





QUALITY ASSURANCE

CLAUSE NO.

| D) Ageing test:                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                              | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Condition                                                 | Test Requirements                                                                                                                                                                                                                                                           | Remarks                                                                                                                                                     |
| <b>PVC insulation &amp; outer sheath:</b>                                                                                    | Samples as per relevant IS, from each size of cables in the offered lot, shall be tested for tensile strength & elongation (before ageing). <b>Tensile &amp; elongation testing shall preferably be done with a computerized machine.</b><br>The values will be compared with corresponding values mentioned in the Type Test report accepted by NTPC. These values of Tensile Strength & Elongation (before ageing) should be within +/- 15% of the corresponding values of Type Test report. (Please note that test values should be more than the minimum values indicated in relevant standard). | All sizes which meet the criteria                         | The size which has maximum negative deviation from type test report values will be put on accelerated ageing test. The samples shall be aged in air oven at temperature of 130°C+/- 2°C for 5 hours and tested for TS & elongation.<br>Acceptance norms shall be as per IS. | In case the size does not meet the requirement in accelerated ageing test then all sizes (which had met the criteria) will be put on ageing test as per IS. |
| <b>XLPE insulation</b>                                                                                                       | Samples as per relevant IS, from each size of cables in the offered lot, will be put on ageing test as per IS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sizes which do not meet the criteria                      | Every size will be put on ageing test as per IS.                                                                                                                                                                                                                            | ----                                                                                                                                                        |
| <b>E) Following tests will be carried out on completed cables as per IS on each size of each type (PVC / XLPE insulated)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
|                                                                                                                              | 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Insulation resistance test ( Volume resistivity method )  |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
|                                                                                                                              | 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | High voltage test                                         |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
| <b>F) Following tests shall be carried out on only one size of offered lot (comprising of all sizes &amp; types)</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
|                                                                                                                              | 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Thermal stability test on PVC insulation and outer sheath |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |
|                                                                                                                              | 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Oxygen index test on outer sheath                         |                                                                                                                                                                                                                                                                             |                                                                                                                                                             |

LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION – VI, PART-B  
BID DOC. NO CS-0011-109(1A)-2

SUB-SECTION-V-QE3  
LT POWER CABLES

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                  |                                                                                                                                                                                                                                                               |                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| CLAUSE NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | QUALITY ASSURANCE                                                                |                                                                                                                                                                                                                                                               |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3)                                                                               | Smoke density rating test on outer sheath                                                                                                                                                                                                                     |                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4)                                                                               | Acid gas generation test on outer sheath                                                                                                                                                                                                                      |                                                                                   |
| <b>G) Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cables as per following sampling plan:</b><br>This test will be carried out using composite sampling i.e. irrespective of size; cables of one particular type (i.e. armoured PVC insulated, unarmoured PVC insulated, armoured XLPE insulated, unarmoured XLPE insulated) will be bunched together, as per calculations in line with the IEC. All sizes of PVC & XLPE insulated, armoured & unarmoured cables shall be covered.<br>For one particular type, cables with OD less than or equal to 30 mm shall be clubbed together in touching formation while cables with OD greater than 30 mm shall be clubbed together leaving a gap equal to OD of cable having least diameter. Cable OD shall be taken as nominal overall diameter as per NTPC approved datasheet. |                                                                                  |                                                                                                                                                                                                                                                               |                                                                                   |
| <b>H) Following tests shall be carried on one length of each size of each type (PVC / XLPE insulated) of offered lot:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                  |                                                                                                                                                                                                                                                               |                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1)                                                                               | Constructional / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, drum / Batch (outer sheath extrusion batch )number marking on sheath |                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2)                                                                               | Measurement of Eccentricity & Ovality                                                                                                                                                                                                                         |                                                                                   |
| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 | SUB-SECTION-V-QE3<br>LT POWER CABLES                                                                                                                                                                                                                          | PAGE 4 OF 4                                                                       |

## **SUB-SECTION-V-QE4**

### **CONTROL CABLES**

| CLAUSE NO.                                                                                          |                                           | QUALITY ASSURANCE        |                       |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |  |  |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------|-----------------------|----------------------|---------------------------|-----------------------|-----------------------|---------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|-------------------|--------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------|--|
| Control Cables                                                                                      |                                           |                          |                       |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Attributes / Characteristics                                                                        | Make, Type & T.C as per relevant standard | Dimension/surface finish | Mechanical properties | Chemical Composition | Spark Test(as applicable) | Electrical properties | Lay length & Sequence | Armour coverage, cross over, looseness, gap between two | Sequential marking/ Batch marking/ surface finish/ cable length | T.S & elongation before & after ageing on outer sheath & insulation | Thermal stability | Anti termite coating on wooden | Constructional requirements as per NTPC specification | Routine & Acceptance Tests as per relevant standard & NTPC specification | FRLS Tests |                                                                                   |  |
| Item / Components / Sub System Assembly                                                             |                                           |                          |                       |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Copper (IS-8130)                                                                                    | Y                                         | Y                        | Y                     | Y                    | Y                         | Y                     |                       |                                                         |                                                                 | Y                                                                   | Y                 |                                |                                                       |                                                                          |            |                                                                                   |  |
| PVC insulation Compound (IS: 5831)                                                                  | Y                                         |                          | Y                     |                      |                           | Y                     |                       |                                                         |                                                                 | Y                                                                   |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| FRLS PVC Compound (IS-5831, ASTM-D2843, IS10810( Part 58), IEC-60754 Part-1)                        | Y                                         |                          | Y                     |                      |                           |                       |                       |                                                         |                                                                 | Y                                                                   | Y                 |                                |                                                       |                                                                          | Y          |                                                                                   |  |
| Extrusion & curing /Manufacturing of Core                                                           |                                           | Y                        |                       |                      | Y                         |                       |                       |                                                         |                                                                 |                                                                     | Y                 |                                |                                                       |                                                                          |            |                                                                                   |  |
| Core Laying                                                                                         |                                           |                          |                       |                      |                           |                       | Y                     |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Armour wire/strip                                                                                   | Y                                         | Y                        | Y                     |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Inner sheath                                                                                        | Y                                         | Y                        |                       |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Armouring                                                                                           |                                           | Y                        |                       |                      |                           |                       |                       | Y                                                       |                                                                 |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Outer Sheathing                                                                                     |                                           | Y                        |                       |                      |                           |                       |                       |                                                         | Y                                                               |                                                                     |                   |                                |                                                       |                                                                          |            |                                                                                   |  |
| Finished Cable (IS-5831, ASTM-D2843, IS10810( Part 58), IEC-60754 Part-1, IEC 60332 part III cat B) |                                           |                          |                       |                      |                           |                       | Y                     | Y                                                       | Y                                                               | Y                                                                   | Y                 | Y                              | Y                                                     | Y                                                                        | Y          |                                                                                   |  |
| Wooden drum(IS-10418) /Steel Drum                                                                   |                                           | Y                        |                       |                      |                           |                       |                       |                                                         |                                                                 |                                                                     |                   | Y                              | Y                                                     |                                                                          |            |                                                                                   |  |

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.

2. Make of all major Bought out items will be subject to NTPC approval.

|                                                             |                                                                                  |                                        |             |
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| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 | SUB-SECTION-V-QE4<br>LT CONTROL CABLES | PAGE 1 OF 4 |
|-------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|-------------|

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought out items will be subject to NTPC approval.

|                                                             |                                                                                  |                                        |             |
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| LOT-1A PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 | SUB-SECTION-V-QE4<br>LT CONTROL CABLES | PAGE 1 OF 4 |
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| CLAUSE NO.                                                                                        |  | QUALITY ASSURANCE                                                                           |                                                                              |  |  |
| ROUTINE TESTS                                                                                     |  | Following routine tests shall be carried out on each drum of finished cables for all sizes. |                                                                              |                                                                                   |  |
| 1)                                                                                                |  | Conductor Resistance test                                                                   |                                                                              |                                                                                   |  |
| 2)                                                                                                |  | High voltage test                                                                           |                                                                              |                                                                                   |  |
| ACCEPTANCE TESTS                                                                                  |  | Following Acceptance tests shall be carried out on each size of cables, in the offered lot. |                                                                              |                                                                                   |  |
| A) For Conductor (as per sampling plan mentioned in IS: 1554)                                     |  |                                                                                             |                                                                              |                                                                                   |  |
|                                                                                                   |  | 1)                                                                                          | Annealing test (Copper)                                                      |                                                                                   |  |
|                                                                                                   |  | 2)                                                                                          | Resistance test                                                              |                                                                                   |  |
| B) For Armour Wires / Formed Wires ( If applicable ) (as per sampling plan mentioned in IS: 1554) |  |                                                                                             |                                                                              |                                                                                   |  |
|                                                                                                   |  | 1.                                                                                          | Measurement of Dimensions                                                    |                                                                                   |  |
|                                                                                                   |  | 2.                                                                                          | Tensile Tests                                                                |                                                                                   |  |
|                                                                                                   |  | 3.                                                                                          | Elongation Test                                                              |                                                                                   |  |
|                                                                                                   |  | 4.                                                                                          | Torsion Test For Round wires only                                            |                                                                                   |  |
|                                                                                                   |  | 5.                                                                                          | Wrapping Test                                                                |                                                                                   |  |
|                                                                                                   |  | 6.                                                                                          | Resistance Test                                                              |                                                                                   |  |
|                                                                                                   |  | 7.                                                                                          | Mass of Zinc coating test For G S wires / Formed wires only                  |                                                                                   |  |
|                                                                                                   |  | 8.                                                                                          | Uniformity of Zinc coating For G S wires / Formed wires only                 |                                                                                   |  |
|                                                                                                   |  | 9.                                                                                          | Adhesion test For G S wires / Formed wires only                              |                                                                                   |  |
|                                                                                                   |  | 10.                                                                                         | Freedom from surface defects                                                 |                                                                                   |  |
| C) For PVC insulation & PVC Sheath (as per sampling plan mentioned in IS: 1554)                   |  |                                                                                             |                                                                              |                                                                                   |  |
|                                                                                                   |  | 1)                                                                                          | Test for thickness                                                           |                                                                                   |  |
|                                                                                                   |  | 2)                                                                                          | Tensile strength & Elongation before ageing (for tests after ageing see "D") |                                                                                   |  |
| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE                                       |  | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2            |                                                                              | SUB-SECTION-V-QE4<br>LT CONTROL CABLES                                            |  |
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| CLAUSE NO.                                                                                                                                  |    | QUALITY ASSURANCE                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |  |  |
| <b>G) Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cable will be carried out as per following sampling plan:</b> |    |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                             |                                                                                   |  |
|                                                                                                                                             |    |                                                                                                                                                                                                                                               | This test will be carried out using composite sampling i.e. irrespective of size; cables of one particular type (i.e. armoured, unarmoured) will be bunched together, as per calculations in line with the IEC. All sizes of armoured & unarmoured cables shall be covered. |                                                                                   |  |
| <b>H) Following tests shall be carried on one length of each size (armoured &amp; unarmoured) of offered lot:</b>                           |    |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                             |                                                                                   |  |
|                                                                                                                                             | 1) | Constructional / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, drum / outer sheath extrusion's batch number marking |                                                                                                                                                                                                                                                                             |                                                                                   |  |
|                                                                                                                                             | 2) | Measurement of Eccentricity & Ovality                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                             |                                                                                   |  |
| LOT-1A PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE                                                                                 |    | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2                                                                                                                                                              |                                                                                                                                                                                                                                                                             | SUB-SECTION-V-QE4<br>LT CONTROL CABLES                                            |  |
|                                                                                                                                             |    |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                             | PAGE 4 OF 4                                                                       |  |

