

Package !

Package-1



निविदा / Enquiry

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 765 KV SOLAPUR

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000483	11-Feb-20	0		70I2000551	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	1150.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	1133.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	1.0000		

Instructions to Bidders

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Offers Through E-MAIL / FAX / E-Procurement Portal: WHOSEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO SEND THE OFFERS TO THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX or bhel.abc.procure.com as instructed. THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONVENTIONAL METHOD FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE COVERS ARE KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE. OFFERS SENT TO ANY OTHER E-MAIL ID or FAX NO AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATION PURPOSE. The bidders who has sent offers with password, the passwords are to be forwarded to email id: tenderbox@bhel.in

It is suggested that the bidders are advised to send the files with 'password protection'.

राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एस.एम.) / Manager (T.B.M.M.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Nays IT Business Park
Plot No.-7, Sector-142, Expressway
11.02.2020

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To
RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000483 Enquiry Date: 11-Feb-20

2/24
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एन.) / Manager (T.B.M.M.)
परिवहन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

Package-1

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV CHAMPA

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000484	11-Feb-20	0		70I2000556	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	470.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	451.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	1.0000		

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (सि.बी.ए.ए.) / Manager (S.B.E.E.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Havis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)
21-7
11.02.2020
भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To

RAJEEV KUMAR ROY

Bharat Heavy Electricals Limited

Transmission Business Group

Tower-A, 5th Floor,

Advant Navis IT Business Park,

Plot No-7, Sector-142, Expressway Noida

Noida-201305

Distt. Gautam BudhNagar, U.P

Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000484

Enquiry Date: 11-Feb-20

21-7
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एल.ग्रुप) / Manager (T.B.M.M.)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

Package-1

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 765 KV WARDHA

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000485	11-Feb-20	0		70I2000552	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	1000.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FDR LAYING OF FIBER OPTIC CABLE	0	MTR	968.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	1.0000		

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एन.) / Manager (T.B.M.N.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Adyant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)
21/2
11.02.2020
भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

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To

RAJEEV KUMAR ROY

Bharat Heavy Electricals Limited

Transmission Business Group

Tower-A, 5th Floor,

Advant Navis IT Business Park,

Plot No-7, Sector-142, Expressway Noida

Noida-201305

Distt. Gautam BudhNagar, U.P

Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000485

Enquiry Date: 11-Feb-20

21/2/20
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एल.एन.) / Manager (T.B.M.M.)
परिवहन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

Package-1

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 765 KV AURANGBAD

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000486	11-Feb-20	0		70I2000553	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	1.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
12	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	1350.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	1320.0000		

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एस.ए.) / Manager (T.B.S.E.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Limited
5th Floor, Section-2, Express Highway, Plot No. 7, Sector-10, Gurgaon, Haryana-122001
11.02.2020

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

- (a) The offer against subject enquiry shall be submitted by the scheduled date and time.
- (b) We regret to quote. The item in reference is out of our manufacturing range.
- (c) We regret because of our prior commitments.
- (d) Any other reason.

To

RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000486 Enquiry Date: 11-Feb-20

21-7
11.02.2020
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (ली.बी.एम.एम.) / Manager (T.B.M.M.)
परिचय व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

Package-1

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV KHANDWA

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000487	11-Feb-20	0		70I2000554	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	1.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	500.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND PDWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	462.0000		
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		

Instructions to Bidders

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.ए.) / Manager (T.B.M.M.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advantia IT Business Park,
Plot No.-7, Sector-142, Expressway, Gurgaon-201305 (U.P.)
11-02-2020

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

- (a) The offer against subject enquiry shall be submitted by the scheduled date and time.
- (b) We regret to quote. The item in reference is out of our manufacturing range.
- (c) We regret because of our prior commitments.
- (d) Any other reason.

To
RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000487 Enquiry Date: 11-Feb-20

21-4
11.02.2020
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (वि.बी.एस.ग्रुप) / Manager (T.B.M.M.)
पतरेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

Package - 1

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
परिचलन व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV ITARSI

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000488	11-Feb-20	0		70I2000558	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	1.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	1.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	1.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	3.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	1.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	1.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	500.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	20.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	20.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	462.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	20.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTDR- INDUSTRIAL GR	0	PAIR	1.0000		

Instructions to Bidders

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (ली.बी.एम.एल.) / Manager (L.B.M.RO)
परिचलन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Naya 'T' Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)

भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

21/2
11.02.2020

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To

RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noide-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000488 Enquiry Date: 11-Feb-20

21-7
2020-2020
राजीव कुमार रॉय / Rajeev Kumar Roy (T.B.M.M.)
प्रबंधक (टी.बी.एम.एम.) / Manager (T.B.M.M.)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV JABALPUR

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000489	11-Feb-20	0		70I2000557	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	9.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	3.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	3.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	3.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	3.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	3.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	3.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	3.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : OESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	60.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMOREO, SINGLE MODE	0	MTR	1550.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	190.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	60.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	1513.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INOUSTRIAL GR	0	PAIR	3.0000		

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राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एन.) / Manager (T.B.M.N.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park
Plot No.-7, Sector-142, Expressway Noida-201304 (U.P.)
11-02-2020
भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

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- (c) We regret because of our prior commitments.
- (d) Any other reason.

To
RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000489 Enquiry Date: 11-Feb-20

21/2/20
11.02.2020

राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एम.) / Manager (T.B.M.M.)
परिवहन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)



निविदा / Enquiry

भारत हेवी इलेक्ट्रिकल्स लिमिटेड / BHARAT HEAVY ELECTRICALS LIMITED
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL 400 KV RAJGARH

Enquiry No	Enquiry Date	Rev No	Rev Date	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000490	11-Feb-20	0		70I2000555	Package		25-Feb-20			RAJEEV KUMAR ROY

Equipment Detail

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	0	NO	6.0000		
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	0	NO	1.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	0	NO	2.0000		
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	0	NO	2.0000		
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	2.0000		
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	0	NO	2.0000		
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	0	NO	2.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	0	NO	2.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	0	NO	2.0000		
10	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	0	LOT	1.0000		
11	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	0	LOT	1.0000		
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	0	MTR	750.0000		
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	0	MTR	140.0000		
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	0	MTR	40.0000		
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	0	MTR	40.0000		
16	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	0	MTR	726.0000		
17	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	0	PAIR	2.0000		

Instructions to Bidders

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS NOT RECEIVED WITHIN SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED. BHEL shall not be responsible for any postal delay.

In your own interest, you are advised to carefully read "the instructions to bidders". Incomplete bids and/or bids not complying with tender conditions shall be treated as non-responsive and are likely to be ignored.

In case Tender Documents are not received within 7 days of this E-mail message, intimate BHEL accordingly. If no intimation is received, it will be considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will not be entertained.

You are requested to submit your most competitive offer as stated in Terms & conditions.

BHEL reserves the right to opt for reverse auction for obtaining best prices.

Offers Through E-MAIL / FAX / E-Procurement Portal: WHOSEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO SEND THE OFFERS TO THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX or bhel.abc.procure.com as instructed. THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONVENTIONAL METHOD FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE COVERS ARE KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE. OFFERS SENT TO ANY OTHER E-MAIL ID or FAX ND AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATION PURPOSES. The vendors who has sent offers with password, the passwords are to be forwarded to email id: tenderbox@bhel.in

It is suggested that the bidders are advised to send the files with 'password protection'.

राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एम.) / Manager (T.B.M.M.)
पारेषण व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (UP)
11.02.2020

Please acknowledge the receipt of tender enquiry and e-mail/fax back this letter by ticking the appropriate item below.

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To
RAJEEV KUMAR ROY
Bharat Heavy Electricals Limited
Transmission Business Group
Tower-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P
Ph: 0120-6748137

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

Enquiry No : 70Q2000490 Enquiry Date: 11-Feb-20

21-7
11.02.2020
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एम.) / Manager (T.B.M.M.)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida-201305 (U.P.)

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR POWERGRID SS-19 PROJECT

Enquiry No:, Dated.....

1. In case any discrepancy between the requirements mentioned under special terms & conditions and general terms & conditions, special terms and conditions shall prevail.
2. For any technical clarification, kindly contact **Ms. DEEPALI SHARMA, SR. ENGR-TBEM / Mr. S K SHUKLA, SR. DGM-TBEM**
 BHEL, Transmission Business Group
 Tower-A, 5th Floor, Advant Navis IT Business Park
 Plot-7, Sector-142, Expressway Noida, Noida-201305, UP, India
 Phone: +91 (0) 0120- 6748506/8539
 Fax: +91 (0) 0120 – 6748580.
 E-mail: deepali/skshukla@bhel.in
3. For any commercial clarification, kindly contact **Rajeev Kumar Roy, Manager (TBMM);**
 BHEL, Transmission Business Group
 Tower-A, 5th Floor, Advant Navis IT Business Park
 Plot-7, Sector-142, Expressway Noida, Noida-201305, UP, India
 Phone: +91 (0) 0120- 6748484
 Fax: +91 (0) 0120 – 6748580.
 Contact No. 0120 6748484; e-mail: rajeevroy@bhel.in.
4. **Bidder to submit offer directly through E-PROCUREMENT MODE ONLY.** Bidder may visit <https://bhel.abcpurchase.com>. No other mode for submission of tender is acceptable. Note: Both bids (Techno-commercial Bid & Price Bid) will be opened immediate after receipt of offer.
5. **Proposed delivery plan: IMMEDIATE.** However, vendor has to examine their best possible delivery plan & mentioned in **ACTIVITY SCHEDULE** to meet the tender delivery requirement. In case, BHEL's delivery requirement is not met by vendor(s), then a chance may be given to all such vendors to review their quoted delivery schedule in line with BHEL's delivery requirement. However, if vendor fails to meet the requisite delivery plan, then BHEL reserves the right not to consider the offer of such vendor(s).
6. **Technical specification No:** BHEL technical specification no: TB-408-316-110, REV-00 is applicable. No permissible Technical Deviation has been envisaged.
7. **Quantity Variation:** The total contract value may vary at contract stage by $\pm 30\%$.
8. **PQR (Pre-qualification requirement):** Bidder must comply with technical specification of tender enquiry otherwise offer is liable for rejection.
9. **Clause No. 2.1 of General Terms & Conditions (GTC) for tender Enquiry / Contract should be as follows:**

PRICES: A. all prices shall be FIRM & Ex-works price including packing & forwarding charges. No enhancement of rate for whatsoever reasons unless and until asked by BHEL shall be allowed.

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR POWERGRID SS-19 PROJECT

Enquiry No:, Dated.....

PROJECT STATUS: Domestic in nature. GST is applicable as per current prevailing rates.

10. **TERMS OF PAYMENT:** Clause no: 3.2 is applicable for supply and 3.5 for supervision of ETC works as per GTC whereas scope is defined for supply & supervision of ETC works.
11. **DEFECT LIABILITY (GUARANTEE SPECIFIC CLAUSE NO-05 of GTC):** The guarantee period of equipment shall be twelve (12) months from the date of Taking Over plant/ completion of all facilities. **Taking Over/ Completion of Facilities is 31-07-2021.**
12. **PERFORMANCE BG (Refer Clause no-7 of GTC):** Option-B is applicable in case not opt any option as per NIT condition. Performance BG will be valid twelve (12) months from the date of Taking Over plant/ completion of all facilities. **Taking Over/ Completion of Facilities is 31-07-2021 with extra claim period of 3 months extra and over guarantee period.**
13. **LIQUIDATED DAMAGES FOR DELAYED DELIVERY (Clause No:13 of GTC for tender Enquiry / Contract should be as follows:**
In case of delay in execution of Purchase Order beyond the contractual delivery time, an amount of 0.5% of the total PO value for supply per week of delay or part thereof subject to a maximum of 10% of the total Purchase Order value for supply shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. **PO value is defined as total ex-works & total F & I Charges.**
14. **Clause No. 33 for Reverse Auction of NIT shall be as follows:**
"BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer.

The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR POWERGRID SS-19 PROJECT

Enquiry No:, Dated.....

considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com)."

As a reminder to the bidders, system will flash following message (in RED Color) during the course of 'online sealed bid': *"Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL."*

In addition to above RA guidelines, bidder note that

(A) In case where RA is conducted successfully Reverse auction shall be conducted as per existing procedure of BHEL. Ranking of bids shall be based on final price fed by respective bidder (including H1 bidder) in reverse auction process. If L1 bid is from a 'Local Supplier', L-1 bidder may be considered for further award of work. No other Bidder shall be invited to match price of L-1 Bidder

If L1 bid is not from a 'Local Supplier', the lowest evaluated bidder among the 'Local Suppliers' based on the ranking of the price after RA, will be invited to match the L1 price provided 'Local Supplier's price is within the Margin of Purchase Preference i.e. +20% of L1 price. In case such local supplier agrees to match the price of L-1 Bidder, such local supplier may be considered for further award of work. In case such lowest eligible 'Local Supplier' fails to match the L1 price, the eligible 'Local Supplier' with the next higher bid within the Margin of Purchase Preference (i.e. 20% of L-1 Price) as above shall be invited to match the L1 price, and so on, and may be considered for award of work accordingly. In case none of the 'Local Suppliers' within the Margin of Purchase Preference (i.e. 20% of L-1 price) matches the L1 price, then the L1 bidder may be considered for award of work.

(B) In case where RA is failed, Price bid shall be opened as per reverse auction procedure of BHEL and based on the same make in India policy shall be implemented.

15. **PRICE BID FORMAT:** Vendor to quote as per specified price format of NIT, otherwise their offer shall be liable to be rejected.

16. **IMPORTANT INSTRUCTION:**

- Bidder to ensure procurement of BOI items from PGCIL approved sources and inspection shall be done as per their standard practice/procedure.
- Bidder who are not approved in POWERGRID as system integral, needs to be submitted complete credential along with techno-commercial bid for approval from POWERGRID & placement of order is subject to approval/acceptance of POWERGRID. Required documents for approval from POWERGRID listed in **ANNEXURE-I**.
- Final acceptance of technical qualified vendor for placement of order is subject to approval/acceptance of POWERGRID. Price bid opening of offers is also subject to vendor approval from POWERGRID
- PO/LOI shall be placed to L1 bidder project wise on ex-works basis. However evaluation shall be done based on overall quantity as per NIT for individual **PACKAGE-01 & PACKAGE-02**.

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR POWERGRID SS-19 PROJECT

Enquiry No:, Dated.....

17. **Promotion of MAKE IN INDIA:** For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent orders issued by the respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/VO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable. Preference to Make in India will be as per the Public Procurement (Preference to Make in India), Order 2017 available in the following link:

http://dipp.nic.in/sites/default/files/publicProcurement_MakeinIndia_15June2017.pdf

http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017_28052018.pdf

For this procurement, Public Procurement (Preference to Make in India) Order, 2017" dated 15/06/2017 & 28/05/2018 and subsequent orders issued by respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract /PO/VO against this NIT.

In the event of any nodal ministry prescribing higher and lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.

Note: Bidder to submit FORMAT duly filled & signed and stamped by their authorized persons. It is mandatory against this NIT. Minimum Local content is 50% (being transmission/sub-station package).

18. Following confirmation to be provided by vendor:

"We confirm that we have quoted as per specified price format provided along with this tender".

NAME & SEAL OF TENDERER

Enclosed:

- Commercial deviation sheet, technical deviation sheet.
- Format of local content certificate
- Activity schedule
- General terms and condition for supply.
- Un-priced bid format for **PACKAGE-01 & PACKAGE-02.**

SCHEDULE OF PRICE BID - SUPPLY AND SUPERVISION OF ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: POWERGRIS SS-19 PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY & SUPERVISION OF ETC WORKS (PACKAGE-01)

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-408-316-110)	UNIT	QTY	HSN CODE	UNIT EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT F & I UP TO SITE (Rs.)	TDTAL F & I UP TO SITE (Rs.)	GST @..... % OF TDTAL EX- WORKS (Rs.)	GST @.....% OF (TDTAL F & I UP TD SITE)	TOTAL F.O.R. DESTINATION PRICE
			1		2	3 = 2 X 1	4	5 = 4 X 1	8 = (18 X 3)/100	7 = (18 X 5)/100	8 = 3 + 5 + 6 + 7
PROJECT: POWERGRID SOLAPUR PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 800VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1150								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1133								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHED JLE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
A	SUB-TOTAL (A) =										
PROJECT: POWERGRID CHANDRA PROJECT											
1	SUPPLY- VISUAL MONITDRING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 800VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	470								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MDUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	451								
15	SUPPLY- VISUAL MONITDRING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
B	SUB-TOTAL (B) =										
PROJECT: POWERGRID WARDHA PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								

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SCHEDULE OF PRICE BID - SUPPLY AND SUPERVISION OF ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: POWERGRIS SS-19 PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY & SUPERVISION OF ETC WORKS (PACKAGE-01)

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-408-316-110)	UNIT	QTY	HSN CODE	UNIT EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT F & I UP TO SITE (Rs.)	TOTAL F & I UP TO SITE (Rs.)	GST @..... % OF TOTAL EX- WORKS (Rs.)	GST @.....% OF (TOTAL F & I UP TO SITE)	TOTAL F.O.R. DESTINATION PRICE
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1000								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	968								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
C	SUB-TOTAL (C)=										

1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1350								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1320								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
D	SUB-TOTAL (D)=										
E	TOTAL DELIVERED COST TO BHEL (A + B + C + D)=										

NOTE:

- PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICES BLANKED) SHALL BE FURNISHED ALONG WITH TECHNO-COMMERCIAL BID.
- REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.
- THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.

SIGNATURE & SEAL OF TENDERER

SCHEDULE OF PRICE BID - SUPPLY AND SUPERVISION OF ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: POWERGRIS SS-19 PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY & SUPERVISION OF ETC WORKS (PACKAGE-02)

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-408-318-110)	UNIT	QTY	HSN CODE	UNIT EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT F & I UP TO SITE (Rs.)	TOTAL F & I UP TO SITE (Rs.)	GST @..... % OF TOTAL EX- WORKS (Rs.)	GST @.....% OF (TOTAL F & I UP TO SITE)	TOTAL F.O.R. DESTINATION PRICE
			1		2	3 = 2 X 1	4	5 = 4 X 1	6 = (18 X 3)/100	7 = (18 X 5)/100	8 = 3 + 5 + 6 + 7
PROJECT: POWERGRIS SS-19 PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	500								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM OIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	462								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIDNING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NDT APPLICABLE	NDT APPLICABLE		NOT APPLICABLE	
A	SUB-TOTAL (A) =										
PROJECT: POWERGRIS SS-19 PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	1								
2	SUPPLY- VISUAL MDNITORING SYSTEM/CCTV : CAMERA HOUSING	NO	1								
	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	1								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTDR- INDUSTRIAL GR	PAIR	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	3								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : UU (12 PORT)	NO	1								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	ND	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	1								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	500								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ MM) UNARMORED WITH TERMINAL CONNECTDRS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	462								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MDUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	1								

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SCHEDULE OF PRICE BID - SUPPLY AND SUPERVISION OF ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: POWERGRIS SS-19 PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY & SUPERVISION OF ETC WORKS (PACKAGE-02)

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-408-316-110)	UNIT	QTY	HSN CDDE	UNIT EX. WDRKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT F & I UP TO SITE (Rs.)	TOTAL F & I UP TO SITE (Rs.)	GST @..... % OF TOTAL EX- WDRKS (Rs.)	GST @.....% DF (TOTAL F & I UP TO SITE)	TOTAL F.O.R. DESTINATION PRICE
			1		2	3 = 2 X 1	4	5 = 4 X 1	6 = (18 X 3)/100	7 = (18 X 5)/100	8 = 3 + 5 + 6 + 7
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
17	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
B	SUB-TOTAL (B) =										
PROJECT: POWERGRID RAIPUR PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	3								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	3								
	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	3								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	3								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	3								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	9								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	3								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	3								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1550								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	190								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	60								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	60								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1513								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	3								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
C	SUB-TOTAL (C) =										
PROJECT: POWERGRID RAIPUR PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	2								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NO	2								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NO	2								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NO	2								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	2								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NO	6								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NO	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NO	2								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NO	2								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	750								

SCHEDULE OF PRICE BID - SUPPLY AND SUPERVISION OF ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: POWERGRIS SS-19 PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY & SUPERVISION OF ETC WORKS (PACKAGE-02)

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-408-318-110)	UNIT	QTY	HSN CODE	UNIT EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT F & I UP TO SITE (Rs.)	TOTAL F & I UP TO SITE (Rs.)	GST @..... % OF TOTAL EX- WORKS (Rs.)	GST @.....% OF (TOTAL F & I UP TO SITE)	TOTAL F.O.R. DESTINATION PRICE
			1		2	3 = 2 X 1	4	5 = 4 X 1	6 = (18 X 3)/100	7 = (18 X 5)/100	8 = 3 + 5 + 6 + 7
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	140								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	40								
13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	40								
14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	726								
15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NO	2								
16	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEOULE & DETAILED BILL OF QTY.	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1				NOT APPLICABLE	NOT APPLICABLE		NOT APPLICABLE	
D	SUB-TOTAL (D) =										
E	TOTAL DELIVERED COST TO BHEL (A + B + C + D)=										

NOTE:

- PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICES BLANKED) SHALL BE FURNISHED ALONG WITH TECHNO-COMMERCIAL BID.
- REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.
- THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.

SIGNATURE & SEAL OF TENDERER



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भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

पारेषण व्यापार समूह, नोएडा, ऊ.प्र. / TBG, Noida, U.P.

संविदा प्रबंधन/ Material Management

ANNEXURE-I

Bidder should be approved by POWERGRID. In case Bidder is not already approved, Bidder is required to obtain POWERGRID approval before placement of PO/LOI. The vendor will be required to take POWERGRID approval based on the assessment report, to be considered for further tendering process. Any cost incurred on account of a physical assessment conducted by POWERGRID, if required, will be borne by the vendor only. For information of vendors, following documents are required by POWERGRID for vendor approval:

1. Registration / License of the works
2. Organization chart with name and qualification of key persons.
3. List of Plant and Machinery.
4. List of testing equipment with their calibration status.
5. List of Raw material, bought out items with sourcing details.
6. List of out-sourced services with sourcing details.
7. List of supply in last three years.
8. Third party approval, if any (viz. ISO, BIS).
9. Pollution clearance wherever applicable.
10. Energy Conservation and Efficiency report.
(Applicable to industries having contract load more than 100 KVA)
11. Formats for RM, in process and acceptance testing.
12. Type test approvals conducted in last 5 years, if applicable.
13. Performance Certificates from Customers.
14. Photographs of factory, plant and machinery & testing facilities.

If the Vendor is unable to get the approval from POWERGRID, they will be disqualified from the bidding process without further notice.

ACTIVITY SCHEDULE FOR CCTV CAMERA

ENQUIRY NO:....., Dated.....

SN	ACTIVITY	TIME ALLOTTED [in weeks]	CUMULATIVE TIME FROM RECEIPT OF INPUTS FROM BHEL [in weeks]	SCOPE
1.	Input to vendor [last date of input]	2	2	BHEL SCOPE
2.	Submission of Documents necessary for getting manufacturing clearance like drawings, Data sheet.	4	6	BY SUPPLIER
3.	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	4	10	BHEL SCOPE
4.	Manufacturing Time	8	18	BY SUPPLIER
5.	Inspection call	2	20	BY SUPPLIER
6.	Inspection by BHEL/Customer	1	21	BHEL SCOPE
7.	Issue of Dispatch clearance	1	22	BHEL SCOPE
8.	Dispatch	2	24	BY SUPPLIER
9	SUPERVISION OF ETC WORKS	10	34	COMPLETION OF WORKS FROM THE DATE OF SITE CONFIRMATION/ READINESS OF FRONTS.

1. Inspection call to be issued 2 weeks in advance.
2. Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier.
3. Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.
4. Qty to be offered for inspection should be in accordance within Delivery-schedule. BHEL reserves the right not to entertain multiple inspection calls for a Delivery and delay on this account shall be the responsibility of Supplier.
5. Delay in activity pertaining to BHEL as listed above shall be re-fixed, if required for time extension.

**Signature & Seal of
Supplier
Date:**

Item Name :	CCTV CAMERA
Enquiry No. :	
Project :	PGCIL SS-19 PROJECT
Type of project	Transmission/Thermal (Coal or Gas)/Hydro
Applicable percentage of Local Content	50 % (Minimum)

Format for Affidavit of Self certification regarding Minimum Local Content in line with PPP-MII order, 2017 if applicable, to be provided on a non-judicial stamp paper of Rs. 100/-.

Date: / /2019

I _____ S/o, _____ D/o, _____ W/o, _____ Resident
of _____ hereby solemnly affirm and
declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 (*hereinafter PPP-MII order*) of Government of India issued vide Notification No:P-45021/2/2017 -BE-II dated 15/06/2017, its revision dated 28/05/2018 and any subsequent modifications/Amendments, if any and

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/BHEL or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for (Enter the name of the Equipment/Item for Project).

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the goods/services/works supplied by me for (Enter the name of the Equipment/Item for Project) meets the 'Minimum Local Content' as defined in the PPP-MII order.

That the value addition for the purpose of meeting the 'Minimum Local Content' has been made by me at (Enter the details of the location(s) at which value addition is made).

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed Minimum Local Content criteria, based on the assessment of procuring agency (ies)/BHEL/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order and provisions of the Integrity pact/ Bidding Documents.

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

- i. Name and details of the Local Supplier
(Registered Office, Manufacturing unit location, nature of legal entity)
- ii. Date on which this certificate is issued
- iii. Goods/services/works for which the certificate is produced
- iv. Procuring entity to whom the certificate is furnished
- v. Percentage of local content claimed and whether it meets the Minimum Local Content prescribed
- vi. Name and contact details of the unit of the Local Supplier (s)
- vii. Sale Price of the product
- viii. Ex-Factory Price of the product
- ix. Freight, insurance and handling
- x. Total Bill of Material
- xi. List and total cost value of input used to manufacture the Goods/to provide services/in construction of works
- xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached
- xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)

<Insert Name, Designation and Contact No.>

SCHEDULE OF TECHNICAL DEVIATION

This Format is to be submitted in original duly signed by bidder.
The following are the deviations/variations/exceptions from the Terms and Conditions :-

S N	CLAUSE NO. OF TERMS AND CONDITIONS	STATEMENT OF DEVIATION

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Terms and Conditions.

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place :
Date :

Signature of the authorised representative of

Bidder's name :
Designation:.....
Company Seal:.....

SCHEDULE OF COMMERCIAL DEVIATION

This Format is to be submitted in original duly signed by bidder.
The following are the deviations/variations/exceptions from the Terms and Conditions :-

S N	CLAUSE NO. OF TERMS AND CONDITIONS	STATEMENT OF DEVIATION

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Terms and Conditions.

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place :
Date :

Signature of the authorised representative of

Bidder's name :
Designation:.....
Company Seal:.....

**BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)**

GENERAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

This is to be submitted duly signed by bidder in original. Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation". Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.

