

MIL-P-1144D (SHIPS)  
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 SUPERSEDING  
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 (See 6.5)

## MILITARY SPECIFICATION

### PIPE, CORROSION-RESISTANT, STAINLESS STEEL, SEAMLESS OR WELDED

This specification is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers seamless and welded austenitic steel pipe intended for elevated temperature and general corrosive service, including cryogenic application. Specific temperature limitations are given in MIL-STD-438 and MIL-STD-777.

1.2 Classification. Pipe covered by this specification shall be one of the following types, grades, and classes as specified (see 6.2.1).

Type I - Seamless  
 Type II - Welded

Grade 304 - Chromium-nickel  
 Grade 304L - Chromium-nickel, low carbon  
 Grade 316 - Chromium-nickel-molybdenum  
 Grade 316L - Chromium-nickel-molybdenum, low carbon  
 Grade 321 - Chromium-nickel, titanium stabilized  
 Grade 347 - Chromium-nickel, columbium-tantalum stabilized

Class 1 - Thin wall (schedule 5S)  
 Class 2 - Lightweight (schedule 10S)  
 Class 3 - Standard (schedule 40S)  
 Class 4 - Extra strong (schedule 80S)  
 Class 5 - Double extra strong (schedule 160S)

#### 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

##### STANDARDS

##### FEDERAL

FED-STD-151 - Metals, Test Methods.  
 FED-STD-183 - Continuous Identification Marking of Iron and Steel Products.

##### MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.  
 MIL-STD-163 - Steel Mill Products Preparation for Shipment and Storage.  
 MIL-STD-792 - Identification Marking Requirements for Special Purpose Components.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

##### NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

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## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A262 - Detecting Susceptibility to Intergranular Attack in Stainless Steels.
- E8 - Tension Testing of Metallic Materials.
- E426 - Electromagnetic (Eddy-Current) Testing of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.)

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- B36.10 - Wrought-Steel and Wrought Iron Pipe.
- B36.19 - Stainless Steel Pipe.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

## 3. REQUIREMENTS

3.1 Description. Unless otherwise specified in the contract or order, the steel from which the pipe is manufactured shall be made by the electric furnace process.

3.1.1 Type I. Seamless pipe shall be made from solid billets.

3.1.1.1 Type II. Welded pipe shall be formed from hot or cold finished sheet, strip, or plate. The pipe shall be manufactured by an automatic welding process with or without addition of filler metal.

3.1.2 Grade. Chemical requirements of the pipe shall be in accordance with table I.

Table I - Chemical composition.

Grade	Carbon (max.)	Manganese (max.)	Phosphorus (max.)	Sulfur (max.)	Silicon (max.)	Nickel	Chromium	Molybdenum
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
304	0.08	2.00	0.040	0.030	0.75	8.00-11.00	18.0-20.0	---
304L	.035	2.00	.040	.030	.75	8.00-13.00	18.0-20.0	---
316	.08	2.00	.040	.030	.75	11.0-14.0	16.0-18.0	2.0-3.0
316L	.035	2.00	.040	.030	.75	10.0-15.0	16.0-18.0	2.0-3.0
<sup>1/</sup> 321	.08	2.00	.040	.030	.75	9.0-13.0	17.0-20.0	---
<sup>2/</sup> 347	.08	2.00	.040	.030	.75	9.0-13.0	17.0-20.0	---

<sup>1/</sup>For grade 321, the titanium content shall be not less than five times the carbon content and not more than 0.60 percent.

<sup>2/</sup>For grade 347, the columbium plus tantalum content shall be not less than ten times the carbon content and not more than 1.00 percent.

3.1.3 Class. Wall thickness and outside diameter (o.d.) of pipe supplied for each class shall be in accordance with table II.

3.2 Heat treatment. Pipe shall be furnished in the heat treated condition. The heat treatment procedure shall consist of annealing the pipe at a minimum temperature of 1900°F (1038°C) and then rapidly cooling the pipe at a sufficient rate so that all the material meets the requirements of the intergranular corrosion test.

3.3 Finish. Pipe shall be either pickled or bright annealed free from mill scale. If the pipe has been pickled, it shall be thoroughly washed in hot water to remove all traces of the acid solution. If the pipe has been bright annealed, it shall be passivated and thoroughly rinsed to remove all traces of passivating solution.

