

CHAPTER 7
Definition and Lists

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1. DRAWINGS LIST**1.1 LINE-1 EXTENSION (CHAND POLE TO BADI CHAUPAR))**

Sr. No.	DRAWING No.	DESCRIPTION
AUXILIARY NETWORK DRAWINGS		

2. MAIN APPLICABLE INTERNATIONAL STANDARDS

All equipment of the JP/EW/1B/E2 Contract shall comply with the EMC standards EN 50-121-1 to 5. Concerning the tests, when not defined into the EN 50121, the equipment shall comply with the relevant EMC standard of the series IEC 61000.

Standard Number	Title
IEC 38	IEC standard voltage
IEC 44-6	Instructions related to protection current transformer for transient state response
IEC 62271-100	High voltage circuit breaker for alternating current
IEC 59	IEC standard current
IEC 99-4	Metal oxide surge arrester without gaps for a.c. systems
IEC 62271-102	Alternating current disconnectors and earthing switches
IEC 383-1 & 2	Insulators and fittings for overhead lines. Insulators of ceramic material or glass for overhead line with nominal voltage higher than 1000 V. Requirements
IEC 60502	Power cables with extruded insulation and their accessories for rated voltage from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV). Part 2: rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)
IEC 529	Degrees of protection provided by enclosures (IP code)
IEC 617-2	Graphical symbols for diagrams. Part 2: symbol elements, qualifying symbols and other symbols having general application.

Standard Number	Title
IEC 694	Common specifications for high-voltage switchgear and controlgear standards
IEC 721-3-4	Classification of environmental conditions- Classification of groups of environmental parameters and their severities- Stationary use at non weather 'protected locations.
IEE 802-3	
UIC 812-3	
IEC 840	Power cables with extruded insulation and their accessories for rated voltage above 30kV ($U_m = 36$ kV) up to 100 kV. Test methods and requirements.
IEC 865	Earth mesh and earth procedure code
IEC 889	Hard-drawn aluminium wire for overhead line conductor
IEC 60071	Insulation co-ordination
IEC 60076	Power transformer
IEC 61000	Electromagnetic compatibility
IEC 61508-3	Functional safety of electrical/electronic/programmable safety-related systems. Part 3: software requirements

Standard Number	Title
EN 10025	Hot Rolled Products of Non-Alloy Structural Steels: Delivery Conditions
EN 10034	Structural Steel I and H Sections – Tolerances on Shape and Dimensions
EN 10055	Hot Rolled Steel Equal Flange Tees with Raduised Root and Toes – Dimensions and Tolerances on Shape and Dimensions
EN 10056	Structural Steel Equal and Unequal Leg Angles
EN 10083	Quenched and Tempered Steels
EN 10088	Stainless Steels
EN 1301	Aluminium and Aluminium Alloys
EN 50163	Supply Voltage of Traction System
EN 60811	Insulating and Sheathing Materials of Electric Cables
ENV 50121-5	Railway Application Electromagnetic Compatibility Part 5: Fixed Power Supply Installations
EURONORM 19	IPE Beams; I-Beams with Parallel Flange Facings and Steel Products – IPN Beams – Dimensions
IEC 60398	General Test for Electro-heating Equipment
IEC 1131	Programmable controllers
IEC 265.1	High Voltage Switch
IEC 502	Insulated and protected cables for power supply network
IEC 60 44-1	Current Transformers
IEC 60 44-2	Voltage Transformer
IEC 60137	Insulated Bushing for rated Voltage above 1 kV
IEC 60157	Low Voltage Switchgear Circuit Breakers

Standard Number	Title
IEC 60168	Tests on Indoor and Outdoor Post Insulators of Ceramic Material or Glass for Systems with Nominal Voltages greater than 1000 V
IEC 60228	Conductor of Insulated Cables
IEC 60273	Dimensions of Indoor and Outdoor Post Insulators and Post Insulator Units for Systems with Nominal Voltages greater than 1000 V
IEC 60296	Insulating oils for transformers
IEC 60297	Dimensions of mechanical structures of the 482.6 mm (19 in)
IEC 60372	Locking Devices for Ball and Socket Couplings of String Insulator Units – Dimensions and Tests
IEC 60376	Sulphur Hexafluoride
IEC 60383	Insulators for Overhead Lines with a nominal Voltage above 1000 V
IEC 60502	Power Cables from 1 kV to 30 kV
IEC 60591	Test for OHCS Ceramic or Glass Insulators above 1 kV
IEC 60591	Sampling Rules and Acceptance Criteria when applying Statistical Control Methods for Mechanical and Electromechanical Tests on Insulators of Ceramic Material or Glass for Overhead Lines with a Nominal Voltage greater than 1000 V
IEC 60721	Environmental conditions :Specifications for painting
IEC 622	Sealed Nickel-Cadmium prismatic rechargeable single cell.
IEC 801	Electromagnetic Compatibility for Industrial-process Measurement and Control IEC 870
ISO 1035	Hot Rolled Steel Bars
ISO 1190	Copper and Copper Alloys
ISO 1234	Split Pins