## **SUB-SECTION-V-QE5**

### **CABLING EARTHING & LIGHTNING PROTECTION**

LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2



## **SUB-SECTION-V-QE6**

### **HT CABLES**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

QUALITY ASSURANCE

CLAUSE NO.

MV (3.3 kV / 6.6. kV / 11 kV / 33 kV) Cables

| Attributes / Characteristics<br><br>Item / Components / Sub System Assembly | Make, Type & T.C as per relevant standard | Dimension/surface finish | Mechanical properties | Chemical Composition | Spark Test(as applicable) | Electrical properties | Hot Set Test/ Eccentricity & Ovality | Lay length & Sequence | Armour coverage, cross over, looseness, gap between two wires | Sequential marking/ Batch marking/ surface finish/ cable length | T.S & elongation before & after ageing on outer sheath & insulation | Thermal stability on outer sheath | Metallic ( Cu ) Screening ( if applicable) | Anti termite coating on wooden drums | Constructional requirements as per NTPC | Routine & Acceptance Test as per relevant standard & NTPC specification | FRLS Test |
|-----------------------------------------------------------------------------|-------------------------------------------|--------------------------|-----------------------|----------------------|---------------------------|-----------------------|--------------------------------------|-----------------------|---------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------|--------------------------------------------|--------------------------------------|-----------------------------------------|-------------------------------------------------------------------------|-----------|
| Aluminum (IS-8130)                                                          | Y                                         | Y                        | Y                     | Y                    | Y                         | Y                     |                                      |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Semiconducting Compound                                                     | Y                                         |                          | Y                     |                      |                           | Y                     |                                      |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| XLPE Compound (IS-7098 Part-II)                                             | Y                                         |                          | Y                     |                      |                           | Y                     |                                      |                       |                                                               |                                                                 | Y                                                                   |                                   |                                            |                                      |                                         |                                                                         |           |
| FRLS PVC Compound (IS-5831, ASTM-D2843, IS10810( Part 58)                   | Y                                         |                          | Y                     |                      |                           |                       |                                      |                       |                                                               |                                                                 | Y                                                                   |                                   |                                            |                                      |                                         |                                                                         | Y         |
| IEC-60754 Part-1)                                                           |                                           |                          |                       |                      |                           |                       |                                      |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Triple Extrusion & curing /Manufacturing of Core                            |                                           | Y                        |                       |                      | Y                         | Y                     | Y                                    |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Copper Tape                                                                 | Y                                         | Y                        | Y                     |                      |                           | Y                     |                                      |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Polyester tape                                                              | Y                                         | Y                        |                       |                      |                           |                       |                                      | Y                     |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Core Laying                                                                 |                                           |                          |                       |                      |                           |                       |                                      | Y                     |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Armour wire/strip                                                           | Y                                         | Y                        | Y                     |                      |                           |                       |                                      |                       |                                                               |                                                                 |                                                                     |                                   | Y                                          |                                      |                                         |                                                                         |           |
| Copper tapping                                                              | Y                                         | Y                        |                       |                      |                           |                       |                                      |                       |                                                               |                                                                 |                                                                     |                                   | Y                                          |                                      |                                         |                                                                         |           |
| Inner sheath                                                                | Y                                         | Y                        |                       |                      |                           |                       |                                      |                       |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Armouring                                                                   |                                           | Y                        |                       |                      |                           |                       |                                      | Y                     |                                                               |                                                                 |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Outer Sheathing                                                             |                                           | Y                        |                       |                      |                           |                       |                                      |                       |                                                               | Y                                                               |                                                                     |                                   |                                            |                                      |                                         |                                                                         |           |
| Power Cable (Finished)                                                      |                                           |                          |                       |                      |                           |                       |                                      | Y                     | Y                                                             | Y                                                               | Y                                                                   | Y                                 |                                            | Y                                    | Y                                       |                                                                         | Y         |
| Wooden drum(IS-10418) /Steel Drum                                           |                                           | Y                        |                       |                      |                           |                       |                                      | Y                     | Y                                                             | Y                                                               | Y                                                                   | Y                                 |                                            | Y                                    | Y                                       |                                                                         |           |

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought out items will be subject to NTPC approval.

LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION – VI, PART-B  
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SUB-SECTION-V-QE6  
HT CABLE

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CLAUSE NO.

QUALITY ASSURANCE



|                                                                                                                  |                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>ROUTINE TESTS</b>                                                                                             | Following routine tests shall be carried out on each drum of finished cables for all types & sizes.                       |
| 1)                                                                                                               | Conductor Resistance test                                                                                                 |
| 2)                                                                                                               | High voltage test                                                                                                         |
| 3)                                                                                                               | Partial discharge test (for Screened cables only)                                                                         |
|                                                                                                                  |                                                                                                                           |
| <b>ACCEPTANCE TESTS</b>                                                                                          | Following Acceptance tests shall be carried out on each size of each type (voltage rating) of cables, in the offered lot. |
| <b>A) For Conductor (as per sampling plan mentioned in IS: 7098 Part II)</b>                                     |                                                                                                                           |
| 1)                                                                                                               | Annealing test (Copper)                                                                                                   |
| 2)                                                                                                               | Tensile Test ( Aluminum)                                                                                                  |
| 3)                                                                                                               | Wrapping Test ( Aluminum)                                                                                                 |
| 4)                                                                                                               | Resistance test                                                                                                           |
|                                                                                                                  |                                                                                                                           |
| <b>B) For copper tape / Wires (as per sampling plan mentioned in IS: 7098 Part II)</b>                           |                                                                                                                           |
| 1)                                                                                                               | Measurement of Dimensions                                                                                                 |
| 2)                                                                                                               | Conductivity check                                                                                                        |
|                                                                                                                  |                                                                                                                           |
| <b>B) For Armour Wires / Formed Wires ( If applicable ) (as per sampling plan mentioned in IS: 7098 Part II)</b> |                                                                                                                           |
| 1.                                                                                                               | Measurement of Dimensions                                                                                                 |
| 2.                                                                                                               | Tensile Tests                                                                                                             |
| 3.                                                                                                               | Elongation Test                                                                                                           |
| 4.                                                                                                               | Torsion Test For Round wires only                                                                                         |
| 5.                                                                                                               | Wrapping Test                                                                                                             |
| 6.                                                                                                               | Resistance Test                                                                                                           |
| 7.                                                                                                               | Mass of Zinc coating test For G S wires / Formed wires only                                                               |
| 8.                                                                                                               | Uniformity of Zinc coating For G S wires / Formed wires only                                                              |
| 9.                                                                                                               | Adhesion test For G S wires / Formed wires only                                                                           |
| 10.                                                                                                              | Freedom from surface defects                                                                                              |
|                                                                                                                  |                                                                                                                           |

LOT-1A PROJECTS

FLUE GAS DESULPHURISATION SYSTEM PACKAGE

TECHNICAL SPECIFICATION

SECTION – VI, PART-B

BID DOC. NO CS-0011-109(1A)-2

SUB-SECTION-V-QE6

HT CABLE

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|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
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| CLAUSE NO.                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | QUALITY ASSURANCE                                                                |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |  |  |
| C) For XLPE insulation & PVC Sheath (as per sampling plan mentioned in IS: 7098 Part II)       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1)                                                                               | Test for thickness                                                                                                                                                                                                                                                                   |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2)                                                                               | Tensile strength & Elongation before ageing (for tests after ageing see "D")                                                                                                                                                                                                         |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3)                                                                               | Hot set test (For XLPE insulation)                                                                                                                                                                                                                                                   |                                                                                                                                                                    |                               |                                                                                   |  |
| D) Ageing test:                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Condition                                                                        | Test Requirements                                                                                                                                                                                                                                                                    | Remarks                                                                                                                                                            |                               |                                                                                   |  |
| PVC outer sheath :                                                                             | Samples as per relevant IS, from each size of each type (voltage rating) of cables in the offered lot, shall be tested for tensile strength & elongation (before ageing). <b>Tensile &amp; elongation testing shall preferably be done with a computerized machine.</b><br>The values will be compared with corresponding values mentioned in the Type Test report accepted by NTPC. These values of Tensile Strength & Elongation (before ageing) should be within +/- 15% of the corresponding values of Type Test report. (Please note that test values should be more than the minimum values indicated in relevant standard). | All sizes which meet the criteria                                                | For PVC: The size which has maximum negative deviation from type test report values will be put on accelerated ageing test. The samples shall be aged in air oven at temperature of 130°C+/- 2°C for 5 hours and tested for TS & elongation.<br>Acceptance norms shall be as per IS. | In case the size does not meet the requirement in accelerated ageing test <b>then all sizes (which had met the criteria) will be put on ageing test as per IS.</b> |                               |                                                                                   |  |
| XLPE Insulation                                                                                | Samples as per relevant IS, from each size of each type (voltage rating) of cables in the offered lot, will be put on ageing test as per IS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sizes which do not meet the criteria                                             | Every size will be put on ageing test as per IS.                                                                                                                                                                                                                                     | ----                                                                                                                                                               |                               |                                                                                   |  |
| E) Following tests will be carried out on completed cables as per IS on each size of each type |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                | 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Insulation resistance test ( Volume resistivity method )                         |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                | 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | High voltage test                                                                |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
|                                                                                                | 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Partial discharge test ( for Screened cables only )                              |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    |                               |                                                                                   |  |
| LOT-IA PROJECTS                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    | SUB-SECTION-V-QE6<br>HT CABLE |                                                                                   |  |
| FLUE GAS DESULPHURISATION SYSTEM PACKAGE                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                    | PAGE 3 OF 4                   |                                                                                   |  |