Table II - Dimensions of classes 1 through 5 stainless steel pipe.<sup>1/</sup>

Nominal pipe size inches	O.d. Inches	2/ <sup>2/</sup> 3/ <sup>3/</sup> Class 1 Schedule No. 5		2/ <sup>2/</sup> 3/ <sup>3/</sup> Class 2 Schedule No. 10		3/ <sup>3/</sup> Class 3 Schedule No. 40		3/ <sup>3/</sup> Class 4 Schedule No. 80		4/ <sup>4/</sup> Class 5 Schedule No. 160	
		Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches	Wall thickness Inches
1/8	0.405	---	0.049	---	0.068	---	---	---	---	---	---
1/4	.540	---	.065	---	.088	---	---	---	---	---	---
3/8	.675	---	.083	---	.091	---	---	---	---	---	---
1/2	.840	0.065	.083	0.065	.109	0.065	.126	0.095	0.095	0.119	---
3/4	1.050	.065	.083	.065	.113	.065	.147	.126	.126	.176	---
1	1.315	.065	.109	.065	.133	.065	.154	.147	.147	.179	0.188
1-1/4	1.664	.065	.109	.065	.140	.065	.179	.154	.154	.219	---
1-1/2	1.900	.065	.109	.065	.145	.065	.191	.179	.179	.250	---
2	2.375	.065	.109	.065	.154	.065	.200	.191	.191	.281	---
2-1/2	2.875	.083	.120	.083	.154	.083	.218	.200	.200	.281	---
3	3.500	.083	.120	.083	.203	.083	.276	.218	.218	.344	---
3-1/2	4.000	.083	.120	.083	.216	.083	.276	.218	.218	.375	---
4	4.500	.083	.120	.083	.226	.083	.300	.226	.226	.438	---
5	5.563	.109	.134	.109	.237	.109	.318	.237	.237	.531	---
6	6.625	.109	.134	.109	.258	.109	.328	.258	.258	.625	---
8	8.625	.109	.148	.109	.280	.109	.332	.280	.280	.719	---
10	10.750	.134	.165	.134	.322	.134	.365	.322	.322	.906	---
12	12.750	.156	.180	.156	.375	.156	.375	.375	.375	1.125	---
											1.312

<sup>1/</sup>Dimensions and wall thickness are nominal.<sup>2/</sup>Classes 1 and 2 are not intended for threading.<sup>3/</sup>Dimensions for classes 1, 2, 3, and 4 are in agreement with ANSI B36.19.<sup>4/</sup>Dimensions for class 5 are in agreement with ANSI B36.10.

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3.4 Mechanical properties. Pipe material shall conform to the mechanical properties specified in table III.

Table III - Mechanical properties.

Grade	Tensile strength (minimum)	Yield strength (minimum)	<sup>1/</sup> Elongation in 2 inches (minimum)
	Psi	Psi	Percent
304 316 321 347	75,000	30,000	35
304L 316L	70,000	25,000	35

<sup>1/</sup> Elongation for all small size pipe tested in full section, and for strip tests with wall thickness of 5/16 inch and over. For strip tests of pipe with wall thickness less than 5/16 inch, the minimum elongation shall be as follows:

<u>Actual wall thickness</u> Inch	<u>Elongation in 2 inches, minimum, longitudinal</u> Percent
0.3125 and over	35.00
Under 0.3125 to 0.281, inclusive	33.25
Under 0.281 to 0.250, inclusive	31.50
Under 0.250 to 0.219, inclusive	29.75
Under 0.219 to 0.188, inclusive	28.00
Under 0.188 to 0.156, inclusive	26.25
Under 0.156 to 0.125, inclusive	24.50
Under 0.125 to 0.094, inclusive	22.75
Under 0.094 to 0.062, inclusive	21.00

3.5 Flattening. When tested as specified in 4.4.4, pipe shall withstand being flattened to the distance calculated in table IV without developing cracks, breaks, or other defects.

Table IV - Calculated "H" values.

