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Stainless steel sanitary pipes

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In the event of any doubts arising as to the contents,
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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 of revision of Japanese Industrial Standard submitted by the Japan Iron and Steel Federation (JISF) 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 G 3447:2004 is replaced with this Standard.

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Stainless steel sanitary pipes

Introduction

This Japanese Industrial Standard has been prepared by adding the medical and pharmaceutical industries to the scope of application of the 2004-revised edition, and adopting the second edition of ISO 2037 published in 1992 without modifying its technical contents as Annex A.

The portions with continuous sidelines and dotted underlines comprise the matters that are modified from the corresponding International Standard. A list of modifications with explanations is given in Annex JB.

1 Scope

This Standard specifies stainless steel sanitary pipes (hereafter referred to as “pipes”) used for the food and dairy industries and medical and pharmaceutical industries. This Standard is generally applicable to pipes of outside diameters in the range of 25.4 mm to 165.2 mm.

The purchaser may designate the special quality requirements specified in Annex JA in addition to items specified in the text based on the previous agreement with the manufacturer.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows :

ISO 2037:1992 *Stainless steel tubes **for** the food industry* (MOD)

The symbols which denote the degree of correspondence in the contents between JIS and the corresponding International Standard are IDT (identical), MOD (modified) and NEQ (not equivalent) according to ISO/IEC Guide 21-1.

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 G 0320 *Standard test method for heat analysis of steel products*

JIS G 0321 *Product analysis and its tolerance for wrought steel*

JIS G 0404 *Steel and steel products — General technical delivery requirements*

JIS G 0415 *Steel and steel products — Inspection documents*

NOTE : Corresponding International Standard : ISO 10474 *Steel and steel products — Inspection documents* (IDT)

JIS G 0571 *Method of oxalic acid etching test for stainless steels*

JIS G 0572 *Method of ferric sulfate-sulfuric acid test for stainless steel*

JIS G 0573 *Method of 65 per cent nitric acid test for stainless steels*

JIS G 0575 *Method of copper sulfate-sulfuric acid test for stainless steels*

JIS G 0582 *Ultrasonic examination for steel pipes and tubes*

JIS G 0583 *Eddy current examination of steel pipes and tubes by encircling coil technique*

JIS R 6001 *Bonded abrasive grain sizes*

JIS S 3200-1 *Equipment for water supply service — Test methods of hydrostatic pressure*

JIS S 3200-7 *Equipment for water supply service — Test methods of effect to water quality*

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

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

3 Classification and symbols

The pipes are classified into 4 grades and their symbols are shown in table 1.

Table 1 Symbol of grade

Symbol of grade
SUS304TBS
SUS304LTBS
SUS316TBS
SUS316LTBS

4 Manufacturing method

The manufacturing method of pipes shall be as follows.

- a) Pipes shall be manufactured by a seamless process, or by an automatic arc welding, laser welding or electric resistance welding.

The use of filler metal is left to the manufacturer's discretion.

- b) Pipes shall be solution-treated (rapid cooling after heating at 1 010 °C or higher).

5 Chemical composition

The pipes, when tested in accordance with **13.1**, shall satisfy the heat analysis values given in table 2. If the purchaser requests a product analysis, the pipes shall be tested in accordance with **13.1**, and the resultant product analysis values shall satisfy table 2 within the tolerances given in table 5 of JIS G 0321.

Table 2 Chemical composition

Symbol of grade	C	Si	Mn	P	S	Ni	Cr	Mo
SUS304TBS	0.08 max.	1.00 max.	2.00 max.	0.045 max.	0.030 max.	8.00 to 10.50	18.00 to 20.00	— a)
SUS304LTBS	0.030 max.					9.00 to 13.00		
SUS316TBS	0.08 max.	1.00 max.	2.00 max.	0.045 max.	0.030 max.	10.00 to 14.00	16.00 to 18.00	2.00 to 3.00
SUS316LTBS	0.030 max.					12.00 to 15.00		

Note a) When adding an alloy element, for which no upper, lower or upper and lower limit values are specified, to a certain grade given in this table as required, it shall not be added to such a degree that the specified values of another grade are satisfied, making the grade in question no longer discernible.

6 Mechanical properties

6.1 Tensile strength and elongation

The pipes, when subjected to the test in 13.2.2, shall satisfy the tensile strength and elongation values given in table 3.

Symbol of grade	Tensile strength N/mm ²	Elongation %
SUS304TBS	520 min.	35 min.
SUS304LTBS	480 min.	
SUS316TBS	520 min.	
SUS316LTBS	480 min.	

6.2 Reverse flattening resistance

Welded pipes shall be tested in accordance with **13.2.3**, and the weld part shall be free from flaws, cracks, or any other detrimental defects.

7 Wetting resistance

The pipes, when tested in accordance with **13.3**, shall satisfy either the specified hydraulic or pneumatic test characteristics, or non-destructive test characteristics, as designated by the purchaser. In the case of no designation from the purchaser, the selection shall be left to the discretion of the manufacturer.

- a) Hydraulic ~~or~~ pneumatic test characteristics The pipes, when subjected to 2.5 MPa, the lower limit pressure for hydraulic test, or 0.6 MPa, the lower limit pressure for pneumatic test, shall be free from leakage or any other abnormalities.
- b) Non-destructive test characteristics The seamless pipes, when subjected to the ultrasonic flaw detection or eddy current flaw detection, and the welded steel pipes, when subjected to the eddy current flaw detection, shall not generate any signals equivalent to or greater than those from artificial flaw on reference test piece of working sensitivity division UD specified in JIS G 0582 or working sensitivity division EY in JIS G **0583**. Where any non-destructive test other than above is performed upon agreement between the purchaser and the manufacturer, the acceptance criteria shall be as agreed.

8 Pressure resistance performance

The pipes, when subjected to the test in **13.4**, shall withstand it, and be free from leakage.

NOTE : The Water Supply Act stipulates that the pipes to be used in feed water system should all be subjected to the pressure resistance performance test.

9 Leaching performance

The pipes, when subjected to the test of **13.5**, shall satisfy the criterion given in table 4.

NOTE : The Water Supply Act stipulates that the pipes to be used in feed water system should all be subjected to the leaching performance test.

Item		Acceptance criterion	
Odour		No abnormalities	
Chromaticity	degrees	5	max.
Turbidity	degrees	2	max.
Hexavalent chromium compounds	mg/L	The amount of hexavalent chromium	0.05 max.
Iron and other compounds	mg/L	The amount of iron	0.3 max.