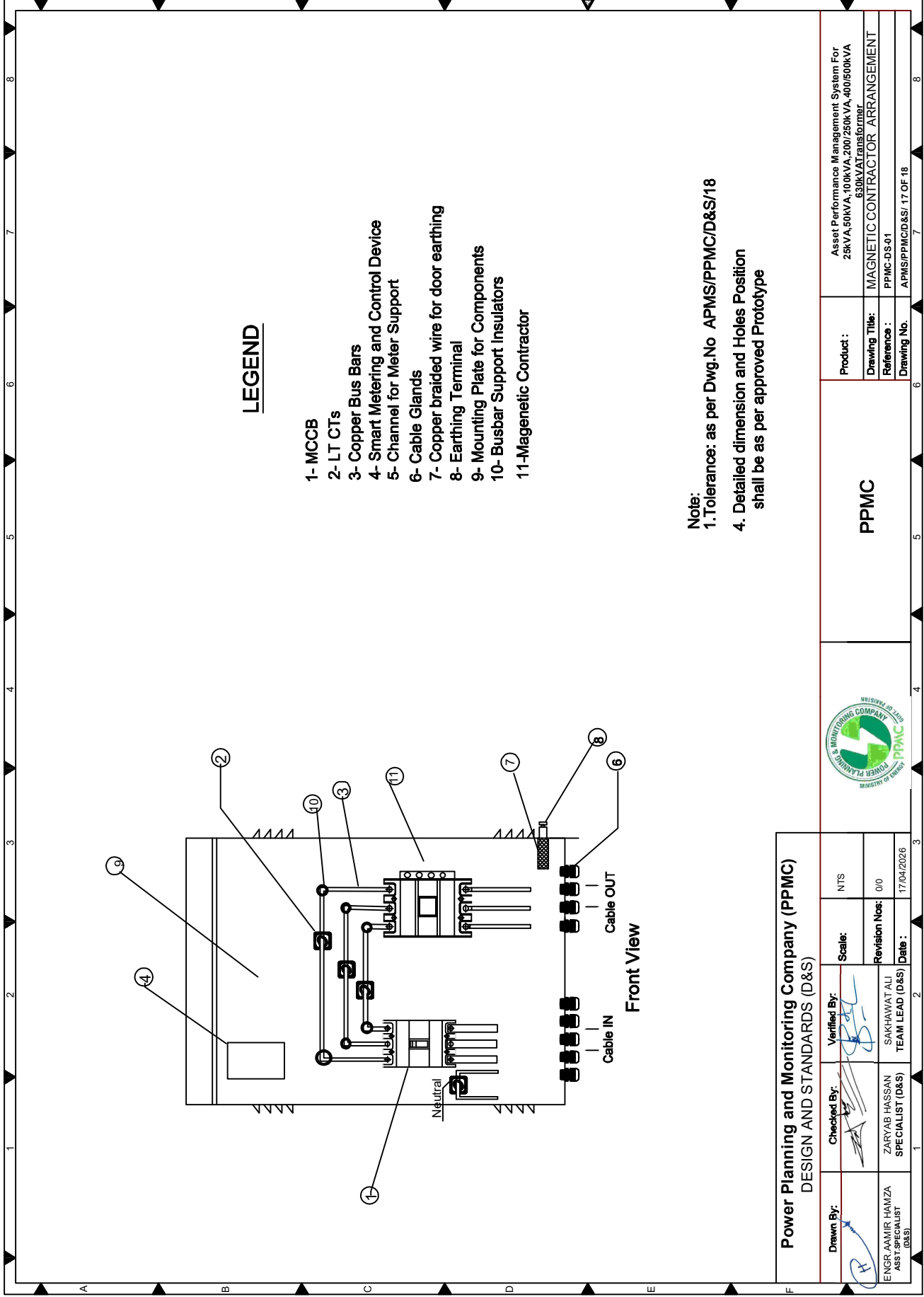
Drawn By:	Checked By:	Verified By:	Scale:	NTS
ENGR AAMIR HANIZA ASST. SPECIALIST (D&S)	ZAFYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	0/0	17/04/2026



PPMC

Product :	Asset Performance Management System For 25kVA, 50kVA, 100kVA, 200/250kVA, 400/500kVA and 630kVA Transformer
Drawing Title:	Circuit Diagram with Magnetic Contactor
Reference :	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/ 15 OF 18





LEGEND

- 1- MCCB
- 2- LT CTs
- 3- Copper Bus Bars
- 4- Smart Metering and Control Device
- 5- Channel for Meter Support
- 6- Cable Glands
- 7- Copper braided wire for door earthing
- 8- Earthing Terminal
- 9- Mounting Plate for Components
- 10- Busbar Support Insulators
- 11- Magnetic Contactor

Note:
 1. Tolerance: as per Dwg.No APMS/PPMC/D&S/18
 4. Detailed dimension and Holes Position shall be as per approved Prototype

Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)			
Drawn By:	Checked By:	Verified By:	Scale:
ENGR.AAMIR HAMZA ASST.SPECIALIST (D&S)	ZARYAB HASSAN SPECIALIST (D&S)	SAKHAWAT ALI TEAM LEAD (D&S)	NTS
			Revision Nos:
			0/0
			Date:
			17/04/2026



PPMC

Product :	Asset Performance Management System For 25kVA, 50kVA, 100kVA, 200/250kVA, 400/500kVA 630kVATransformer
Drawing Title:	MAGNETIC CONTACTOR ARRANGEMENT
Reference :	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/ 17 OF 18

Tolerance Sheet

Tolerance in Dimensions

DIMENSION RANGE

1.0mm To 10mm
11mm To 55mm
56mm To 75mm
76mm & Above

TOLERANCE

±10.0%
±5.0%
±3.0%
±2.0%

Power Planning and Monitoring Company (PPMC) DESIGN AND STANDARDS (D&S)

Drawn By: ENGR AAMIR HAMZA ASST. SPECIALIST (D&S)	Checked By: ZARYAB HASSAN SPECIALIST (D&S)	Verified By: SAKHAWAT ALI TEAM LEAD (D&S)	Scale: NTS
		Revision Nos: 0/0	
		Date: 17/04/2026	



PPMC

Product:	Asset Performance Management System For 25kVA, 50kVA, 100kVA, 200/250kVA, 400/500kVA and 630kVA Transformer
Drawing Title:	Tolerance Sheet
Reference:	PPMC-DS-01
Drawing No.	APMS/PPMC/D&S/18 OF 18