



Construction Plant-hire Association
Tower Crane Interest Group



Tower Crane Technical Information Note

TIN 036

Tower Crane Power Supplies, Earthing Arrangements and Lightning Protection

This Technical Information Note sets out requirements for the provision of tower crane power supplies, earthing arrangements and lightning protection arrangements.

Power Supplies and Earthing

Before the tower crane arrives on site, checks should be made to ensure that there is an adequate mains electricity supply. Most tower cranes require a three phase supply and the tower crane manufacturer's instruction manual will specify the type and size of supply required. If a suitable mains supply is not available on site, the alternative is to use an engine driven generator which must be adequately earthed and sized to cope with the potentially high starting currents of the tower crane motors. The use of frequency controlled motors on later designs of crane will reduce starting currents and consequently the required capacity of the power supply, which is particularly beneficial when a generator is used.

Some control systems however, require that the power supply to the control panel heaters is left on at all times to ensure that a stable temperature and humidity is maintained. In this case, when power from a generator is not available, a temporary night supply will be required.

All cables should be of the steel wire armoured type to give adequate mechanical protection in site conditions. The power supply should terminate in a suitable weatherproof isolator adjacent to the crane. Care should be taken to ensure that the tower crane power supply is not switched off without giving the crane team plenty of warning, as this may lead to uncontrolled movements of the crane.

If earth fault protection is provided by the use of Residual Current Devices (RCDs) these may need to be set with an appropriate trip current and delay setting to ensure discrimination between RCDs on the site distribution system and prevent nuisance tripping. Any RCD protecting the tower crane supply will need to have appropriate trip current and delay settings to avoid nuisance tripping caused by frequency control drives on the tower crane. RCDs with a 30mA rated tripping current and "instantaneous" operation are only required on final sub circuits, such as socket outlets, to protect users of portable appliances and a tower crane is not classified as a portable appliance. Nuisance tripping of a tower crane supply may also lead to uncontrolled movements of the crane.

The electrical installation should be in accordance with BS 7671:2008+A1:2011 *Requirements for electrical installations — IET Wiring Regulations 17th edition*. Section 704 sets out specific requirements for construction and demolition site installations.

Additional guidance is given in:-

- BS 7375:2010, *Distribution of electricity on construction and demolition sites - Code of practice*;
- BS 7430:2011, *Code of practice for protective earthing of electrical installations*.

Lightning Protection

Lightning protection should be provided for all tower cranes erected on site. Reliance should not be placed on the earth conductor of any mains power supply. Normally the earth bonding can be connected to the lowest metallic part of the crane structure as the metal structure of a tower crane provides good continuity. Following installation of lightning protection, an earth continuity check should be made to ensure that the resistance path between the bottom of the tower and earth is less than 10 ohms.

If the resistance to earth exceeds 10Ω, the tower crane base should be bonded to a suitable earth network via a single core cable of not less than 70 mm² cross sectional area and the earth resistance measured again to ensure that it has been reduced to an acceptable value. The connection to the tower cranes base should be carried out using the manufacturer's approved earthing points.

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In the event of a lightning strike the crane should be thoroughly examined before being returned to service, to ensure that damage has not occurred to the crane or any of its components including the slew ring, safety and control systems.

Further information on lightning protection is given in BS EN 62305-1:2006, *Protection against lightning - Part 1: General principles* and BS EN 62305-3:2006, *Protection against lightning - Part 3: Physical damage to structures and life hazard*

NOTE: *Provision of power supplies and arrangements for lightning protection are normally the responsibility of the tower crane Hirer (user).*

Operational Issues when Lightning Occurs

Lightning can induce significant voltages in the tower crane structure, which may lead to the electrocution of personnel in direct or indirect contact with the crane or load. In the event of a thunderstorm warning the operator should put the crane out of service and leave the crane. Where the operator does not have time to leave the crane, as in the event of a sudden thunderstorm, he/she should stay in the operating cab and avoid touching any controls until the storm has passed.

It is important that personnel on the ground do not touch any part of the load, lifting accessories or the crane structure during a thunderstorm.