

SEE-TECH: SAFETY-02

Electrical Safety Audit at Refinery

About installation:

Electricity constitutes one of the major sources of ignition involving fire accidents and explosions in the petroleum industry, which carries hazardous operations and materials. As per the statistics available, 30% of the total accidents in petroleum industry caused due to electrical problems. The damages due to electrical hazards vary from minor electrical shock, equipment loss to fatal accidents, which causes huge loss to both plant and human beings.

About Assignment:

Electrical Safety Audit has been carried out at Bombay Refinery Division, Mahul, Mumbai considering IS (Indian standard) guidelines, IE (Indian electricity) rules etc. The audit has covered the requirements of Electrical safety & energy conservation for the following:

1. Substation equipment i.e. isolator, breaker panels, transformers, PMCC, lighting distribution boards wherever applicable
2. Flame proof equipment with respect to flame proof characteristics, cable glanding and terminations at Substations
3. Flame proof and non flame proof motors
4. Flame proof lighting fixtures, junction boxes and distribution boards, etc
5. Earthing system and hardware used, continuity test
6. DG sets and accessories wherever applicable
7. Lighting protection
8. High mast towers and lighting poles
9. Electrical equipment used in the administrative building and other amenity blocks
10. Environmental protection provided to the equipment
11. Capacitors and panels for improvement of the power factor wherever applicable.
12. Any other equipment
13. Load balancing on all three phases of supply
14. Scope for energy saving
15. Evaluation of electrical safety for retail equipments at hazardous zones and suggesting ways of rectification
16. Cabling distribution to be studied and checked for healthiness of the cable. Cable layout is to be prepared. Insulation resistance test is to be carried out for all the cables to ascertain the healthiness of the cable
17. Check whether adequate illumination is provided for all the working space around service equipment, switchboards and motor control centers installed indoor/outdoor
18. Budgetary estimates for any major work required to be done subsequent to the audit
19. Single line diagram for electrical layout and earthing layout for the respective Retail Outlets

How did we approach

In Electrical Safety audit in order to achieve the said objectives and perform the assignment a team of consulting engineers carried out the required observations, tests and checks in all the three units of the Refinery (which are Fuel Refinery, Captive Power Plant (CPP)& Lube Refinery). It includes inspection of all refinery equipments and facilities for electrical safety as per OISD-137.

Our overall focus has been on data collection, measurement of resistance offered by earth grid at various earth pits, checking of continuity, check for adequacy of earth pits to minimize the hazard potential& checking all electrical equipments like lighting system, motors, starters& push button switches for their flame proof nature and check the cable glands for their effectiveness.

Observations:

Following observations were found out during Electrical Safety Audit:


1. General cleanliness of electrical panel is OK.
2. Mains Electrical Panel Room is **not** separately provided.
3. Adequate space has been provided for accessing Mains Electrical Panel.
4. Weather protection is provided to electrical panel.
5. Dust and vermin-proof panel is provided.
6. There is **external damage** to electrical fittings & panel.
7. Ventilation is adequate.
8. Shock treatment chart is **not** displayed.
9. Earthing pit has **not** been provided for Mains Electrical Panel.
10. Earthing is connected to Mains Electrical Panel.
11. HRC Fuses for protection are **not** provided.
12. Indicating Lamps are **not** provided.
13. Voltmeter and Ammeter is **not** provided.
14. Doors/covers are properly closed.
15. Battery for DG set is not provided.
16. Nut & Bolts of cable connections are tight.
17. Cable termination glands are **not** provided.
18. Cable lugs are **not** provided.
19. Proper support & dressing has **not** been provided to cables.
20. Cable trench is **not** provided.
21. There is no roof leakage or possibility of water spillage in this area.
22. Water drainage arrangement is OK in the surrounding area.
23. Housekeeping is **not** satisfactory in this area.
24. Sealing of cables and bus duct entries are OK.
25. Rubber mats are **not** provided.
26. Labeling on the switchboard for the identification of circuits is **not** provided.
27. A danger or caution board is **not** provided.
28. Switch board is rust free.
29. Panel Painting is OK.
30. Painted line diagram is **not** provided.
31. Two pairs of Rubber hand gloves are **not** provided.

Findings & Recommendations:

1. Break glass fire alarm system should be provided in substation.
2. Exhaust fan should be provided in battery room for proper ventilation.
3. Safety equipments like Rubber apron, Acid proof gloves, Goggles etc.; should be provided in Battery room.

4. Air Ventilation System is poor (No exhaust fans are not provided and need to be provided).
5. Shock treatment chart should be provided.
6. Cable identification tags should be provided.
7. Rubber apron, Acid proof gloves, Goggles should be provided in Battery room.
8. Sand filled buckets should be provided near Transformer.
9. Proper cover should be provided on earth pit as per IS-3043.
10. Oil Leakage should be attended & rectified immediately.
11. Some motors don't have flameproof connections; immediately change to flameproof connections.
12. Colour of Silica gel has been changed to pink & orange; should be replaced
13. Vegetation should be removed immediately.
14. Lights should be provided near Transformer.
15. Rusted terminal Box should be painted immediately.
16. Some motors don't have double earthing; should be provided immediately
17. Tank earthing resistance is high; earth strip should be replaced.
18. Rusted bars, Electrodes, Nuts & Bolts, C-Clamp, CI cover should be replaced.
19. Some tanks don't have earthing connections/ Earth pits; should be provided
20. Earth pit should be traceable for regular maintenance.
21. Damaged masonry wall should be reconstructed.

If interested please contact:

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