

66kv Circuit Breaker Specification

PNG Power Limited formally requests for a quotation of six (6) 66kV Circuit Breaker from reputable and certified suppliers of high voltage power equipment to be used for 66/11kv substation. The circuit breaker will be deployed in addition to others (circuit breakers) already in service and shall meet relevant IEC/ISO/IEEE and/or other international and AS/NZ electrical standards for high voltage equipment. Following specifications sets out general system requirements for operations only and does not include all requirements which the tenderer shall consider for inclusion in their offer.

The 66kv circuit breaker shall be able to operate satisfactorily in the following operating atmospheric and/or weather conditions.

- Maximum Ambient Temperature: 45°C
- Minimum Ambient Temperature: 20°C
- Average Yearly Rainfall: >100 mm
- Maximum Relative Humidity: 100%

Technical Specification

The 66kV circuit breaker shall comply with AS62271.100-2008 (IEC 62271-100) and shall be designed and manufactured to latest versions/editions of the other international relevant standards for enhanced performance and efficiency with due consideration of the following provisions:

Parameters

- Circuit breaker type: SF6, Outdoor
- No. of poles: 3
- System frequency: 50 Hz
- Maximum system voltage: 72.5kV
- Nominal system voltage: 66kV
- Rated continuous current: 1250A
- Rated short-circuit current: 31.5kA
- Rated symmetrical breaking current: 31.5kA
- Rated making current: 80kA
- Rated short-time current: 31.5kA for 3 seconds
- Power frequency withstand voltage: 140kV
- Lightning impulse withstand voltage: 325kV
- Switching impulse withstand voltage: -kV
- Line charging breaking current:

▪ Rated operating sequence:	O-0.3 sec.-OC-3min-CO
▪ No. of auxiliary contacts:	9 NO + 9 NC
▪ First pole-to-clear factor:	1.5
▪ Control supply voltage:	48Vdc
▪ Motor supply voltage:	240Vac @ 50Hz
▪ Heater supply voltage:	240Vac @ 50Hz

Operating Devices

- ✓ The auto-reclosing circuit breaker shall be provided with anti-pumping features.
- ✓ Two trip coils shall be provided for the 66kv circuit breaker. The trip coils shall have sufficient continuous rating to cater for the trip coil supervision relay.
- ✓ The circuit breaking operating mechanism shall be capable for high speed re-closing action. It shall be non-pumping electrically or mechanically under every method of closing (except for manual tripping of circuit breaker for maintenance).
- ✓ A mechanical indicator shall be provided in the operating mechanism box to show open and close positions visible through a glass window from the ground level. An operation counter shall also be provided.
- ✓ All standard operating devices shall be incorporated to bring about reliability and efficiency of the circuit breaker operation to ensure required operations are performed by the equipment as expected.

Operating Mechanism

- ✓ The operating mechanism shall be spring charged complete with motor, opening spring, closing spring with limit switch for automatic charging and all necessary fittings and/or accessories.
- ✓ Breaker operation shall be independent of the motor operation, which shall be used solely for the compression of the closing spring.
- ✓ Operating mechanism shall be able to be operated by remote electrical controls through SCADA or other distance communication facilities. Provision shall be made for local electrical control. Local/Remote selector switch shall be provided in the operating mechanism cubicle.
- ✓ Facilities for manual spring-charging shall be provided for local closing and tripping of the circuit breaker for routine maintenance and other operations during normal operations.
- ✓ The housing of the operating mechanism shall be weatherproof. All natural activities against the housing shall not possibly deteriorate material composition of the mechanism box. Hinged doors giving access to the operating mechanism facilities shall be provided in front of the circuit breaker. Suitable water and dustproof material shall be used to prevent ingress of these unwanted

elements into the mechanism housing. Possible padlocks or lockable devices shall be provided with equivalent unlocking devices (keys) for easy closing and accessing of the mechanism.

Other Circuit Breaker Composition Material Requirement

- ✓ All exposed conductors shall be painted with rust preventing or protective materials to deter rust formation accelerating eventual deterioration and breakdown of the conductors.
- ✓ Bushings and/or insulators used shall have the required capacity to deliver their required function of preventing electric discharge, sustaining and withstanding electrical and mechanical stresses during short-circuits and other external forces. Insulator and bushing porcelains shall be made of high graded material so as to prevent crack and damage during cartage and installation or after being exposed in polluted environment for long period of time.
- ✓ All the fittings and accessories necessary and/or required for ensuring satisfactory operation shall be considered as part of this scope.

Test

- ✓ All routine and type tests required shall be carried out as per latest applicable standard requirements to ensure satisfactory operation. The circuit breaker and its associated equipment/components required to be tested as per international electrical standards shall be allowed to undergo the test.
- ✓ A copy of test results shall be supplied for approval before shipment of the circuit breaker.

Name Plate

Each circuit breaker shall be provided with nameplate of weather resistant material fitted in a visible position showing the following items as a minimum.

- ✓ Manufacturer's name
- ✓ Manufacturer's serial number and type designation
- ✓ Year of manufacture
- ✓ Rated voltage, kV
- ✓ Rated insulation level, kV
- ✓ Rated frequency, Hz
- ✓ Rated normal current, A
- ✓ Rated short-circuit breaking current, kA
- ✓ Rated interrupting time cycles
- ✓ Weight of circuit breaker, kg

Documentation:

Following documentations shall be produced by the supplier and supplied in PDF format for site personals use:

1. O&M manual document
2. Circuit Breaker control and protection drawing/schematic
3. Layout drawing of the standard 66kv circuit breaker structure