TDK

Prefabricated Substation

Technical Data

TGOOD
2017.2

TGOOD

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1. TDK prefabricated substation technical data

Description	Value
General Technical	
Frequency (Hz)	50
Transformer Rating (kVA)	315/750
Transformer Primary Voltage (kV)	11
Transformer Secondary Voltage (V)	415
MV Switchgear Rated Voltage (kV)	12
MV Switchgear Configurations	CCF
TDK General Arrangement	The individual compartments (Transformer, 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 Transformer and LV or standalone MV switching station using the standard modules above.
Enclosure Material (mm)	2
Base frame Material	Hot dip galvanized steel in accordance with AS/NZS 4680 or another equivalent standard.
Concrete Plinth	Refer to drawings of TGOOD TDK
Service Life (year)	30
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.
Color Range	Standard color set shall include: Avacado Green (G34) Rainforest Green (G15) Silver Grey (N24) Mid Grey (N52). It is preferred that these colors be selected from the AS2700 standard, which may be sourced from the Dulux Protective Coatings range
Dimensions (mm)	LXWXH=3150x2000x1600
Width (mm)	W=2100
IP Ratings	
Transformer Compartment	IP23D - standard, IP 35 as option
HV Compartment	IP54 - standard, IP 55 as option

LV Compartment	IP54 - standard, IP 55 as option
Environmental Conditions	
Altitude (m)	<1000 in accordance with IEC 60694
Humidity	98%
Ambient Temperature	-5°C ~40°C (lower or higher temperature optional)
Temperature Performance	Class 10 in accordance with IEC62271.202
Max Sunlight (LX)	Up to 100. Accessible parts of enclosure shall not exceed 70.
Solar Radiation	In accordance with IEC60721-2-4
Cyclone Rating / Wind	Region D / Terrain Category 2 in accordance with AS/NZ 1170.2 or equivalent rating in accordance with IEC60721-2
Salt Spray	Salt spray test of 1000 hours in accordance with ASTM-B117
Seismic	Option
Pollution	In accordance with IEC 60815
Sound Level	In accordance with IEC 60076
Cooling Mechanisms	Natural
Earthing	In accordance with IEC62271.202. Standard option for larger earth bar cross sectional area up to 80mm2 copper shall be included.
Oil containment	Oil containment bund for 110% oil volume shall be a standard option.
Mechanical Deformation	Structure of the enclosure (including roof) shall be able to withstand at least 2500N/m2 as specified in IEC62271.202
Mechanical Impact	Enclosure shall withstand a mechanical impact of 20 Joules corresponding to a degree of protection IK10 according to IEC62271.202
Assembly Method	
Enclosure	Riveted and bolted
Base Frame	Welding (bolted optional)
Hinges	
Material/Design	Stainless steel, minimum pin diameter 10mm, suitable to withstand arc fault pressures.
Mounting	External as standard. Internal (tamper-proof) hinges shall be a standard option.
Opening Angle	Up to 170°

Door Stays	Lockable at angles. Door stay designed to remain secure under gusting wind of up to 25m/s
Door Locks	Three-point locking - padlock or key. Tamper proof cover/escutcheon shall be a standard option.
Internal Arc Classification	IAC - AB-20kA-1s
Type Testing (IEC62271.202 Parts A and B)	
Assembly Options	See Procurement Concepts
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
HV Cables	XLPE with fully insulated (touch proof) bolted connections
Light and Power	Facility for interior lighting and GPOs provided with residual current device. Wiring standard to required regional standard (e.g. AS 3000) as standard option.
RTU / Automation	Provision for RTU and associated equipment to automate kiosk. Dedicated commas and protection panels are sometimes required for special industrial applications.
Other	
Vermin Protection	The CSS shall be fully sealed to prevent the infestation of vermin or other wildlife.
Sun Shade	Sun shade or other suitable system to reduce the effects of solar radiation shall be developed as an option.

