Compliance checklists

Project	Client	Location	Revision	Date
Sample 220/33 kV pooling substation	Sample client	Sample site	0	2 Nov 2026

Document no.	Prepared	Checked	Approved
SSL-C-CMP-001	Sample engineer	Sample engineer	Sample engineer

Rev	Date	Description	By
0	2 Nov 2026	Issued	Sample engineer

220/33 kV pooling substation, 250 MW. 64 comply (5 met by design) · 0 do not comply · 0 need your answer · 0 need your review · 5 not applicable. Automatic items are evaluated from the design run. Manual items record your answer.

CEA / Indian

No.	Requirement	Standard and clause	Design value	Status
CEA-01	Phase-to-earth clearance at 220 kV not less than the minimum	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(i)	4.50 m provided to the bay edge, 2.10 m minimum	Complies
CEA-02	Phase-to-phase spacing at 220 kV not less than the minimum	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(i)	4.50 m provided, 2.10 m minimum	Complies
CEA-03	Sectional clearance for maintenance with one bus live	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(iii), Schedule V	9.00 m provided, 5.00 m minimum	Complies
CEA-04	Ground clearance of live parts in the switchyard	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(iii), Schedule V	5.90 m provided, 5.50 m minimum	Complies
CEA-05	33 kV ground clearance and phase spacing	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(i), 46(2)(iii), Schedule V	4.00 m provided, 3.70 m minimum	Complies
CEA-06	Equipment insulation level 245 kV / 1050 kVp at 220 kV	CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Reg. 45(1), Table 9	Um 245 kV, BIL 1050 kVp	Complies
CEA-07	Switchgear rated for the maximum fault level (220 kV and 33 kV)	CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Reg. 43(1), Table 6; Reg. 43(2)	Worst: 33 kV CB making current (ip) 68.58 kA of 78.75 kA	Complies
CEA-08	Bus scheme for a 220 kV substation	CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Reg. 44(2)(a), Table 7	220 kV double main bus, 33 kV sectionalised bus	Complies
CEA-09	Touch voltage within the tolerable limit	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 · IS 3043:1987 (Code of practice for earthing), Reg. 50(1)(i) · §22.2.4	Mesh voltage 577.6 V ≤ tolerable touch 684.6 V (50 kg)	Complies
CEA-10	Step voltage within the tolerable limit	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 · IS 3043:1987 (Code of practice for earthing), Reg. 50(1)(i) · §22.2.4	Step voltage 1450.6 V ≤ tolerable step 2246.3 V (50 kg)	Complies
CEA-11	Substation earth resistance not more than 1 Ω	CBIP Manual on Earthing of AC Power Systems (Publication 311) · IEEE 80-2013, §6.1 · §14.1	Grid resistance (Rg) 0.476 Ω ≤ 1 Ω	Complies
CEA-12	Fence bonded to the earth mat (mat 1.5 m outside the fence)	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 51(ii)(a)	Outer mat conductor 1.5 m outside the fence, fence bonded	Met by design

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No.	Requirement	Standard and clause	Design value	Status
CEA-13	Switchyard shielded against direct lightning strokes	CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Reg. 44(2)(c)	5 shield wires, 14 masts, 5 of 5 protected levels covered	Complies
CEA-14	Switchyard fenced (height not less than 1.8 m) with a lockable gate	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 51(ii)(a)	2.4 m chain link, 565 m around the yard	Complies
CEA-15	Firewall between transformers closer than the separation distance	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(vii)(a)	Not required: ICT clear gap ≥ 10 m	Complies
CEA-16	Oil soak pits and a burnt-oil pit for oil-filled transformers	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(vii)(b)	2 soak pits (1.5 m beyond the tank) and a common burnt-oil pit	Complies
CEA-17	Fire hydrant / emulsifier (HVWS) system for the transformers	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(ix)	Sample answer.	Complies
CEA-18	Fire detection and alarm in the control building	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 46(2)(viii)	Sample answer.	Complies
CEA-19	33 kV neutral earthing limits the earth-fault current as designed	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 50(2)	Earth-fault current 1097 A at voltage factor 1.1 ≤ 1.15 × 1000 A NGR rating	Complies
CEA-20	Interface (ABT) meters: Main and Check at the connection point, Standby on ICTs	CEA (Installation and Operation of Meters) Regulations, 2006 (as amended in 2019), Reg. 7(1), Table 1; Reg. 8, Schedule Part I	Main and Check meters on 1 line bay, Standby meters on the HV sides of 2 ICTs, 0.2S cores	Met by design
CEA-21	Reactive power capability 0.95 lagging to 0.95 leading at the interconnection point	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 5, Schedule Part II, B2(1)	SVG ±62.5 Mvar in total · Sample answer.	Complies
CEA-22	Low / high voltage ride-through capability of the plant	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 5, Schedule Part II, B2(3), B2(7)	Sample answer.	Complies
CEA-23	Harmonic distortion within limits at the interconnection point (harmonic study)	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 5, Schedule Part II, B1(1)	Sample answer.	Complies
CEA-24	Line, ICT and bus protection per the grid code (duplicated main protection at 220 kV)	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 5, Schedule Part III, 1–3	Sample answer.	Complies
CEA-25	Two battery sets and two chargers for 220 kV	CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, Reg. 47(1)(c)	2 × 200 Ah batteries, 2 × 40 A chargers	Met by design
CEA-26	Two independent aux sources and a standby DG	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 5, Schedule Part III, 6(a)	2 × 250 kVA aux transformers from two 33 kV sections and a 250 kVA DG	Met by design
CEA-27	Real-time data and communication to the RLDC / SLDC (SCADA, RTU, OPGW)	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 6(3), 6(5)	Sample answer.	Complies
CEA-28	Danger boards, phase identification and maintenance earthing at each bay	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 20, 21(1), 26	Sample answer.	Complies

