



SINGAPORE STANDARD

Code of practice for the selection, care and maintenance of steel wire ropes for hoisting

Erratum No. 1 (issued separately)





CP 35 : 1996 (ICS 77.140.65)

SINGAPORE STANDARD

Code of practice for the selection, care and maintenance of steel wire ropes for hoisting

All rights reserved. Unless otherwise specified, no part of this Singapore Standard may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from SPRING Singapore at the address below:

Standards SPRING Singapore 1 Fusionopolis Walk, #01-02 South Tower, Solaris Singapore 138628

Email: standards@spring.gov.sg

This Singapore Standard having been approved by the Mechanical Standards Committee was endorsed by the Standards Council on 22 November 1996.

First published, 1986. First revision, 1996.

The Mechanical Standards Committee appointed by the Standards Council consists of the following members:

	Name	Organisation
Chairman :	Mr Victor Ho Kwok Weng	Standards Council
Deputy		
Chairman :	Mr Ng Thin Teng	Singapore International Chamber of Commerce
Secretary :	Mr Kiew Hock Thiam	Singapore Productivity and Standards Board
Members :	Assoc Prof Chau Fook Siong	National University of Singapore
	Mr Cheng Wee Sik	Institution of Engineers Singapore
	Mr D D Daruvala	Association of Singapore Marine Industries
	Mr James Kuah Geok Lin	Singapore Chinese Chamber of Commerce and Industry
	Mr Lau Keong Ong	Singapore Productivity and Standards Board
	Mr Leong Kah Fai	Individual Capacity
	Mr James Ling	Gintic Institute of Manufacturing Technology
	Dr Low Kin Huat	Nanyang Technological University
	Mr N M Ramchandani	Singapore Indian Chamber of Commerce and Industry
	Mr Soh Yoke Lun	Singapore Confederation of Industries
	Mr George Sze	Public Works Department

The Technical Committee appointed by the Mechanical Standards Committee and responsible for the preparation of this standard consists of representatives from the following organisations:

	Name	Organisation
Chairman :	Mr Ng Thin Teng	Mechanical Standards Committee
Secretary :	Mr Loke Seck Kar	Singapore Productivity and Standards Board
Members :	Mr Ang Ban Gee	Association of Singapore Marine Industries
	Mr Chan Chee Tack	Port of Singapore Authority
	Mr Ho Lik Chin	Singapore Confederation of Industries
	Mr Leow Kee Wat	Housing and Development Board
	Mr Gilbert Lum Shuet Meng	The Singapore Lift and Escalator Contractors and Manufacturers Association
	Mr Ng Siew Sing	Institution of Engineers Singapore
	Mr Ng Tong Leng	Department of Industrial Safety
	Dr Ong Lin Seng	Nanyang Technological University
	Dr Tay Tong Earn	National University of Singapore

The Working Group (WG) appointed by the Technical Committee for Lifting and Hoisting Systems to prepare the first draft comprises the following members:

	Name	Organisation
WG Leader :	Mr Chan Chee Tack	Port of Singapore Authority
Members :	Mr Ang Ban Gee	Sembawang Shipyard Ltd
	Mr Hashim Bin Mansoor	Department of Industrial Safety
	Mr Leow Kee Wat	Housing and Development Board
	Mr Gilbert Lum Shuet Meng	Hitachi Elevator Engineering (S) Pte Ltd
	Mr Ng Siew Sing	Ngee Ann Polytechnic

CONTENTS

										Page
Forewo	ord -		-		-		_	-	100	7
				CODE	OF PRA	CTICE				
1.	Scope -	-	-	-	-	P	-	-	-	9
2.	Statutory requi	rements	-	-	-	-	-	-	-	9
3.	Definitions	-	-	-		<u>.</u>				9
4.	Selection of st	eel wire	ropes f	or hoistir	ng	-	-	-	-	11
5.	Rope specifica	tions	-	-	-	~	-	-	-	13
6.	Specification of	hecks	-	-	-	-	-	~	-	15
7.	Storage and ha	andling	-	-	-	-	-	-	-	16
8.	Replacement of	of wire r	opes	-		_	-	-	"	18
9.	Maintenance	-	-	-	-	_	-	-	-	27
10.	Inspection and	replace	ment c	riteria	-	_	-		-	29
11.	Associated eq	uipment	_	-	-	-	-	-	-	38
12.	Precautions		_	-	-	-	-	-		46
13.	Documentation	receiv	ing, ins	tallation,	mainter	nance ar	nd dispo	sal)	-	47
				AP	PENDIC	ES				
A.	Diagrammatic	illustrati	on of N				herehiza			
Λ.	during examina		-				-	-	-	49
В.	Common caus	es of wi	re rope	failures	-	-	-	-	-	50
C.	Typical examp	les of fa	ailures t	hat may	occur in	wire ro	pes	-	-	51
D,	Typical examp	ole of a v	wire rop	e inspec	tion reco	ord	-	-	-	55
E.	Examples of w	vire rope	certific	ates	-	-		~	-	56
F.	List of hoisting	equipm	nent	-	-	-	-	-	-	58
G	Example of a	purchas	e specit	ication f	or a wire	rope	-	-	-	59