2. TDT-I transformer technical data

Description	Value
Environmental Conditions	
Altitude (m)	<1000
Maximum Ambient Temperature	40°C (Note: higher temperature optional)
Minimum Ambient Temperature	-5°C (Note: lower temperature optional)
Precipitation	Maximum annual rainfall: 1800-2400mm Minimum annual rainfall: 0-100mm
Average Annual Lighting Ground Flash Density	3 strikes per km^2
Solar Radiation- Maximum	1.1 kW/m^2, High ultra violet content
Humidity	95%
Pollution Level	From Light to Very Heavy. ESDD 0.2 to 0.5 mg/cm^2
Power System Conditions	
Frequency (Hz)	50
Highest System Voltage (kV)	12
No. of Phases	3
Impulse Withstand Voltage (peak) (kV)	95
Power Frequency Withstand Voltage (rms) (kV)	28
Nominal System Voltage (kV)	12
System Earthing	Solidly earthed
System Fault Level (kA/s)	25kA/1s
Auxiliary Power Supplies (V)	220, AC
General Technical parameters	
Applicable Standards	IEC 60076
Installation Location	Outdoor in enclosure
No. of Phases	3
Frequency (Hz)	50
No. of Windings	2
Rated Voltage Ratio	11000/ 415
Rated Power (kVA)	315, 500, 750
Vector Group	Dyn11
Type of Cooling	ONAN

Winding Material	Cu
Impedance Voltage %	4,5
Oil Conservation System (NA for Dry Type)	Sealed
Sound Level (dB)	58
Operation Flux Density	<1.6
Insulation and Cooling Medium	
Mineral Insulating Oil (where used)	Yes
Standard	IEC 60296
Tap changer requirement	
Tap Changer Location	HV side
Tapping Range	-5% to +10% in 2.5% steps
Tapping Positions	7
Tapping Method	Off load (bein locked in each position)
External connections	
HV	In accordance with IEC 60137
Terminal Type	Cast resin, bolted/ plug in type. Bushing wells with elbow connectors is alternative
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 hours as per ASTM-B117 shall be performed.
Paint thickness (um)	>110
Paint Color	As per customer requirement
Magnetic Core Material	Grain-oriented, silicon steel
LV Winding Material	Cu foil
HV Winding Material	Cu profile wire, or Cu round wire.
Fittings	
Rating Plate	Yes (requirements are typically customer specific)
Lifting Lug	Yes
Oil Level Indicator	Yes
Oil Thermometer	Yes (as standard option)
Winding Thermometer	Optional
Temperature Gauge	One for top oil
Thermometer Pocket	Yes

Drain Valve	Yes
Pressure Relief Valve	Yes (as standard option)
Filler Cap	Yes
Transformer Earthing Connection/ Terminal	Stainless steel earth bar
Filter Valve	Yes (as standard option)
Transformer Markings	Yes
Terminal Markings/ Marking Plate	As per IEC 60076
Guaranteed No Load Loss	Customer Specific - Standard offering TBD
Guaranteed Load Loss	Customer Specific - Standard offering TBD
Type Tests	
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
Lighting Impulse	In accordance with IEC 60076
Lighting Impulse Including Chopped Wave	In accordance with IEC 60076
Sound Level	In accordance with IEC 60076
Short Circuit Withstand	In accordance with IEC 60076
Routine Tests	
Measurement of Winding Resistance	In accordance with IEC 60076
Ratio and Phase Check	In accordance with IEC 60076
Impedance and Load Loss	In accordance with IEC 60076
No Load Loss and Current	In accordance with IEC 60076
Induced Over-Voltage Withstand	In accordance with IEC 60076
Separate Source Voltage Withstand	In accordance with IEC 60076
Insulation Resistance	In accordance with IEC 60076

3. TGS RMU technical data

3.1 Standard compliance

- Switchboard: IEC 62271-200, IEC 62271-1
- Behavior in the event of internal faults: IEC 62271-200
- Earthing switch (in C, F, V, De, I): IEC 62271-102
- Disconnector (in V, I): IEC 62271-102
- General use switch (C): IEC 62271-103
- Switch-disconnector fuse combination (F): IEC 62271-105
- Circuit-breaker (in V, I): IEC 62271-100
- Current transformer: IEC 61869-2
- Voltage transformer: IEC 61869-3
- Voltage presence indicators: IEC 62271-206
- Voltage detection systems: IEC 61243-5
- Protection against accidental contact, foreign bodies and ingress of water: IEC 60529