Nominal pipe size	O.d.	Class	H	Nominal pipe size	O.d.	Class	H
Inches	Inches		Inches	Inches	Inches		Inches
1/8	0.405	2	0.253	1	1.315	1	0.558
		3	.287			2	.688
		4	.320			3	.760
1/4	.540	2	.370			4	.836
		3	.379			5	.972
3/8	.675	2	.380	1-1/4	1.660	1	.603
		3	.441			2	.765
		4	.496			3	.875
1/2	.840	2	.423			4	1.013
		3	.541			5	1.132
		4	.604	1-1/2	1.900	1	0.628
5	.647	2	.807				
3/4	1.050	1	.514			3	.950
		2	.536			4	1.108
		3	.623			5	1.285
4	1.050	4	.708	2	2.375	1	0.665
		5	.800			2	.888
						3	1.087
		4	1.308				
						5	1.595

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Table IV - Calculated "H" values (con.).

Nominal pipe size	O.d.	Class	H	Nominal pipe size	O.d.	Class	H
Inches	Inches		Inches	Inches	Inches		Inches
2-1/2	2.875	1	0.76	6	6.625	1	1.12
		2	.99			2	1.33
		3	1.38			3	2.32
		4	1.62			4	3.04
		5	1.86			5	3.96
3	3.500	1	0.79	8	8.625	1	1.16
		2	1.05			2	1.51
		3	1.55			3	2.76
		4	1.86			4	3.68
		5	2.22			5	5.06
3-1/2	4.000	1	0.82	10	10.750	1	1.43
		2	1.09			2	1.71
		3	1.68			3	3.21
		4	2.04			4	4.00
		5	----			5	6.30
4	4.500	1	0.835	12	12.750	1	1.75
		2	1.12			2	1.88
		3	1.81			3	3.42
		4	2.22			4	4.22
		5	2.78			5	7.40
5	5.563	1	1.09				
		2	1.28				
		3	2.06				
		4	2.59				
		5	3.36				

3.6 Nondestructive electric and hydrostatic pressure. Each length of pipe with a nominal wall thickness of 0.120 inches and below, shall be subjected to a nondestructive electric test as specified in 4.4.5 or a hydrostatic pressure test as specified in 4.4.6. The producer shall have the option to select which one of the two test methods is to be used. For pipe with a nominal wall thickness greater than 0.120 inch, each length of pipe shall be subjected to a hydrostatic test as specified in 4.4.6.

3.7 Intergranular corrosion. Pipe shall be free from precipitated carbides which result in intergranular corrosion. Test specimens shall be tested for intergranular corrosion as specified in 4.4.3.

3.8 Dimensions. Dimensions shall conform to table II as specified (see 6.2.1) and shall be within the tolerances specified in 3.9.

### 3.9 Tolerance.

3.9.1 Wall thickness. The wall thickness at any point shall not vary from the nominal wall thickness as specified in table II by more than plus or minus 12.5 percent.

3.9.2 Outside diameters. No individual measurement of the o.d. of the pipe (see table II) at any point shall vary from the ordered sizes by an amount greater than the applicable value shown in table V.

Table V - Variations in o.d.

O.d.	Permissible variations	
	Over	Under
Inches	Inch	Inch
0.405 to 1.900, incl.	.015	0.031
2.375 to 4.500, incl.	.031	.031
5.563 to 8.625, incl.	.062	.031
10.750 to 12.750, incl.	.093	.031

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3.9.3 Length. Pipe shall be furnished in lengths of 24 feet (ft) or under with not less than 75 percent by weight being furnished in lengths of 18 to 24 ft inclusive, and the balance in random lengths of not less than 12 ft. When pipe is ordered to "EXACT" lengths (see 6.2.1), no piece shall be under the length specified nor more than 1/4 inch over that specified herein.

3.10 Pipe shall contain no weld except for the longitudinal weld necessary in the manufacture of welded pipe. Repair of defects by welding will not be permitted.

3.11 Unless otherwise specified in the contract or order, pipe shall be furnished with plain ends. When threaded ends are specified (see 6.2.1), the threads shall conform to Handbook H28 and the procuring activity shall furnish the manufacturer with coupling and thread protection information in the contract or order.

3.12 Lot identification number. For each lot of pipe as defined in 4.2.1, the manufacturer shall assign a lot identification number which shall be marked on the pipe as specified in 3.13.1.

