	Construction Plant-hire Association Tower Crane Interest Group ***Tower Crane Technical Information Note***	
TIN 045	**Load Testing of Tower Cranes**	

1. Scope

This Technical Information Note deals with the load testing of tower cranes at time of first supply, on subsequent erections and when in-service.

2. Regulations

The first supply and subsequent use of tower cranes in the UK fall under two different sets of regulations:-

- **First supply** is covered by the *Supply of Machinery (Safety) Regulations 2008*, which is the UK's implementation of the European Machinery Directive 2006/42/EC;
- **Subsequent use** is covered by the *Provision and Use of Work Equipment Regulations 1998* (PUWER) and the *Lifting Operations and Lifting Equipment Regulations 1998* (LOLER), which are the UK's implementation of the European Use of Work Equipment Directive 89/655/EEC (as amended).

3. Load testing of Tower Cranes at Time of First Supply

As stated above, when a new tower crane is supplied to its first owner (first placed on the market) it must comply with the requirements of the *Supply of Machinery (Safety) Regulations*. Most manufacturers do this by complying with the Harmonised Product Standard for tower cranes, EN 14439. **Clause 6.3** and **Annex D.3.3** of EN 14439:2006+A2:2009 set out the requirements for the static and dynamic tests that must be carried out on each crane made, at time of first erection; which for a top slew tower crane is generally on site. The standard requires a static test with 125% of rated capacity and a dynamic test with 110% of rated capacity.

NOTE 1: *It is essential that the manufacturer's static and dynamic test procedures for the specific model and configuration of crane to be tested are followed (see* ***Section 7****)*

NOTE 2*: Where a tower crane is supplied with a "special load curve" allowing an increased rated capacity at restricted motion speeds, the Standard specifies that the static test should be carried out at 125% of the standard rated capacity whilst the dynamic test shall be carried out at 110% of the enhanced rated capacity (at restricted speed).*

4. Load Testing of Tower Cranes on Subsequent Erections and In-service

Once a new tower crane has been erected for the first time, load tested and is taken into service, it is subject to the requirements of PUWER and LOLER. Load testing, subsequent to load testing at time of first supply, is covered by the Approved Code of Practice to Regulation 9 of LOLER which states that *"The competent person should decide whether or not a load test is necessary, and the nature of the test, as part of the thorough examination."*

The guidance to Regulation 9 of LOLER states that *"The design of certain lifting equipment is such that damage may be caused by conventional overload tests. The competent person carrying out the thorough examination or testing should take account of the instructions and other relevant information, e.g. regularity of such testing, provided by the manufacturer."*

In the case of tower cranes, **Clause 9** of BS 7121-2-5:2012, *Code of practice for the safe use of cranes, Part 2-5: Inspection, maintenance and thorough examination – Tower cranes,* states that *"Overload testing of tower cranes should be carried out to supplement the thorough examination after each erection, and after every reconfiguration (alteration of jib length, alteration of tower height, addition or removal of ties, (etc.)"*. The nature of the test and the magnitude of the overload should be specified by the tower crane manufacturer.

Clause 9 of BS 7121-2-5 also sets out the steps that need to be carried out before testing, test preparation, test procedure and post-test thorough examination.

5. Rated capacity indicator/rated capacity limiter (RCI/RCL) calibration check and functional test

Clause **8.11** of BS 7121-2-5 sets out requirements for RCI/RCL calibration checks and function tests as follows:-

*"The thorough examination of a tower crane before being put into use for the first time (see **8.5**) and following installation (see **8.6**) should include a calibration check of the rated capacity indicator/rated capacity limiter (RCI/RCL) in accordance with BS 7121-2-1:2012, **10.15** and a functional test with a known load in accordance with Clause **11**. The periodic thorough examination (see **8.7**) should include a functional test with a known load in accordance with Clause **11**."*

6. Test Weight Accuracy

Test weights should be used which have been proven to be accurate within ±1% of their nominal value by a weighing device which has been calibrated within the previous 12 months.

The accuracy of the weighing device should be such that the sum of the possible calibration error and the indicated load error do not exceed ±1.0% of the required test load. (BS 7121-2-1:2012, Clause **10.11.6**).

***NOTE:** If a calibrated "digital load link", placed between the crane hook and test weight, is used to ascertain the mass of the test load it should meet the above criteria for accuracy and calibration.*

7. Typical Commissioning Test Requirements

Tower crane manufacturers have specific test procedures for carrying out the commissioning tests of a new crane. It is essential that the test procedures for the specific model and configuration of crane to be tested are followed.

Test procedures for the static test will typically contain the following elements:-

- A test load of 125% of the load curve is lifted 200mm off the ground;
- Only one motion can be used at a time;
- The motion must be operated at the reduced speed in accordance with the manufacturer's requirements;
- Any oscillation of the crane and load must be allowed to decay before a new motion is selected;
- Travelling is not permitted;
- The load is moved to the maximum radius at maximum load;
- The load is held for a minimum period of 10minutes;
- Maximum permitted wind speed is 29 km/h (8 m/s,18 mph).

Test procedures for the dynamic test will be similar to those in **Clause 9** of BS 7121-2-5:2012.