



33KV RING MAIN SYSTEM INCLUDING 33/0.433KV SUBSTATIONS IN NIT, ROURKELA CAMPUS.

SECTION-IX : PROPOSAL EXHIBIT SHEETS

PART-I : TECHNICAL

TITLE	Doc. No.	Section	Prepared by	Date	Rev. No.	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV Substation in NIT Campus	NITRKL-33KVRM-TD-01	Proposal Exhibit Sheets-Part-I : Technical	SKD	20.02.2010	0	1 of 100

CONTENTS

<u>ANNEXURE</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
ANNEXURE-I	PROPOSAL PARTICULARS	4
ANNEXURE-II	TECHNICAL PARTICULARS	7
ANNEXURE-III	MANDATORY SPARES	92
ANNEXURE-IV	MAINTENANCE SPARES	96
ANNEXURE-V	COMMISSIONING SPARES	97
ANNEXURE-VI	LIST OF TOOLS AND TACKLES	98
ANNEXURE-VII	DRAWING SUBMISSION SCHEDULE	99
ANNEXURE-VIII	DEVIATION SHEET : PART-A	100
ANNEXURE-IX	DEVIATION SHEET : PART-B	101

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	2 of 101

ANNEXURE-I

PROPOSAL PARTICULARS

(To be filled by Bidder)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	3 of 101

ANNEXURE-I

PROPOSAL PARTICULARS

01. Bidder's Complete Company Name :
and address, telephone No., fax no.
and E-mail ID
02. Bidder's Proposal Number :
03. Bidder's Proposal Date :
04. Bidder's Proposal Validity :
05. Name and Designation of the Officer :
of the Bidder to whom all references
shall be made for expeditious
technical co-ordination
06. Earnest money deposit :-
 - a) If deposited, give references :
 - b) If not, give reasons :
07. Copy of Income Tax Clearance :
Certificate furnished
08. Terms of Payment :-
 - a) Terms of payment as per :
Owner's Specification is
acceptable
 - b) If not, specify terms of payment :
09. Delivery :-
 - a) Delivery period in months for :
complete equipment from the
date of issue of 'Letter of Intent'
(allowing time for approval of
drawings and test certificates)
 - b) Is the delivery period guaranteed :
under penalty
10. Conformance :-

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	4 of 101

- a) Is the equipment offered strictly in accordance with Owner's Specification ? :
 - b) If not, have the Deviation sheet been duly filled-up ? :
 - c) Are proposal data sheets duly filled-up ? :
 - d) All drawings, document, type test Certificates furnished ? :
11. Performance guarantee period for the equipment offered :-
- a) From the date of commissioning at site :
 - b) From the date of dispatch :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	5 of 101

ANNEXURE-II

TECHNICAL PARTICULARS

(To be filled by Bidder)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	6 of 101

**TECHNICAL PARTICULARS
FOR
33KV VACUUM CIRCUIT BREAKER**

- 1.0 Nominal System Voltage (kV)
- 2.0 System Short Circuit Current at rated system voltage (kA sym.)
- 3.0 APPLICABLE INDUSTRY STANDARD**

4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General

Model Designation

Configuration

Separate Operating Mechanism/
pole or common operating mechanism

Three Pole Auto-Reclosing required?

4.2 Performance Characteristics and Rating

Maximum Rated Voltage (kVrms)

Rated Lightning Impulse withstand
voltage (BIL) (kV peak)

Rated Switching Impulse withstand
voltage (BSL) (kV peak)

One Minute Power Frequency
withstand Voltage (kV rms)

Rated Continuous Current (A)

Maximum DC resistance of the power
carrying circuit from terminal to terminal
of circuit breaker (Ohms)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	7 of 101

Temperature rise at rated continuous current of circuit breaker

Main Contacts (°C)

Terminals (°C)

Conducting Joints (°C)

Rated 3-phase symmetrical short circuit interrupting current (at maximum rated voltage) (kArms)

Asymmetrical Short-Circuit interrupting Current (kArms)

Rated Short Time withstand Current (kA rms) for 3 sec

Rated Short Circuit making current (kApeak)

Rated maximum interrupting time (cycles or ms)

Closing Time (ms)

Arcing Time (ms) - maximum
- minimum

Rated Reclosing Time (ms)

Rated Close-Open Time (ms)

Rated Permissible Tripping Delay (Sec.)

Rated opening time (ms)

Rated Voltage Range Factor (K)

Rated Out-of-Phase breaking current capability (kA)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	8 of 101

Rated Line Charging Current
Breaking Capability (A)

Rated Cable Charging Current
Breaking Capability (A)

Rated small inductive current
breaking capability (A)

Rated Reactive Current breaking
capability, if applicable (A)

Rated Transient Recovery
Voltage for Short Line Faults (kVpeak)

Rated Characteristics of Short Line Faults:

Amplitude Constant

R.R.R.V factor (kV/ μ s kA)

The critical line length (L%)

Rated Transient Recovery voltage for
Terminal Fault (kVpeak)

Maximum Operating Current (DC):

Closing Coil (A)

Tripping Coil (A)

Range of Rated Control and auxiliary
Supply Voltages:

Control (Vdc)

Tripping (Vdc)

Operating Mechanism
(Vdc/ac)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	9 of 101

4.3 CONSTRUCTION

Tank Material of Construction

Phase spacing

No. of breaks per pole

Provision of grading capacitors:

- No. of Capacitor per pole
- Total Capacitance (pF) per pole

Maximum Noise Level at 3-meter distance

External Metal to Metal Striking Distances:

Phase to ground (mm)

Phase to Phase (mm)

4.4 Total Number of Spare Auxiliary Contacts:

Normally Open

Normally Closed

Rated current (Adc)

Rated voltage (Vdc)

4.5 SF6 GAS SYSTEM

Reference Industry Standard to which the
SF6 Gas Conforms

Rated Operating SF6
Gas Pressure (kPa)

Maximum Operating SF6
Gas Pressure (kPa)

Minimum operating SF6
Gas Pressure (kPa)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	10 of 101

Minimum operating SF6
Gas Density (Kg/m³)

Close lockout pressure (kPa)

Trip lockout pressure (kPa)

Maximum Relative Leakage Rate
per Year (%)

Operating Pressure of Rupture Disc/
Pressure Relief Valve, if provided (kPa)

Total quantity of SF6 Gas required
to fill each breaker (Kg)

Equipment to be provided for SF6 gas
filling, removing, maintaining and testing

4.6 OPERATING MECHANISM

Type of Operating Mechanism

Manufacturer's Designation

Rated Voltage of Charging Motor
(Vdc/Vac)

Rated Current of Charging Motor (A)

Maximum Starting Current of the
motor (A)

Number of Phases/Wires of Motor

Rated control voltage for closing/
tripping (Vdc)

Space Heaters:

Voltage (Vac)

Wattage (W)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	11 of 101

Spring-Operated Mechanism (if applicable):

Number of close-open operations that can be performed by the mechanism before having recharge

Time required to charge the closing spring (Sec.)

4.7 BUSHING

Name of Manufacturer

Type and designation number

Rated voltage (kV)

Rated current (A)

Power Frequency Wet/Dry withstand voltage(kVrms)

Lightning Impulse withstand voltage (kVpeak)

Switching Impulse withstand voltage (kVpeak)

Creepage Distance (mm)

Color of Bushing

Cantilever loading (kN)

Mounting details

Bolt circle diameter of the flange (mm)

No. of bolts

Size of bolts (mm)

Terminal

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	12 of 101

Type

Size

No. of holes (if applicable)

Dimensional Drawing of bushing provided?

4.8 OTHER GENERAL INFORMATION

Net weight of complete circuit breaker:

with SF6 Gas (Kg)

without SF6 gas (Kg)

Weight of Support Structure(Kg)

Overall Height (mm)

Overall Depth (mm)

Overall Width (mm)

Impact loading of circuit breaker during open and close operations (kg)

GA drawing furnished with the bid?

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	13 of 101

**TECHNICAL DATA SHEET
FOR
33KV ISOLATOR**

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

1.1 Ratings:

Nominal System Voltage (kV rms)

Power frequency withstand (kV rms)

- To earth

- Across open disconnect

Lightning Impulse Withstand Voltage (BIL)
(kV peak)

- To earth

- Across open disconnect

Switching Impulse Withstand Voltage (BSL)
(kV peak)

- To earth

- Across open disconnect

Line Charging Current Breaking
Capability per IEC 265-2 provided?

Transformer Magnetizing Current Breaking
Capability per IEC 265-2 provided?

Rated Continuous Current (A rms)

Rated Short-Time Withstand
Current, 3 sec (kA rms)

Rated Peak Withstand Current (kA)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	14 of 101

Maximum r. i. v. (μV)

1.2 Construction

Installation (Outdoor or Indoor)

Type of Break (Center, Side or Vertical)

Model Designation

Isolator Application
(Transformer Switching, Line Switching, Bus Transfer Switching per IEC 1128, etc.)

