

## JIS G3464 Steel Heat Exchanger Tubes for Low Temperature Service

### 1. Scope

This Japanese Industrial Standard specifies the steel tubes, hereinafter referred to as the "tubes", used for the purpose of exchanging heat on the inside and outside of the tube at exceptionally low temperatures below freezing point, such as heat exchanger tubes, condenser tubes, etc.

#### Remarks

1. The purchaser may designate in addition to the items specified in this text, by prior agreement with the manufacturer, part or all of the items in the special requirements Z1, Z3, Z4, specified in Appendix 1 and the items of the U-bend tube specified in Appendix 2.

Appendix 1 Z1 hardness

Appendix 1 Z3 Ultrasonic examination

Appendix 1 Z4 Eddy current examination

Appendix 2 U-bend tube

2. The austenitic steel tubes among the steel tubes specified in JIS G 3463 may be used. In this case, the impact test need not be particularly performed.

3. The units and numerical values given in { } in this Standard are based on the International System of Units (SI) and are appended for informative reference.

Further, the traditional units accompanied by numerical values in this Standard shall be converted to the SI units and numerical values on Jan. 1, 1991.

### 2. Class and Symbols

The tubes shall be classified into three classes and their symbols shall be as given in Table 1.

Table 1

Classification	Class new	(Informative reference)
		Traditional symbol
Carbon steel tube	STBL 380	STBL 39
Nickel steel tube	STBL 450	STBL 46
	STBL 690	STBL 70

World standard comparative table

Symbol of class	GRADE	KS	JIS	ASTM	BS
		NUMBER	D 3571	G 3464	A 334
Carbon steel tube		STLT 39	STBL380	Gr 1	430 LT
	Nickel steel tube	STLT 46	STBL450	Gr 3	503 LT
		STLT 70	STBL690	Gr 8	509 LT

				Gr 6	
				Gr 7	
				Gr 9	
				Gr11	

### 3. Heat Treatment

Table 2 Heat Treatment

Symbol of class	Heat treatment
STBL 380	Normalizing or normalizing and successive tempering
STBL 450	
STBL 690	Double normalizing and successive tempering or quenching and tempering.

### 4. Chemical Composition

The tube shall be tested in accordance with 9.1 and the resulting ladle analysis values shall conform to Table 3

Table 3

Symbol of class	Chemical composition (%)					
	C	Si	Mn	P	S	Ni
STBL 380	0.25 max	0.35 max	1.35 max	0.035 max	0.035 max	-
STBL 450	0.18 max	0.10~0.35	0.30~0.60	0.030 max	0.030 max	3.20~3.80
STBL 690	0.13 max	0.10~0.35	0.90 max	0.030 max	0.030 max	8.50~9.50

#### Remarks

- When it is practically difficult to apply the impact test due to the dimensions of a tube, STBL 380 shall, by way of compensation, contain 0.010 % or more of acid soluble aluminum, or alternatively, 0.015 % or more of total aluminum.
- When product analysis is required by the purchaser, the tolerances for the values given in the above table shall be as specified in Table 2 in JIS G 0321 for the seamless steel tube of STBL 380 and likewise in Table 1 for the electric resistance welded steel tube.

The tube of STBL 450 an STBL 690 shall be in accordance with Table 3.

### 5. Mechanical Properties

#### 5.1 Tensile Strength, Yield Point or Proof Stress and Elongation

The tube shall be tested in accordance with 9.2 and the resulting tensile strength, yield point or proof stress and elongation shall conform to Table 4.

Table 4

Symbol of class	Tensile strength kg f/Π {N/mm <sup>2</sup> }	Yield point or proof stress kg f/Π {N/mm <sup>2</sup> }	Elongation %		
			Outside diameter 20 mm or over	Outside diameter 10 mm or over to and excl 20mm	Outside diameter under 10 mm
			No. 11 test piece No. 12 test piece	No. 11 test piece	No. 11 Test piece
STBL 380	39{382} min	21{206} min	35 min	30 min	27 min
STBL 450	46{451} min	25{245} min	30 min	25 min	22 min
STBL 690	70{686} min	53{520} min	21 min	16 min	13 min

## Remarks

1. The purchaser may designate the upper limit of tensile strength. In this case, the upper limit of tensile strength shall be the value 2kgf/Π(118N/Π) added to the value specified in the Table 4 for STBL 380, and 15kgf/Π(147N/Π) added for STBL 450 and STBL 690.
2. When the tube under 8 mm in thickness is subjected to tensile test by using No. 12 test piece the minimum value of elongation shall be calculated by subtracting 1.5% from the value of elongation given in Table 4 for each decrease of 1 mm and rounding result to a whole number according to KS A 0021. Examples of calculation are shown in Reference (Reference Table).
3. When a tensile test piece is to be taken from the electric resistance welded steel tube, a No. 12 test piece shall be taken from a seamless portion.

