

TGK Prefabricated Substation Technical Data		
Ref	Item	Data
1	General Technical	
1.1	Frequency (Hz)	50
1.2	Transformer Rating (kVA)	315/750
1.3	Transformer Primary Voltage (kV)	11
1.4	Transformer Secondary Voltage (V)	415
1.5	MV Switchgear Rated Voltage (kV)	12
1.6	MV Switchgear Configurations	CCF
1.7	Kiosk General Arrangement	The individual compartments (Trafo, MV, LV) shall be separable and modular such that multiple combinations can be constructed without the need for special designs. For example, it shall be possible to configure a Trafo and LV or standalone MV switching station using the standard modules above.
1.8	Enclosure Material (mm)	2
1.9	Baseframe Material	Hot dip galvanised steel in accordance with AS/NZS 4680 or other equivalent standard.
1.10	Concrete Plinth	Refer to drawings of TGOOD TDK
1.11	Service Life (year)	30
1.12	Paint System	Paint system shall be suitable for outdoor operational life of >30 years. Minimum suggested system: * Prime coat of multi etch primer * Second coat of a 2-pack epoxy primer * Third coat of polyurethane * Anti-graffiti paint option plus different finishing coat options to suit customer requirements.
1.13	Colour Range	Standard colour set shall include: Avacado Green (G34) Rainforest Green (G15) Silver Grey (N24) Mid Grey (N52). It is preferred that these colours be selected from the AS2700 standard, which may be sourced from the Dulux Protective Coatings range
1.14	Dimensions (mm)	LXWXH=3150x2000x1600
1.15	Width (mm)	W=2100
2	IP Ratings	
2.1	Transformer Compartment	IP23D - standard, IP 35 as option
2.2	HV Compartment	IP54 - standard, IP 55 as option
2.3	LV Compartment	IP54 - standard, IP 55 as option

3	Environmental Conditions	
3.1	Altitude (m)	<1000 in accordance with IEC 60694
3.2	Humidity	98%
3.3	Ambient Temperature	-5°C ~40°C (lower or higher temperature optional)
3.4	Temperature Performance	Class 10 in accordance with IEC62271.202
3.5	Max Sunlight (LX)	Up to 100. Accessible parts of enclosure shall not exceed 70.
3.6	Solar Radiation	In accordance with IEC60721-2-4
3.7	Cyclone Rating / Wind	Region D / Terrain Category 2 in accordance with AS/NZ 1170.2 or equivalent rating in accordance with IEC60721-2
3.8	Salt Spray	Salt spray test of 1000 hours in accordance with ASTM-B117
3.9	Seismic	Option
3.10	Pollution	In accordance with IEC 60815
3.11	Sound Level	In accordance with IEC 60076
3.12	Cooling Mechanisms	Natural
3.13	Earthing	In accordance with IEC62271.202. Standard option for larger earth bar cross sectional area up to 80mm ² copper shall be included.
3.14	Oil containment	Oil containment bund for 110% oil volume shall be a standard option.
3.15	Mechanical Deformation	Structure of the enclosure (including roof) shall be able to withstand at least 2500N/m ² as specified in IEC62271.202
3.16	Mechanical Impact	Enclosure shall withstand a mechanical impact of 20 Joules corresponding to a degree of protection IK10 according to IEC62271.202
4	Assembly Method	
4.1	Enclosure	Riveted and bolted
4.2	Base Frame	Welding (bolted optional)
5	Hinges	
5.1	Material/Design	Stainless steel, minimum pin diameter 10mm, suitable to withstand arc fault pressures.
5.2	Mounting	External as standard. Internal (tamper-proof) hinges shall be a standard option.
5.3	Opening Angle	Up to 170°
5.4	Door Stays	Lockable at angles. Door stay designed to remain secure under gusting wind of up to 25m/s

5.5	Door Locks	Three-point locking - padlock or key. Tamper proof cover/escutcheon shall be a standard option.
5.6	Internal Arc Classification	IAC AB
6	Type Testing (IEC62271.202 Parts A and B)	
6.1	Assembly Options	See Procurement Concepts
6.2	Access to Components	Doors, access hatches and lift-off hoods designed for: * Operating, testing and inspecting MV and LV equipment * Inspecting transformer and operating tap changer and oil valves. * Access to cabling * Access to MV fuses * Access to lighting and GPOs (if fitted) * Removal and replacement of any component as required during operating life
6.3	HV Cables	XLPE with fully insulated (touch proof) bolted connections
6.4	Light and Power	Facility for interior lighting and GPOs provided with residual current device. Wiring standard to required regional standard (eg AS 3000) as standard option.
6.5	RTU / Automation	Provision for RTU and associated equipment to automate kiosk. Dedicated comms and protection panels are sometimes required for special industrial applications.
7	Other	
7.1	Vermin Protection	The CSS shall be fully sealed to prevent the infestation of vermin or other wildlife.
7.2	Sun Shade	Sun shade or other suitable system to reduce the effects of solar radiation shall be developed as an option.

