

SINGAPORE STANDARD

**Specification for steel tubes and fittings  
used in tubular scaffolding**



Published by

**Enterprise**  
**Singapore**

**SS 311 : 2005**  
(ICS 77.140.75)

---

SINGAPORE STANDARD

**Specification for steel tubes and fittings used in  
tubular scaffolding**

---

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 Enterprise Singapore. Request for permission can be sent to: [standards@enterprisesg.gov.sg](mailto:standards@enterprisesg.gov.sg).

ISBN 981-4154-08-3

## SS 311 : 2005

---

This Singapore Standard was approved by the Building and Construction Standards Committee on behalf of the Standards Council of Singapore on 2 June 2005.

First published, 1986.

First revision, 1994.

Second revision, 2005.

The Building and Construction Standards Committee appointed by the Standards Council consists of the following members:

	<b>Name</b>	<b>Capacity</b>
<b>Chairman</b>	: Mr Goh Peng Thong	<i>Member, Standards Council</i>
<b>1<sup>st</sup> Dy Chairman</b>	: Dr Tam Chat Tim	<i>Member, Standards Council</i>
<b>2<sup>nd</sup> Dy Chairman</b>	: Mr Tan Tian Chong	<i>Member, Standards Council</i>
<b>Secretary 1</b>	: Mr Kenneth Lim See Khoon	<i>SPRING Singapore</i>
<b>Secretary 2</b>	: Ms Lee Hiok Hoong	<i>SPRING Singapore</i>
<b>Members</b>	: Mr Boo Geok Kwang	<i>Singapore Civil Defence Force</i>
	Mr Chan Kok Way	<i>Individual Capacity</i>
	Dr Jimmy Chen Wie Ying	<i>Individual Capacity</i>
	Mr Chin Jen Chyi	<i>Building and Construction Authority</i>
	Mr Chong Kee Sen	<i>Institution of Engineers, Singapore</i>
	Mr Paul Fok	<i>Land Transport Authority</i>
	Mr Desmond Hill	<i>Singapore Contractors Association Limited</i>
	Mr Joseph Lai Kuong Kiu	<i>JTC Corporation</i>
	Mr Benedict Lee Khee Chong	<i>Singapore Institute of Architects</i>
	Assoc Prof Leong Eng Choon	<i>Nanyang Technological University</i>
	Mr Larry Ng Lye Hock	<i>Urban Redevelopment Authority</i>
	Assoc Prof Gary Ong Khim Chye	<i>National University of Singapore</i>
	Er. See Sing Kok	<i>Singapore Manufacturers' Federation</i>
	Er. Shum Chee Hoong	<i>Housing &amp; Development Board</i>
	Dr Tan Guan	<i>Association of Consulting Engineers, Singapore</i>

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

	<b>Name</b>	<b>Capacity</b>
<b>Chairman</b>	: Mr Desmond Hill	<i>Member, Building and Construction Standards Committee</i>
<b>Secretary</b>	: Ms Lee Hiok Hoong	<i>SPRING Singapore</i>
<b>Members</b>	: Assoc Prof Chan Weng Tat	<i>National University of Singapore</i>

<b>Members</b>	: Mr Hashim Bin Mansoor	<i>Ministry of Manpower</i>
	Er. Low Kam Fook	<i>Institution of Engineers, Singapore</i>
	Mr Ng Ek Cheong	<i>Defence Science &amp; Technology Agency</i>
	Er. Ng Say Cheong	<i>Housing &amp; Development Board</i>
	Mr Tan Boon Kee	<i>Building and Construction Authority</i>
	Mr Tan Yew Meng	<i>Singapore Polytechnic</i>
	Assoc Prof Robert Tiong Lee Kong	<i>Nanyang Technological University</i>
	Mr Yap Boon Leong	<i>Land Transport Authority</i>
	Mr Yeang Hoong Goon	<i>CPG Corporation Pte Ltd</i>
<b>Co-opted Member</b>	: Mr Chan Kok Way	<i>Individual Capacity</i>

The Working Group appointed by the Technical Committee to assist in the preparation of this standard comprises the following experts who contribute in their *individual capacity*:

	<b>Name</b>
<b>Convenor</b>	: Mr Low Kam Fook
<b>Secretary</b>	: Mr Leonard Heng Eu Chang (IES)
<b>Members</b>	: Mr Richard Chee
	Mr Benedict Lee
	Ms Theresa Liew
	Mr Tan See Wan
	Mr Teo Tee Hong