Mounting position of Isolator
(Horizontal, Inverted or Vertical)

Terminal Pads

For Conductor: Size (mm^2)

For Tubular Bus: Size (mm)

Material (Al or Cu)

Additional Accessories (Arcing Horns, Corona Ring, Insulated Operating Pipe, etc.)

2.0 Support Insulators:

Bidder to fill up separate data sheet attached.

3.0 Operating Mechanism:

Type

Auxiliary Switches:

Number of Spare Contacts

Rated Current (A)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	15 of 101

Rated Voltage (Vdc)

4.0 Grounding Switch

Grounding Switch provided as per SLD?

Type

Rated Short-Time Withstand Current for 3 second (kA rms)

Electromagnetic Coupling:

Rated Induced Current and Voltage (Class A or Class B per IEC 1129)

Electrostatic Coupling:

Rated Induced Current and Voltage (Class A or Class B per IEC 1129)

Auxiliary Switches:

Number of Spare Contacts

Rated Current (A)

Rated Voltage (Vdc)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	16 of 101

**TECHNICAL DATA SHEET
FOR
33KV CURRENT TRANSFORMER**

1.0 GENERAL

Nominal System Voltage (kV)

System short circuit current (kA sym.)
at rated system voltage.

Type of System Grounding

Installation (Outdoor/Indoor)

**2.0 APPLICABLE INDUSTRY
STANDARD(S)**

**3.0 DESIGN AND CONSTRUCTION
REQUIREMENTS**

4.0 RATING

Rated Primary Current (A)

Rated Secondary Current (A)

**4.0 CONTINUOUS THERMAL CURRENT
RATING FACTOR**

Multi ratio CTs

Single ratio CTs

Rated Short Time Thermal
Current-I_{th} (kA rms)

Short time thermal current
duration (sec.)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	17 of 101

Rated Dynamic Current (kA peak)

Rated primary short circuit
current $-I_{PSC}$ (kA) and duration

Temperature Rise at rated continuous
Thermal current over design ambient
(°C)

- a) Winding
- b) Oil at top
- c) Exposed current carrying parts

5.0 Construction

Type & designation

Type of Insulation (Mineral
Oil filled/Fluid/Cast Resin)

Manufacturer's type/designation

5.1 Insulating Oil /Fluid

Reference standard

Oil volume in liter

5.2 High Voltage Insulator Housing

Name of Manufacturer

Type

Make Designation

Creepage Distance (mm)

Colour

Cantilever Strength (kN)

Whether CT bushing is hermitically

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	18 of 101

sealed or not

5.3 Terminals

Primary Terminal Connector:

- a. Conductor Material (Al or Cu)
- b. Size (mm²)

Degree of protection of enclosure for secondary terminal box

6.0 Primary Winding for Free Standing Type CTs

Bar Primary

Wound Primary

Material

Winding Insulation and Class

Rated Maximum Voltage (kV)

BIL (kV peak)

Power Frequency Withstand Voltage (kV rms)

- 1 minute dry (kV rms)

- 10 sec. Wet (kV rms)

7.0 Secondary Winding

33kV IC

33KV OG

Core 1

Purpose (metering/protection)

Type of protection

Ratio

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	19 of 101

33kV IC

33kV OG

Accuracy class

Burden (VA)

Instrument security factor

For class PS CTs

Rated symmetrical short circuit
current factor - K_{SSC}

Dimensioning parameter -K

Excitation limiting secondary
voltage - U_{al} (Volts)*

Accuracy limiting secondary exciting
current – I_{al} (mA)

Secondary excitation current- I_{mag}
at half excitation limiting secondary
voltage (mA)

Secondary winding resistance
- R_{ct} (ohm)

Core 2

Purpose (metering/protection)

Type of protection

Ratio

Accuracy class

Burden (VA)

Instrument security factor

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	20 of 101

For class PS CTs

Rated symmetrical short circuit current factor - K_{SSC}

Dimensioning parameter -K

Excitation limiting secondary voltage - U_{al} (Volts)*

Accuracy limiting secondary exciting current - I_{al} (mA)

Secondary excitation current- I_{mag} at half excitation limiting secondary voltage (mA)

Secondary winding resistance - R_{ct} (ohm)

Core 3

Purpose (metering/protection)

Type of protection

Ratio

Accuracy class

Burden (VA)

Instrument security factor

For class PS CTs

Rated symmetrical short circuit current factor - K_{SSC}

Dimensioning parameter -K

Excitation limiting secondary voltage - U_{al} (Volts)*

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	21 of 101

33kV IC

33kV OG

Accuracy limiting secondary exciting current – I_{al} (mA)

Secondary excitation current- I_{mag} at half excitation limiting secondary voltage (mA)

Secondary winding resistance – R_{ct} (ohm)

Core 4

Purpose (metering/protection)

Type of protection

Ratio

Accuracy class

Burden (VA)

Instrument security factor

For class PS CTs

Rated symmetrical short circuit current factor - K_{SSC}

Dimensioning parameter -K

Excitation limiting secondary voltage - U_{al} (Volts)*

Accuracy limiting secondary exciting current – I_{al} (mA)

Secondary excitation current- I_{mag} at half excitation limiting secondary voltage (mA)

Secondary winding resistance

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	22 of 101

$-R_{ct}$ (ohm)

8.0 Characteristic curves

Magnetization curve of CT cores

Ratio and phase angle error

9.0 Weight, dimension and enclosure protection

Total weight (Kg)

Weight of oil (Kg)

Overall dimension (mm)

Mounting details

Degree of protection of enclosure for secondary terminal box.

10.0 Partial discharge level in pico coulomb

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	23 of 101

**TECHNICAL DATA SHEET
FOR
33KV VOLTAGE TRANSFORMER**

1.0 GENERAL

Nominal System Voltage (kV)

System short circuit current (kA sym.)
at rated system voltage

Type of System Grounding

Installation (Outdoor/Indoor)

2.0 APPLICABLE INDUSTRY STANDARD

3.0 DESIGN AND CONSTRUCTION
REQUIREMENTS

4.0 Ratings

Maximum Rated Primary Voltage
(kV rms) (Phase to Ground)

Rated secondary voltage (V rms)
(Nominal) :

a. Secondary - 1

b. Secondary - 2

Any tap required on
Secondary-1 or Secondary-2 winding

If yes, What is the tap Voltage

- Secondary -1 (V rms)
- Secondary -2 (V rms)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	24 of 101

Rated burden (VA)

Secondary-1

Secondary-2

Continuous Thermal Burden (VA)

Rated capacity of capacitor (pF)

Maximum loss factors at 50 Hz
And rated voltage

Rated Voltage Factor

Winding insulation and class

Winding Material (Al or Cu)

BIL of Winding (kV peak)

Power Frequency Withstand
Voltage of Winding (kV rms)

Accuracy class :

Secondary - 1

Secondary – 2

4.0 Construction
Type of PT

Manufacturer's type
Designation

5.0 Insulating Oil

Reference standard

Oil volume in liter

6.0 High Voltage Bushings

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	25 of 101

Name of Manufacturer

Type

Make Designation

Rated Voltage (Nominal) (kV rms)

Rated current (A)

BIL (kV peak)

Power Frequency withstand voltage :
(Wet withstand for outdoor bushings)

1 minute dry (kV rms)

10 sec. wet (kV rms)

Creepage distance (mm)

Color

Cantilever Strength (kg)

7.0 Terminals

Primary Terminal Connector :

- a. For Conductor Material (Al or Cu)
- b. Size (mm²)
- c. Number of Conductor/phase

PT secondary fuse rating (A)

8.0 Weight, dimension and enclosure protection

Total weight (Kg)

Weight of oil (Kg)

Overall dimension (mm)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	26 of 101

Mounting details

Degree of protection of enclosure
for secondary terminal box.

