ASTM B366-04b^{E1}

Standard Specification for Factory – Made Wrought

Nickel and Nickel Alloy Fittings

1. Scope :-

1.1 This specification covers wrought welding fittings for pressure piping , factory – made from nickel alloys . Threaded fittings as covered in ASME B16.11 are also covered by this specification . The term welding applies to butt – welding or socket – welding parts such as 45 and 90° elbows , 180° bends , caps , tees , reducers , lap-joint stub ends , and others types , as covered by ASME B16.9 , ASME B16.11 , MSS-SP-43 , MSS-SP-95 , and MSS-SP-97 .

1.1.1 Several grades of nickel and nickel alloys are included in this specification . Grades are designated with a prefix , WP or CR , based on the applicable ASME or MSS dimensional and rating standard .

1.1.2 Class WP fittings are those manufactured to the requirements of ASME B16.9 , B16.11 .

1.1.3 For each of the WP nickel and nickel alloy grades , several classes of fittings are covered to indicate whether seamless or welded construction was utilized / Class designations are also utilized to indicate the non-destructive test method and extent of non-destructive examination (NDE). Table 1 is general summary of the fitting classes applicable to all WP grades of nickel and nickel alloys covered by this specification . There are no classes for the CR grades . Specified requirements are covered elsewhere .

TABLE 1 fitting Classes for WP Grades

Class	Construction	Non-destructive Examination
S	Seamless	None
W	Welded	Radiography or Ultrasonic
WX	Welded	Radiography
WU	Welded	Ultrasonic

2. Referenced Documents :-

2.1 ASTM Standards :-

B 127 Specification for Nickel-Copper Alloy (UNS N04400) Plate , Sheet , and Strip

B 160 Specification for Nickel Rod and Bar

B 161 Specification for Nickel seamless Pipe and Tube

B 162 Specification for Nickel Plate , Sheet and Strip

B 163 Specification for seamless Nickel and Nickel Alloy Condenser and Heat-Exchanger Tubes

B 164 Specification for Nickel-copper Alloy Rod , Bar , and Wire

B 165 Specification for Nickel-copper Alloy (UNS N04400)* Seamless pipe and tube

B 166 Specification for Nickel-Chromium-Iron Alloys (UNS N06600 , N06601 , N06603 , N06690 , N06693 , N06025 , and N06045)* and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Rod , Bar , and Wire

B 167 specification for Nickel-Chromium-Iron Alloys (UNS N06600 , N06601 , N06603 , N06690 , N06693 , N06025 , and N06045)* and Nickel-Chromium-Cobalt-Molybdenum Alloy (UNS N06617) Seamless pipe and tube

B 168 specification Nickel – Chromium – Iron Alloys (UNS N06600 ,N06601 ,N06603 , N06690 , N06693 , N06025 , and N06045) and Nickel – Chromium – Cobalt – Molybdenum Alloy (UNS N06617) Plate , sheet , and strip

B 333 Specification for Nickel-Molybdenum Alloy plate , sheet , and strip

B 335 Specification for Nickel-Molybdenum Alloy Rod

B 407 Specification for Nickel-Iron-Chromium Alloy seamless pipe and tube

B 408 Specification for Nickel-Iron-Chromium Alloy Rod and Bar

B 409 Specification for Nickel-Iron-Chromium alloy plate , sheet , and strip

B 423 Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and N08221)* seamless pipe and tube

B 424 specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221)* plate , sheet , and strip

B 425 specification for Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221)* rod and bar

B 434 Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, UNS N10242)* plate , sheet , and strip

B 435 Specification for UNS N06002 , UNS N06230 , UNS N12160 , and UNS R30556 plate , sheet , and strip

B 443 Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNSN06625) and Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219)* plate , sheet , strip

B 444 Specification for Nickel-Chromium-Molybdenum-Columbium Alloys (UNS N06625 and UNS N06852) and Nickel-Chromium-molybdenum-Silicon Alloy (UNS N06219) pipe and tube

B 446 Specification for Nickel-Chromium-Molybdenum-Columbium alloy (UNS N06625) , Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219) , and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650)* rod and bar

B 462 specification for forged or Rolled UNS N06030 , UNS N06022 , UNS N06035 , UNS N06200 , UNS N06059 , UNS N06686 , UNS N08020 , UNS N08024 , UNS N08026 , UNS N08367 , UNS N10276 , UNS N10665 , UNS N10675 , UNS N10629 , UNS N08031 , UNS N06045 , UNS N06025 , and UNS R20033 Al

B 463 Specification for UNS N08020 , UNS N08026 , and UNS N08024 Alloy plate , sheet , and strip

