

DISTRIBUTION TRANSFORMERS

Selection & Technical Specification Guide

Electrical ratings / installation interfaces / thermal and loss performance / factory acceptance



OIL-IMMERSED	DRY-TYPE	PAD-MOUNTED	POLE-MOUNTED
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INSULATION CONSTRUCTION Oil-immersed / Dry-type	INSTALLATION ARRANGEMENT Pad-mounted / Pole-mounted
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Classifications can overlap. Site conditions govern selection; illustrated values are examples, not product guarantees.

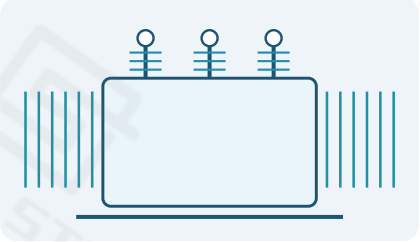
01 / CONFIGURATION

Transformer Type Selection Matrix

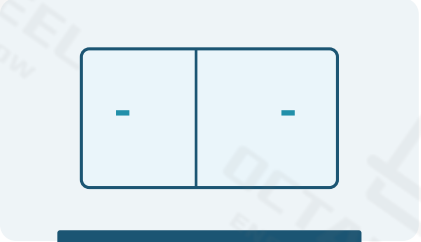
Use the electrical supply interface and installation environment to select the construction. These examples are typical, not exclusive.



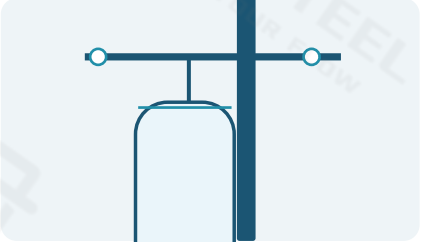
INDOOR ROOM
Dry-type
Ventilation, clearances and fire requirements; enclosure as specified.



OUTDOOR LIQUID
Oil-immersed
Insulating fluid, tank protection, cooling and containment requirements.



UNDERGROUND FEED
Pad-mounted
Ground-level cabinet, cable entry and radial / loop-feed interface.



OVERHEAD FEED
Pole-mounted
Pole loading, mounting brackets, primary connections and protection.

COMPARISON CHECKPOINTS

CHECK	OIL-IMMERSED	DRY-TYPE	PAD-MOUNTED	POLE-MOUNTED
Insulation	Mineral oil / ester	Cast resin / VPI	Usually liquid	Usually liquid
Site interface	Tank / foundation	Room / enclosure	Pad / duct / cabinet	Pole / overhead lines
Cooling examples	ONAN / design-rated	AN / AF if specified	Liquid design-rated	Liquid design-rated
Verify before RFQ	Fluid + fire rules	Airflow + clearances	Cable + switch layout	Load + conductor data

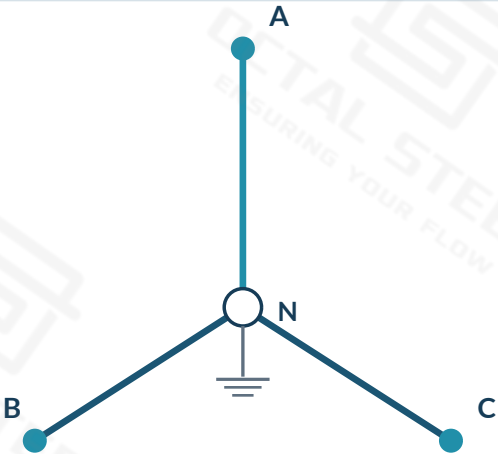
Selection rule: enclosure rating, service conditions, fire constraints and system interface take precedence over these typical pairings.

02 / ELECTRICAL REFERENCE

Voltage, Connections & Rated Current

Separate feeder system voltage from actual winding voltage, particularly on grounded-wye distribution networks.