3.2 TGS technical data

Description	Unit	Value
General Details		
Manufacturer's Name	-	TGOOD Electric Co. Ltd
Manufacturer's Address	-	Chengdu, Sichuan, China
Country of Manufacture	-	China
Manufacturer’s Ref. code / Make / Type		TGS
Applicable Standard		IEC
Service Condition		
Indoor / Outdoor	-	Indoor/ Outdoor
Minimum Ambient Temperature	^{0}C	*-5 (-25 optional)
Maximum Ambient Temperature	^{0}C	*+40 (+55 optional)
Maximum Altitude	m	1500 (higher is optional)
Relative Humidity Range	%	95
Pollution Level	I, II, III, IV	Yes
Design and Construction		
Loss of Service Continuity Category	LSC1/2A/2B	LSC1/2A/2B
Partition Class	PM / PI	PM / PI
Material for Partition and Shutters	-	N/A
Type of Accessibility - Busbar (Tools or Interlock?)	-	Tools
Type of Accessibility - Main Device (Tools or Interlock?)	-	Interlock
Type of Accessibility - Cable (Tools or Interlock?)	-	Interlock
Type of Accessibility - CT (Tools or Interlock?)	-	Interlock
Type of Accessibility - VT (Tools or Interlock?)	-	Tools & Interlock
Internal Arc Classification	Yes / No	Yes
Accessibility Type	A (F, L, R)	AFLR (IEC 62271-200)
Arc Test Current	kA	20
Arc Test Current Duration	s	1
Insulation Medium (Air / Gas)	-	Gas
Rated Filling Level for Insulation	Pa	40,000
Alarm Level for Insulation	Pa	30,000
Minimum Functional Level for Insulation	Pa	30,000

Insulating Fluid and Mass	kg	5 （CCF)
Degree of Protection - Compartment	IP	3X
Degree of Protection - Enclosure Outdoor	IP	33
Busbar Material and Cross Section	-	Red copper/T2Y/40mm×8mm
Busbar Insulated? If yes, please specify material	-	SF6
Support Insulator Material	-	Epoxy resin
Support Insulator Creepage Distance	mm	135
Earth Bar Material and Cross Section	-	Red copper/T2Y/25mm×8mm
Limit of Temperature Rise - Main Circuits	^{0}C / K	75
Limit of Temperature Rise - Contacts	^{0}C / K	65
Limit of Temperature Rise - Connections	^{0}C / K	75
Limit of Temperature Rise - Terminals	^{0}C / K	75
Limit of Temperature Rise - Insulating Material	^{0}C / K	120
Limit of Temperature Rise - Accessible Parts	^{0}C / K	30
Switchgear Overall Surface Finish and Color	-	RAL7035
Typical Panel Dimensions (L x D x H)	mm	1050mm×800mm×1500mm
Typical Panel Weight	kg	650
General Electrical Characteristics		
No. of Phases	-	3
Rated Voltage	kV	12, 24
Rated Frequency	Hz	50/60
Type of Neutral Earthing (Effectively Earthed?)	-	Effectively Earthed
Rated Lightning Impulse Withstand Voltage to Earth	kVp	Refer table 1
Rated Lightning Impulse Withstand Voltage Across Isolation	kVp	Refer table 1
Rated Power Frequency Withstand Voltage to Earth	kV	Refer table 1
Rated Power Frequency Withstand Voltage Across Isolation	kV	Refer table 1
Rated Busbar Normal Current	A	630/1250A
Rated Short-Time Withstand Current	kA	25/1s and 20/3
Rated Peak Withstand Current	kAp	52kA/65kA