# 3.13 Identification marking. Pipe shall be marked in accordance with FED-STD-183.

# 3.13.1 Marking information. Each pipe 1/4 inch and over in o.d. shall be clearly and legibly marked by painting or stencilling the following information at intervals not greater than 3 ft:

- (a) Name, trademark, or brand name of the manufacturer.
- (b) Specification number (MIL-P-1144).
- (c) Type, grade, and class designation of pipe.
- (d) Letters "S" (seamless) or "W" (welded) according to the process of manufacture.
- (e) Heat and lot identification numbers.
- (f) Contract number.

# 3.13.2 Tags. Pipe less than 1/4 inch in o.d. shall have the markings specified in 3.13.1 clearly shown on two oil proof tags securely attached to each pipe or bundle.

# 3.13.3 The marking fluid shall not be harmful to the pipe, rub off, or smear in normal handling, and shall conform to the limitations on the use of marking fluid in accordance with MIL-STD-792.

3.14 Workmanship. Pipe shall be of proper dimensions with ends cut square, free of burrs, and shall not deviate from straightness by more than 0.060 inch in 3 ft of length. The pipe shall be free from laminations, laps, seams, scale, rust, and visible cracks. The pipe surface on delivery shall be free from grooves, scratches, indentations, marks, abrasions, and pits with depths equal to or greater than 5 percent of the specified nominal wall thickness or over 0.005 inch whichever is greater. Permissible defects in finished pipe shall have rounded profiles only and shall be randomly distributed over the surface.

3.15 Certificate of compliance. For each lot of pipe (see 4.2.1), the manufacturer shall provide in each pipe bundle a certificate of compliance (see 4.5).

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

# 4.1.1 Quality program. The supplier shall provide and maintain a quality program in accordance with the data ordering document included in the contract or order (see 6.2.2).

#### 4.2 Sampling for quality conformance inspection.

4.2.1 Lot. For the purposes of sampling, a lot shall consist of all pipe of the same type, grade, and class of the same o.d. and wall thickness; manufactured during an 8-hour period from the same heat or melt; heat treated in the same batch or by the continuous process under the same conditions as to temperature and time; and subjected to inspection at the same time.

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4.2.2 Sampling for visual and dimensional examination. From each lot, pipe shall be selected in accordance with the procedures of MIL-STD-105 for the examination specified in 4.3. The acceptable quality level (AQL) expressed as percent defective and inspection levels shall be as follows:

	<u>Inspection level</u>	<u>AQL (percent)</u>
Visual examination	L-II	1.5
Dimensional examination	L-II	1.5

4.2.3 Sampling for tensile test. Samples shall be selected from each lot of pipe using inspection level S-2 of MIL-STD-105 for an AQL equal to 2.5 percent. The samples shall be tested as specified in 4.4.2, and if the test results of the samples do not meet the acceptance criteria as outlined in MIL-STD-105, the entire lot shall be rejected.

4.2.4 Sampling for intergranular corrosion test. Samples shall be selected from each lot of pipe using inspection level S-2 of MIL-STD-105 for an AQL equal to 2.5 percent. The samples shall be tested as specified in 4.4.3, and if any of the samples do not meet the acceptance criteria as outlined in MIL-STD-105, the entire lot shall be rejected.

4.2.5 Sampling for flattening test. A random sample consisting of a number of lengths of pipe (from which test specimens shall be prepared) shall be selected from each lot in accordance with table VI, and the test specimens shall be subjected to the flattening test specified in 4.4.4.

Table VI - Sampling for flattening test.

Number of pipe lengths in inspection lot	Number of pipe lengths in sample	Acceptance number (test failures)	Rejection number (test failures)
2 to 50	3	0	1
51 to 150	5	0	1
151 to 500	8	0	1
501 and over	13	0	1

4.3 Examination.

4.3.1 Visual examination. Each sample pipe selected in accordance with 4.2.2 shall be visually examined in accordance with table VII to verify conformance with this specification. Any nonconforming pipe in each sample shall not be offered for delivery, and if the number of nonconforming pipe in the sample exceeds the acceptance number specified for that sample, the entire lot shall be rejected or 100 percent visually examined.

Table VII - Classification of defects.

