TECHNICAL SCHEDULES A & B FOR 6,6 kV to 765 kV
OUTDOOR CIRCUIT-BREAKERS
SAP: _____ BKR 66kV 2500A 31,5kA 3P 31 110VDC

Schedule A: Purchasers specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

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Item	**Clause of 240-56063756**	**Description**		**Schedule A**	**Schedule B**
1		**Item and system description**			
		BKR 66kV 2500A 31,5kA 3P 31 110VDC			
1.1		• SAP No		_____	xxxxxxxxxx
1.2		• Buyers Guide Drawing		_____	xxxxxxxxxx
1.3	2.1.1	• Circuit-breaker application		Transformer/Bus-section/Bus-Coupler/Feeder	xxxxxxxxxx
1.4	3.1.1	• Nominal system voltage (U_n)	kV	66	xxxxxxxxxx
1.5		• System voltage range	pu	0,9 to 1,1	xxxxxxxxxx
1.6	3.2.1	• System earthing (effective/non effective)		Non-effective	xxxxxxxxxx
2		**Ratings**			
2.1	3.1.1	• Rated voltage (U_r)	kV	72,5	
2.2	3.1.1	• Number of phases on system		3	
2.3	3.1.2	• Rated short-duration power-frequency withstand voltage (U_d) - Phase-to-earth and between phases	kV	140	
2.4	3.1.2	• Rated short-duration power-frequency withstand voltage (U_d) - Phase-to-earth and between phases - under Wet conditions as per SANS 62271-1 cl. 6.2 ($U_r \leq 245$kV)	kV	xxxxxxxxxx	
2.5	3.1.2	• Rated short-duration power-frequency withstand voltage (U_d) - Across open switching device (under Dry conditions)	kV	160	
2.6	3.1.2	• Rated short-duration power-frequency withstand voltage (U_d) - Across open switching device (under Wet conditions)	kV	xxxxxxxxxx	
2.7	3.1.2	• Rated short-duration power-frequency withstand voltage (U_d) - under Wet conditions as per SANS 62271-1 cl. 6.2 ($U_r \leq 245$kV)	kV	xxxxxxxxxx	
2.8	3.1.2	• Rated peak lightning impulse withstand voltage (U_p) - Phase-to-earth and between phases	kV	325/ 350	
2.9	3.1.2	• Rated peak lightning impulse withstand voltage (U_p) - Across open switching device	kV	375	
2.10	3.1.2	• Rated switching impulse withstand voltage (U_s) - Phase-to-earth and across open switching device - (Dry conditions)	kV	xxxxxxxxxx	
2.11	3.1.2	• Rated switching impulse withstand voltage (U_s) - Between phases - (Dry conditions)	kV	xxxxxxxxxx	
2.12	3.1.2	• Rated switching impulse withstand voltage (U_s) - Phase-to-earth and across open switching device - under Wet conditions as per SANS 62271-1 cl. 6.2	kV	xxxxxxxxxx	
2.13	3.1.2	• Rated switching impulse withstand voltage (U_s) - Between phases - under Wet conditions as per SANS 62271-1 cl. 6.2	kV	xxxxxxxxxx	
2.14	3.1.3	• Rated frequency (f_r)	Hz	50	
2.15	3.1.4	• Rated normal current (I_r) - main circuit	A	2500	
2.16	3.1.4 f)	• Calculated maximum continuous current - main circuit @ 40 ^{0}C ambient	A	xxxxxxxxxx	
2.17	3.1.4 f)	• Calculated maximum continuous current - main circuit @ 45 ^{0}C ambient	A	xxxxxxxxxx	
2.18	3.1.4 g)	• Maximum allowable temperature of main contacts (refer to Table 3 of SANS 62271-1)	^{O}C	xxxxxxxxxx	

2.19	3.1.4 g)	• Measured temperature rise (highest) of main contacts @ rated current (type test)	K	xxxxxxxxxx	
2.20	3.1.4 f) & g)	• Maximum allowable temperature of bolted or equivalent connections (refer to Table 3 of SANS 62271-1)	^{O}C	xxxxxxxxxx	
2.21	3.1.4 g)	• Measured temperature rise (highest) of bolted or equiv connections @ rated current (type test)	K	xxxxxxxxxx	
2.22	3.1.4 f) & g)	• Maximum allowable temperature of terminals for the connection to external conductors (refer to Table 3 of SANS 62271-1)	^{O}C	xxxxxxxxxx	
2.23	3.1.4 g)	• Measured temperature rise (highest) of terminals for the connection to external conductors @ rated current (type test)	K	xxxxxxxxxx	
2.24	3.1.4	• Contact resistance of the main circuit measured during temperature rise	µΩ	xxxxxxxxxx	
2.25	3.1.4	• Minimium contact resistance of the main circuit measured during temperature rise	µΩ	xxxxxxxxxx	
2.26	3.1.4	• Maximium contact resistance of the main circuit not to be exceeded when testing CB during maintenance/ repairs	µΩ	xxxxxxxxxx	
2.27	3.1.5	• Rated short-time withstand current (I_k)	kA	31,5	
2.28	3.1.6	• Rated peak withstand current (I_p)	kA	78,75	
2.29	3.1.7	• Rated duration of short circuit (t_k)	s	3	
2.30	3.1.8	• Rated d.c. supply voltage of closing and opening devices and of auxiliary and control circuits (U_a)	V	110	
2.31	3.1.8.1	• Rated a.c. supply voltage of heaters and other a.c. auxiliary circuits (U_a)	V	230	
2.32	3.1.8.1	• Rated supply frequency of closing and opening devices and of auxiliary and control circuits	Hz	d.c.	
2.33	3.1.8.1	• Rated supply frequency of heaters and other a.c. auxiliary circuits	Hz	50	
2.34	3.1.9 a)	• Rated short-circuit breaking current (I_{SC}) of circuit-breaker	kA	31,5	
2.35		• - a.c. component of short-circuit breaking current	kA	xxxxxxxxxx	
2.36		• - d.c. component of short-circuit breaking current	%	xxxxxxxxxx	
2.37	3.1.9 b)	• Factor by which the 100 % symmetrical and asymmetrical single-phase rated short-circuit breaking current exceeds the three-phase rating	pu	xxxxxxxxxx	
2.38	3.1.19	• Circuit-breaker class S1 or class S2		Class S2	
2.39	3.1.10 a)	• First-pole-to-clear factor (k_{pp}) for circuit-breaker		1,5	
2.40	3.1.10 b)	• Standard values of TRV related to the rated short-circuit breaking current (SANS 62271-100)		SANS 62271-100 Table 2	
2.41	3.1.10 b)	• Peak value of TRV (u_c)	kA	xxxxxxxxxx	
2.42	3.1.10 b)	• Rate of rise of recovery voltage of TRV	kV/µs	xxxxxxxxxx	
2.43	3.1.10 b)	• Time delay (t_d) of TRV	µs	xxxxxxxxxx	
2.44	3.1.10 b)	• Amplitude factor (k_{af}) of TRV	p.u.	xxxxxxxxxx	
2.45	3.1.10 b)	• Peak value of the Initial TRV (ITRV)	kA	xxxxxxxxxx	
2.46	3.1.10 b)	• Rate of rise of recovery voltage of ITRV	kV/µs	xxxxxxxxxx	
2.47	3.1.11	• Rated short-circuit making current of circuit-breaker	kA	78,75	
2.48	3.1.12 a) to d)	• Rated operating sequence for circuit-breaker		O-0,3s-CO-3m-CO (all poles)	
2.49	3.1.12 d)	• Minimum resting time following rated operating sequence	min	xxxxxxxxxx	
2.50	3.1.13	• Characteristics for short-line faults tested in accordance with the standard		SANS 62271-100 4.105 & 6.109	
2.51	3.1.14	• Rated out-of-phase making current for circuit-breakers	kA	xxxxxxxxxx	
2.52	3.1.14	• Rated out-of-phase breaking current for circuit-breakers	kA	xxxxxxxxxx	
2.53	3.1.15 c) & 3.1.19	• Classification of circuit-breaker according to its restrike performance (line- and cable-charging breaking current)		Class C2	
2.54	3.1.15	• Rated capacitive switching currents for circuit-breaker - line charging breaking current	A	10	
2.55	3.1.15	• Rated capacitive switching currents for circuit-breaker - cable-charging breaking current	A	125	
2.56	3.1.15 c) & 3.1.19	• Classification of circuit-breaker according to its restrike performance (capacitor bank switching)		xxxxxxxxxx	
2.57	3.1.15	• Rated capacitive switching currents for circuit-breaker - single capacitor bank breaking current	A	xxxxxxxxxx	
2.58	3.1.15	• Rated capacitive switching currents for circuit-breaker - back-to-back capacitor bank breaking current	A	xxxxxxxxxx	