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	27 of 101

**TECHNICAL DATA SHEET
FOR
33KV LIGHTNING ARRESTOR**

1.0 SYSTEM DATA

Nominal System Voltage (kV)

System Fault Current Level at
Rated System Voltage (kA)

Max. Duration of Ground Fault (ms)

System Neutral Grounding

BIL of Equipment to be protected
(kVpeak)

2.0 APPLICABLE INDUSTRY STANDARD

3.0 DESIGN AND CONSTRUCTION
REQUIREMENT

4.0 General

Type

Model Designation

Location (Indoor/Outdoor)

5.0 Performance Characteristics and Ratings

Rated Voltage (kVrms)

Line Discharge Class

Dielectric Withstand for Housing

- Lightning impulse withstand voltage, with
1.2/50 μ s waveform(kVpeak)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	28 of 101

- One minute power frequency withstand Voltage. (kVrms)

Nominal Discharge Current (Lightning Impulse Classifying Current) With 8/20 μ s Wave-Form (kA)

High Current Impulse Capability With 4/10 μ s Waveform (kA peak)

Long Duration Wave Withstand Capability

- Current (A)
- Duration (ms)

Maximum Lightning Impulse Residual Voltage with 8/20 μ s waveform (kVpeak) at a Discharge (classifying) Current of :

- 5 kA
- 10 kA
- 20 kA
- 40 kA

Maximum Switching Surge Residual Voltage (kVpeak) at a Discharge Current of :

- 0.5 kA
- 1 kA
- 2 kA
- 3 kA

Maximum Steep Current/Front-of-Wave Residual Voltage Based on 1/> 2 or 0.5 μ s Waveform, as Applicable (kVpeak) at a Discharge Current of :

- 10 kA
- 20 kA

Temporary over voltage capability

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	29 of 101

(kVrms) for :

- 1 second
- 10 seconds

Maximum R.I.V (μ v)

Maximum External Insulation Levels

Power frequency Dry Withstand Voltage
(kVrms)

Power frequency Wet Withstand Voltage
(kVrms)

Lightning Impulse Withstand
Level (kVpeak)

Switching Impulse Withstand
Level (kVpeak)

Leakage Current Through Arrester
at MCOV (mA)

Maximum Energy Absorption Capability

- i) kj/kV of Arrester Rating
- ii) kj/kV of MCOV

5.0 Construction

Pressure Relief Capability (rms symmetrical)

High current, short duration (kA)

Low current, long duration (A)

Porcelain Housing

Colour

Creepage Distance (mm)

Bending Failing Load (kN)

Cantilever Strength min. (kN)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	30 of 101

Torsional Strength (kN)

Compression Strength (kNm)

No. of stacks in each unit

Height (mm)

Internal Pressure Required to Operate
Pressure Relief Device as a Percent of
Pressure Required to Burst Porcelain (%)

Mounting Arrangement

Mode of mounting
(Self supporting/bracket mounting)

Bolt circle diameter (mm)

No. of holes

Size of bolts (mm)

Accessories

Scale range of the leakage
Ammeter (mA)

Dia of the grading ring, if applicable (mm)

Terminals

Type

Material (Al or CU)

MISCELLANEOUS

Minimum Clearance, Between Live
Parts and Earth Parts (mm)

Minimum Permissible Centre to Centre
Distance Between Arresters (mm)

Overall Height of Arrester (mm)

Weight of Arrester (kg)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	31 of 101

**TECHNICAL DATA SHEET
FOR
33KV INSULATORS**

A. POST INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

Application: (Indoor/Outdoor)

2.0 Stack Assembly
(Tapered/Uniform)

3.0 Electrical Ratings

Outdoor:

Nominal System voltage
(kV rms)

Basic Impulse withstand
Voltage (kV peak)

Power Frequency withstand
voltage, Wet (kV rms)

Critical Impulse Flashover,
Positive (kV peak)
Maximum r. i. v. (μ V)

4.0 Mechanical Ratings:

Bending Failing Load or Cantilever Strength (kN)

Tension Strength (kN)

Torsion Strength (kN.m)

Compression Strength (kN)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	32 of 101

5.0 Material:

Insulator Shell

Insulator Glaze

6.0 Dimensions

Insulator Overall Height (mm)

Insulator Weight (kg)

Leakage Distance (mm)

7.0 Mounting:

Top:

Bolt Circle (mm)

Number of Bolt

Bolts Arrangement (90°)

Bolt Size (mm)

Kind of Thread (UNC)

Base:

Bolt Circle (mm)

Number of Bolt

Spacing of Bolts (90°)

Bolt Size (mm)

Kind of Thread (UNC)

Adapter Plates or Spacers required?

Size

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	33 of 101

B. TENSION INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

- 2.0 Insulator type
(Superfog/Fog/Aerodynamic)
- Number of insulators per string
- 3.0 Ratings
- Combined Mechanical and Electrical Strength (kN)
- Tension proof load (kN)
- Electrical Values
- Low frequency dry flashover (kV)
- Low frequency wet flashover (kV)
- Critical impulse flashover, Positive (kV)
- Critical impulse flashover, negative (kV)
- Low frequency puncture Voltage (kV)
- RIV low frequency test voltage (rms to ground) (kV)
- Maximum RIV at 1000 KHz (μ V)
- Weight per unit (kg)
- Insulator Shell Material

4.0 Dimension :

Coupling type (ANSI - J/K)
(IEC - size 16A/20)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	34 of 101

Minimum leakage distance per unit (mm)

Shell diameter (mm)

Spacing distance (mm)

C. SUSPENSION INSULATORS

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

2.0 Insulator type
(Superfog/Fog/Aerodynamic)

Number of insulators per string

3.0 Ratings

Combined Mechanical and Electrical
Strength (kN)

Tension proof load (kN)

Electrical Values

Low frequency dry flashover (kV)

Low frequency wet flashover (kV)

Critical impulse flashover, Positive (kV)

Critical impulse flashover, negative (kV)

Low frequency puncture Voltage (kV)

RIV low frequency test voltage (rms to
ground) (kV)

Maximum RIV at 1000 KHz (μ V)

Weight per unit (kg)

Insulator Shell Material

4.0 Dimension :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	35 of 101

Coupling type (ANSI - J/K)
(IEC - size 16A/20)

Minimum leakage distance per unit (mm)

Shell diameter (mm)

Spacing distance (mm)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	36 of 101

**TECHNICAL DATA SHEET
FOR
33KV CONTROL AND RELAY PANELS**

1.0 APPLICABLE INDUSTRY STANDARD

**2.0 DESIGN AND CONSTRUCTION
REQUIREMENTS**

General

Degree of protection

Panel Dimensions in mm (WxDxH) for
33KV Control & Relay Panel

Number of Shipping Sections

3.0 Relays, Meters and Instruments

Complete list of the required Protective
Relays, Meters and Instruments
Provided?

Drawing Attachments:

- a. Relay and Metering One-Line
Diagram
- b. Front and Rear Panel Layout
- c. Rear Panel Wiring/
Interconnection Block Diagrams
- d. BOQ of all materials with ratings,
make, model and specification
- e. Terminal plan

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	37 of 101

f. Panel foundation plan

Technical Literature or Catalogs of All Required Relays, Meters and Instruments Provided?

Relay make and models for:

33kV line overcurrent protection

33kV line earth fault protection

Master trip relay, hand reset

Trip circuit supervision relay

DC supply supervision relay

Auxiliary relays

Antipumping relay

Meters

Type, make and models for:

Ammeter

Voltmeter

Tri-vector meter

Digital Multifunction meters

Panel cut out dimension

Multifunction meters

Reference standard

Input voltage

Input current

Input/output isolation

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	38 of 101

Measurement functions

Details of front panel display

Display type

Communication protocol

Burden (VA)

Dimension

Panel cut out

Tri-vector meters

Reference standard

Input voltage

Input current

Input/output isolation

Measurement functions

Details of front panel display

Display type

Communication protocol

Burden (VA)

Data retention (years)

Pulse output

Dimension

Panel cut out

Enclosure material

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	39 of 101

Transducers

Type, make and model for:

Current transducer

Voltage transducer

Watt transducer

VAR transducer

Dual output?

DC Output range

Auxiliary supply

Power consumption (VA)

Response time

Input/output isolation

Accuracy class

4.0 Annunciator System

Make and model

Supply voltage

Number of windows for

- 33kV IC line
- 33kV OG line

Window sizes

Display device

Facia type

Window/LED colour

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	40 of 101

Flash rate

Response time

Input signal

Interrogation voltage

Output contacts

Contact rating

Architecture (Integrated/Non integrated?)

Power consumption per Window (W)

Overall dimension (mm)

Panel cut out (mm)

5.0 Control Switches

Type or Model No.

Contact Ratings:

AC Voltage (Vrms)

DC Voltage (Vdc)

Current (A)

Number of Contacts

6.0 LED Lamps

- a) Make
- b) Type & Cat. No.
- c) Watts/Voltage
- d) Lamp & Lens replaceable

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	41 of 101

from front.