Sr. No.	
1.	INSTRUCTION TO BIDDERS : 1.1 Sealed bids are invited for the items mentioned in the tender enquiry conforming to the NIT including Technical Specifications. Bids should be typed and free from overwriting and erasures. Corrections or additions / deletions, if any, must be clearly written and attested, otherwise offer may be rejected. 1.2 Bidder must ensure that their bid is submitted / dropped in the tender box on or before 14-00 Hrs. IST on the due date of opening, unless otherwise specified in the NIT, at the address as follows :- Tender Box, Materials Management, Transmission Business Group, Bharat Heavy Electricals Limited, 5th Floor, Tower-A, Advant Navis IT Business Park, Plot-7, Sector-142, Noida Expressway, Noida, Dist. G. B. Nagar, U. P. – 201305 1.3 In case tender enquiry is floated through the e-procurement system, offer / bid has to be submitted through the e-procurement system ONLY as per instructions given in the e-procurement portal (https://bhel.abcprocure.com). 1.4 The bids shall be opened at 14-30 Hrs. IST on the due date of opening, in the presence of participating bidders who may like to be present, unless otherwise specified in the NIT. Bids received late are liable for rejection. Bidders sending bids by courier or post will have to ensure that it is timely delivered at the above address. 1.5 Bids are to be submitted duly signed with seal in two parts :- a) Techno-commercial Bid (Part-I) – To be submitted in 2 sets (original + copy). A copy of Price Bid (Part-II) clearly mentioning all the necessary information as per format without prices "Un-Priced Bid" is also to be enclosed in Part-I Bid. b) Price Bid (Part-II) – To be submitted only in one set in a separate sealed envelope. This should not contain any Technical and / or Commercial Terms and Conditions. The rates should be quoted both in figures and words. 1.6 The Part-I and Part-II Bids are to be sealed in separate envelopes and

Sr. No.	
	marked as "Techno-commercial Bid (Part-I)" and "Price Bid (Part-II)" respectively. Both the envelopes are to be kept in another common envelope and marked as "BID". Each envelope should be sealed and superscribed with tender enquiry no., item / package name, project name and due date of opening. Bidder's name and address shall also be mentioned on each envelope. 1.7 For any technical clarification, please contact official mentioned in the tender enquiry / NIT. 1.8 For any commercial clarification please contact official issuing tender enquiry / NIT. 1.9 Price bid (Part-II) should not contain any additional information / description other than given in "Un-Priced Bid" submitted with "Techno-commercial Bid (Part-I)" except prices, otherwise bid is liable for rejection. 1.10 Price Bid submitted along with the bid shall remain valid up to validity of offer. Any discount / revised offer submitted by the bidder on its own shall be accepted provided it is received before the due date and time of offer submission (i.e. Part-I Bid). The discount shall be applied on pro-rata basis to all items including optional items, if any, unless specified otherwise by the bidder. Discount offered shall be valid for full duration of validity of the offer including extension of validity, if any. Unsolicited Supplementary / Revised Price Bid submitted after the due date and time of offer submission (i.e. Part-I Bid), during validity period of offer, unless asked by BHEL, shall not be considered. Withdrawal of quotation by the bidder, at any stage after its opening, may entail suitable action against such bidder by BHEL. 1.11 The consultants / firm (and any of its affiliates) shall not be eligible to participate against tender enquiry for the related goods or works or services for the same project, if they were engaged by BHEL-TBG for the consultancy services. 1.12 In case any Foreign OEM / Foreign Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer / supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer / supplier or the manufacturer / supplier could bid directly but not both. In case bids are received from the manufacturer / supplier and the agent, bid received from the agent shall be ignored. 1.13 Non-conformities / errors / discrepancies in quoted prices in price bids shall be dealt as follows :- - If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of BHEL there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly. - If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

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	c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above. d) If there is such discrepancy in an offer as mentioned in (a), (b) & (c) above, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the BHEL, the bid is liable to be ignored. 1.14 In case the scope of the successful bidder / supplier against this tender enquiry includes Erection, Testing and Commissioning (ETC) of the equipment / material at site in addition to Supply, Purchase Order shall be placed for Supply Portion and Contract shall be separately awarded for ETC at Site Portion. General Terms and Conditions for Tender Enquiry / Contract mentioned herein shall be applicable for both Supply & ETC at Site. Additional Terms and Conditions for Tender Enquiry / Contract for Erection, Testing and Commissioning at Site "BHEL/TBG/GTC-ETC/2016 REV01" shall be applicable for ETC at Site only which is to be read in conjunction with General Terms and Conditions for Tender Enquiry / Contract mentioned herein. However, any breach of either the Purchase Order or the Contract shall be deemed to be breach of the other. 1.15 Taxes and Duties payable extra as per Clause No. 2.3 in NIT, if not specified/quoted clearly as extra shall be considered as included in Ex-works Price and therefore shall not be reimbursed. Taxes and duties not payable extra as per NIT shall be deemed to be included in Ex-works Price. 1.16 If the rates for taxes and duties in respect of the quoted materials and / or services assumed by the Supplier are less than the tariff prevailing at the time of tendering, Supplier will be responsible for such under quotations. However if the rates assumed are higher than the correct rates prevailing at the time tendering, the difference will be to the credit of BHEL. Note : Representative / official deputed by the bidder to witness tender opening must produce authorization letter for the same.
2.	PRICES : 2.1 Unless specifically indicated in the NIT, all prices shall be FIRM. No enhancement of rate for whatsoever reasons unless and until asked by BHEL shall be allowed. 2.2 Unless specifically indicated in the NIT, the prices shall be on INR basis. 2.3 Unless specifically indicated in the NIT, the prices are to be quoted on FOR (Site / Destination) basis excluding GST. The break-up of prices shall be as under :- a) Ex-works Price: Ex-works price including packing & forwarding charges.

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3.	TERMS OF PAYMENT : 3.1 For Supply only in scope of the supplier 100% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : • LR / GR duly endorsed by BHEL Site Official. • Material Receipt Certificate issued by BHEL Site Official. • GST Compliant Tax Invoice • Packing List (Case-wise) • Copy of Transit Insurance Certificate from underwriters. • Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management • Guarantee Certificate • Copy of Performance Bank Guarantee (PBG) • Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order.

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	3.2 For Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier or Supply where Testing & Commissioning at Site is in scope of the supplier a) 95% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order. b) 5% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site if it is in the scope of the supplier or Certificate of successful completion of Testing & Commissioning at Site if it is in the scope of the supplier. · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.3 For Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier a) 90% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order b) 10% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.4 For Type Test Charges 100% payment along with applicable GST within 60 days from the date of receipt

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	of complete GST compliant Tax invoice along with copy of Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management in 3 sets (original + 2 copies) on completion of delivery (at site, if F&I is in scope of supplier) of main supplies (excluding spares) for which Type Tests are applicable. List of main supplies (excluding spares) for which Type Tests are applicable shall be certified by BHEL Engineering Management. 3.5 For Charges for Supervision of Erection, Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.6 For Charges for Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.7 For Training Charges 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of completion of training issued by BHEL Engineering Management in 3 sets (original + 2 copies). Note : i) Supplier has to submit invoice(s) as per PO or approved billing break-up of prices (if applicable as per NIT). ii) In case of supplies for overseas project, Material Receipt Certificate issued by BHEL Authorized Representative shall also be acceptable. iii) In case of Transit Insurance under Open Insurance Policy, Intimation / Declaration of Transit Insurance as per terms of the relevant Open Insurance Policy along with copy of Open Insurance Policy from underwriters shall also be acceptable. iv) Supplier has to ensure commencement of transit insurance from the date not later than LR / GR date. v) Supplier has to submit Tax Invoice(s). Supplier should ensure that Tax Invoice should comply all statutory requirements under GST Law to enable BHEL to avail input credit vi) MSMED Act, 2006 and the rules made thereunder as amended from time to time shall be applicable for release of payment to suppliers qualified & registered as Micro & Small Enterprises based on documents mentioned in the NIT for MSME. vii) Supplier has to submit PBG (as per BHEL format) & Guarantee Certificate as per

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	PO terms. viii) In case any shortages and / or damages in supplies, an amount calculated based on comments against Material Receipt Certificate issued by the BHEL Site Official shall be withheld from the supply payment against 3.1(a) or 3.2(a) above to be deemed fit by BHEL subject to a minimum of 10% of the total ex-works value of the invoice corresponding to the LR / GR against which any shortages and / or damages are reported. The withheld amount shall be released after the shortages and / or damages in supplies are supplied / replenished against Certification by BHEL Site Official. ix) Payment of GST component shall be made only if vendor has deposited the Tax and credit for the same is reflected in GSTN (GST Network). In case credit of the same is not reflected in GSTN , vendor may alternatively furnish BG of GST Amount for a period valid for not less than 1 month .In case of disallowance of credit /non reflection of credit in GSTN , amount will be recovered from supplier along with applicable Interest , penalty etc from any of his dues. x) If GST is payable by BHEL on reverse Charge Mechanism basis, vendor should ensure the submission of GST compliant Tax invoice immediately on dispatch/ performance of service. In case of non-compliance any additional charges towards interest , penalty etc , will be to vendors account. xi) TDS under GST Act, if applicable, shall be deducted unless Exemption Certificate If applicable, from the appropriate authority is furnished to BHEL along with Invoice.
4.	INTEREST LIABILITY : In case of any delay in payment due to any reason, BHEL shall not pay any interest on delayed payment. Also, no interest shall be payable by BHEL on the bank guarantee / deposit amount or balance payment or any other money which may become due owing to difference or misunderstanding or any dispute before any quasi judicial authority between BHEL and the Supplier / Contractor.
5.	GUARANTEE : The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is earlier. Wherever Erection, Testing & Commissioning at Site are also in the scope of the Supplier, the guarantee period shall be 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is later. The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to

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	undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor. Note : i) In case of Illumination System, items viz. Lamps, Tubes, Ballast, Starters, Capacitors & Fuses will not be under Guarantee after commissioning. ii) In addition to the above guarantee period, Extended Guarantee / Warranty, if any, shall be as per NIT / Technical Specifications. iii) In case offer of agent of Foreign OEM / Foreign Principal is considered, as per Clause No. 1.12 above, Guarantee as mentioned above has to be provided by the Foreign OEM / Foreign Principal also.
6.	LATENT DEFECT : Liability for latent defects shall be for defects inherently lying within material or arising out of design deficiency which does not manifest itself during guarantee period but later and shall be limited to five years from the expiry of the guarantee period.
7.	PERFORMANCE BANK GUARANTEE (PBG) : Supplier shall arrange to submit Performance BG / deposit on a non-judicial stamp paper of appropriate value along with first invoice or within 60 days from placement of Purchase Order (PO) whichever is earlier, in line with one of the applicable options as follows :- <u>Option "A"</u> A single rolling PBG for Rs. 50 Lakhs initially valid for 18 months with claim period of 3 months extra over and above 18 months for all the Purchase Orders being executed for Transmission Business Group, BHEL. However, validity of the PBG shall be extended till 18 months from the date of last delivery with 3 months claim period extra over and above 18 months. Single Rolling PBG option shall not be applicable in case Ex-works value of the PO at the time of placement of PO exceeds Rs. One Crore. <u>Option "B"</u> PBG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery with claim period of 3 months extra over and above 18 months. Ex-works PO value at the time of placement of PO shall be considered for calculation of the PBG amount. <u>Option "C"</u> In case the total Ex-works PO value at the time of placement of PO does not exceed Rs. Ten Lakhs, interest free Deposit of 10% of the total Ex-works PO value at the time of placement of PO in form of Demand Draft favouring "Bharat Heavy Electricals Limited" and payable at New Delhi / Delhi / Noida shall also be acceptable to BHEL in lieu of PBG, which shall be released after expiry of 21 months from the date of last delivery after deduction, if any, within 60 days from receipt of invoice in 3 sets (original + 2 copies) to be submitted by the supplier. Note : i) The Bank Guarantee shall be from any bank as per Annexure for List of Banks (32 Nos.). The original PBG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida. ii) Extension of validity of the PBG in original, as per above clause, should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida at least 45 days

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	before expiry of validity of the PBG. iii) Unless otherwise specified in the NIT, deviation taken for non-submission of PBG / Deposit, as applicable, shall not be accepted. iv) Supplier has to confirm one of the applicable options for submission of PBG / Deposit before placement of PO. v) In case of non-submission PBG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business Dealings with the Supplier / Contractor. vi) BHEL reserve the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Supplier in fulfilment of performance of the Purchase Order. vii) Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Purchase Order value up to $\pm 20\%$. Beyond this variation of $\pm 20\%$, the Supplier shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly for the total variation promptly. viii) Vendor to ensure submission of Certificate of Final Documentation / Confirmation regarding Non applicability of Final Documentation, as the case may be, as referred in clause No 9 regarding Final Documentation. BG shall be released only after submission of the same to BHEL TBMM.
8.	SUBMISSION OF DRAWINGS / DOCUMENTS FOR APPROVAL : Supplier shall submit the master document list within 7 days from date of Purchase Order / Contract, unless otherwise specified in the NIT, with planned dates for submission which shall be in line with activity schedule as per Purchase Order / Contract and shall be finalized with BHEL Engineering Management. Date of first submission of drawings / documents shall be certified by BHEL Engineering Management after the receipt of applicable drawings / documents (e.g. project specific cover sheet, GTP, OGA drawings, schemes, type test reports etc.) by BHEL. During detailed engineering stage, necessary hard copies of the engineering drawings / documents shall also be submitted by the supplier as per the Purchase Order / Contract requirement. The supplier shall also submit the packing drawings as per technical specifications. In case item(s) offered require any interface details of other item (not in the scope of supplier & required for operating the equipment), the supplier has to submit interfaces schedule along with submission of engineering drawings / documents. It shall be responsibility of the supplier to get the details of the interfaced item from BHEL before manufacturing to avoid any mismatch at site.
9.	FINAL DOCUMENTATION : Final documentation as called in the Technical /contract specification is to be submitted within 3 months from the date of first delivery of respective equipment, item/material. After submission of Final Documentation, BHEL Engineering Management (TBEM) will issue a Certificate of Completion of Final Documentation. Wherever Final Documentation is not applicable, BHEL Engineering Management (TBEM) will issue confirmation regarding the same, Vendor to submit the Certificate of Final Documentation / Confirmation regarding Non applicability of Final Documentation, as the case may be, to BHEL TBMM. In case of Non Submission of Certificate of Final Documentation / Confirmation regarding Non applicability of Final Documentation, BG will be liable for encashment.
10.	INSPECTION : BHEL / customer / third party shall inspect equipment / material before despatch. Stage inspection during manufacturing may also be carried out. Material to be despatched only after getting Material Despatch Clearance Certificate (MDCC) / MICC issued by BHEL. Supplier shall send inspection call on prescribed format / web site only, with an

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	advance notice of 15 days. Supplier to ensure submission of all routine / acceptance test reports, inspection reports and all other documents related to inspection, immediately to BHEL. BHEL representative is authorised to carry out audits along with Third Party Inspection Agency at vendor's / supplier's works before clearing the items for despatch.
11.	DESPATCH DOCUMENTS : Despatch documents to be immediately sent to BHEL on despatch are as follows :- • Copy of Invoice • Copy of LR / GR in case of Indian suppliers or BL / AWB in case of foreign suppliers • Copy of Packing List (Case-wise) • Copy of Transit Insurance Certificate from underwriters • Copy of Guarantee Certificate
12.	DELIVERY PERIOD : Delivery / Completion requirement shall be mentioned in the NIT. Bidder to specify best delivery / completion period possible in weeks from the date of LOI / PO as per activity schedule for consideration by BHEL. Time required for type test, if applicable, is to be separately indicated. Note : LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) contracts shall be considered as delivery date.
13.	LIQUIDATED DAMAGES FOR DELAYED DELIVERY: In case of delay in execution of Purchase Order beyond the contractual delivery time, an amount of 0.5% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) per week of delay or part thereof subject to a maximum of 10% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. However, in case of staggered (lot-wise) contractual delivery schedule, an amount of 0.5% of the total delayed lot value for supply (incl. taxes, duties, freight & insurance as applicable) per week of delay or part thereof subject to maximum of 10% of the total delayed lot value (Incl taxes, duties, Freight & Insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. Note : i) In case of any amendment / revision in P.O./WO, the LD shall be linked to the amended / revised Purchase Order / Contract value and delivery / completion time / schedule, if applicable. ii) LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) for imported supplies shall be treated as the date of dispatch for levying LD as above. iv) However, for indigenous supply, if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 30 days, where distance from place of despatch as per LR / GR is upto 1000 Kms or if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 45 days, where distance from place of despatch as per LR / GR is more than 1000 Kms, such excess period shall also be considered for LD

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	purpose. iv) If, as per supplier, delay is not attributable to the supplier, delay analysis with documentary evidence may be submitted by the supplier at the earliest but not later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the supplier, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delayed delivery.
14.	VALIDITY OF OFFER : The offer shall be valid for 120 days from the due date of opening of tender (i.e. techno-commercial bid unless otherwise specified in the NIT). Prices of Spares, wherever they optional items, shall be valid till two years from the date of placement of PO.
15.	ACCEPTANCE / REJECTION OF TENDER : BHEL reserve the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserve right to vary the quantities as mentioned in the NIT. Acceptance of offer is subject to vendor approval by customer before opening of price bid. BHEL shall not be bound by any power of attorney granted by tenderer or by changes in composition of the firm made subsequent to award of order / contract. BHEL may however recognize such power of attorney and changes after obtaining proper legal advice, cost of which will be chargeable to the seller / contractor concerned. If the tenderer deliberately gives wrong information, BHEL reserves the right to reject such an offer at any stage or cancel the order / contract, if awarded, and forfeit the security deposit and bank guarantee.
16.	DEVIATION : The bids having deviation(s) w.r.t. tender are liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer with prior intimation to bidder.
17.	TENDER EVALUATION : Comparative statement shall be prepared and evaluated on total cost basis at destination/site (as per terms of NIT) considering overall quantity indicated in NIT unless contrary to same is specifically mentioned in the tender enquiry / NIT. Total cost for this purpose shall include cost of scope of work as mentioned in NIT along with applicable taxes & duties, and other services etc. (if applicable). GST input credit available to BHEL shall be reduced from prices while determining L1 status. In case all bidders are foreign & Port of Import (destination port) is same for all the bidders, evaluation of offers shall be done on CIF (Port of Import) basis. Otherwise, evaluation of offers shall be done on the basis of delivered cost at site /destination to BHEL. Further, in case of foreign bidders, marine freight & insurance are to be quoted separately & the purchase order may be placed on FOB basis with an option for delivery on CIF / CFR basis, if required, later. In case of foreign bidders, Exchange Rate (TT selling rate of State Bank of India) as on date of tender opening (Part-I Bid in case of two part bid) shall be considered. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken for tender evaluation.
18.	LOADING CRITERIA : List of permissible deviations & loading criteria thereof are as follows :- a) Payment Terms Base rate of SBI (as applicable on the date of bid opening / techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the

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	period of relaxation sought by bidder(s) against terms of payment in the NIT. b) Liquidated Damages (LD) for Delayed Delivery Loading on LD clause shall be to the extent to which it is not agreed to by the bidder (at offered value). c) In case of foreign bidders, if the quoted prices is on CIF basis only, it shall be loaded to arrive at total FOR (Site / Destination) price, as applicable, by factors as follows :- i) Port handling / clearing charges: @ 1% of CIF value to arrive at Customs Assessable Value. ii) Custom Duty (including CVD & SAD) as per NIT prevailing on date of price bid opening. iii) Inland Freight & Transit Insurance: @ 5% of CIF value where distance between site / destination and Port of Discharge is upto 1000 Kms or @ 7% of CIF value where distance between site / destination and Port of Discharge is more than 1000 Kms. Note : Additional deviations (if considered acceptable by BHEL) & the loading criteria shall be communicated to all the qualified bidders before price bid opening.
19.	ARBITRATION : In the event of any dispute emanating from and relating to this contract, the matter shall be referred to the sole arbitration of the person appointed by the competent authority of BHEL. Subject to aforesaid, the provisions of "The Arbitration and Conciliation Act, 1996" and the rules made thereunder as amended from time to time in India shall apply to the arbitration proceedings. The venue of arbitration shall be in New Delhi. Further there shall be no claim for any pre-reference or pendente-lite interest on the claims and any claim for such interest made shall be void. However, in case of contract with Public Sector Enterprise / Undertaking (PSE/PSU) or Govt. Dept., the extant guidelines of Govt. of India shall be followed.
20.	LEGAL SETTLEMENT : Indian Courts at New Delhi / Delhi shall have exclusive jurisdiction to decide the dispute, if any, arising out of or in respect of the contract(s) to which these conditions are applicable. Contract, including all matters connected with contract, shall be governed by the Indian Law, both substantive and procedural, for the time being in force including modification thereto.
21.	SUB-CONTRACTING : In case further subcontracting of BHEL Purchase Order / Contract or part thereof is envisaged by supplier, the same can be done after written permission is obtained from BHEL. However it shall not absolve the Supplier / Contractor of the responsibility of fulfilling BHEL Purchase Order / Contract requirements. In case of subcontracting of Purchase Order / Contract awarded by BHEL or part thereof without such permission, BHEL reserve the right to cancel the Purchase Order / Contract and source such material / component / equipment / system from any other agency at the risk and cost of the Supplier / Contractor. If Supplier / Contractor is an individual or proprietary concern and the individual or the proprietor dies or the partnership is dissolved or substantially affected, then unless BHEL is satisfied that legal representative of individual Supplier / Contractor or proprietor of proprietary concern and surviving partners of partnership firm are capable of carrying out and completing the Purchase Order / Contract, BHEL shall be entitled to cancel the Purchase Order / Contract as to its incomplete portion and without being in any way liable to payment of any compensation to legal

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	representative of Supplier / Contractor and / or to surviving partners of Supplier's / Contractor's firm on account of cancellation of the Purchase Order / Contract. Decision of BHEL that legal representatives of deceased Supplier / Contractor or surviving partners of the Supplier's / Contractor's firm cannot carry out and complete the Purchase Order / Contract shall be final and binding on the parties hereto. Terms and Conditions shall not get affected in case of de-merger / amalgamation / taking-over / re-constitution etc.
22.	RISK PURCHASE : In case the Supplier / Contractor fails to supply or fails to comply with terms & conditions of the Purchase Order / Contract or delivers equipment / material not of the contracted quality or fails to adhere to the contract specifications or fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery / completion period to justify that supplies shall be inordinately delayed beyond contractual delivery / completion period, BHEL reserve the right to cancel the Purchase Order / Contract either in whole or in part thereof without compensation to Supplier / Contractor and if BHEL so desires, may procure such equipment / material / items not delivered or others of similar description where equipment / material / items exactly complying with particulars are not readily procurable in the opinion of BHEL which is final and in such manner as deemed appropriate, at the risk and cost of the Supplier / Contractor and the Supplier / Contractor shall be liable to BHEL for any excess cost to BHEL. However, the Supplier / Contractor shall continue execution of the Purchase Order / Contract to the extent not cancelled under the provisions of this clause. Recovery amount on account of purchases made by BHEL at the risk and cost of Supplier / Contractor shall be the difference of total value of new Purchase Order (PO) value and total value of old Purchase Order for applicable items, where the total value of new PO is more than total value of old PO for applicable items, plus additional 15% of the total ex-works value of new PO as overheads. The Supplier / Contractor shall on no account be entitled to any gain on such risk & cost purchase. In case the purchase order (PO) value of the new PO is less than the PO value of the old PO, 15% of the total ex-works value of the new PO shall be recovered as overheads and the difference between the PO value of the old PO and the new PO shall not be considered for calculation of the recovery amount.
23.	ADJUSTMENT OF RECOVERY : Any amount payable by the Supplier / Contractor under any of the condition of this contract shall be liable to be adjusted against any amount payable to the Supplier / Contractor under any other Purchase Order / Contract awarded to him by any BHEL unit. This is without prejudice to any other action, as may be deemed fit, by BHEL.
24.	FORCE MAJEURE CONDITION : If by reason of war, civil commotion, act of god, Government restrictions, strike, lockout which are not in control of Supplier / Contractor the deliveries / services are delayed, Supplier / Contractor shall not be held responsible. If at any time during the continuance of the Purchase Order / Contract, the performance in whole or in part by either party of any obligations under the Purchase Order / Contract is prevented or delayed by reason of any war hostilities, acts of the public enemy, restrictions by Govt. of India, civil commotion, sabotage, fires, floods, explosion, epidemics, quarantine restrictions, strike, lock-outs or acts of God (hereinafter referred to as "event"), which are not in control of Supplier / Contractor or BHEL, then provided notice of the happening of such event is given by either party to the other within fifteen (15) days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate the Purchase Order /

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	Contract nor shall have any claim for damages against each other in respect of such non-performance and delay in performance. Performance under the Purchase Order / Contract shall be resumed immediately after such event has come to an end or ceased to exist and decision of BHEL as to whether the deliveries have to be resumed or not shall be final, conclusive and binding on the parties hereto. In the event of the parties hereto not able to agree that a force majeure event has occurred, the parties shall submit the disputes for resolution pursuant to the provisions hereunder, provided that the burden of proof as to whether a force majeure event has occurred shall be upon the party claiming such an event. Notwithstanding above provisions, BHEL shall reserve the right to cancel the Purchase Order / Contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of delivery and other schedules.
25.	MANUFACTURING QUALITY PLAN (MQP) : Supplier to submit approved MQP in line with requirement of BHEL/customer.
26.	SUPPLIER PERFORMANCE MONITORING AND RATING SYSTEM : BHEL reserve the right for evaluation of Supplier Performance Rating as per Supplier Performance Monitoring and Rating System of BHEL for necessary action. Details are available at BHEL Website www.bhel.com for reference.
27.	DEALING WITH BANNED SUPPLIERS / CONTRACTORS IN BHEL : Offers of the bidders, who are on the banned list, as also the offers of the bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com for reference.
28.	ORDER OF PRECEDENCE : The order of precedence shall be as follows :- a) Special Terms & Conditions (STC) for Tender Enquiry / Contract, if any b) General Terms & Conditions (GTC) for Tender Enquiry / Contract & Additional General Terms & Conditions (GTC) for Tender Enquiry / Contract for Erection Testing & Commissioning (ETC) at Site, if applicable Provisions in (a) above shall prevail over (b). In case of conflict, between Technical Specifications and STC / GTC, bidder to seek necessary clarifications from BHEL concerned official as specified in NIT.
29.	PACKING : Packing shall be in conformity with specifications and shall be such as to ensure prevention of damages, corrosion, deterioration, shortages, pilferage and loss in transit or storage. In case of shipment by sea or air, the packing shall be sea-worthy or air-worthy respectively and of international standards. Different types of spares i.e. start-up / commissioning spares and initial spares (mandatory spares and recommended O&M spares) are to be packed separately. Packing List shall be submitted as per standard format along with advance set of documents for claiming payment which shall also indicate :- a) Case / Packing size (as applicable). b) Gross weight and net weight of each package. c) Detailed contents of the package with quantity of each item separately. Project, Item / Package Description, BHEL's PO No. with date & Case / Packing Mark should also be clearly mentioned on the Case / Packing and Packing List for identification. Also, Packing List must be duly signed & should include respective Invoice No. & LR No. Note : Foreign suppliers to furnish details to arrange inland transportation by BHEL, if applicable, as follows :-

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	i) No. of Packages ii) Size with Weight (Gross & Net) of each Package iii) No. of Containers with type & size required for inland transportation iv) Type of Cargo (Break Bulk / LCL / FCL) v) Customs Tariff No.
30.	COLOUR CODING : Aluminium stickers are required to be attached to large components but plastic sheet tags should be tied with small components, giving details like purchase order, description of the component, quantity etc. Tags should be of the colour as follows :- a) Main equipment : Yellow or White tag b) Start-up / Commissioning spares : Blue tag c) Mandatory spares : Pink or Red tag d) Recommended / O&M spares : Green tag
31.	MICRO, SMALL & MEDIUM ENTERPRISES (MSME) : MSME Act 2006 as amended from time to time & extant regulations of Govt. of India for MSME will be applicable. Micro & Small Enterprises (MSE) can avail the intended benefits only if they submit along with the offer / bid, attested copies of either Acknowledgement of Entrepreneur Memorandum Part-II (EM-II certificate) having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (As per BHEL format where deemed validity of EM-II certificate of five years have expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of opening (for Techno-commercial Bid : Part-I in case of two part bid). Non-submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested (in original) by a Gazetted officer. Copy of Udyog Aadhaar Memorandum with Acknowledgement of Ministry of Micro, Small & Medium Enterprises should also be furnished.
32.	BUSINESS ETHICS / SUSPENSION OF BUSINESS DEALINGS WITH SUPPLIERS / CONTRACTORS : If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution, indulges in malpractices cheating, bribery, fraud or other misconduct or formation of cartel so as to influence the bidding process or influences the price or fails to perform or is in default without any reasonable cause etc or performs any act considered objectionable as per extant guidelines, action may be taken against such bidders/supplier/contractor as per extant "Guidelines for Suspension of Business Dealings with Suppliers/Contractors". Abridged version of same is available at BHEL website (www.bhel.com) on "Supplier Registration" Page.
33.	REVERSE AUCTION : BHEL reserve the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder or price bid submitted by the bidder through e-procurement system. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA. In case BHEL decides to go for Reverse Auction, only those bidders who have given their unconditional acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit "online sealed bid" in the Reverse Auction. Non-submission of "online sealed bid" by the bidder will be

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	considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue. General Terms and Conditions of RA are available at Annexure. Business Rules for RA shall be sent to the bidders before conducting RA. Abridged Version of "Common Guidelines for Conducting Reverse Auction" may also be seen at BHEL website (www.bhel.com) on "Supplier Registration" Page & "Tender Notifications" Page.
34.	INTEGRITY PACT : NOT APPLICABLE Bidders shall have to enter into Integrity Pact with BHEL, duly signed with seal in original, if specified in NIT / RFQ failing which bidder's offer shall be liable for rejection.
35.	TERMINATION OF CONTRACT : BHEL shall have the right to cancel the Purchase Order / Contract without any financial implication to BHEL if vendor approval by end user / customer is withdrawn or in case of Suspension of Business Dealings with the Suppliers / Contractors by BHEL. BHEL shall have the right to cancel Purchase Order / Contract, wholly or in part, in case they are obliged to do so on account of any decline, diminution, curtailment or stoppage of their business and in that event, the Supplier's / Contractor's compensation claim shall be settled mutually. In case of cancellation of Purchase Order / Contract for main supply, all other associated Purchase Orders / Contracts like those for Mandatory Spares / Recommended Spares / Erection, Testing & Commissioning (ETC) / Supervision of ETC, if any, would also get cancelled.
36.	SHELF LIFE : NOT APPLICABLE Supplier has to inform the list of the items / sub-items which have limited shelf life like consumables or those required for the first fill and shall indicate the corresponding shelf life period in the offer. Such items / sub-items shall be manufactured / despatched only after getting formal clearance from BHEL.
37.	LIMITATION OF LIABILITY : Notwithstanding any other provisions, except in cases of wilful misconduct and / or criminal negligence / acts, a) Neither the Supplier / Contractor nor BHEL shall be liable to the other, whether in Purchase Order / Contract, tort, or otherwise, for any consequential loss or damage, loss of use, loss of production or loss of profits or interest costs, provided however that this exclusion shall not apply to any obligation of the Supplier / Contractor to pay Liquidated Damages to the BHEL and b) Notwithstanding any other provisions incorporated elsewhere in the contract, the aggregate liability of the Contractor in respect of this contract, whether under the Contract, in tort or otherwise, shall not exceed total Contract Price, provided however that this limitation shall not apply to any obligation of the Vendor to indemnify BHEL with respect to Patent Infringement or Intellectual Property Rights.
38.	SHORTAGES / DAMAGES : a) Against Supply only or Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site or Supply where Testing & Commissioning at Site is in scope of the supplier : Any shortages and / or damages in supplies shall be supplied / replenished free of cost by the supplier as early as possible but not later than 30 days from the date of intimation by BHEL to the supplier.