2.59	3.1.15	• Rated capacitive switching currents for circuit-breaker - back-to-back capacitor bank inrush making current	kA	xxxxxxxxxx	
2.60	3.1.16	Inductive load switching tests performed in accordance to SANS 62271-110 (for U_r ≥52kV)	Y/N	N/A	
2.61	3.1.16	• Chopping number of the circuit-breaker for inductive load switching (used to determine suppression peak overvoltage factor) and re-ignition behaviour used to configure electronic controller	λ	xxxxxxxxxx	
2.62	3.1.17	• Rated opening time for circuit-breaker	ms	xxxxxxxxxx	
2.63	3.1.17	• Rated break-time for circuit-breaker (max 60ms for U_n ≤ 132kV; max 50ms for U_n >132kV	ms	shall not exceed 60	
2.64	3.1.17	• Rated closing time for circuit-breaker	ms	xxxxxxxxxx	
2.65	3.1.17	• Rated open-close time for circuit-breaker	ms	xxxxxxxxxx	
2.66	3.1.17	• Rated reclosing time for circuit-breaker	ms	xxxxxxxxxx	
2.67	3.1.17	• Rated close-open time for circuit-breaker	ms	xxxxxxxxxx	
2.68	3.1.17	• Rated pre-insertion time for circuit-breaker with pre-insertion resistor	ms	xxxxxxxxxx	
2.69	3.1.18 & 3.1.19	• Circuit-breaker mechanical endurance class		Class M2	
2.70		• Number of mechanical operations for circuit-breaker		10000	
2.71	3.1.19	• Classification of circuit-breakers as a function of electrical endurance (Class E1 or Class E2)		Yes	
3	3.2.1	**Service conditions**			
3.1	3.2.1 a)	• Location (indoors/outdoors)		Outdoors	
3.2	3.2.1 a)	• Ambient air temperature range	℃	-10 to +40	
3.3	3.2.1 a)	• Solar radiation	W/m^2	1100	
3.4	3.2.1 a)	• Altitude (amsl)	m	1800	
3.5	3.2.1 a)	• Class of pollution (SANS 60815-1:2009)		Very heavy ('e')	
3.6	3.2.1 a)	• Average humidity	%	95	
3.7	3.2.5 b)	• Wind speed (velocity)	m/s	34	
3.8	3.2.1 a)	• Condensation and precipitations		Yes	
3.9	3.2.1 a)	• Seismic activity	g	0,3	
4	3.2.2	**General**			
4.1	3.2.2 a)	• Circuit-breaker compliant to SANS 62271-100		Yes	
4.2	3.2.2 b)	• Circuit-breaker design (live-tank / dead-tank)		Live-tank	
4.3		• Circuit-breaker manufacturer		xxxxxxxxxx	
4.4		• Circuit-breaker country of origin		xxxxxxxxxx	
4.5		• Circuit-breaker model/type designation		xxxxxxxxxx	
4.6	3.2.23.1	• Circuit-breaker total mass	kg	xxxxxxxxxx	
4.7	3.2.2 c)	• CTs required		No	
4.8		- CT manufacturer		N/A	
4.9		- CT country of origin		N/A	
4.10	3.2.2 d	• Support structure design		2 column support with common base frame	
4.11	3.2.2 d)	- Steel support structure to be supplied with circuit-breaker	Y/N	No	
4.12	3.2.2 e)	- Circuit-breaker pole operation		3-pole operated (3P)	
4.13	3.2.2 e)	- Stored energy operation for circuit-breaker mechanism		Yes	
4.14	3.2.2 e)	- Energy storage device		Spring	
4.15		- Operating drive mechanism country of origin		xxxxxxxxxx	
4.16		- Operating drive mechanism model/type designation		xxxxxxxxxx	
4.17	3.2.2 e)	**NOTE:** When a feeder circuit-breaker is in the closed position and the spring has been charged, it shall be able to "TRIP-CLOSE-TRIP" before the spring needs to be recharged		Yes	
4.18	3.2.2 e)	- Manual and motorised spring charging		Yes	
4.19	3.2.2 e)	- Manual and electric energy release		Yes	
4.20	3.2.2 e)	- Mechanical energy stored in charged spring	kJ	xxxxxxxxxx	
4.21	3.2.2 e)	- Mechanical device provided to prevent over-charging of the closing spring for manual and motor charging		Yes	
4.22	3.2.2 e)	- Safe conditions produced in the case of failure to latch		Yes	
4.23	3.2.2 f)	- Circuit-breaker insulation and/or extinguishing medium		SF6/Enviro-friendly	
4.24		- Mass of insulation and/or extinguishing medium	kg	xxxxxxxxxx	
4.25	3.2.2 f)	- Type of interrupter design (puffer, self-blast, etc.)		xxxxxxxxxx	

