

Code of practice for

# Safe use of cranes —

Part 2: Inspection, testing and  
examination

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mechanical Handling Standards Policy Committee (MHE/-) to Technical Committee MHE/3, upon which the following bodies were represented:

- Associated British Ports
- Associated Offices Technical Committee
- Association of Consulting Engineers
- Association of Lorry Loaders, Manufacturers and Importers
- BP Trading Ltd.
- British Ports Federation
- British Railways Board
- British Steel plc
- Construction Plant-Hire Association
- Department of the Environment (Building Research Establishment)
- Electricity Supply Industry in United Kingdom
- Engineering Equipment and Materials Users' Association
- Federation of Manufacturers of Construction Equipment and Cranes
- Federation of Wire Rope Manufacturers of Great Britain
- Health and Safety Executive
- Independent Engineering Insurers Committee
- Institute of Materials Management
- Institution of Mechanical Engineers
- Institution of Plant Engineers
- Institution of Structural Engineers
- Lloyd's Register of Shipping

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Amalgamated Engineering Union
- Building Employers Confederation
- Construction Health and Safety Group
- Federation of Civil Engineering Contractors
- Institution of Civil Engineers
- Institution of Occupational Safety and Health
- Oil and Chemical Plant Constructors' Association
- United Kingdom Module Constructors' Association Ltd.

This British Standard, having been prepared under the direction of the Mechanical Handling Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 October 1991

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The following BSI references relate to the work on this standard:  
Committee reference MHE/3  
Draft for comment 89/78497 DC

ISBN 0 580 19862 6

## Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
|          |      |          |
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## Foreword

This Part of BS 7121 has been prepared under the direction of the Mechanical Handling Standards Policy Committee. It should be used in conjunction with other Parts of BS 7121 to ensure, so far as is reasonably practicable, that lifting operations are carried out safely.

It is in the interest of all parties involved in lifting operations to ensure that they are carried out efficiently and safely. CP 3010 and BS 5744 have for many years provided advice to assist crane users to achieve these objectives.

During the review of CP 3010 it was decided that it was essential to broaden the scope to recognize the need for planning the operation and for the adoption of safety systems of work as these are the foundation stones on which the successful operation should be built. It became clear that these foundation stones were essential to all operations regardless of the type of crane to be used, and the committee came to the conclusion that CP 3010 and BS 5744 should therefore be combined into one standard. BS 7121-1 deals with common features and this Part covers in-service inspection, testing and examination. Subsequent Parts will deal specifically with each crane type as follows.

- *Part 3: Mobile cranes;*
- *Part 4: Lorry loaders;*
- *Part 5: Tower cranes;*
- *Part 6: Derrick cranes;*
- *Part 7: Overhead/underhung travelling and goliath cranes;*
- *Part 8: High pedestal and portal jib dockside cranes;*
- *Part 9: Container handling cranes;*
- *Part 10: Rail mounted cranes.*

Parts 1 and 2 of BS 7121 supersede the corresponding sections of CP 3010 and BS 5744.

Amendments to CP 3010 and BS 5744 will be published to delete sections one and two from each publication and to amend the references to BS 7121. When all Parts of BS 7121 have been published, CP 3010 will be withdrawn. BS 5744 will be revised to cover manually operated and light cranes only.

The Health and Safety Executive (HSE) commend the use of this British Standard code of practice to those who have duties under the Health and Safety at Work etc. Act 1974 and other relevant health and safety legislation. This code was drawn up with the participation of HSE representatives and will be included in the list of “standards significant to health and safety at work” available from HMSO.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

## 1 Scope

This Part of BS 7121 gives recommendations for the in-service inspection, testing and examination of cranes and other lifting machines and the means by which tests are to be carried out.

Although this Part does not cover the testing of new cranes, which is given in the relevant British Standard for the particular crane type, it does however give guidance on safety matters to be observed during these tests.

This standard does not cover tests for lorry loaders which are given in BS 1757.

Reference is also made to legislation and attention is drawn to statutory requirements for the testing and examination of cranes.

**NOTE** The titles of the publications referred to in this standard are listed on the inside back cover.

## 2 Definitions

For the purposes of this Part of BS 7121 the definitions given in BS 7121-1 apply.

## 3 General

### 3.1 Testing and examination

Various tests and a thorough examination by a competent person are required to ensure that a crane is safe for use. For legal requirements for the inspection, testing and thorough examination of cranes, see clause 14 of BS 7121-1:1989 and Table 1. Additional tests and thorough examinations are usually necessary following any substantial alteration or repair likely to affect the strength or stability of the crane. Any lifting gear to be used with the crane in normal duties or for the purpose of testing the crane, should be tested separately from the crane prior to use.

### 3.2 Test certificates and documentation

Cranes are used under a wide variety of service conditions but the following minimum certification and documentation requirements generally apply.

