# BHARAT HEAVY ELECTRICALS LIMITED

## TRANSMISSION BUSINESS GROUP

## ENGINEERING MANAGEMENT, NEW DELHI

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| Title | 400KV AND 132KV SF6 CIRCUIT BREAKERS | | Date | 03.05.12 | 03.05.12 | 03.05.12 |
| | | | Group | TBEM | | |
| | | | W.O. No | 81009 | | |
| CUSTOMER | THE SINGARENI COLLIERIES COMPANY LTD. | | | | | |
| CONSULTANT | NATIONAL THERMAL POWER CORPORATION LTD. | | | | | |
| PROJECT | 400 KV AND 132 KV SWITCHYARD FOR SINGARENI THERMAL POWER PROJECT 2X660MW AT ADILABAD, AP | | | | | |

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| Rev No. | Date | Altered | Checked | Approved | REVISION DETAILS |
|---|---|---|---|---|---|
| 01 | 29.10.12 | 29.10.12 | 29/10/12 | | List of Type tests to be conducted on 132kV Circuit Breaker included at cl.1.4.1.2 of Section-1 |

## SECTION 1

## SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES.

### 1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of 400kV and 132kV SF6 Circuit Breakers complete with accessories as listed in clause 1.2 & 1.3 below.

This section covers the specific technical requirements of SF6 Circuit Breakers. In case of any discrepancies between the requirements mentioned in this section and those specified in the following sections of this specification, the specifications given herein shall prevail and shall be treated as binding requirements.

**1.1** The equipment is required for the following project.

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Refer Section - 3 for Project Details and General Specifications.

### 1.2 TECHNICAL PARTICULARS

Minimum creepage for Insulators (@ 25 mm /kV) - 10500 mm
Minimum Zinc coating on Support Structure - 610 grams/ sq meter

Rest as per the following NTPC Specifications attached herewith:

(i) For 400kV SF6 Circuit Breakers refer SCCL (2X600MW) BTG package, Technical Specification: Section-VI, Part-B, Technical Specifications, Sub Section-B-17, SWITCHYARD-CIRCUIT BREAKER, and Page 1 to 13.

(ii) For 132kV SF6 Circuit Breakers refer Technical Specification :132KV START UP POWER FOR SCCL 2X600 MW TPS AT ADILABAD PROJECT , SPEC. NO TBEM-81009-132KV START UP POWER SPECIFICATION,CHAPTER-E1: CIRCUIT BREAKER, Page E1-1 to 12.

### 1.3 QUANTITIES

#### 1.3.1 Main Equipment

| Sl No. | Description | Quantity (in Nos.) |
|---|---|---|
| 1 | 420 KV, 3150 A, 50 kA for 1 sec , SF6 Circuit Breakers without PIR, Pneumatic/Electrically Spring Charged/Electro-Hydraulic mechanism with single and three phase high speed auto reclosing and with Support Structure | 7 |
| 2 | 420 KV, 2000 A, 50 kA for 1 sec , SF6 Circuit Breakers without PIR, Pneumatic/Electrically Spring Charged/Electro-Hydraulic mechanism with single and three phase high speed auto reclosing and with Support Structure | 7 |

| Sl No. | Description | Quantity (in Nos.) |
|---|---|---|
| 3 | 132KV, 1600 A, 31.5 kA for 1 sec , SF6 Circuit Breakers without PIR, Spring/Pneumatic mechanism without auto reclosing and with Support Structure | 2 |
| 4 | 132KV, 1250 A, 31.5 kA for 1 sec , SF6 Circuit Breakers without PIR, Spring/Pneumatic mechanism with single and three phase high speed auto reclosing and with Support Structure | 2 |
| 5 | 132KV, 1250 A, 31.5 kA for 1 sec , SF6 Circuit Breakers without PIR, Spring/Pneumatic mechanism without auto reclosing and with Support Structure | 1 |

**ACCESSORIES:**

Each Circuit Breaker (400kV and 132kV) shall be supplied with following accessories as required for the satisfactory operation of the breaker.

i) Support Structure
ii) Interpole cabling, pipes, cable tray of associated size, etc.
iii) Gas filling adaptor.
iv) Foundation bolts.
v) Any other accessory/device required for the satisfactory operation of the breaker.

### 1.3.2 Mandatory Maintenance Equipment <u>for 400kV Circuit Breaker</u>

| Sl No. | Description | Quantity (in Nos.) |
|---|---|---|
| 1 | SF6 Gas Filling and Evacuating Device (Portable) | 1 |
| 2 | SF6 Gas Recycling and Purifying plant(300liters) | 1 |
| 3 | SF6 Gas Leak Detector | 1 |

### 1.3.3 SPARES

i) Mandatory Spares - Following spares shall be supplied for each rating of the **<u>400kV Circuit Breaker</u>** (Set means complete replacement for one circuit breaker)

| Sl. No. | Item Description | Unit | Quantity (in Nos.) |
|---|---|---|---|
| 1 | Relays, power contactors, switch-fuses for electrical control circuit (one set consisting of one no. each of all types for one circuit breaker) | set | 1 |
| 2 | Set of gaskets, ring & seals | set | 1 |
| 3 | Molecular filter for circuit breaker | set | 1 |
| 4 | Tripping and closing coil (one set consisting of one no. each of all types) | set | 3 |
| 5 | Spring charging motors (if applicable) | no. | 1 |
| 6 | Pressure switch set for pneumatically operated circuit breaker | set | 1 |
| 7 | Spares for hydraulic operated mechanism | | |
| 8 | a) Motor with gear | no. | 1 |
| 9 | b) Limit switch | no. each | 1 |

