

13.1.2. Sound

ID	Description
13.1.2.1	Generator set sound level must not exceed <65dBA at 15m distance.
13.1.2.2	Transformer sound level must not exceed <65dBA at 15m distance.

13.1.3. Environment

ID	Description
13.1.3.1	Protection against spillage of hazardous liquids must be implemented.
13.1.3.2	Exhaust gasses and smoke must not interfere with normal operations.
13.1.3.3	Fuel tanks must be double walled and intrinsically safe against spillage.

13.2.1. Electrical

ID	Description
13.2.1.1	The phase rotation must be clockwise (L1->L2->L3).
13.2.1.2	The supply must have (only) one common point of coupling of N to ground at any time for any operating mode (single / redundant / parallel).
13.2.1.3	The system must be able to generate required active(kW) and apparent(kVA) power to supply the total required load from power factor -0.8 inductive to 0.9 capacitive.
13.2.1.4	Earth mat impedance must be < 5.0 Ohm.

13.2.2. Topology

ID	Description
13.2.2.1	Network configuration must be IEC60364 TN-S.
13.2.2.2	Conductors of an individual group must not be intersected by closed conductive loops.
13.2.2.3	All conductors of an individual group (U,V,W,N,PE) must be routed in parallel and physically adjacent.
13.2.2.4	Protective earth must be routed in a star topology.
13.2.2.5	Electrical connections must remain mechanically and physically reliable for the operational time.
13.2.2.6	Redundant feeders must be connected to different main distribution board outgoing breakers.
13.2.2.7	The main distribution board must be located inside the power compound.
13.2.2.8	The maximum size of BTP generators is 350 kVA.

13.2.3. Components – General

ID	Description
13.2.3.1	All components must be able to withstand the prospective fault currents.
13.2.3.2	Components must be protected according IEC60529 IP54 or better.
13.2.3.3	Components used in customer accessible areas must be properly enclosed and secured.
13.2.3.4	Components used must have one clearly visible unique identifier corresponding with SLD designators.
13.2.3.5	Sufficient spare parts must be on site.
13.2.3.6	Components must be free of any commercial branding.

13.2.4. Generator Sets

ID	Description
13.2.4.1	Generator source sub transient reactance must be $0.12 X''d$ or lower.
13.2.4.2	Generators with 2/3 pitch windings must be used.
13.2.4.3	Generators must be able to supply 3 times rated current for 10 seconds to ensure fault clearing.
13.2.4.4	Generators must be equipped with automatic synchronisation and active/ reactive load sharing controls.
13.2.4.5	Generators must be equipped with a PMG or Auxiliary Windings.
13.2.4.6	Generators must be equipped with a redundant fuel filtering system.
13.2.4.7	Generators must be equipped with an internal fuel tank.
13.2.4.8	Generator sets must be able to operate in standby, single operation, parallel.
13.2.4.9	Generator sets must be able to change between any mode of operation without negatively affecting system power quality.
13.2.4.10	Generator sets must be able to close on a dead bus.
13.2.4.11	Protections must be installed to ensure that faults are detected and eliminated before affecting system power quality. (e.g. under, - overvoltage, overcurrent, earth fault, loss of excitation, reverse power, vector jump, loss of sensing, overexcitation).

13.2.5. Transformers

ID	Description
13.2.5.1	Transformers must be connected in delta – wye configuration.
13.2.5.2	Transformers secondary neutral must be earthed.
13.2.5.3	Transformers must have isolated primary/secondary windings.

13.2.7. Cabling

ID	Description
13.2.7.1	All cables must be protected against mechanical, chemical or thermal damage.
13.2.7.2	Cable temperature may not exceed 60°C considering local conditions and under full load conditions.
13.2.7.3	The neutral conductor must be sized equal to the phase conductors.
13.2.7.4	All cables, including Protective Earth must be electrically insulated.
13.2.7.5	Protective Earth conductors must be free of any sort of switch, fuse, coils, overcurrent protection, etc.
13.2.7.6	Cables must be properly identified with source, destination and phase (color).
13.2.7.7	Cables must be H07RN-F or equivalent.
13.2.7.8	CEE plugs must adhere to standard IEC 60309, 3P/N/PE, with keyway pin location at 6h.
13.2.7.9	Cable termination at end of primary distribution must be powerlock or camlock.
13.2.7.10	Cable conductors must be copper.

13.2.8. Protections

ID	Description
13.2.8.1	Protection against electrical shock must be implemented.
13.2.8.2	Protective measures must be taken to prevent damage caused by overload.

13.2.8.3	Protection against transients caused by direct or indirect lightning strikes must be implemented.
13.2.8.4	Critical components (e.g. emergency lighting) must be distributed over different RCDs/ELCIs and overcurrent protections as much as possible.
13.2.8.5	Three phase protections must switch all phases and neutral.
13.2.8.6	Single phase protections must switch both phase and neutral.
13.2.8.7	Overcurrent protection must have neutral overload protection.
13.2.8.8	Conductive structures within 2 meters from the main power distribution must be earthed.
13.2.8.9	Protective Earth impedance must be low enough to ensure safe touch and step voltage for the prospective fault currents.
13.2.8.10	Earth leakage of one feeder must not influence other feeders.
13.2.8.11	Overload of one feeder must not influence other feeders.
13.2.8.12	It must be possible to disable/enable the RCD/ELCI protection.
13.2.8.13	The RCD/ELCI level must be adjustable in level and time by authorised personnel only.
13.2.8.14	All components protected by a specific RCD/ELCI must have a common earth conductor.
13.2.8.15	When earth leakage protections are used in series, discrimination must ensure the smallest possible area is affected by a fault.
13.2.8.16	The use of RCDs/ELCIs of AC type is prohibited.
13.2.8.17	Each overcurrent protection device must be able to withstand the maximum expected fault current at the installed location.
13.2.8.19	Components must re-close automatically after a power dip unless this creates a dangerous situation.

13.3. Quality

13.3.1. Reliability and Performance

ID	Description
13.3.1.1	Power frequency must adhere to the compliance limit of IEC61000-2-2 (2%) for steady state conditions.
13.3.1.2	Power frequency must adhere to a +/- 5% compliance limit for loadsteps >50% of available power, with a maximum recovery time of 250 ms.
13.3.1.3	RMS Voltage variation at the source must adhere to a +/- 2.5% compliance limit for steady state conditions.
13.3.1.4	RMS Voltage variation at the source must adhere to a +/- 10% compliance limit for loadsteps >50% of available power, with a maximum recovery time of 250 ms.
13.3.1.5	RMS Voltage variation due to distribution or transformation losses (e.g. cable losses) must adhere to a +/-2.5% compliance level at the power provider end demarcation point.
13.3.1.6	Flicker levels must adhere to the compliance limit of IEC61000-2-2 (Pst 1.0 , Plt 0.8).
13.3.1.7	Voltage unbalance must adhere to the compliance limit of IEC61000-2-2 (2%).
13.3.1.8	Harmonics must adhere to the compliance limits of IEC61000-2-2 with a maximum THD <8%.
13.3.1.9	Generator power must be sized to 2 times nominal required load (2N).
13.3.1.10	Redundant cabling must physically follow separate routes and may not be placed within 5 meters of each other without explicit consent from the Host Broadcaster.
13.3.1.11	Redundant components must physically be separated as much as possible and may not be placed within 5 meters of each other without explicit consent from the Host Broadcaster.

13.3.1.12	The power supply design must incorporate the possibility for regular maintenance without affecting stability or reliability of power supply.
13.3.1.13	Active components must adhere to the IEC61000-3 EMC standard.