4.26	3.2.2 f)	- Configuration of moving contacts (single, double or triple motion) **(Subject to Eskom approval)**		xxxxxxxxxx	
4.27	3.2.2 g)	- Minimim expected life-span of circuit-breaker	years	> 40	
4.28		- minimal maintenance accordance to electrical and mechanical endurance	Y/N	Yes	
5	3.2.3	**Construction requirements**			
	3.2.3	• Design and layout of the circuit-breaker :			
5.1	3.2.3 a)	- standardised circuit-breaker elements to maximise interchageability	Y/N	Yes	
5.2	3.2.3 b)	- modular, pre-assembled elements shall be designed to facilitate handling and installation	Y/N	Yes	
5.3	3.2.3 c)	- designed to facilitate ease of construction and maintenance	Y/N	Yes	
5.4	3.2.3 d)	- Filter material housing located to provide easy access during maintenance	Y/N	Yes	
6	3.2.4	**Circuit-breaker operating mechanism enclosure requirements**			
6.1	3.2.4 a)	• Operating mechanisms, local control facilities and all parts requiring lubrication protected by weatherproof enclosures	Y/N	Yes	
6.2	3.2.4 a)	- degree of protection for enclosures containing exposed bearings, auxiliary switches, motors and other electrical devices	IP	IP 55	
6.3	3.2.4 a)	- degree of protection for all open areas in the circuit-breaker common base frame as well as externally mounted indicating devices (where applicable)	IP	IP 2X	
6.4	3.2.4 a)	- degree of protection for all other enclosures	IP	IP 54	
6.5	3.2.4 b) & 3.2.6	• Operating mechanism enclosure, handles and fixings material		3CR12 stainless steel/ Painted aluminium	
6.6	3.2.4 b) & 3.2.6	• Operating mechanism enclosure corrosion protection in accordance with 3.2.6 of DSP 34-1658	Y/N	Yes	
6.7	3.2.4 c)	• Operating mechanism enclosures arranged to facilitate easy access from all sides	Y/N	Yes	
6.8	3.2.4 c)	- all fastenings compliant with 240-56063756 and subject to Eskom approval	Y/N	Yes	
6.9	3.2.4 d)	• Circuit-breaker designed for operation from the front of the operating mechanism enclosure	Y/N	Yes	
6.10	3.2.4 e)	• Access to the operating mechanism controls, terminals strips etc. provided through hinged front access door	Y/N	Yes	
6.11	3.2.4 f) & 3.2.23.1 b) iii.	• Maximum height to top of mechanism allows servicing from ground ($U_n \leq 132$kV) or viewing indications and reading from ground (U_n >132kV) - it shall be shown clearly on the outline General Arrangement (GA) drawing	Y/N	Yes	
6.12	3.2.4 g)	• Front access door secured with a heavy-duty locking mechanism	Y/N	Yes	
6.13	3.2.4 h)	• Padlocking facility shackle diameter	mm	6	
6.14	3.2.4 i)	• Front access door equipped with travel stop	Y/N	Yes	
6.15	3.2.4 j)	• Rigid, corrosion resistant documentation pocket provided on inside of front access door, securely attached no protrusion through door	Y/N	Yes	
6.16	3.2.4 k)	• Facilites provided for securing operating tools on inside of front access door	Y/N	Yes	
6.17	3.2.4 l)	• Earthing of operating mechanism enclosure in accordance with 240-56063756	mm	Yes	
6.18	3.2.4 m) & 3.2.21 c)	• Provision for bottom/ below entry of all control cabling into operating mechanism enclosure	Y/N	Yes	
6.19	3.2.4 n)	• Metallic cable racking provided for inter-pole cabling?	Y/N	No	
6.20	3.2.4 o)	• Upper surfaces of enclosure shaped/sloped to prevent the accumulation of water	Y/N	Yes	
6.21	3.2.4 p)	• Gasket material offered (O-rings)		Neoprene rubber/ Nitrile rubber/ Cork	
6.22	3.2.4 q)	• Gauze-covered drain hole provided (> 25 mm)	Y/N	Yes	
6.23	3.2.4 r)	• Enclosure lifting eyes provided		Top	
6.24	3.2.4 s)	• Enclosure colour in accordance with SANS 1019		Light grey (G29)	

6.25	3.2.4 t)	• Mechanical trip facility located inside mechanism enclosure (clearly marked with warning labels)	Y/N	Yes	
7	3.2.5 3.2.5 a) & 3.2.23.1	**Circuit-breaker supporting structure** • Mechanical loads (in accordance to SANS 62271-100 clause 6.101.6) and parameters relating to the design of the circuit-breaker support structure and foundation			
7.1	3.2.5 a)	• - "static" dead weight of the circuit-breaker	N	xxxxxxxxxx	
7.2		• - rated "static" horizontal terminal force (longitudinal) F_{thA} of the circuit-breaker due to connected conductors	N	750	
7.3		• - rated "static" vertical terminal force (upward & downward) F_{tv} of the circuit-breaker due to connected conductors	N	750	
7.4	3.2.5 a)	• - rated "static" terminal load horizontal force F_{shA} of the circuit-breaker due to connected conductors	N	xxxxxxxxxx	
7.5		- rated "static" horizontal terminal force (transversal) F_{thB} of the circuit-breaker due to connected conductors	N	500	
7.6	3.2.5 a)	• - rated "static" terminal load horizontal force F_{shB} of the circuit-breaker due to connected conductors	N	xxxxxxxxxx	
7.7	3.2.5 a)	• - rated "static" terminal load vertical force F_{sv} of the circuit-breaker due to connected conductors	N	xxxxxxxxxx	
7.8		• - horizontal force due to wind pressure on ice coated circuit-breaker F_{wh}	N	xxxxxxxxxx	
7.9	3.2.5 a)	• - "dynamic" horizontal force exerted during operation on the foundation	N	xxxxxxxxxx	
7.10	3.2.5 a)	• - "dynamic" vertical force exerted during operation on the foundation	N	xxxxxxxxxx	
7.11	3.2.5 a)	• - "dynamic" moment (torque) exerted during operation about the foundation	Nm	xxxxxxxxxx	
7.12	3.2.5 a)	• - "dynamic" horizontal force exerted between circuit-breaker poles (centre phase interrupter chamber) during a rated (terminal fault) short-circuit	N	xxxxxxxxxx	
7.13		• Rated static terminal load (resultant force) - F_{sr1}	N	xxxxxxxxxx	
7.14		• Rated static terminal load (resultant force) - F_{sr2}	N	xxxxxxxxxx	
7.15		• Rated static terminal load (resultant force) - F_{sr3}	N	xxxxxxxxxx	
7.16		• Rated static terminal load (resultant force) - F_{sr4}	N	xxxxxxxxxx	
7.17	3.2.5 a)	• - wind force (load) exerted on the circuit-breaker due to the wind velocity of 34 m/s	N	xxxxxxxxxx	
7.18	3.2.5 a)	• - maximum torque required for the foundation holding down bolt nuts	Nm	xxxxxxxxxx	
7.19		• - centre of gravity of the circuit-breaker		xxxxxxxxxx	
7.20	3.2.5 b)	• Circuit-breaker steel support structure to be designed by manufacturer	Y/N	No	
7.21	3.2.5 b)	• Circuit-breaker concrete foundation to be designed by manufacturer	Y/N	No	
7.22	3.2.5 c)	• Common base frame supplied with circuit-breaker ($U_n \leq 132$ kV)	Y / N / N/A	Yes	
7.23	3.2.5 c) & d)	• Circuit-breaker designed to interface with the standard Eskom steel support structure	Y/N	Yes	
7.24	3.2.5 c) & d)	• Circuit-breaker support structure designed to interface with the standard Eskom concrete foundation	Y/N	Yes	
7.25	3.2.5 c) & d)	• Circuit-breaker steel support structure drawing (240-56063756 Table 6)		D-DT-5200 Sh 2	
7.26	3.2.5 c) & d)	• Circuit-breaker concrete foundation drawing (240-56063756 Table 6)		D-DT-5201	
7.27	3.2.5 e)	• Rated static terminal load according to SANS 62271-100 Clause 6.101.6	Y/N	No	
7.28		• - rated static terminal load	N	xxxxxxxxxx	
8	3.2.6	**Corrosion protection and lubrication**			
8.1	3.2.6 a)	• Corrosion specification		DSP 34-1658/ 240-75655504	