Examination	Defects
Design and construction	Not type, grade, or class specified. Defective material. Out of straightness tolerance. Welds other than longitudinal weld in welded pipe. Presence of acid pits resulting from pickling treatment.
Workmanship	Rough threads (when applicable). Not pickled free from mill scale. Interior obstructions. Welds not smooth and uniform (when applicable).
Marking identification	Missing, incomplete, not legible, not stamped or rolled, not continuous as specified. Marking fluid harmful to pipe.

4.3.2 Dimensional examination. Examination shall be made of each sample pipe selected in accordance with 4.2.2 for compliance with dimensions specified herein. Any deviation from a specified tolerance shall constitute a defect.



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## 4.4 Tests.

4.4.1 Chemical analysis. An analysis of each heat of steel shall be made by the producer to determine the percentages of elements specified in table I. The analysis shall be made in accordance with the wet chemical method 111 or the spectrographic method 112 of FED-STD-151 to determine compliance with table I. In case of dispute the wet chemical method 111 shall be the basis for acceptance.

4.4.2 Tension test. Longitudinal tension test specimens selected as specified in 4.2.2 shall each be cut from a different length of pipe. Where practicable, the specimens shall be a full test specimen and shall conform to ASTM E8. For pipe whose diameter does not permit testing in full size, the test specimens shall be cut longitudinally from the test pipes and shall conform with the applicable test specimen of ASTM E8. The yield strength shall be determined at a limiting offset of 0.2 percent elongation.

4.4.3 Intergranular corrosion test. Specimens selected in accordance with 4.2.4 shall be subjected to the intergranular corrosion test as specified in 4.4.3.1. Test specimens of grades 304 and 316 pipe shall be tested in the as-delivered, unsensitized condition. Test specimens of grades 304L, 316L, 321, and 347 pipe shall be heated at 1250°F + 25°F (675°C ± 15°C) for one hour, followed by air cooling, prior to the intergranular corrosion test.

4.4.3.1 The specimens shall be prepared in accordance with practice E of ASTM A262 using the size and type of configuration, full ring or circumferential segment, conforming to table VII. The test shall consist of subjecting the specimens to one 24-hour boiling period in the test solution after which ring specimens shall be flattened to a distance not less than three times the wall thickness. Circumferential specimens shall be bent through 180 degrees and over a diameter equal to the thickness of the specimen being bent. The specimens shall then be examined in accordance with ASTM A262 for conformance with the test requirements. Practice A etch test for rapid screening will not be applicable.

4.4.4 Flattening test. A section of seamless pipe not less than 2-1/2 inches in length, or a section of welded pipe not less than 4 inches in length shall be cut from one end of each sample piece selected as specified in 4.2.4. The samples shall be flattened cold between parallel plates in two steps. For welded pipe, the weld shall be placed 90 degrees from the direction of the applied force. During the first step, which is a test for ductility, no cracks or breaks on the inside, outside, or end surfaces shall occur until the distance between the plates is less than the value of H calculated as follows:

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

where: H = Distance between flattening plates in inches.  
 t = Nominal wall thickness of pipe in inches.  
 D = Actual o.d. of pipe in inches.  
 e = Deformation per unit length (0.09 for austenitic steels).

Note: See table IV for calculated values of H.

During the second step, which is a test for soundness, the flattening shall be continued until the specimen breaks or the opposite walls of the pipe meet. Evidence of laminated, or defective material or weld revealed during the entire flattening test shall be cause for rejection. If desired, the flattening test may be made on crop ends. Should a crop end fail, one retest may be made from the failed end. Within any one lot, approximately half of the flattening test specimens shall be cut from the end of the pipe first out of the heat-treating furnace and the remainder from the end last out of the furnace. If any sample fails this test, it shall not be offered for delivery, and if the number of samples that fail exceeds the acceptance number specified in table VI, the lot shall not be offered for delivery.

4.4.5 Nondestructive electric test. Each length of pipe shall be tested in accordance with ASTM E426 using the following calibration standard to establish a minimum sensitivity level for rejection. For welded pipe, the calibration standard shall be placed in the weld, if visible:

Drilled hole. A hole not larger than 0.031 inch (0.787 mm) diameter shall be drilled radially and completely through the pipe wall, care being taken to avoid distortion of the pipe while drilling.