**SUB-SECTION-V-QE7**

**ELECTRIC ACTUATORS WITH INTEGRAL  
STARTERS**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

## ELECTRICAL ACTUATOR WITH INTEGRAL STARTER

| Test/Attributes Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                   |               |                     |                                                   |                         |                                                    |                          |                                                   |                                                                       |              |                  |                                             |                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|---------------|---------------------|---------------------------------------------------|-------------------------|----------------------------------------------------|--------------------------|---------------------------------------------------|-----------------------------------------------------------------------|--------------|------------------|---------------------------------------------|--------------------------------------------------------------------|
| ITEM/<br>COPONENT/<br>SUB SYSTEM<br>ASSEMBLY/<br>TESTING                                                                                                                                                                                                                                                                                                                                                                                                                  | RPM ® | No Load Current ® | IR & HV Test® | Mounting Dimension® | All routine Test as per Standard & Specification® | Correct Phase Sequence® | Operation & Setting of limit Switch/Torque Switch® | Stall Torque/Current (A) | Hand Wheel operation/ Auto de clutch function (A) | Function of Aux. like Potentiometer, space heater, position indicator | EPT output ® | Grease leakage ® | Local/ Remote ( Open-Stop-Close) Operation® | Safety check (Single phasing, Phase correction, Tripping etc.) (A) |
| <b>ELECTRICAL ACTUATOR WITH INTEGRAL STARTER(IS_9334)</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                   |               |                     |                                                   |                         |                                                    |                          |                                                   |                                                                       |              |                  |                                             |                                                                    |
| Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Y     | Y                 | Y             | Y                   | Y                                                 |                         |                                                    |                          |                                                   |                                                                       |              |                  |                                             |                                                                    |
| Final Testing                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Y     | Y                 | Y             | Y                   | Y                                                 | Y                       | Y                                                  | Y                        | Y                                                 | Y                                                                     | Y            | Y                | Y                                           | Y                                                                  |
| <p>Note: 1) Detailed procedure of Burn-in and Elevated Temperature test shall be as per Quality Assurance Programme in General Technical Conditions</p> <p>2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the practices and procedure adopted along with relevant supporting documents.</p> <p>® - Routine Test                      (A) - Acceptance Test                      Y - Test applicable</p> |       |                   |               |                     |                                                   |                         |                                                    |                          |                                                   |                                                                       |              |                  |                                             |                                                                    |

## **SUB-SECTION-V-QE8**

### **HT SWTIGCHGEAR**

| CLAUSE NO.                                                  |  | QUALITY ASSURANCE & INSPECTION                                                   |                       |                       |                     |                     |                                                                     |                                       |                             |                                           |                   |              |                                                     |  |                                            |
|-------------------------------------------------------------|--|----------------------------------------------------------------------------------|-----------------------|-----------------------|---------------------|---------------------|---------------------------------------------------------------------|---------------------------------------|-----------------------------|-------------------------------------------|-------------------|--------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------|
| QA TABLE FOR HT SWITCHGEAR                                  |  |                                                                                  |                       |                       |                     |                     |                                                                     |                                       |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| ATTRIBUTES CHARACTERISTICS<br>→                             |  | Make, Type, Model, Rating & TC                                                   | Electrical Properties | Mechanical properties | Chemical Properties | Dimensions & Finish | Constructional, Functional & Operational Features as per NTPC Spec. | Item to conform to relevant Standards | Pretreatment as per IS 6005 | Paint shade, thickness, adhesion & finish | Functional Checks | HV & IR Test | Degree of Protection Routine test as per NTPC spec. | CB Operation timing check                                                           | All Routine Tests as per relevant standard |
| ITEMS, COMPONENTS, SUB-SYSTEM ASSEMBLY<br>↓                 |  |                                                                                  |                       |                       |                     |                     |                                                                     |                                       |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| CRCA steel sheet/ Aluzinc*/ Zinalum*/ Galvalum*             |  | Y                                                                                |                       | Y                     | Y                   | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Aluminum Bus bar material ( IS : 5082 )                     |  | Y                                                                                | Y                     | Y                     | Y                   | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Copper Bus bar material ( IS : 613 )                        |  | Y                                                                                | Y                     | Y                     | Y                   | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Bus bar Support Insulator                                   |  | Y                                                                                | Y                     | Y                     |                     | Y                   |                                                                     | Y                                     |                             |                                           |                   | Y            |                                                     |                                                                                     |                                            |
| HT Circuit Breaker (IEC-62271-100)                          |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     | Y                                                                                   | Y                                          |
| HT Contactors ( IS : 9046 / IEC 60470)                      |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| Protection & Auxilliary Relays                              |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| HT CT's & PT's ( IS : 2705 / 3156 )                         |  | Y                                                                                |                       |                       |                     | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     | Y                                          |
| HT Fuses ( IS : 9385 )                                      |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Surge Arrester ( IEC : 99 -4 )                              |  | Y                                                                                |                       |                       |                     | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     | Y                                          |
| LT Contactors ( IS : 13947)                                 |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     |                                            |
| Control & Selector Switches ( IS : 6875 )                   |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     |                                            |
| Indicating Meters ( IS : 1248)                              |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| Indicating Lamps ( IS : 13947)                              |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     |                                            |
| Push Buttons ( IS : 4794)                                   |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     |                                            |
| Control Transformer ( IS : 12021 )                          |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| LT Fuses ( IS : 13703)                                      |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Energy Meters ( IS : 722 )                                  |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| Transducers ( IEC : 60688)                                  |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     | Y                                          |
| Diodes                                                      |  | Y                                                                                | Y                     |                       |                     |                     | Y                                                                   | Y                                     |                             |                                           | Y                 |              |                                                     |                                                                                     |                                            |
| Terminal Blocks                                             |  | Y                                                                                | Y                     |                       |                     |                     | Y                                                                   | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Synthetic Rubber Gasket ( IS : 11149 / 3400 )               |  | Y                                                                                | Y                     |                       |                     | Y                   |                                                                     | Y                                     |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| Breaker Handling Trolley                                    |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   |                                       |                             | Y                                         | Y                 |              |                                                     |                                                                                     |                                            |
| HT Switchgear Panel IEC-62271-200)                          |  | Y                                                                                |                       |                       |                     | Y                   | Y                                                                   | Y                                     | Y                           | Y                                         | Y                 | Y            | Y                                                   | Y                                                                                   | Y                                          |
|                                                             |  |                                                                                  |                       |                       |                     |                     |                                                                     |                                       |                             |                                           |                   |              |                                                     |                                                                                     |                                            |
| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE |  | TECHNICAL SPECIFICATION<br>SECTION - VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 |                       |                       |                     |                     |                                                                     | SUB-SECTION-V-QE8<br>HT SWITCHGEAR    |                             |                                           |                   |              | PAGE<br>1 OF 2                                      |                                                                                     |                                            |

| CLAUSE NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | QUALITY ASSURANCE & INSPECTION                                                   |  |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| <p>Notes:</p> <ol style="list-style-type: none"><li>1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.</li><li>2. Make of all major Bought Out Items will be subject to NTPC approval.</li><li>3. Temperature rise test reports for diode plates with actual heat sink will be verified.</li></ol> <p>*. CRCA Galvanized steel with metal coating composed of Al (55%), Zn (43.4%) &amp; Si (1.6%),</p> |                                                                                  |                                                                                     |                |
| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM<br>PACKAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2 | SUB-SECTION-V-QE8<br>HT SWITCHGEAR                                                  | PAGE<br>2 OF 2 |

## **SUB-SECTION-V-QE9**

### **LT SWTIGCHGEAR**

**LT SWITCHGEAR**

( MCC, PCC, ACDB, DCDB, FUSE BOARDS, LOCAL PUSH BUTTON STATION, LOCAL MOTOR STARTERS)