Standard Number	Title
ISO 1337	Wrought Coppers (having Minimum Copper Contents of 99,85%) – Chemical Composition and Forms of Wrought Products
ISO 1460	Metallic Coatings – Hot Dip Galvanised Coatings on Ferrous Materials – Gravimetric Determination of the Mass per Unit Area
ISO 1461	Metallic Coatings – Hot Dip Galvanised Coatings on Fabricated Ferrous Products – Requirements
ISO 2092	Light Metals and their Alloys – Code of Designation based on Chemical Symbols
ISO 2340	Clevis Pins without Head
ISO 2341	Clevis Pins with Head
ISO 261	ISO General Purpose Metric Screw Threads – General Plan
ISO 262	ISO General Purpose Metric Screw Threads – Selected Sizes for Screws, Bolts and Nuts
ISO 2859/1	Sampling Procedures for Inspection by Attributes – Sampling Plans Indexed by Acceptable Quality Level (AQL) for Lot-by-lot Inspection
ISO 3768	Metallic Coatings – Neutral Salt Spray Test (NSS Test)
ISO 4014	Hexagon Head Bolts – Product Grades A and B
ISO 4017	Hexagon Head Screw Bolts – Product Grades A and B
ISO 4032	Hexagon Nuts, Style 1 – Product Grades A and B
ISO 404	Steel and Steel Products – General Technical Delivery Requirements
ISO 657	Hot Rolled Steel Sections
ISO 68	ISO General Purpose Screw Threads – Basic Profile
ISO 8402	Quality Management and Quality Assurance – Vocabulary

Standard Number	Title
ISO 898	Mechanical Properties of Fasteners
ISO 9000	Quality Management and Quality Assurance Standards
ISO 9001	Quality Systems – Model for Quality Assurance in Design / Development, Production, Installation and Servicing
ISO 9002	Quality Systems – Model for Quality Assurance in Production and Installation
ISO 9003	Quality Systems – Model for Quality Assurance in Final Inspection and Test
ISO 9004	Quality Management and Quality System Elements
ISO 965	ISO General Purpose Metric Screw Threads
UIC 505-1	Railway Transport Stock – Rolling Stock Construction Gauge
UIC 505-4	Effects on the Application of the Kinematic Gauges defined in the 505 Series of Leaflets on the Positioning of Structures in relation to the Tracks and of the Tracks in relation to each other
UIC 606-1 OR	Consequences of the Application of the Kinematic Gauges defined by UIC Leaflets in the 505 Series on the Design of the Contact Lines
UIC 606-2 OR	Installation of 25 kV and 50 or 60 Hz Overhead Contact Lines
UIC 608 OR	Conditions to be complied with for the Pantographs of Tractive Units used on International Services
UIC 791 R	Quality Assurance of Overhead Line Equipment
UIC 811-1	Technical Specifications for the Supply of Axles and Trailing Stock
UIC 812-2	Solid Wheels for Tractive and Trailing Stock – Tolerances
UIC 870 O	Technical Specification for Grooved Contact Wires

Standard Number	Title
IEC 28	International specification of soft annealing type copper
IEC 99-2	Expulsion type lightning arresters
IEC 99-1	Non-linear resistor type gapped surge arresters for A.C. system
IEC 62271-200	Alternating current disconnectors and earthing switches
IEC 62271-100,102	GIS Switchgears
IEC 146-1-3	Semiconductor converters, general requirements and line commutated converters. Transformers and reactors
IEC 146-1-2	Semiconductor converters, general requirements and line commutated converters. Application guide
IEC 146-1-1	Semiconductor converters, general requirements and line commutated converters. Specifications of basic requirements.
IEC 196	IEC standard frequencies
IEC 228	Conductors of insulated cable
IEC 265-1	High voltage switches for rated voltage above 1 kV and less than 52 kV
IEC 296	New insulating mineral oil specification for transformers
IEC 298	A.C. metal enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 72,5 kV
IEC 502-2	Extruded solid dielectric insulated power cables and their accessories for rated voltage from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)
IEC 551	Determination of transformer and reactor sound level
IEC 622	Alkaline secondary cells and batteries- Sealed nickel-cadmium parallelepiped rechargeable single cells