8.2	3.2.6 a)	•	Corrosivity rating of environment		"high" to "very high"	xxxxxxxxxx
8.3	3.2.6 a)		Corrosivity rating environment - 'C4' and 'C5' (i.e. marine)		C5 (marine)	xxxxxxxxxx
8.4	3.2.6 b)	•	Minimum detailed specification number for exposed metal:-	DS	DS-11	
8.5			- 3CR12, where applicable	DS	DS-11	
8.6			- Stainless steel, where applicable	DS	DS-18	
8.7			- Hot dip galvanised steel, where applicable	DS	DS-13	
8.8	3.2.6 c)		- Equivalent detailed specification number offered for operating mechanism enclosures	DS	xxxxxxxxxx	
8.9	3.2.6 c)		- Equivalent detailed specification number offered for all bolts, nuts and washers	DS	xxxxxxxxxx	
8.10	3.2.6 c)		- Equivalent detailed specification number offered for all structural steel	DS	xxxxxxxxxx	
8.11	3.2.6 c)		- Equivalent detailed specification number offered for all other exposed metal (excluding main terminals)	DS	xxxxxxxxxx	
8.12	3.2.6 d)	•	Details of lubricants provided with tender documentation	Y/N	Yes	
8.13	3.2.6 e)	•	Details of flange arrangements, treatments to prevent flange corrosion provided with tender		Yes	
8.14	3.2.6 c) & f)	•	Material and Corrosion Protection Information Table 7 on the 240-56063756 standard completed	Y/N	Yes	
9	3.2.6 f)	**Circuit-breaker operating mechanism enclosure heaters**				
9.1	3.2.6 f) i.	•	Heater size offered	Watt	xxxxxxxxxx	
9.2	3.2.6 f) ii.	•	Heater maintains dew-point higher than ambient temperature, constantly circulates air to all parts of enclosure	Y/N	Yes	
9.3	3.2.6 f) iii.		Electrical supply for heater shall be single phase 230V a.c.	Y/N	Yes	
9.4	3.2.6 f) iv.	•	Heater control circuit specification (240-56030489 and Eskom standard wiring drawing)		240-56030489 and D-DT-5407	
10	3.2.7	**Terminal requirements**				
10.1	3.2.7 a)	•	HV main terminal type		Flat pad	
10.2	3.2.7 a)	•	Flat pad details:			
10.3	3.2.7 a)		- Number of holes and pitch	mm	8 x 50	
10.4	3.2.7 a)		- Thickness (min)	mm	20	
10.5	3.2.7 a)		- Material		Aluminium	
10.6	3.2.7 a)	•	Main HV terminals shall be in accordance with SANS 62271-301	Y/N	Yes	
10.7	3.2.7 a)	•	HV main terminals removable without interfering with operation of circuit-breaker	Y/N	Yes	
10.8	3.2.7 b) & 3.2.23.1	•	Details of main HV terminals shown on the GA	Y/N	Yes	
10.9	3.2.7 b)		Earthing terminals			
10.10	3.2.7 b) & 3.2.23.1	•	Details of earthing terminals shown on the GA	Y/N	Yes	
10.11	3.2.7 b)		- Circuit-breaker earthed to main substation grid through support structure and foundation holding down bolts	Y/N	Yes	
10.12	3.2.7 b)		- Earthing of circuit-breaker via steel support structure and foundation holding down bolts	Y/N	Yes	
10.13	3.2.7 b)		- Additional conductor provided between the circuit-breaker and the support structure	Y/N	Yes	
10.14	3.2.7 b)		- Material (preferably not exposed copper or aluminium)	Cu/ Al	Yes	
10.15	3.2.7 b)		- Additional Ø18 mm hole provided at bottom of steel support structure (if part of supply)		N/A	
11	3.2.8	**Safety clearances and personnel safety**				
11.1	3.2.8 a)	•	Live parts isolated by means of elevation	Y/N	Yes	
11.2	3.2.8 b)		Safe working procedure compliance to OHS Act provided	Y/N	Yes	
11.3	3.2.8 b)	•	Minimum electrical working clearance (240-56063756 Table 8)	mm	3270	
11.4	3.2.8 c)	•	Distance from lowest part of any high-voltage insulation above ground	mm	2500	
11.5	3.2.8 d) & e)	•	Type of pressure relief devices provided		xxxxxxxxxx	

11.6	3.2.8 e)	• Circuit-breaker of dead-tank type - internal faults (internal arc) and pressure reief devices in ccordance with SANS 62271-203, where applicable	Y/N	Yes	
11.7	3.2.8 e)	- time for an arc due to internal fault (internal arc) up to short-circuit current cause no external effects	mm	xxxxxxxxxx	
11.8	3.2.8 e)	- details provided with tender documentation	Y/N	Yes	
12	3.2.9	**Insulation requirements**			
	3.2.9 a)	• Hollow insulators			
12.1	3.2.9 a)	- Insulator material		Ceramic (porcelain)/ Silicone rubber composite	
12.2	3.2.9 a)	- Insulator manufacturer		xxxxxxxxxx	
12.3		- Insulator country of origin		xxxxxxxxxx	
12.4	3.2.9 a)	- Ceramic (porcelain) type insulators in accordance with SANS 62155 and SANS 60815-2, where applicable	Y/N	Yes	
12.5	3.2.9 a)	- Silicone rubber composite type insulators in accordance with SANS 61462 and SANS 60815-3, where applicable	Y/N	Yes	
12.6	3.2.9 a)	• - Circuit-breaker tested at KIPTS or Any equivalent Insulator Pollution test performed		xxxxxxxxxx	
12.7	3.2.9 a)	• Test certificate & Test report for Insulator Pollution testing submitted with this Tender Documentation	Y/N	Yes	
	3.2.9 b)	• Minimum insulation creepage distances (SANS 60815-1)			
12.8	3.2.9 b)	- Minimum external unified specific creepage distance (USCD)	mm/kV	53,7	
12.9	3.2.9 b)	- Minimum external specific creepage distance (SCD)	mm/kV	31	
	3.2.9 c)	• Clearances in air			
12.10	3.2.9 c)	- Phase to phase clearance in air	mm	xxxxxxxxxx	
12.11	3.2.9 c)	- Phase to earth clearance in air	mm	xxxxxxxxxx	
13	3.2.10	**Position / status indication**			
		• Circuit-breaker position indication			
13.1	3.2.10 a) & b)	- Position indication to SANS 62271-100 clause 5.12	Y/N	Yes	
13.2	3.2.10 a) & b)	- Position indication visible with operating mechanism enclosure front access door closed	Y/N	Yes	
13.3	3.2.10 b)	- Closed position: “I” in white lettering on a red background	Y/N	Yes	
13.4	3.2.10 b)	- Open position: “O” in white lettering on a green background	Y/N	Yes	
13.5	3.2.10 c)	- Lettering (symbol) size (min)	mm	30	
	3.2.10 d)	• Closing spring status indication			
13.6	3.2.10 d)	- Status indicated by "SPRING CHARGED" and "SPRING DISCHARGED"	Y/N	Yes	
13.7	3.2.10 d)	- Lettering size (min)	mm	15	
13.8	3.2.10 e)	• Type of non-resettable circuit-breaker operation counter offered		Mechanical / electrical	
13.9	3.2.10 f)	• Pressure gauge provided (compensated for temperature and responding to insulation and/or extinguishing medium density) - where applicable	Y/N	Yes	
13.10	3.2.10 f)	• Pressure gauge sheltered from the elements - where applicable	Y/N	Yes	
13.11	3.2.10 g)	• All indicating devices clearly visible and legible by persons with norml vision standing at ground level	Y/N	Yes	
14	3.2.11	**Labels**			
	3.2.11 a)	• Operating labels			
14.1	3.2.11 a)	- Instructions for tripping (“TO TRIP”) and closing (“TO CLOSE”) the circuit-breaker	Y/N	Yes	
14.2	3.2.11 a)	- Instructions for charging closing springs (“TO CHARGE SPRING”)	Y/N	Yes	
14.3	3.2.11 b)	• Actuator(s) for local opening and closing of the circuit-breaker labelled in accordance with 240-56063756. NOTE The trip/close actuator colour differ from IEC 60073	Y/N	Yes	

