

1. Lightning Protection system requirements

1.1. Applicable standards:

- IS/IEC 62305
- OISD GDN 180

1.2. Protection of Building/Structure against Lightning:

The buildings/structures in a potentially explosive atmosphere shall be designed for lightning protection system in accordance with applicable **OISD 180 and IS/IEC 62305 Lightning Protection** standards.

1.3. Scope:

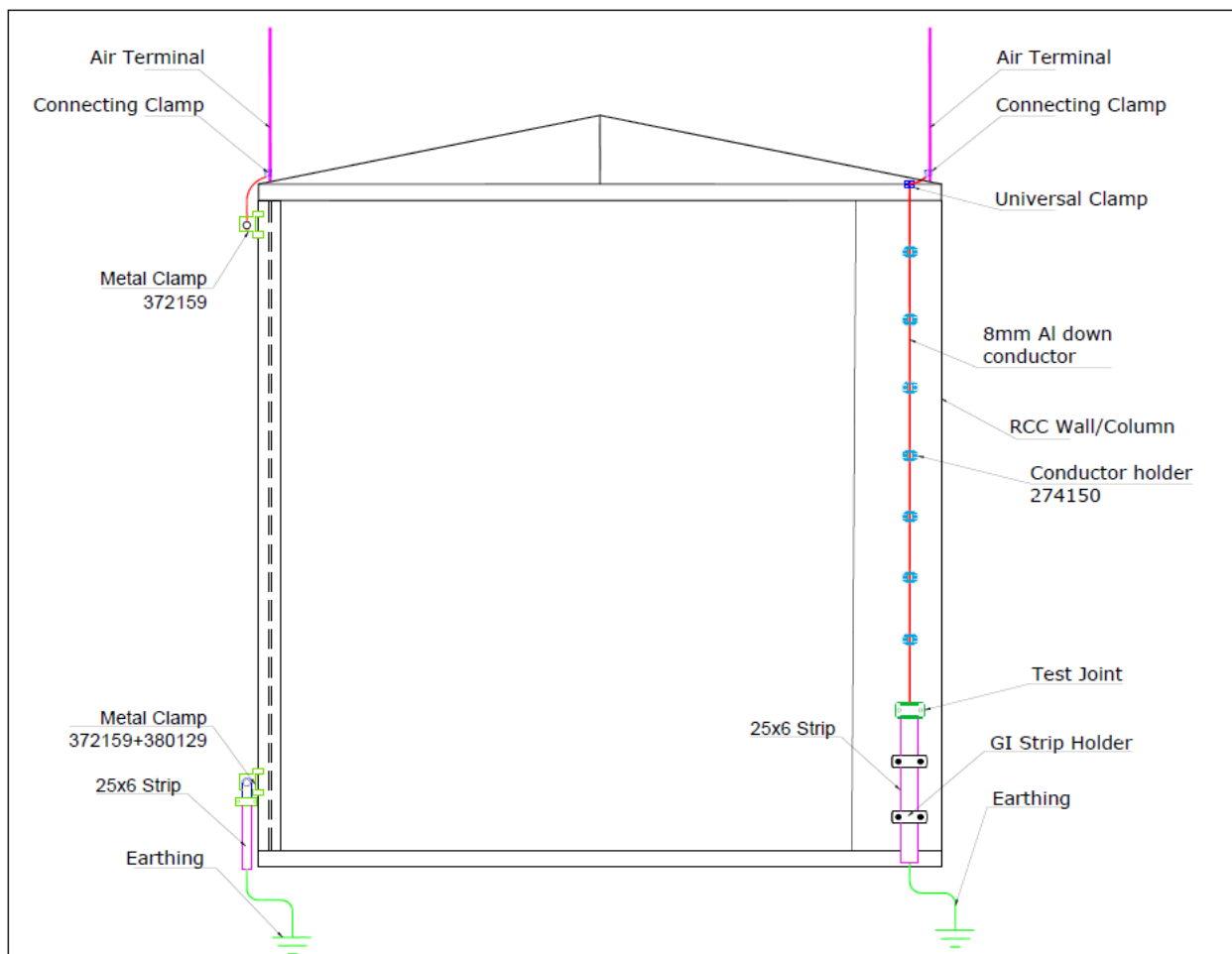
The applicable Indian standard IS/IEC 62305 supersedes old IS 2309:1989 standard for lightning protection. The standards clearly state the necessary requirement of protection of structure against lightning using the various methods for external lightning protection and internal lightning protection using surge protection measures, as defined in the said standard. Also, OISD GDN 180 states requirement and method of lightning protection system.