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	b) Against Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier : Any shortages and / or damages in supplies and during handling / storage, erection, testing and commissioning at site shall be supplied / replenished free of cost by the Supplier / Contractor, as early as possible, to meet the contractual completion time / schedule. Note: There shall not be any extension in the contractual delivery time / schedule due to any shortages and / or damages in supplies.
39.	VARIATION OF CONTRACT VALUE / QUANTITY VARIATION : BHEL shall have the right to variation in quantities of items within $\pm 30\%$ of the total Purchase Order / Contract value at the time of placement of PO or award of Contract on overall basis for all amendments together within two years from the date of original Purchase Order / Contract or completion of execution of the Purchase Order / Contract whichever is earlier but quantities of individual items may vary to any extent or may get deleted unless otherwise specified in the technical specifications. No compensation is payable due to variation in the quantities and the Supplier / Contractor shall be bound to accept the same the contracted prices / rates without any escalation. However, if the Purchase Order / Contract is on "Lumpsum" basis, no variation of Purchase Order / Contract value shall be admissible to the Supplier / Contractor within the scope of Purchase Order / Contract, as long as the inputs remain unchanged.
40.	STATUTORY VARIATION : GST rates prevailing at the time of dispatch of goods/ completion of services shall be payable by BHEL. All other taxes, duties, charges, royalty, cess, other levies shall be deemed to be included in the Ex Works Prices /Charges quoted by bidders and no variations shall be payable in respect thereof . No other variations such as on customs duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the BHEL. Notwithstanding anything above, where the actual completion of the supply / services occurs beyond the period stipulated in the Purchase Order / Contract or any extension thereof, variations referred to above, will be limited to the rates prevailing on the dates of such agreed completion periods only. For variations after the agreed completion periods, the Supplier / Contractor alone shall bear the impact for the upward revisions and for downward revisions BHEL shall be given the benefit of reduction in applicable taxes /GST. This will be without prejudice to the levy of liquidated damages for delay in delivery / completion. If new tax is introduced by Central/ State Govt/ Municipality becomes directly applicable on items specified in Bill of Quantities/Purchase Order/Contract, full reimbursements shall be made provided it becomes applicable on items specified in Bill of Quantities. However, any additional tax implication due to delay in delivery, beyond the Contractual Delivery, attributable to supplier shall be borne by supplier.
41.	MODE OF PAYMENT : Payment shall be made directly to the Supplier / Contractor by BHEL through NEFT / RTGS.
42.	CONFIDENTIALITY : Supplier / Contractor shall, at all times, undertake to maintain complete confidentiality of all data, information, software, drawings & documents etc. belonging to BHEL and also of systems, procedures, reports, input documents, manuals, results and any other BHEL documents discussed and / or finalized during the course of execution of Purchase Order / Contract.

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43.	INDEMNIFICATION : The Supplier / Contractor shall indemnify and keep indemnified and hold harmless BHEL and its employees and officers from and against any and all claims, suits, actions or administrative proceedings, demands, losses, damages, costs and expenses and any other claim of whatsoever nature in respect of the death or injury of any person or loss of or damage to any property arising during the course and out of the execution of the Purchase Order / Contract.
44.	TITLE OF GOODS : a) Ownership of the equipment / material procured in India, shall be transferred to BHEL upon loading on to the mode of transport to be used for transportation of the said equipment / material from the works to the site / destination and upon endorsement of the dispatch documents in favour of BHEL. b) Ownership of the equipment / material to be imported into the country where the site is located, if not procured in India, shall be transferred to BHEL upon loading on the mode of transport to be used for transportation of the equipment / material from the country of origin to that country / destination and upon endorsement of despatch document in favour of BHEL. c) Notwithstanding the transfer of ownership of the equipment / material, the responsibility for care and safe custody thereof together with the risk of loss or damage thereto for whatsoever reason shall remain with the Supplier.
45.	COMPLIANCE OF STATUTORY REQUIREMENTS : The vendor shall comply with all State and Central Laws / Acts, Statutory Rules, Regulations etc., as may be enacted by the Government during the tenure of the Purchase Order / Contract and having in force and applicable to the Purchase Order / Contract and nothing shall be done by the Supplier / Contractor in contravention of any Law / Act and / or Rules / Regulations, thereunder or any amendment thereof. The Supplier / Contractor shall pay all taxes, fees, licence charges / deposits, duties, tolls, royalty, commissions or other charges which may be levied on account of any of his operations connected with the Purchase Order / Contract. In case BHEL is constrained to make any of such payments, BHEL shall recover the same from the Supplier / Contractor either from moneys due to him or otherwise as deemed fit.
46.	ACCEPTANCE OF ORDER : Supplier should acknowledge and accept the Letter of Award / Purchase Order issued by BHEL within 7 days of the issue of Letter of Award / Purchase Order. In case of any discrepancy / typographical error in issue of Purchase Order / Contract, the agreed terms & conditions, scope of work, rates / prices for placement of PO / award of contract shall be applicable and BHEL reserves the right to issue amendment(s) to PO / Contract for correction of discrepancies / typographical errors in the PO / Contract at a later date.
47.	FRAUD PREVENTION POLICY : The Bidder along with its associate / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

Signature of Bidder (Authorized Signatory) with Date & Seal

BHARAT HEAVY ELECTRICALS LIMITED TRANSMISSION PROJECTS ENGINEERING MANAGEMENT								
	DOCUMENT No.	TB-408-316-110	Rev. No.	00		Prepared	Checked	Approved
	TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	DS	JK	SKS
	TITLE Technical Specification for Visual Monitoring system				SIGN	 		
					DATE	28.01.20	28.01.20	28.01.20
					GROUP	TBEM	W.O. No	
	CUSTOMER	POWER GRID CORPORATION OF INDIA LTD.						
	PROJECT	Extension of Substation under Western Region System Strengthening Scheme (WRSS)-20.						
CONTENTS								
COPYRIGHT AND CONFIDENTIALITY The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in anyway detrimental to the interest of the company	S/N	Description					No. of Sheets	
	1.	SECTION-1: SCOPE, SPECIFIC TECHNICAL REQUIREMENTS & QUANTITIES Annexure_BOQ Annexure_QR					06 12 01	
	2.	SECTION-2: Annexure_III Annexure_III (A)					07 01	
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Rev No.		Date	Altered	Checked	Approved	REVISION DETAILS		
Distribution				To	TBMM	OFFICE COPY		
				Copies	03	01		

SECTION - 1**1.1 SCOPE**

This technical specification covers the requirements of design, packing at works, supply, supervision of erection and execution testing and commissioning works of extension of visual monitoring system.

The Visual Monitoring System is required for the following Project:

Customer: Power Grid Corporation of India Ltd.

Project: Extension of following substation under Western Region System Strengthening Scheme (WRSS)-20.

- (i) 765kV Solapur Substation
- (ii) 765kV Aurangabad Substation
- (iii) 765kV Wardha Substation
- (iv) 400kV Khandwa Substation
- (v) 400kV Rajgarh Substation
- (vi) 400kV Champa Substation
- (vii) 400/220kV Jabalpur Substation
- (viii) 400/220kV Itarsi Substation

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the enquiry.

The specification comprises of following sections:

Section-1: Scope, Specific Technical Requirements & Bill of Quantities

Section-2: Enclosed as Annexure-III & Annexure-III(A)

Section-3: Project Details & General Technical Requirements

In case of any conflict between various sections, order of precedence shall be in the same order as listed above.

Technical Specification for Visual Monitoring system

1.2 SPECIFIC TECHNICAL REQUIREMENT

Augmentation of Visual Monitoring system for Switchyard bays are in present scope of supply & services. The provided system has to be integrated with existing system. The bidder shall provide Color IP camera with PAN, Tilt & Zoom facility suitably located in switchyard for monitoring of Switchyard bay & equipment. The scope of bidder shall include providing all Items, Accessories, Line Interface units, Fiber patch cords, Power supply units, Junction Boxes, Power Cables, Fiber Optic Cables, Hardware and Software, etc. as are applicable to the product design, to meet functional requirements. Compatibility enhancement of exiting VMS system, as needed, shall be done to integrate visual monitoring for Switchyard bays under present scope with existing Visual monitoring system of the station.

A copy of specification for Visual Monitoring system is enclosed at Annexure-III, which shall be read only for the Augmentation scope of existing VMS system.

Junction Box - Shall be made of stainless steel of at least 1.5 mm thick or aluminum enclosure of at least 1.6 mm thick and shall be dust, water and vermin proof. Stainless steel used shall be of grade SS304. Suitable for Outdoor, weatherproof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.

Bidder to review the BOQ and consider any other item required for successful completion of works. The same shall be under scope of bidder's supply.

1.3 OTHER TECHNICAL REQUIREMENT

1. The scope of the bidder shall include providing all items, accessories, line interface units, Junction Boxes, Cables, Fiber Optic Cables, Pipe conduit,

Hardware and Software etc. as applicable to the product design, to meet the functional requirements, complete in all aspect.

2. Height of the equipment – Please refer section Elevation drawings, standard height of 765kV equipment's is 14 meter and 400kV equipment is 8 meter. Camera to cover view pan of equipment terminal height.
3. Power supply – 220V DC / 415V AC supply (Non UPS based) shall be provided near camera at ground level.
4. Other items / Accessories – Bidder to offer reputed item during detailed engineering stage and the same is subject to approval of Powergrid.

1.4 DETAILS OF EXISTING CAMERA / SOFTWARE

SL	Name of Substation	Existing Camera Make	Existing Software details
1	Solapur	SONY	RealShot Manager Advanced
2	Aurangabad	SONY	RealShot Manager Advanced
3	Wardha	SONY	RealShot Manager Advanced
4	Khandwa	PELCO	Nice Vision, QUGNIFY Net 3.1
5	Rajgarh	PELCO	Nice Vision, QUGNIFY Net 3.1
6	Champa	SONY	RealShot Manager Advanced
7	Jabalpur	PELCO	Nice Vision, QUGNIFY Net 3.1
8	Itarsi	PELCO	Nice Vision, QUGNIFY Net 3.1

Bidder to offer make of camera as per existing make of camera at respective site as mentioned above.

Technical Specification for Visual Monitoring system

1.5 BILL OF QUANTITY:

1. Please refer **Annexure_BOQ**
2. Total contract value may vary up to $\pm 30\%$ at contract stage.
3. Tentative quantities are mentioned in Annexure_BOQ. The above quantities (BOQ) are as per preliminary design only. The detail design will be submitted by vendor and subject to approval by the Customer. The BOQ quantities, which are finalized after approval has to be supplied.
4. The Contract shall be on Bill of Quantity basis for the package. In case of change in scope after award of the contract, the additions/ deletions to the scope shall be as per the breakup unit rates for all the equipment and services furnished by the bidder in his offer.

1.6 SCOPE:

Following work are not in the scope of contractor

1. Receipt of material, Storage at site.
2. Installation of HDPE Pipe, Power Cable & FO cable
3. Installation of Junction Box & Camera
4. Junction Box earthing

Following are scope of services at site

1. Supervision of erection of VMS system supplied by bidder.
2. Installation of accessories, Line Interface units, Fiber patch cords, Power supply units, Hardware, JB & Camera accessories etc.
3. Termination of Cables, FO Cables, Patch cords etc complete.
4. Remaining activities for successful commissioning of VMS augmentation works.

1.7 TEST REQUIREMENT

The vendor shall submit a FAT (factory acceptance test) & SAT (site acceptance test) plan complying the specification for POWERGRID / BHEL approval that will be used during inspection at works & and site respectively.

- i) Complete operating and maintenance manuals and training of O&M personnel.

- ii) System commissioning and acceptance tests as specified in site acceptance test (SAT) plan.

1.8 DOCUMENTS TO BE PROVIDED BY BIDDER

- Detailed BOQ to meet the requirement of specification with make, model & quantity of each item
- Technical datasheet/Catalogues/brochures of the item
- Test certificates as per relevant standards
- Reference list of the Projects where similar equipment for similar application is being used for at least 2 years.

1.9 TECHNICAL QUALIFYING REQUIREMENT

Please refer **Annexure_QR**

1.10 Techno commercial evaluation shall be done separately for 02 lots as follows:

1. LOT-1 :

- (i) 765kV Solapur Substation
- (ii) 765kV Aurangabad Substation
- (iii) 765kV Wardha Substation
- (iv) 400kV Champa Substation

2. LOT-2:

- (i) 400kV Khandwa Substation
- (ii) 400kV Rajgarh Substation
- (iii) 400/220kV Jabalpur Substation
- (iv) 400/220kV Itarsi Substation

1.11 Drawings / Documents required:

Following documents with project title block are required to be submitted by bidder after award of order:

- 1.Camera GTP and Test Reports
- 2.VMS Layout
- 3.Detailed BOQ.
- 4.Catalogues of accessories.

These documents shall be considered for prompting engineering clearance for manufacturing. Complete set of these documents shall be submitted as per below mentioned plan.

S. No.	Drawing/Document Revision	Time
1.	First submission from the date of acceptance of PO	4 weeks
2.	Re-submission by the vendor from the date of comments from BHEL	2 weeks

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AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
1. 765KV SOLAPUR SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1150	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.

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AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM OIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1133	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HOPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEOULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING ANO SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
2. 765kV WARDHA SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORO, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.

ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)

S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1000	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	968	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
3. VIDEO SURVEILLANCE SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.

ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)

S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1350	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1320	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.

ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)

S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
400KV KHANDWA SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	500	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Raigarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.

ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)

S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	462	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
5. 400KV RAIGARH SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	2	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	2	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	2	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	2	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	2	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	6	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	2	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	2	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	750	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	140	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	40	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	40	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	726	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	2	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	

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AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
6. 400kV CHAMPA SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	470	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	451	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
400/220KV CHAMPA S/S/ITARI S/S				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	3	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	3	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	3	
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	3	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	3	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	9	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	3	

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AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	3	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	1550	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	190	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	60	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	60	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	1513	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	3	
B	SERVICES			
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEDULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING AND SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	
8. 400/220 kV ITARSI SUBSTATION				
A	SUPPLY			
A.1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NOS.	1	
A.2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAMERA HOUSING	NOS.	1	
A.3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : VIDEO MONITORING SOFTWARE	NOS.	1	

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabaipur Substation under Western Region System Strengthening Scheme (WRSS)-20.

ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)

S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
A.4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 600VA UPS	NOS.	1	(1) Sizing calculation (for back up of 2 hour) to be provided by bidder during detailed engineering . (2) Power supply of UPS for Camera shall be taken from nearest AC junction box located in switchyard. (3.) Minimum 600VA (4.) APC and reputed make
A.5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MEDIA CONVERTOR- INDUSTRIAL GR	PAIR	1	Including media converter chassis
A.6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER DUPLEX PATCH CORD, 2 METER	NOS.	3	
A.7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (12 PORT)	NOS.	1	
A.8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : LIU (06 PORTS)	NOS.	1	
A.9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : JUNCTION BOX	NOS.	1	Stainless steel, thickness 1.5 mm. Suitable for Outdoor, weather proof application, IP 66 and above. Suitable size to mount all the accessories required for 1 camera such as UPS, media converter, LIU, Power switch etc to complete. Power switch circuit is included in the scope.
A.10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FIBER OPTIC CABLE (6 CORE) ARMORED, SINGLE MODE	MTR	500	Outdoor type, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 CABLE (SHIELDED TWISTED PAIR - STP) BETWEEN CAMERA AND MEDIA CONVERTOR	MTR	20	STP cable, D-Link / Digilink / AMP / Molex / Equivalent Powergrid approved make.
A.12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : FLEXIBLE 25MM GI CONDUIT FOR CAT 6 CABLE AND POWER CABLE FOR ALL CAMERAS.	MTR	20	
A.13	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE (3CX2.5 SQ.MM) UNARMORED WITH TERMINAL CONNECTORS AND NECESSARY MOUNTING HARDWARE ON WALL / CEILING	MTR	20	FINOLEX/ POLYCAB/ HAVELLS / KEI / Equivalent Powergrid approved make.
A.14	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 25 MM DIA. HDPE PIPES FOR LAYING OF FIBER OPTIC CABLE	MTR	462	MINIMUM CUT LENGTH 300METER (1) Supply of sockets , joints and bends of pipes shall be in Bidder scope. (2) Supply of required clamp for fixing HDPE pipe conduits on Cable rack/tray/trench wall shall be in Bidder scope. (3) Payment will be made as per running length of HDPE pipe.
A.15	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : MOUNTING HARDWARE FOR VMS CAMERA ON EXISTING STRUCTUE	NOS.	1	
B	SERVICES			

AIS Substation Package-SS19 for extension of (i) 765kV Solapur S/S; (ii) 765kV Aurangabad S/S; (iii) 765kV Wardha S/S; (iv) 400kV Khandwa S/S; (v) 400kV Rajgarh S/S; (vi) 400kV Champa S/S; (vii) 400/220kV Itarsi S/S & (viii) 400/220kV Jabalpur Substation under Western Region System Strengthening Scheme (WRSS)-20.				
ANNEXURE-BOQ- VISUAL MONITORING SYSTEM/ CCTV (REV 00)				
S.No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
B.1	SERVICES- VISUAL MONITORING SYSTEM/CCTV : DESIGN OF VISUAL MONITORING SYSTEM INCLUDING VMS LAYOUT, DETAILED CABLE SCHEOULE & DETAILED BILL OF QTY.	LOT	1	
B.2	SERVICES- VISUAL MONITORING SYSTEM/CCTV : TESTING, COMMISSIONING ANO SUPERVISION OF ERECTION OF VMS SYSTEM AT SITE	LOT	1	

Note: Service charges shall be inclusive of charges for To & Fro travel charges, lodging, boarding, medical, insurances etc .

Bharat Heavy Electricals Limited

Doc No. TB-408-316-110

Technical Specification

Technical Specification for Visual Monitoring system

ANNEXURE-QR

TECHNICAL QUALIFYING REQUIREMENT

(1.) The Bidder should have experience of design, supply and installation of Visual Monitoring System / CCTV system in Switchyard / Power Plants/ Industrial/ Commercial Installations.

AND

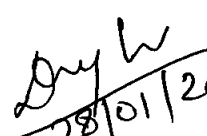
(2.) The Bidder should have successfully executed similar job (as defined in point 1) having order value not less than Rs 10 lacs (excluding taxes, duties, F&I) as single order or not less than Rs. 6 lacs (excluding taxes, duties, F&I) each as two orders, during last five years as on the date of NOA..#

Documents to be submitted for Technical Requirements:

A. Bidder has to submit the Purchase Order / Work order copy defining the scope & value (as per point 1 & 2)

B. Bidder has to submit the certificate/end user certificate for completion of works / commissioning to meet the requirement as mentioned in 1 & 2 above.

NOA: Date of NOA (Notification of Award) for reference project is 29.07.2019


28/01/20
PREPARED BY


28/01-2020
REVIEWED BY


28/01/2020
APPROVED BY

Technical Specification for Visual Monitoring System**Visual monitoring system for watch and ward of Substation premises :**

Visual monitoring system (VMS) for effective watch and ward of sub station premises covering the areas of entire switchyard, Control Room cum Administrative building, Fire fighting pump house, stores and main gate, shall be provided. The contractor shall design, supply, erect, test and commission the complete system including cameras, Digital video recorder system, mounting arrangement for cameras, cables, LAN Switches, UPS and any other items/accessories required to complete the system. To provide all the necessary licenses to run the system successfully shall be in the scope of contractor.

System with Color IP Cameras for VMS surveillance would be located at various locations including indoor areas and outdoor switchyard and as per the direction of Engineer-In-Charge. The VMS data partly/completely shall be recorded (minimum for 15 days) and stored on network video recorder.

The number of cameras and their locations shall be decided in such a way that any location covered in the area can be scanned. The cameras shall be located in such a way to monitor at least:

1. The operation of each and every isolator pole of the complete yard in case of AIS Sub-station.
2. The Operation of each bay bays of GIS Hall as Applicable.
3. All the Transformer and Reactors All the Entrance doors of Control Room Building and Fire-fighting Pump House, GIS Hall and Switchyard Panel room as applicable.
4. All the gates of switchyard.
5. Main entrance Gate
6. All other Major AIS Equipment (such as CB, CT, CVT, SA etc. as applicable)

The cameras can be mounted on structures, buildings or any other suitable mounting arrangement to be provided by the contractor.

1.1 Technical requirements of major equipment of Visual Monitoring System.

- 1.1.1 The Video Monitoring system shall be an integrated system with IP network centric functional and management architecture aimed at providing high-speed manual/automatic operation for best performance.
- 1.1.2 The system should facilitate viewing of live and recorded images and controlling of all cameras by the authorized users.
- 1.1.3 The system shall use video signals from various types of indoor/outdoor CCD colour cameras installed at different locations, process them for viewing on

Technical Specification for Visual Monitoring System

workstations/monitors in the control Room and simultaneously record all the cameras after compression using **H 264**/MPEG 4 or better standard. Mouse/Joystick-KeyBoard controllers shall be used for Pan, Tilt, Zoom, and other functions of desired cameras.

1.1.4 The System shall provide sufficient storage of all the camera recordings for a period of 15 days or more @ 25 FPS, at 4 CIF or better quality using necessary compression techniques for all cameras. It shall be ensured that data once recorded shall not be altered by any means. The recording resolution and frame rate for each camera shall be user programmable.

1.1.5 The surveillance VMS System shall operate on 230 V, 50 Hz single-phase power supply. System shall have back up UPS power supply meeting the power supply need of all the cameras in the stations including those which are installed at gate for a period of 2 hours. The bidder shall submit the sizing calculation for the UPS considering the total load requirement of Video Monitoring System.

1.2 System requirements:

- a) System must provide built-in facility of watermarking or Digital certificate to ensure tamperproof recording.
- b) All cameras may be connected through a suitable LAN which shall be able to perform in 765kV class sub-station environment without fail.
- c) All camera recordings shall have Camera ID & location/area of recording as well as date/time stamp. Camera ID, Location/Area of recording & date/time shall be programmable by the system administrator with User ID & Password.
- d) Facility of camera recording in real-time mode (25 FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.
- e) Facility of Camera recording in HD (1280X720p), D1, 4CIF, CIF, VGA, as well as in any combination i.e. any camera can be recorded in any quality.
- f) System to have facility of **100%** additional camera installation beyond the originally planned capacity.
- g) In order to optimize the memory, while recording, video shall be compressed using **H 264**/MPEG-4 or better standard and streamed over the IP network.
- h) System shall be triplex i.e. it should provide facility of Viewing, Recording & Replay simultaneously.
- i) The offered system shall have facility to export the desired portion of clipping (from a specific date/time to another specific date/time) on CD or DVD. Viewing of this recording shall be possible on standard PC using standard software like windows media player etc.
- j) System shall have provision of WAN connectivity for remote monitoring.
- k) The equipment should generally conform to Electro magnetic compatibility requirements for outdoor equipment in EHV switchyards. The major EMC required for Cameras and other equipment shall be as under:

- | | |
|---|-------------------------|
| 1. Electrical Fast Transient (Level 4) | - As per IEC 61000-4-4 |
| 2. Damped Oscillatory (1 MHz and 100 KHz) (level 3) | - As per IEC 61000-4-18 |

Technical Specification for Visual Monitoring System
reports etc.

1.2.2 Network video recorder

The Network Video recorder shall include at least Server (min 3.0 GHZ, 4GB RAM, 3000GB HDD(min)), RAID 5 ,with suitable configuration along with Colored TFT 22" High resolution monitor, and Internal DVD writer. Windows XP/Vista/7 Prof. or VMS compatible operating system latest version with hardware like graphic cards, licensed Anti-virus etc.