## 5.2 Flattening Resistance

The tube shall be tested in accordance with 9.3 and shall be free from flaws or cracks on its wall surfaces.

The distance between the flattening plates in this test shall be in accordance with the following formula:

$$H = \frac{(1 + e)t}{e + \frac{t}{D}}$$

Where

H: distance between flat plates (mm)

t: wall thickness of tube (mm)

D: outside diameter of tube (mm)

e: constant 0.08

## 5.3 Flaring Resistance

The tube shall be flared into a bell shape to 1.14 times the outside diameter and then no flaws shall be generated.

#### 5.4 Absorbed Energy

(1) The tube shall be tested in accordance with 9.5 and the absorbed energy of the tube in the Charpy impact test shall comply with Table 5. In this case, the testing temperature for the tube of STBL 380, STBL 450 and STBL 690 shall be  $-45^{\circ}\text{C}$ ,  $-100^{\circ}\text{C}$ , respectively.

Table 5 (Applicable on and after Jan. 1, 1991)

Dimensions of test piece mm	Absorbed energy in charpy impact test J		
	Average value of one set (3 pieces)	Each value of 2 pieces out of 3	Value of each piece
10] 10	21min.	21 min.	14 min.
10] 7.5	18 min.	18 min.	12 min.
10] 5	14 min.	14 min.	10 min.

#### Remark

(1) To the tube not fit to provide a test piece 10 x 5 mm, the impact test shall not be applied.

(2) The electric resistance welded steel tube shall be subjected to the impact test for the weld in addition to the Charpy impact test specified in (1), and the absorbed energy obtained shall comply with Table 5.

In this case, the testing temperature shall be  $-45^{\circ}\text{C}$ .

#### 5.5 Hydrostatic Characteristic or Nondestructive Characteristic

The tube shall be tested in accordance with 9.6 and the resulting hydrostatic characteristic or nondestructive characteristic shall conform to either of the following two.

The preference shall be in accordance with the designation made by the purchaser or left to the discretion of the manufacturer.

(1) Hydrostatic Characteristic (Applicable on and after Jan. 1, 1991)

When the hydrostatic pressure specified by the purchaser or, in the absence of a specified value, pressure P (5 MPa max.) calculated from the formula below is applied, the tube shall withstand it without leakage.

In this case, the purchaser may specify values of pressure lower or higher than those given in Attached Table 1

$$P = 2st / D$$

Where

P: test pressure (MPa)

t: wall thickness of tube (mm)

D: outside diameter of tube (mm)

s: 60% of the minimum value of yield point or proof stress specified in Table 5 (N/Π)

(2) Nondestructive Characteristic

Either an ultrasonic examination or an eddy current examination shall be made on the tube, and there shall be no signal greater than those produced by the artificial defects of the

reference test block which is the division UD of the working sensitivity specified in JIS G 0582 or the division EY of the working sensitivity specified in JIS G 0583, respectively.

## 6. Dimensions, Mass and Dimensional Tolerances

### 6.1 Dimensions and Mass

The outside diameter, wall thickness and mass of the tubes shall conform to (Attached Table), unless specially designated.

Attached Table.

The manufacturer shall, in general, submit to the purchaser a detailed statement carrying the test results, method of manufacture, ordered dimensions, quantity, work number indication the history of manufacture, etc.

Outside diameter (mm)	Wall thickness (mm)	1.2	1.6	2.0	2.3	2.9	3.5	4.5	5.5	6.5
15.9		0.435	0.564	0.686						
19.0			0.687	0.838	0.947					
25.4				1.15	1.13	1.61				
31.8					1.67	2.07	2.44			
38.1						2.52	2.99	3.73		
45.0							3.58	4.49	5.36	
50.8							4.08	5.14	6.14	7.10

#### Remark

1. The numerical value of mass shall be obtained by calculating according to the following formula, assuming 1X of steel to be 7.85 g and by rounding off the result to 3 significant figures in accordance with JIS G 8401.

$$W = 0.02466 t (D-t)$$

When

W: unit mass of tube (kg/m)

t: wall thickness of tube (mm)

D: outside diameter of tube (mm)

2. In transaction, the unit mass of the tube to be taken as the standard shall be the value given in the above table increases by 15 % for hot finished seamless steel tube, by 10 % for cold finished seamless steel tube, and by 9 % electric resistance welded steel tube.

