

**SPECIFICATIONS FOR LIGHTNING
PROTECTION SYSTEM**

Revised on 02-09-2017

TABLE OF CONTENTS

	Page Number
1.1 General Requirements	8ar- 2
1.1.a Air Terminations (Final)	8ar- 2
1.1.b Down Conductors	8ar- 2
1.1.c Earth Termination Network	8ar- 3
1.1.d Testing Clamp	8ar- 3
1.1.e Bonding	8ar- 3
1.1.f Corrosion	8ar- 3
1.1.g Inspection, Testing, Records & Maintenance	8ar- 4
1.2 Specification	8ar- 4

SPECIFICATIONS FOR LIGHTNING PROTECTION SYSTEM

1.1 GENERAL REQUIREMENTS

A complete lightning protection system for the structures, equipment & accessories including clear water reservoir, distribution tower, high lift pump house and chlorinator house is necessary. All materials and labour necessary in this regard, shall be supplied and installed by the contractor (Refer Drawing No.....and other relevant drawings). It is to be decided by the contractor to supply and install a common protection system for all clear water reservoir, distribution tower, high lift pump house and chlorinator house or separate protection system for each depending on the cost factor, all components of the system and their installation shall comply with BS 6651: 1992 or equivalent.

The principal components of the lightning protection system, in accordance with BS 6651:1992 shall be:

- Air Terminations
- Down Conductors
- Earth Termination Network
- Bonding (to prevent side flashing)

In addition, the following areas shall be considered.

- Corrosion
- Inspection, Testing, Records and Maintenance

1.1.a Air Terminations (Final)

Number of air terminals (final) required and place of installation, for the protection of above mentioned structures and equipments shall be decided by the contractor, contractor should submit any methodology, calculation and relevant standards which have been used to design the lightning protection system with the offer, also the safety & protection of the people and their belongings in the surrounding area should be taken in to consideration while designing the protection system. The final shall be of phosphor bronze with one central pointed rod, and at least three rods placed symmetrically around it. The rods shall have a minimum diameter of 10mm with the top ends well pointed. The final assembly shall be carried on a rod having sufficient diameter to ensure stability under maximum wind forces.

1.1.b Down Conductors

There shall be two down conductors from each final along the structure to the earth termination network and shall be routed as directly as possible to avoid risks of side flashing. Re-entrant loops are also be avoided.

In addition, a down conductor shall have minimum sectional area of 50mm² and shall be securely fixed to the rod supporting the final and to the structure. All fixing materials used are to be fully weather proof requiring no maintenance after installation. The part of the down conductor above 3m from ground level shall be encased in high strength PVC pipe of adequate internal diameter.

1.1.c Earth Termination Network

There shall be a separate earth termination for each down conductor. Moreover provision shall be made in each down conductor, for disconnection from the earth for testing purposes. This is achieved with a test clamp (see below)

The earth station shall consist of a single or a set of interconnected earth pipes, rods or plates, buried as close as possible to the testing point. The materials used shall be long lasting without the need for periodic maintenance after installation. The earth resistance of the network under dry weather conditions shall not exceed 5 ohms.

1.1.d Testing Clamp

Every down conductor shall be provided with a Testing point close to, and before connection to the Earthing station. The testing point shall be conveniently located and shall be guarded against inadvertent or unauthorized tampering. At the testing point it shall be possible to conveniently detach the down conductor from the Earth Termination for purposes of resistance measurements. No additional joints are permissible between the testing point and the earthing station. The joint at the testing station shall be well protected against adverse effects of the weather.

1.1.e Bonding

All metal work, including water pipes, metal cladding etc, in the vicinity of the lightning Protection System must be bonded to it, to avoid the danger of side flashing.

For the same reason, the Lightning Protection System earth should be bonded to the main electrical earth, as well as any other earthing system present in the structure.

1.1.f Corrosion

BS 6651:1992 contains tables of materials suitable for use in lightning Protection System components. Adherence to these requirements is vital to avoid corrosion problems.

1.1.g Inspection, Testing, Records & Maintenance

Of particular importance is the regular detailed examination of the complete lightning protection system with records for any evidence of corrosion. If this check is not carried out then vital components within the lightning Protection System, which may have suffered from corrosion and which could exhibit a high resistance could be missed.

To minimize this problem, along with regular inspections, the selection of the correct materials should be made in accordance with the recommendation of BS 6651:1992.

1.2 SPECIFICATION

The selection of equipment and the installation of the lightning protection system shall be in accordance with the recommendation of BS 6651 of 1992.

Selection and installation should be done to suit the materials of roof and other prevailing conditions of the work place, which should be studied by the contractor.

BS 6651:1992 contains tables of materials suitable for use in Lightning Protection System components. Adherence to these requirements is vital to avoid corrosion problems.

Air termination shall be copper or phosphor bronze and other material better in quality. Projecting length of the Air Terminations (which shall not be less than 0.3 m high) should be decided so that the whole area required to be protected, shall be protected against lightning.

Down conductors shall be copper 25 x 3 mm in section. The position and spacing of down conductors shall be governed by architectural convenience and their number shall be one for each 20m or part thereof of the perimeter at roof level or ground level whichever is greater.

The down conductor shall follow the most direct path possible between the air termination and the earth termination. If bends cannot be avoided, they shall be of a large radius as possible and the down conductor shall not be made to turn upwards.

Total length of the down conductor may be nearly 25m. The Lightning protection system should have as few joints as possible. Joints and bends shall be mechanically and electrically effective. E.g. Clamped, screwed, bolted, riveted or welded. Overlaps shall not be less than 20mm.

The down conductor shall be connected to the general mass of the earth by most efficient means possible. The earth termination network should have a combined resistance to earth not exceeding 5 ohm.

Each down conductor shall be provided with a test joint in such a position that, whilst not inviting unauthorized interference, it is convenient for tests.

Earth electrodes shall be capable of being isolated and a reference earth electrode shall be provided for testing purpose.

(Reference electrode: an earth electrode capable of being completely isolated from an earth terminating network for use in periodic testing)

An indicating plate detailing the number, position and type of earth electrodes shall be fitted above earth test point.

All earth terminals in the site should be bonded together (i.e. panel earth and all lightening earths should be bonded together)

All total works, including water pipes, metal cladding etc, in the vicinity of the Lightening Protection System must be bonded to it, to avoid the danger of side flashing.

On completion of the installation, the resistance to earth of the whole installation shall be measured, and the electrical continuity of all conductors, bends and joints and their mechanical condition shall be verified. Method of Testing shall be in accordance with BS 7430:1998.

The contractor shall provide the following at least 14 days before handing over.

- i. A lightening protection system log book to record:
 - (a). the resistance to earth of the earth termination network and of earth electrodes:
 - (b). the results of a visual check of all conductors, bends and joints or their measured electrical continuity.
- ii. A manual showing Test procedures on measurements of earth resistance continuity of conductors, periodic inspection and other information needed for the proper maintenance and upkeep of the lightening protection system.

Notes : Some contents must be modified by the designer to suit the particular application and designer may add further requirements.