14.4	3.2.11 c)	• Appropriate warning label for performing manual operation without adequate amount of SF6 inside DCB	Y/N	Yes	
14.5	3.2.11 c) Note	• Appropriate warning label for mechanical trip facility	Y/N	Yes	
14.6	3.2.11 d)	• Appropriate warning labels for interval between repeated CO's at testing	Y/N	Yes	
	3.2.11 e)	• Function labels			
14.7	3.2.11 e)	- Function labels provided to identify all LV (secondary) control equipment	Y/N	Yes	
14.8	3.2.11 e)	- Function label text height (min) - text in bleck letters on white background	mm	5	
14.9	3.2.11 f)	• Labels manufactured to 240-56062515, using inherently corrosion-resistant rivets or self-tapping screws	Y/N	Yes	
15	3.2.12	**Requirements for SF_6 gas (where applicable)** NOTE The Supplier shall provide details of other environmental friendly insulation and/or extinguishing medium, if applicable			
15.1	3.2.12 a)	• SF_6 in accordance with IEC 60376	Y/N	Yes	
15.2	3.2.12 c)	• The maximum SF_6 gas leakage rate (NB: provide details if other enviro-friendly insulation and/or extinguishing medium)	%	0,5 / year	
	3.2.12 d)	• SF_6 gas purity			
15.3		- SF_6 content	%	>98	
15.4		• - Dew point at rated filling pressure (max) (at +20℃) at commissioning	℃	>-10	
		- Moisture content (volume concentration of moisture expressed in microliters per litre) at commissioning	µL/L	xxxxxxxxxx	
		- Dew point at rated filling pressure (max) (at +20℃) limit when in service	℃	>-5	
		- Moisture content (volume concentration of moisture expressed in microliters per litre) limit when in service	µL/L	xxxxxxxxxx	
		• - SF_6 gas contamination (by-products) by volume, limit when in service	ppmv	xxxxxxxxxx	
	3.2.12 e)	• SF_6 gas-filled circuit-breaker filling and pressure monitoring (NB: provide details if other enviro-friendly insulation and/or extinguishing medium)			
15.5		- central gas/filling evacuation point connection provided		DILO DN8	
15.6		- height of gas filling/evacuation point above ground (max)	mm	<2400	
15.7		- gas filling point and the gas pressure gauge separated	Y/N	Yes	
15.8		- dial type gauge responding to Density and indicating pressure compensated for temperature provided	Y/N	Yes	
15.9		- Density monitoring device (density switch) contact requirements		D-DT-5407	
15.10		- Density monitoring device suitable for outdoor operation	Y/N	Yes	
15.11		- method/system used to prevent corrosion of moving parts and contacts		xxxxxxxxxx	
15.12		- Density monitoring device shielded against direct sunshine	Y/N	Yes	
15.13		- non-return valves fitted on all DN8 (for U_n≤132kV) / DN20 (Un≥220kV) fittings and pipe work to allow removal of poles and/or density monitoring device while maintaining system pressure	Y/N	Yes	
15.14		- details of arrangement offered supplied with tender documentation	Y/N	Yes	
15.15		- pipe work material		Stainless steel/ factory painted Cu	
15.16		- separate/common filling/evacuating and density monitoring point per pole provided (i.e. 3P or 1P design)		Separate	
15.17		- type of electrical connections to the density-monitoring device		xxxxxxxxxx	

15.18		- electrical connections to the density monitoring device shall preferably not be the plug-in type	Y/N	Yes	
15.19		- density-monitoring devices with locking facilities (preferred)	Y/N	Yes	
15.20		- cabling protected using compression glands/ rubber grommets	Y/N	Yes	
15.21		- details of all pressure devices provided with tender documentation	Y/N	Yes	
15.22		- Density monitoring device electrical interlocks and alarm requirements		240-56030489 and D-DT-5407	
15.23	3.2.12 f)	• Management of SF_6 gas in accordance with NRS 087	Y/N	Yes	
16	3.2.13	**Current Transformers**			
16.1	3.2.13 a)	• Type of CT design (type designation)		N/A	
16.2		- CT outline GA, rating plate drawing and wiring schematic submitted (where applicable)	Y/N	N/A	
16.3		- CT type tests submitted (where applicable)	Y/N	N/A	
16.4	3.2.13 a)	• CT specification		N/A	
16.5	3.2.13 b)	• Number of cores		N/A	
16.6	3.2.13 c)	• CT specification (drawing number)		N/A	
16.7	3.2.13 e)	• Rated short-time withstand current - magnitude	kA	N/A	
		Rated short-time withstand current - duration	s	N/A	
16.8	3.2.13 e)	• Position relative to the circuit-breaker		N/A	
16.9	3.2.13 c)	• Terminal numbering and wiring interface (drawing number)		N/A	
	3.2.13 e)	• Protection current transformers:			
16.10		a) cores		N/A	
16.11		b) class		N/A	
16.12		c) ratios	A	N/A	
	3.2.13 e)	• Bus-zone current transformers:			
16.13		a) cores		N/A	
16.14		b) class		N/A	
16.15		c) ratios	A	N/A	
	3.2.13 e)	• Measurement current transformers:			
16.16		a) cores		N/A	
16.17		b) class		N/A	
16.18		c) burden	VA	N/A	
16.19		d) ratios	A	N/A	
16.20	3.2.13 e)	• Details of the calculated magnetising curves provided on a log-scale	Y/N	N/A	
16.21		• Details of protection against mechanical damage and fixing method provided	Y/N	N/A	
16.22	3.2.13 d)	• Ring-type CTs interchangeable without dismantling the bushing, this method provided with tender documentation		N/A	
17	3.2.14	**Switching surge control (where applicable)**			
17.1	3.2.14 a)	• Pre-insertion closing resistor offered	Y/N	xxxxxxxxxx	
17.2	3.2.14 a)	• Pre-insertion closing resistor resistance	Ω	xxxxxxxxxx	
17.3	3.2.14 b)	• Electronic controller offered for switching of cap banks, reactor banks and transformers (Provide Manufacturer & Type, IEC 61850 protocol compliancy)	Y/N	N/A	
17.4	3.2.14 b)	• Metal oxide surge arresters in parallel with CB interrupters offered	Y/N	xxxxxxxxxx	
18	3.2.15	**Grading capacitors (where applicable)**			
18.1	3.2.15 a)	• Grading capacitors offered	Y/N	xxxxxxxxxx	
18.2		- Grading capacitors insulation material e.g. oil/paper	Y/N	xxxxxxxxxx	
18.3		- Grading capacitors manufacturer	Y/N	xxxxxxxxxx	
18.4		- Grading capacitors insulation type designation	Y/N	xxxxxxxxxx	
18.5		- Grading capacitors country of origin	Y/N	xxxxxxxxxx	
18.6	3.2.15 a)	• Grading capacitor capacitance	pF	xxxxxxxxxx	
18.7	3.2.15 b)	• Details of how to verify condition of grading capacitors during the life of the circuit-breaker provided with the tender documentation	Y/N	N/A	