| ATTRIBUTES<br>CHARACTERIS-TICS<br><br>→<br><br>↓<br><br>ITEMS/ COMPONENTS/ SUB<br>SYSTEM ASSEMBLY | Make, Model, Type, Rating & TC | Dimensions & Finish | Electrical properties | Mechanical Properties | Chemical properties | Functional & Operational Features<br>as per NTPC Spec. | Item to conform to relevant | Pretreatment as per IS 6005 | Paint Shade, Adhesion, Thickness | Functional Checks | Milli-volt drop Test | IR – HV – IR Test | Degree of Protection Routine test<br>as per NTPC spec | All Routine tests as per NTPC |
|---------------------------------------------------------------------------------------------------|--------------------------------|---------------------|-----------------------|-----------------------|---------------------|--------------------------------------------------------|-----------------------------|-----------------------------|----------------------------------|-------------------|----------------------|-------------------|-------------------------------------------------------|-------------------------------|
|                                                                                                   |                                |                     |                       |                       |                     |                                                        |                             |                             |                                  |                   |                      |                   |                                                       |                               |
| Sheet Steel (IS : 513)                                                                            | Y                              | Y                   |                       | Y                     | Y                   |                                                        | Y                           |                             |                                  |                   |                      |                   |                                                       |                               |
| Aluminum Bus bar Material<br>(IS : 5082)                                                          | Y                              | Y                   | Y                     | Y                     | Y                   |                                                        | Y                           |                             |                                  |                   |                      |                   |                                                       |                               |
| Copper Bus bar Material<br>(IS : 613)                                                             | Y                              | Y                   | Y                     | Y                     | Y                   |                                                        | Y                           |                             |                                  |                   |                      |                   |                                                       |                               |
| Support Insulator                                                                                 | Y                              | Y                   | Y                     | Y                     |                     |                                                        | Y                           |                             |                                  |                   |                      |                   |                                                       |                               |
| Air Circuit Breaker ( IS: 13947)                                                                  | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 | Y                    |                   |                                                       | Y                             |
| Energy Meters ( IS : 13010,<br>13779 )                                                            | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       | Y                             |
| Power & Aux. Contactors<br>(IS : 13947 )                                                          | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       |                               |
| Protection & Aux. Relays<br>(IS : 3231)<br>(IEC 60255 / IEC 61850)                                | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       | Y                             |
| Control & Selector Switches<br>( IS : 13947)                                                      | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       |                               |
| CT's & PT's ( IS 2705 / 3156)                                                                     | Y                              | Y                   |                       |                       |                     |                                                        | Y                           |                             |                                  |                   |                      |                   |                                                       | Y                             |
| MCCB ( IS : 13947 )                                                                               | Y                              | Y                   |                       |                       |                     |                                                        | Y                           |                             |                                  | Y                 |                      |                   |                                                       |                               |
| Indicating Meters ( IS : 1248 )                                                                   | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       | Y                             |
| Indicating Lamps ( IS : 13947 )                                                                   | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       |                               |
| Air Break Switches<br>( IS : 13947 )                                                              | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  | Y                 |                      |                   |                                                       |                               |
| Control Terminal Blocks                                                                           | Y                              | Y                   |                       |                       |                     | Y                                                      | Y                           |                             |                                  |                   |                      |                   |                                                       |                               |

# **LT SWITCHGEAR**

**( MCC, PCC, ACDB, DCDB, FUSE BOARDS, LOCAL PUSH BUTTON STATION, LOCAL MOTOR STARTERS)**

| ATTRIBUTES CHARACTERISTICS /<br><br>ITEMS/ COMPONENTS/<br>SUB SYSTEM ASSEMBLY |                                |                     |                       |                       |                     |                                                     |                                       |                             |                                                      |                      |                   |                                                    |                                          |
|-------------------------------------------------------------------------------|--------------------------------|---------------------|-----------------------|-----------------------|---------------------|-----------------------------------------------------|---------------------------------------|-----------------------------|------------------------------------------------------|----------------------|-------------------|----------------------------------------------------|------------------------------------------|
|                                                                               | Make, Model, Type, Rating & TC | Dimensions & Finish | Electrical properties | Mechanical Properties | Chemical properties | Functional & Operational Features as per NTPC Spec. | Item to conform to relevant Standards | Pretreatment as per IS 6005 | Paint Shade, Adhesion, Thickness & Functional Checks | Milli-volt drop Test | IR – HV – IR Test | Degree of Protection Routine test as per NTPC spec | All Routine tests as per NTPC spec. & IS |
| Fuse ( IS 13703)                                                              | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     |                             |                                                      |                      |                   |                                                    |                                          |
| Control Transformer ( IS : 12021)                                             | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     |                             | Y                                                    |                      |                   |                                                    | Y                                        |
| Push Buttons ( IS : 4794 )                                                    | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     |                             | Y                                                    |                      |                   |                                                    |                                          |
| Transducer ( IEC : 60688)                                                     | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     |                             | Y                                                    |                      |                   |                                                    | Y                                        |
| MCB ( IS : 8828)                                                              | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     |                             | Y                                                    |                      |                   |                                                    |                                          |
| Breaker Handling Trolley                                                      | Y                              | Y                   |                       |                       |                     | Y                                                   |                                       |                             | Y                                                    | Y                    |                   |                                                    | Y                                        |
| Synthetic Rubber Gasket (IS : 11149 )                                         | Y                              | Y                   |                       | Y                     | Y                   |                                                     | Y                                     |                             |                                                      |                      |                   |                                                    |                                          |
| LT SWITCHGEAR ( IS : 8623 )                                                   | Y                              | Y                   |                       |                       |                     | Y                                                   | Y                                     | Y                           | Y                                                    | Y                    | Y                 | Y                                                  | Y                                        |

**Notes:**

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Makes of all major Bought Out Items will be subject to NTPC approval.

## LT BUSDUCT

ATTRIBUTES  
CHARACTERISTICSITEM, COMPONENTS, SUB  
SYSTEM ASSEMBLY

|                                                                           | Dimension & Surface Finish | Make, Type, Rating & TC | Electrical Properties | Mechanical Properties | Chemical Properties | Item to conform to relevant IS | WPS Approval, Welder Qualification | Weld Quality Check ( DP test & x-ray | Paint Shade, Thickness, Adhesion & | Tightness by Torque measurement | Electrical Clearances | Galvanizing Test as per IS 2629/ 2633/ | IR – HV – IR Test | Phase Sequence Check | Degree of Protection routine test as per NTPC spec. |
|---------------------------------------------------------------------------|----------------------------|-------------------------|-----------------------|-----------------------|---------------------|--------------------------------|------------------------------------|--------------------------------------|------------------------------------|---------------------------------|-----------------------|----------------------------------------|-------------------|----------------------|-----------------------------------------------------|
| Aluminum Sheets / Plates / Strips / Flexibles / tubes ( IS : 5082 / 737 ) | Y                          | Y                       |                       | Y                     | Y                   | Y                              | Y                                  | Y                                    |                                    |                                 |                       |                                        |                   |                      |                                                     |
| CRCA Flats / ISMC ( IS 2062 )                                             | Y                          | Y                       |                       | Y                     | Y                   | Y                              |                                    |                                      |                                    |                                 |                       |                                        |                   |                      |                                                     |
| Neoprene / Synthetic Rubber Gaskets ( IS 11149 / 3400 )                   | Y                          | Y                       |                       | Y                     | Y                   |                                |                                    |                                      |                                    |                                 |                       |                                        |                   |                      |                                                     |
| Rubber Bellows ( IS : 3400)                                               | Y                          | Y                       |                       | Y                     | Y                   |                                |                                    |                                      |                                    |                                 |                       |                                        |                   |                      |                                                     |
| Support Insulator ( BS : 2782, IEC : 660, IS : 10912 )                    | Y                          | Y                       | Y                     | Y                     |                     |                                |                                    |                                      |                                    |                                 |                       |                                        |                   |                      |                                                     |
| Galvanized Structure & GI Earthing Flat ( IS : 2629 / 2633 / 4749 )       | Y                          | Y                       |                       |                       |                     | Y                              |                                    |                                      |                                    |                                 |                       | Y                                      |                   |                      |                                                     |
| Space Heater & Thermostat                                                 |                            | Y                       | Y                     |                       |                     |                                |                                    |                                      |                                    |                                 |                       |                                        | Y                 |                      |                                                     |
| LT Busduct ( IS : 8623 PART 2)                                            | Y                          | Y                       |                       |                       |                     | Y                              | Y                                  | Y                                    | Y                                  | Y                               | Y                     |                                        | Y                 | Y                    | Y                                                   |

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Makes of all major Bought Out Items will be subject to NTPC approval.

## **SUB-SECTION-V-QE10**

## **DIESEL GENERATORS**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**



| CLAUSE NO.                                                   |  | QUALITY ASSURANCE |             |          |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                          |           |            |                                                    |  |  |
|--------------------------------------------------------------|--|-------------------|-------------|----------|-----------------------|---------------|---------------|----------------------------|--------------------------|----------------|--------------------------|------------------------------|-------------------------|---------|-------------------|--------------------------|-----------|------------|----------------------------------------------------|-----------------------------------------------------------------------------------|--|
| ALTERNATOR                                                   |  |                   |             |          |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                          |           |            |                                                    |                                                                                   |  |
| TESTS/CHECKS                                                 |  | Visual            | Dimensional | Physical | Mech/Chem. Properties | NDT /DP/MP/UT | Metallography | Electrical Characteristics | Welding/Brazing(WPS/PQR) | Heat Treatment | Magnetic Characteristics | Hydraulic/Leak/Pressure Test | Thermal Characteristics | Run out | Dynamic Balancing | All tests as per IS-4722 | Vibration | Over speed | Tan delta, shaft voltage & polarisation index test |                                                                                   |  |
| ITEMS/COMPONENTS                                             |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Plates for stator frame,end shield, spider etc.              |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Shaft                                                        |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Magnetic Material                                            |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Rotor Copper/Aluminium                                       |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Stator copper                                                |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| SC Ring                                                      |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Insulating Material                                          |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Tubes for Cooler                                             |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Sleeve Bearing                                               |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Stator/Rotor, Exciter Coils                                  |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Castings, stator frame,terminal box and bearing housing etc. |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |
| Fabrication & machining of stator, rotor, terminal box       |  | Y                 | Y           | Y        | Y                     | Y             | Y             | Y                          | Y                        | Y              | Y                        | Y                            | Y                       | Y       | Y                 | Y                        | Y         | Y          | Y                                                  |                                                                                   |  |

LOT-IA PROJECTS

FLUE GAS DESULPHURISATION SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION – VI, PART-B  
BID DOC. NO CS-0011-109(1A)-2

SUB-SECTION-V-QE10  
DG SET

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LOT-1A PROJECTS

FLUE GAS DESULPHURISATION SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
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DG SET