Rated Duration of Short Circuit	s	1 and 3
Rated Auxiliary Voltage for Operation	V	220-30V
Rated Auxiliary Voltage Frequency for Operation	AC / DC	AC / DC
Rated Auxiliary Voltage for Heating Circuit	V	220-30V
Rated Auxiliary Voltage Frequency for Heating	AC / DC	AC / DC
Partial Discharge Guarantee @ 1.1 Ur	pC	10
Circuit Breaker		
Manufacturer's Name	-	TGOOD
Country of Manufacture	-	China
Manufacturer’s Ref. code / Make / Type	-	TGS-V
Applicable Standard		IEC 62271-200
Circuit Breaker Interrupting Medium	SF6 / Vacuum	Vacuum
Type of Circuit Breaker (Fix / Withdrawble)	-	Fixed
If Withdrawble, Is It Motorized or Manual Rack-in	-	N/A
Is Breaker Trip Free?	-	Yes
Rated Normal Current	A	630A
Rated Short Circuit Breaking Current	kA	20/25
Rated Duration of Short Circuit	s	1 and 3
DC Component of Rated Short Circuit Breaking Current	%	52
Rated X/R Ratio	-	
Rated Out of Phase Breaking Current	kA	5/6.25
Rated Out of Phase Recovery Voltage	kV	13.8/27.6
Rated Line Charging Breaking Current	A	10
Rated Cable Charging Breaking Current	A	25/31.5
Rated Single Capacitor Bank Breaking Current	A	/
Rated Back-to-Back Capacitor Bank Breaking Current	A	/
Rated Capacitor Bank Inrush Making Current	kA	/
Rated Back-to-Back Capacitor Bank Inrush Making Current	kA	/
Rated Filling Pressure for Operation	MPa	0.04
Rated Filling Pressure for Interruption	MPa	0.03
Rated Operating Sequence	-	O-0.3s-CO-180-CO
Maximum Opening Time	ms	50

Maximum Break Time	ms	10
Maximum Closing Time	ms	60
Maximum Make Time	ms	10
Electrical Endurance Class	E1 / E2	Refer to 4.6.1.1
Capacitive Restrike Probability Class	C1 / C2	C2
Mechanical Endurance Class	M1 / M2	M2
Switching Class	S1 / S2	S1
First Pole-To-Clear Factor - Terminal Fault	p.u.	1.5
First Pole-To-Clear Factor - Out of Phase	p.u.	2.5
Amplitude Factor - Terminal Fault	p.u.	1.4
Amplitude Factor - Out of Phase	p.u.	1.25
TRV Peak Value, kpp - Terminal Fault	kV	20.6/41
TRV Peak Value, kpp - Out of Phase	kV	30.6/61
Time, t3 - Terminal Fault	us	61/87
Time, t3 - Out of Phase	us	118/174
Time Delay, td - Terminal Fault	us	9/13
Time Delay, td - Out of Phase	us	18/26
Voltage, u' - Terminal Fault	kV	6.9/13.7
Voltage, u' - Out of Phase	kV	10/20
Time, t' - Terminal Fault	us	29/42
Time, t' - Out of Phase	us	56/83
RRRV, uc/t3 - Terminal Fault	kV/us	0.34/0.47
RRRV, uc/t3 - Out of Phase	kV/us	0.26/0.35
Circuit Breaker Operating Mechanism (Spring / Hydraulic)	-	Spring
Drive Motor Minimum and Maximum Operating Voltage	V	110/220 AC/DC
Drive Motor Power Consumption	W	120
Spring Motor Charging Time	s	15
Method of Tripping (Magnetic Actuator / Shunt Trip)	-	Shunt Trip
Number of Trip Coil	-	Two
Trip Coil Minimum and Maximum Operating Voltage	V	110/220 AC/DC
Trip Coil Current at Rated Voltage	A	1.7
Trip Coil Power Consumption	W	374