19	3.2.16	**Extreme asymmetrical short-circuit interrupting capability (where applicable)**			
19.1	3.2.16	• Circuit-breaker required to interrupt short-circuit currents with a higher degree of asymmetry than required by SANS 62271-100	Y/N	No	
19.2	3.2.16	• Proof of higher asymmetrical interrupting capability provided with tender documentation	Y/N	Yes (where applicable)	
20	3.2.17	**Requirements for simultaneity of poles during single closing and single opening operations**			
20.1	3.2.17 a)	• Contact synchronism retained within rated values during the expected maintenance interval of circuit-breaker	Y/N	Yes	
20.2	3.2.17 a)	- time interval between contact touch for all poles of the circuit-breaker	ms	< 5	
20.3	3.2.17 a)	- time interval between contact touch for interrupters in the same pole	ms	< 3.3	
20.4	3.2.17 a)	- time interval between contact touch for individual closing resistors - where applicable	ms	< 10	
20.5	3.2.17 a)	- time interval between contact touch for individual closing resistors in the same pole (series connected) - where applicable	ms	< 6,6	
20.6	3.2.17 a)	- time interval between contact separation for all poles of the circuit-breaker	ms	< 3,3	
20.7	3.2.17 a)	- time interval between contact separation for interrupters in the same pole	ms	< 2.5	
21	3.2.18	**Controlled switching & condition monotoring (where applicable)**			
21.1	3.2.18	• All information and details provided with the tender documentation (Controller is IEC61850 protocol compliant)	Y/N	N/A	
21.2	3.2.18	• All information and details provided with the tender documentation	Y/N	N/A	
21.3		• Technical A & B schedule for controlled switching device (Point on Wave) completed and submitted	Y/N	N/A	
21.4	3.2.18 b)	• Circuit-breaker offered has been tested in accordance with SANS 62271-302	Y/N	N/A	
21.5	3.2.18 b)	• Circuit-breaker offered has been tested independent from any controlled switching device or with dedicated controller, sensors & auxiliary equipment	Y/N	Yes	
21.6	3.2.18 c) & 3.2.23.1	• Circuit-breaker mechanical charateristics submitted with tender documentation - which affect mechanical operating time, e.g. ambient temp, substation d.c.voltage, standing time, operating pressure	Y/N	Yes	
21.7	3.2.18 & 3.2.23.1	• Circuit-breaker mechanical charateristics submitted with tender documentation - which affect mechanical operating time, e.g. ambient temp, substation d.c.voltage, standing time, operating pressure	Y/N	Yes	
21.8	3.2.18 d)	Submitted with tender documentation the circuit-breaker dielectric characteristics - as a function of time (closing) and SF6 gas filling pressure up to maximum rated design pressure; upper & lower limits; critical arcing window for re-ignition-free shunt reactor opening shunt reactor	Y/N	Yes	
21.9	3.2.18 d)	Critical arcing window for re-ignition-free shunt reactor opening shunt reactor	ms	N/A	
21.10	3.2.18 c) & d)	Tolerance of +/- 1ms required as function of items under 3.2.18 c) and d)	Y/N	Yes	
21.11	3.2.18.1	Point-on-Wave switching controller shall form part of PIU (digital secondary interface) as per clause 3.2.20.1	Y/N	N/A	
		• **Condition monitoring**			
21.12	3.5.5	On-line condition monitoring and/or integrated diagnostic device shall be IEC61850 protocol compliant	Y/N	Yes	

21.13	3.5.5	Details of functions achieved by on-line condition monitoring and/or integrated diagnostic device submitted	Y/N	Yes	
21.14	3.5.5	All information required for circuit-breaker condition monitoring shall be supplied for each design type at contract award - Specification sheets, speed calculation points, travel curve values, etc.	Y/N	Yes	
22	3.2.19	**Pole discordance (PD) or phase discrepancy**			
22.1	3.2.19	• All information and details provided with the tender documentation	Y/N	Yes	
22.2	3.2.19	• The PD timer and its associated circuitry are to be provided as a separate contract item (to be located on the control panel at a remote location in the control room associated with the particular circuit-breaker)	Y/N	N/A	
		Timing events (with tolerances) between:-			
22.3	3.2.19 b)	- main contact timing and the auxiliary contacts timing of the same pole for both opening and closing operations	ms	xxxxxxxxxx	
22.4	3.2.19 b)	- main contact timing and the auxiliary contacts timing between all poles for both opening and closing operations	ms	xxxxxxxxxx	
22.5	3.2.19 b)	- designation of auxiliary contacts (required for future testing)	ms	xxxxxxxxxx	
23	3.2.20	**Auxiliary and control circuits**			
23.1	3.2.20	• Auxiliary and control circuit requirements (≥220kV use 0.54/07529 (Live-tank CB's) & 0.54/8557 (Dead-tank CB's))		240-56030489 and D-DT-5407	
		• Auxiliary power supplies:			
23.2		- Provision		On site by Eskom	
23.3		- Peak power requirement (max)	VA	xxxxxxxxxx	
23.4		- Standby power requirements	VA	xxxxxxxxxx	
		• Circuit-breaker spring-charging motor control circuit (per mechanism):			
23.5		- d.c. supply voltage range of operation	%	85 to 110	
23.6		- d.c. current (peak starting)	A	< 30	
23.7		- d.c. current (max continuous)	A	< 10	
23.8		- total time taken to charge spring	s	< 10	
23.9		- method offered for protection against continual motor running (over-run)		xxxxxxxxxx	
23.10		- automatic charging of closing spring		Yes	
23.11		- number of spare contacts of SLS provided (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		D-DT-5407	
		• Circuit-breaker closing control circuit (per mechanism):			
23.12		- d.c. supply voltage range of operation	%	85 to 110	
23.13		- d.c. power (peak)	W	≤ 500	
23.14		- number of close coils required		1	
23.15		- close coil current	A	xxxxxxxxxx	
23.16		- close coil resitance @ 20^0C	Ω	xxxxxxxxxx	
		• Circuit-breaker tripping control circuit (per mechanism):			
23.17		- d.c. supply voltage range of operation	%	70 to 110	
23.18		- d.c. power (peak)	W	≤ 500	
23.19		- number of trip coils required		2	
23.20		- physically and electrically separate trip control circuits		Yes	
23.21		- trip circuit supervision		Yes	
23.22		- trip coils rated to carry 20mA d.c. continuously		Yes	
23.23		- trip coil current	A	xxxxxxxxxx	
23.24		- trip coil resitance @ 20^0C	Ω	xxxxxxxxxx	
23.25		• Circuit-breaker equipped with anti-pumping circuitry		Yes	
23.26		• d.c. isolation switch provided		Yes	
23.27		• Circuit-breaker control circuit interlocks specification		240-56030489 and D-DT-5407	
23.28		• Circuit-breaker alarm circuits wiring specification		240-56030489 and D-DT-5407	
		• Auxiliary contacts provided (spare for Eskom use):			