Further the digital video recorder shall conform to the following requirements:

1.	Server Spec	Intel Quad Core (or better) 3.0 Ghz (min.) , 8 MB Cache , 4 GB memory , with suitable NVIDIA graphics card,3 TB HDD , Raid 5
2.	Recording and Display Frame Rate	Real-time 25 frames per second per channel , manual select
3.	Recording Resolution	(PAL): 1280X720 , 704(H) x 586(V) It should be possible to select lower resolutions
4.	Compression Method	H.264/MPEG-4 or better and latest
5.	Video Motion Detection Capable	Standard and built-in (selectable in menu)
6.	Monitoring Options	Split screen 1, 2, 4 , 8, 16, 32 or more cameras
7.	Playback Options	Search, still image capture
8.	Alarm/Event Recording Capable	To be provided with built-in external alarm input/ output ports minimum(8 in, 2 out)
9.	Network Operation Capable	To be provided by using WAN or LAN router
10.	Remote Internet Viewing Capable	Using WAN or LAN router
11.	HDD Storage Consumption	1GB ~ per hour / channel variable based on frame speed and resolution settings, as well as compression
12.	Operation	Triplex operation (simultaneous recording, playback, network operation)
13.	Number of Video Channel	32
14.	Audio Recording Capable	32
15.	Input Voltage	230V AC or equivalent with UPS as a back up for 30 minutes.

Technical Specification for Visual Monitoring System

- | | |
|--|-------------------------|
| 3. AC Voltage Dips & Interruption/Variation (class 3) | - As per IEC 61000-4-11 |
| 4. Electrostatic Discharge (Level 4) | - As per IEC 61000-4-2 |
| 5. Power Frequency Magnetic Field (level 4) | - As per IEC 61000-4-8 |
| 6. Ripple on DC input Power Supply Port immunity test(level 4) | - As per IEC 61000-4-17 |

Type test reports to establish compliance with the above requirement shall be submitted during detailed engineering.

1.2.1 VIDEO SURVEILLANCE APPLICATION SOFTWARE

- a) Digital video surveillance control software should be capable to display and manage the entire surveillance system. It should be capable of supporting variety of devices such as cameras, video encoder, Servers, NAS boxes/Raid backup device etc.
- b) The software should have inbuilt facility to store configuration of encoders and cameras.
- c) The software should Support flexible 1/2/4/8/16/32 Windows Split screen display mode and scroll mode on the PC monitor.
- d) The software should be able to control all cameras i.e. PTZ control, Iris control, auto / manual focus, and color balance of camera, Selection of presets, Video tour selection etc.
- e) The software should have user access authority configurable on per device or per device group basis. The system shall provide user activity log with user ID, time stamp, action performed, etc.
- f) The users should be on a hierarchical basis as assigned by the administrator. The higher priority person can take control of cameras, which are already being controlled by a lower priority user.
- g) It should have recording modes viz. continuous, manual, or programmed modes on date, time and camera-wise. All modes should be disabled and enabled using scheduled configuration. It should also be possible to search and replay the recorded images on date, time and camera-wise. It should provide onscreen controls for remote operation of PTZ cameras. It should have the facility for scheduled recording. Different recording speeds (fps) and resolution for each recording mode for each camera should be possible.
- h) The software for clients should also be working on a browser based system for remote users. This will allow any authorized user to display the video of any desired camera on the monitor with full PTZ and associated controls.
- i) Retrieval: The VMS application should allow retrieval of data instantaneously or any date / time interval chosen through search functionality of the application software. In case data is older than 15 days and available, the retrieval should be possible. The system should also allow for backup of specific data on any drives like DVD's or any other device in a format which can be replayed through a standard PC based software. Log of any such activity should be maintained by the system.
- j) VMS shall provide the full functionality reporting tool which can provide reports for user login/logoff, camera accessibility report, server health check

Technical Specification for Visual Monitoring System

1.2.3 VMS Camera

- a) The color IP camera for substation shall have PAN, TILT and ZOOM facilities so that it can be focused to the required location from the remote station through a controller. Whereas wireless IP cameras with PTZ controls are required for installation at gates of the POWERGRID premises as per the direction of Engineer-In-Charge
- b) The IP Camera at the main gate can be fixed or PTZ based and shall be used for monitoring entry and exit
- c) It should have sufficient range for viewing all the poles of isolators and other equipments with high degree of clarity.
- d) The VMS camera shall be suitable for wall mounting, ceiling mounting and switchyard structure mounting.
- e) It shall be possible to define at 128 selectable preset locations so that the camera gets automatically focused on selection of the location for viewing a predefined location.
- f) The camera should be able to detect motion in day & night environments having light intensity of Color: 0.5 Lux; B&W:0.05 Lux
- g) Housing of cameras meant for indoor use shall be of IP 42 or better rating whereas outdoor camera housing shall be of IP 66 or better rating. Housing shall be robust and not have the effect of electromagnetic induction in 765/400KV switchyard.
- h) All camera recordings shall have Camera ID & location/area of recording as well as date/time stamp. Camera ID, Location/Area of recording & date/time shall be programmable by the system administrator with User ID & Password
- i) Facility of camera recording in real-time mode (25 FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.

A. Outdoor IP Fixed Megapixel Camera Specifications (For Main Gate)

1.	Image Sensor	2-megapixel Progressive ,1 / 3" CMOS/CCD sensor, Minimum illumination 0.1 Lux
2.	Min Luminous	0.5LUX(Color) 0.05Lux(Black)
3.	Camera Enclosure Type	IP66 Grade
4.	Iris/Focus	Auto/Manual
5.	Video Compression	Dual Stream H.264 and MPEG 4 user selectable
6.	Support Dual-stream	primary/secondary stream, H.264/MPEG 4 optional
7.	Video Definition	Primary stream:1600x1200,1280x960,1280x720, Secondary stream:800x600,400x288,192x144
8.	Video Parameters	Brightness, hue, contrast, saturation and image quality
9.	Video Frame Rate	PAL: 1-25frames/second

Technical Specification for Visual Monitoring System

		NTSC:1-30frames/second
10.	Video Compression BR	32Kbit/S - 6Mbit/S
11.	Video Output	One channel composite Streaming
12.	Supported Protocols	TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP, IPsec, UpnP, RTP, RTCP
13.	Operating Temperature	-5 ~ +50°C
14.	Operating Humidity	10 ~ 90%

B. Outdoor IP66 PTZ HD Camera Specifications (For Switch Yards)

1.	Image sensor	1/3 type Solid State Progressive Scan CCD, WDR(High Definition)
2.	Security	Multiple user access with password protection
3.	Effective Pixels	(PAL): Main Stream : 1280x720 Sub Stream : 640x360, 320x280 selectable
4.	Compression	Dual Stream H.264 and MPEG 4 user selectable
5.	Signal System	50 Hz
6.	S/N (signal to noise) Ratio	Better than 50 dB
7.	Electronic Shutter	1/60 ~ 1/10,000 sec. automatic or better
8.	Scanning System	Progressive/interlace
9.	Low Light Sensitivity (lux)	Color: 0.5 Lux; B&W:0.02 Lux
10.	Lens	Minimum 10x (minimum) optical in High Definition (The system shall be able to zoom the images on the monitor without any distortion to the maximum level of optical zoom)
11.	Lens Size	Minimum 4.1~73.8 mm
12.	Lens Aperture	F1.6(wide)~F2.8(tele), f=4.1~41.0mm, 10X Zoom, Video Auto Focus Angle of View Horizontal : 52°(wide) , 2.8°(tele)
13.	PTZ Data Transfer Baud/Bit Rates Supported	Selectable 2400 bps / 4800 bps / 9600 bps
14.	Panning Range	Complete 360 degrees (horizontal)
15.	Pan Speed	Adjustable, 0.1 degrees / second ~ 250 degrees / second
16.	Tilting Range	Minimum 180° Tilt Rotation
17.	Tilt Speed	Adjustable, 0.1 degrees / second ~ 150 degrees / second
18.	In Built Storage	Camera should have inbuilt storage TF or SD format for recording and storing Pictures
19.	IP Class	IP66 Standard

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Technical Specification for Visual Monitoring System

20.	Working temperature	-0°C ~ +50°C
21.	Working Humidity	10 ~ 90%

1.2.4 PTZ-Keyboards

The features of PTZ shall include:

- Fully functional dynamic keyboard/joystick controllers
- Controls all pan, tilt, zoom, iris, preset functions
- Control up to 255 units from a single keyboard
- Many preset options and advanced tour programming
- Compatible with all connected cameras

1.	Key Application	wired keyboard control operation of PTZ functions for weatherproof dome cameras
2.	Pan / Tilt / Zoom Protocol Languages Supported	Selectable
3.	PTZ Data Transfer Baud Rates Supported	selectable 1200 bps / 2400 bps / 4800 bps / 9600 bps
4.	Additional Features	dynamic joystick for smooth camera movements, preset location option for quick access to frequently monitored areas

Annexure_III (A)

Camera Ethernet switch in Control Room-**a) For Bay extension Package:**

An Ethernet switch shall be provided in the Control room which shall have suitable Fiber optic port to connect the supplied number of cameras. The switch shall also have two nos. copper ports to connect to an existing switch which has the connection with existing NVR server.

The Ethernet switches shall be compliant to the IEC 61850-3 standard for Substation.

Fiber optic cable-

Suitable single mode optical fiber cable of six cores shall be provided for connecting the camera to the control room switch. All the cores of fiber cable are to be terminated in the LIU (Line interface unit) at switchyard end as well as the LIU in control room. Optical fiber in switchyard area/Cable trench/cable vault shall be laid in HDPE pipe.

Media converter – The Media converter should support Single Mode fiber and shall be suitable for interfacing with the camera /Ethernet switch.

Integration with NVR

(applicable for Khandwa, Rajgarh, Jabalpur & Itarsi SS only)

The cameras being supplied with the system are to be integrated with the existing/new NVR (Network Video Recorder) of NICE Vision (Version NICE VISION NET 3.1) for Bay extensions packages/new sub stations. The Contractor shall provide all the SDK/APIs and extend full support to integrate the cameras with the NVR.

Note: NVR NICE application software shall be provided by NTAMC for new S/S beyond 192 S/S.

Accessories required with the cameras are:

1. ~~Power converter converting 220 Volt AC to Camera rated Volt DC/as per rating of cameras~~
2. Surge protector if external of suitable rating as per camera
3. Media converter for single mode fiber operating on both 1310 & 1550 nm wavelength compatible with FO port of Switch in control room.
4. MCB for ~~DC~~ of suitable rating of Schneider make.
5. LIU SLX port or 12 or 48 port as per site requirement with suitable connector, patch cord, pigtail and all the cores of fiber are to be terminated in LIU.
6. Junction box of suitable size to accommodate all the components with provision of proper maintenance. Junction should be of IP66 type.
7. Single mode fiber cable.

Handwritten signature/initials

Bharat Heavy Electricals Limited

Project: Substation package-SS19: Extension of 765kV Solapur, 765kV Aurangabad, 765kV Wardha, 400kV Khandwa, 400kV Rajgarh, 400kV Champa, 400/220kV Itarsi & 400/220kV Jabalpur substations

Section -3 of Technical Specification**Doc No. TB-408-316-S03, Rev.0****SECTION-3****PROJECT DETAILS & GENERAL SPECIFICATION****SITE INFORMATION**

Sl	Particular	Details																																				
a)	Owner	POWERGRID																																				
b)	Customer	POWERGRID																																				
c)	Project Title	Substation package-SS19: Extension of 765kV Solapur, 765kV Aurangabad, 765kV Wardha, 400kV Khandwa, 400kV Rajgarh, 400kV Champa, 400/220kV Itarsi & 400/220kV Jabalpur substations. Under Western Region System Strengthening Scheme (WRSS-20)																																				
d)	Location																																					
		<table border="1"> <thead> <tr> <th>SL</th><th>Name of Substation</th><th>Name of State</th><th>Nearest Rail / Road Head</th></tr> </thead> <tbody> <tr> <td>1</td><td>Solapur</td><td>Maharashtra</td><td>Solapur</td></tr> <tr> <td>2</td><td>Aurangabad</td><td>Maharashtra</td><td>Aurangabad</td></tr> <tr> <td>3</td><td>Wardha</td><td>Maharashtra</td><td>Wardha</td></tr> <tr> <td>4</td><td>Khandwa</td><td>M.P.</td><td>Khandwa</td></tr> <tr> <td>5</td><td>Rajgarh</td><td>M.P.</td><td>Rajgarh</td></tr> <tr> <td>6</td><td>Champa</td><td>Chhattisgarh</td><td>Champa</td></tr> <tr> <td>7</td><td>Jabalpur</td><td>M.P.</td><td>Jabalpur</td></tr> <tr> <td>8</td><td>Itarsi</td><td>M.P.</td><td>Itarsi</td></tr> </tbody> </table>	SL	Name of Substation	Name of State	Nearest Rail / Road Head	1	Solapur	Maharashtra	Solapur	2	Aurangabad	Maharashtra	Aurangabad	3	Wardha	Maharashtra	Wardha	4	Khandwa	M.P.	Khandwa	5	Rajgarh	M.P.	Rajgarh	6	Champa	Chhattisgarh	Champa	7	Jabalpur	M.P.	Jabalpur	8	Itarsi	M.P.	Itarsi
SL	Name of Substation	Name of State	Nearest Rail / Road Head																																			
1	Solapur	Maharashtra	Solapur																																			
2	Aurangabad	Maharashtra	Aurangabad																																			
3	Wardha	Maharashtra	Wardha																																			
4	Khandwa	M.P.	Khandwa																																			
5	Rajgarh	M.P.	Rajgarh																																			
6	Champa	Chhattisgarh	Champa																																			
7	Jabalpur	M.P.	Jabalpur																																			
8	Itarsi	M.P.	Itarsi																																			
e)	Transport Facilities	As above																																				
SITE CONDITIONS																																						
a)	Max. ambient air temp.	50°C																																				
b)	Min. ambient air temp.	0°C																																				
c)	Max. design ambient emp.	50°C																																				
d)	Design reference temp.	50°C																																				
e)	Average Humidity	Max. 100%																																				
f)	Special corrosion conditions	No																																				

Bharat Heavy Electricals Limited

Project: Substation package-SS19: Extension of 765kV Solapur, 765kV Aurangabad, 765kV Wardha, 400kV Khandwa, 400kV Rajgarh, 400kV Champa, 400/220kV Itarsi & 400/220kV Jabalpur substations

Section -3 of Technical Specification**Doc No. TB-408-316-S03, Rev.0**

g)	Solar Radiation	1.2kW/sqmtr
h)	Atmospheric UV radiation	High
i)	Altitude above sea level	Less than 1000meter
j)	Pollution Severity	Normal Pollution level
k)	Seismic Zone	As per the seismic zone defined in the relevant BIS / IEC-62271-300 but not less than 0.3g horizontal
WIND DATA		
	Wind velocity	As per IS
	Average No. of thunderstorm days per annum	As per IS
Main Electrical Parameters:		
Fault Levels:		
SL	Name of Substation	Fault level
1	765kV Solapur	40kA for 1sec
2	765kV Aurangabad	40kA for 1sec
3	765kV Wardha	40kA for 1sec
4	400kV Khandwa	40kA for 1sec
5	400kV Rajgarh	40kA for 1sec
6	400kV Champa	50kA for 1sec
7	400/220kV Jabalpur	40kA for 1sec
8	400/220kV Itarsi	40kA for 1sec
	Minimum Creepage Distance	25mm/kV for all equipments i.e. BPI / Bushing, CB, Isolator, CT, CVT, LA, NCT etc. 31mm/kV. For string insulators

ENCLOSED – "SECTION-GTR (GENERAL TECHNICAL REQUIREMENT) REV.14"
FOR DETAILS OF GENERAL TECHNICAL SPECIFICATION.

PLEASE READ TERMINOLOGY AS FOLLOWS -

1. Read "GTR" as "Section-3 of technical specification"
2. Read "Powergrid" as "BHEL/Powergrid".
3. Read "Employer" as "Powergrid".
4. Read "Contractor" as bidder

continued.....
Section -3 of Technical Specification
Doc No. TB-408-316-S03, Rev.0

SECTION- GENERAL TECHNICAL REQUIREMENT (GTR)

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**1.0 FOREWORD**

The provisions under this section are intended to supplement requirements for the materials, equipments and services covered under other sections of tender documents and are not exclusive.

2.0 GENERAL REQUIREMENT

2.1 The contractor shall furnish catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification during detailed engineering.

2.2 It is recognised that the Contractor may have standardised on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to Employer.

2.3 Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

2.4 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specifications unless included in the list of exclusions. Materials and components which are minor in nature and incidental to the requirement but not specifically stated in the specification and bid price schedule, which are necessary for commissioning and satisfactory operation of the switchyard/ substation unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

2.5 ~~The Contractor shall also be responsible for the overall co-ordination with internal /external agencies; Supplier of Employer's supplied equipments, project management, training of Employer's manpower, loading, unloading, handling, insurance, moving to final destination for successful erection, testing and commissioning of the substation /switchyard.~~

2.6 ~~The bidder shall be responsible for safety of human and equipment during the working. It will be the responsibility of the Contractor to co-ordinate and obtain Electrical Inspector's clearance before commissioning. Any additional items, modification due to observation of such statutory authorities shall be provided by the Contractor at no extra cost to the Employer.~~

3.0 STANDARDS

3.1 The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.2 The equipment to be furnished under this specification shall conform to latest issue with all amendments (as on the originally scheduled date of bid opening) of standard specified under Annexure-C of this section, unless specifically mentioned in the specification.

3.3 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to compliment each other.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

- 3.4 The Contractor shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC.
- 3.5 When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.
- 3.6 Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards specified under Annexure-C/ individual sections for various equipments shall also, be accepted, however the salient points of difference shall be clearly brought out during detailed engineering along with English language version of such standard. The equipment conforming to standards other than specified under Annexure-C/individual sections for various equipments shall be subject to Employer's approval.

4.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

- 4.1 The 800kV and 420kV system is being designed to limit the switching surge over voltage of 1.9 p.u. and 2.5 p.u., respectively and the power frequency over voltage of 1.4 p.u. and 1.5 p.u., respectively. In case of the 420kV system, the initial value of the temporary overvoltages could be 2.0 p.u. for 1-2 cycles. The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, restrike etc under such over voltage conditions.
- 4.2 All equipments shall also perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.
- 4.3 All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (wherever applicable) short circuit etc for the equipment.
- 4.4 The bidder shall design terminal connectors of the equipment taking into account various forces that are required to withstand.
- 4.5 The equipment shall also comply to the following:
- To facilitate erection of equipment, all items to be assembled at site shall be "match marked".
 - All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site.

4.6 System Parameter**765kV, 400kV & 220kV System**

SL No	Description of parameters	765kV System	400kV System	220kV System
1.	System operating voltage	765kV	400kV	220kV
2.	Maximum operating voltage of the system (rms)	800kV	420kV	245kV
3.	Rated frequency	50HZ	50Hz	50Hz
4.	No. of phase	3	3	3
5.	Rated Insulation levels			

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

SL No	Description of parameters	765kV System	400kV System	220kV System
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	2100kVp	1550kVp	1050 kVp
ii)	Switching impulse withstand voltage (250/2500 micro sec.) dry and wet	1550kVp	1050kVp	-
iii)	One minute power frequency dry withstand voltage (rms)	830kV	630kV	-
iv)	One minute power frequency dry and wet withstand voltage (rms)	-	-	460kV
6.	Corona extinction voltage	508 kV	320kV	-
7.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	2500 μ V at 508 kV rms	1000 μ V at 266kV rms	1000 μ V at 156kV rms
8.	Minimum creepage distance - for Equipment other than Insulator string	20000 mm (24800 mm for coastal area)	10500 mm (13020 mm for coastal area)	6125 mm (7595 mm for coastal area)
	Minimum creepage distance - for Insulator String	As specified in Section-Switchyard Erection		
9.	Min. clearances			
i.	Phase to phase	7600mm (for conductor-conductor configuration) 9400mm (for rod-conductor configuration)	4000mm (for conductor-conductor configuration) 4200mm (for rod -conductor configuration)	2100 mm
ii.	Phase to earth	4900mm (for conductor-structure) 6400mm (for rod- structure)	3500 mm	2100 mm
iii)	Sectional clearances	10300 mm	6500 mm	5000 mm
10.	Rated short circuit current for 1 sec. duration	40kA/50kA (as applicable)	40kA/50kA/ 63 kA (as applicable)	40kA/ 50kA(as applicable)
11.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**132kV, 66kV, 33kV & 11kV System**

SL No	Description of parameters	132 kV System	66kV System	33 kV System	11kV System
1.	System operating voltage	132kV	66kV	33kV	11kV
2.	Maximum operating voltage of the system(rms)	145kV	72.5kV	36kV	12kV
3.	Rated frequency	50Hz	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3	3
5.	Rated Insulation levels				
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	650 kVp	325 kVp	170 kVp	75 kVp
ii)	One minute power frequency dry and wet withstand voltage (rms)	275kV	140kV	70kV	28kV
6.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	500 μ V at 92kV rms	-	-	-
7.	Minimum creepage distance	3625 mm (4495mm for coastal area)	1813 mm (2248mm for coastal area)	900 mm (1116mm for coastal area)	300 mm (372mm for coastal area)
8.	Min. clearances				
i.	Phase to phase	1300 mm	750 mm	320 mm	280 mm
ii.	Phase to earth	1300 mm	630 mm	320 mm	140 mm
iii.	Sectional clearances	4000 mm	3000 mm	2800 mm	2800 mm
9.	Rated short circuit current	40kA/ 31.5 kA (as applicable) for 1 sec	31.5 kA for 3 sec	25 kA for 3 sec	25 kA for 3 sec
10.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed	Effectively earthed

Notes:

1. The above parameters are applicable for installations up to an altitude of 1000m above mean sea level. For altitude exceeding 1000m, necessary altitude correction factor shall be applicable as per relevant IEC.
2. The insulation and RIV levels of the equipments shall be as per values given in the Technical Specification of respective equipment.
3. Corona and radio interference voltage test and seismic withstand test procedures for equipments shall be in line with the procedure given at **Annexure-A** and **Annexure-B** respectively.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

5.0 ENGINEERING DATA AND DRAWINGS

5.1 The list of drawings/documents which are to be submitted to the Employer is enclosed in **Annexure-E**. In case any additional drawings/documents are required, the same shall also be submitted during execution of the contract.

5.2 The Contractor shall submit 4 (four) sets of drawings/ design documents /data / detailed bill of quantity and 1 (one) set of test reports for the approval of the Employer. The contractor shall also submit the softcopy of the above documents in addition to hardcopy.

5.3 Drawings

5.3.1 All drawings submitted by the Contractor shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

5.3.2 Drawings submitted by the Contractor shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. POWERGRID has standardized a large number of drawings/documents of various make including type test reports which can be used for all projects having similar requirements and in such cases no project specific approval (except for list of applicable drawings alongwith type test reports) is required. However, distribution copies of standard drawings/documents shall be submitted as per provision of the contract. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in SI units.

5.3.3 The review of these data by the Employer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

5.5 All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Contractor's risk. The Contractor may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Contractor's drawing or work by the Employer shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

5.6 All engineering data submitted by the Contractor after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

5.7 Approval Procedure

The following schedule shall be followed generally for approval and for providing final documentation.

- | | | |
|----|--|--------------------|
| i) | Approval/comments/
by Employer on initial
submission | As per L2 schedule |
|----|--|--------------------|

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- | | | |
|-------|--|---|
| ii) | Resubmission
(whenever
required) | Within 3 (three) weeks
from date of comments |
| iii) | Approval or comments | Within 3 (three) weeks of
receipt of resubmission. |
| iv) | Furnishing of distribution
copies (2 hard copies to each
substation and one scanned
copy (pdf format) | 2 weeks from the date
of approval |
| v) | Furnishing of distribution
copies of test reports | |
| | (a) Type test reports
(one scanned softcopy in
pdf format to each substation
plus one for corporate centre
& one hardcopy per substation) | 2 weeks from the date
of final approval |
| | (b) Routine Test Reports
(one copy for each
substation) | -do- |
| vi) | Furnishing of instruction/
operation manuals (2 copies
per substation and one softcopy
(pdf format) for corporate centre
& per substation) | On completion of Engineering |
| (vii) | As built drawings (two sets of
hardcopy per substation & one
softcopy (pdf format) for
corporate centre & per substation) | On completion of entire works |

NOTE :

- (1) The contractor may please note that all resubmissions must incorporate all comments given in the earlier submission by the Employer or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.
- (2) All drawings should be submitted in softcopy form, however substation design drawings like SLD, GA, all layouts etc. shall also be submitted in AutoCAD Version. SLD, GA & layout drawings shall be submitted for the entire substation in case of substation extension also.
- (3) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.
- (4) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/additions/changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Employer.
- (5) The Contractor shall furnish to the Employer catalogues of spare parts.
- (6) All As-built drawings/documents shall be certified by site indicating the changes before final submission.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

- 5.8 The list of major drawings/documents to be approved to qualify for second advance as per Section SCC, shall be as per **Annexure-D**.
- 6.0 MATERIAL/ WORKMANSHIP**
- 6.1 General Requirement**
- 6.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.
- 6.1.2 In case where the equipment, materials or components are indicated in the specification as "similar" to any special standard, the Employer shall decide upon the question of similarity. When required by the specification or when required by the Employer the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it is to be understood that the cost as well as the time delay associated with the rejection shall be borne by the Contractor.
- 6.1.3 The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfill their required function. In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the Employer.
- 6.1.4 Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall also be interchangeable and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.
- 6.1.5 All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be considered as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances, instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacturer's limits suitable guards shall be provided for the protection of personnel on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purposes. The spare equipment(s) shall be installed at designated locations and tested for healthiness.
- 6.1.6 The Contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Contractor shall apply all operational lubricants to the equipment installed by him.

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- 6.1.7 All oil, grease and other consumables used in the Works/Equipment shall be purchased in India unless the Contractor has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare in the proposal, where such oil or grease is available. He shall help Employer in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

6.2 Provisions For Exposure to Hot and Humid climate

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

6.2.1 Space Heaters

- 6.2.1.1 The heaters shall be suitable for continuous operation at 240V as supply voltage. On-off switch and fuse shall be provided.

- 6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

6.2.2 FUNGI STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on parts which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

6.2.3 Ventilation opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust.

6.2.4 Degree of Protection

The enclosures of the Control Cabinets, Junction boxes and Marshalling Boxes, panels etc. to be installed shall comply with following degree of protection as detailed here under:

- a) Installed out door: IP- 55
- b) Installed indoor in air conditioned area: IP-31
- c) Installed in covered area: IP-52
- d) Installed indoor in non-air conditioned area where possibility of entry of water is limited: IP-41.
- e) For LT Switchgear (AC & DC distribution Boards): IP-52

The degree of protection shall be in accordance with IS:13947 (Part-I)/IEC-60947 (Part-I)/IS 12063/IEC-60529. Type test report for IP-55 or higher degree of protection test, shall be submitted for approval.

6.3 RATING PLATES, NAME PLATES AND LABELS

- 6.3.1 Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the Employer. The rating plate of each equipment shall be according to IEC requirement.

- 6.3.2 All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

6.4 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into operation, shall be furnished by the Contractor unless specifically excluded under the exclusions in these specifications and documents.

7.0 DESIGN IMPROVEMENTS / COORDINATION

- 7.1 The bidder shall offer the equipment meeting the requirement of the technical specification. However, the Employer or the Contractor may propose changes in the specification of the equipment or quality thereof and if the contractor & Employer agree upon any such changes, the specification shall be modified accordingly.

- 7.2 If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any change in the price and/or schedule of completion before the Contractor proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.

- 7.3 The Contractor shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

- 7.4 The Contractor has to coordinate designs and terminations with the agencies (if any) who are Consultants/Contractor for the Employer. The names of agencies shall be intimated to the successful bidders.

- 7.5 The Contractor will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Employer (if any) during the period of Contract. The Contractor shall attend such meetings at his own cost at POWERGRID Corporate Centre, Gurgaon (Haryana) or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

8.0 QUALITY ASSURANCE PROGRAMME

- 8.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Contractor's Works or at his Sub-Contractor's premises or at the Employer's site or at any other place of Work as applicable, are in accordance with the specifications, the Contractor shall ensure suitable quality assurance programme to control such activities at all points necessary. A quality assurance programme of the Contractor shall be in line with ISO requirements & shall generally cover the following:

- a) The organisation structure for the management and implementation of the proposed quality assurance programme.

