

If it is temporarily not possible to inspect some connections, for example due to site works, this should be noted. Any bonding of recently added services should be both inspected and recorded.

All changes, alterations or additions to the building structure which may require changes to the lightning protection system, including change of use, particularly such changes as the erection of masts, aerials or chimneys, must be recorded and brought to the attention of the responsible person.

It is a recommendation of BS 6651 (clause 16.1) that each down conductor of the installation be connected to an earth electrode.

11.3 Testing

Testing is an integral part of maintenance and should be carried out to confirm the visual inspection. Testing also confirms that there is continuity, and that the resistance to earth is within the limits required by the British standard. The results should be compared with the results from the previous tests and any substantial changes investigated. Environmental conditions should be recorded when carrying out tests. Resistance values may be higher during the height of summer when the ground is dry or in winter conditions when the ground is frozen. Measurements should, ideally, be taken under the worst conditions to be expected.

The following tests should be performed on the completion of the installation of a lightning protection system and at fixed intervals preferably not exceeding 12 months. The results should be recorded in a lightning protection system log book.

- a** The resistance to earth of each local earth electrode. Each local earth electrode will need to be disconnected at the test point between the down conductor and the earth electrode connection to perform this measurement (this is the 'isolated measurement').

Prior to disconnecting an earth electrode, it will need to be tested to ensure that there is no potential that could pose a risk of electric shock. The down conductor and the earth electrode should be checked for voltage both before and after disconnection. The voltmeter should be checked before and after making measurements with a proving unit.

Significant differences between the measurements for individual electrodes should be investigated.

- b** The resistance to earth of the complete earth termination system ('combined measurement'). This value must be measured when not bonded to other services.

The resistance to earth of the complete installation, comprising all the electrodes, should not exceed 10 Ω . If the resistance to earth of a lightning protection system exceeds 10 Ω , the value should be reduced except for structures on rock. If the resistance is less than 10 Ω but significantly higher than the previous reading, the cause should be investigated and any necessary remedial action taken. It is important to reduce the resistance to earth to 10 Ω or less as this reduces potential gradients around the earth electrodes when lightning currents are discharged. It may also reduce the risk of side flashing.

As previously stated, each down conductor of the installation should be connected to an earth electrode and the resistance to earth of each of these earth electrodes should not exceed the resistance value given below:

$$\text{maximum value of electrode resistance} \leq 10 \times \text{No. of earth electrodes}$$

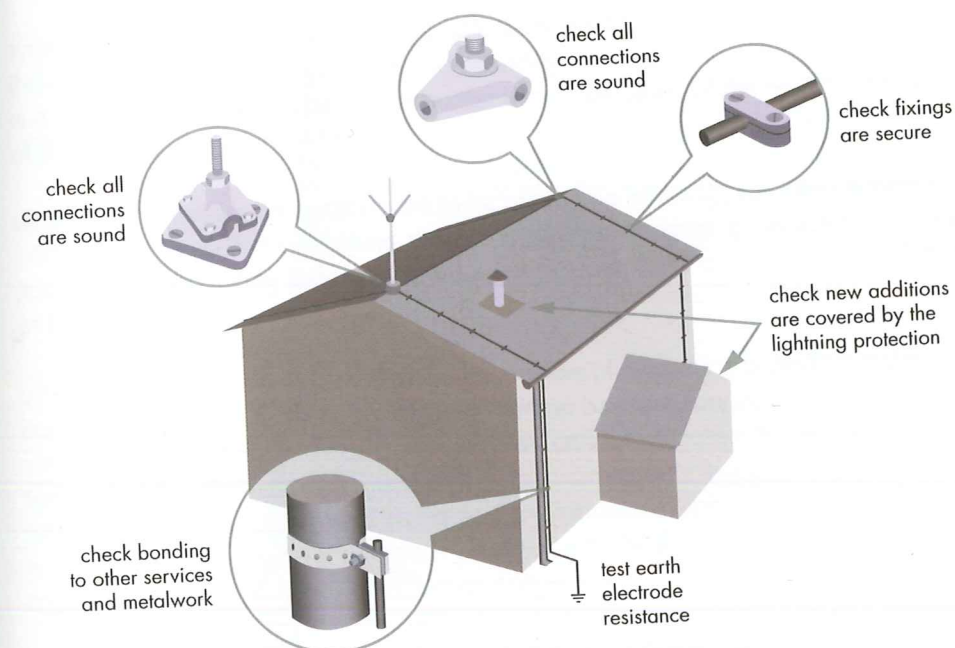


Figure 11.2 Checks to be made on a lightning protection system

For example, if there are ten electrodes in the installation, the resistance of each individual electrode should not exceed 100 Ω and if there are 20 electrodes in an installation, the resistance of each individual electrode should not exceed 200 Ω .

- c** A visual check on the condition of the conductors, bonds and joints or their measured electrical continuity.

The recommended method of testing is given in BS 7430.

11.4 Records

The following records should be kept on site by the person responsible for the lightning protection system and made available to engineers performing maintenance:

- a** Scale drawings of the installation showing the nature, dimensions, materials and positions of all component parts of the system. The drawings should be up-to-date and show any additions or changes made.
- b** The nature of the soil, in particular the presumed soil resistivity ($\Omega.m$).
- c** Any special earthing arrangements.
- d** The type and position of the earth electrodes including the reference electrodes.
- e** The test conditions and results obtained.
- f** Any alterations, additions or repairs to the system.
- g** The results of all previous tests, including environmental conditions at the time of testing.
- h** The name of the person responsible for the installation or its upkeep.
- i** The presence of a label at the origin of the electrical installation.

This structure is provided with a lightning protection system that is in accordance with BS 6651 and the bonding to other services and the main equipotential bonding should be maintained accordingly.

Figure 11.3 Lightning protection label