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No.	Requirement	Standard and clause	Design value	Status
CEA-29	Insulating mats, first aid, shock-treatment chart and fire extinguishers in the control room	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 21(5), 29, 30	Sample answer.	Complies
CEA-30	Electrical inspector's approval before energisation	CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, Reg. 45(3), 45(4)	Sample answer.	Complies
CEA-31	Connectivity agreement and approved drawings from the CTU / STU	CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 (as amended), Reg. 6(7), 9	Sample answer.	Complies

IEC

No.	Requirement	Standard and clause	Design value	Status
IEC-01	Standard insulation level for Um 245 kV (range I)	IEC 60071-1:2019, Table 2 (range I), Table 3 (range II)	Um 245 kV, BIL 1050 kVp	Complies
IEC-02	Standard insulation level for Um 36 kV	IEC 60071-1:2019, Table 2	Um 36 kV, BIL 170 kVp	Complies
IEC-03	Minimum clearances in air for the insulation level	IEC 61936-1:2021, §5.4.2, Table 2 (range I); §5.4.3, Table 3 (range II)	4.50 m provided to the bay edge, 2.10 m minimum	Complies
IEC-04	Protection against direct contact: perimeter fence	IEC 61936-1:2021, §7.2.7, §8.2	2.4 m chain link, 565 m around the yard	Complies
IEC-05	Equivalent voltage source with voltage factor c	IEC 60909-0:2016, Table 1	Voltage factors cmax 1.10 and cmin 1.00 for Un above 1 kV, the transformer correction factor KT applied to the ICTs	Met by design
IEC-06	Rated short-circuit breaking current ≥ I″k	IEC 62271-100:2008, §4.101	220 kV breaking current 21.98 kA ≤ 50.00 kA · 33 kV breaking current 24.25 kA ≤ 31.50 kA	Complies
IEC-07	Rated making current (2.5 × breaking at 50 Hz) ≥ peak ip	IEC 62271-100:2008, §4.103	220 kV peak current (ip) 62.17 kA ≤ 125.00 kA · 33 kV peak current (ip) 68.58 kA ≤ 78.75 kA	Complies
IEC-08	Standby generator starts the largest motor within the voltage-dip limit	ISO 8528-5, class G3	Largest motor dip 14.8 % ≤ 15 %	Complies
IEC-09	Rated short-time withstand current ≥ Ith	IEC 62271-1:2017, §5.6	220 kV thermal current (Ith) 22.46 kA ≤ 50.00 kA · 33 kV thermal current (Ith) 24.66 kA ≤ 31.50 kA	Complies
IEC-10	Disconnectors and earthing switches type tested	IEC 62271-102:2018, §7	Sample answer.	Complies
IEC-11	GIS type tested: gas compartments, density monitoring, internal-arc rating as specified	IEC 62271-203:2022, §6; §7, Table 5; Annex B		Not applicable
IEC-12	SF6 handling, recovery and leakage per gas compartment within the specified limit	IEC 62271-203:2022, §11, §13		Not applicable
IEC-13	Very fast transient overvoltages (VFTO) in the GIS assessed by the supplier	IEC 60071-1:2019, Table 1		Not applicable
IEC-14	GIS hall: SF6 gas detection with alarm, bottom-level exhaust ventilation, EOT crane	IEC 62271-203:2022, §11, §12		Not applicable
IEC-15	33 kV metal-enclosed switchgear type tested, internal arc classified (indoor)	IEC 62271-200:2021, §7, §7.105, Annex A	Sample answer.	Complies
IEC-16	CT accuracy classes: 0.2S metering, 5P / PX protection cores	IEC 61869-2:2012, §5.6.201, §5.6.202	Sample answer.	Complies