Pipe lengths producing a signal equal to or greater than the calibration defect shall be subject to rejection. Pipe lengths which have failed the nondestructive electric test shall



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be rejected unless retested and found acceptable under the hydrostatic test as provided in 4.4.6.

- # 4.4.6 Hydrostatic test. Each length of pipe shall withstand the required internal test pressure. The test pressure shall be calculated by the following formula:

$$P = \frac{2 St}{D}$$

where: t = Nominal wall thickness of pipe in inches.  
 D = O.d. of pipe in inches.  
 P = Hydrostatic test pressure in pounds per square inch (psi).  
 S = Allowable fiber stress in psi at 100°F, based on the following values:

Grade	Seamless	Welded
304	18,750	16,000
304L	17,900	14,900
316	18,750	16,000
316L	17,500	14,900
321	18,750	16,000
347	18,750	16,000

Each piece of pipe shall remain under the specified pressure for at least 5 seconds. Each pipe shall be tight under pressure and shall show no bulges, cracks, flaws, porosity, or other harmful defects. If any pipe fails the test, it shall not be offered for delivery and shall not be resubmitted for acceptance under the nondestructive electric test.

4.5 Certificate of compliance. The manufacturer shall provide in each pipe bundle a certificate of compliance for that lot of pipe (see 4.2.1) which contains the results of the following tests:

- Chemical analysis (see 4.4.1).
- Tension test (see 4.4.2).
- Flattening test (see 4.4.4).
- Intergranular corrosion test (see 4.4.3).
- Nondestructive electric test or hydrostatic pressure test (as applicable) (see 4.4.5 and 4.4.6).
- Certification of heat treatment.

To be acceptable, the certificate of compliance shall contain the actual test data and shall be validated by a representative of the manufacturer. It shall also include the marking information specified in 3.13.1.

4.6 Inspection of preparation for delivery. Preservation-packaging, packing, and marking shall be inspected for compliance with section 5 of this document.

## 5. PREPARATION FOR DELIVERY

- # (The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3)

5.1 Preservation, packaging, and packing shall be level A or C as specified (see 6.2.1) and shall be in accordance with the applicable requirements of MIL-STD-163.

5.2 Marking for shipment shall be in accordance with MIL-STD-163, unless specified otherwise (see 6.2.1)

## 6. NOTES

- # 6.1 Intended use. Typical applications for pipe supplied under this specification include hydraulic oil, liquid oxygen and nitrogen, and gaseous nitrogen helium, and air. It is not intended for salt water systems and high pressure main steam lines. For maximum corrosion resistance, a post weld solution-anneal heat treatment is required for grade 304 and grade 316 weld joints.

### 6.2 Ordering data.

- # 6.2.1 Procurement requirements. Procurement documents should specify the following:

- Title, number, and date of this specification.
- Type, grade, and class of pipe required (see 1.2).

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- (c) Nominal pipe size or outside diameter required (see 3.8).
- (d) Total length of pipe; whether random or exact lengths are required (see 3.9.3).
- (e) When threaded ends and thread protection are required (see 3.11 and table II).
- (f) Level of packaging and packing required (see 5.1).
- (g) Marking required if other than specified (see 5.2).

6.2.2 Contract data requirements. When this specification is used in a procurement invoking the data requirement clause of the Armed Services Procurement Regulations (ASPR) paragraph 7-104.9 (in) and which incorporates a DD Form 1423 Contract Data Requirements List (CDRL), the data requirements identified below will be developed as specified in the cited Data Item Description (DID) and delivered in accordance with such CDRL. When the ASPR provisions are not invoked, the data specified below shall be delivered in accordance with the contract requirements.

<u>Specification paragraph</u>	<u>Data requirements</u>	<u>Service</u>	<u>Applicable DID</u>	<u>Options</u>
4.1.1	Quality program plan	SH	UDI-E-23743	---

(Copies of DID's required by the supplier in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.)

6.3 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in Section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 The chemical and mechanical property requirements of this specification are similar to those of ASTM A312 alloys TP304, TP304L, TP316, TP316L, TP321, and TP347.

6.5 THE MARGINS OF THIS SPECIFICATION ARE MARKED "#" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE WERE MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

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