### 6.2 Dimensional Tolerances

The dimensional tolerances shall be as follows.

(1) The tolerances on the outside diameter of the tube shall be as specified in Table 6.

Table 6

Division of outside diameter	Tolerances on outside diameter				
	Hot finished seamless steel tube	Quenched and tempered cold finished seamless steel tube	Cold finished seamless tube after heat treatment other than quenching and tempering	Electric resistance welded steel tube not cold finished	Cold finished electric resistance welded steel tube
Up to 24	+0.4 -0.8	【0.25	【0.10	【0.15	【0.10
25 and over, up to 40			【0.15	【0.20	【0.15
40 and over, up to 50			【0.20	【0.25	【0.20
50 and over, up to 60			【0.25	【0.30	【0.25
60 and over, up to 80		【0.30	【0.30	【0.40	【0.30
80 and over, up to 100		【0.40	【0.40	+0.40 -0.60	【0.40
100 and over, up to 120	+0.4 -1.2	+0.40 -0.60	+0.40 -0.60	+0.40 -0.80	+0.40 -0.60
120 and over, up to 160	+0.4 -1.8	+0.40 -0.80	+0.40 -1.80	+0.40 -1.00	+0.40 -0.80
160 and over, up to 200		+0.40 -1.20	+0.40 -1.20	+0.40 -1.20	+0.40 -1.20
200 and over	+0.4 -2.4	+0.40 -1.60	+0.40 -1.60	+0.40 -1.60	+0.40 -1.60

Remark

1. To the tolerances on the outside diameter of electric resistance welded steel tube not cold finished, the tolerances on the outside diameter of cold finished seamless steel tube may be applied, when specially requested by the purchaser.
2. The purchaser may designate the permissible deviations of outside diameter of quenched and tempered cold finished seamless steel tube under 40 mm outside diameter as 【0.20mm.

(2) Table 7. Tolerance on Wall Thickness and Wall thickness Deviations

TABLE 7

Tolerances	Division of method of manufacture		Hot finished seamless steel tube		Cold finished seamless steel tube		Electric resistance welded steel tube	
	Division of thickness mm	Division of outside diameter mm	Up to 100	100 and over	Up to 40	40 and over	Up to 40	40 and over
Permissible deviation of wall thickness %	Under 2		-	-	+0.4mm 0		+0.3mm 0	
	2 and over, up to 2.4		+40 0	-		+22 0		+18 0
	2.4 and over, up to 3.8		+35 0	+35 0	+20 0			
	3.8 and over, up to 4.6		+33 0	+33 0				
	4.6 and over		+28 0	+28 0				
Permissible wall thickness deviation%			Within 22.8 of wall thickness					

Remark

The "wall thickness deviation" means the ratio of the difference between the maximum and the minimum of the measured wall thickness in the same section to the ordered wall thickness. This is not applicable to tubes under 5.6 mm in wall thickness.

Table 8. Tolerances on Tube length

Division		Tolerances on tube length
Up to and incl. 50 mm in outside diameter	Up to and incl. 7 m	+0.7 0
	Over 7 m	Add 3 mm to the plus side tolerances given above for each increase of 3 m or its fraction in length. However, the maximum value shall be 15 mm.
Over 50 mm in outside diameter	Up to and incl. 7 m	+10mm 0
	Over 7 m	Add 3 mm to the plus side tolerances given above for each increase of 3 m or its fraction in length. However, the maximum value shall be 15 mm.

Remark

When accurate length is particularly required, the relevant tolerances shall be agreed upon by the purchaser and the manufacturer.

**7. Appearance**

7.1 The tube shall be practically straight and its both ends shall be at right angles to the axis injurious to use.

7.2 The inside and outside surfaces of the tube shall be well-finished and free from defect injurious to use.

**8. Test**

8.1 Chemical Analysis

8.1.1 Chemical Analysis

General matters of chemical analysis and method of sampling analysis samples shall be in accordance with 3. of JIS G 0303

8.1.2 Method of Analysis

The method of analysis shall be in accordance with one of the following Standards.