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| CLAUSE NO.                               |                                                                                                                    | QUALITY ASSURANCE                                                                                                                                                                                              |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |  |  |             |  |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------|-----------------------|---------------|---------------|----------------------------|--------------------------|----------------|--------------------------|------------------------------|-------------------------|---------|-------------------|--------------------------------------|-----------|------------|----------------------------------------------------|-----------------------------------------------------------------------------------|--|-------------|--|
| TESTS/CHECKS                             |                                                                                                                    | ALTERNATOR                                                                                                                                                                                                     |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
| ITEMS/COMPONENTS                         |                                                                                                                    | Visual                                                                                                                                                                                                         | Dimensional | Make/Type/Rating/TC/Ge | Mech/Chem. Properties | NDT /DP/MP/UT | Metallography | Electrical Characteristics | Welding/Brazing(WPS/PQR) | Heat Treatment | Magnetic Characteristics | Hydraulic/Leak/Pressure Test | Thermal Characteristics | Run out | Dynamic Balancing | All Routine tests as per IS-/IS-4722 | vibration | Over speed | Tan delta, shaft voltage & polarisation index test |                                                                                   |  |             |  |
| Wound stator                             |                                                                                                                    | Y                                                                                                                                                                                                              | Y           |                        |                       |               |               | Y                          | Y                        |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          | Wound Exciter                                                                                                      | Y                                                                                                                                                                                                              | Y           |                        |                       |               |               | Y                          | Y                        |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          | Rotor complete                                                                                                     | Y                                                                                                                                                                                                              | Y           |                        |                       |               |               | Y                          |                          |                |                          |                              |                         | Y       |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          | Exciter, Stator, Rotor, Terminal Box assembly                                                                      | Y                                                                                                                                                                                                              | Y           |                        |                       |               |               | Y                          |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          | Accessories, RTD, BTD,CT,AVR. Brushes, Diodes,Space heater, antifriction bearing, cable glands, lugs, gaskets etc. | Y                                                                                                                                                                                                              | Y           | Y                      |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
| Alternator ( IS 4722)                    | Y                                                                                                                  | Y                                                                                                                                                                                                              | Y           |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   | Y                                    | Y         | Y          | Y1                                                 |                                                                                   |  |             |  |
| Note:                                    |                                                                                                                    | 1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and Procedure along with relevant supporting documents during QP finalisation. |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          |                                                                                                                    | 2. Make of all major BOIs will be subject to NTPC approval.                                                                                                                                                    |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
|                                          |                                                                                                                    | Y1= for HT Machines only.                                                                                                                                                                                      |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |
| LOT-IA PROJECTS                          |                                                                                                                    | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2                                                                                                                               |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    | SUB-SECTION-V-QE10<br>DG SET                                                      |  | PAGE 3 OF 4 |  |
| FLUE GAS DESULPHURISATION SYSTEM PACKAGE |                                                                                                                    |                                                                                                                                                                                                                |             |                        |                       |               |               |                            |                          |                |                          |                              |                         |         |                   |                                      |           |            |                                                    |                                                                                   |  |             |  |

| Clause No.                                                                                                                                                                                                                                                                                             | Quality Assurance |           |                 |                                                                                  |                    |                              |                  |                                  |                                                                           |                        | NTPC |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|-----------------|----------------------------------------------------------------------------------|--------------------|------------------------------|------------------|----------------------------------|---------------------------------------------------------------------------|------------------------|------|--|
| Tests/Checks                                                                                                                                                                                                                                                                                           | Final Assembly    |           |                 |                                                                                  |                    |                              |                  |                                  |                                                                           |                        |      |  |
|                                                                                                                                                                                                                                                                                                        | Material Test     | Dimension | WPS/PQR/Welding | NDT/DP/MP/UT                                                                     | Check completeness | Hydraulic/Leak/Pressure test | Functional Tests | All routine test as per Spec/ IS | No load test for 5 min & partial load for one hour of the DG set assembly | Clearances & Alignment |      |  |
| Items/Components                                                                                                                                                                                                                                                                                       |                   |           |                 |                                                                                  |                    |                              |                  |                                  |                                                                           |                        |      |  |
| Base frame                                                                                                                                                                                                                                                                                             | Y                 | Y         | Y               | Y                                                                                | Y                  |                              |                  |                                  |                                                                           |                        |      |  |
| Fuel Tank                                                                                                                                                                                                                                                                                              | Y                 | Y         | Y               | Y                                                                                | Y                  | Y                            |                  |                                  |                                                                           |                        |      |  |
| Battery                                                                                                                                                                                                                                                                                                |                   |           |                 |                                                                                  |                    |                              |                  | Y                                |                                                                           |                        |      |  |
| Battery Charger                                                                                                                                                                                                                                                                                        |                   |           |                 |                                                                                  |                    |                              |                  | Y                                |                                                                           |                        |      |  |
| Control Panel                                                                                                                                                                                                                                                                                          |                   |           |                 |                                                                                  |                    |                              |                  | Y                                |                                                                           |                        |      |  |
| Assembled DG Set                                                                                                                                                                                                                                                                                       |                   | Y         |                 |                                                                                  | Y                  |                              | Y                |                                  | Y                                                                         | Y                      |      |  |
| NOTES:<br>1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents during finalisation of QP.<br>2. Make of all major Bought Out Items will be subject to NTPC approval. |                   |           |                 |                                                                                  |                    |                              |                  |                                  |                                                                           |                        |      |  |
| Lot-1A Projects<br>Flue Gas Desulphurisation System Package                                                                                                                                                                                                                                            |                   |           |                 | Technical Specification<br>Section – VI, Part-B<br>Bid Doc. No CS-0011-109(1A)-2 |                    |                              |                  | Sub-Section-V-QE10<br>DG Set     |                                                                           | Page 4 of 4            |      |  |

## **SUB-SECTION-V-QE11**

### **AUXILIARY TRANSFORMERS**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

| CLAUSE NO.                                                      |  | QUALITY ASSURANCE                                                                                                                                                                             |                       |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
|-----------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|--------------------|----------------------|----------------------------------------------|----------------------|--------------|---------------------------------------------------------------|------------------------------------------------------------------|------------------|-----------|------------------------------------------------------------|---|
|                                                                 |  | AUXILIARY / LT TRANSFORMER                                                                                                                                                                    |                       |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
| Attributes / Characteristics                                    |  | Visual & Dimensional Checks                                                                                                                                                                   | Mechanical properties | Electrical strength | Thermal properties | Chemical Composition | Compatibility with oil                       | NDT / DPT / MPI / UT | Ageing Test. | Voltage Ratio, Vector Group & Polarity, Magnetic Balance Test | Make / Type / Rating / Model / TC / General Physical Inspection. | Functional check | WPS & PQR | Routine Test as per relevant standard / NTPC Specification |   |
| Items/Components Sub Systems                                    |  |                                                                                                                                                                                               |                       |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
|                                                                 |  | Tank, H.V. & L.V. Cable Box / Flange throat                                                                                                                                                   | Y                     | Y                   |                    |                      |                                              | Y                    |              |                                                               |                                                                  |                  | Y         |                                                            |   |
|                                                                 |  | Conservator / Radiator / Cooler / Pipes                                                                                                                                                       | Y                     | Y                   |                    |                      |                                              |                      | Y            |                                                               |                                                                  |                  |           |                                                            |   |
|                                                                 |  | Copper Conductor (IS:191)                                                                                                                                                                     | Y                     | Y                   | Y                  |                      | Y                                            |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
|                                                                 |  | Insulating Material                                                                                                                                                                           | Y                     | Y                   | Y                  | Y                    | Y                                            | Y                    |              |                                                               |                                                                  |                  |           |                                                            |   |
|                                                                 |  | CRGO Lamination & Built Core                                                                                                                                                                  | Y                     | Y                   | Y                  |                      | Y                                            | Y                    |              |                                                               |                                                                  | Y                |           |                                                            |   |
|                                                                 |  | Bushing / Insulator (IS:2544 / 5621)                                                                                                                                                          | Y                     | Y                   |                    |                      |                                              |                      |              |                                                               |                                                                  | Y                |           |                                                            | Y |
|                                                                 |  | Gasket                                                                                                                                                                                        | Y                     | Y                   |                    |                      | Y                                            | Y                    |              | Y                                                             |                                                                  | Y                |           |                                                            | Y |
|                                                                 |  | Transformer Oil (IEC296)                                                                                                                                                                      |                       |                     | Y                  |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            | Y |
|                                                                 |  | OLTC / Off-Circuit Tap Changer                                                                                                                                                                | Y                     |                     |                    |                      |                                              |                      |              |                                                               |                                                                  | Y                |           |                                                            | Y |
|                                                                 |  | Core Coil Assembly & Pre-tanking                                                                                                                                                              | Y                     |                     |                    |                      |                                              |                      |              |                                                               |                                                                  | Y                |           |                                                            |   |
|                                                                 |  | Marshalling Box                                                                                                                                                                               | Y                     |                     |                    |                      |                                              |                      |              |                                                               |                                                                  | Y                | Y         |                                                            | Y |
|                                                                 |  | WTI, OTI, MOG, PRD, Breather, Terminal Connector, Buchholz Relay, Valves                                                                                                                      | Y                     |                     |                    |                      |                                              |                      |              |                                                               |                                                                  | Y                | Y         |                                                            |   |
|                                                                 |  | Welding (ASME Sect-IX)                                                                                                                                                                        | Y                     |                     |                    |                      |                                              |                      |              | Y                                                             |                                                                  |                  |           | Y                                                          |   |
|                                                                 |  | Complete Transformer (IS:2026/ IEC-60076)                                                                                                                                                     | Y                     |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            | Y |
|                                                                 |  | Note: 1) This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents. |                       |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
| 2) All major Bought Out Items will be subject to NTPC approval. |  |                                                                                                                                                                                               |                       |                     |                    |                      |                                              |                      |              |                                                               |                                                                  |                  |           |                                                            |   |
| LOT-IA PROJECTS<br>FLUE GAS DESULPHURISATION SYSTEM PACKAGE     |  | TECHNICAL SPECIFICATION<br>SECTION – VI, PART-B<br>BID DOC. NO CS-0011-109(1A)-2                                                                                                              |                       |                     |                    |                      | SUB-SECTION-V-QE11<br>AUXILIARY TRANSFORMERS |                      |              |                                                               |                                                                  | PAGE 1 OF 1      |           |                                                            |   |

