



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS H 4635 : 2006

(JTS)

Titanium and titanium alloy welded pipes

ICS 23.040.15; 77.150.50

Reference number : JIS H 4635 : 2006 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Titanium Society (JTS) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS H 4635 : 2001** is replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Being in conformance with this Standard may come under the use of the patent rights held by the following:

- Name: Kobe Steel, Ltd.
- Address: 10-26, 2-tyôme Wakinohama-tyô, Tyûô-ku, Kôbe-si, Hyôgo-ken
- Name: Sumitomo Metal Industries, Ltd.
- Address: 5-33, 4-tyôme Kitahama, Tyûô-ku, Ôsaka-si, Ôsaka-hu
- Name: Nikko Metal Manufacturing, Co., Ltd.
- Address: 3-banti Kurami, Samukawa-mati, Kôza-gun, Kanagawa-ken

The relevant holders of the above-mentioned industrial property rights have indicated to the Japanese Industrial Standards Committee an intention of granting license to anyone under the nondiscriminatory and reasonable conditions, except to the other holders of the industrial property rights related to this Standard who will not grant their licenses under the same conditions.

It should be noted that following this Standard does not always refer to granting a free license.

It should be noted that the conformance to this Standard does not necessarily suggest the royalty-free opening of the relevant patent rights.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties mentioned above or other than mentioned above. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the technical properties of this kind.

Date of Establishment: 1986-07-01

Date of Revision: 2006-03-25

Date of Public Notice in Official Gazette: 2006-03-27

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Non-Ferrous Metals

JIS H 4635 : 2006, First English edition published in 2006-10

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

Contents

	Page
1 Scope	1
2 Normative references	1
3 Classification, finish methods, heat treatment and symbols	1
4 Quality	3
4.1 Appearance and shape	3
4.2 Chemical composition	3
4.3 Mechanical properties	4
4.4 Flatness	5
4.5 Airtightness	5
4.6 Resistance to pressure	6
4.7 Non-destructive inspection characteristics	6
5 Dimensional tolerance	6
5.1 Tolerance on outside diameter	6
5.2 Tolerance on wall thickness	6
5.3 Tolerance on length	7
6 Tests	7
6.1 Chemical analysis test	7
6.2 Tensile test	8
6.3 Flattening test	8
6.4 Airtightness test	9
6.5 Pressure test	9
6.6 Non-destructive inspection characteristics test	9
7 Inspection	9
8 Marking	10

Titanium and titanium alloy welded pipes

1 Scope This Japanese Industrial Standard specifies corrosion-resistive titanium and titanium alloy welded pipes of circular section for intended uses except for heat exchangers (hereafter referred to as “pipes”).

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS H 0321 *General rules for inspection of non-ferrous metal materials*

JIS H 0515 *Eddy current inspection of titanium pipes and tubes*

JIS H 0516 *Ultrasonic inspection of titanium pipes and tubes*

JIS H 0517 *Differential pressure testing method of titanium welded tubes*

JIS H 1610 *Titanium and titanium alloys—Sampling methods*

JIS H 1612 *Methods for determination of nitrogen in titanium and titanium alloys*

JIS H 1614 *Methods for determination of iron in titanium and titanium alloys*

JIS H 1617 *Methods for determination of carbon in titanium and titanium alloys*

JIS H 1619 *Methods for determination of hydrogen in titanium and titanium alloys*

JIS H 1620 *Methods for determination of oxygen in titanium and titanium alloys*

JIS H 1621 *Methods for determination of palladium in titanium alloys*

JIS H 1622 *Titanium alloys—Methods for determination of aluminium*

JIS H 1624 *Titanium alloys—Method for determination of vanadium*

JIS H 1630 *Method for atomic emission spectrometric analysis of titanium*

JIS Z 2201 *Test pieces for tensile test for metallic materials*

JIS Z 2241 *Method of tensile test for metallic materials*

3 Classification, finish methods, heat treatment and symbols The classification, finish methods, heat treatment and symbols of pipes shall be as given in table 1.

Table 1 Classification, finish methods, heat treatment and symbols

Classification	Finish method	Heat treatment	Symbol	Informative
				Characteristics and examples of use
Class 1	As welded	None	TTP 270 W	Corrosion resistance, especially sea-water resistance is good. Chemical apparatus, petroleum refining apparatus, pulp paper making industrial apparatus or the like.
	Cold working		TTP 270 WC	
Class 2	As welded		TTP 340 W	
	Cold working		TTP 340 WC	
Class 3	As welded		TTP 480 W	
	Cold working		TTP 480 WC	
Class 4	As welded		TTP 550 W	
	Cold working		TTP 550 WC	
Class 11	As welded		TTP 270 Pd W	
	Cold working		TTP 270 Pd WC	
Class 12	As welded		TTP 340 Pd W	
	Cold working		TTP 340 Pd WC	
Class 13	As welded		TTP 480 Pd W	
	Cold working		TTP 480 Pd WC	
Class 14	As welded		TTP 345 NPrC W	
	Cold working		TTP 345 NPrC WC	
Class 15	As welded		TTP 450 NPrC W	
	Cold working		TTP 450 NPrC WC	
Class 16	As welded		TTP 343 Ta W	
	Cold working		TTP 343 Ta WC	
Class 17	As welded		TTP 240 Pd W	
	Cold working		TTP 240 Pd WC	
Class 18	As welded		TTP 345 Pd W	
	Cold working		TTP 345 Pd WC	
Class 19	As welded		TTP 345 PCo W	
	Cold working		TTP 345 PCo WC	
Class 20	As welded		TTP 450 PCo W	
	Cold working		TTP 450 PCo WC	
Class 21	As welded		TTP 275 RN W	
	Cold working		TTP 275 RN WC	
Class 22	As welded		TTP 410 RN W	
	Cold working		TTP 410 RN WC	
Class 23	As welded		TTP 483 RN W	
	Cold working		TTP 483 RN WC	