- a) A crane should not be used unless it has the appropriate current test certificates. Tests are required following substantial repairs or alteration likely to affect strength or stability and/or periodically as prescribed by legislation (see Table 1).
- b) Periodic examination and inspections, systematic maintenance, repairs, renewals and any necessary heat treatment (as applicable) should be carried out and recorded.
- c) The safe working load(s) should be clearly marked on the crane or the duty charts affixed to it.

d) Any lifting attachments should be clearly marked with their safe working loads and due account taken of their dead weight.

e) A copy of the operating instructions should be with the crane.

f) All test certificates and records related to items a) to e) should be available for inspection.

### 3.3 Design verification and stability

Prior to the application of overloads, it should be established by reference to an authority on the design and construction of the crane, e.g. the manufacturer, that the design of the crane will permit the imposition of the overloads at the positions at which the overloads will be applied.

**NOTE** This is necessary because the overloads may be limited by the structural strength and not the stability of the crane. Under such circumstances the structure might buckle or collapse without warning before the crane gives any sign of tipping.

## 4 Site conditions

**4.1** Careful consideration should be given to the condition of the site where the tests are to be conducted. It should be remembered that the recommendations provided in the operating instructions for the crane relate to operations within the safe working load and that more stringent requirements apply when loads are being applied for the purpose of testing.

Items a) to d) give general recommendations which should be taken into account whenever possible. Further guidance is given in other Parts of this standard covering specific crane types.

- a) The ground should be well consolidated and capable of withstanding the loads that will be applied to it. Care should be taken to ensure that there are no hidden dangers such as cable ducts, drains, pipes, back-filled areas, cellars or other subterranean weaknesses. Cranes should not be tested in the vicinity of overhead power lines (see **9.3.2** of BS 7121-1:1989).
- b) The ground should be level to within the limits appropriate for testing the particular crane.
- c) The site should be of sufficient area and have unrestricted overhead clearance to allow the unobstructed movement of the crane and load throughout all its appropriate test movements, e.g. slewing, derricking, travelling.
- d) Tests should not be conducted over high risk areas e.g. a public highway, railway, occupied buildings or in the flight path of airports (see **9.3.3** of BS 7121-1:1989).

Table 1 — Legal requirements for the inspection, testing and thorough examination of cranes

| Authority                                                                         | Before erection, before being taken into use after each erection, adjustment, removal or exposure to weather conditions affecting anchorages or ballasting of cranes | Before first being taken into use                               | Before being taken into use for the first time after dismantling or being out of regular use for a period exceeding two months | Weekly | Monthly                                           | 12-monthly                                                                      | 14-monthly                         | 4-yearly | After substantial alteration or repair if likely to affect strength or stability |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------|----------|----------------------------------------------------------------------------------|
| The Docks Regulations 1988                                                        | Test and thorough examination Regulations 14(1)(a) and 15(1)(b)                                                                                                      | Test and thorough examination Regulations 14(1)(a) and 15(1)(b) |                                                                                                                                |        |                                                   | Max period between thorough examinations Regulation 15(1)(a)                    |                                    |          | Test and thorough examination Regulations 14(1)(b) and 15(1)(b)                  |
| The Loading and Unloading of Fishing Vessels Regulations 1988 — SEE Guide HS(R)2B | Test and inspection before use Regulation 6.2 Guide Clause 4 and 6                                                                                                   | Test and inspection Regulation 6.2 Guide Clause 4 and 6         | Test and inspection Regulation 6.2 Guide Clause 4 and 6                                                                        |        | Thorough inspection Regulation 6.2 Guide Clause 5 | Thorough examination Regulation 6.2 of lifting plant over 250 kg Guide Clause 6 |                                    |          | Test plant over 250 kg Regulation 6.2 Guide Clause 6                             |
| The Shipbuilding and Ship Repairing Regulations 1960                              |                                                                                                                                                                      | Test and thorough examination Regulation 34(1)                  |                                                                                                                                |        |                                                   | Thorough examination Regulation 34(2)                                           |                                    |          | Test and thorough examination Regulation 34(1)                                   |
| The Factories Act 1961                                                            |                                                                                                                                                                      | Test and thorough examination Section 27(6)                     |                                                                                                                                |        |                                                   |                                                                                 | Thorough examination Section 27(2) |          |                                                                                  |