JIS G 1211 JIS G 1212 JIS G 1213 JIS G 1214

JIS G 1215 JIS G 1216 JIS G 1224 JIS G 1253

JIS G 1256 JIS G 1257

8.2 Tensile Test

8.2.1 Test Piece

The test specimen shall be NO. 11, No. 12 A, No. 12 B or No. 12 C test piece specified in JIS Z 2201 and shall be cut off from the tube longitudinally.

8.2.2 The Method

The test method shall be in accordance with JIS Z 2241.

8.3 Flattening Test

8.3.1 Test piece

A test piece 50 mm or over in length shall be cut off from the end of a tube. For the tube whose wall thickness is 15 % or over of the outside diameter, a C-shape test piece made by removing part of the circumference of a whole test piece may be used.

8.3.2 Test Method

The test piece shall be placed at ordinary temperature between two flat plates and flattened by compression until the distance between the plates comes to the specified value, and checked for the occurrence of flaws or cracks on its wall surface. For the electric resistance welded steel pipe, the weld shall be placed at right angles to the direction of compression as shown in Fig. 1 and the C-shape test piece shall be placed as shown in Fig. 2.



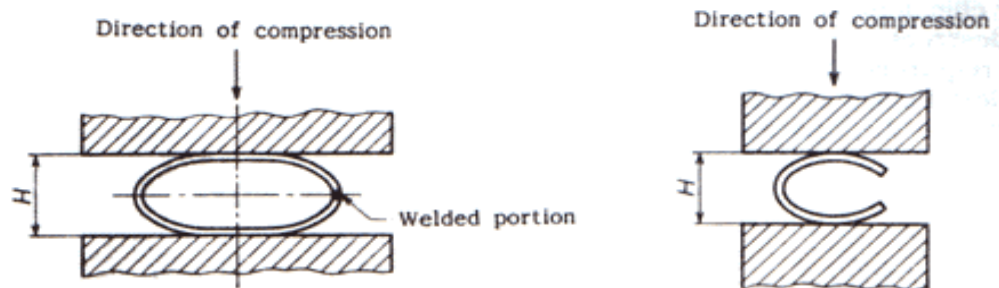


Fig 1. Flattening Test (for Whole Test piece)

Fig 2. Flattening Test (for C-shape Test Piece)

## 8.4 Flaring Test

### 8.4.1 Test Pieces

An adequate length of tube shall be cut off from one end of the tube as a test piece.

### 8.4.2 Method of Test

The test piece shall be flared at one of the tube ends at ordinary temperature into a bell shape and to the specified size with a conical tool forming an angle of 60° and checked for any flaws or other defects.

## 8.5 Charpy Impact Test

### 8.5.1 Test piece

The Charpy impact test piece shall be NO. 4 test piece specified in JIS G 2202, However, the width of the test piece may be altered to 7.5 mm or 5 mm according to the dimensions of the tube. This is to be cut off longitudinally.

### 8.5.2 Test Method

The test method shall be in accordance with the method of Charpy impact test specified in JIS Z 2242

## 8.6 Hydrostatic Test or Nondestructive Examination

8.6.1 The tube shall be subjected to a hydrostatic pressure and kept at the designated or specified pressure to see if it withstands the pressure without leakage

8.6.2 The test method of nondestructive examination shall be in accordance with either JIS G 0582 or JIS G 0583.

## 9. Inspection

9.1 General matters of inspection shall be as specified in JIS G 0303.

9.2 The chemical composition, mechanical properties, hydrostatic or nondestructive characteristics, dimensions and appearance shall conform to the requirements specified in 3.,

4., 5., 6. and 7. However, appropriate nondestructive examinations other than those specified in 9.6 (2)2 may substitute for the said nondestructive examination when agreed upon by the purchaser and the manufacturer.

Further, when the supplementary quality requirements given in Appendix 1 are specified or a U-bend tube given in Appendix 2 is designated by agreement between the purchaser and the manufacturer, the results of inspection shall conform to the requirements of Z1, Z3 and Z4 in Appendix 1 and the requirements in Appendix 2, respectively.

9.3 Either the hydrostatic test or the nondestructive examination shall be performed for each pipe.

9.4 The number of specimens for the product analysis shall be agreed upon by the purchaser and the manufacturer.

9.5 The method of sampling test specimens and the number of test pieces for tensile test, flattening test and flaring test shall be as follows. Take one tube as the specimen from each 50 tubes or its fraction of the same dimension () Which are subjected to a concurrent heat treatment, and then from the test specimen take one tensile test piece. Further, from one end of the test specimen take one flattening test piece and from the others take one flaring test piece.