7.0 Semaphore Indicators

- a) Make
- b) Type & Cat. No.
- c) Watts/Voltage

8.0 Miscellaneous Electrical Features

Space Heater Power (Watts)

9.0 Mimic Bus Diagram

Mimic bus material

Colour

Thickness

10.0 Wiring and Terminal Blocks

Type of Insulated Wire

Type of Terminal Blocks
(Contractor to provide literature or catalog)

11.0 Auxiliary Power

Nominal DC Power Voltage (Vdc)

Operating Voltage range (Vdc)

Nominal AC Power Voltage (Vrms)

12.0 Grounding

Size of Ground Bus (mm x mm)

Material

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	42 of 101

**TECHNICAL DATA SHEET
FOR
STATION SERVICE TRANSFORMER**

1.0 General

- 1.1 Make
- 1.2 Type
- 1.3 Reference Standard

2.0 Rating

- 2.1 Rated Output Kva
- 2.2 Type of Cooling
- 2.3 Rated Voltage KV
H.V.
L.V.
- 2.4 Rated Current Amps
H.V.
L.V
- 2.5 No . of phases
- 2.6 Rated frequency Hz
- 2.7 Vector Group reference

3.0 Temperature

- 3.1 Reference ambient temp
- 3.2 Temp rise over reference ambient
 - a) In Oil by thermometer °C
 - b) In winding by resistance °C

4.0 Tappings

- 4.1 Type
- 4.2 Capacity

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	43 of 101

- 4.3 Range – Steps x % Variation
- 4.4 Taps provided on H.V. winding
- 5.0 Insulation level** KV/KVp
- 5.1 H.V.
- 5.2 L.V.
- 5.3 L.V.Neutral
- 6.0 Impedances at principal tap**
Rated current & frequency %
- 6.1 Impedance
- 6.2 Reactance
- 6.3 Resistance at 75⁰
- 6.4 Zero Sequence Impedance
- 6.5 Zero sequence capacitance of L.V.
Winding uf/ph
- 7.0 Guranteed losses at principal tap full load at**
75⁰ C KW
- 7.1 No load losses
- 7.2 Load losses
- 8.0 Efficiency** at 75⁰ C and
0.8 power factor lag %
- 8.1 At full load
- 8.2 At ¾ full load
- 8.3 At ½ full load
- 8.4 Maximum Efficiency
- 8.5 Load and power factor at which it occurs
- 9.0 Regulation** at full load at 75⁰ C %
- 9.1 At unity power factor
- 9.2 At 0.8 power factor lagging
- 10.0 No load current** referred to HV Amps
- 10.1 At 90% rated voltage

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	44 of 101

- 10.2 At 100% rated voltage
- 10.3 At 110% rated voltage
- 11.0 Approx max flux density** Web/m²
- 11.1 At 90% rated voltage
- 11.2 At 100% rated voltage
- 11.3 At 110% rated voltage
- 12.0 Max.current density** Amps/cm²
- 12.1 H.V. Winding
- 12.2 L.V. Winding
- 13.0 Withstanding time without injury for Sec**
- 13.1 Three phase dead short circuit at terminal
With rated voltage maintained on the other
Side
- 13.2 Single phase short circuit at terminal with
Rated voltage maintained on other side
- 14.0 Cooling System**
- 14.1 Details of Tank
- 14.2 Material
- 14.3 Thickness of sides mm
- 14.4 Thickness of bottom mm
- 14.5 Thickness of cover mm
- 15.0 Core**
- 15.1 Type – Core or Shell
- 15.2 Core of material
- 15.3 Thickness of lamination mm
- 16.0 Coils**
- 16.1 Type of Coil :
 - a) H.V.
 - b) L.V
- 17.0 Conductor material**

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	45 of 101

17.1 Insulating material

- a) H.V. – turn
- b) L. V. – turn
- c) L.V. – Earth
- d) H.V. – L.V

18.0 Tap-Changer

18.1 Make

18.2 Type

18.3 Rated Current

18.4 Insulating Oil

18.5 Approx. Volume liter

18.6 10% excess oil furnished?

18.7 Oil conforms to

19.0 Bushings

19.1 Make

19.2 Type

19.3 Reference Standard

19.4 Voltage class KV

19.5 Creepage distance mm/MV

19.6 Weight

19.7 Free space required for busing removal

19.8 Test terminals for H.V. bushing provided

19.9 Reference standard

19.10 Minimum Clearance

19.11 Between phases :

- a) In air mm
- b) In oil mm

19.12 Terminal Connections

19.13 H.V.

19.14 L.V

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	46 of 101

19.15 L.V. Neutral

H.V Neutral

20.0 Marshalling Box

20.1 Weather proof suitable for outdoor

20.2 Degree of protection

21.0 Terminal Blocks

21.1 Make

21.2 Type

21.3 20% Spare terminals furnished ?

21.4 Wiring

21.5 Cable Type

21.6 Voltage grade Volt

21.7 Conductor size mm²

21.8 Trip & Alarm Contacts Ratings

21.9 Voltage 110 Volt D.C

21.10 Rated/Making Current Amps.

22.0 Accessories

The transformer furnished with fittings and

Accessories as per IS?

23.0 Detail of Conservator

23.1 Volume of conservator

23.2 Volume of oil between the highest

And lowest levels

24.0 Approx .Overall dimension

24.1 Length mm

24.2 Breadth mm

24.3 Height mm

25.0 Approx. Weights

25.1 Core and Coil Kg

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	47 of 101

25.2	Tank and fittings	Kg
25.3	Oil	Kg
25.4	Total weight	Kg

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	48 of 101

- 4.0 Tappings :
- 4.1 Type :
- 4.2 Capacity :
- 4.3 Range – Steps x % Variation :
- 4.4 Taps provided on H.V. winding :
- 4.5 Highest design operating voltage for the
tappings
- Continuous operation (%) :
- Emergency operation (%) :
- 5.0 Insulation level KV/KVp
- 5.1 H.V. :
- 5.2 L.V. :
- 5.3 H.V.Neutral :
- 5.4 Switching Impulse Withstand Voltage (BSL):
- 6.0 Separate Source Power Frequency Withstand Voltage
- HV winding (kV rms) :
- LV winding (kV rms) :
- HV neutral end (kV rms) :
- 7.0 Impedance Voltage natural cooling power base
and reference temp. of 75°C (%)
- a) At Principal Tap (Guaranteed values)
- HV – LV :
- Reactance :
- Resistance :
- b) At Extreme Plus Tap
- HV – LV :
- c) At Extreme Minus Tap
- HV – LV :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	50 of 101

- 8.0 Zero-sequence impedance on natural cooling
power base (%)
- a) At Principal Tap (Guaranteed values)
HV – LV :
- b) At Extreme Plus Tap
HV – LV :
- c) At Extreme Minus Tap
HV – LV :
- 9.0 Design X/R ratio :
- 10.0 **Guaranteed losses** at principal tap, natural cooling
base, rated voltage, rated frequency and at 75⁰ C
- 10.1 No load losses KW :
- 10.2 Load losses KW :
- 10.3 Auxiliary losses KW :
- 11.0 Efficiency at 75⁰ C % : At 0.8 pf lag At unity pf
- 11.1 At full load :
- 11.2 At ¾ full load :
- 11.3 At ½ full load :
- 11.4 Maximum Efficiency :
- 11.5 Load and power factor at which it occurs :
- 12.0 Regulation at full load at 75⁰ C % :
- 12.1 At unity power factor :
- 12.2 At 0.8 power factor lagging :
- 13.0 No load current referred to HV Amps
- 13.1 At 90% rated voltage :
- 13.2 At 100% rated voltage :
- 13.3 At 110% rated voltage :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	51 of 101

- 14.0 Max flux density Web/m²
- 14.1 At 90% rated voltage :
- 14.2 At 100% rated voltage :
- 14.3 At 110% rated voltage :
- 14.4 Saturation voltage of core material (% Un) :
- 15.0 Max.current density Amps/cm² :
- 15.1 H.V. Winding :
- 15.2 L.V. Winding :
- 16.0 Maximum Symmetrical short
circuit current for which windings
are designed to thermally withstand
for 3 seconds:
- HV winding (kA) :
- LV winding (kA) :
- 17.0 Maximum Asymmetrical short
circuit current for which the windings
are mechanically designed:
- HV winding (kA) :
- LV winding (kA) :
- 18.0 Noise Level at full rated power :
- 19.0 Conservator Expansion Device Material :
- 20.0 Whether suitable for parallel operation :
- 21.0 Details of Tank :
- 21.1 Material :
- 21.2 Thickness of sides mm :
- 21.3 Thickness of bottom mm :
- 21.4 Thickness of cover mm :
- 21.5 Min. Thickness of radiator plates (mm) :
- 21.6 Maximum Positive Withstand Pressure

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	52 of 101

	of Tank and Radiators (kPa)	:
21.7	Minimum Vacuum Withstand (kPa)	:
22.0	<u>Core</u>	:
22.1	Type – Core or Shell	:
22.2	Core of material and grade	:
22.3	Thickness of lamination mm	:
23.0	<u>Coils</u>	:
23.1	Type of Coil	:
	c) H.V.	:
	d) L.V	:
23.2	Conductor material	:
23.3	Insulating material	:
	e) H.V. – turn	:
	f) L. V. – turn	:
	g) L.V. – Earth	:
	h) H.V. – L.V	:
24.0	<u>On Load Tap Changer</u>	
	Manufacturer	:
	Type Designation	:
24.1	Number of steps	:
	Step Voltage (%)	:
	Tapping Range (%)	:
	Rated Through Current (A)	:
	Short Circuit Current (kA)	:
	Location (External or Internal)	:
	Voltage Class (kVrms)	:
	BIL (kVpeak)	:
24.2	Motor drive unit:	
	Type	:
	Power	:

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	53 of 101

- Rated voltage (Vac) :
- Number of phases :
- Control voltage (Vac) :
- Space heater (Vac) :
- Heater power (W) :
- Provision of parallel operation
alongwith Supervisory Equipment :
- 24.3 Oil/Gas Surge Relay for OLTC
- Manufacturer :
- Type Designation :
- Trip Contact Current Rating at 110 Vdc (A) :
- 24.4 Pressure Relief Device for OLTC
- Manufacturer :
- Type Designation :
- Operation Range (From__to__kPa) :
- Resealing Pressure (kPa) :
- Number of alarm/trip contacts :
- Alarm Contact Current Rating at 110 Vdc (A) :
- 25.0 Insulating Oil :
- 25.1 Volume in litre :
- 25.2 10% excess oil furnished? :
- 25.4 Oil preservation system provided? Type?
- 25.5 Manufacturer :
- 25.6 Make Designation :
- 25.7 Applicable Industry Standards :
- 25.8 Class of Oil :
- 26.0 Bushings
- 26.1 High Voltage Bushings
- Manufacturer :
- Type designation :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	54 of 101

Material :
 Location (top, side, others) :
 Terminal take off angle :
 (vertical, horizontal, angle)
 Number :
 Rated Voltage (kV) :
 Rated Maximum Voltage (kV) :
 Rated current (A) :
 BIL (kVpeak) :
 Switching Impulse Withstand
 Voltage (kVpeak) :
 Power Frequency Dry/Wet
 Withstand Voltage (kVrms) :
 Creepage distance (mm) :
 Cantilever strength (kN) :
 Mounting details
 Hole circle diameter of the flange (mm) :
 Number of bolts :
 Hole diameter (mm) :
 Terminal
 Type :
 Size :
 No. of holes :

26.2 Low Voltage Bushings

Manufacturer :
 Type Designation :
 Material :
 Location (Top, side, others) :
 Terminal take off angle :
 (vertical, horizontal, angle)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	55 of 101

Number :
 Rated voltage (kV) :
 Rated maximum voltage (kV) :
 Rated current (A) :
 BIL (kVpeak) :
 Power Frequency Dry/Wet Withstand
 Voltage (kVrms) :
 Creepage Distance (mm) :
 Cantilever strength (kN) :
 Mounting details
 Hole circle diameter
 of the flange (mm) :
 Number of bolts :
 Hole diameter (mm) :
 Terminal
 Type :
 Size :
 No. of holes :

26.3 HV Neutral Bushings

Manufacturer :
 Type designation :
 Material :
 Location (top, side, others) :
 Terminal take-off angle :
 (vertical, horizontal, angle)
 Rated Voltage (kV) :
 Rated Current (A) :
 BIL (kVpeak) :
 Power Frequency Dry/Wet Withstand
 Voltage (kV rms) :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	56 of 101

	Creepage distance (mm)	:
	Cantilever strength (kN)	:
	Mounting details	
	Hole circle diameter of the flange (mm)	:
	Number of bolts	:
	Hole diameter (mm)	:
	Terminal	
	Type	:
	Size	:
	No. of holes	:
27.0	Marshalling Box	:
27.1	Weather proof suitable for outdoor	:
27.3	Degree of protection	:
27.4	Terminal Blocks	:
27.5	Make	:
27.6	Type	:
27.7	20% Spare terminals furnished ?	:
27.8	Mounting (Ground/tank)	:
28.0	Winding Temperature Indicator	:
28.1	Manufacturer	:
28.2	Type Designation	:
28.3	Provision of Maximum Indicator	:
28.4	Adjustment Range of Alarm and Trip Contacts (From_to_°C)	:
28.5	Adjustment Range of Forced Cooling Contacts (From_to_°C)	:
28.6	Contact Current Rating at 110 Vdc (A)	:
28.7	Number of contacts	:

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	57 of 101

- 29.0 Oil Temperature Indicator
- 29.1 Manufacturer :
- 29.2 Type Designation :
- 29.3 Type of Liquid Sensing Element :
- 29.4 Provision of maximum indicator :
- 29.5 Adjustment Range of Alarm and
Trip contacts (From_to_°C) :
- 29.6 Adjustment Range of Forced
Cooling contacts (From_to_°C) :
- 29.7 Contact Current Rating at 125 Vdc (A) :
- 29.8 Number of contacts :
- 30.0 Buchholz Relay
- 30.1 Manufacturer :
- 30.2 Type Designation :
- 30.3 Alarm/Trip Contact Current Rating
at 110 Vdc (A) :
- 31.0 Pressure Relief Device
- 31.1 Manufacturer :
- 31.2 Type Designation
- 31.3 Pressure Range for Operation
(From_to_kPa) :
- 31.4 Resealing Pressure (kPa) :
- 31.5 Number of alarm/trip contacts :
- 31.6 Alarm Contact Current Rating at 110 Vdc (A) :
- 32.0 Cooling Equipment
- 32.1 Fans
- Number of cooling fans :
- Number of cooling fan groups :
- Power rating of each fan (W) :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	58 of 101

- Supply voltage (Vac) :
- Number of phases :
- Number of wires :
- 32.2 Total fan consumption at
full load (kW) :
- Degree of protection for fan blades :
- 33.0 Oil Level Indicator for the Main Tank
Manufacturer :
- Type Designation :
- Alarm Contact Current Rating at 110 Vdc (A) :
- 34.0 Oil level indicator for OLTC
Manufacturer :
- Type designation :
- Alarm contact current rating at 110 Vdc(A) :
- 35.0 Drain, Filter and Sampling Valves
Type & Size of Oil Drain Valve (mm) :
- Type and Size of Filtration :
- Valves (mm) :
- Size of Oil Sampling Valve/s (mm) :
- Type & Size of Radiator Valves (mm) :
- 36.0 Bushing Current Transformers
- 36.1 High Voltage Neutral Bushing Current Transformers
Manufacturer :
- Type Designation :
- Core 1:
Type of Protection :
- (back up/differential/REF Protection etc)
- Ratio (A) :
- Accuracy Class :
- Burden (VA)/Resistive burden - R_b (ohms) :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	59 of 101

Core 2: Purpose

Type of Protection :
(back up/differential/REF Protection etc)
Ratio (A) :
Accuracy Class :
Burden (VA)/Resistive burden - R_b (ohms) :
Secondary winding Resistance :
at 20°C - R_{ct} (ohm)
Knee point voltage (V) :
Secondary excitation current, I_{mag} (A) :

36.2 Bushing Current Transformers for W.T.I.

Manufacturer :
Type Designation :
Ratio
• HV :
• LV :
Burden (VA) :
Accuracy Class :

37.0 Terminations

37.1 Termination for HV Winding

Open Bushings (oil/Air)
Type of conductor :
Conductor material :
Conductor size (mm²) :

37.2 Termination for LV Winding

Cable Box
Type of cable :
Cable size (mm²) :
Material :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	60 of 101

- Number per phase :
- Method of termination :
- (Pothead, stress cone, heat shrinkable) :
- Number of terminations :
- Terminal enclosure required :
- Type (Air, Oil) :
- Incoming cable take off method :
- (Vertical, horizontal, Angle to horizontal)
- 38.0 Wiring :
- 38.1 Cable Type :
- Voltage grade Volt :
- Conductor size mm² :
- Trip & Alarm Contacts Ratings :
- Voltage 110 Volt D.C :
- Rated/Making Current Amps. :
- 39.0 Accessories :
- The transformer furnished with fittings and
Accessories as per Annexure?
- 40.0 Auxiliary supply
- AC Voltage for Motors and Controls (Vac) :
- Number of phases :
- Number of wires :
- DC Voltage for Control and Protection.(Vdc) :
- 41.0 Approx .Overall dimension :
- 41.1 Length mm :
- 41.2 Breadth mm :
- 41.3 Height mm :
- 41.4 Crane lift for un-tanking core
and coil assembly (Including sling) mm :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	61 of 101

- 42.0 Approx. Weights :
- 42.1 Core and Coil Kg :
- 42.2 Tank and fittings Kg :
- 42.3 Oil Kg :
- 42.4 Total weight Kg :
- 42.5 Shipping Data :
- 42.6 Weight of the heaviest package Kg :
- 43.0 Dimension of the largest package (L x B x h):
- 44.0 Tests :
- 44.1 Routine Tests as per IS? :
- 44.2 Tank pressure test : :
- a) Test Pressure KN/m² :
- b) Duration Hours :
- 44.3 Tank Vacuum Test
- a) Vacuum KN/m² :
- b) Duration Hours :
- 44.4 Core bolt withstand voltage for 1 min KV :
- 44.5 Type test quoted?