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- b) System for Document and Data Control.
- c) Qualification and Experience data of Bidder's key personnel.
- d) The procedure for purchases of materials, parts, components and selection of sub-Contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.
- e) System for shop manufacturing and site erection controls including process controls, fabrication and assembly control.
- f) System for Control of non-conforming products including deviation dispositioning, if any and system for corrective and preventive actions based on the feedback received from the Customers and also internally documented system for Customer complaints.
- g) Inspection and test procedure both for manufacture and field activities.
- h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.
- i) System for indication and appraisal of inspection status.
- j) System of Internal Quality Audits, Management review and initiation of corrective and Preventive actions based on the above.
- k) System for authorising release of manufactured product to the Employer.
- l) System for maintenance of records.
- m) System for handling, storage and delivery.
- n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.
- o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records. In this regard, the Employer has already prepared Standard Field Quality Plan for transmission line/substation equipments as applicable, Civil/erection Works which is required to be followed for associated works.

The Employer or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Contractor/his vendor's quality management and control activities.

8.2 **Quality Assurance Documents**

The Contractor shall ensure availability of the following Quality Assurance Documents:

- i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.
- ii) Welder and welding operator qualification certificates.
- iii) Welder's identification list, welding operator's qualification procedure and welding identification symbols.
- iv) Raw Material test reports on components as specified by the specification and in the quality plan.

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- v) The Manufacturing Quality Plan(MQP) indicating Customer Inspection Points (CIPs) at various stages of manufacturing and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.
- vi) Factory test results for testing required as per applicable quality plan/technical specifications/GTP/Drawings etc.
- vii) Stress relief time temperature charts/oil impregnation time temperature charts, wherever applicable.

8.3 INSPECTION, TESTING & INSPECTION CERTIFICATE

- 8.3.1 Contractor shall procure bought out items from sub-vendors as per the list in "Compendium of Vendors" available on POWERGRID web-site www.powergridindia.com after ensuring compliance to the requirements/conditions mentioned therein. Contractor shall explore first the possibilities of procuring the bought out items from POWERGRID approved existing vendors. In case of their unavailability / non-response, Contractor may approach POWERGRID for additional sub-vendor approval. In that case, the assessment report of proposed sub vendor by Contractor along with the enclosures as per **Annexure-F** shall be submitted within 60 days of the award. The proposal shall be reviewed and approval will be accorded based on the verification of the document submitted and/or after the physical assessment of the works as the case may be. The physical assessment conducted by POWERGRID, if required, shall be on chargeable basis. Charges shall be as per the POWERGRID norms prevailing at that time, which shall be intimated by POWERGRID separately. If proposal for sub-vendor is submitted after 60 days, the Contractor's proposal normally will not be considered for current LOA. However, POWERGRID may process the case for developing more vendors for referred items, if found relevant. In all cases, It is the responsibility of the Contractor that Project activities do not suffer on account of delay in approval/non approval of a new sub-vendor.

The responsibility and the basis of inspection for various items & equipment is placed at **Annexure-G** along with the requirement of MQP (Manufacturing Quality Plan), ITP(Inspection & Test Plan), FAT(Factory Acceptance Test) which should be valid & POWERGRID approved and Level of inspection envisaged against each item.

Contractor shall ensure that order for items where MQP/ITP/FAT is required will be placed only on vendors having valid MQP/ITP/FAT and where the supplier's MQP/ITP/FAT is either not valid or has not been approved by POWERGRID, MQP shall be generally submitted as per POWERGRID format before placing order.

Items not covered under MQP/ITP/FAT shall be offered for inspection as per POWERGRID LOA/technical Specifications/POWERGRID approved data sheets/ POWERGRID approved drawings and relevant Indian/International standards.

Inspection Levels: For implementation of projects in a time bound manner and to avoid any delay in deputation of POWERGRID or its authorized representative, involvement of POWERGRID for inspection of various items / equipment will be based on the level below:

- Level -I:** Contractor to raise all inspection calls and review the report of tests carried out by the manufacturer, on his own, as per applicable standards/ POWERGRID specification, and submit to concerned POWERGRID inspection office/Inspection Engineer. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates of manufacturers.

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- Level - II:** Contractor to raise all inspection calls and carry out the inspection on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during inspection, the same would be intimated to Contractor and CIP/MICC will be issued by POWERGRID. Else, Contractor would submit their test reports/certificates to POWERGRID. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates.
- Level - III:** Contractor to raise inspection calls for both, stage (as applicable) & final inspection and carry out the stage inspections (if applicable) on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during stage inspection, the same would be intimated to Contractor and CIP will be issued by POWERGRID. Else, Contractor would submit the test reports / certificates of stage inspection after their own review and CIP will be issued by POWERGRID based on review of test reports / certificates. Final inspection will be carried out by POWERGRID and CIP/MICC will be issued by POWERGRID.
- Level - IV:** Contractor to raise inspection calls for both, stage (as applicable) & final inspections. POWERGRID will carry out the inspection for both stage & final inspection as per applicable standards/specification and CIP/MICC will be issued by POWERGRID.
- 8.3.2 Contractor shall ensure that to implement the above inspection levels, particularly for the quality control and inspection at sub-vendor's works, they would depute sufficient qualified & experienced manpower in their Quality Control and Inspection department. Further, to assure quality of construction, Contractor shall have a separate workforce having appropriate qualification & experience and deploy suitable tools and plant for maintaining quality requirement during construction in line with applicable Field Quality Plan (FQP).
- 8.3.3 The Employer, his duly authorised representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Contractor's premises or Works and shall have the power at all reasonable times to ensure that proper Quality Management practices / norms are adhered to, inspect and examine the materials & workmanship of the Works, to carry out Quality/Surveillance Audit during manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works. The Contractor shall obtain for the Employer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works. The item/equipment, if found unsatisfactory with respect to workmanship or material is liable to be rejected. The observations for improvements during product/ process inspection by POWERGRID shall be recorded in Quality Improvement Register (available & maintained at works) for review & timely compliance of observations.
- 8.3.4 Contractor shall submit inspection calls over internet through POWERGRID website. The required vendor code and password to enable raising inspection call will be furnished to the main Contractor within 30 days of award of contract on submission of documents by Contractor. After raising the inspection calls, Contractor shall then proceed as per the message of that particular call which is available on the message board.
- 8.3.5 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which the Contractor shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing for each stage of

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testing as identified in the approved quality plan as customer inspection point(CIP) for indigenous inspections. All inspection calls for overseas material shall be given at least forty five (45) days in advance. Such tests shall be to the Contractor's account except for the expenses of the Inspection Engineer. The Employer/inspector, unless witnessing of the tests is waived by Employer, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector three copies of tests, duly certified. Contractor shall ensure, before giving notice for type test, that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer. CIP/Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment or review of test reports as applicable. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. CIP/MICC will be issued only after review and approval of the test reports.

- 8.3.6 Contractor shall generally offer material for inspection as per supply bar chart approved by POWERGRID and not before 30 days from schedule indicated in the bar chart. In case Contractor offers material(s) for inspection prior to 30 days from the scheduled date with necessary approval of POWERGRID, POWERGRID shall inspect the material and issue CIP only. However, in such an exceptional case, MICC shall be issued only as per provision of original / revised approved supply schedule.
- 8.3.7 Contractor shall minimize the number of inspection calls by offering optimum quantities in each inspection call at the respective manufacturer's works.
- 8.3.8 Contractor shall inspect the material themselves and only after they are fully convinced about the Quality, they shall offer the material for POWERGRID inspection and shall also ensure that relevant portion of LOA/NOA, approved drawing and data sheets along with applicable Quality Plans are available at the works of Contractor or their Sub-vendor before the material is offered for inspection.
- 8.3.9 Contractor shall ensure that material which has been cleared for dispatch after inspection will be dispatched within 30 days in case of domestic supplies and within 60 days in case of Off-shore supplies from the date of issuance of CIP. Material which is not dispatched within stipulated time as above will be reoffered for POWERGRID inspection or specific approval of POWERGRID QA&I shall be obtained for delayed dispatch.
- 8.3.10 The Employer or IE shall give notice in writing to the Contractor, of any objection either to conformance to any drawings or to any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspection Engineer giving reasons therein, that no modifications are necessary to comply with the Contract.
- 8.3.11 All Test Reports and documents to be submitted in English during final inspection of equipment by POWERGRID or as and when required for submission.
- 8.3.12 When the factory tests have been completed at the Contractor's or Sub-Contractor's works, the Employer/Inspection Engineer(IE) shall issue a certificate to this effect within fifteen (15) days after completion of tests & submission of documents by Contractor/manufacturer but if the tests are not witnessed by the Employer/IE, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Employer/IE. Contractor shall, on completion of all tests, submit test

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reports within Ten (10) days to POWERGRID IE. Failure of the Employer/IE to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

- 8.3.13 In all cases, where the Contract provides for tests whether at the premises or works of the Contractor or of any Sub- Contractor, the Contractor, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspection Engineer or to his authorised representative to accomplish testing.
- 8.3.14 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.
- 8.3.15 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.
- 8.3.16 The Employer reserves the right for getting any additional field tests conducted on the completely assembled equipment at site to satisfy that material complies with specifications.
- 8.3.17 Rework/ Re-engineering, if any, on any item/equipment shall be carried out only after mutual discussions and in accordance with mutually agreed procedure. Contractor shall submit Joint Inspection Report of equipments under Re-Work/Re-Engineering alongwith procedure for the same to POWERGRID for approval, before taking up the Re-Work/Re-Engineering, failing which POWERGRID reserves the right to reject the equipment.
- 8.3.18 Contractor may establish a field test Laboratory to execute Civil Construction testing requirements at site with the condition that all testing equipment shall be calibrated from POWERGRID approved accredited Testing laboratories, with calibration certificates kept available at site and all testing personnel employed in the Field Testing Laboratories to be qualified and experienced Engineers or testing to be carried out at POWERGRID approved Third Party Laboratories.
- 8.3.19 Contractor shall ensure that all possible steps are taken to avoid damages to the equipment during transport, storage and erection.
- 8.3.20 Contractor shall implement additional stringent quality checks and preparation during installation of GIS at site (if applicable) as per POWERGRID approved guidelines/Technical specifications.
- 8.3.21 Contractor shall ensure commissioning of all CSDs along with Circuit Breakers wherever applicable.
- 8.3.22 **For EHV transformers/reactors:**
Insulation oil shall be as per POWERGRID Technical specifications and same grade shall be used for impregnation of the active part & testing at the works of Transformer/Reactor Manufacturer and as well as for filling the Transformer/Reactors at site. Contractor to ensure that windings for Transformer/Reactors are made in air-conditioned environment. Core-coil assembly shall be performed in positive

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pressurized dust controlled environment. Dust measurements shall be monitored regularly at Transformer / Reactor Manufacturer works. Contractor shall ensure that respective civil foundations & Fire walls for Transformer/Reactors units to be commissioned, shall be made ready at concerned sites before receipt of Transformer/Reactors units. All the requisite material for Neutral & Delta Bus formation required for charging of complete bank of 765KV class 1-ph Transformer/Reactor units shall be made available at the concerned sites before receipt of the Transformer/Reactor units at site.

- 8.3.23 The Employer reserves the right to increase or decrease their involvement in inspections at Contractor's Works or at his Sub-Contractor's premises or at the Employer's site or at any other place of Work based on performance of Contractor/sub-Contractor.

9.0 TYPE TESTING & CLEARANCE CERTIFICATE

- 9.1 All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

- 9.2 The reports for all type tests as per technical specification shall be furnished by the Contractor alongwith equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by POWERGRID or representative authorized by POWERGRID or Utility or representative of accredited test lab.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within last 10 (ten) years from the date of NOA. In case the test reports are of the test conducted earlier than 10 (ten) years from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer.

Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

The Contractor shall intimate the Employer the detailed program about the type tests atleast two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

- 9.3 The Employer intends to repeat those type tests which are indicated in the price schedule and the same shall be payable as per provision of contract. The price of conducting type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected. The Employer reserves the right to waive the repeating of type tests partly or fully and in case of waiver, test charges for the same shall not be payable.

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9.4 The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests.

9.5 The list of makes of various items, for which Type test reports are not required to be submitted are specified in Compendium of Vendors (COV).

10.0 TESTS

10.1 Pre-commissioning Tests

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Employer and the Contractor for correctness and completeness of installation and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed are given in respective chapters and shall be included in the Contractor's quality assurance programme.

10.2 Commissioning Tests

10.2.1 The available instrumentation and control equipment will to be used during such tests and the Employer will calibrate, all such measuring equipment and devices as far as practicable.

10.2.2 Any special equipment, tools and tackles required for the successful completion of the Commissioning Tests shall be arranged by the Contractor at his own cost.

10.2.3 The specific tests requirement on equipment have been brought out in the respective chapters of the technical specification.

10.3.4 PRECOMMISSIONING, COMMISSIONING, TRIAL-RUN & COMPLETION

As soon as the Facilities covered by these specifications are physically completed in all respects, the Pre commissioning, Commissioning, Trial-run and Completion of the Facilities, as mentioned below, shall be attained in accordance with the procedure given in the Conditions of Contract, Vol.-I of the Bidding Documents.

- (i) Pre commissioning : As per relevant Sections
- (ii) Commissioning : Charging of the Facilities at rated voltage.

Further, wherever appearing in these specifications, the words-'commissioning checks', 'installation checks', 'site tests', 'performance guarantee tests for fire protection system', are to be considered as 'pre commissioning checks'.

- (iii) Trial-run : Operation of the Facilities or any part thereof by the Contractor immediately after the Commissioning for a continuous period of 72 (Seventy two) hours continuously. In case of interruption due to problem/failure in the respective equipment, the contractor shall rectify the problem and after rectification, continuous 72 (Seventy two) hours period start after such rectification.

- (iv) Completion : Upon successful completion of Trial-run.

'Guarantee Test(s)' and/or 'Functional Guarantees' are applicable only for Substation Automation System as specified in Section-'Substation Automation System.'

10.3. The Contractor shall be responsible for obtaining statutory clearances from the concerned authorities for commissioning the equipment and the switchyard. However necessary fee shall be reimbursed by POWERGRID on production of requisite documents.

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11.0 PACKAGING & PROTECTION

11.1 All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the Employer, the Contractor shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Employer to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Employer takes no responsibility of the availability of the wagons.

11.2 All coated surfaces shall be protected against abrasion, impact, discolouration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves and pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

12.0 FINISHING OF METAL SURFACES

12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS: 2629.

12.2 HOT DIP GALVANISING

12.2.1 The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above **and 900 gm/sq.m for coastal area (30km from sea shore approximately) or as specified in Section-Project.** For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum **and 900 gm/sq.m for coastal area as specified in Section-Project.**

12.2.2 The galvanized surfaces shall consist of a continuous and uniform thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surface, flaking or peeling off, etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.

12.2.3 After galvanizing, no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. Sodium dichromate or alternate approved treatment shall be provided to avoid formation of white rust after hot dip galvanization.

12.2.4 The galvanized steel shall be subjected to four numbers of one minute dips in copper sulphate solution as per IS-2633.

12.2.5 Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc

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- Adhesion test
- Mass of zinc coating

12.2.6 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of touch-up zinc rich paint at site shall be allowed with approval of Engineer Incharge.

12.3 PAINTING

12.3.1 All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS-6005 "Code of practice for phosphating iron and sheet". All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

12.3.2 After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved.

12.3.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

12.3.4 The exterior and interior colour of the paint in case of new substations shall preferably be RAL 7032 for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Glossy white colour inside the equipments /boards /panels/junction boxes is also acceptable. The exterior colour for panels shall be matching with the existing panels in case of extension of a substation. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

12.3.5 In case the contractor proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted during detailed engineering for Employer's review & approval.

12.3.6 The colour scheme as given below shall be followed for Fire Protection and Air Conditioning systems

S.No.	PIPE LINE	Base colour	Band colour
Fire Protection System			
1	Hydrant and Emulsifier system pipeline	FIRE RED	-
2	Emulsifier system detection line - water	FIRE RED	Sea Green
3	Emulsifier system detection line -Air	FIRE RED	Sky Blue
4	Pylon support pipes	FIRE RED	
Air Conditioning Plant			
5	Refrigerant gas pipeline - at compressor suction	Canary Yellow	-

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S.No.	PIPE LINE	Base colour	Band colour
6	Refrigerant gas pipeline – at compressor discharge	Canary Yellow	Red
7	Refrigerant liquid pipeline	Dark Admiralty Green	-
8	Chilled water pipeline	Sea Green	-
9	Condenser water pipeline	Sea Green	Dark Blue

The direction of flow shall be marked by → (arrow) in black colour.



Base Colour Direction of flow Band Colour

- 12.3.7 For aluminium casted surfaces, the surface shall be with smooth finish. Further, in case of aluminium enclosures, the surface shall be coated with powder (coating thickness of 60 microns) after surface preparation for painting. For stainless steel surfaces, no painting is envisaged.
- 13.0 HANDLING, STORING AND INSTALLATION**
- 13.1 In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the Employer or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.
- 13.2 Contractor may engage manufacturer's Engineers to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unload, transport, store, erect, test and commission the equipment as per instructions of the manufacturer's supervisory Engineer(s) and shall extend full cooperation to them.
- 13.3 The contractor must ensure that the open storage platform (as per Drawing No. C-ENGG-CVL-STD-PLATFORM-01, Rev.0) is constructed for storage of outdoor type equipment/material prior to commencement of delivery at site. Outdoor equipment shall be stored on open storage platform, properly covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress.
- However, all indoor equipments including control & protection panels, Communication equipments and operating mechanism boxes etc. of outdoor equipments shall be stored indoors.
- Storage of equipment on top of another one is not permitted if the wooden packing is used and there is possibility of equipment/packing damage. Material opened for joint inspection shall be repacked properly as per manufacturer's recommendations.
- During storage of material regular periodic monitoring of important parameters like oil level / leakage, SF6 / Nitrogen pressure etc. shall be ensured by the contractor.
- 13.4 In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the Employer. Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.
- 13.5 Where assemblies are supplied in more than one section, Contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments

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for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the Contractor at his own expense.

- 13.6 Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.
- 13.7 The Contractor shall be fully responsible for the equipment/material until the same is handed over to the Employer in an operating condition after commissioning. Contractor shall be responsible for the maintenance of the equipment/material while in storage as well as after erection until taken over by Employer, as well as protection of the same against theft, element of nature, corrosion, damages etc.
- 13.8 Where material / equipment is unloaded by Employer before the Contractor arrives at site or even when he is at site, Employer by right can hand over the same to Contractor and there upon it will be the responsibility of Contractor to store the material in an orderly and proper manner.
- 13.9 The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipment which requires indoor storage.
- 13.10 The words 'erection' and 'installation' used in the specification are synonymous.
- 13.11 Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes.
- 13.12 The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances the Contractor shall immediately proceed to correct the discrepancy at his risks and cost.
- 13.13 Equipment Bases**
A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base unless otherwise agreed to by the Employer. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.
- 14.0 TOOLS**
- 14.1 TOOLS & PLANTS (T&P)**
The Contractor shall arrange all T&P (such as necessary supports, cranes, ladders, platforms etc.) for erection, testing & commissioning of the system at his own cost. Further, all consumables, wastage and damages shall be to the account of contractor.
All such T&P shall be taken back by the contractor after commissioning of the system.
- 14.2 SPECIAL TOOLS AND TACKLES**
The contractor shall supply all special tools and tackles required for Operation and maintenance of equipment. The special tools and tackles shall only cover items which

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are specifically required for the equipment offered and are proprietary in nature. The list of special tools and tackles, if any, shall be finalized during detail engineering and the same shall be supplied without any additional cost implication to the Employer.

14.3 FACILITIES TO BE PROVIDED BY THE EMPLOYER

14.3.1 Employer shall make available the auxiliary supplies at a single point in the substation on chargeable basis. The prevailing energy rates of the state shall be applicable. All further distribution from the same for construction supply shall be made by the contractor. However, in case of failure of power due to any unavoidable circumstances, the contractor shall make his own necessary arrangements like diesel generator sets etc. at his own cost so that progress of work is not affected and Employer shall in no case be responsible for any delay in works because of non-availability of power.

14.3.2 Employer shall make available construction water supply at a single point in the substation. All further distribution for the same shall be made by the Contractor. In case of non-availability or inadequate availability of water for construction work, the contractor shall make his own arrangement at his own cost and the Employer shall in no case be responsible for any delay in works because of non-availability or inadequate availability of water.

15.0 AUXILIARY SUPPLY

15.1 The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform the parameters as indicated in the following table:

Normal Voltage	Variation in Voltage	Frequency in HZ	Phase/Wire	Neutral connection
415V	± 10%	50 ± 5%	3/4 Wire	Solidly Earthed.
240V	± 10%	50 ± 5%	1/2 Wire	Solidly Earthed.
220V	190V to 240V	DC	Isolated 2 wire System	-
110V	95V to 120V	DC	Isolated 2 wire System	-
48V	--	DC	2 wire system (+) earthed	-

Combined variation of voltage and frequency shall be limited to ± 10%.

16.0 SUPPORT STRUCTURE

16.1 The equipment support structures shall be suitable for equipment connections at the first level i.e 14.0 meter, 8.0 meter, 5.9 meter and 4.6 meter from plinth level for 765kV, 400kV, 220kV and 132kV substations respectively. All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets & marshalling box (wherever applicable) etc.

16.2 The minimum vertical distance from the bottom of the lowest porcelain part of the bushing, porcelain enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 metres.

17.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS

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- 17.1 All power clamps and connectors shall conform to IS:5561 or other equivalent international standard and shall be made of materials listed below :

Sl. No.	Description	Materials
a)	For connecting ACSR conductors/AAC conductors/ Aluminium tube	Aluminum alloy casting, conforming to designation A6 of IS:617 and all test shall conform to IS:617
b)	For connecting equipment terminals mad of copper with ACSR conductors/AAC conductors/ Aluminium tube	Bimetallic connectors made from aluminum alloy casting, conforming to designation A6 of IS:617 with 2mm thick bimetallic liner/strip and all test shall conform to IS:617
c)	For connecting G.I	Galvanised mild steel shield wire
d)	Bolts, nuts & plain washers	Electro-galvanised for sizes below M12, for others hot dip galvanised.
e)	Spring washers	Electro-galvanised mild steel suitable for atleast service condition-3 as per IS:1573

- 17.2 Necessary clamps and connectors shall be supplied for all equipment and connections. If corona rings are required to meet these requirements they shall be considered as part of that equipment and included in the scope of work.
- 17.3 Where copper to aluminum connections are required, bi-metallic clamps shall be used, which shall be properly designed to ensure that any deterioration of the connection is kept to a minimum and restricted to parts which are not current carrying or subjected to stress.
- 17.4 Low voltage connectors, grounding connectors and accessories for grounding all equipment as specified in each particular case, are also included in the scope of Work.
- 17.5 No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanised. Copper alloy liner/strip of minimum 2 mm thickness shall be cast integral with aluminum body or 2 mm thick bi-metallic liner/strips shall be provided for Bi-metallic clamps.
- 17.6 All casting shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.
- 17.7 Flexible connectors, braids or laminated straps made for the terminal clamps for bus posts shall be suitable for both expansion or through (fixed/sliding) type connection of IPS AL tube as required. In both the cases the clamp height (top of the mounting pad to centre line of the tube) should be same.
- 17.8 Current carrying parts (500A and above) of the clamp/connector shall be provided with minimum four numbers of bolts preferably for 132kV & above.
- 17.9 All current carrying parts shall be designed and manufactured to have minimum contact resistance.
- 17.10 Power Clamps and connectors shall be designed to control corona as per requirement.

17.11 Tests

Clamps and connectors should be type tested as per IS:5561 and shall also be subjected to routine tests as per IS:5561. Following type test reports shall be submitted for

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approval. Type test once conducted shall hold good. The requirement of test conducted within last ten years, shall not be applicable.

- i) Temperature rise test (maximum temperature rise allowed is 35°C over 50°C ambient)
- ii) Short time current test
- iii) Corona (dry) [for 400kV and above] and RIV (dry) test [for 132kV and above voltage level clamps]
- iv) Resistance test and tensile test

18.0 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES & MARSHALLING BOXES FOR OUTDOOR EQUIPMENT

- 18.1 All types of boxes, cabinets etc. shall generally conform to & be tested in accordance with IS-5039/IS-8623, IEC-60439, as applicable, and the clauses given below:
- 18.2 Control cabinets, junction boxes, Marshalling boxes & terminal boxes shall be made of stainless steel of atleast 1.5 mm thick or aluminum enclosure of atleast 1.6 mm thick and shall be dust, water and vermin proof. Stainless steel used shall be of grade SS304 (SS316 for coastal area) or better. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. In case of aluminum enclosed box the thickness of aluminum shall be such that it provides adequate rigidity and long life as comparable with sheet steel of specified thickness.
- 18.3 A canopy and sealing arrangements for operating rods shall be provided in marshalling boxes / Control cabinets to prevent ingress of rain water.
- 18.4 Cabinet/boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere.
- 18.5 All doors, removable covers and plates shall be gasketed all around with suitably profiled EPDM/Neoprene/PU gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

Further, the gasketing arrangement shall be such that gaskets are pasted in slots (in door fabrication/gasket itself) in order to prevent ingress of dust and moisture inside the panels so that no internal rusting occurs in panels during the operation of the equipment.
- 18.6 All boxes/cabinets shall be designed for the entry of cables by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate above the base of the marshalling kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland plate. Gland plate shall have provision for some future glands to be provided later, if required. The Nickel plated glands shall be dust proof, screw on & double compression type and made of brass. The gland shall have provision for securing armour of the cable separately and shall be provided with earthing tag. The glands shall conform to BS:6121.
- 18.7 A 240V, single phase, 50 Hz, 15 amp AC plug and socket shall be provided in the cabinet with ON-OFF switch for connection of hand lamps. Plug and socket shall be of industrial grade.

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- 18.8 LED based illumination of minimum 9 watts shall be provided. The switching of the fittings shall be controlled by the door switch.
For junction boxes of smaller sizes such as lighting junction box, manual operated earth switch mechanism box etc., plug socket, heater and illumination is not required to be provided.
- 18.9 All control switches shall be of MCB/rotary switch type and Toggle/piano switches shall not be accepted.
- 18.10 Earthing of the cabinet shall be ensured by providing two separate earthing pads. The earth wire shall be terminated on to the earthing pad and secured by the use of self etching washer. Earthing of hinged door shall be done by using a separate earth wire.
- 18.11 The bay marshalling kiosks shall be provided with danger plate and a diagram showing the numbering/connection/feruling by pasting the same on the inside of the door.
- 18.12 The following routine tests alongwith the routine tests as per IS:5039 shall also be conducted:
- i) Check for wiring
 - ii) Visual and dimension check
- 18.13 The enclosure of bay marshalling kiosk, junction box, terminal box and control cabinets shall conform to IP-55 as per IS:13947 including application of 2KV rms for 1 (one) minute, insulation resistance and functional test after IP-55 test.
- 19.0 DISPOSAL OF PACKING MATERIAL & WASTE FROM CONSTRUCTION SITE**
After completion of the work, Contractor shall dispose-off all the packing & waste materials including empty conductor drums, cable drums, wooden containers, oil drums, gas cylinders and other waste/scrapped materials from construction site at his own cost and shall make the substation area properly cleaned.
- 20.0 TERMINAL BLOCKS AND WIRING**
- 20.1 Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All interphase and external connections to equipment or to control cubicles will be made through terminal blocks.
- 20.2 Terminal blocks shall be 650V grade and have continuous rating to carry the maximum expected current on the terminals and non-breakable type. These shall be of moulded piece, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But the terminal blocks shall be non-disconnecting stud type except for the secondary junction boxes of Current Transformer and Voltage Transformer.
- 20.3 Terminal blocks for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.
- 20.4 The terminal shall be such that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally.
- 20.5 The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable.
- 20.6 The terminal blocks shall be of extensible design, multilayer terminal arrangement is not allowed in any junction box (Common MB, Individual MB, JB etc.). There should be

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sufficient space at both sides of terminals so that ferrule number of wires / TB numbers are clearly visible during wire removal or insertion.