The experts of the Working Group are nominated/recommended by the following organisations:

*Institution of Engineers, Singapore*

*Ministry of Manpower*

*PSB Corporation Pte Ltd*

*Singapore Contractors Association Limited*

*Singapore Manufacturers' Federation*

*Technical and Safety Committee of the Oil & Petrochemical Industries (OPITSC)*



**Contents**

	<b>Page</b>
Foreword _____	6

**CLAUSES**

1	Scope _____	7
2	Normative references _____	7
3	Definitions _____	8
4	Steel scaffold tubes _____	8
5	Fittings _____	12
6	Marking _____	14
7	Test reports _____	14
8	Certification _____	14

**ANNEXES**

A	Requirements and quality control of the paint coating _____	15
B	Flattening test for steel scaffold tubes _____	19
C	Tests on right-angle couplers _____	20
D	Tests on swivel couplers _____	22
E	Tests on end-to-end couplers _____	23

**TABLES**

1	Chemical composition of steel tubes _____	10
2	Mechanical properties of steel tubes _____	10
3	Dimensions and tolerances for welded and seamless steel tubes _____	10
4	Performance requirements for fittings for use in tubular scaffolding _____	13
5	Classification of test results _____	17

**FIGURES**

1	Scaffold fittings and accessories _____	9
2	Maximum deviation of a tube from straight _____	11
3	Single cutting tool _____	18
4	Multiple cutting tool _____	18
5	Flattening test _____	19
6	Tests for right-angle and swivel couplers _____	20
7	Tests on end-to-end couplers _____	23

## **Foreword**

This Singapore Standard was revised by the Technical Committee on Construction Management under the purview of the Building and Construction Standards Committee.

This standard lays down the requirements pertaining to steel quality and mechanical properties of the tubes (mild or high tensile steel) and fittings, the finishes and the requisite tests. It is a revision of SS 311 : 1994 'Specification for steel tubes and fittings used in tubular scaffolding'.

The changes include:

- (a) New clause on dimensional checks on steel tubes;
- (b) Dimensions and tolerances for a new type of 3.2 mm thick mild steel tubes (see Table 3);
- (c) New clause on 'Marking' of steel tubes;
- (d) Definition of the frequency of sampling for tubes and fittings for testing;
- (e) Updates on Table 1 'Chemical composition' and Table 2 'Mechanical properties' of steel tubes.

In preparing this standard, reference was made to:

- (1) BS EN 39 : 2001 Loose steel tubes for tube and coupler scaffolds – Technical delivery conditions
- (2) JIS A 8951 : 1995 Tubular steel scaffolds

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

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.
3. Compliance with a SS or TR does not exempt users from any legal obligations.

## Specification for steel tubes and fittings used in tubular scaffolding

### 1 Scope

This Singapore Standard specifies the minimum requirements for steel tubes and related fittings for use in tubular scaffolding used as temporary structures for access or on which persons work and which provide support for the materials used. It is applicable to construction, maintenance, repair and demolition work in building, shipbuilding and repair, petrochemical and other industries.

### 2 Normative references

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

BS 970	Specification for wrought steels for mechanical and allied engineering purposes – Part 1 : General inspection and test procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels
BS 1449	Steel plate, sheet and strip. Carbon and carbon-manganese plate, sheet and strip
BS EN 39 : 2001	Loose steel tubes for tube and coupler scaffolds – Technical delivery conditions
BS EN 10025	Hot-rolled products of non-alloy structural steels – Technical delivery conditions
BS EN 10113	Hot rolled products in weldable fine grain structural steels
ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods
ISO 2409 : 1992	Paints and varnishes – Cross-cut test
ISO 4016	Hexagon head bolts – Product grade C
ISO 4018	Hexagon head screws – Product grade C
ISO 8492	Metallic materials – Tube – Flattening test
JIS A 8951 : 1995	Tubular steel scaffolds
JIS G 3444	Carbon steel tubes for general structural purposes
JIS Z 2201 : 1998	Zinc alloy ingot for die casting
JIS Z 2241	Method of tensile test for metallic materials
SS 5	Methods of test for paints, varnishes and related materials Part G1 : Determination of resistance to continuous neutral salt spray Part H3 : Designation of degree of rusting <sup>120</sup>
SS 280	Frame scaffolding
SS 456	Metallic materials – Tensile testing at ambient temperature