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	62 of 101

**TECHNICAL DATA SHEET
FOR
BATTERY AND BATTERY CHARGER**

1.0 DESIGN AND CONSTRUCTION REQUIREMENTS

Battery Application

System Description

Grounded/ungrounded
D.C. System

No. of Wires

Battery Bank Nominal
Voltage or D. C. System
rated voltage (Vdc)

Minimum permitted
voltage (Vdc)

Maximum permitted
voltage (Vdc)
(during boost)

Recommended float
charging voltage
at 25°C (Vdc/cell)

Maximum boost
voltage (Vdc/cell)

End of Discharge
Voltage (Vdc/Cell)

No. of cells forming
the battery bank

Open circuit voltage
(Vdc/cell)

Battery Loading

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	63 of 101

- a. Continuous load ___ Amps for 10 hours
- b. Short duration load ___ Amps for 1 hour
- c. Momentary Load ___ Amps for hours
- d. Short duration load ___ Amps for 1 min

Battery Ampere hours Capacity
as computed based on 10
hours discharge rate (including
all correction factors) (AH)

Minimum battery bank voltage
based on end of discharge
cell voltage (Vdc)

Battery type or Model No.

Manufactured and tested as per
Standards

Composition:

- a. Plates composition
 - Positive Plate
 - Negative Plate
- b. Separators
- c. Retainer
- d. Container and cover
- e. Connectors

Plate configuration

Positive Plate

Negative Plate

Oxygen Index of Cover
and container

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	64 of 101

Internal resistance of battery bank including inter-cell and inter-tier

connectors in fully charged condition ($m\Omega$)

Internal resistance of individual cell ($m\Omega$)

Cross section of inter-cell connectors (mm^2)

Battery terminal short circuit current (A) :

Time for total discharge during short circuit (sec.)

Maximum discharge rate
Discharge duration (minutes/seconds)
Discharge current (A)

Recommended maximum recharge current following discharge (A)

Float charging current at the recommended float voltage setting (mA/AH) :

Maximum Self discharge rate per month at 25°C (%)

Guaranteed Service Life (minimum) under operating conditions (years)

Maximum allowable deep discharge/ percent of discharge depth

Electrolyte density at 25°C

Temperature correction factor for electrolyte density at maximum level (kg/m^3)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	65 of 101

Temperature correction factor
for electrolyte density at minimum
level (kg/m³) :

Electrolyte volume per cell
(litres) :

Maximum gassing rate at the
recommended boost
voltage (mL/AH/Cell/Month)

Material of Battery rack

Racking of Battery
(single tier/two tiers)

Total weight of the cell (kg)

Cell Dimensions

Height (mm)

Width (mm)

Depth (mm)

2.0 BATTERY CHARGER

2.1 DESIGN AND CONSTRUCTION REQUIREMENTS

a) Performance characteristics and ratings.

Rated output voltage of the
charger (V_{DC})

Rated Input voltage (V_{AC})
No. of phases and wires
of input supply

Charger Output current rating (A)

Continuous DC load to be
catered to by the charger
per load profile (A)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	66 of 101

Float charging current to be catered to by the charger (A)

Battery Recharging time (max.) (Hrs)

Type of Battery (VRLA/Lead Acid Vented/Ni-Cad)

No. of cells

AH capacity

- 8 H discharge rate
- 10 H discharge rate

Parallel operation between chargers required?

Adjustable charging range for float and boost mode (%)

Steady state Voltage regulations under specified conditions (%)

Max. Voltage Transients (%)

- with battery connected
- with battery disconnected

Max. Transient Recovery time to (m.Sec)

- Steady state conditions Max.
- Full recovery

Ripple Voltage with battery disconnected Max. (%)

AC Voltage fluctuations range (%)

Audible noise level at 1.5 m Max. (db)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	67 of 101

2.2 CONTROL & PROTECTION

Current limit adjustment range
Min. (%)

Power walk-in time to full load (Secs)

Surge protection provided?

Short circuit rating of :

- AC Circuit breaker (kA)
- DC Circuit breaker (kA)

2.3 CONSTRUCTION

Type of mounting, Floor/wall

conduit/cable entry (top/bottom)

Any Forced cooling required?

Total Weight of panel (kg)

Overall dimensions of
charger panel (mm)

Width

Height

Length

Incoming cable size, mm²

Outgoing cable size, mm²

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	68 of 101

**TECHNICAL DATA SHEET
FOR
33KV POWER CABLES**

1.0 Ratings

Voltage rating (KV)

Conductor dc resistances per
km at 20°C (Ω)

Conductor ac resistance per
km at 20°C (Ω)

Minimum insulation resistance
per km at 20°C (M Ω)

Maximum permissible continuous
conductor temperature (°C)

Maximum rated temperature of
insulation material (°C)

Maximum permissible continuous
jacket temperature (°C)

2.0 Conductor Material (Cu or Al)

Ref. standard

Size

Number of strands per
Conductor

Diameter of compacted
strand (mm)

Number of Conductors

Conductor Cross Sectional area (mm²)

Outer diameter of conductor (mm)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	69 of 101

3.0 **Conductor screening**

Material

Average thickness of screening (mm)

4.0 **Insulation Material**

Average thickness of insulation (mm)

Outer diameter over insulation (mm)

5.0 **Insulation screening**

5.1 Material of non metallic part

5.2 Thickness of non metallic part

5.3 Material of metallic part

5.4 Thickness of metallic part

5.5 Short time current rating of metallic screen

6.0 **Inner sheath**

6.1 Material and type

6.2 Thickness

6.3 Diam. over inner sheath

7.0 **Armour**

7.1 Ref. standard

7.2 Material

7.3 Number of wires

7.4 Conductor cross section

7.5 Short time current rating

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	70 of 101

8.0 **Outer jacket material**

8.1 Average jacket thickness (mm)

8.2 Overall diameter of cable (mm)

9.0 Reference standard for core identification

10.0 Cable weight (kg/km)

10.1 Reel and cable weight (kg)

10.2 Cable length per Reel (m)

10.3 Total quantity (m)

10.4 Cable reel diameter (mm)

10.5 Cable reel width (mm)

10.6 Maximum pulling tension (kN)

10.7 Minimum bending radius (mm)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	71 of 101

**TECHNICAL DATA SHEET
FOR
415V DISTRIBUTION BOARDS**

- 1.0 DB ASSEMBLY :
- 1.1 Make :
- 1.2 Type :
- 1.3 Reference Standard :
- 1.4 Voltage (Nom./Max.) Volt :
- 1.5 Phase, Frequency No., Hz :
- 1.6 Short Circuit Rating
- a) Interrupting Symmetrical KA :
- b) Short time for 1 sec. KA rms :
- 1.7 Insulation Level
- 1-min., 50 Hz Voltage withstand KV rms :
- 1.8 Construction
- a) Metal clad, air insulated, floor mounting Yes/No :
- b) Suitable for mounting against building wall Yes/No :
- 1.9 Enclosure
- a) Degree of Protection :
- b) Minimum thickness of sheet metal mm :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	72 of 101

1.10 DB fully assembled, wired and tested at factory Yes/No :

2.0 CONSTRUCTION

2.1 Design

a) Completely compartmentalised :

b) Working height limits from floor level mm :

2.2 Control Compartment

a) Provided with individual front access door :

2.3 DB section provided with

a) Removable back cover :

b) Full height cable chamber :

2.4 Horizontal wireway for inter panel wiring provided for each MCC/DB :

2.5 All meters, relays, lamps etc. flush mounted type :

2.6 Vertical Section Size

a) DB (L x D x H) mm :

3.0 BUSBAR

3.1 Make :

3.2 Material & Grade :

3.3 Reference Standard :

3.4 Continuous currents at site condition, 50°C ambient and within cubicle :

a) Main Busbar Amp :

b) Vertical Busbar (minimum) Amp :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	73 of 101

- 3.5 Conductor Section
- a) Main Busbar mm² :
- b) Vertical Busbar mm² :
- 3.6 Max. temp. rise over 50°C ambient °C :
- 3.7 Short-time current for 1 second KA rms :
- 3.8 Separate chamber/phase barrier/shrouding provided for
- a) Main Busbar :
- b) Vertical Busbar :
- 3.9 Bus Connections
- a) Silver plated :
- b) Provided with anti-oxide grease :
- c) Bimetallic connectors between dissimilar metals :
- 3.10 Minimum clearance of bare busbar and connection
- a) Phase to phase mm :
- b) Phase to ground mm :
- 3.11 Busbar support spacing mm :
- 3.12 Busbars colour coded Yes/No :
- 3.13 Bus Support Insulator
- a) Make :
- b) Type :
- c) Reference Standard :
- d) Voltage Class KV :
- e) Minimum Creepage Distance mm:

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	74 of 101

- f) Cantilever Strength Kg/cm² :
- g) Net Weight Kg :