- 20.7 The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.
- 20.8 The terminal blocks shall be fully enclosed with removable covers of transparent, non-deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.
- 20.9 Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.
- | | | |
|----|------------------------------------|---|
| a) | All circuits except CT/PT circuits | Minimum of two of 2.5 sq mm copper flexible. |
| b) | All CT/PT circuits | Minimum of 4 nos. of 2.5 sq mm copper flexible. |
- 20.10 The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live.
- 20.11 Atleast 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.
- 20.12 There shall be a minimum clearance of 250 mm between the First/bottom row of terminal block and the associated cable gland plate for outdoor ground mounted marshalling box and the clearance between two rows of terminal blocks shall be a minimum of 150 mm.
- 20.13 The Contractor shall furnish all wire, conduits and terminals for the necessary interphase electrical connections (where applicable) as well as between phases and common terminal boxes or control cabinets. For equipments rated for 400 kV and above the wiring required in these items shall be run in metallic ducts or shielded cables in order to avoid surge overvoltages either transferred through the equipment or due to transients induced from the EHV circuits.
- 20.14 All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publications, in both longitudinal and transverse modes. The Contractor shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment.
- 21.0 LAMPS & SOCKETS**
- 21.1 Lamps & Sockets**
- All lamps shall use a socket base as per IS-1258, except in the case of signal lamps.
- All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.
- 21.2 Hand Lamp:**
- A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.
- 21.3 Switches and Fuses:**
- 21.3.1 Each panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signaling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with miniature circuit breaker / switch fuse units. Selection of the main and Sub-circuit fuse

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ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.

- 21.3.2 All fuses shall be of HRC cartridge type conforming to IS:9228 mounted on plug-in type fuse bases. Miniature circuit breakers with thermal protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.
- 22.0 Bushings, Hollow Column Insulators, Support Insulators:**
- 22.1 Bushings shall be manufactured and tested in accordance with IS:2099 & IEC-60137 while hollow column insulators shall be manufactured and tested in accordance with IEC-62155/IS:5621. The support insulators shall be manufactured and tested as per IS:2544/IEC-60168 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.
- The bidder may also offer composite hollow insulators, conforming to IEC-61462.
- 22.2 Support insulators, bushings and hollow column insulators shall be manufactured from high quality porcelain. Porcelain used shall be homogeneous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified tough and impervious to moisture.
- 22.3 Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.
- 22.4 Support insulators/bushings/hollow column insulators shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.
- 22.5 When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the insulators/bushings when operating at the normal rated voltage.
- 22.6 Bushing porcelain shall be robust and capable of withstanding the internal pressures likely to occur in service. The design and location of clamps and the shape and the strength of the porcelain flange securing the bushing to the tank shall be such that there is no risk of fracture. All portions of the assembled porcelain enclosures and supports other than gaskets, which may in any way be exposed to the atmosphere shall be composed of completely non hygroscopic material such as metal or glazed porcelain.
- 22.7 All iron parts shall be hot dip galvanised and all joints shall be air tight. Surface of joints shall be trued up porcelain parts by grinding and metal parts by machining. Insulator/bushing design shall be such as to ensure a uniform compressive pressure on the joints.
- 22.8 Tests**
- In bushing, hollow column insulators and support insulators shall conform to type tests and shall be subjected to routine tests in accordance with IS:2099 & IS:2544 & IS:5621.
- 22.9 RTV Coating on porcelain insulators (for coastal area)**
- ~~RTV coating shall be done at site on all porcelain insulators (i.e. bushings, hollow and solid insulators, disc insulators etc.) for substation(s) in coastal area as defined elsewhere. The cost of RTV coating shall be deemed to be included in the respective~~

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

~~equipment/items' erection cost. The technical details of RTV coating is attached in Annexure-H.~~

23.0 MOTORS

Motors shall be "Squirrel Cage" three phase induction motors of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment and shall be subjected to routine tests as per applicable standards. The motors shall be of approved make.

23.1 Enclosures

- a) Motors to be installed outdoor without enclosure shall have hose proof enclosure equivalent to IP-55 as per IS: 4691. For motors to be installed indoor i.e. inside a box, the motor enclosure, shall be dust proof equivalent to IP-44 as per IS: 4691.
- b) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection of earthing conductor.
- c) Motors shall have drain plugs so located that they will drain water resulting from condensation or other causes from all pockets in the motor casing.
- d) Motors weighing more than 25 Kg. shall be provided with eyebolts, lugs or other means to facilitate lifting.

23.2 Operational Features

- a) Continuous motor rating (name plate rating) shall be at least ten (10) percent above the maximum load demand of the driven equipment at design duty point and the motor shall not be over loaded at any operating point of driven equipment that will rise in service.
- b) Motor shall be capable at giving rated output without reduction in the expected life span when operated continuously in the system having the particulars as given in Clause 15.0 of this Section.

23.3 Starting Requirements:

- a) All induction motors shall be suitable for full voltage direct-on-line starting. These shall be capable of starting and accelerating to the rated speed along with the driven equipment without exceeding the acceptable winding temperature even when the supply voltage drops down to 80% of the rated voltage.
- b) Motors shall be capable of withstanding the electrodynamic stresses and heating imposed if it is started at a voltage of 110% of the rated value.
- c) The locked rotor current shall not exceed six (6) times the rated full load current for all motors, subject to tolerance as given in IS:325.
- d) Motors when started with the driven equipment imposing full starting torque under the supply voltage conditions specified under Clause 15.0 shall be capable of withstanding atleast two successive starts from cold condition at room temperature and one start from hot condition without injurious heating of winding. The motors shall also be suitable for three equally spread starts per hour under the above referred supply condition.
- e) The locked rotor withstand time under hot condition at 110% of rated voltage shall be more than starting time with the driven equipment of minimum permissible voltage by at least two seconds or 15% of the accelerating time whichever is greater. In case it is not possible to meet the above requirement, the Bidder shall offer centrifugal type speed switch mounted on the motor shaft which shall remain closed for speed lower than 20% and open for speeds above

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20% of the rated speed. The speed switch shall be capable of withstanding 120% of the rated speed in either direction of rotation.

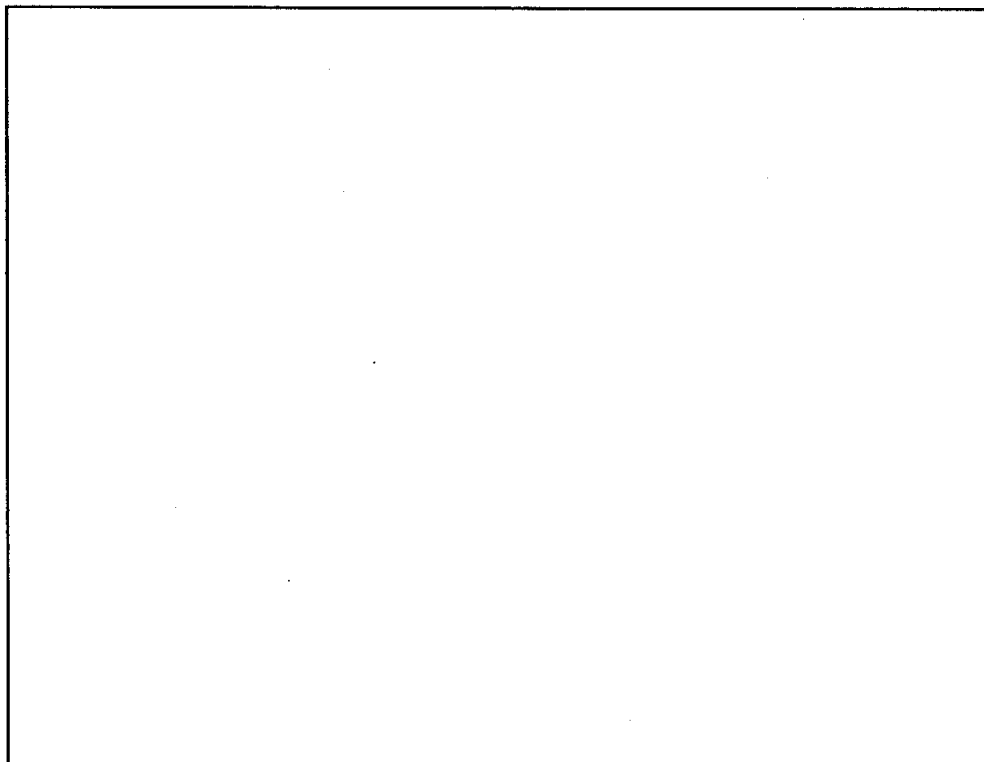
23.4 Running Requirements:

- a) The maximum permissible temperature rise over the ambient temperature of 50 degree C shall be within the limits specified in IS:325 (for 3-phase induction motors) after adjustment due to increased ambient temperature specified.
- b) The double amplitude of motor vibration shall be within the limits specified in IS: 4729. Vibration shall also be within the limits specified by the relevant standard for the driven equipment when measured at the motor bearings.
- c) All the induction motors shall be capable of running at 80% of rated voltage for a period of 5 minutes with rated load commencing from hot condition.

23.5 TESTING AND COMMISSIONING

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

- (a) Insulation resistance.
- (b) Phase sequence and proper direction of rotation.
- (c) Any motor operating incorrectly shall be checked to determine the cause and the conditions corrected.

24.**24.1**

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**ANNEXURE-A****CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST****1. General**

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & above) both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV) for 132kV and above.

2. Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3. Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency with 10% of 0.5 Mhz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be carried out in accordance with relevant IEC of respective equipment or NEMA standard Publication No. 107-1964.

3.3 In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, and 110% of the specified RIV test voltage for all equipment unless otherwise specified. The specified RIV test voltage for 765kV, 400 kV, 220 KV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5 The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noise meter.

4. Test Methods for Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 110% of specified corona extinction voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped, otherwise test shall be continued and the voltage will then be decreased slowly until

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-A

all visible corona disappears. The procedure shall be repeated at least 4 times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, and 110%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall be photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

For recording purpose, modern devices utilizing UV recording methods such as image intensifier may also be used.

- 4.1 The test shall be recorded on each photograph. Additional photograph shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.
- 4.2 In addition to photographs of the test object preferably four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Employer's inspector, after determining the best camera locations by trial energisation of test object at a voltage which results in corona.
- 4.3 The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.
- 4.4 However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Employer's inspector if, in his opinion, it will not prejudice other test.
5. **Test Records:**
In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:
 - a) Background noise before and after test.
 - b) Detailed procedure of application of test voltage.
 - c) Measurements of RIV levels expressed in micro volts at each level.
 - d) Results and observations with regard to location and type of interference sources detected at each step.
 - e) Test voltage shall be recorded when measured RIV passes through 100 microvolts in each direction.
 - f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-B

SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 132kV and above) shall be carried out alongwith supporting structure.

The Bidder shall arrange to transport the structure from his Contractor's premises/ POWERGRID sites for the purpose of seismic withstand test only.

The seismic level specified shall be applied at the base of the structure. The accelerometers shall be provided at the Terminal Pad of the equipment and any other point as agreed by the Employer. The seismic test shall be carried out in all possible combinations of the equipment. The seismic test procedure shall be furnished for approval of the Employer.

The frequency range for the earthquake spectra shall be as per IEC-6227-300.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**ANNEXURE-C****LIST OF GENERAL STANDARDS AND CODES**

CODES	TITLE
--	India Electricity Rules
--	Indian Electricity Act
--	Indian Electricity (Supply) Act
--	Indian Factories Act
IS-5	Colors for Ready Mixed Paints and Enamels
IS-335	New Insulating Oils
IS-617	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes
IS-1448 (P1 to P 145)	Methods of Test for Petroleum and its Products
IS-2071 (P1 to P3)	Methods of High Voltage Testing
IS-12063	Classification of degrees of protection provided by enclosures of electrical equipment
IS-2165 ; P1:1997, P2:1983	Insulation Coordination
IS-3043	Code of Practice for Earthing
IS-6103	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids
IS-6104	Method of Test for Interfacial Tension of Oil against Water by the Ring Method
IS-6262	Method of test for Power factor & Dielectric Constant of Electrical Insulating Liquids
IS-6792	Method for determination of electric strength of insulating oils
IS-5578	Guide for marking of insulated conductors
IS-11353	Guide for uniform system of marking & identification of conductors & apparatus terminals.
IS-8263	Methods for Radio Interference Test on High voltage Insulators
IS-9224 (Part 1,2&4)	Low Voltage Fuses
IEC-60060 (Part 1 to P4)	High Voltage Test Techniques
IEC 60068	Environmental Test
IEC-60117	Graphical Symbols
IEC-60156	Method for the Determination of the Electrical Strength of Insulation Oils
IEC-60270	Partial Discharge Measurements
IEC-60376	Specification and Acceptance of New Sulphur Hexafluoride
IEC-60437	Radio Interference Test on High Voltage Insulators
IEC-60507	Artificial Pollution Tests on High Voltage Insulators to be used on AC Systems
IEC-62271-1	Common Specification for High Voltage Switchgear & Control gear Standards
IEC-60815	Guide for the Selection of Insulators in respect of Polluted Conditions

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**ANNEXURE-C**

CODES	TITLE
IEC-60865 (P1 & P2)	Short Circuit Current - Calculation of effects
ANSI-C.1/NFPA.70	National Electrical Code
ANSI-C37.90A	Guide for Surge Withstand Capability (SWC) Tests
ANSI-C63.21, C63.3	Specification for Electromagnetic Noise and Field Strength Instrumentation 10 KHz to 1 GHZ
C36.4ANSI-C68.1	Technique for Dielectric Tests
ANSI-C76.1/IEEE21	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings
ANSI-SI-4	Specification for Sound Level Meters
ANSI-Y32-2/C337.2	Drawing Symbols
ANSI-Z55.11	Gray Finishes for Industrial Apparatus and Equipment No. 61 Light Gray
NEMA-107T	Methods of Measurements of RIV of High Voltage Apparatus
NEMA-ICS-II	General Standards for Industrial Control and Systems Part ICSI-109
CISPR-1	Specification for CISPR Radio Interference Measuring Apparatus for the frequency range 0.15 MHz to 30 MHz
CSA-Z299.1-1978h	Quality Assurance Program Requirements
CSA-Z299.2-1979h	Quality Control Program Requirements
CSA-Z299.3-1979h	Quality Verification Program Requirements
CSA-Z299.4-1979h	Inspection Program Requirements
TRANSFORMERS AND REACTORS	
IS:10028 (Part 2 & 3)	Code of practice for selection, installation & maintenance of Transformers (P1:1993), (P2:1991), (P3:1991)
IS-2026 (P1 to P4)	Power Transformers
IS-3347 (part 1 to Part 8)	Dimensions for Porcelain transformer Bushings for use in lightly polluted atmospheres
IS-3639	Fittings and Accessories for Power Transformers
IS-6600	Guide for Loading of oil immersed Transformers
IEC-60076 (Part 1 to 5)	Power Transformers
IEC-60214	On-Load Tap-Changers
IEC-60289	Reactors
IEC-60354	Loading Guide for Oil - Immersed power transformers
IEC-60076-10	Determination of Transformer and Reactor Sound Levels
ANSI-C571280	General requirements for Distribution, Power and Regulating Transformers
ANSI-C571290	Test Code for Distribution, Power and Regulation Transformers
ANSI-C5716	Terminology & Test Code for Current Limiting Reactors
ANSI-C5721	Requirements, Terminology and Test Code for Shunt Reactors Rated Over 500 KVA
ANSI-C5792	Guide for Loading Oil-Immersed Power Transformers upto and including 100 MVA with 55 deg C or 65 deg C Winding Rise

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**ANNEXURE-C**

CODES	TITLE
ANSI-CG,1EEE-4	Standard Techniques for High Voltage Testing
IEC 60076	Power transformers
IEC 60076-1	Part 1: General
IEC 60076-2	Part 2: Temperature rise
IEC 60076-3	Part 3: Insulation levels, dielectric tests and external clearances in air
IEC 60076-4	Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors
IEC 60076-3-1	Part 3-1: Insulation Levels and Dielectric Tests –External Clearances in Air
IEC 60076-5	Part 5: Ability to withstand short circuit
IEC 60076-6	Part 6: Reactors
IEC 60076-7	Part 7: Loading guide for oil-immersed power transformers
IEC 60076-8	Part 8: Application guide
IEC 60076-10	Part 10: Determination of sound levels
IEC 60076-10-1	Part 10-1: Determination of sound levels - Application guide
IEC 60076-11	Part 11: Dry-type transformers
IEC 60076-12	Part 12: Loading guide for dry-type power transformers
IEC 60076-13	Part 13: Self-protected liquid-filled transformers
IEC 60076-14	Part 14: Design and application of liquid-immersed power transformers using high-temperature insulation materials
IEC 60076-15	Part 15: Gas-filled power transformers
IEC 60076-16	Part 16: Transformers for wind turbine applications
IEC 60076-18	Part 18: Measurement of frequency response
IEC 60076-19	Part 19: Rules for the determination of uncertainties in the measurement of losses in power transformers and reactors
IEC 60076-21	Part 21: Standard requirements, terminology, and test code for step-voltage regulators
IEC 60044, BS 3938	Current transformers
IEC 60050	International Electrotechnical Vocabulary
IEC 60050(421)	International Electrotechnical vocabulary- Chapter 421 : Power Transformers and Reactors
IEC 60060	High Voltage test techniques
IEC 60060-1	General definitions and test requirements
IEC 60060-2	Measuring systems
IEC 60071	Insulation co-ordination
IEC 60071-1	Part 1: Definitions, principles and rules
IEC 60071-2	Part 2 : Application guide
IEC 60137	Bushing for alternating voltage above 1000V
IEC 60214	On-Load Tap changers
IEC 255-21-3	Relays vibration

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CODES	TITLE
IEC 60270	Partial discharge measurements
IEC 60296	Specification for Unused Mineral Oil for Transformers and Switchgear
IEC 60422	Supervision and Maintenance guide for Mineral Insulating Oil in Electrical Equipment
IEC 60475	Method of Sampling Liquid dielectrics
IEC 60529	Classification of Degrees of Protection provided by Enclosures
IEC 60542	Application Guide for On-Load Tap-Changers
IEC 60567	Guide for the Sampling of Gases and of Oil from Oil-filled Electrical Equipment for the Analysis of Free and Dissolved Gases
IEC 60651	Sound Level Meters
IEC 61083	Digital Recorders and Software for High Voltage Impulse testing
IEC 61083-1	Part 1: Requirements for digital recorders in high voltage impulse tests
IEC 61083-2	Part 2: Evaluation of software used for the determination of the parameters of impulse waveforms
CISPR 16	Specification for radio disturbance and immunity measuring apparatus
CISPR 16-1	Radio disturbance and immunity measuring apparatus
CISPR-18	Radio Interference Characteristics of Power Lines and High Voltage Equipment
ISO 9001	Quality system-Model for Quality Assurance in Design /development
Cigre Publication 202	Guidelines for conducting design reviews for transformers 100 MVA and 123 kV and above. August 2002-Cigre Working Group 12.22
WG 12-15	Guide for Customers Specifications for Transformers 100 MVA and 123 kV and above
WG 12 19	Short Circuit Performance of Transformers.
BS-4360	Specification for weldable structural steel
BS-5135	Specification for arc welding of carbon and carbon manganese steels
BS-5500	Specification for unfired fusion welded pressure vessels
IS-3618	Specification for phosphate treatment of iron & steel for protection against corrosion
IS-6005	Code of practice for phosphating of Iron and Steel
ISO-8501	Preparation of steel surface before application of Paints and related product
IEC-60599	Mineral oil impregnated electrical equipment in service – guide to the interpretation of dissolved and free gases analysis
IS-10593	Method of evaluating the analysis of gases in oil filled electrical equipment in service
IS-2099	Bushings for alternating voltages above 1000 volts

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CODES	TITLE
IS-3347 Part I to 8	Dimension for porcelain transformer bushing
DIN-42530	Bushing up to 1000kV from 250A-5000A for liquid filled Transformer
IS-2026 Part 1 to 5	Power transformer
IS-4691	Degrees of protection provided by enclosure for rotating electrical machinery
IEC-60034-5	Degrees of protection provided by integral design of rotating electrical machines(IP Code) classification
IS:325 / IEC -60034	Performance of cooling fan / oil pump motor
IS-13947 part 1 to 5	Specification for low voltage switchgear and control gear
IS:3400	Methods of test for vulcanised rubber
IS:7016 part 1 to 14	Methods of test for coated and treated fabrics
IS:803	Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks.
IS:3637	Gas operated Relays
IS:335	New Insulating oils – Specification
IEC-62271-203	Gas insulated metal enclosed switchgear for rated voltage above 52kV
IEC-61639	Direct connection between power transformers and gas-insulated metal enclosed switchgear for rated voltages of 52.5 kV and above.
IS:3400 / BS 903 / IS:7016	Air cell (Flexible Air Separator)
IEC 60529 / IP : 55	Degree of protection for cooler control cabinet , MOLG, Cooling fan , oil pump, Buchholz Relay
IEC 60529 / IP : 56	Degree of protection for Pressure Relief Device
IEC 60529 / IP : 43	Degree of protection for Remote tap Changer cubicle (RTCC)
CIRCUIT BREAKERS	
IEC-62271-100	High-voltage switchgear and control gear - Part 100: Alternating current circuit-breakers
IEC-62271-101	High-voltage switchgear and control gear - Part 101: Synthetic testing
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V
IEC-62271-110	High-voltage switchgear and control gear - Part 110: Inductive load switching
IEC-62271-109	High-voltage switchgear and control gear - Part 110: Inductive load switching
CURRENT TRANSFORMERS, VOLTAGE TRANSFORMERS AND COUPLING CAPACITOR VOLTAGE TRANSFORMERS	
IS-2705- (P1 to P4)	Current Transformers

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CODES	TITLE
IS:3156- (P1 to P4)	Voltage Transformers
IS-4379	Identification of the Contents of Industrial Gas Cylinders
IEC-61869 (Part-1)	Instrument transformers - Part 1: General requirements
IEC-61869 (Part-2)	Instrument transformers - Part 2: Additional requirements for current transformers
IEC-61869 (Part-3)	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers
IEC-61869 (Part-4)	Instrument transformers - Part 4: Additional requirements for combined transformers
IEC-61869 (Part-5)	Instrument transformers - Part 5: Additional requirements for capacitor voltage transformers
IEC-61869 (Part-6)	Instrument transformers - Part 6: Additional general requirements for low-power instrument transformers
IEC-61869 (Part-9)	Instrument transformers - Part 9: Digital interface for instrument transformers
IEC-61869 (Part-102)	Instrument transformers - Part 102: Ferroresonance oscillations in substations with inductive voltage transformers
IEC-61869 (Part-103)	Instrument transformers - The use of instrument transformers for power quality measurement
BUSHING	
IS-2099	Bushings for Alternating Voltages above 1000V
IEC-60137	Insulated Bushings for Alternating Voltages above 1000V
SURGE ARRESTERS	
IS-3070 (PART2)	Lightning arresters for alternating current systems : Metal oxide lightning arrestors without gaps
IEC-60099-4	Metal oxide surge arrestors without gaps
IEC-60099-5	Selection and application recommendation
ANSI-C62.1	IEEE Standards for S A for AC Power Circuits
NEMA-LA 1	Surge Arresters
CUBICLES AND PANELS & OTHER RELATED EQUIPMENTS	
IS-722, IS-1248	Electrical relays for power system
IS-3231, 3231 (P-3)	Protection
IS:5039	Distributed pillars for Voltages not Exceeding 1000 Volts
IEC-60068.2.2	Basic environmental testing procedures Part 2: Test B: Dry heat
IEC-60529	Degree of Protection provided by enclosures
IEC-60947-4-1	Low voltage switchgear and control gear
IEC-61095	Electromechanical Contactors for household and similar purposes
IEC-60439 (P1 & 2)	Low Voltage Switchgear and control gear assemblies
ANSI-C37.20	Switchgear Assemblies, including metal enclosed bus
ANSI-C37.50	Test Procedures for Low Voltage Alternating Current Power

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CODES	TITLE
	Circuit Breakers
ANSI-C39	Electric Measuring instrument
ANSI-C83	Components for Electric Equipment
IS: 8623: (Part I to 3)	Specification for Switchgear & Control Assemblies
NEMA-AB	Moulded Case Circuit and Systems
NEMA-CS	Industrial Controls and Systems
NEMA-PB-1	Panel Boards
NEMA-SG-5	Low voltage Power Circuit breakers
NEMA-SG-3	Power Switchgear Assemblies
NEMA-SG-6	Power switching Equipment
NEMA-5E-3	Motor Control Centers
1248 (P1 to P9)	Direct acting indicating analogue electrical measuring instruments & their accessories
Disconnecting switches	
IEC-62271-102	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
IEC-60265 (Part 1 & 2)	High Voltage switches
ANSI-C37.32	Schedule of preferred Ratings, Manufacturing Specifications and Application Guide for high voltage Air Switches, Bus supports and switch accessories
ANSI-C37.34	Test Code for high voltage air switches
NEMA-SG6	Power switching equipment
PLCC and line traps	
IS-8792	Line traps for AC power system
IS-8793	Methods of tests for line traps
IS-8997	Coupling devices for PLC systems
IS-8998	Methods of test for coupling devices for PLC systems
IEC-60353	Line traps for A.C. power systems
IEC-60481	Coupling Devices for power line carrier systems
IEC-60495	Single sideboard power line carrier terminals
IEC-60683	Planning of (single Side-Band) power line carrier systems
CIGRE	Teleprotection report by Committee 34 & 35
CIGRE	Guide on power line carrier 1979
CCIR	International Radio Consultative Committee
CCITT	International Telegraph & Telephone Consultative Committee
EIA	Electric Industries Association
Protection and control equipment	
IEC-60051: (P1 to P9)	Recommendations for Direct Acting indicating analogue electrical measuring instruments and their accessories
IEC-60255 (Part 1 to 23)	Electrical relays
IEC-60297 (P1 to P4)	Dimensions of mechanical structures of the 482.6mm (19 inches)

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CODES	TITLE
	series
IEC-60359	Expression of the performance of electrical & electronic measuring equipment
IEC-60387	Symbols for Alternating-Current Electricity meters
IEC-60447	Man machine interface (MMI) - Actuating principles
IEC-60521	Class 0.5, 1 and 2 alternating current watt hour metres
IEC-60547	Modular plug-in Unit and standard 19-inch rack mounting unit based on NIM Standard (for electronic nuclear instruments)
ANSI-81	Screw threads
ANSI-B18	Bolts and Nuts
ANSI-C37.1	Relays, Station Controls etc
ANSI-C37.2	Manual and automatic station control, supervisory and associated telemetering equipment
ANSI-C37.2	Relays and relay systems associated with electric power apparatus
ANSI-C39.1	Requirements for electrical analog indicating instruments
MOTORS	
IS-325	Three phase induction motors
IS-4691	Degree of protection provided by enclosure for rotating electrical machinery
IEC-60034 (P1 to P19:)	Rotating electrical machines
IEC-Document 2	Three phase induction motors
(Central Office) NEMA-MGI	Motors and Generators
Electronic equipment and components	
MIL-21B, MIL-833 & MIL-2750	Environmental testing
EC-60068 (P1 to P5)	Printed boards
IEC-60326 (P1 to P2)	Material and workmanship standards
IS-1363 (P1 to P3)	Hexagon head bolts, screws and nuts of product grade C
IS-1364 (P1 to P5)	Hexagon head bolts, screws and nuts of products grades A and B
IS-3138	Hexagonal Bolts and Nuts (M42 to M150)
ISO-898	Fasteners: Bolts, screws and studs
ASTM	Specification and tests for materials
Clamps & connectors	
IS-5561	Electric power connectors
NEMA-CC1	Electric Power connectors for sub station
NEMA-CC 3	Connectors for Use between aluminium or aluminum-Copper Overhead Conductors
Bus hardware and insulators	
IS: 2121	Fittings for Aluminum and steel cored Al conductors for overhead

