

SINGAPORE STANDARD

**Code of practice for design, safe use and
maintenance of gantry cranes, overhead
travelling cranes and monorail hoists**



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maintenance of gantry cranes, overhead travelling
cranes and monorail hoists**

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Foreword

This Singapore Standard was prepared by the Technical Committee on Safety and Health involving the Use of Equipment under the purview of the General Engineering and Safety Standards Committee.

It is a revision of SS 497 : 2002 which was for overhead travelling cranes only. This revised standard is based on AS 1418.1:2002 – “Cranes, hoists and winches, Part 1 : General requirements” and is reproduced with permission from SAI Global under Licence 1108-c146. Australian Standards can be purchased online at: <http://www.saiglobal.com>.

This standard is expanded to include overhead travelling, gantry, jib cranes and hoists on monorails. It is aligned with current industrial practices and legal requirements on the safe use, design, maintenance and testing of such cranes. The salient points are as follows:

- (a) The responsibilities of the relevant parties who are involved in the design, use, maintenance, testing and inspection of cranes are delineated.
- (b) The requirements under each clause are elaborated to provide a common understanding amongst the various interested parties.
- (c) The in-service wind speeds in Table 10 are based on the updated data obtained from the Singapore Meteorological Service and SS EN 1991-1-4: 2009 ‘Eurocode 1 – Actions on structures – Part 1-4: General actions – Wind actions’.
- (d) Section Two covers the basic design considerations for the crane. Where the design and calculations are based on an overseas / established crane standard, there shall be no mix-and-match of the data quoted in this Singapore Standard and the aforesaid crane standard (e.g. the load factors, coefficients, etc).
- (e) Various safety limiters and indicating devices are introduced as part of the crane mechanism to ensure safe operation. These include anti-collision devices, overload limiters, etc. Work space limiters are also introduced to prevent operation of cranes in prohibited areas where there is danger of collision of crane structure or load with a permanent object or structure.
- (f) When tested with the SWL, the maximum deflection at the centre of the bridge shall not exceed 1/750 of the span. The deflection at end of cantilevered bridge shall not exceed 1/300 of the span of the cantilevered portion of the bridge.
- (g) The markings on cranes have been provided to ensure proper identification and SWL limits, particularly for cranes fitted with at least 2 lifting devices.
- (h) Manufacturer or supplier of cranes is required to provide complete documentation for the crane installed. It includes operations manual, maintenance manual, parts book and log book.

In preparing this standard, references were made to the following publications:

- | | | |
|----|---------|---|
| 1. | AS 1418 | Cranes, hoists and winches
Part 3 : 1997 Bridge, gantry and portal cranes (including container cranes) |
| 2. | BS 2573 | Rules for the design of cranes
Part 1 : 1983 Classification, stress calculations and design criteria for structures
Part 2 : 1980 Classification, stress calculations and design criteria of mechanisms |

3.	DIN 15018	Cranes – Steel structures Part 1 : 1994 Verification and analyses
4.	IEC 60204	Safety of machinery – Electrical equipment of machines Part 32 : 1998 Requirements for hoisting machines
5.	ISO 2408 : 1985	Steel wire ropes for general purposes – Characteristics
6.	ISO 4301	Cranes – Classification Part 1 : 1986 General Part 5 : 1991 Overhead travelling and portal bridge cranes
7.	ISO 4308	Cranes and lifting appliances – Selection of wire ropes Part 1 : 1986 General
8.	ISO 4310 : 2009	Cranes – Test code and procedures
9.	ISO 8686	Cranes – Design principles for loads and load combinations Part 1 : 1989 General Part 5 : 1992 Overhead travelling and portal bridge cranes
10.	ISO 9927	Cranes – Inspections Part 1 : 1994 General
11.	ISO 10245	Cranes – Limiting and indicating devices Part 1 : 1994 General Part 5 : 1995 Overhead travelling and portal bridge cranes
12.	ISO 10972	Cranes – Requirements for mechanisms Part 1 : 1998 General
13.	ISO 11660	Cranes – Access, guards and restraints Part 5 : 2001 Bridge and gantry cranes
14.	SS 536 : 2008	Code of practice for the safe use of mobile cranes
15.	SS 559 : 2010	Code of practice for safe use of tower cranes
16.	SS 567 : 2011	Code of practice for factory layout – Safety, health and welfare considerations