4.0 CONTROL MODULE

4.1 Control Modules :

- a) Fully drawout for MCCs Yes/No:
- b) Fixed type for Dbs Yes/No:

4.2 Power/Control disconnects silver plated for good contacts :

4.3 Drawout Modules of same type & rating are physically & electrically interchangeable :

4.4 Module sizes (L x D x H)

- a) Incomer with
- 1250 A ACB mm :
- 800 A ACB mm :
- 630 A ACB mm :
- b) Outgoing feeder with
- 400 A MCCB mm :
- 250 A MCCB mm :
- 160 A MCCB mm :
- 100 A MCCB mm :
- 63 A MCCB mm :
- 32 A MCCB mm :

5.0 CIRCUIT BREAKER

5.1 Make :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	75 of 101

- 5.2 Type :
- 5.3 Reference Standard :
- 5.4 Rated Voltage KV :
- 5.5 Rated Frequency Hz :
- 5.6 No. of Poles No. :
- 5.7 Rated Currents
- a) Continuous (at site condition, 50°C ambient & within cubicle) Amp :
- b) Short-time Current for 1 second KA rms :
- 5.8 Max. temp. rise over 50°C ambient°C :
- 5.9 Rated Operating Duty :
- 5.10 Interrupting Capacity at rated voltage and operating duty
- a) Symmetrical KA rms :
- b) Asymmetrical KA rms :
- 5.11 Rated Making Current KA.peak :
- 5.12 Insulation Level
- a) 1 min 50 Hz withstand KV rms :
- 5.13 Operating Mechanism
- a) Type :
- b) Trip free or fixed trip :
- 5.14 Circuit Breaker provided with
- a) Drawout feature having SERVICE, TEST & ISOLATED positions :
- b) Mechanical safety interlock :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	76 of 101

- c) Automatic safety shutter :
 - d) Manual operating handle :
 - e) Emergency manual trip :
 - f) Mechanical ON-OFF indications :
 - g) Overload release :
 - h) Shortcircuit release :
 - i) Auxiliary switch with
6 NO + 6 NC contacts :
- 5.15 Range of release
- a) Overload :
 - b) Short Circuit :
- 6.0 SWITCHES
- 6.1 Make :
- 6.2 Type :
- 6.3 Reference Standard :
- 6.4 Switch furnished with :
- a) Operating handle :
 - b) Door interlock :
 - c) Provision for padlocking in
ON & OFF Positions. :
- 6.5 All feeders provided with bolted
disconnect link :
- 6.6 Current Ratings at 50`C
ambient & within cubicle
- (a) :
 - (b) :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	77 of 101

- (c) :
- (d) :
- (e) :
- (f) :
- 6.7 Breaking current @ 415V A.C.
or 110V D.C.
- (a) :
- (b) :
- (c) :
- (d) :
- (e) :
- (f) :
- 7.0 FUSE
- 7.1 Make :
- 7.2 Type :
- 7.3 Reference standard :
- 7.4 Rupturing capacity KA rms :
- 7.5 Continuous current at 50°C ambient
& within cubicle Amps :
- 7.6 Cut off currents KA peak :
- 7.7 Fuse characteristics furnished
for various fuse ratings :
- 8.0 CONTACTORS
- 8.1 Make :
- 8.2 Type :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	78 of 101

- 8.3 Reference standard :
- 8.4 Duty class :
- 8.5 Utilization category :
- 8.6 Operating Coil Voltage
- a) Rated :
- b) Pick-up :
- c) Drop-out :
- 8.7 Continuous Current rating @ 50°C & within cubicle A :
- 8.8 Power Consumption
- a) During closing VA :
- b) After closing VA :
- 8.9 Auxiliary Contacts furnished per Contactor :
- a) Normally open (NO) :
- b) Normally closed (NC) :
- 8.10 Aux. Contact rating
- a) Make & Continuous Amp :
- b) Break (Inductive) at :
- 240V A.C. Amp :
- 220V D.C. Amp :
- 8.11 Time range of delayed dropout contactors furnished Sec. :
- 8.12 Thermal Overload Relay & Single Phase Preventor
- a) Temperature compensated ? :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	79 of 101

- b) Hand Reset ? :
- c) No. & type of contacts :
- d) Thermal overload characteristics furnished :
- e) Tolerance on current injection
- 1 - pole :
- 2 - pole :
- 3 - pole :

9.0 PUSHBUTTON & LAMPS

9.1 Push Button

- a) Make :
- b) Type :
- c) Cat.No. :
- d) Contact Rating :
- Make & Continuous Amp :
- Break (inductive)
- 240V A.C. Amp :
- 110V D.C. Amp :

9.2 Lamps

- a) Make :
- b) Type :
- c) Cat. No. :
- d) Watts/Voltage :
- e) Series resistor Ohm :
- f) Lamp & lens replaceable from front

10.0 METER

10.1 Make :

10.2 Type :

10.3 Reference Standard :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	80 of 101

- 10.4 Size :
- 10.5 Scale :
- 10.6 Accuracy class :
- 11.0 CURRENT TRANSFORMER
- 11.1 Make :
- 11.2 Type :
- 11.3 Reference Standard :
- 11.4 C.T. Ratings
- a) Current ratio :
- b) Rated burden :
- c) Accuracy class :
- Protection
Metering
- 12.0 SECONDARY WIRING
- 12.1 Type of Insulation :
- 12.2 Voltage Grade :
- 12.3 Conductor material :
- 12.4 Conductor size (minimum)
- a) Potential Circuit mm² :
- b) Current & Control Circuit mm² :
- 12.5 Wires identified at both ends with ferrules :
- 13.0 TERMINAL BLOCK
- 13.1 Make :
- 13.2 Type :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	81 of 101

- 13.3 Cat. No. :
- 13.4 Voltage Grade :
- 13.5 20% spare terminals furnished :
- 14.0 BUS DUCT CONNECTION
- 14.1 Bus duct connection included as per drawing/bill of materials :
- 14.2 Average length assumed for bus duct:
- 15.0 CABLE TERMINATION
- 15.1 Cable entry provision from top & bottom ? :
- 15.2 Cable termination & connection arrangement furnished as specified :
- 15.3 Power Cable Lugs
- a) Type :
- b) Materials :
- 15.4 Power Cable Glands
- a) Make :
- b) Type :
- c) Materials :
- d) With tapered washers :
- 15.5 Removeable Gland Plate
- a) Material for multicore cable :
- b) Material for I/C cable :
- c) Thickness of the plate :
- 16.0 GROUND BUS
- 16.1 Ground bus furnished ? :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	82 of 101

16.2	Material	:
16.3	Size	:
17.0	NAME PLATE	
17.1	Material	:
17.2	Thickness	:
17.3	Size	:
18.0	SPACE HEATER	
18.1	Cubicle Heater	
	a) Thermostat controlled	:
	b) Wattage	:
	c) Voltage	:
18.2	Provision made for motor heater supply	:
18.3	Cubicle/Motor heater provided with individual switch fuse units	:
19.0	TROPICAL PROTECTION	
	a. Any special treatment for tropical protection	:
	b. Screens are of corrosion resistant materials	:
20.0	PAINTING	
	Finish of MCC/DB	
	a. Inside	:
	b. Outside	:
21.0	TEST	
22.1	Routine tests on DB to be performed	:

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	83 of 101

a.

b.

c.

d.

23.0 TYPICAL DRAWINGS/DATA FURNISHED

23.1 General arrangement :

23.2 Foundation plan :

23.3 Control scheme :

23.4 Bill of Materials :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	84 of 101

24.0 OVERALL DIMENSIONS & WEIGHTS

	Name of DB	Dimensions (L x D x H) mm	Approximate Weights KG
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

(Add more sheets, if required)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	85 of 101

TECHNICAL DATA SHEET
FOR
DATA ACQUISITION SYSTEM

1.00.00 RTU

- 01. Data transmission rate :
- 02. Communication ports :
- 03. Communication protocol with Master station :
- 04. Communication protocol with MFM :
- 05. Analog/Status data transfer to Master station :
- 06 Analog Input Channel
- 07 Digital Input
- 08 Digital Output
- 09 Real Time Clock stability
- 10 Temperature

2.00.00 GSM/GPRS MODEM

- 01. Make & Type :
- 02. Frequency Band. :
- 03. Data & SMS :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	86 of 101

04. Power Output :
- 900 MHz
- 1800 MHz
05. Operating Temp :
- 06 Humidity
- 07 Remote Control
- 08 Baud Rate
- 09 Antenna
- 10 SIM Card Holder
- VA Burden
Total burden during data
Communication
- Total burden during stand
by
- Service Indicating

3.00.00 CABLES

01. Cables of Indoor area :
- a) Conductor :
- b) Insulation :
- c) Inner & Outer sheath :
- d) Armour :
03. Cables for wiring at : .
Subscriber's end

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	87 of 101

4.00.00 BATTERY & CHARGER

- 01. Make & Type :
- 02. AH capacity :
- 03. DC voltage :
- 04. Charger :
- 05. Rating :

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	88 of 101

TECHNICAL QUERIES FOR DATA ACQUISITION SYSTEM

For the clarity with regard to the system offered by the Bidder, the following questionnaire is required to be answered point wise as per the Technical Specifications :

01. Is the system offered fully digital and uses the technology as specified in the tender.
- a) YES b) NO
02. Is the system offered the state-of-art and belongs to prevailing series of system introduced by the Supplier across the globe.
- a) YES b) NO
03. Is the system offered fully compliant with tender requirements and specification ?
- a) YES b) NO
04. Is the system offered fully compliant to DAS Software specified ?
- a) YES b) NO
05. Is the system offered based on the Open System Architecture ?
- a) YES b) NO
06. Is the system up-gradation involve any processor up-gradation or any of the other common control cards and cabinet ?
- a) YES b) NO
07. Number of installation of same series in INDIA
- i) 0 - 10
ii) 10 - 25
iii) 25 – 50
iv) 50 – 100
v) Above 100
08. Is the system offered supports system management to provide modular options for effective and easy system management ?