- i. As per OISD GDN 180 and IS/IEC 62305-2, it is essential to determine the risk involved in the structure and depending on the risk involved, level of protection is determined which is basis of designing as per IS/IEC 62305-3 and IS/IEC 62305-4.
However, areas with potential explosive or hazardous atmosphere, the lightning protection system is essential, irrespective of the overall risk factor. And, at least Class 2 lightning protection system shall be adopted for structure with risk of explosion.
- ii. Therefore, the design may be made according to IS/IEC 62305-3 using any or combination of three method, as per defined lightning protection level: -
 - ⇒ Rolling sphere method
 - ⇒ Mesh method
 - ⇒ Protection angle method

1.4. Protection concept

1. Here, the non-isolated concept of lightning protection system is applied for all structures.
2. The main and most effective measure for protection of structures against physical damage is considered to be the lightning protection system (LPS). It usually consists of both external and internal lightning protection systems.
3. **An external LPS** is intended to
 - a) intercept a lightning flash to the structure (with an air-termination system),
 - b) conduct the lightning current safely towards earth (using a down-conductor system),
 - c) disperse the lightning current into the earth (using an earth-termination system).
4. Air termination system: The structures to be protected are installed with air terminals to intercept direct lightning and avoid any situation of hot spot or surface melting. These terminals will be connected to the truces of the structures to make continuity for conduction of lightning current.

5. Down conductor system: The structures (are with metallic roof and column) to be protected are being used as natural lightning protection component as per IS/IEC 62305-3 where thickness of the metal sheet/structure is in accordance with standard requirement.
6. Earthing termination system: The truces in turn connected with metal column will be terminated to the earthing system using GI flats of sufficient size as per standard requirement. These termination to the dedicated earth pits shall be made at a regular interval of 10m as per LPL-II requirement of down conductors in accordance with IS/IEC 62305-3.
7. The Type B earthing forming a closed ring is to be installed by interconnecting all earth pits across periphery of the structure by using GI flats of sufficient size, buried underground at a depth of atleast 0.5m and at a distance of about 1m away from the structure. It is to be ensured that 80% of the ring conductors shall be in contact with the soil.
8. A typical scheme showing a non-isolated external lightning protection concept with various lightning protection components along with BOM is attached for ease of reference.
9. In the typical scheme, two ways of down conductor system is illustrated based on the MOC of the column. One side is for metal column and the other side with RCC column.



10. **An internal LPS** prevents dangerous sparking within the structure using either equipotential bonding or a separation distance (and hence electrical insulation) between the external LPS components and other electrically conducting elements internal to the structure.

11. Since, we are using the structure to be protected as natural lightning protection component, there will be a partial flow of lightning current across it and therefore the electrical equipment inside the structure becomes vulnerable to these lightning current and shall be installed with atleast Type 1+2 Surge Protection Devices (SPD) rated to discharge 10/350microsec lightning impulse current.
12. The Mains LT power supply panel, sub-distribution panel or PDB panels for pumps, compressors, filling sheds etc. are to be installed with Type 1+2 SPD. The electrical fittings on the roof of the sheds like light fixtures etc. are also to be installed with Type 1+2 SPD's.
13. The various earthing grids like lightning earth pits, electrical safety earth pits, instrumentation earth pits shall be directly interconnected to form an equi-potential surface during the event of lightning strikes. The direct connection is to be made using GI flats of sufficient size. And places where direct interconnection of various earth pits is not possible due to operational reason, isolating spark gap (ISG) is to be used for establishing the interconnection to meet the operational requirement of various earth pits.

1.5. Bill of Material:

1. The detailed bill of material for both external and internal LPS is attached for reference purpose. The technical specification of various lightning protection components is also mentioned.
2. It is to be noted that the lightning protection components are to be tested as per applicable IEC/EN 62561 standard for external LPS components and IEC 61643-11 for SPD's.