Standard Number	Title
IEC 721-3-3	Classification of environmental conditions- Classification of groups of environmental parameters and their severity- Stationary use at weather protected locations.
IEC 726	Dry type power transformer

Standard Number	Title
IEC 1131	Programming languages – Programmable controllers– Part 3
IEC 1131	Programmable Logic Controllers
IEC 297-3	Dimensions of mechanical structures of the 482.6 mm (19 in) series
IEC 571	Electronic equipment specification
IEC 60870	Transmission Protocol
IEC 801-1	Electromagnetic compatibility for industrial-process measurement and control equipment – General introduction
IEC 801-2	Electromagnetic compatibility for industrial-process measurement and control equipment – Electrostatic discharge requirements
IEC 801-3	Electromagnetic compatibility for industrial-process measurement and control equipment – Radiated electromagnetic field requirements
IEC 801-4	Electromagnetic compatibility for industrial-process measurement and control equipment - Electrical for transient/burst requirements
IEC 801-5	Electromagnetic compatibility for industrial-process measurement and control equipment – Shock wave requirements
IEC 801-6	Electromagnetic compatibility for industrial-process measurement and control equipment – Immunities to disturbances conducted and induced by radio fields
IEC 848	Preparation of block diagrams for control systems

Standard Number	Title
IEC 870-1-1	Control equipment and systems – General principles
IEC 870-2-1	Control equipment and systems – Power supply and environment conditions
IEC 870-3	Control equipment and systems – Interfaces (electrical characteristics)
IEC 870-4	Control equipment and systems – Performance requirements
IEC 870-5	Control equipment and systems – Transmission protocol

3. DEFINITION OF ABBREVIATIONS

Abbreviations	Meaning
AC	Alternating Current
ACOCB	Alternating current outgoing circuit breaker
ACRC	Alternating current rectifier contactor
ACRCB	Alternating current rectifier circuit breaker
AMS	Auxiliary main sub Station
ASS	Auxiliary Sub Station
AT	Auxiliary transformer
ATCB	Auxiliary Transformer Circuit Breaker
ATIS	Auxiliary Transformer Isolator
B	Traction bus bar
BA	Batteries
BAIT	Batteries interrupter

Abbreviations	Meaning
C&C	Control & Communication
CAMS	Computer Aided Maintenance System
CB	Circuit Breaker
CCB	Coupling circuit breaker
CIS	Coupling Isolator
CTATP	Current Transformer for protection of Auxiliary Transformer
CTC	Current transformer for coupling
CTIM	Incoming Current Transformer for Measures
CT	Current transformer for traction transformer
CTTTP	Current Transformer for Protection of Traction Transformer
DC	Direct Current
DCAC	Direct current auxiliary contactor
DCACC	Direct current auxiliary coupling contactor
DCOCB	Direct current outgoing circuit breaker
DCRC	Direct current rectifier contactor
DTN	Data Transmission Network
TRANSCO	State Transmission Company
ECC	Energy Control Centre
EIS	Earthing Isolator
EMIS	Energy Management and Information System
GRC	General Remote Control
IED	Intelligent Electronic Device

Abbreviations	Meaning
IS	Isolator
IR	Indian Railways
IT	Interrupter
OCC	Operations Control Centre
ITC	Coupling interrupter
L	Hand operated traction isolator
LAAT	Surge arrester for Auxiliary Transformer
LAN	Local Area Network
LATT	Surge arrester for Traction Transformer
LBCB	Lighting bridge circuit breaker
LBCCB	Lighting bridge coupling circuit breaker
LBCCT	Lighting bridge coupling current transformer
LBCT	Lighting bridge current transformer
LBCVT	Lighting bridge coupling voltage transformer
LBEIS	Lighting bridge earthing isolator
LBVT	Lighting bridge voltage transformer
LEIS	Line Earthing Isolator
LFCB	Lighting feeder circuit breaker (spare)
LFEIS	Lighting feeder earthing isolator
LIS	Line Isolator
LV	Low Voltage
LVACB	Low voltage auxiliary circuit breaker

Abbreviations	Meaning
LVACCB	Low voltage auxiliary coupling circuit breaker
LVAT	Low voltage auxiliary transformer
LVATCB	Low voltage auxiliary transformer circuit breaker
LVATEIS	Low voltage auxiliary transformer earthing isolator
LVCB	Low voltage circuit breaker
LVCCB	Low voltage coupling circuit breaker
MC	Metro Corridor (Underground Alignment operational)
MCCB	Metro corridor circuit breaker
MCEIS	Metro corridor earthing isolator
MCIS	Main coupling isolator
MMI	Man Machine Interface
HMI	Human Machine Interface
MVCB	Medium Voltage Circuit Breaker
NMS	Network Management System
NGR	Neutral Ground Resistor
OCC	Operation Control Centre
OHE	Over-Head Equipment
PCW	Power Control Workstation
PICOP	Person In Charge Of Protection
PLC	Programmable Logic Controller
PNCT	Primary neutral current transformer
PNEIS	Primary neutral earthing isolator