Method of Closing (Magnetic Actuator / Shunt Trip)	-	Shunt Trip
Number of Close Coil	-	One
Close Coil Minimum and Maximum Operating Voltage	V	110/220 AC/DC
Close Coil Current at Rated Voltage	A	1.7
Close Coil Power Consumption	W	374
No. of NO/NC Auxiliary Contact	-	Up to 4NO 4NC
Earthing Switch		
Manufacturer's Name	-	TGOOD
Country of Manufacture	-	China
Manufacturer’s Ref. code / Make / Type	-	TGS-E
Applicable Standard	IEC	IEC62271-102
Rated Short-Time Withstand Current	kA	20/25
Rated Duration of Short Circuit	S	1 and 3
Short Circuit Making Capability	E1 / E2	E2
Mechanical Endurance Class	M1 / M2	M1
Minimum Isolating Distance (Live Parts to Earth)	mm	60
Motorized Operation Available?	-	Option if available
No. of NO/NC Auxiliary Contact	-	2NO 2NC
Disconnector Switch (If Applicable)		
Manufacturer's Name	-	TGOOD
Country of Manufacture	-	China
Manufacturer’s Ref. code / Make / Type	-	TGS-D
Applicable Standard	IEC	IEC62271-102
Rated Normal Current	A	630
Rated Short-Time Withstand Current	kA	20/25
Rated Duration of Short Circuit	s	1 and 3
Mechanical Endurance Class	M1 / M2	M1
Minimum Isolating Distance (Live Parts to Earth)	mm	60
Minimum Isolating Distance (Clearance Bet. Open Contacts)	mm	60
Motorized Operation Available?	-	Option if available
No. of NO/NC Auxiliary Contact	-	Up to 4 NO 4 NC
Fuse Switch (If Applicable)		

Manufacturer's Name	-	TGOOD
Country of Manufacture	-	China
Manufacturer’s Ref. code / Make / Type	-	TGS-F
Applicable Standard	IEC	IEC62271-102
Rated Normal Current	A	200
Rated Short-Time Withstand Current	kA	20/25
Rated Duration of Short Circuit	s	1 and 3
Mechanical Endurance Class	M1 / M2	M1
Minimum Isolating Distance (Live Parts to Earth)	mm	60
Minimum Isolating Distance (Clearance Bet. Open Contacts)	mm	60
Motorized Operation Available?	-	
No. of NO/NC Auxiliary Contact	-	2 NO 2NC (If specified)
Voltage Transformer		
Manufacturer's Name	-	TGOOD specify
Country of Manufacture	-	TGOOD specify
Manufacturer’s Ref. code / Make / Type	-	TGOOD specify
Applicable Standard	IEC	IEC61869-3
Voltage Transformer Type	-	3 phase dry type
Voltage Transformer Primary and Secondary Ratios	-	11000V/110V
Voltage Transformer Secondary Winding Classes	-	0.5
Withdrawable VT Available for Incomer Panel?	-	Fixed
Withdrawable VT Available for Busbar?		Optional
MV Cable Compartment		
Cable Compartment Accessible Side	Front / Rear	Front
Cable Box Insulation (Air / Gas)	-	Air
Cable Termination Type	-	Dry screened/unscreened
Cable testing facility		Optional
Maximum Cable Size per Phase	-	300mm²
Maximum Cable Quantity per Phase	-	2

4. Low voltage apparatus technical data

4.1 Low voltage ACB parameter

Number of poles	3/4		
Rated insulation voltage (V)	1000		
Rated frequency (Hz)	50,60		
Rated operational voltage (V AC 50/60Hz)	690		
Rated current (A)	630~1000	1250~1600	2000
Ultimate breaking capability (kA rms)	42	42	50
Service breaking capability (kA rms)	35	35	40
Short- time withstand current (kA rms 1s)	35	35	40

Note: Higher performance optional, consult us for more information.

4.2 Low voltage MCCB

Rated current (A)			100/160/250/400/630
Rated insulation voltage (V)			800
Rated impulse voltage (kA, Peak)			8
Rated operational voltage (V)			690
Ultimate breaking capability	Icu (kA)	220V/230V	85
		380V/400V	35
Service breaking Ics capability			75%~100% Icu

Note: Higher performance optional, consult us for more information.

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