

BS ISO 16625:2013



BSI Standards Publication

Cranes and hoists — Selection of wire ropes, drums and sheaves

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of ISO 16625:2013. It supersedes BS ISO 4308-1:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MHE/3/1, Crane design.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013. Published by BSI Standards Limited 2013

ISBN 978 0 580 74468 6

ICS 53.020.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2013.

Amendments issued since publication

Date	Text affected
------	---------------

INTERNATIONAL STANDARD

BS ISO 16625:2013

ISO
16625

First edition
2013-07-01

Cranes and hoists — Selection of wire ropes, drums and sheaves

*Appareils de levage à charge suspendue — Choix des câbles,
tambours et poulies*



Reference number
ISO 16625:2013(E)
Documents
Document Sharing Hub
© ISO 2013



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Group classification of the mechanism as a whole	1
5 Selection of rope	2
5.1 Type and construction.....	2
5.2 Design factor, Z_p	2
5.3 Minimum breaking force.....	3
5.4 Diameter.....	4
6 Drums and sheaves	4
6.1 Sheave material.....	4
6.2 Calculation of minimum drum and sheave diameters.....	5
7 Exceptional conditions	7
8 Care and maintenance, inspection and discard	7
Annex A (normative) Applicable cranes and hoists	8
Annex B (informative) Other rope-related design and rope selection aspects	9
Bibliography	21

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 96, *Cranes*, Subcommittee SC 3, *Selection of wire ropes*.

This first edition of ISO 16625 cancels and replaces ISO 4308-1:2003, ISO 4308-2:1988 and ISO 8087:1985, of which it constitutes a technical revision.

Cranes and hoists — Selection of wire ropes, drums and sheaves

1 Scope

This International Standard specifies the minimum practical design factors, Z_p , for the various classifications of mechanism, rope types, rope duties and types of spooling and demonstrates how these are used in the determination of the minimum breaking force of the wire rope.

It specifies the selection factors for drums and sheaves for the various classifications of mechanisms, rope types and rope duties and how these are used in the determination of the minimum practical diameters of drums and sheaves that work in association with the selected wire rope.

A list of types of cranes and hoists to which this standard applies is given in [Annex A](#).

[Annex B](#) gives factors, additional to those mentioned above, which might need consideration when selecting the wire rope and associated equipment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2408, *Steel wire ropes for general purposes — Minimum requirements*

ISO 4301-1:1986, *Cranes and lifting appliances — Classification — Part 1: General*

ISO 4306-1, *Cranes — Vocabulary — Part 1: General*

ISO 4309, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

ISO 10425, *Steel wire ropes for the petroleum and natural gas industries — Minimum requirements and terms of acceptance*

ISO 17893, *Steel wire ropes — Vocabulary, designation and classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306-1 and ISO 17893 apply.

NOTE 1 In this document, “single-layer ropes” and “parallel-closed ropes”, as defined in ISO 17893, are referred to as “standard ropes” to distinguish them from “rotation-resistant ropes”.

NOTE 2 Single-layer ropes and parallel-closed ropes are also sometimes referred to as “non-rotation-resistant ropes”.

4 Group classification of the mechanism as a whole

The resulting classification of mechanism (M4, M5, etc.) shall be taken into account when establishing the minimum design factor and the minimum drum and sheave sizes.

The group classification of the mechanism as a whole takes account of the state of loading (light, moderate, heavy, etc.) and the class of utilization of the mechanism (based on total duration of use) as a whole, as detailed in ISO 4301-1.

NOTE Other parts of ISO 4301 (such as ISO 4301-2, covering mobile cranes) specify the classification of a particular type of crane and related crane mechanisms taking account of the rope duty (hoisting, luffing, etc.) and crane operating conditions.

5 Selection of rope

5.1 Type and construction

The wire rope selected shall conform to either ISO 2408 or ISO 10425, according to the application and/or duty.

5.2 Design factor, Z_p

The minimum design factor shall be specified in accordance with [Tables 1, 2](#) or [3](#), as applicable, taking into account the classification of mechanism and the rope duty or rope hoist and, in the case of stationary ropes, the crane classification.

NOTE The design factors listed in the tables are based on long experience in the field.

Table 1 — Minimum design factors for all cranes and hoists except mobile cranes

Group classification of mechanism in accordance with ISO 4301-1:1986	Hoisting				Boom hoisting or luffing	
	Single-layer spooling		Multi-layer spooling		Standard rope	Rotation-resistant rope
	Standard rope	Rotation-resistant rope	Standard rope	Rotation-resistant rope		
M1	3,15	3,15	3,55	3,55	3,55	4,5
M2	3,35	3,35	3,55	3,55	3,55	4,5
M3	3,55	3,55	3,55	3,55	3,55	4,5
M4	4,0	4,0	4,0	4,0	4,0	4,5
M5	4,5	4,5	4,5	4,5	4,5	4,5
M6	5,6	5,6	5,6	5,6	5,6	5,6
M7	7,1	7,1	—	—	7,1	—
M8	9,0	9,0	—	—	9,0	—

Table 2 — Minimum design factors for mobile cranes

Group classification of mechanism in accordance with ISO 4301-1:1986	Running rope						Telescoping
	Hoisting		Boom hoisting				
			Working		Erecting		
	Standard rope	Rotation-resistant rope	Standard rope	Rotation-resistant rope	Standard rope	Rotation-resistant rope	
M1	3,55	4,5	3,35	4,5	3,05	4,5	3,15
M2	3,55	4,5	3,35	4,5	3,05	4,5	3,35
M3	3,55	4,5	3,35	4,5	3,05	4,5	3,35
M4	4,0	4,5	3,35	4,5	3,05	4,5	3,35
M5	4,5	4,5	3,35	4,5	—	—	—
M6	5,6	5,6	3,35	5,6	—	—	—

Table 3 — Stationary working rope and erecting rope

Crane classification	All cranes	
	Stationary ropes	Erection ropes
A1	3,0	2,73
A2	3,0	2,73
A3	3,0	2,73
A4	3,5	2,73
A5	4,0	2,73
A6	4,5	—
A7	5,0	—
A8	5,0	—

5.3 Minimum breaking force

The minimum breaking force of the rope, $F_{\min}$, shall be calculated using Formula (1):

$$F_{\min} \geq S \times Z_p \quad (1)$$

where, for hoisting ropes, S is the maximum rope tension, in kN, obtained by taking into account

- rated working load of the appliance,
- mass of the sheave block and/or other lifting attachments,
- mechanical advantage of reeving,
- efficiency of reeving (e.g. bearing efficiency), and
- the increase in force in the rope caused by the rope inclination at the upper extreme position of the hook, if the inclination with respect to the drum axis exceeds 22,5°;

or, for stationary ropes, S is the maximum rope tension, in kN, obtained by taking account of both the static and dynamic forces;

and where Z_p is the minimum design factor.