			Duty rating			
23.29			- a.c. and d.c. supply current	A	10	
23.30			- N/O and N/C contact reference positions (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		Circuit-breaker opened, spring discharged, gas low, relay coils de-energised	
			Low insulation and/or extinguishing medium alarm			
23.31			- N/O		0	
23.32			- N/C		2	
			Low insulation and/or extinguishing medium block contacts			
23.33			- N/O		0	
23.34			- N/C		2	
			Spare circuit-breaker auxiliary switch contacts (per mechanism) (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))			
23.35			- N/O		4	
23.36			- N/C		4	
			Spare circuit-breaker spring limit switch contacts (per mechanism) (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))			
23.37			- N/O		3	
23.38			- N/C		3	
		•	Terminal blocks and terminal strips:			
23.39			- Number of spare terminals provided		≥ 6	
23.40			- Terminal blocks to DSP 34-253, screw clamp, spring-loaded insertion type (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		Yes	
23.41			- Terminal block width offered (above 132kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))	mm	≥ 8	
23.42			- Make of terminal block offered (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		xxxxxxxxxx	
23.43		•	Lugs (insulated hook blade type)		Crimped	
23.44		•	Earth sliding link types/equivalents (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		Weidmuller TVP SAKA 10	
23.45		•	Trunking provided on both sides of each terminal strip		Yes	
23.46		•	'Fine-tooth' trunking tooth width	mm	6,1	
23.47		•	Trunking size	mm	60 x 60	
		•	Wiring size:			
23.48			- CT and motor control circuit wires	mm^2	2,5	
23.49			- Control and other auxiliary wires	mm^2	1,5	
23.50			- Minimum number of strands		7	
		•	Wiring colour:			
23.51			- CT wires		red/white/blue/black	
23.52			- Earth wires		green/yellow	
23.53			- All other wires		grey	
23.54		•	Wiring identification		Ferruling	
23.55		•	Terminal strips numbered and designated as per drawing		D-DT-5407	
		•	LV MCBs:			
23.56			- MCBs to SANS 60947-2 and IEC 60898		Yes	
23.57			- Make and type offered		xxxxxxxxxx	
23.58			- I_{CU}	A	xxxxxxxxxx	
23.59			- I_{CS}	A	xxxxxxxxxx	
23.60			- Utilisation category (SANS 60947-2)		'A'	
23.61			- Max service voltage	V	xxxxxxxxxx	
23.62			- d.c. MCB rated voltage	V	≥ 250	
23.63			- Pollution degree (SANS 60947-2)		≥ 3	
23.64			- Suitable for isolation (SANS 60947-2)		Yes	
23.65			- Protection curve (SANS 60947-2 / IEC 60898)		'C'	
23.66			- Location		Mechanism enclosure	
23.67	3.2.20 b)	•	Circuit-breaker auxiliary and control circuit wiring interface (drawing number) (≥220kV use 0.54/07529 (LTCB's) & 0.54/8557 (DTCB's))		D-DT-5407	
23.68	3.2.20 c)	•	Bottom entry removable brass/aluminium LV gland plates provided	Y/N	Yes	
23.69	3.2.20 d)	•	Terminal strips shall be arranged in a vertical orientation	Y/N	Yes	

23.70	3.2.20 e)	• Earthing point inside mechanism enclosure provided, allows 10 spare secondary control cable cores	Y/N	Yes	
		Digital secondary plant interface option:-			
23.71	3.2.20.1	- is the digital secondry plnt interface offered as a option for this circuit-breaker	Y/N	xxxxxxxxxx	
23.72	3.2.20.1	- does the digital secondary interface comply to the clause 3.2.20.1	Y/N	xxxxxxxxxx	
23.73	3.2.20.1 b) & Annex C	- has the Technical Schedules B (of 240-6465228) specific to digital secondary interface been completed and submitted with tender documentation	Y/N	xxxxxxxxxx	
23.74		- have all type test records been submitted with tender documentation	Y/N	xxxxxxxxxx	
23.75		- have the wiring schematics been submitted with tender documentation	Y/N	xxxxxxxxxx	
24	3.2.21	**Nameplates**			
		• Nameplates provided for the following:-			
24.1	3.2.21 a)	- circuit-breaker (SANS 62271-100)	Y/N	Yes	
24.2	3.2.21 b)	- circuit-breaker operating mechanism (SANS 62271-100)	Y/N	Yes	
24.3		- CT (SANS 60044-1 / NRS 029)	Y/N	N/A	
24.4	3.2.21 c)	• Circuit-breaker also tested according to SANS 62271-302 shall make special reference on its nameplate	Y/N	Yes	
24.5	3.2.21 d)	• Method used to attach nameplates (riveted or screwed on)		xxxxxxxxxx	
24.6	3.2.21 d)	• Nameplate material offered weather-proof and inherently corrosion-resistant (engraved aluminium or stainless steel)		xxxxxxxxxx	
24.7	3.2.21 e)	• Duplicate nameplates provided for CTs on inside of operating mechanism enclosure front access door	Y/N	N/A	
24.8	3.2.21 f)	• Actual ratings of DCB type-tested values shall be displayed on nameplates	Y/N	Yes	
25	3.2.22 / 3.5.3	**Tools and spares**			
		• Tools to be supplied with circuit-breaker (minimum requirements):			
25.1	3.2.22 a)	- full set of operating tools (Has the list on separate sheet been provided?)	Sets	1 set per circuit-breaker	
25.2	3.2.22 b)	- tools fitted on inside of the front access door	Y/N	Yes	
25.3	3.2.22 c)	• Standard tools available for minor maintenance (Has the list on separate sheet been provided?)	Y/N	Yes	
25.4	3.2.22 d)	• Specialised tools available for major maintenance purposes (Has the list on separate sheet been provided?)	Y/N	Yes	
25.5	3.2.22 e) / 3.5.3	• Spares available for maintenance (Has the list on separate sheet been provided?)	Y/N	Yes	
25.6	3.2.22 f)	Written letter, in case of design obsolescence has been provided?	Y/N	Yes	
26	3.2.23	**Documentation** **Note: All tender documentation to be provided in electronic format.**			
	3.2.23.1	• Documentation to be supplied with tender:			
26.1		- GA drawing (provide drawing number on separate sheet provided)	Sets	1	
26.2		- Drawing of all insulators used in the circuit-breaker (provide drawing number on separate sheet provided)	Sets	1	
26.3		- Generic layout of nameplates (provide drawing number on separate sheet provided)	Sets	1	
26.4		- Generic auxiliary and control circuit schematic wiring diagram (provide drawing number on separate sheet provided)	Sets	1	
26.5		- GA drawing of the operating mechanism enclosure	Sets	1	
26.6		- list of spare parts with prices for each circuit-breaker offered (provide list on separate sheet provided)	Sets	1	
26.7		- list of all operating tools for each circuit-breaker offered (Has the list on separate sheet been provided?)	Sets	1	