## **SUB-SECTION-V-QE12**

### **ELEVATOR**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

## Passenger/ Service Elevators

| TEST /CHECK<br>ITEM                   | Material Test | DPI/MPI | Ultrasonic Test | Dimensions/Physical | Functional/ Operational Test/ Run Test | Performance Test | Other Tests | All routine tests as per applicable standard | Plain shade, thickness & adhesion | Assembly/fit up |
|---------------------------------------|---------------|---------|-----------------|---------------------|----------------------------------------|------------------|-------------|----------------------------------------------|-----------------------------------|-----------------|
| Shaft/<br>/Gears/Pinion/Pulley/Sheave | Y             | Y       | Y               | Y                   |                                        |                  |             |                                              |                                   |                 |
| Spring                                | Y             | Y       | Y               | Y                   |                                        |                  |             | Y                                            |                                   |                 |
| Plates                                | Y             |         |                 | Y                   |                                        |                  |             |                                              |                                   |                 |
| Wire rope                             |               |         |                 | Y                   |                                        |                  | Y5          |                                              |                                   |                 |
| Safety device                         |               |         |                 |                     |                                        |                  |             | Y                                            |                                   |                 |
| Geared Machine                        |               |         |                 |                     | Y                                      |                  |             |                                              |                                   |                 |
| VVVF Drive                            |               |         |                 |                     | Y                                      |                  |             | Y                                            |                                   |                 |
| Power, Control & Trailing Cables      |               |         |                 |                     |                                        |                  |             | Y4                                           |                                   |                 |
| Control Panel                         |               |         |                 | Y                   |                                        |                  |             |                                              | Y                                 |                 |
| ARD System                            |               |         |                 |                     | Y                                      |                  |             | Y                                            |                                   |                 |
| Electrical motor                      |               |         |                 |                     |                                        |                  |             | Y                                            |                                   |                 |
| Controller assembly with VVVF drive   |               |         |                 |                     | Y                                      |                  | Y3          |                                              |                                   |                 |
| Complete Elevator                     |               |         |                 | Y                   | Y1                                     | Y1               | Y2          |                                              |                                   | Y               |

Y1 –Test to Be Done At Site

Y2 - Load/Overload Test to Be Done At Site as Applicable.

Y3 – Burn in test on electronic card

Y4 – Routine tests including FRLS tests as per Tech. Spec.

Y5- Test report as per relevant std.

NOTE: 1. This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the applicable practices and procedures followed along with relevant supporting documents during QAP finalization.

2. Makes of all bought out items shall be subject to NTPC approval

## **SUB-SECTION-V-QE13**

### **VFD MODULE**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

**VFD MODULE SQE\_28**

| ATTRIBUTES /<br>CHARACTERISTICS             | Visual &<br>Dimensional<br>checks | Make /<br>Type /<br>Rating<br>etc. | Final<br>Inspectio<br>n as ISS /<br>IEC | Remarks                                       |
|---------------------------------------------|-----------------------------------|------------------------------------|-----------------------------------------|-----------------------------------------------|
|                                             |                                   |                                    |                                         |                                               |
| ITEMS/COMPONENTS,<br>SUB SYSTEM<br>ASSEMBLY |                                   |                                    |                                         |                                               |
| HT Breaker (IEC 56)                         | Y                                 | Y                                  | Y                                       |                                               |
| DC Reactor                                  | Y                                 | Y                                  |                                         | For details refer table for<br>DC Reactor     |
| Transformer                                 | Y                                 | Y                                  |                                         | For details refer table for<br>Transformer    |
| Motor                                       | Y                                 | Y                                  |                                         | For details refer separate<br>table for Motor |
| VFD Panel                                   | Y                                 | Y                                  |                                         | For details refer table for<br>VFD            |

Note : 1) This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality

Plan indicating the practices & Procedure followed alongwith relevant supporting documents during QP finalisation.

2) Make of all major Bought Out Items will be subject to NTPC approval.

## DC REACTOR

| ATTRIBUTES /<br>CHARACTERISTICS          |        |             |                        |                            |                            |                             |                                 |
|------------------------------------------|--------|-------------|------------------------|----------------------------|----------------------------|-----------------------------|---------------------------------|
|                                          | Visual | Dimensional | Mech. & Chem. Property | Electrical Characteristics | Pretreatment by Seven Tank | Painting by Stove Enameling | Final Inspection as per IS-2026 |
| ITEMS/COMPONENTS, SUB<br>SYSTEM ASSEMBLY |        |             |                        |                            |                            |                             |                                 |
| Winding Material (Aluminium)             | Y      | Y           | Y                      | Y                          |                            |                             |                                 |
| Insulation Material                      | Y      | Y           |                        | Y                          |                            |                             |                                 |
| Sheet Steel                              | Y      | Y           | Y                      |                            |                            |                             |                                 |
| Winding                                  | Y      | Y           |                        | Y                          |                            |                             |                                 |
| Fabrication of Enclosures                | Y      | Y           |                        |                            | Y                          | Y                           | Y                               |
| Assembly                                 | Y      | Y           |                        |                            |                            |                             |                                 |
| Routine Tests                            | Y      | Y           |                        |                            |                            |                             | Y                               |

- Note : 1) This is an indicative list of tests/checks. The manufacturer to furnish a detailed Quality Plan indicating their practice & procedure along with relevant supporting documents during QP finalisation for all items.
- 2) All major Bought Out Items will be subject to NTPC approval.

## TRANSFORMER (OIL FILLED)

| Attributes / Characteristics<br>Items/Components<br>Sub Systems                      | Visual & Dimensional Checks | Mechanical properties | Electrical strength | Thermal properties | Chemical Composition | Compatibility with oil | NDT / DPT / MPI / UT | Ageing Test | Voltage Ratio, Vector Group & Polarity, Magnetic Balance Test | Make / Type / Rating / Model / TC / General Physical Inspection. | WPS & PQR | Routine Test as per relevant test | Routine Test |
|--------------------------------------------------------------------------------------|-----------------------------|-----------------------|---------------------|--------------------|----------------------|------------------------|----------------------|-------------|---------------------------------------------------------------|------------------------------------------------------------------|-----------|-----------------------------------|--------------|
| Tank, H.V. & L.V. Cable Box / Flange throat                                          | Y                           | Y                     |                     |                    |                      |                        | Y                    |             |                                                               |                                                                  |           |                                   |              |
| Conservator / Radiator / Cooler / Pipes                                              | Y                           | Y                     |                     |                    |                      |                        | Y                    |             |                                                               |                                                                  |           |                                   |              |
| Copper Conductor (IS:191)                                                            | Y                           | Y                     | Y                   |                    | Y                    |                        |                      |             |                                                               |                                                                  |           |                                   |              |
| Insulating Material                                                                  | Y                           | Y                     | Y                   | Y                  | Y                    | Y                      |                      |             |                                                               |                                                                  |           |                                   |              |
| CRGO Lamination & Built Core                                                         | Y                           | Y                     | Y                   |                    | Y                    | Y                      |                      |             |                                                               |                                                                  |           |                                   |              |
| Bushing / Insulator (IS:2544 / 5621)                                                 | Y                           | Y                     |                     |                    |                      |                        |                      |             |                                                               | Y                                                                |           | Y                                 |              |
| Gasket                                                                               | Y                           |                       |                     |                    | Y                    | Y                      |                      | Y           |                                                               |                                                                  |           | Y                                 |              |
| Transformer Oil (IS:335 / IEC296)                                                    |                             |                       |                     |                    |                      |                        |                      |             |                                                               |                                                                  |           | Y                                 |              |
| Off-Circuit Tap Changer                                                              | Y                           |                       |                     |                    |                      |                        |                      |             |                                                               | Y                                                                |           |                                   |              |
| Core Coil Assembly & Pre-tanking                                                     | Y                           |                       |                     |                    |                      |                        |                      |             | Y                                                             |                                                                  |           |                                   |              |
| Marshalling Box                                                                      | Y                           | Y                     |                     |                    |                      |                        | Y                    |             |                                                               |                                                                  |           | Y                                 |              |
| WTI, OTI, MOG, PRD, Breather, Terminal Connector, Bucholz Relay, Globe & Gate Valve, | Y                           |                       |                     |                    |                      |                        |                      |             |                                                               | Y                                                                |           |                                   |              |
| Welding (ASME Sect-IX)                                                               | Y                           |                       |                     |                    |                      |                        |                      |             |                                                               |                                                                  | Y         |                                   |              |
| Complete Transformer (IS:2026/ IEC-60076)                                            | Y                           |                       |                     |                    |                      |                        |                      |             |                                                               |                                                                  |           |                                   | Y            |

Note: 1) This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.  
2) All major Bought Out Items will be subject to NTPC approval.

**DRY TYPE TRANSFORMER**

| Attributes /<br>Characteristics<br><br>Items/Components<br>Sub Systems                                                                                                                                                                                                                                        | Visual & Dimensional check | Mechanical properties | Electrical strength | Thermal Properties | Chemical Properties | NDT / DP / MPI | Voltage Ratio, Vector Group & Polarity | Make / Type / Rating / Model / TC /<br>General Physical Inspection | WPS & PQR | Routine Test as per relevant standard | Measurement of capacitance & tan delta<br>between winding | Routine Test |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------|---------------------|--------------------|---------------------|----------------|----------------------------------------|--------------------------------------------------------------------|-----------|---------------------------------------|-----------------------------------------------------------|--------------|
| Enclosure door, H.V. & L.V. Cable Box / Flange Throat                                                                                                                                                                                                                                                         | Y                          | Y                     |                     |                    |                     |                |                                        | Y                                                                  |           |                                       |                                                           |              |
| Copper Conductor                                                                                                                                                                                                                                                                                              | Y                          | Y                     | Y                   |                    | Y                   |                |                                        |                                                                    |           |                                       |                                                           |              |
| Insulating Material                                                                                                                                                                                                                                                                                           | Y                          |                       |                     | Y                  | Y                   |                |                                        |                                                                    |           |                                       |                                                           |              |
| CRGO Lamination & Built Core                                                                                                                                                                                                                                                                                  | Y                          |                       |                     |                    |                     |                |                                        |                                                                    |           |                                       |                                                           |              |
| Bushing /Insulator ( IS:2544 / 5621)                                                                                                                                                                                                                                                                          | Y                          |                       |                     |                    |                     |                |                                        | Y                                                                  |           | Y                                     |                                                           |              |
| Gasket                                                                                                                                                                                                                                                                                                        | Y                          |                       |                     |                    |                     |                |                                        | Y                                                                  |           | Y                                     |                                                           |              |
| Off-Circuit Tap Changer                                                                                                                                                                                                                                                                                       | Y                          |                       |                     |                    |                     |                |                                        | Y                                                                  |           |                                       |                                                           |              |
| Core Coil Assembly                                                                                                                                                                                                                                                                                            | Y                          |                       |                     |                    |                     |                | Y                                      |                                                                    |           |                                       |                                                           |              |
| Marshalling Box                                                                                                                                                                                                                                                                                               | Y                          |                       |                     |                    |                     |                |                                        |                                                                    |           | Y                                     |                                                           |              |
| WTI, Thermister, Terminal Connector                                                                                                                                                                                                                                                                           | Y                          |                       |                     |                    |                     |                |                                        | Y                                                                  |           |                                       |                                                           |              |
| Welding                                                                                                                                                                                                                                                                                                       |                            |                       |                     |                    |                     |                |                                        |                                                                    | Y         |                                       |                                                           |              |
| Complete Transformer (IS:11171 / IEC 60076)                                                                                                                                                                                                                                                                   | Y                          |                       |                     |                    |                     |                |                                        |                                                                    |           |                                       | Y                                                         | Y            |
| <p>Notes: 1) This is an indicative List of test/checks. The manufacturer is to furnish a detailed Quality Plan indicating his practice and procedure along with relevant supporting documents during QP finalization for all item.</p> <p>2. All major Bought out Items will be subject to NTPC approval.</p> |                            |                       |                     |                    |                     |                |                                        |                                                                    |           |                                       |                                                           |              |