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	89 of 101

- a) YES b) NO
09. Is the system offered automatic check through series of tests the normal operation ?
- a) YES b) NO
10. Is the system offered has the provision of instant fault information by raising external alarm ?
- a) YES b) NO
11. Is the system offered support remote maintenance facility for trouble indication and recording and Automatic Line Testing ?
- a) YES b) NO
12. Is the system warranty for 36 months from the date of commissioning ?
- a) YES b) NO

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	90 of 101

ANNEXURE-III

MANDATORY SPARES

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	91 of 101

ANNEXURE -III

MANDATORY SPARE (ELECTRICAL)

Bidder shall quote for the mandatory spares indicated below. In case, the bidder does not consider any item and add any item, the Bidder shall indicate it.

Sl. No.	Description	Quantity (Nos.)
1.	DISTRIBUTION TRANSFORMER	
	a) H.T. Bushing with metal parts.	2 nos.
	b) L.T. Bushing with metal parts.	2 nos.
	c) Oil Level gauge for main tank conservator.	2 nos.
	d) Oil Temperature Indicator (OTI).	2 nos.
	e) Winding Temperature Indicator (WTI).	2 nos.
	f) Buchholz Relay.	2 nos.
	g) Silica gel Breather for main tank.	2 nos.
	h) Oil Inlet/Outlet Valve	2 nos.
	i) Water Inlet/Outlet Valve	2 nos.
	j) Oil Sampling Valve	2 nos.
	k) Gas Release device	2 nos.
2.	33KV OUTDOOR VCB	
	a) Vacuum Bottle, 36kV,1250 Amp	2 Nos.
	b) Spring Charging Mechanism	1 No.
	c) Closing Coil 110V D.C	1 No.
	d) Tripping Coil 110V D.C	1 No.
	e) Breaker Control switch with pistol grip handle	2 Nos.
	f) Local/Remote selector switch	2 Nos.
	g) Control fuse 2A/6A/20A	6 Nos. each
	h) H.T. Bushing with metal parts.	1 No.
	i) Indicating lamps of each colour	2 sets
3.	33kV ISOLATOR	
	a) Aux. switch with 6 NO + 6 NC contacts	3 nos.
	b) Main contact assembly	2 nos.
	c) Interlocking coil 110V D.C	1 no.
	d) H.T. Bushing with metal parts	3 nos.
	e) Operating mechanism assembly	2 nos.

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	92 of 101

Sl. No.	Description	Quantity (Nos.)
4.	33kV INSULATORS	
	a) Post insulator, 2kN	2 nos.
	b) Pin insulator	6 nos.
	c) 11kV Disc insulator, 70kN	15 nos.
5.	36kV LA	
	a) 36 kV LA	3 nos.
	b) Surge Counter	3 nos.
6.	33kV CONTROL & RELAY PANEL	
	a) Protective relay each type	1 no.
	b) Auxiliary relay each type	1 no.
	c) Ammeter each type	1 no.
	d) Voltmeter (0-36kV)	1 no.
	e) Ammeter selector switch	1 no.
	f) Voltmeter selector switch	1 no.
	g) HRC Control Fuse 2/6/20 Amp. rating	6 Nos. each
	h) Indication lamps suitable for 240 Volt AC	12 Nos.
	i) Local/Remote selector switch	1 No.
	j) Push Button Station	2 Nos.
	k) Miniature Circuit Breakers 2/16 Amp. rating	1 No. each
	l) Breaker control switch, TNC	1 No.
	m) Auxiliary contactor 2NO+2NC, 110 V DC coil	1 No.
	n) Semaphore indicators	2 nos.
	o) Digital multifunction meter	1 no.
7.	BATTERY CHARGER AND DCDB	
	a) HRC fuse links of each rating	2 nos.
	b) MCB of each rating	1 no.
	c) Indicating lamps of each colour and size	1 no.
	d) Diode/Thyristor of each rating	1 no.
	e) Pulse firing PCB	1 no.
	f) Indicating type fuse for thyristor	6 nos.
8.	415V DB	
	a) Closing coil for each rating of ACB	1 each

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	93 of 101

Sl. No.	Description	Quantity (Nos.)
	b) Tripping coil for each rating of ACB	1 each
	c) Microprocessor based built in release each type with ACBs	2 nos. each
	d) Control fuse of each rating	2 nos.
	e) Indicating lamps of each colour/size	12 nos.
	f) Thermo magnetic release each type with MCCBs	2 nos. each
	g) Bus support insulators	6 nos. each type
9.	LIGHTING SYSTEM	
	a) Normal lighting fixtures each type	6 nos.
	b) Emergency lighting fixtures each type	2 nos.
	c) MCB of each rating	4 nos.
	d) Starters for 36W FTL	20 nos.
	e) Ballast for 36W FTL	10 nos.
	f) 240V, 20A, 3 pin receptacles	5 nos.
	g) 5A kit kat switches	30 nos.
	h) 5A, 240V socket	10 nos.

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	94 of 101

ANNEXURE -III

MANDATORY SPARE (DAS)

Bidder shall quote for the mandatory spares indicated below. In case, the bidder does not consider any item and add any item, the Bidder shall indicate it.

SL. No.	ITEM	QUANTITY (NOS.)
01.	DAS Server	1
02.	Metering Server	1
03.	RTU with all accessories	1
04.	RTU DI Module	1
05.	RTU Communication Module	1
06.	RTU AI Module	1
07.	RTU Power Supply Module	1
08.	GSM/GPRS Modem with all accessories	1
09.	Ethernet Switch	1
10.	Any other item, deemed necessary to be included by the Contractor	

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	95 of 101

ANNEXURE-IV

MAINTENANCE SPARES

The Bidder shall quote Maintenance spare parts for operation and maintenance for a period of ten (10) years.

SL. No.	ITEM	QUANTITY (NOS.)

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	96 of 101

ANNEXURE-V
COMMISSIONING SPARES

The Bidder shall quote Commissioning spare parts.

SL. No.	DESCRIPTION	QUANTITY (NOS.)
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	97 of 101

ANNEXURE-VI

LIST OF TOOLS AND TACKLES

The Bidder shall tabulate below the item-wise list of tools furnished by him for the operation and maintenance of the equipment supplied under this Specification and whose total cost has been indicated separately in **PRICE TABULATION SHEET**.

SL No.	DESCRIPTION	QUANTITY (NOS.)
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		
11.		
12.		

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	98 of 101

ANNEXURE-VII

DRAWING SUBMISSION SCHEDULE

SL. No.	DRAWING	SUBMISSION OF DRAWINGS FOR APPROVAL IN WEEKS AFTER ISSUE OF "LETTER OF INTENT"
01.		
02.		
03.		
04.		
05.		
06.		
07.		
08.		
09.		
10.		

The Bidder shall also furnish the time in weeks for resubmission of reviewed / commented drawings from Owner from the date of receipt.

The Bidder shall also submit completion schedule in the form of Bar Chart showing different activities and corresponding time for supply and installation of complete equipment

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	99 of 101

ANNEXURE-IX

DEVIATION SHEET : PART-B

If the proposal has got any deviation from the tendering conditions and the General Conditions of Contract, the Bidder shall tabulate these deviations clause by clause in this Schedule. Add more sheets, if required.

CLAUSE NO.	DEVIATIONS

TITLE	Doc. No.	Section	Sub section	Prep. by	Date	Rev	Page no.
Tender Document for 33kV Ring Main including 33/0.433kV S/S in NIT, Rourkela Campus	NITRKL-33KVRM-TD-01	IX : Proposal Exhibit Sheets	Part-I : Technical	SKD	20.02.2010	0	101 of 101