					Page
H.	Seizing and cutting of wire ropes		~	-	60
J.	Abrasion resistance vs Bending-fatigue resistance -		••	-	63
K.	Types of end terminations		-	-	64
	TABLES				
1.	Number of outside wires against percentage of reserve st	rength	ı		13
2.	Common wire rope sizes available in the market		-	-	14
3.	Tolerances on wire rope dimensions		-	-	15
4.	Seizing wire diameters for use with a range of wire rope of	diamet	ters	~	60
	FIGURES				
1.	Method of measuring the actual diameter of a wire rope		-	-	15
2.	Method of estimating the length of wire rope coiled in a d	rum	-	-	16
3.	Correct methods of storage of wire ropes in reels -		-	p.	19
4.	Correct methods of storage of wire ropes in coils -		**	-	21
5.	Correct methods of handling wire ropes in transit -		_	-	22
6.	Wrong methods of handling wire ropes		-	-	23
7.	Correct methods of handling and uncoiling wire ropes -		-	-	25
8.	Winding of wire ropes from reel to drum or reel to reel -		-		26
9.	Some methods of applying lubricant to wire ropes -		-	-	28
10.	Broken wires		-	-	32
1 1.	Outer strands of wire ropes		_	_	32
12.	Location of broken wires/wear		-	-	34
13.	Flattened portion of a wire rope		-	-	37
14.	Methods of internal examination of wire ropes		-		38
15.	Proper procedure for applying left- and right-hand lay rope on a plain drum		-24		40
16.	Drum groove design		_	_	41

								Page
17.	Sheave groove	-	-	-	-	-	-	42
18.	Various dimensions of a sheave	e and th	ne use of	f a groov	ve gaug	e	-	43
19.	Cross-sections illustrating shea	ve-groo	ve condi	itions	-	-	-	43
20.	Wire rope seating conditions	-	-	-	-	-	-	44
21.	Sheave rope guard -	-	-	-	-	ū	-	44
22.	Maximum angle of fleet	→		-	-	-	-	45
23.	Methods of seizing wire ropes	-	-	-	-	-	-	61
24.	Seizing of preformed and non-p	oreform	ed wire r	opes be	fore cut	ting	-	62
25.	'X-chart'	_	-	_	_	-	-	63

SINGAPORE STANDARD

CODE OF PRACTICE FOR THE SELECTION, CARE AND MAINTENANCE OF STEEL WIRE ROPES FOR HOISTING

FOREWORD

This code of practice was first drawn up in 1986 and was revised in 1996 by the Technical Committee on Hoisting and Lifting Systems under the direction of the Mechanical Standards Committee. The aim is to bring the code up-to-date by incorporating current international practices applicable for use in Singapore. It complements the Singapore Standard, SS 297 - 'Specification for Steel Wire Ropes for Hoisting'.

The objective of this code is to establish a sound practice for the safe and economical application of steel wire ropes. It provides equipment owners, operators and maintenance personnel with a guide on the proper selection, care and maintenance of steel wire ropes.

The major changes from the 1986 edition of this Code are as follows:

- (a) The respective sections were expanded and re-organised to cover areas which had not been adequately addressed previously;
- (b) Irrelevant charts and tables were deleted; and
- (c) Additional drawings and definitions were incorporated to enhance clarity, with endusers in mind.

In preparing this code, reference was made to the following publications:

(1)	BS 6570 : 1986	Code of practice for the selection, care and maintenance of steel wire ropes
(2	2)	ISO 2408 : 1985	Steel wire ropes for general purposes - Characteristics
(;	3)	ISO 4308 ; -	Cranes and lifting appliances - Selection of wire ropes Part 1: 1986: General Part 2: 1988: Mobile cranes - Coefficient of utilization
(•	4)	ISO 4309 : 1990	Wire rope for lifting appliances - Code of practice for examination and discard
(5)	SS ISO 1000 : 1992	SI units and recommendations for the use of their multiples and of certain other units.

- (6) Lifting Tackle Manual by the Construction Safety Association of Ontario, Canada; and
- (7) Wire Rope Users Manual (3rd edition, 1993) by the Wire Rope Technical Board, USA

Acknowledgement is made for the use of information from the above overseas references.

NOTE

- 1. Singapore Standards are subject to periodic review to keep abreast of technological changes and new technical developments. The revisions of Singapore Standards are announced through the issue of either amendment slips or revised editions.
- 2. Compliance with a Singapore Standard does not exempt users from legal obligations.

1. SCOPE

This code of practice covers the selection, care and maintenance of steel wire ropes for hoisting as specified in Singapore Standard, SS 297.

Note: The titles of the publications referred to in this standard are listed at the end of the standard.