Grounded-wye feeder: phase-to-neutral connection



12.47Y / 7.2 kV SYSTEM

Line-to-line voltage

12.47 kV

Phase-to-neutral voltage

~ 7.20 kV

For a phase-to-neutral single-phase transformer, the HV winding rating is approximately 7.2 kV; verify the feeder connection and nameplate.

$$V_{\text{phase}} = V_{\text{LL}} / \sqrt{3} = 12.47 / 1.732 = 7.20 \text{ kV}$$

Rated line-current reference

SINGLE-PHASE (S in kVA, V in volts)

$$I = 1000 \text{ S} / V$$

$$50 \text{ kVA} / 240 \text{ V} = 208 \text{ A}$$

THREE-PHASE (VLL = line-to-line)

$$I = 1000 \text{ S} / (\sqrt{3} \times V_{\text{LL}})$$

$$100 \text{ kVA} / 415 \text{ V} = 139 \text{ A}$$

Specify before ordering

- **Voltage** System and winding ratings
- **Connections** Vector group / polarity
- **Limits** Taps, impedance, BIL

SINGLE-PHASE SPLIT SECONDARY



THREE-PHASE CONNECTION

Specify HV/LV line-to-line and line-to-neutral ratings, vector group, neutral grounding and frequency.

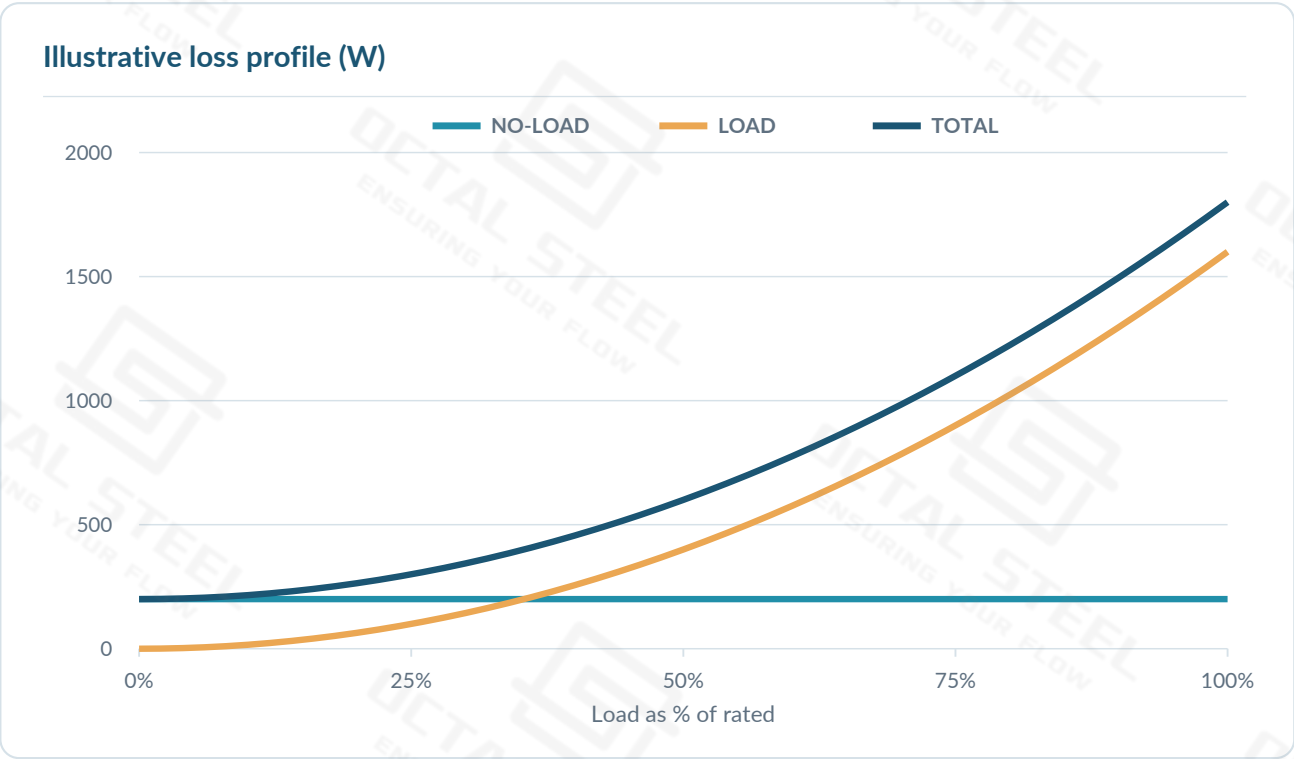
INSTALLATION TERMINATIONS

Match pad-mounted cable elbows and bushing ratings, or overhead HV bushings and conductor interfaces, to drawings.

03 / PERFORMANCE

Losses & Thermal Performance

Compare guaranteed no-load and load losses at the same rated conditions; assess lifetime energy exposure, not only purchase cost.