## VFD PANEL

| Item Components<br>Sub System Assembly            | Attributes Characteristics |                       |                     |                     |                               |       |                                   |                         |                             |                               |                                     |                                                             |                           |                               |
|---------------------------------------------------|----------------------------|-----------------------|---------------------|---------------------|-------------------------------|-------|-----------------------------------|-------------------------|-----------------------------|-------------------------------|-------------------------------------|-------------------------------------------------------------|---------------------------|-------------------------------|
|                                                   | Electrical Properties      | Mechanical Properties | Chemical Properties | Dimensions / Finish | Type/ Rating/Functional check | HV/IR | Routine test as per relevant std. | Constructional Features | IS:6005 ,Seven tank process | Paint finish/ shade/thickness | Mountings / BOM/ Make, Completeness | Interlock Functional & Operation Testing / Simulation check | Degree of Protection Test | Final testing as per Relevant |
| Sheet Steel (IS-513)                              |                            | Y                     | Y                   | Y                   |                               |       |                                   |                         |                             |                               |                                     |                                                             |                           |                               |
| Aluminum / Copper Bus-bar(IS-5082/IS-613/IS-1987) | Y                          | Y                     | Y                   | Y                   |                               |       |                                   |                         |                             |                               |                                     |                                                             |                           |                               |
| Support Insulator (BS-2782/IEC-660/IS-10912)      | Y                          | Y                     | Y                   | Y                   |                               |       |                                   |                         |                             |                               |                                     |                                                             |                           |                               |
| Control / Selector Switch(IS-6875)                |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Contactor/ MCB(IS-13947)                          |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| O/L Protection relays(IS-3231)                    |                            |                       |                     |                     | Y                             |       | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| C.T /V.T/ Indicating Meter(IS-2705/3156/1248)     |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Fuse/ Fuse carrier(IS-13703)                      |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Terminals/lugs/pvc wires(IS-13947//IS-694)        | Y                          |                       |                     | Y                   | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Timers(IS-3231)                                   |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Push Button/ Lamp/ (IS-6875)                      |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Control Transformer (IS-12021)                    |                            |                       |                     |                     | Y                             | Y     | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Mimic, Annunciater                                |                            |                       |                     |                     | Y                             |       | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| GASKET(IS-11149)                                  |                            | Y                     | Y                   | Y                   | Y                             |       | Y                                 |                         |                             |                               |                                     |                                                             |                           |                               |
| Fabrication                                       |                            |                       |                     |                     |                               |       |                                   | Y                       |                             |                               |                                     |                                                             |                           |                               |
| Pretreatment & Painting                           |                            |                       |                     |                     |                               |       |                                   |                         | Y                           | Y                             |                                     |                                                             |                           |                               |
| VFD panel                                         |                            |                       |                     |                     |                               |       |                                   |                         |                             | Y                             | Y                                   | Y                                                           | Y                         | Y                             |

NOTE:

1. This is an indicative list of Test/ Checks. The manufacturer to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. All major Bought Out Items will be subject to NTPC approval.

## **SUB-SECTION-V-QE14**

### **STATION LIGHTING**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

## STATION LIGHTING

SQE\_17

| Item Components<br>Sub System<br>Assembly                                                                         | Attributes<br>Characteristics | Make, Type, Rating/ TC | Dimension | Pre-Treatment of sheet | Paint Shade Thickness Adhesion & Finish | Galvanization Tests | IP Test | Bought Out Items/ Bill of Material | HV & IR | Functional Check as per spec. | Constructional Feature as per NTPC spec. | Routine Test as per relevant std and spec | Acceptance Test as per relevant std and spec | Item to conform to relevant standard |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------|-----------|------------------------|-----------------------------------------|---------------------|---------|------------------------------------|---------|-------------------------------|------------------------------------------|-------------------------------------------|----------------------------------------------|--------------------------------------|
| Luminaries (IS-10322 Part-5 Sec.1 ( non –LED type)                                                                |                               | Y                      |           |                        |                                         |                     | Y       |                                    | Y       |                               |                                          | Y                                         | Y                                            | Y                                    |
| Electronic Ballast                                                                                                |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         | Y                                            | Y                                    |
| Lighting Wire (IS-694)                                                                                            |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              |                                      |
| Fans (IS-374)                                                                                                     |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              |                                      |
| Pole (IS-2713)                                                                                                    |                               | Y                      |           |                        | Y                                       |                     |         |                                    |         |                               | Y                                        | Y                                         | Y                                            |                                      |
| Lamps (IS-9800, IS-9974)                                                                                          |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         | Y                                            |                                      |
| Lighting Mast (with raise & lower lantern type)                                                                   |                               | Y                      | Y         |                        |                                         | Y                   |         |                                    |         |                               | Y                                        | Y                                         | Y                                            |                                      |
| Wall Mounted Lighting Panel (IS-513, IS-5)                                                                        |                               | Y                      | Y         | Y                      | Y                                       | Y                   | Y       | Y                                  | Y       | Y                             | Y                                        | Y                                         | Y                                            |                                      |
| Switch Box/ Junction Box/Receptacles/ Local Push Button Station / Lighting Panel (IS-513, 2629, 2633, 4759, 6745) |                               | Y                      | Y         | Y                      | Y                                       | Y                   | Y       | Y                                  | Y       | Y                             | Y                                        | Y                                         | Y                                            |                                      |
| Cable Gland (BS-6121)                                                                                             |                               | Y                      | Y         |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              |                                      |
| Cable Lug (IS-8309)                                                                                               |                               | Y                      | Y         |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              |                                      |
| Flexible Conduit                                                                                                  |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              |                                      |
| Lighting Transformer (IS-11171)                                                                                   |                               | Y                      |           |                        |                                         |                     |         |                                    |         |                               | Y                                        | Y                                         |                                              |                                      |
| Epoxy & Galvanised Conduit (IS-9537, 2629, 2633, 4759, 6745)                                                      |                               | Y                      | Y         |                        |                                         |                     |         |                                    |         |                               |                                          | Y                                         |                                              | Y                                    |

**LED Luminaire quality requirements:**

- 1) LED modules to conform to IS: 16103 part 2. Manufacturer to issue a certificate of compliance for the same.
- 2) Control gear to conform to IS 15885 part 2 section 13. Manufacturer to issue a certificate of compliance for the same.
- 3) LED luminaire to conform to IS 16107 part 2 section 1. Manufacturer to issue a certificate of compliance for the same.
- 4) LED luminaire marking to be as per IS 16107 part 2 section 1. Manufacturer to issue a certificate of compliance for the same.
- 5) Acceptance tests as per IS 16107 part 2 section 1 to be carried out on LED luminaire except long duration tests i.e. a) Chromaticity coordinates & correlated color temperature (CCT); b) Color rendering index (CRI). Manufacturer will submit a COC for above tests i.e. CCT & CRI
- 6) LED driver make, model, type & rating may be as per recommendations of LED module manufacturer.

**Notes:**

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought Out Items will be subject to NTPC approval.

**(CONTROL & INSTRUMENTATION SYSTEM)**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

**SUB-SECTION-V-QC1**

**MEASURING INSTRUMENTS  
(PRIMARY & SECONDARY**

**LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE**

**TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2**

## MEASURING INSTRUMENTS (PRIMARY AND SECONDARY)

| TESTS                                        | ITEMS | Dimensions (R) | Make, Model, Type, Rating (R) | Process / Electrical connection (R) | Calibration (R) | Test as per standard(R) | Insulation Resistance (R) | IBR Certification (if applicable )(R) | Hydro Test(R) | Material Test certificate ® |
|----------------------------------------------|-------|----------------|-------------------------------|-------------------------------------|-----------------|-------------------------|---------------------------|---------------------------------------|---------------|-----------------------------|
| 1. PR Gauge (IS-3624)                        |       | Y              | Y                             | Y                                   | Y               | Y                       |                           |                                       |               |                             |
| 2. Temp. Gauge (BS-5235)                     |       | Y              | Y                             | Y                                   | Y               | Y                       |                           |                                       |               |                             |
| 3. Pr./D.P.Switch(BS-6134)                   |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 4. Electronic Transmitter(IEC-60770)         |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 5. Temp. Switch                              |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 6. Recorder(IS-9319/ANSI C-39.4)             |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 7. Vertical indicators                       |       | Y              | Y                             | Y                                   | Y               |                         | Y                         |                                       |               |                             |
| 8. Digital Indicators                        |       | Y              | Y                             | Y                                   | Y               |                         | Y                         |                                       |               |                             |
| 9. Integrators                               |       | Y              | Y                             | Y                                   | Y               |                         |                           |                                       |               |                             |
| 10. Electrical Metering Instrument (IS-1248) |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 11. Transducer (IEC-688)                     |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 12. Thermocouples (IEC – 754 / ANSI-MC-96.1) |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 13. RTD(IEC-751)                             |       | Y              | Y                             | Y                                   | Y               | Y                       | Y                         |                                       |               |                             |
| 14. Thermowell                               |       | Y              |                               | Y                                   |                 |                         |                           | Y                                     | Y             | Y                           |