26.8		- list of all standard minor maintenance tools for each circuit-breaker offered (Has the list on separate sheet been provided?)	Sets	1	
26.9		- list of all specialised major maintenance tools for each circuit-breaker offered (Has the list on separate sheet been provided?)	Sets	1	
26.10		- full list as well as copies of type test certificates and reports (Has the report numbers on separate sheet been provided?)	Sets	1	
26.11		- generic routine test certificates for each circuit-breaker	Sets	1	
26.12		- transport, storage, installation, operating and maintenance manuals	Sets	1	
26.13		- training material	Sets	1	
26.14		- generic quality inspection and test plan (QITP)	Sets	1	
26.15		- all other relevant additional information requested	Sets	1	
	3.2.23.2	• Documentation to be supplied with each circuit-breaker:			
26.16		- Schematic wiring diagram for circuit-breaker	Sets	1	
26.17		- Complete set of routine test certificates for circuit-breaker	Sets	1	
26.18		- Commissioning and hand-over test sheet	Sets	1	
26.19		- Transport, storage, installation, operating and maintenance manuals	Sets	1	
26.20	3.2.23.4	• Submission of documentation requested upon awarding of contract	Y/N	Yes	
26.21		• Units used in Republic of South Africa		In tender/offer	
26.22		• Project reference list, service to Eskom		In tender/offer	
27	3.2.24	**Packaging requirements**			
27.1	3.2.24 a)	• Each individual circuit-breaker unit packed	Y/N	Yes	
27.2	3.2.24 b)	• Containers (e.g. wooden crates) suitable for transport and storage over long periods (for up to 18 months) (NB: preservation requirements in QM-58)	Y/N	Yes	
27.3	3.2.24 c)	• Durable waterproof packaging designed to prevent damage to components during transportation and storage on site	Y/N	Yes	
27.4	3.2.24 c)	• Suitable ventilation provided to minimise condensation	Y/N	Yes	
27.5	3.2.24 d)	• Packaging able to withstand impact loadings of at least 18 kN	Y/N	Yes	
27.6	3.2.24 e)	• Each crate clearly and sequentially marked	Y/N	Yes	
27.7	3.2.24 f)	• Each container/crate clearly marked with a durable label using an indelible font with all specified information in 240-56063756	Y/N	Yes	
27.8	3.2.24 g)	• Exposed shafts, bearings and machined surfaces treated with a temporary anti-corrosive coating	Y/N	Yes	
27.9	3.2.24 h)	• Loose components or components that are subject to damage from exposure to dust or water packed in hermetically sealed plastic bags	Y/N	Yes	
27.10	3.2.24 i)	• All components clearly marked	Y/N	Yes	
27.11	3.2.24 j)	• Fork-lift lifting points provided on the packaging - where applicable	Y/N	Yes	
27.12	3.2.24 k)	• External temporary 230 V a.c. connection point for the heater circuit provided	Y/N	Yes	
27.13	3.2.24 l)	• Non-resettable impact recorder/detector provided	Y/N	Yes	
27.14	3.2.24 m)	• Circuit-breaker transported with a positive gas pressure of maximum 150 kPa - where applicable	Y/N	Yes	
27.15	3.2.24 n)	• Copy of the BOM shall be provided with the delivery note	Y/N	Yes	
28		**Miscellaneous**			
		• General			
28.1	3.4.7.1 a) & NOTES	• Test equipment used for precommissioning shall be in accordance with 240-56063756	Y/N	Yes	
28.2	3.5.2 & 3.2.23.1 p)	• Written commitment to provide Inspection and maintenance DVD has been provided with tender docs	Y/N	Yes	
28.3	3.5.3.2 & 3.2.23.1 p)	• Required period for spares availability	Years	25 years after discontinuation of switchgear	
28.4	3.5.3.2	Availability of trip coils, close coils, spring charging motors, density monitoring devices, contactors & relays	Hours	12	

28.5	3.5.5	• Specification sheets, speed calculation points, travel curve values shall be provided at contract awarding	Y/N	Yes	
29	3.7	**Training Requirements**			
29.1		• Training offered in accordance with 240-56065202	Y/N	Yes	
29.2		• Will the training levels to be adapted to the Training Levels 1 to 4 in accordance with 240-56065202	Y/N	Yes	
29.3		• Has the detailed training programme in accordance with the training standard 240-56065202 been submitted with tender documentation	Y/N	Yes	

SIGNATURES

Supplier	Name (Print)	Sign	Date
Factory	Name (Print)	Sign	Date
Eskom	Name (Print)	Sign	Date

Deviation Schedule - 66 kV Live-tank circuit-breaker 3P offered

Any Deviation offered to this (240-56063756) Standard specification shall be listed below with reasons for deviations. In addition evidence shall be provided that the deviation proposed will be at least more cost-effective than that spcified by Eskom.

Item	Clause	Proposed Deviation
		NO DEVIATIONS TO SPECIFICATION

SIGNATURES

Supplier	Name (Print)	Sign	Date
Factory	Name (Print)	Sign	Date
Eskom	Name (Print)	Sign	Date

Tools, Spares, Drawings and Type Test reports/ certificates Schedule for 66 kV Live-tank circuit-breaker 3P offered

OUTDOOR CIRCUIT-BREAKERS

CB Type and Ratings:

1	2	3	4	5
T.1	**Full set of operating tools required 1 set per circuit-breaker upon delivery at site (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
T.2 a)	**Standard tools available for minor maintenance (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
T.2 b)	**Specialised tools available for major maintenance purposes (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
T.3 a)	**Spares available for maintenance - for breakdown repairs (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
T.3 b)	**Spares available for maintenance - for non-intrusive maintenance minor inspection (provide a detailed list)**			

Item	Quantity	Description	Drawing Number	Part Number
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
T.3 c)	**Spares available for maintenance -for intrusive maintenance major overhaul inspection (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
T.3 d)	**Complete Spare parts (provide a detailed list)**			
Item	**Quantity**	**Description**	**Drawing Number**	**Part Number**
1				
2				
3				
4				
5				
6				
7				
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11				
12				
13				
14				
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30				
T.4	**Drawings (provide the complete list)**			
Item	**Revision No**	**Description**	**Drawing Number**	**Eskom No** *(to be allocated)*
4.1		General Arrangement (GA) outline drawing		
4.2		Drawing of all insulators used in the circuit-breaker		
4.3		Generic layout of nameplates - complete CB, Pole, Mechanism and Motors		

4.4		Generic auxiliary and control circuit schematic wiring diagram			
4.5		GA drawing of the operating mechanism enclosure			
4.6		Steel support structure dimensioned outline and general arrangement			
4.7		Steel support structure dimensioned outline and general arrangement			
4.8		Other submitted drawings (namely):-			
4.9		Other submitted drawings (namely):-			
T.5	**Type Tests Reports/ Certificates (provide the complete list of type-tests performed as per Spec clause 3.3.2)**				
Item	**Date test performed**	**Description**	**Passed test/ failed**	**Test Facility**	**Test Report Number**
5.1		Insulation level (SANS 62271-100 6.2); dry lightning impulse withstand voltage test (BIL or LIWL)			
5.2		Dry power frequency withstand level voltage tests (PFWL) (SANS 62271-100)			
5.3		Wet power frequency voltage withstand level (PFWL) test (SANS 62271-100)			
5.4		Dry switching impulse withstand level voltage test (SIWL) (SANS 62271-100)			
5.5		Temperature rise and measurement of resistance of circuits (SANS 62271-100 6.5 & 6.4)			
5.6		Breaking current withstand - main circuit (SANS 62271-100 6.6)			
5.7		Short-circuit making and breaking capacities (SANS 62271-100 6.102 to 6.106)			
5.8		Critical current tests (where applicable) (SANS 62271-100 6.107)			
5.9		Single-phase tests (for Un ≥ 66 kV) (SANS 62271-100 6.108)			
5.10		Double earth fault tests (for Un ≥ 132 kV) (SANS 62271-100 6.108)			