TDT-I Power Distribution Transformer Technical Data		
Ref	Item	Data
1	Environmental Conditions	
1.1	Altitude (m)	<1000
1.2	Maximum Ambient Temperature	40°C (Note: higher temperature optional)
1.3	Minimum Ambient Temperature	-5°C (Note: lower temperature optional)
1.4	Precipitation	Maximum annual rainfall: 1800-2400mm Minimum annual rainfall: 0-100mm
1.5	Average Annual Lightning Ground Flash Density	3 strikes per km ²
1.1	Solar Radiation- Maximum	1.1 kW/m ² , High ultra violet content
1.2	Humidity	95%

1.3	Pollution Level	From Light to Very Heavy. ESDD 0.2 to 0.5 mg/cm ²
2	Power System Conditions	
2.1	Frequency (Hz)	50
2.2	Highest System Voltage (kV)	12
2.3	No. of Phases	3
2.4	Impulse Withstand Voltage (peak) (kV)	95
2.5	Power Frequency Withstand Voltage (rms) (kV)	28
2.6	Nominal System Voltage (kV)	12
2.7	System Earthing	Solidly earthed
2.8	System Fault Level (kA/s)	25kA/1s
2.9	Auxiliary Power Supplies (V)	220, AC
3	General Technical Requirements	
3.1	Applicable Standards	IEC 60076
3.2	Installation Location	Outdoor in enclosure
3.3	No. of Phases	3
3.4	Frequency (Hz)	50
3.5	No. of Windings	2
3.6	Rated Voltage Ratio	11000/ 415
3.7	Rated Power (kVA)	315, 500, 750
3.8	Vector Group	Dyn11
3.9	Type of Cooling	ONAN
3.10	Winding Material	Cu
3.11	Impedance Voltage %	4,5
3.12	Oil Conservation System (NA for Dry Type)	Sealed
3.13	Sound Level (dB)	58
3.14	Operation Flux Density	<1.6
4	Insulation and Cooling Medium	
4.1	Mineral Insulating Oil (where used)	Yes

4.2	Standard	IEC 60296
5	Tap changer requirement	
5.1	Tap Changer Location	HV side
5.2	Tapping Range	-5% to +10% in 2.5% steps
5.3	Tapping Positions	7
5.4	Tapping Method	Off load (bein locked in each position)
6	External connections	
6.1	HV	In accordance with IEC 60137
6.2	Terminal Type	Cast resin, bolted/ plug in type. Bushing wells with elbow connectors is alternative
6.3	Paint System	Prime coat with thermo setting zinc rich primer, Second coat with thermo setting acrylic enamel, Top coat is polyurethane 2 pack finish. A salt spray resistance of 1000 hrs as per ASTM-B117 shall be performed.
6.4	Paint thickness (um)	>110
6.5	Paint Colour	As per customer requirement
6.6	Magnetic Core Material	Grain-oriented, silicon steel
6.7	LV Winding Material	Cu foil
6.8	HV Winding Material	Cu or Al profile wire, or Cu or Al round wire.
7	Fittings	
7.1	Rating Plate	Yes (requirements are typically customer specific)
7.2	Lifting Lug	Yes
7.3	Oil Level Indicator	Yes
7.4	Oil Thermometer	Yes (as standard option)
7.5	Winding Thermometer	Optional
7.6	Temperature Gauge	One for top oil
7.7	Themometer Pocket	Yes
7.8	Drain Valve	Yes
7.9	Pressure Relief Valve	Yes (as standard option)
7.10	Filler Cap	Yes
7.11	Transformer Earthing Connection/ Terminal	Stainless steel earth bar

7.12	Filter Valve	Yes (as standard option)
7.13	Transformer Markings	Yes
7.14	Terminal Markings/ Marking Plate	As per IEC 60076
7.15	Guaranteed No Load Loss	Customer Specific - Standard offering TBD
7.16	Guaranteed Load Loss	Customer Specific - Standard offering TBD
8	Type Tests	
8.1	Temperature Rise	As per Australian standard or similar: AS 2374.2-1997 Clause 5 In addition an Overload Temperature Rise Test is required to conducted on the same unit as per AS2374.7-1997 clause 1.1.4, 1.4, 1.4.3, 1.5
8.2	Lighting Impulse	In accordance with IEC 60076
8.3	Lighting Impulse Including Chopped Wave	In accordance with IEC 60076
8.4	Sound Level	In accordance with IEC 60076
8.5	Short Circuit Withstand	In accordance with IEC 60076
9	Routine Tests	
9.1	Measurement of Winding Resistance	In accordance with IEC 60076
9.2	Ratio and Phase Check	In accordance with IEC 60076
9.3	Impedance and Load Loss	In accordance with IEC 60076
9.4	No Load Loss and Current	In accordance with IEC 60076
9.5	Induced Over-Voltage Withstand	In accordance with IEC 60076
9.6	Separate Source Voltage Withstand	In accordance with IEC 60076
9.7	Insulation Resistance	In accordance with IEC 60076