9.6 The method of sampling the test specimens and the number of test pieces for Charpy impact test shall be as follows. Take one tube as the specimen from each 100 tubes or its fraction of the same dimensions () subjected to a concurrent heat treatment, and then take one set (3 pieces) of test pieces from each specimen.

For the electric resistance welded steel tube, take one set (3 pieces) of Charpy impact test pieces for the welded zone, in addition to the above-mentioned Charpy impact test pieces.

Note (): The "same dimensions" means the same outside diameter combined with the same wall thickness.

## 10. Reinspection

10.1 The tube which fails to pass the tests specified in 9.2 to 9.4 may be retested in accordance with 4.4 in JIS G 0303 to determine whether it is acceptable or not.

10.2 When the tube fails to pass the test specified in 9.5, but satisfies the following two conditions as well as the specified limit of the average value of the absorbed energy, a retest may be conducted to determine whether it is acceptable or not.

(a) In the case where the values for two out of the three are equal to or higher than the average value specified in Table 5 but each individual one fails to satisfy the specified value.

(b) In the case where the values for two out of the three satisfy the value specified for two pieces given in Table 5 but fail to satisfy the average value specified in the relevant Table.

In this case, three additional test pieces shall be taken from the same lot for a retest, and each value of the three test pieces shall conform to the average value of one set (3 pieces) specified in Table 5.

## 11. Marking

Each tube having passed the inspection shall be marked with the following items.

However, in the case of either smaller tubes or a request fro the purchaser, the tubes may be bundled together and marked for each bundle by suitable means.

The order of arranging the items is not specified.

When approved by the purchaser, part of the items may be omitted:

- (1) Letter symbol of grade
- (2) Letter symbol indication the manufacturing process <sup>(3)</sup>
- (3) Dimensions
- (4) Manufacturer's name or its abbreviation
- (5) Letter symbol Z denoting the supplementary quality requirement

Note <sup>(3)</sup>

The letter symbol indicating the manufacturing process shall be as follows, provided that the dash may be replaced by a blank.

Hot finished seamless steel tube-S-H

Cold finished seamless steel tube-S-C

Electric resistance welded steel tube other than hot finished or cold finished ones-E-G

Hot finished electric resistance welded steel tube-E-H

Cold finished electric resistance welded steel tube-E-C

## 12. Report

The manufacturer shall, in general, submit to the purchaser a detailed statement carrying the test results, method of manufacture, ordered dimensions, quantity, work number indicating the history of manufacture, etc.

### Appendix 1. Special Quality Requirement

The special quality requirements apply only when required by the purchaser and the manufacturer shall perform the designated items on the straight tube.

#### Z1 Hardness

Z 1.1 The hardness of the tube shall be as given in Appendix 1 Table.

Appendix 1 Table Hardness

Symbol of class	Rockwell hardness HRB (Mean of three points)
STBL 380	85 max.
STBL 450	90 max.
STBL 690	

Z 1.2 An adequate length shall be cut off from an end of the tube as a test piece.

Z 1.3 The test method shall be in accordance with JIS Z 2245 and the hardness on the cross section or inside surface of the test piece shall be measured at three points on each test piece.

Z 1.4 The hardness shall comply with the requirements specified in Appendix 1 Table.

Z 1.5 The sampling of specimens and the number of test pieces shall be as specified for the tensile in 10.1 (5) 5 of the text.

Z 1.6 The tube is entitled to a retest in accordance with 4.4 of JIS G 0303 for a final acceptance.

#### Z 3 Ultrasonic Examination

(1) The criteria of the working sensitivity in the ultrasonic examination shall be the division UA or UC specified in JIS G 0582, and there shall be no signal equal to or greater than those produced by the artificial defects of the reference test block.

(2) The test method of the ultrasonic examination shall be as specified in JIS G 0583

(3) The ultrasonic examination shall be performed for each tube and the results shall conform to the requirements specified in (1).

#### Z 4 Eddy Current Examination

(1) The criteria of the working sensitivity in the eddy current examination shall be the division EV< EW, or EX specified in JIS G 0583, and there shall be no signal equal to or greater than those produced by the artificial defects of the reference test block.

(2) The test method of the eddy current examination shall be as specified in JIS G 0583

(3) The eddy current examination shall be performed for each tube and the results shall conform to the requirements specified in (1).

#### Appendix 2. U-Bend Tube

The U-bend tube shall be applicable only when required by the purchaser and shall be executed by the manufacturer.