R-Routine Test A- Acceptance Test Y – Test applicable

: Note: 1) Detailed procedure of Environmental Stress Screening shall be as per Quality Assurance Programme in General Technical Conditions. Requirement of test and procedure (if required) finalized during QP finalization

2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.

| MEASURING INSTRUMENTS (PRIMARY AND SECONDARY)                                                                                                                                                                                                                                                                                                                                                                                                 |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------|-------------------------------------|-----------------|---------------------------------|------------------|-----------------------------|------------------------------|---------------------------|-------------------------------------|----------------|
| TESTS<br><br>ITEMS                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | Dimensions (R) | Make, Model, Type, Rating (R) | Process / Electrical connection (R) | Calibration (R) | Requirement as per standard (R) | WPS approval (A) | Non-destructive testing (R) | Calculation for accuracy (R) | Insulation Resistance (R) | IBR Certification as applicable (R) | Hydro test (R) |
| 15. Cold junction compensation box                                                                                                                                                                                                                                                                                                                                                                                                            | Y              | Y                             | Y                                   | Y               |                                 |                  |                             |                              | Y                         |                                     |                |
| 16. Orifice plate(BS-1042)                                                                                                                                                                                                                                                                                                                                                                                                                    | Y              | Y                             | Y                                   | Y*              | Y                               | Y**              | Y**                         |                              |                           | Y                                   | Y**            |
| 17. Flow nozzle(BS-1042)                                                                                                                                                                                                                                                                                                                                                                                                                      | Y              | Y                             | Y                                   | Y*              | Y                               | Y                | Y                           |                              |                           | Y                                   | Y              |
| 18. Impact head type element                                                                                                                                                                                                                                                                                                                                                                                                                  | Y              | Y                             | Y                                   |                 |                                 |                  |                             | Y                            |                           |                                     | Y              |
| 19. Level transmitter/float type switch                                                                                                                                                                                                                                                                                                                                                                                                       | Y              | Y                             | Y                                   | Y               |                                 |                  |                             |                              | Y                         | Y                                   | Y              |
| 20. Analysers                                                                                                                                                                                                                                                                                                                                                                                                                                 | Y              | Y                             | Y                                   | Y               |                                 |                  |                             |                              |                           |                                     |                |
| 21. Dust emission monitors                                                                                                                                                                                                                                                                                                                                                                                                                    | Y              | Y                             | Y                                   | Y               |                                 |                  |                             |                              |                           |                                     |                |
| *Calibration to be carried out on one flow element of each type and size if calibration carried out as type test same shall not be repeated.                                                                                                                                                                                                                                                                                                  |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |
| ** If applicable                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |
| R-Routine Test      A- Acceptance Test      Y – Test applicable                                                                                                                                                                                                                                                                                                                                                                               |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |
| <p>Note: 1) Detailed procedure of Environmental Stress screening test shall be as per Quality Assurance Programme in General Technical Conditions. Requirement of test and procedure (if required) finalized during QP finalization</p> <p>2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.</p> |                |                               |                                     |                 |                                 |                  |                             |                              |                           |                                     |                |

## **SUB-SECTION-V-QC2**

### **PROCESS CONNECTION & PIPING**

LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2

## Process, Connection &amp; piping FOR C&amp;I SYSTEMS

| ITEMS                               | Visual ® | GA, BOM, Layout of component & construction feature® | Dimension ® | Paint Shade/thickness ® | Flattening, flaring, hydrotest, hardness check as per ASTM standard | Component Ratings ® | Wiring ® | Make, Model, Type, Rating® | IR & HV ® | Review of TC for instrument/devices (R) | Accessibility of TBs/Devices ® | Illumination,grounding ® | Tubing ® | Leak/Hydro test(A) | Chemical/physical properties of material (A) | Proof pressure test,Dismantling & reassembly test,Hydraulic impulse and vibration test (R) | Tests as per standards & specification |
|-------------------------------------|----------|------------------------------------------------------|-------------|-------------------------|---------------------------------------------------------------------|---------------------|----------|----------------------------|-----------|-----------------------------------------|--------------------------------|--------------------------|----------|--------------------|----------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------|
| Local Instrument enclosure          | Y        | Y                                                    | Y           | Y                       |                                                                     | Y                   | Y        | Y                          | Y         | Y                                       | Y                              | Y                        | Y        | Y                  |                                              |                                                                                            |                                        |
| Local instruments racks             | Y        | Y                                                    | Y           | Y                       |                                                                     | Y                   | Y        | Y                          | Y         | Y                                       | Y                              | Y                        | Y        | Y                  |                                              |                                                                                            |                                        |
| Junction Box                        | Y        | Y                                                    | Y           | Y *                     |                                                                     | Y                   |          | Y                          | Y         |                                         |                                |                          |          |                    |                                              |                                                                                            |                                        |
| Gauge Board                         | Y        | Y                                                    | Y           | Y                       |                                                                     | Y                   |          | Y                          |           | Y                                       |                                |                          | Y        | Y                  |                                              |                                                                                            |                                        |
| Impulse pipes and tubes             | Y        |                                                      | Y           |                         | Y                                                                   |                     |          | Y                          |           |                                         |                                |                          |          |                    | Y                                            |                                                                                            |                                        |
| Socket weld fittings ANSI B-16.11   | Y        |                                                      | Y           |                         |                                                                     |                     |          | Y                          |           |                                         |                                |                          |          |                    | Y                                            |                                                                                            | Y                                      |
| Compression fittings                | Y        |                                                      | Y           |                         |                                                                     |                     |          | Y                          |           |                                         |                                |                          |          | Y                  | Y                                            | Y                                                                                          |                                        |
| Instrument valves & Valve manifolds | Y        |                                                      | Y           |                         |                                                                     |                     |          | Y                          |           |                                         |                                |                          |          | Y                  | Y                                            |                                                                                            |                                        |
| Copper tubings ASTM B75             | Y        |                                                      |             |                         |                                                                     |                     |          | Y                          |           |                                         |                                |                          |          |                    |                                              |                                                                                            | Y                                      |

\*-applicable for painted junction boxes.

Note: R-Routine Test

A- Acceptance Test

Y – Test applicable

Note: This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.

**SUB-SECTION-V-QC3**

**INSTRUMENTATION CABLES**

LOT-IA PROJECTS  
FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE

TECHNICAL SPECIFICATION  
SECTION-VI  
BID DOCUMENT NO.: CS-0011-109(1A)-2

## INSTRUMENTATION CABLE

| ITEMS                                           | TESTS                        |                      |                               |                                       |                                            |                         |                              |                                |                        |                                 |                                          |                    |
|-------------------------------------------------|------------------------------|----------------------|-------------------------------|---------------------------------------|--------------------------------------------|-------------------------|------------------------------|--------------------------------|------------------------|---------------------------------|------------------------------------------|--------------------|
|                                                 | Conductor Resistance ® & (A) | High Voltage ® & (A) | Insulation Resistance ® & (A) | Constructional detail, dimensions (A) | Outer-Sheath/core marking, end sealing (A) | Thermal Stability (A) + | Visual, Surface finish (A) + | Electrical Parameters ** (A) + | Persulphate Test (A) + | Overall/Coverage/Continuity (A) | Swidesh chimney Test (SS-4241475) (A) ++ | FRLS Test * (A) ++ |
| <b>1. Instrument cable twisted and shielded</b> |                              |                      |                               |                                       |                                            |                         |                              |                                |                        |                                 |                                          |                    |
| Conductor(IS-8130)                              | Y                            |                      |                               | Y                                     |                                            | Y                       |                              |                                |                        |                                 |                                          |                    |
| Insulation(VDE-207)                             |                              |                      |                               | Y                                     | Y                                          | Y                       | Y                            |                                |                        |                                 |                                          | Y                  |
| Pairing/Twisting                                |                              |                      |                               | Y                                     | Y                                          | Y                       |                              |                                |                        |                                 |                                          |                    |
| Shielding                                       |                              |                      |                               | Y                                     |                                            | Y                       |                              |                                | Y                      |                                 |                                          |                    |
| Drain wire                                      | Y                            |                      |                               | Y                                     |                                            | Y                       |                              | Y                              | Y                      |                                 |                                          |                    |
| Inner Sheath                                    |                              |                      |                               | Y                                     | Y                                          | Y                       | Y                            |                                |                        |                                 | Y                                        | Y                  |
| Outer Sheath                                    |                              |                      |                               | Y                                     | Y                                          | Y                       | Y                            |                                |                        |                                 | Y                                        | Y                  |
| Over all cable                                  | Y                            | Y                    | Y                             | Y                                     | Y                                          | Y                       | Y                            | Y                              |                        | Y                               |                                          | Y                  |
| Cable Drums(IS-10418)                           |                              |                      |                               | Y                                     |                                            | Y                       |                              |                                |                        |                                 |                                          |                    |

**Note :** High Temp. cables shall be subjected to tests as per VDE-207(Part-6) Compensating cables shall be checked for Thermal EMF/Endurance test as per IS 8784.

**Note :** This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating his practice & Procedure along with relevant supporting documents during QP finalization for all items.

**Note :** ® - Routine Test A - Acceptance Test Y - Test Applicable

**Note :** Sampling Plan for Acceptance test shall be as per IS 8784 (As applicable)

- \* FRLS Tests: Oxygen / Temp Index ( ASTM D-2863), Smoke Density Rating ( ASTM – D 2843), HCL Emission ( IEC-754-1)

- \*\* Characteristic Impedance, Attenuation, Mutual Capacitance, Cross Talk ( As applicable)

+ Sample size will be One No. of each size/type per lot.

++ Sample size will be One No. sample for complete lot offered irrespective of size/type.