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|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------|------------|---------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------|
| The Construction (Lifting Operations) Regulations 1961 | Examination of anchorages and/or ballasting Regulation 19(3) and (7)                                                                                                 | Test and thorough examination Regulation 28(1)                     |                                                                                                                                | Inspection Regulation 10(1)(c)                                         |         |            | Thorough examination Regulation 28(3) | Test and thorough examination Regulation 28(1) | Test and thorough examination Regulations 28(2) and (3)                          |
|                                                        | Test of anchorages and ballasting Regulation 19(4)                                                                                                                   | Test of automatic safe load indicators Regulations 30(1) and 30(2) |                                                                                                                                | Inspection of automatic safe load indicators Regulations 30(1) and (2) |         |            |                                       |                                                |                                                                                  |
|                                                        | Test automatic safe working load indicators Regulations 30(1) and (2)                                                                                                |                                                                    |                                                                                                                                |                                                                        |         |            |                                       |                                                |                                                                                  |
| The Quarries (General) Regulations 1956                |                                                                                                                                                                      |                                                                    | Thorough examination Regulation 13(2)                                                                                          |                                                                        |         |            | Thorough examination Regulation 13(1) |                                                |                                                                                  |
| Miscellaneous Mines (General) Regulations 1956         |                                                                                                                                                                      |                                                                    | Thorough examination Regulation 51(2)                                                                                          |                                                                        |         |            | Thorough examination Regulation 51(1) |                                                |                                                                                  |

NOTE 1 The requirements given apply to all cranes unless otherwise stated.

NOTE 2 Reference should be made to the full text of the Act or Regulation indicated.

NOTE 3 Copies of the Statutory Instruments and the prescribed reports and certificates associated with the requirements above are obtainable from Her Majesty's Stationery Office (HMSO), 49 High Holborn, WC1V 6HB for personal callers or by post from HMSO, P O Box 276, London SW2 5DT.

**4.2** If a crane is required to slew over a public highway the client should contact the appropriate Local Authorities to arrange convenient times and dates and, where necessary, diversion of traffic and pedestrians during the tests.

**4.3** If a crane is required to slew over a railway or river the appropriate Authority should be asked to give permission and indicate the most suitable time for the tests to take place.

**4.4** A test is designed to prove a crane and it should be borne in mind that the crane might not withstand the loading. It is therefore necessary to ensure that all personnel not essential to the test are kept away from the area. Test personnel should be positioned so that they are unlikely to be injured should there be a mishap. The test area should be roped off and notices posted prohibiting unauthorized entry. The site should be clear of plant and property which may inhibit the test.

## 5 Weather conditions

NOTE See 12.6 of BS 7121-1:1989.

**5.1** For cranes operating in situations where they are likely to be affected by the weather, careful attention should be given to this aspect. Certain weather conditions such as strong wind, heavy rains, ice or snow can impose loads on a crane or adversely affect the safety of crane operations.

For this reason test sites should not be in areas which are known to be subject to freak weather conditions. The limitations on wind speed for testing of the crane may be lower than the limitations for normal operation and in cases of doubt the designers' or other competent engineers' advice should be sought.

Tests should never be undertaken when the crane or load cannot easily be seen because of limitations on visibility or when heavily coated with ice or snow.

**5.2** The crane should not be operated in wind speeds that are in excess of those specified in the operating instructions for the crane.

NOTE 1 Gusting wind conditions may have an additional adverse effect on the safe handling of the load and the safety of the crane.

NOTE 2 Long jib configurations present larger wind surface areas and in general should not be tested in wind speeds which exceed 8.0 m/s (18 miles/h) (Beaufort scale 4).

NOTE 3 Appendix A gives details of the Beaufort scale of wind force.

## 6 Test weights

The following test weights should be used.

- a) Weights of proven accuracy to within  $\pm 1.0\%$ .
- b) Weights proven on a weighbridge, the weighbridge having been calibrated within the last 12 months.

- c) Weights suspended from a calibrated weighing device, the weighing device having been calibrated within the last 12 months.

NOTE It is important that the weighing device is capable of weighing the test load to within  $\pm 1.0\%$ .

## 7 Thorough examination

**7.1** Prior to the tests the competent person should ensure by thorough examination with the crane in motion and at rest that it is:

- a) free from any defect that would preclude it from safely handling the test load;
- b) in the correct configuration and condition according to the manufacturer's instructions;
- c) equipped with sufficient falls of rope for the load under consideration.

**7.2** Whenever considered necessary by the competent person the thorough examination should be supplemented by the following.

- a) Methods of non-destructive testing that determine the condition of any part of the crane without causing any detrimental change to the material.
- b) The opening up of concealed or encased parts by a skilled person to the extent required by the competent person.

**7.3** The amount of ballast and its disposition should be checked and, where possible, reference should be made to the crane manufacturer's handbook for this information. It should be borne in mind that during the processes of erection and dismantling, ballast can be mislaid or lost.

**7.4** The weight of all ballast should be known and, where not marked on the ballast, the weight should be confirmed.

Where loose ballast such as brick, gravel, punchings, pig iron, billets or similar material is used, it should be effectively contained.

**7.5** The lifting gear should be thoroughly examined before the test and the competent person conducting the test should satisfy himself that the slinging arrangements are safe. Uncertified lifting gear should not be used.

**7.6** The weight of the lifting gear should be included as part of the test load.

**7.7** After test a thorough examination (see 3.1) should be carried out by a competent person to ensure that the crane has withstood the test loadings without signs of structural damage that will affect the safety of the crane, such as:

- a) cracking;
- b) permanent deformation;
- c) paint flaking;