Acknowledgement is made for the use of information from the above publications.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
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Code of practice for design, safe use and maintenance of gantry cranes, overhead travelling cranes and monorail hoists

Section One – General

1 Scope

This standard applies to the following types of powered cranes (hereinafter called “cranes”):

- 1.1 Gantry cranes
- 1.2 Overhead travelling cranes
- 1.3 Jib cranes; and
- 1.4 Monorail hoists.

It specifies the basic requirements of cranes and lays down the responsibilities of the various parties involved.

NOTE 1 – This does not include mobile cranes and tower cranes (covered in their respective individual Singapore Standards).

NOTE 2 – Annex C is informative and could be used as a reference when installing a crane.

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AS 1418.1 : 2002	Cranes hoists and winches Part 1 : 2002 General requirements
ANSI/AWS D14.1 : 2005	Specification for welding industrial and mill cranes and other material handling equipment
BS EN 60470 : 2001	High-voltage alternating current contactors and contactor-based motor starters
BS EN 60947-4-1 : 2001	Low-voltage switchgear and control gear. Contactors and motor-starters. Electromechanical contactors and motor-starters
BS EN 13001-2:2004+A3:2009	Crane safety. General design. Load effects
BS EN 13001-1 : 2004+A1:2009	Cranes. General design. General principles and requirements
BS EN 60309	Plugs, socket-outlets and couplers for industrial purposes Part 2 : 1999 Dimensional interchangeability requirements for pin and contact-tube accessories
DIN 1055-4 (2005-03)	Action on structures – Part 4: Wind loads

DIN 15018-1 (1984-11)	Cranes - Principles for steel structures, stress analysis Part 1 : 1994 Verification and analyses
Euro Code 3	Design of steel structures Part 1-1 : 1992 General rules and rules for buildings Part 1-2 : 1997 General rules – Structural fire designs Part 1-3 : 1996 General rules – Supplementary rules for cold thin gauge members and sheeting
IEC 60034 Ed.12	Rotating electrical machines Part 1 : 2010 Rating and performance
IEC 60204 Ed.2.0	Safety of machinery – Electrical equipment of machines Part 32 : 2008 Requirements for hoisting machines
IEC 60947	Low-voltage switchgear and control gear Part 4 : Contactors and motor-starters Section 1 : 2009 Electrotechnical contactors and motor-starters Section 2 : 2007 AC semiconductor motor controllers and starters Section 3 : 2007 AC semiconductor controllers and contactors for non-motor loads
ISO 2394 : 1998	General principles on reliability for structures
ISO 3077 : 2001	Short link chain for lifting purposes – Grade T, (types T, DAT, and DT), find-tolerance hoist chains
ISO 4306	Cranes – Vocabulary Part 1 : 2007 General
ISO 12488	Cranes – Tolerances for wheels and travel and traversing tracks Part 1 : 2005 General
ISO 8686	Cranes – Design principles for loads and load combinations Part 1 : 1989 General
ISO 9374	Cranes – Information to be provided Part 5 : 1991 Overhead travelling cranes and portal bridge cranes
ISO 11660	Cranes – Access, guards and restraints Part 1 : 2008 General Part 5 : 2001 Bridge and gantry cranes
ISO 13200 : 1995	Cranes – Safety signs and hazard pictorials – General principles
JIS B 8821 : 2004	Calculation of standards for steel structures of cranes
CP 5 : 1998	Code of practice for electrical installations
CP 35 : 1996	Code of practice for the selection, care and maintenance of steel wire ropes for hoisting

SS 145	13A plugs and socket outlets
	Part 1 : 1997 Rewirable and non-rewirable 13A fused plug
	Part 2 : 1997 13A switched and unswitched socket outlets
SS 472 : 1999	15A plugs and switched socket-outlets for domestic and similar purposes