ILLUSTRATIVE CALCULATION

200 W No-load P0

1,600 W Rated-load Pk

50% load / 8,760 h energized

5,256 kWh / year

Simplified annual energy model

$P = P0 + Pk \times (\text{load fraction})^2$

$(0.2 + 1.6 \times 0.5^2) \times 8,760$

Fixed 50% load; not a product guarantee.

COOLING AND REFERENCE CONDITIONS

LIQUID-IMMERSED

ONAN is common for mineral-oil natural cooling; use the actual fluid and cooling designation.

DRY-TYPE

AN is natural air cooling; AF applies only when a fan-assisted rating is specified.

SITE AND TEST CONDITIONS

Check ambient, altitude, airflow, enclosure and the stated loss reference temperature.

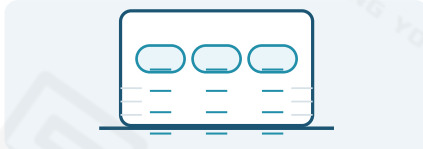
04 / INTERFACES & ACCEPTANCE

Installation Interfaces & Factory Inspection

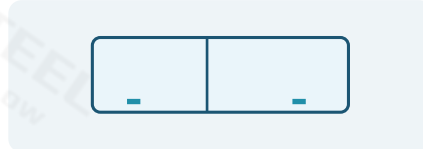
Verify physical interfaces against approved drawings and classify factory tests under the selected IEC or IEEE standard.



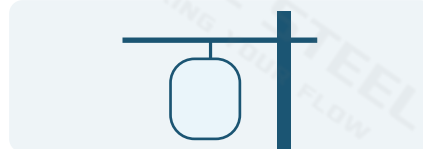
OIL-IMMERSED
Tank, sealing, bushings, cooling, fluid access



DRY-TYPE
Coil supports, airflow, insulation clearances



PAD-MOUNTED
HV/LV cabinet, barriers, cable and switch layout



POLE-MOUNTED
Brackets, conductors, HV connections, protection

INSPECTION FOCUS BY CONSTRUCTION

CONSTRUCTION	ELECTRICAL / INSULATION CHECKS	MECHANICAL / INTERFACE CHECKS
Oil-immersed	Winding resistance, ratio, phase, PO/Pk, impedance, dielectric and applicable liquid tests.	Tank integrity, bushings, fluid handling, fittings and cooling.
Dry-type	Resistance, ratio, phase, PO/Pk, impedance and dielectric tests. Routine PD for applicable IEC units.	Coil / encapsulation, mounting, airflow and clearances.
Pad-mounted	Electrical tests per actual insulation construction; specified switch / fuse accessories.	HV/LV barriers, terminations, cabinet security, loop / radial layout.
Pole-mounted	Electrical tests per actual insulation construction; connection polarity / phase.	Mounting brackets, conductor terminals, clearances and protection.

Dry-type PD note (IEC 60076-11:2018): Routine partial-discharge measurement applies to windings with $U_m \geq 3.6$ kV; the specified acceptance limit is 10 pC under the standard test procedure. Check the contract and instrumented test report.

Release dossier: nameplate and data sheet, approved connection / arrangement drawings, routine test records and accessory list. Agree witness points in advance.

Temperature-rise, impulse and short-circuit withstand evidence may be type or special tests; apply the agreed standard and contract scope.

Technical Specification Checklist

Complete the editable fields and return with your RFQ. A marked-up single-line diagram should be included where connection details are project-specific.

Installation arrangement	Insulation system / fluid	Quantity (units)
Rated capacity (kVA)	Phase / frequency (Hz)	Project / installation location
Primary system voltage (kV)	HV winding rated voltage (kV)	LV voltage / neutral arrangement
Vector group / 1-phase connection	Impedance (%) / tap range	HV/LV insulation levels / BIL
Guaranteed P0 / Pk (W); ref temp	Cooling / ambient loading basis	Protection / cable interfaces
Ambient / altitude / enclosure	Standards / editions	Factory tests / witness scope
Required drawings / documentation	Accessory / switchgear scope	Delivery terms / destination

INSTALLATION / DELIVERY NOTES

Standards reference: IEC 60076 series (including IEC 60076-11:2018 for dry-type); IEEE C57.12.20-2023 (overhead), IEEE C57.12.34-2022 (three-phase pad-mounted) and IEEE C57.12.38-2025 (single-phase pad-mounted), when in scope.