Abbreviations	Meaning
PNLA	Primary neutral surge arrester
RC	Rail Corridor
RCCB	Rail corridor circuit breaker
RCEIS	Rail corridor earthing isolator
RSS	Receiving Sub Station
SCADA	Supervisory Control And Data Acquisition System
SNCT	Secondary neutral current transformer
SNEIS	Secondary neutral earthing isolator
SNLA	Secondary neutral surge arrester
SP	Sectioning and Paralleling Post
SSP	Sub-Sectioning and paralleling Post
T	Transformer
TCB	Traction Circuit breaker
TEIS	Transformer Earthing Isolator
TSS	Traction Sub Station
TT	Traction transformer
TTCB	Traction Transformer Circuit Breaker
TTIS	Traction Transformer Isolator
UPS	Uninterruptible Power supply
VDU	Video Display Unit
VT	Voltage Transformer
VTB	Voltage Transformer for traction bus bar

Abbreviations	Meaning
VTBB	Bus Bar Voltage Transformer
VTC	Voltage transformer for coupling

4. SPARE PART LIST

4.1 GENERAL

The following list indicates the description and quantities of requirement of spare parts, to be supplied by the Contractor. The Contractor shall deliver these spare parts, at the same time as of handing over the first lot of erected equipment, if not earlier in a phased manner. The spare parts shall be adequate to meet the maintenance requirement for two years after DLP. The employer at his discretion may order any number of quantities of the spares, the price shall be valid till the two years after DLP. If, however, the Tenderer feels that some more items mentioned herein are required for the proper operation and maintenance of the installations supplied and erected by him, for a period of at least 2 years commencing from the expiry of the Defects Liability Period, the Tenderer shall, in that case, add such items to this list and shall include the amended list in his bid. The Tenderer, shall quote the price against each item even if the quantities are mentioned as 'NIL'. The prices shall not be unbalanced.

PSI Spares for ASS of Line-8 *					
S. No	Description	Unit	Qty	Unit Price	Total Price
1	33 KV IT	No	Nil		
2	33 KV CB	No	1		
3	Transformer 630 KVA	No	Nil		
4	Transformer 3150 KVA	No	1		
5	Battery Bank	No	1		
6	Battery Charger (1 Main+ 1 Standby)	Set	1		
7	ACDB	No	1		
8	DCDB	No	1		
9	O/C relay	No	1		
10	E/F relay	No	1		
11	MTR relay	No	1		
12	PILOT wire protection relay for one panel	No	1		
13	Differential relay	No	1		
14	Distance relay	No	Nil		
15	33 Breaker poles (VCB)	No	1		
16	SF6 leak detector	Set	1		

17	SF 6 filling kit with cylinder	Set	1		
18	33 KV breaker gasket set	Set	Nil		
19	33 KV breaker tulip contact set	Set	Nil		
20	33 KV breaker auxiliary contact set	Set	Nil		
21	33 KV breaker sliding rail set	Set	Nil		
22	All type of panel locks, indicators, selector switches, auxiliary contactors, limit switches.	Set	1		
23	All type of panel keys	Set	1		
24	33KV FRLSOH Cable, 400 sq.mm, Copper (1 run of Single Core)	Km	0.5		
25	33KV FRLSOH Cable, 95 sq.mm, Copper (1 run of Single Core)	Km	0.2		
26	Pilot wire cable (FRLSOH)	Km	1		
27	Current transformer for each type	Set	1		
28	Straight through joint kit for 33KV FRLSOH Cable, 400 sq.mm	No	1		
29	End termination kit for 33KV FRLSOH Cable, 400 sq.mm	No	1		
30	End termination kit for 33KV FRLSOH Cable, 95 sq.mm	No	1		
31	CB timing kit	No	1		
32	Battery discharging kit	No	1		
33	Power analyzer (1A-500A)	No	1		
B	SCADA Spares				
1	One Spare Card of each type used for the installation as per TS Chapter 8D	Set	1		
2	One Spare Server **	No	1		

; Spare shall be procured only after the approval from the engineer. The quantity of spares given can be increased or decreased by the engineer. The equipments/kits supplied should be as per latest specifications/models and should be compatible with the system (ROCS & ASS) being installed in this contract. Approval for the specifications should be taken from engineer before placement of the order.

****** In case a separate server is provided by the vendor then the same spare server shall be provided.