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No.	Requirement	Standard and clause	Design value	Status
IEC-17	CVT accuracy class 0.2 metering, 3P protection	IEC 61869-5:2011, §5.6.501, §5.6.502	Sample answer.	Complies
IEC-18	Arrester rated voltage against temporary overvoltage	IEC 60099-4:2014, §5.1, Table 2; §6.12	220 kV LA 216 kV rated, 33 kV LA 30 kV rated · Sample answer.	Complies
IEC-19	ICT routine, type and special tests, impedance and losses as specified	IEC 60076-1:2011, §11; §6.5; §10, Table 1	Sample answer.	Complies
IEC-20	Temperature-rise limits at the site ambient	IEC 60076-2:2011, §6.2, Table 1	Sample answer.	Complies
IEC-21	Rolling sphere 20 m (LPL I) for the 33 kV areas and the building	IEC 62305-3, Table 2	222 of 222 points, least margin +0.22 m, sphere 20.00 m	Complies
IEC-22	Control building protected (LPL I)	IEC 62305-3, Table 2	196 of 196 points, least margin +3.46 m, sphere 20.00 m	Complies
IEC-23	EMC immunity of protection and control equipment in substations	IEC 61000-6-5:2015, §10.3, Tables 7–10	Sample answer.	Complies
IEC-24	Substation automation and communication	IEC 61850, Parts 5, 6, 7 and 8	Sample answer.	Complies

IEEE

No.	Requirement	Standard and clause	Design value	Status
IEEE-01	GIS enclosures bonded at each bay, transient enclosure voltage within limits	IEEE 80-2013, §10		Not applicable
IEEE-02	Mesh voltage Em within the 50 kg tolerable touch voltage	IEEE 80-2013, Eq. 32, Eq. 80	Mesh voltage 577.6 V ≤ tolerable touch 684.6 V (50 kg)	Complies
IEEE-03	Step voltage Es within the 50 kg tolerable step voltage	IEEE 80-2013, Eq. 29, Eq. 92	Step voltage 1450.6 V ≤ tolerable step 2246.3 V (50 kg)	Complies
IEEE-04	Grid conductor sized for the fault current and time, plus corrosion allowance	IEEE 80-2013, Eq. 37	40 mm MS rod ≥ 27.84 mm + 6 mm corrosion	Complies
IEEE-05	Surface layer (gravel) and its derating factor Cs in the tolerable voltages	IEEE 80-2013, Eq. 27	3000 Ω·m × 0.10 m, Cs 0.705	Complies
IEEE-06	Mesh and step voltage equations within their stated range (up to 40 meshes per side, meshes of 2.5–22.5 m)	IEEE 80-2013, §16.5, §16.7	39 × 34 meshes of 3.97 m, within the 40 per side and 2.5–22.5 m of §16.7	Complies
IEEE-07	Soil resistivity measured on site (Wenner) and seasonal variation allowed	IEEE 80-2013, §13.3, §13.4	Entered value 100 Ω·m · Sample answer.	Complies
IEEE-08	220 kV bus shielded (rolling sphere, Mousa)	IEEE 998-2012, §6.5, §6.6	222 of 222 points, least margin +8.09 m, sphere 29.15 m	Complies
IEEE-09	220 kV equipment shielded	IEEE 998-2012, §6.5, §6.6	81 of 81 points, least margin +11.17 m, sphere 28.97 m	Complies
IEEE-10	ICTs shielded	IEEE 998-2012, §6.5, §6.6	70 of 70 points, least margin +9.82 m, sphere 27.99 m	Complies
IEEE-11	Battery capacity covers the duty cycle with aging and design margins	IEEE 485-2020, §6.4, §6.3.3, §6.3.4	200 Ah ≥ 163 Ah for 10 h	Complies
IEEE-12	Number of cells keeps the DC voltage within the equipment's range	IEEE 485-2020, §6.2.2	107 cells: 187.2–240.8 V within 187–242 V	Complies
IEEE-13	Charger recharges the battery while carrying the continuous load	IEEE 946-2020, §7.3	40 A ≥ 32.5 A	Complies

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No.	Requirement	Standard and clause	Design value	Status
IEEE-14	Protection settings and coordination study	IEEE C37 series, C37.113, C37.91, C37.234, C37.2	Sample answer.	Complies

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