ASTERGRID

Substation & power transformers

TECHNICAL REFERENCE | November 2026

45 / 60 MVA reference configuration

138 kV / 34.5 kV power transformer reference design.

Parameter	Reference value
Rated capacity / cooling	45 MVA ONAN / 60 MVA ONAF
Primary / secondary voltage	138 kV Delta / 34.5Y/19.92 kV
Phase / frequency	Three-phase / 60 Hz
Winding connection / material	Dyn1 / copper-copper
Insulating fluid	Mineral oil
Average winding temperature rise	65 K
BIL, HV / LV	650 / 200 kV
Neutral BIL design basis	150 kV
Impedance	10% at 45 MVA, rated tap; IEEE tolerance
HV voltage regulation	Vacuum-type OLTC; +/-10%, 33 positions
Cooling arrangement	Two fan stages; no oil pumps
Protection	Buchholz relay, pressure-relief device, sudden-pressure relay
Monitoring	Oil and winding temperature, oil level, online gas and moisture
Controls / communication	Outdoor NEMA 4X control cabinet / Modbus TCP
Altitude / ambient design basis	Below 1,000 m / -25 deg C to +40 deg C
Design / test standards	IEEE C57.12.00 / C57.12.10 / C57.12.90 / C57.131

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25 / 31.25 MVA reference configuration

69 kV / 24.9 kV power transformer reference design.

Parameter	Reference value
Rated capacity / cooling	25 MVA ONAN / 31.25 MVA ONAF
Primary / secondary voltage	69 / 24.9 kV
Phase / frequency	Three-phase / 60 Hz
Winding connection / material	Dyn1 / copper
Insulating fluid	Mineral oil
Winding / top-oil rise	65 / 65 K
Hot-spot rise	80 K
BIL, HV / LV and neutral	350 / 150 kV
Power-frequency withstand, HV / LV	140 / 50 kV
Impedance	8% at 25 MVA, 85 deg C; standard tolerance
No-load loss	30 kW
Load loss	80 kW at 25 MVA, 85 deg C
HV / LV tap adjustment	HV de-energized +/-2 x 2.5%; LV OLTC +/-16 x 0.625%
Approximate total / oil weight	79,800 / 21,300 kg
Main-body transport, L x W x H	Approx. 6,200 x 3,100 x 3,100 mm; nitrogen-filled
Main-body transport weight	Approx. 51,050 kg
Design / test basis	IEC 60076 / IEEE; routine factory tests

Reference configurations are illustrative. Final specifications, certification and drawings are confirmed for your project.