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CODES	TITLE
	power lines
IS-731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
IS-2486 (P1 to P4)	Insulator fittings for overhead power lines with a nominal voltage greater than 1000 V
IEC-60120	Dimensions of Ball and Socket Couplings of string insulator units
IEC-60137	Insulated bushings for alternating voltages above 1000 V
IEC-60168	Tests on indoor and outdoor post insulators of ceramic material or glass for Systems with Nominal Voltages Greater than 1000 V
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V
IEC-60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V
IEC-61462	Pressurized and un-pressurized insulator for use in electrical equipment with rated voltage greater than 1000V – Definitions, Test methods, acceptance criteria and design recommendations
IEC-60305	Insulators for overhead lines with nominal voltage above 1000V-ceramic or glass insulator units for ac systems Characteristics of String Insulator Units of the cap and pin type
IEC-60372 (1984)	Locking devices for ball and socket couplings of string insulator units : dimensions and tests
IEC-60383 (P1 and P2)	Insulators for overhead lines with a nominal voltage above 1000 V
IEC-60433	Characteristics of string insulator units of the long rod type
IEC-60471	Dimensions of Clevis and tongue couplings of string insulator units
ANSI-C29	Wet process porcelain insulators
ANSI-C29.1	Test methods for electrical power insulators
ANSI-C92.2	For insulators, wet-process porcelain and toughened glass suspension type
ANSI-C29.8	For wet-process porcelain insulators apparatus, post-type
ANSI-G.8	Iron and steel hardware
CISPR-7B	Recommendations of the CISPR, tolerances of form and of Position, Part 1
ASTM A-153	Zinc Coating (Hot-Dip) on iron and steel hardware
Strain and rigid bus-conductor	
IS-2678	Dimensions & tolerances for Wrought Aluminum and Aluminum Alloys drawn round tube
IS-5082	Wrought Aluminum and Aluminum Alloy Bars. Rods, Tubes and Sections for Electrical purposes
ASTM-B 230-82	Aluminum 1350 H19 Wire for electrical purposes

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CODES	TITLE
ASTM-B 231-81	Concentric - lay - stranded, aluminum 1350 conductors
ASTM-B 221	Aluminum - Alloy extruded bar, rod, wire, shape
ASTM-B 236-83	Aluminum bars for electrical purpose (Bus-bars)
ASTM-B 317-83	Aluminum-Alloy extruded bar, rod, pipe and structural shapes for electrical purposes (Bus Conductors)
Batteries	
IS:1651	Stationary Cells and Batteries, Lead-Acid Type (with Tubular Positive Plates)
IS:1652	Stationary Cells and Batteries, Lead-Acid Type (with Plante Positive Plates)
IS:1146	Rubber and Plastic Containers for Lead-Acid Storage Batteries
IS:6071	Synthetic Separators for Lead-Acid Batteries
IS:266	Specification for Sulphuric Acid
IS:1069	Specification for Water for Storage Batteries
IS:3116	Specification for Sealing Compound for Lead-Acid Batteries
IS:1248	Indicating Instruments
IS:10918	Vented type nickel Cadmium Batteries
IEC:60896-21&22	Lead Acid Batteries Valve Regulated types – Methods of Tests & Requirements
IEC: 60623	Vented type nickel Cadmium Batteries
IEC:60622	Secondary Cells & Batteries – Sealed Ni-Cd rechargeable single cell
IEC:60623	Secondary Cells & Batteries – Vented Ni-Cd rechargeable single cell
IEC:60896-11	Stationary Lead Acid Batteries – Vented Type – General requirements & method of tests
IEEE-485	Recommended practices for sizing of Lead Acid Batteries
IEEE-1115	Sizing of Ni-Cd Batteries
IEEE-1187	Recommended practices for design & installation of VRLA Batteries
IEEE-1188	Recommended practices for design & installation of VRLA Batteries
IEEE-1189	Guide for selection of VRLA Batteries
Battery Charger	
IS:3895	Mono-crystalline Semiconductor Rectifier Cells and Stacks
IS:4540	Mono-crystalline Semiconductor Rectifier Assemblies and Equipment
IS:6619	Safety Code for Semiconductor Rectifier Equipment
IS:2026	Power Transformers
IS:2959	AC Contactors for Voltages not Exceeding 1000 Volts

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CODES	TITLE
IS:1248	Indicating Instruments
IS:2208	HRC Fuses
IS:13947 (Part-3)	Air break switches, air break disconnectors & fuse combination units for voltage not exceeding 1000V AC or 1200V DC
IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS:6005	Code of practice for phosphating of Iron and Steel
IS:3231	Electrical relays for power system protection
IS:3842	Electrical relay for AC Systems
IS:5	Colours for ready mix paint
IEEE-484	Recommended Design for installation design and installation of large lead storage batteries for generating stations and substations
IEEE-485	Sizing large lead storage batteries for generating stations and substations
Wires and cables	
ASTMD-2863	Measuring the minimum oxygen concentration to support candle like combustion of plastics (oxygen index)
IS-694	PVC insulated cables for working voltages upto and including 1100 Volts
IS-1255	Code of practice for installation and maintenance of power cables, upto and including 33 kV rating
IS-1554 (P1 and P2)	PVC insulated (heavy duty) electric cables (part 1) for working voltage upto and including 1100 V Part (2) for working voltage from 3.3 kV upto and including 11kV
IS:1753	Aluminium conductor for insulated cables
IS:2982	Copper Conductor in insulated cables
IS-3961 (P1 to P5)	Recommended current ratings for cables
IS-3975	Mild steel wires, formed wires and tapes for armouring of cables
IS-5831	PVC insulating and sheath of electric cables
IS-6380	Elastometric insulating and sheath of electric cables
IS-7098	Cross linked polyethylene insulated PVC sheathed cables for working voltage upto and including 1100 volts
IS-7098	Cross-linked polyethylene insulated PVC sheathed cables for working voltage from 3.3kV upto and including 33 kV
IS-8130	Conductors for insulated electrical cables and flexible cords
IS-1753	Aluminum Conductors for insulated cables
IS-10418	Specification for drums for electric cables
IEC-60096 (part 0 to p4)	Radio Frequency cables
IEC-60183	Guide to the Selection of High Voltage Cables
IEC-60189 (P1 to P7)	Low frequency cables and wires with PVC insulation and PVC sheath

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CODES	TITLE
IEC-60227 (P1 to P7)	Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V
IEC-60228	Conductors of insulated cables
IEC-60230	Impulse tests on cables and their accessories
IEC-60287 (P1 to P3)	Calculation of the continuous current rating of cables (100% load factor)
IEC-60304	Standard colours for insulation for low-frequency cables and wires
IEC-60331	Fire resisting characteristics of Electric cables
IEC-60332 (P1 to P3)	Tests on electric cables under fire conditions
IEC-60502	Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto to 30 kV
IEC-754 (P1 and P2)	Tests on gases evolved during combustion of electric cables
AIR conditioning and ventilation	
IS-659	Safety code for air conditioning
IS-660	Safety code for Mechanical Refrigeration
ARI:520	Standard for Positive Displacement Refrigeration Compressor and Condensing Units
IS:4503	Shell and tube type heat exchanger
ASHRAE-24	Method of testing for rating of liquid coolers
ANSI-B-31.5	Refrigeration Piping
IS:2062	Steel for general structural purposes
IS:655	Specification for Metal Air Dust
IS:277	Specification for Galvanised Steel Sheets
IS-737	Specification for Wrought Aluminium and Aluminium Sheet & Strip
IS-1079	Hot rolled cast steel sheet & strip
IS-3588	Specification for Electrical Axial Flow Fans
IS-2312	Propeller Type AC Ventilation Fans
BS-848	Methods of Performance Test for Fans
BS-6540 Part-I	Air Filters used in Air Conditioning and General Ventilation
BS-3928	Sodium Flame Test for Air Filters (Other than for Air Supply to I.C. Engines and Compressors)
US-PED-2098	Method of cold DOP & hot DOP test
MIL-STD-282	DOP smoke penetration method
ASHRAE-52	Air cleaning device used in general ventilation for removing particle matter
IS:3069	Glossary of Terms, Symbols and Units Relating to Thermal Insulation Materials
IS:4671	Expanded Polystyrene for Thermal Insulation Purposes
IS:8183	Bonded Mineral Wool
IS:3346	Evaluation of Thermal Conductivity properties by means of

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CODES	TITLE
	guarded hot plate method
ASTM-C-591-69	Standard specification for rigid preformed cellular urethane thermal insulation
IS:4894	Centrifugal Fans
BS:848	Method of Performance Test for Centrifugal Fans
IS:325	Induction motors, three-phase
IS:4722	Rotating electrical machines
IS:1231	Three phase foot mounted Induction motors, dimensions of
IS:2233	Designations of types of construction and mounting arrangements of rotating electrical machines
IS:2254	Vertical shaft motors for pumps, dimensions of
IS:7816	Guide for testing insulation resistance of rotating machines
IS:4029	Guide for testing three phase induction motors
IS: 4729	Rotating electrical machines, vibration of, Measurement and evaluation of
IS:4691	Degree of protection provided by enclosures for rotating electrical machinery
IS:7572	Guide for testing single-phase ac motors
IS:2148	Flame proof enclosure for electrical apparatus
BS:4999(Part-51)	Noise levels
Galvanizing	
IS-209	Zinc Ingot
IS-2629	Recommended Practice for Hot-Dip galvanizing on iron and steel
IS-2633	Methods for testing uniformity of coating of zinc coated articles
ASTM-A-123	Specification for zinc (Hot Galvanizing) Coatings, on products Fabricated from rolled, pressed and forged steel shapes, plates, bars and strips
ASTM-A-121-77	Zinc-coated (Galvanized) steel barbed wire
Painting	
IS-6005	Code of practice for phosphating of iron and steel
ANSI-Z551	Gray finishes for industrial apparatus and equipment
SSPEC	Steel structure painting council
Fire protection system	
--	Fire protection manual issued by tariff advisory committee (TAC) of India
HORIZONTAL CENTRIFUGAL PUMPS	
IS:1520	Horizontal centrifugal pumps for clear, cold and fresh water
IS:9137	Code for acceptance test for centrifugal & axial pumps
IS:5120	Technical requirement – Rotodynamic special purpose pumps
API-610	Centrifugal pumps for general services Hydraulic Institutes Standards

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CODES	TITLE
BS:599	Methods of testing pumps
PTC-8.2	Power Test Codes - Centrifugal pumps
DIESEL ENGINES	
IS:10000	Methods of tests for internal combustion engines
IS:10002	Specification for performance requirements for constant speed compression ignition engines for general purposes (above 20 kW)
BS:5514	The performance of reciprocating compression ignition (Diesel) engines, utilizing liquid fuel only, for general purposes
ISO:3046	Reciprocating internal combustion engines performance
IS:554	Dimensions for pipe threads where pressure tight joints are required on threads
ASME Power Test Code	Internal combustion engine PTC-17
--	Codes of Diesel Engine Manufacturer's Association, USA
PIPING VALVES & SPECIALITIES	
IS:636	Non percolating flexible fire-fighting delivery hose
IS:638	Sheet rubber jointing and rubber inserting jointing
IS:778	Gun metal gate, globe and check valves for general purpose
IS:780	Sluice valves for water works purposes (50 to 300 mm)
IS:901	Couplings, double male and double female instantaneous pattern for fire fighting
IS:902	Suction hose couplings for fire-fighting purposes
IS:903	Fire hose delivery couplings branch pipe nozzles and nozzle spanner
IS:1538	Cast iron fittings for pressure pipes for water, gas and sewage
IS:1903	Ball valve (horizontal plunger type) including floats for water supply purposes
IS:2062	SP for weldable structural steel
IS:2379	Colour Code for the identification of pipelines
IS:2643	Dimensions of pipe threads for fastening purposes
IS:2685	Code of Practice for selection, installation and maintenance of sluice valves
IS:2906	Sluice valves for water-works purposes (350 to 1200 mm size)
IS:3582	Basket strainers for fire-fighting purposes (cylindrical type)
IS:3589	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal diameter)
IS:4038	Foot valves for water works purposes
IS:4927	Unlined flax canvas hose for fire fighting
IS:5290	Landing valves (internal hydrant)
IS:5312 (Part-I)	Swing check type reflex (non-return) valves
IS:5306	Code of practice for fire extinguishing installations and equipment on premises

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CODES	TITLE
Part-I	Hydrant systems, hose reels and foam inlets
Part-II	Sprinkler systems
BS:5150	Specification for cast iron gate valves
MOTORS & ANNUNCIATION PANELS	
IS:325	Three phase induction motors
IS:900	Code of practice for installation and maintenance of induction motors
IS:996	Single phase small AC and universal electric motors
IS:1231	Dimensions of three phase foot mounted induction motors
IS:2148	Flame proof enclosure of electrical apparatus
IS:2223	Dimensions of flange mounted AC induction motors
IS:2253	Designations for types of construction and mounting arrangements of rotating electrical machines
IS:2254	Dimensions of vertical shaft motors for pumps
IS:3202	Code of practice for climate proofing of electrical equipment
IS:4029	Guide for testing three phase induction motors
IS:4691	Degree of protection provided by enclosure for rotating electrical machinery
IS:4722	Rotating electrical machines
IS:4729	Measurement and evaluation of vibration of rotating electrical machines
IS:5572	Classification of hazardous areas for electrical (Part-I) installations (Areas having gases and vapours)
IS:6362	Designation of methods of cooling for rotating electrical machines
IS:6381	Construction and testing of electrical apparatus with type of protection 'e'
IS:7816	Guide for testing insulation for rotating machine
IS:4064	Air break switches
IEC DOCUMENT 2 (Control Office) 432	Three Phase Induction Motor
VDE 0530 Part I/66	Three Phase Induction Motor
IS:9224 (Part-II)	HRC Fuses
IS:6875	Push Button and Control Switches
IS:694	PVC Insulated cables
IS:1248	Indicating instruments
IS:375	Auxiliary wiring & busbar markings
IS:2147	Degree of protection
IS:5	Colour Relay and timers
IS:2959	Contactors
PG Test Procedures	

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CODES	TITLE
NFPA-13	Standard for the installation of sprinkler system
NFPA-15	Standard for water spray fixed system for the fire protection
NFPA-12A	Standard for Halong 1301 Fire Extinguishing System
NFPA-72E	Standard on Automatic Fire Detectors
--	Fire Protection Manual by TAC (Latest Edition)
NFPA-12	Standard on Carbon dioxide extinguisher systems
IS:3034	Fire of industrial building
--	Electrical generating and distributing stations code of practice
IS:2878	CO ₂ (Carbon dioxide) Type Extinguisher
IS:2171	DC (Dry Chemical Powder) type
IS:940	Pressurised Water Type
D.G. SET	
IS:10002	Specification for performance requirements for constant speed compression ignition (diesel engine) for general purposes
IS:10000	Method of tests for internal combustion engines
IS:4722	Rotating electrical machines-specification
IS:12063	Degree of protection provided by enclosures
IS:12065	Permissible limit of noise levels for rotating electrical machines
--	Indian Explosive Act 1932
Steel structures	
IS-228 (1992)	Method of Chemical Analysis of pig iron, cast iron and plain carbon and low alloy steels.
IS-802 (P1 to 3)	Code of practice for use of structural steel in overhead transmission line towers
IS-806	Code of practice for use of steel tubes in general building construction
IS-808	Dimensions for hot rolled steel beam, column channel and angle sections
IS-814	Covered electrodes for manual arc welding of carbon of carbon manganese steel
IS-816	Code of Practice for use of metal arc welding for general construction in Mild steel
IS-817	Code of practice for training and testing of metal arc welders. Part 1 : Manual Metal arc welding
IS-875 (P1 to P4)	Code of practice for design loads (other than earthquake) for buildings and structures
IS-1161	Steel tubes for structural purposes
IS-1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
IS-1363 (P1 to P3)	Hexagonal head bolts, screws & nuts of products grade C
IS-1364	Hexagon head bolts, screws and nuts of product grades A and B
IS-1367 (P1 to P18)	Technical supply condition for threaded steel fasteners

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CODES	TITLE
IS-1599	Methods for bend test
IS-1608	Method for tensile testing of steel products
IS-1893	Criteria for earthquake resistant design of structures
IS-1978	Line Pipe
IS-2062	Steel for general structural purposes
IS-2595	Code of practice for Radiographic testing
IS-3063	Single coil rectangular section spring washers for bolts, nuts and screws
IS-3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods
IS-7205	Safety code for erection of structural steel work
IS-9595	Recommendations for metal arc welding of carbon and carbon manganese steels
ANSI-B18.2.1	Inch series square and Hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
ANSI-G8.14	Round head bolts
ASTM-A6	Specification for General Requirements for rolled steel plates, shapes, sheet piling and bars of structural use
ASTM-A36	Specifications of structural steel
ASTM-A47	Specification for malleable iron castings
ASTM-A143	Practice for safeguarding against embilement of Hot Galvanized structural steel products and procedure for detaching embrilement
ASTM-A242	Specification for high strength low alloy structural steel
ASTM-A283	Specification for low and intermediate tensile strength carbon steel plates of structural quality
ASTM-A394	Specification for Galvanized steel transmission tower bolts and nuts
ASTM-441	Specification for High strength low alloy structural manganese vanadium steel
ASTM-A572	Specification for High strength low alloy colombium-Vanadium steel of structural quality
AWS D1-0	Code for welding in building construction welding inspection
AWS D1-1	Structural welding code
AISC	American institute of steel construction
NEMA-CG1	Manufactured graphite electrodes
Piping and pressure vessels	
IS-1239 (Part 1 and 2)	Mild steel tubes, tubulars and other wrought steel fittings
IS -3589	Seamless Electrically welded steel pipes for water, gas and sewage
IS-6392	Steel pipe flanges
ASME	Boiler and pressure vessel code

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**ANNEXURE-C**

CODES	TITLE
ASTM-A120	Specification for pipe steel, black and hot dipped, zinc-coated (Galvanized) welded and seamless steel pipe for ordinary use
ASTM-A53	Specification for pipe, steel, black, and hot-dipped, zinc coated welded and seamless
ASTM-A106	Seamless carbon steel pipe for high temperature service
ASTM-A284	Low and intermediate tensile strength carbon-silicon steel plates for machine parts and general construction
ASTM-A234	Pipe fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM-S181	Specification for forgings, carbon steel for general purpose piping
ASTM-A105	Forgings, carbon steel for piping components
ASTM-A307	Carbon steel externally threaded standard fasteners
ASTM-A193	Alloy steel and stainless steel bolting materials for high temperature service
ASTM-A345	Flat rolled electrical steel for magnetic applications
ASTM-A197	Cupola malleable iron
ANSI-B2.1	Pipe threads (Except dry seal)
ANSI-B16.1	Cast iron pipe flanges and flanged fitting. Class 25, 125, 250 and 800
ANSI-B16.1	Malleable iron threaded fittings, class 150 and 300
ANSI-B16.5	Pipe flanges and flanged fittings, steel nickel alloy and other special alloys
ANSI-B16.9	Factory-made wrought steel butt welding fittings
ANSI-B16.11	Forged steel fittings, socket-welding and threaded
ANSI-B16.14	Ferrous pipe plug, bushings and locknuts with pipe threads
ANSI-B16.25	Butt welding ends
ANSI-B18.1.1	Fire hose couplings screw thread
ANSI-B18.2.1	Inch series square and hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
ANSI-B18.21.1	Lock washers
ANSI-B18.21.2	Plain washers
ANSI-B31.1	Power piping
ANSI-B36.10	Welded and seamless wrought steel pipe
ANSI-B36.9	Stainless steel pipe
Other civil works standards	
IS-269	33 grade ordinary portland cement
IS2721	Galvanized steel chain link fence fabric
IS-278	Galvanized steel barbed wire for fencing
IS-383	Coarse and fine aggregates from natural sources for concrete
IS-432 (P1 and P2)	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement

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CODES	TITLE
IS-456	Code of practice for plain and reinforced concrete
IS-516	Method of test for strength of concrete
IS-800	Code of practice for general construction in steel
IS-806	Steel tubes for structural purposes
IS-1172	Basic requirements for water supply, drainage and sanitation
IS-1199	Methods of sampling and analysis of concrete
IS-1566	Hard-drawn steel wire fabric for concrete reinforcement
IS-1742	Code of Practice for Building drainage
IS-1785	Plain hard-drawn steel wire for pre-stressed concrete
IS-1786	High strength deformed Steel Bars and wires for concrete reinforcement
IS-1811	Methods of sampling Foundry sands
IS-1893	Criteria for earthquake resistant design of structures
IS-2062	Steel for general structural purposes
IS-2064	Selection, installation and maintenance of sanitary appliances-code of practices
IS-2065	Code of practice for water supply in buildings
IS-2090	High tension steel bars used in pre-stressed concrete
IS-2140	Standard Galvanized steel wire for fencing
IS-2470 (P1 & P2)	Code of practice for installation of septic tanks
IS-2514	Concrete vibrating tables
IS-2645	Integral cement waterproofing compounds
IS-3025 (Part 1 to Part 48)	Methods of sampling and test (Physical and chemical) for water and waste water
IS-4091	Code of practice for design and construction of foundations for transmission line towers and poles
IS-4111 (Part 1 to P5)	Code of practice for ancillary structures in sewerage system
IS-4990	Plywood for concrete shuttering work
IS-5600	Sewage and drainage pumps
National building code of India 1970	
USBR E12	Earth Manual by United States Department of the interior Bureau of Reclamation
ASTM-A392-81	Zinc/Coated steel chain link fence fabric
ASTM-D1557-80	test for moisture-density relation of soils using 10-lb (4.5 kg) rammer 18-in. (457 mm) Drop
ASTM-D1586(1967)	Penetration Test and Split-Barrel Sampling of Soils
ASTM-D2049-69	Test Method for Relative Density of Cohesionless Soils
ASTM-D2435	Test method for Unconsolidated, (1982) Undrained Strengths of Cohesive Soils in Triaxial Compression
BS-5075	Specification for accelerating Part I Admixtures, Retarding Admixtures and Water Reducing Admixtures

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CODES	TITLE
CPWD	Latest CPWD specifications
ACSR MOOSE CONDUCTOR	
IS:6745 BS:443-1969	Methods for Determination of Mass of zinc coating on zinc coated Iron and Steel Articles
IS:8263	Methods for Radio Interference
IEC:437-1973 NEMA:107-1964 CISPR	Test on High Voltage Insulators
IS:209, BS:3436-1961	Zinc Ingot
IS:398 Part - V IEC:209-1966	Aluminum Conductors for Overhead Transmission Purposes
BS:215(Part-II), IEC:209-1966	Aluminium Conductors galvanized steel reinforced extra high voltage (400 kV and above)
IS:1778, BS:1559-1949	Reels and Drums for Bare Conductors
IS:1521, ISO/R89-1959	Method for Tensile Testing of steel wire
IS:2629	Recommended practice for Hot dip Galvanising on Iron and Steel
IS:2633	Method for Testing Uniformity of coating of zinc Coated Articles
IS:4826/ ASTMA-472-729	Hot dip galvanised coatings on round steel wires
GALVANISED STEEL EARTHWIRE	
IS:1521, ISO/R:89-1959	Method for Tensile Testing of Steel Wire
IS:1778	Reels and Drums for Bare Conductors
IS:2629	Recommended practice for Hot Dip Galvanising on Iron and Steel
IS:2633	Methods for testing Uniformity of Coating of Zinc Coated Articles
IS:4826/ ASTM: A 475-72a BS:443-1969	Hot dip Galvanised Coatings on Round Steel Wires
IS:6745/ BS:443-1969	Method for Determination of mass of Zinc Coating on Zinc coated Iron and Steel Articles.
IS:209/ BS:3463-1961	Zinc ingot
IS:398 (Pt. I to P5:1992)/ BS:215 (Part-II)	Aluminum Conductors for overhead transmission purposes
Lighting Fixtures and Accessories	
IS:1913	General and safety requirements for electric lighting fittings
IS:3528	Water proof electric lighting fittings
IS:4012	Dust proof electric lighting fittings
IS:4013	Dust tight proof electric lighting fittings
IS:10322	Industrial lighting fittings with metal reflectors
IS:10322	Industrial lighting fittings with plastic reflectors
IS:2206	Well glass lighting fittings for use under ground in mines (non-

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CODES	TITLE
	flameproof type)
IS:10322	Specification for flood light
IS:10322	Specification for decorative lighting outfits
IS:10322	Luminaries for street lighting
IS:2418	Tubular fluorescent lamps
IS:9900	High pressure mercury vapour lamps
IS:1258	Specification for Bayonet lamp fluorescent lamp
IS:3323	Bi-pin lamp holder tubular fluorescent lamps
IS:1534	Ballasts for use in fluorescent lighting fittings. (Part-I)
IS:1569	Capacitors for use in fluorescent lighting fittings
IS:2215	Starters for fluorescent lamps
IS:3324	Holders for starters for tubular fluorescent lamps
IS:418	GLS lamps
IS:3553	Water tight electric fittings
IS:2713	Tubular steel poles
IS:280	MS wire for general engg. Purposes
Conduits, Accessories and Junction Boxes	
IS:9537	Rigid steel conduits for electrical wiring
IS:3480	Flexible steel conduits for electrical wiring
IS:2667	Fittings for rigid steel conduits for electrical wiring
IS:3837	Accessories for rigid steel conduits for electrical wiring
IS:4649	Adaptors for flexible steel conduits
IS:5133	Steel and Cast Iron Boxes
IS:2629	Hot dip galvanising of Iron & Steel
Lighting Panels	
IS:13947	LV Switchgear and Control gear(Part 1 to 5)
IS:8828	Circuit breakers for over current protection for house hold and similar installations
IS:5	Ready mix paints
IS:2551	Danger notice plates
IS:2705	Current transformers
IS:9224	HRC Cartridge fuse links for voltage above 650V(Part-2)
IS:5082	Wrought aluminium and Al. alloys, bars, rods, tubes and sections for electrical purposes
IS:8623	Factory built Assemblies of Switchgear and Control Gear for voltages upto and including 1000V AC and 1200V DC
IS:1248	Direct Acting electrical indicating instruments
Electrical Installation	
IS:1293	3 pin plug
IS:371	Two to three ceiling roses