(ii) Commissioning Spares : Closing & Tripping Coils – 2 Nos. of each type & rating
Any other commissioning spare to be recommended

## 1.4 TYPE TEST REQUIREMENTS FOR 400KV CIRCUIT BREAKERS

1.4.1.1 The contractor shall carry out the type tests as listed below on the **400kV Circuit Breaker** to be supplied under this contract. The bidder shall indicate the charges for each of these type tests separately and the same shall be considered for the evaluation of the bids. The type test charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the employer's engineer.

| Sl No. | Type test On **400kV Circuit Breaker** |
|---|---|
| 1 | Dielectric Tests |
| 2 | Radio Interference Test |
| 3 | Corona Test |
| 4 | Temperature Rise Test |
| 5 | Short Time withstand current and peak withstand current tests |
| 6 | Mechanical operation Test at ambient temp. (M1) |
| 7 | Short Circuit Test making and breaking test |
| 8 | Capacitive current switching test line charging current breaking test(C2) |
| 9 | Verification of degree of protection of boxes |
| 10 | Static terminal load tests |
| 11 | Short Line Fault Tests |
| 12 | Out of Phase making & breaking test |
| 13 | Switching of Shunt Reactor(50-80 MVAR) |

1.4.1.2 The contractor shall carry out the type tests as listed below on the **132kV Circuit Breaker** to be supplied under this contract. The bidder shall indicate the charges for each of these type tests separately and the same shall be considered for the evaluation of the bids. The type test charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the employer's engineer.

| Sl No. | Type test on **132kV Circuit Breaker** |
|---|---|
| 1 | Dielectric Tests |
| 2 | Radio Interference Test |
| 3 | Temperature Rise Test |
| 4 | Short Time withstand current and peak withstand current tests |
| 5 | Mechanical endurance and environment test |
| 6 | Short Circuit Test duties |
| 7 | Short Line Fault Tests |
| 8 | Out of Phase making & breaking test |
| 9 | Line charging current breaking test |
| 10 | IP:55 test on each type of box |

1.4.2 The type test shall be carried out in presence of employer's representative for which minimum 15 days notice shall be given by contractor .The contractor shall obtain the employer's approval for the type test procedure before conducting the type test. The type test procedure clearly specify the test set up, instruments to be used, procedure, acceptance norms, recording of different parameters interval of recording ,precautions to be taken etc. for the type tests (s) to be carried out.

1.4.3 In case contractor has already conducted such specified type test(s), he may submit during detailed engineering the type test reports to the owner for waival of conductance of such type test(s).These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test (s) should have been either conducted at an independent laboratory or should have been

witnessed by a client. The owner reserves the right to waive conducting of any or all the specified type tests (s) under this contract. In case type tests are waived, the type test charges shall not be payable to the contractor.

1.4.4 All acceptance and routine tests as per the specification and relevant standard shall be carried out. Charges for these shall be deemed to be included in the equipment price.

1.4.5 The type test reports once approved for any projects shall be treated as reference. For subsequent projects of SCCL, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.

## 1.5 SUPERVISION OF ERECTION, COMMISSIONING & SITE TESTING (OPTIONAL FOR PURCHASER):

Bidders are required to quote charges for supervision of erection, testing & commissioning of breakers of each rating with following breakup:

| Sl.no. | Description | Unit | Quantity (in Nos.) |
|---|---|---|---|
| 1. | Supervision of Erection ,Testing & Commissioning of all 400kV Breakers with special tools and test instruments* in Bidder scope | 1 lot | 14 |
| 2. | Supervision of Erection, Testing & Commissioning of all 132kV Breakers with special tools and test instruments* in Bidder scope | 1 lot | 5 |

Note: 1 lot= 1 Circuit Breaker

The Supervision of testing and commissioning shall be inclusive of the following:

i. Testing equipments required for testing.
ii. To and Fro fares from Bidder's headquarter to BHEL site.
iii. Accommodation and conveyance at site.
iv. Any other incidental charges.

No other charges shall be paid by BHEL.

## 1.6 PROVENNESS OF CIRCUIT BREAKERS

Bidders must meet the Provenness Criteria for 400kV and 132kV Circuit Breakers stipulated in ATTACHMENT-3A28 (2 sheets) attached herewith at Section-5 as Annexure. The Provenness data must be furnished with the offer.

Notes:-

1. '*' - The following instruments/kits shall be brought out at site by Bidder/supplier:
   (a) Time Interval meter (Timing kit)
   (b) Gas leak Detector

   The following instruments/kits shall be provided by BHEL at site:
   (a) Circuit Breaker Analyzer- (Make- SCOPE T&M HISAC 2406) - Adaptor/Transducer for above Analyzer suitable for your Breaker shall be in scope of bidder.
   (b) DCRM
   (c) Dew Point Meter
   (d) Megger
   (e) Multimeter