##### 1. Method of manufacture

The method of manufacture shall be as follows (see Appendix 2 Figure).

(1) The U-bend tube shall be manufactured by cold bending process and the bending radius shall be at least 1.5 times the outside diameter of the tube.

(2) The bent portion of the tube shall, in general, not be subjected to a heat treatment. However, when required by the purchaser, agreement may be made on heat treatment.

2. The bent portion shall be free from defects injurious to use.

3. The dimensional tolerances for bent portion shall be as specified in Appendix 2 Table 1 and the tolerances on length after bending shall be as specified in Appendix 2 Table 2.

##### Appendix 2 Figure

R: bend radius

Dn: nominal outside diameter

D1: outside diameter of bent portion

In: nominal wall thickness

I1: minimum wall thickness of bent portion

p: pitch

P:  $p + D_n$

l: length of straight portion

L:  $l + R + D_n/2$

Appendix 2. Table 1

Variation rate of outside diameter D-Dn/Dn X 100		Reduction rate of wall thickness tn-t/t <sub>n</sub> X100%	Tolerances on Pitch (P) or P mm
Minor axis side	Major axis side		
Dn/4R X 100 max. However, minimum value 0.5 mm	Dn/8R X 100 max. However, minimum value 0.5 mm	Dn/2.5R X 100 max	±1.5

Appendix 2 Table 2. Tolerances on length of Bend Tube

Division of length	Tolerances on length (l or L) mm
Up to and incl. 7 m in length of straight portion after bending	+7 0
Over 7 m in length of straight portion after bending	+10 0

4. The measurement of dimensions of bent portion shall be as follows.

Take one specimen from a U-bent tube of the smallest bend radius of the tubes of the same dimension bent concurrently. Measure the outside diameters in two directions at 90 degrees in the bent portion and the wall thickness sat four locations on the circumference and obtain the variation rate of outside diameters and the reduction rate of wall thickness

Material Comparison Tables (ASTM, KS, JIS, DIN, BS, NBN, NF, UNI)

ASTM Standard	UNS NO.	KOREA/JAPANES			GERMAN				BRITISH			FRENCH			ITALIAN		
		KS/JIS Symbol	KS/JIS Number	Remarks	DIN Type	DIN Number	Material Number	Remarks	B.S Number	B.S Grade	Remarks	AFNOR Type	NF Number	Remarks	UNI Type	UNI Number	Remarks
A 334 Seamless and Welded C-and Alloy Steel Tubes for Low-Temperature Service																	
Grade 1	K03008	STLT 39 / STBL 380	D3571 / G 3464		TT St 41N		1.0437	WBL-680(3b)			(3)	TU 42 BT	A49-230	(32)	C 15	5949	(6)Seamless Only

Grade 3	K31918	STLT 46 / STBL 450	D3571 / G 3464		10 Ni 14		1.5637	WBL-680(3b)	3603	HFS 503 LT 100	CAT.2	TU 16 N 14	A49-230 (3c)		18 Ni 14	5949	Seamless Only
Grade 6	K03006			(3)	TT St 45 N		1.0456	WBL-680(3b)	3603	HFS 410 LT 50	CAT.2	TU A 42 BT	A49-230 (29)		C 20	5949	Seamless Only
Grade 8	K31340	STLT 70 / STBL 690	D3571 / G 3464		X8 Ni 9		1.5662	WBL-680(3b)	3603	HFS 590 LT 196	CAT.2	TU Z 11 N 9	A49-230 (6)		12 X Ni 09	5949	Seamless Only

JIS Number and Corresponding Foreign Standards

JIS		ASTM			BS			DIN			NF			ISO			Index Number	
Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade	Type	Standard Number	Grade		Type
G3464	STBL380	C	A334	Gr1	C	3603	HFS410LT50	C	17173	FONi14	Ni				2604/2	TS6	C	C014
	(STBL39)					"	CFS410LT50	C	17174	X8Ni9	Ni							
						"	ERW410LT50	C										
						"	CEW410LT50	C										
	STBL450	Ni	A334	Gr3	Ni	3603	HF503LT100	Ni				A49-230	TU10N14	Ni	2604/2	TS43	Ni	
	(STBL46)					"	CF503LT100	Ni				A49-213	TU10N14	Ni				
	STBL690	Ni	A334	Gr8	Ni	3603	HFS509LT196	Ni				A49-230	TUZ6N9	Ni	2604/2	TS45	Ni	
	(STBL70)					"	CFS509LT196	Ni				A49-215	TUZ6N9	Ni				