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CODES	TITLE
IS:3854	Switches for domestic and similar purposes
IS:5216	Guide for safety procedures and practices in electrical work
IS:732	Code of practice for electrical wiring installation (system voltage not exceeding 650 Volts.)
IS:3043	Code of practice for earthing
IS:3646	Code of practice of interior illumination part II & III
IS:1944	Code of practice for lighting of public through fares
IS:5571	Guide for selection of electrical equipment for hazardous areas
IS:800	Code of practice for use of structural steel in general building construction
IS:2633	Methods of Testing uniformity of coating on zinc coated articles
IS:6005	Code of practice for phosphating iron and steel
	INDIAN ELECTRICITY ACT
	INDIAN ELECTRICITY RULES
LT SWITCHGEAR	
IS:8623 (Part-I)	Specification for low voltage switchgear and control gear assemblies
IS:13947 (Part-I)	Specification for low voltage switchgear and control gear, Part 1 General Rules
IS:13947 (part-2)	Specification for low voltage switchgear and control gear, Part 2 circuit breakers
IS:13947 (part-3)	Specification for low voltage switchgear and control gear. Part 3 Switches, Disconnectors, Switch-disconnectors and fuse combination units
IS:13947 (part-4)	Specification for low voltage switchgear and control gear. Part 4 Contactors and motors starters
IS:13947 (part-5)	Specification for low voltage switchgear and control gear. Part 5 Control-circuit devices and switching elements
IS:13947 (part-6)	Specification for low voltage switchgear and control gear. Part 6 Multiple function switching devices
IS:13947 (part-7)	Specification for low voltage switchgear and control gear. Part 7 Ancillary equipments
IS:12063	Degree of protection provided by enclosures
IS:2705	Current Transformers
IS:3156	Voltage Transformers
IS:3231	Electrical relays for power system protection
IS:1248	Electrical indicating instruments
IS:722	AC Electricity meters
IS:5578	Guide for Marking of insulated conductors of apparatus terminals
IS:13703 (part 1)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 1 General Requirements
IS:13703 (part 2)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 2 Fuses for use of authorized persons

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CODES	TITLE
IS:6005	Code of practice of phosphating iron and steel
IS:5082	Wrought Aluminum and Aluminum alloys for electrical purposes
IS:2633	Hot dip galvanising

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COMPREHENSIVE LIST OF DRAWINGS		
SL. NO.	DRAWINGS/DOCUMENTS TITLE	CATEGORY
1.00	SUBSTATION LAYOUT DRAWINGS	
1.01	Single Line Diagram of substation	A
1.02	Electrical layout (plan & section) drawing	A
1.03	Overall General Arrangement drawing	A
1.04	Structure loading diagram cum layout drawing	A
1.05	DSLP Layout drawing	A
1.06	Switchyard Foundation layout drawing	A
1.07	Erection Key Diagram (plan & section) & Erection Bill of quantity	A
1.08	Indoor Cable trench layout drawing	A
1.09	Outdoor Cable trench layout drawing	A
1.10	Buried cable trench layout drawing	A
1.11	Lighting Fixture & conduit layout – Control room building	A/R
1.12	Lighting Fixture & conduit layout – FFPH building	A/R
1.13	Lighting Fixture & conduit layout – Transit camp (if applicable)	A/R
1.14	Lighting Fixture & conduit layout – Switchyard/Street	A/R
1.15	Lighting Fixture & conduit layout – Switchyard panel room	A/R
1.15	Earthing layout - Control Room building	A
1.16	Earthmat layout – Outdoor Switchyard area	A
1.17	Layout drawing for gravel and fence	A
1.18	Switchyard Road & drain layout drawing	A
1.19	Layout drawing of Visual Monitoring System	A
1.20	SLD of LT AC/DC systems	A
1.21	LT switchgear room -Panel layout	A
1.22	Fire Fighting Piping layout in the switchyard	A
1.23	Fire protection system (Hydrant system & Extinguishers) for Control room building, GIS Building & FFPH building etc	A
1.24	HVV spray system drawings (plan, elevation, side view, isometric view and pylon support location details)	A
1.25	NIFPS drawings	A
1.26	Fire detection & Alarm system for Control room building, GIS Building & Switchyard panel room	A
1.27	Panel layout in Control room building	A
1.28	Layout drawing for LT station	A
1.29	Switchyard Panel room - Panel layout	A
1.30	Power cable termination schedule	R
1.31	Control cable termination schedule	R
	Applicable for GIS	
1.32	Gas System Line Diagram (GAS SLD) indicating compartment details & Weight	A
1.33	GIS Layout drawing including outdoor GIB (Plan & Section)	A
1.34	Layout drawing of UHF sensors for PD Measurement	A
1.35	GIS building - Layout drawing	A
1.36	GIS Building – Lighting Fixture & conduit layout	A
1.37	GIS Building - Layout drawing of Ventilation System	A

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COMPREHENSIVE LIST OF DRAWINGS		
14.00	DISC INSULATOR	
14.01	GA drawing & GTP	A
14.02	Type Test Reports	A
15.00	LONG ROD POLYMER INSULATOR	
15.01	GA drawing & GTP	A
15.02	Type Test Reports	A
16.00	INSULATOR STRING(S) WITH HARDWARE ASSEMBLY	
16.01	GA drawing & GTP	A
16.02	Component drawings	R
16.03	Type Test Reports	A
17.00	CLAMPS & CONNECTORS	
17.01	GA Drawings	A
17.02	Type Test Reports	A
18.00	HORN GAP FUSE	
18.01	GA drawing & GTP	A
18.02	Type Test Reports	A
19.00	BATTERY AND BATTERY CHARGER	
19.01	GA drawing & GTP of Battery Bank	A
19.02	GA drawing, GTP & Schematic Drawings of Battery Charger	A
19.03	Type Test Reports of Battery & Charger	A
20.00	ILLUMINATION	
20.01	GTP/Catalogue of fittings/fixtures	A
20.02	GA drawing of lighting poles/posts	A
20.03	GA drawing of Junction box	A
20.04	GA drawing of street lighting panel/outdoor/indoor lighting panel	A
20.05	GA drawing of Receptacles	A
20.06	Schematic drawing of panel/LDBs to fixtures	R
21.00	LT SWITCHGEAR	
21.01	SLD, GA & Schematic drawings of MSB	A
21.02	SLD, GA & Schematic drawings of ACDB	A
21.03	SLD, GA & Schematic drawings of 220V DCDB	A
21.04	SLD, GA & Schematic drawings of 48V DCDB	A
21.05	SLD, GA & Schematic drawings of MLDB	A
21.06	SLD, GA & Schematic drawings of ELDB	A
21.07	Type Test Reports	A
21.08	Instruction Manual	R

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COMPREHENSIVE LIST OF DRAWINGS		
22.00	HT POWER CABLES	
22.01	GTP & Catalogue	A
22.02	Type Test Reports	A
23.00	POWER & CONTROL CABLES	
23.01	Type Test Reports for control cables	A
23.02	Type Test Reports for power cables	A
24.00	CONTROL AND RELAY PANELS & SUBSTATION AUTOMATION SYSTEM (SAS), VISUAL MONITORING SYSTEM (VMS)	
24.01	GTP for all protection relays, Travelling Wave Fault Locator, SAS Equipment	A
24.02	Type Test Reports of all protection relays, Travelling Wave Fault Locator & SAS IEDs	A/R
24.03	GA and schematic drgs. for :-	
a)	Relay and protection panels for all type of line(s)	A
b)	Relay and protection panels for all type transformer(s) including tertiary loading	A
c)	Relay and protection panels for bus/line reactor(s) (switchable & non-switchable as applicable)	A
d)	Relay and protection panels for tie bay(s)	A
e)	Relay and protection panels for TBC bay(s)	A
f)	Relay and protection panels for BC bay(s)	A
g)	Relay and protection panels for Bus Sectionalizer bay(s)	A
h)	Busbar protection panel (s)	A
i)	Breaker relay panel(s)	A
j)	Interface panel	A
24.04	SAS Architecture	A
24.05	Relay Settings	A
24.06	GTP/Catalogue of VMS equipment	A/R
24.07	GTP/Catalogue of Camera	A/R
24.08	VMS architecture drawing	A
24.09	Technical Literature and O&M manuals	R
25.00	PLCC EQUIPMENTS	
25.01	GTP/Drawings for PLCC Carrier Equipment	A/R
25.02	GTP/Drawings for Wave traps	A
25.03	GTP/Drawings Coupling device	A
25.04	Digital/ Analog Protection coupler	A
25.05	SNR calculation (if applicable)	R
25.06	GTP/Drawing of HF cable	A
25.07	Type Test Reports of PLCC equipment	A
25.08	Testing & maintenance equipments	R
25.09	Frequency Planning	A
25.10	Technical literature and O&M Manuals	R

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COMPREHENSIVE LIST OF DRAWINGS		
6.01	Design Review Document	A
6.02	General Technical Particulars	A
6.03	General Arrangement Drawing with BOM	A
6.04	Main Coil Lifting Details	R
6.05	Foundation Detail Drawing	R
6.06	Main Coil & Insulator Assembly Drawing	A
6.07	Terminal Detail Drawing	A
6.08	Rating & Diagram Plate	A
6.09	Transport Drawing	R
6.10	NGR Pedestal Drawing	A
b) OIL FILLED TYPE NGR		
6.11	Design Review Document	A
6.12	General Technical Particulars	A
6.13	General Arrangement Drawing with BOM	A
6.14	Foundation Detail Drawing	R
6.15	Combined Foundation of Reactor, NGR and LA	A
6.16	Rating & Diagram Plate	A
6.17	Transport Drawing	R
6.18	Control Schematic	A
7.00 CIRCUIT BREAKER		
7.01	GA drawing of SF6 CB	A
7.02	GTP	A
7.03	OGA drawing of control unit	A
7.04	OGA drawing of support insulator, interrupter insulator, PIR chamber insulator, grading capacitor insulator (as applicable)	R
7.05	Support structure & foundation plan drawing	A
7.06	Schematic drawings/Wiring diagrams	A
7.07	Rating and name plate drawing	A
7.08	SF6 gas connection diagram	R
7.09	Schematic diagram of operating mechanism	R
7.10	GA drawing, GTP & Type Test Reports of Controlled Switching Device	A
7.11	Terminal pad and corona rings	R
7.12	Sectional view of interrupter	R
7.13	Type Test Reports	A
7.14	Instruction Manual	R
8.00 ISOLATOR		
8.01	GA drawing of Isolator with/without earth switch	A
8.02	GTP	A
8.03	Contact blade assembly (main & earth switch)	R
8.04	Terminal pad & hinge contacts	R
8.05	GA of MOM – main switch	R
8.06	Schematic & wiring drawing for main switch	R
8.07	Name plate - details	A
8.08	GA of terminal pad	A

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COMPREHENSIVE LIST OF DRAWINGS		
8.09	GA of post insulator for isolator	R
8.10	Type Test Report	A
8.11	Instruction Manual	R
9.00	INSTRUMENT TRANSFORMER (CT/CVT/IVT)	
9.01	General Arrangement	A
9.02	GTP	A
9.03	Sectional view	R
9.04	Sec. terminal box GA	R
9.05	Wiring drawing of JB incl. interpole	R
9.06	Terminal pads	A
9.07	Schematic & rating plate	R
9.08	Porcelain insulator	R
9.09	Corona ring	R
9.10	Type Test Reports	A
9.11	Instruction Manual	R
10.00	SURGE ARRESTER	
10.01	GA of Surge Arrester	A
10.02	GTP	A
10.03	Porcelain/ Polymer insulator	R
10.04	Cross sectional view	R
10.05	Arrestor and unit name plate	A
10.06	Corona & Grading rings	R
10.07	Insulating base / surge counter detail	R
10.08	Outline drawing of surge counter	R
10.09	Circuit diagram of surge counter	R
10.10	GA drawing of ZnO element	R
10.11	Line terminal bracket with corona rings	R
10.12	Drawing showing pressure relief arrangement.	R
10.13	Type Test Report	A
10.14	Instruction Manual	R
11.00	BUS POST INSULATOR	
11.01	GA drawing & GTP	A
11.02	Type Test Reports	A
12.00	Marshalling Box, Junction Boxes	
12.01	GA drawings	A
12.02	Schematic drawings	A
12.03	Type Test Reports	A
13.00	CONDUCTOR, AL. TUBE & GS EARTH WIRE	
13.01	Type Test Reports (if applicable)	A

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COMPREHENSIVE LIST OF DRAWINGS		
1.38	GIS Building (Panel Room) – Air Conditioning system layout drawing	A
1.39	GIS Building – Indoor cable trench Layout drawing	A
2.00	DESIGN CALCULATION	
2.01	DSLIP Calculation	A
2.02	Sag Tension & Short Circuit Force Calculation (if applicable)	R
2.03	Lighting system design calculation (if applicable)	R
2.04	Earthing system design calculation (if applicable)	R
2.05	Battery/Charger sizing calculation (if applicable)	R
2.06	Hydraulic calculations for Fire protection system	R
2.07	AC & Ventilation calculation for GIS Building (if applicable)	R
2.08	EOT crane sizing for GIS building	R
3.00	GAS INSULATED SWITCHGEAR	
3.01	Design Review document along with all supporting documents	A
3.02	Guaranteed Technical Particular (GTP)	A
3.03	Components GA drawing for CB, DS, ES, GIB, CT, VT, Spacers, Bushings etc.	A
3.04	Schematics for CB, DS,ES, CT, VT etc. (Except for LCC)	A
3.05	Type Test Reports for GIS Equipments	A
3.06	Detailed drawing of Bus Extension Module	
3.07	Foundation plan for GIS (Including Loading Data)	A
3.08	Platform Arrangement	R
3.09	Name Plates	R
3.10	GA & Schematic drawings of Local Control Cabinets (LCC)	A
3.11	GA & Schematic drawings of overhead crane	A
3.12	Earthing layout inside GIS building	R
3.13	Catalogues for	R
a)	SF6 gas leakage detector	
b)	SF6 gas filling & evacuation plant	
c)	SF6 gas Analyser	
d)	On line partial discharge monitoring system	
3.14	List of Mandatory spares	A
3.15	List of Special Tools & Tackles	A
3.16	Instruction Manual including catalogue of sensors	R
4.00	AUTOTRANSFORMER	
4.01	Design Review	A
4.02	Guaranteed Technical Particulars	A
4.03	Outline General Arrangement Drawing with Bill of material (OGA parts list)	A
4.04	Foundation Plan	A
4.05	Over Fluxing withstand duration curve	R
4.06	Hysteresis Characteristics & specific loss vs flux density curve of iron core	R
4.07	General Arrangement & Control Schematic of OLTC along with write-up	A
4.08	General Arrangement & Control Schematic of Marshalling Box, Common Marshalling Box and Cooler control cubicle along with write-up	A

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COMPREHENSIVE LIST OF DRAWINGS		
4.09	General Arrangement & Control Schematic of Digital RTCC relay and cubicle	A
4.10	Interconnection diagram of Drive Mechanism Box, Marshalling Box, Common Marshalling Box & Digital RTCC.	A
4.11	SCADA communication interface of online monitoring equipment	A
4.12	Transport Drawing	R
4.13	Technical Particulars of Online DGA, Drying system, FO system	A
4.14	Outline and control schematic of NIFPS	A
4.15	GA & GTP of bushings	A
4.16	Earthing Arrangement Drawing (Internal & External)	A
4.17	Drawing of Aircell, Conservator & Radiator	A
4.18	Conservator & Tank Oil filling procedure plate	R
4.19	Magnetizing Characteristics of bushings CT	R
4.20	Rating and Diagram plate	A
4.21	Oil flow Diagram	R
4.22	Valve Schedule plate drawing	A
4.23	GA of Twin-Bi directional roller	A
4.24	Instruction Manual	R
4.25	Type Test Report	A
5.00	REACTOR	
5.01	Design Review	A
5.02	Guaranteed Technical Particulars	A
5.03	Outline General Arrangement Drawing with Bill of material (OGA parts list)	A
5.04	Foundation Plan	A
5.05	General Arrangement & Control Schematic of Marshalling Box, Common Marshalling Box along with write-up	A
5.06	SCADA communication interface of online monitoring equipment	A
5.07	Transport Drawing	R
5.08	Technical Particulars of Online DGA, Drying system, FO system	A
5.09	Outline and control schematic of NIFPS	A
5.10	GA & GTP of bushings	A
5.11	Earthing Arrangement Drawing (Internal & External)	A
5.12	Drawing of Aircell, Conservator & Radiator	R
5.13	Conservator & Tank Oil filling procedure plate	R
5.14	Magnetization characteristics of Reactor Core and bushing CTs	R
5.15	Hysteresis Characteristics & specific loss vs flux density curve of iron core	R
5.16	Rating and diagram plate	A
5.17	Voltage Ampere curve for Reactor	R
5.18	Valve Schedule plate drawing	A
5.19	GA of Twin bi-directional roller	A
5.20	Instruction Manual	R
5.21	Type test Report	A
6.00	NEUTRAL GROUNDING REACTOR (NGR)	
a)	AIR CORE TYPE NGR	

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Section-3

ANNEXURE-E

COMPREHENSIVE LIST OF DRAWINGS		
26.00	DG SET	
26.01	GTP	A
26.02	Drawings/manuals	A
27.00	AIR CONDITIONING & VENTILATION SYSTEM	
27.01	Drawings/GTP/Catalogues	A
27.02	A/C sizing calculation	A
28.00	LT TRANSFORMER	
28.01	GTP	A
28.02	Drawings	A
28.03	Type Test Reports	A
29.00	FIRE PROTECTION SYSTEM	
29.01	Fire Fighting Annunciation & control panels	A
29.02	GA and Schematic for LCP for deluge valve operation	A
29.03	Hydraulic calculations for HVW spray network	R
29.04	Drawing for deluge valve housing	A
29.05	GTP & drawings for strainers (Y type & basket strainer)	A
29.06	Drawing of valve pit details	A
29.07	System write-up with various settings	A
29.08	GTP & drawing for gate valve, check valve, solenoid valve, outdoor hydrant valve	A
29.09	GTP & catalogue for deluge valve, spray nozzles & projectors	A
29.10	GTP & catalogue for quatrzoid bulb detector	A
29.11	GTP & drawing for pressure switch, pressure gauge	A
29.12	GTP for G.I. & M.S. pipes & pipe accessories	A
29.13	Any other drawing/document required for completion of work	A/R
30.00	CONTROL ROOM BUILDING / TRANSIT CAMP /FFPH BUILDING/ SWITCHAYRD PANEL ROOM/INDOOR HT SWITCHGEAR ROOM/TOWNSHIP BUILDINGS (AS applicable)	A
30.01	Architectural drawing	
a)	Plan, section & elevation	
b)	Doors & windows schedule	
30.02	Building design calculation (if applicable)	
30.03	Civil Construction design/drawings	
31.00	DRAWING FOR GIS BUILDING (If applicable)	A
31.01	Architectural drawing	
a)	Plan, section & elevation	
b)	Doors & windows schedule	
31.02	GIS building superstructure drawings & design calculation	
31.03	Civil Construction design/drawings	

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Section-3

ANNEXURE-E

COMPREHENSIVE LIST OF DRAWINGS		
31.04	GIS Equipment foundation inside GIS building	
32.00	Switchyard Civil Construction Drawings (as applicable)	A
a)	Tower Foundation	
b)	Equipment Foundation	
c)	Transformer foundation	
d)	Reactor foundation	
e)	Road construction including culverts, rail cum road	
f)	Switchyard fencing & Gate	
g)	Cable trench section	
h)	Drain section	
i)	Rain harvesting	
j)	Boundary wall	
k)	DG set foundation	
l)	LT transformer foundation	
m)	Car Parking Shed/Security Room	
n)	Outdoor GIB foundation	
o)	Outdoor Sf6/Air bushing foundation	
p)	BMK/ Lighting pole foundation	
q)	Fire Wall	
r)	Drawing of contour levels	
s)	Drawing of Formation levels	
t)	Soil Investigation Report	
u)	Any other foundation inside switchyard	
33.00	DESIGN, FABRICATION & PROTO CORRECTED DRAWINGS OF ALL TYPES OF TOWERS & BEAMS	A/R
34.00	DESIGN, FABRICATION DRAWINGS FOR EQUIPMENT SUPPORT STRUCTURES	A/R
35.00	MISCELLANEOUS CIVIL DRGS	A/R

LEGEND:- A – for Approval; R- for Record**NOTES:-**

1. In case any additional drawings/documents are required, the same shall also be submitted during execution of the contract.
2. In case, some drawings as mentioned in the above list are not applicable for the scope of work, the same shall not be referred to.

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**Annexure-G****MQP & INSPECTION LEVEL REQUIREMENT**

1 A	Transformer /Reactor	Yes	IV
1 B	Circuit Breakers	Yes	IV
2	Current transformer	Yes	IV
3	Capacitive voltage transformers/Potential transformer	Yes	IV
4	Isolators	Yes	IV
5	Lightening Arrestors	Yes	III
6	Line Trap	Yes	III
7	Control & Relay Panels	Yes	III
8	Power Cables	Yes	III
9	Control Cables	Yes	III
10	LT Switchgear & ACDB/DCDB/MLDB/ELDB/ Lighting Panels	Yes	III
11	Fire protection system		
11-A	Panels, Deluge valve, Hydro pneumatic tank.	No	III
11-B	Strainers, extinguishers, MS/GI pipes, Pumps, motors, air compressor, and other valves, Diesel Engines	No	II
11-C	Others	No	I
12	Insulator (Disc, Long Rod, Solid Core)	Yes	IV
13	Conductor	Yes	IV
14	Clamps & Connectors (including equipment connectors)	Yes	III
15	Junction Box / Lighting Switch Boards / Bay MB/Telecom Equipment Cabinet	No	II
16	Cable lugs	No	I
17	Lighting Fixtures ,Lamps & fans	No	I
18	Switches	No	I
19	Conduits	No	I
20	Lighting Poles	No	II
21	MS/GI /PVC Pipes for cable trenches and lighting	No	I
22	Hume Pipes	No	I
23	Galvanized Cable trays	No	II
24	MS/ GI Flat and earthing material	No	II
25	MS Round for Earthmat (40mm dia)	No	I
26	Lighting Earthwire	No	I
27	Aluminium Tube & Busbar materials	No	II
28	Outdoor Receptacle	No	I
29	Nut / Bolts / Spring Washers (Gr 5.6/5)	No	II
30	LT Transformer	Yes	III
31	Battery	No	II
32	Battery Charger	Yes	III

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**Annexure-G**

Sl. No.	Item / Equipment	Requirement of MSP/HT/FAT	Inspection Level
33	D. G. Set	No	II
34	Split A.C./window A.C.	No	I
35	Substation Automation system	No	III
36	Telephone wires	No	I
37	Telephone sockets	No	I
38	Aluminium ladder	No	I
39	Occupancy sensors for control of lighting	No	I
40	Sub Station Structure (lattice/pipe type)	Yes	III
41	HG fuse	No	II
42	PLCC equipment Viz PLCC Terminal ,Carrier equipment, Protection Coupler , Coupling Device but excluding EPAX / HF Cable/ SDH Equipment	Yes	III
43	HF Cable / GPS Clock	No	I
44	EPAX	No	I
45	Cable Glands / Joints /Clamps/ Termination	No	I
46	Video Monitoring System	No	II
47	Controller for switching	No	IV
48	Solar based street lighting pole including solar panel as per technical specification	No	III
49	Event Logger	No	III
50	Lighting transformers	Yes	II
51	String Hardware	Yes	IV
52	Test Equipment	No	I *
53	GS Earthwire	Yes	IV
54	Oil Storage Tank	Yes	III
55	Insulating Oil	No	III
56	Flow sensitive conservator isolation valve	No	II **
57	On-Line insulating oil drying system	No	II **
58	On line DGA & Moisture Analyzer	No	II **
59	WAMS-(PMU & Accessories)	Yes	III
60	FO Cable	Yes	III
61	Re-rollers of MS/HT Angle Section and galvanized tower parts.	Yes	IV
62	Hardware fittings & Earthwire Accessories	Yes	IV
63	OPGW & H/W	Yes	III
64	Bolts & Nuts Gr up to 5.6/5	Yes	II
65	Bolts & Nuts of Gr 8.8 / 8	Yes	IV
66	D-shackle/ Hanger / Links	Yes	IV
67	Danger Plate /Phase Plate / Number Plate / Circuit plate	No	I
68	Pipe Type & Counter Poise Earthing	No	II
69	Spring Washer	No	II
70	ACD & Barbed wire for ACD/Bird guard	No	II

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)**Annexure-G**

71	Span Marker & Obstruction Light	No	III
72	GIS including spares	Yes	IV
73	GIS Bus Duct	Yes	IV
74	GIS Bushing	Yes	IV
75	SF6 Gas processing Unit	No	II
76	Partial Discharge Monitoring System	No	II
77	STATCOM including Valve, valve base electronics, DC capacitor, series reactor and all accessories	Yes	IV
78	Mechanically switched Reactor bank (3-ph) including all accessories (MSR Branches)	Yes	IV
80	Mechanically switched Capacitor bank (3-ph) including all accessories (MSC Branches)	Yes	IV
81	Pass Harmonic filters	Yes	IV
82	Valve cooling system	Yes	III
	FODP including pigtail	No	II
	Radio link Telecom	Yes	III
	Hardware Fittings for Fibre Optic approach cable	Yes	III
	SDH Equipments (ADM), PDH, Primary Multiplexer	Yes	IV
	Drop & Insert Multiplexer	Yes	IV
	DACS	Yes	IV
	Main Distribution Frame	No	I
	HDPE Pipe	No	II
	NMS, TMN	Yes	IV
	Synchronization Equipment	No	Level-I
93	HT Capacitor	Yes	IV
94	PLC Capacitor	Yes	III
95	48V DCPS	Yes	III
96	Nitrogen Injection system	Yes	III
97	Foundation/Anchor bolts	Yes	III
98	EOT crane/Lift	No	II
99	Optical Signal Column	No	II
100	Maintenance Platform	No	II
101	Spark Gap	Yes	III
102	Thyristor Valve	Yes	III
103	DC current & voltage measuring device	ITP	III
104	Furniture	No	I

Note:

- * MICC for test and measuring equipment shall be issued only after actual verification/demonstration of satisfactory performance at site.
- ** Though level-2 items, CIP can be issued also on review of TCs and visual inspection of these items.

SECTION - (SE) SWITCHYARD ERECTION

ANNEX C1

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV).

2. Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3. Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency with 10% of 0.5 Mhz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be in accordance with NEMA standard Publication No. 107-1964, except otherwise noted herein.

3.3 In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100% and 110% of the specified RIV test voltage for all equipment unless otherwise specified. The specified RIV test voltage for 765kV, 400kV, 220kV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5 The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noise meter.

4. Test Methods for Visible Corona [applicable for 400kV and above]

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 110% of RIV test voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped, otherwise test shall be continued and the voltage will then be decreased slowly until all visible corona disappears. The procedure shall be repeated at least 4

ANNEX C1

SECTION - (SE)
SWITCHYARD ERECTION

times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, and 110%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall be photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

In case corona inception does not take place at 110%, voltage shall not be increased further and corona extinction voltage shall be considered adequate.

- 4.1 The test shall be recorded on each photograph. Additional photograph shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.
- 4.2 In addition to photographs of the test object preferably four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Purchaser's inspector, after determining the best camera locations by trial energisation of test object at a voltage which results in corona.
- 4.3 The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.
- 4.4 However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Purchaser's inspector if, in his opinion, it will not prejudice other test.

5. Test Records:

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

- a) Background noise before and after test.
- b) Detailed procedure of application of test voltage.
- c) Measurements of RIV levels expressed in micro volts at each level.
- d) Results and observations with regard to location and type of interference sources detected at each step.
- e) Test voltage shall be recorded when measured RIV passes through 100 microvolts in each direction.
- f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

ANNEXURE-A**COMPLIANCE CERTIFICATE OF TECHNICAL SPECIFICATION**

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation(s) with respect to specification other than those furnished in the 'schedule of technical deviations'.
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ' of the specification shall not be considered (i.e., technical description & quantities as per the specification shall prevail).

Date:

Bidder's Stamp & Signature

ANNEXURE - B

SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Section/ Page No.	Clause No.	Deviation	Reason / Justification
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Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Tenderer's Stamp & Signature