B 464 Specification for welded UNS N08020 , N08024 , and N08026 alloy pipe

B 468 Specification for welded UNS N08020 , N08024 , and N08026 alloy pipe

B 472 Specification for Nickel Alloy Billets and Bars for Reforging

B 473 Specification for UNS N08020 , UNS N08024 , and UNS N08026 Nickel Alloy Bar and Wire

B 511 Specification for Nickel-Iron-Chromium-Silicon Alloy Bars and Shapes

B 512 Specification for Nickel-Chromium-Silicon Alloy (UNS N08330) Billets and Bars

B 514 Specification for Welded Nickel-Iron-Chromium Alloy Pipe

B 515 Specification for welded UNS N08120 , UNS N08800 , UNS N08810 , and UNS N08811 Alloy Tubes
B 516 Specification for Welded Nickel-Chromium-Iron Alloy (UNS N06600 , UNS N06603 , UNS N06025 , and UNS N06045) Tubes
B 517 Specification for Welded Nickel-Chromium-Iron-Alloy (UNS N06600 , UNS N06603 , UNS N06025 , and UNS N06045) Pipe
B 535 Specification for Nickel-Iron-chromium-Silicon Alloys (UNS N08330 and N08332) seamless pipe and tubes
B 536 Specification for Nickel-Iron-Chromium-Silicon alloy (UNS N08330 and N08332) plate , sheet , strip
B 564 Specification for Nickel alloy forgings
B 572 Specification for UNS N06002 , UNS N06230 , UNS N12160 , and UNS R30556 Rod
B 573 Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003 , N10242)* Rod
B 574 Specification for Low –Carbon Nickel-Chromium-Molybdenum, low—Carbon Nickel-Molybdenum-Chromium-Tantalum, Low-Carbon Nickel –Chromium – Molybdenum-Copper, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Rod
B 575 Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low – Carbon Nickel-Chromium-Molybdenum-Copper, Low – Carbon Nickel-Chromium-Molybdenum-Tantalum, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy plate , sheet , strip
B 581 Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod
B 582 Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy plate , sheet , strip
B 619 Specification for welded Nickel and Nickel-Cobalt Alloy pipe and tube
B 622 Specification for seamless Nickel and Nickel-Cobalt Alloy pipe and tube
B 625 Specification for UNS N08925, UNS N08031, UNS N089321, UNS N08926, UNS N08354, and UNS R20033 plate, sheet, and strip
B 626 Specification for welded Nickel and Nickel-Cobalt Alloy tube
B 649 Specification for Ni-Fe-Cr-Mo-Cu-N low-Carbon Alloys (UNS N08925, UNS N08031, UNS N08354, and UNS N08926), and Cr-Ni-Fe-N Low-Carbon Alloy (UNS R20033) bar and wire , and Ni-Cr-Fe-Mo-N Alloy (UNS N08936) wire
B 673 Specification for UNS N08925, UNS N08354, and uns N08926 welded pipe
B 674 Specification for UNS N08925, UNS N08354, and UNS N08926 welded tube
B 675 Specification for UNS N08367 welded pipe
B 676 Specification for UNS N08367 welded pipe
B 677 Specification for UNS N08925, UNS N08354, and UNS N08926 seamless pipe and tube
B 688 Specification for Chromium-Nickel-Molybdenum-Iron (UNS N08366 and UNS N08366 and UNS N08367) plate, sheet, and strip
B 690 Specification for Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367 seamless pipe and tube

B 691 Specification for Iran-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) rod, bar, and wire

B 704 specification for welded UNS N06625, UNS N06219 and UNS N08825 Alloy Tubes

B 705 Specification for Nickel-alloy (UNS N06625, N06219 and N08825) welded pipe

B 710 Specification for Nickel-Iron-Chromium-Silicon Alloy welded pipe

B 729 Specification for seamless UNS N08020, UNS N08026, and UNS N08024 Nickel-Alloy pipe and tube

B 880 Specification for General Requirements for Chemical check analysis limits for Nickel, Nickel Alloy and Cobalt Alloys

B 899 Terminology Relating to Non-ferrous Metals and Alloys

E 165 Test Method for Liquid Penetrant Examination

E 1916 Guide for Identification and/or segregation of mixed lots of metals

2.2 ASME Standards :-

B 16.9 wrought steel butt welding fittings

B16.11 forged steel fittings, socket-welding and threaded

H34.1 Nickel seamless pipe and tubing

H34.2 Nickel-Copper Alloy seamless pipe and tubing

H34.3 Nickel-Chromium-iron Alloy seamless pipe and tubing

2.3 Manufacturers Standardization Society of the Valve and fittings Industry Standards

MSS-SP-25 standard marking systems for Valves, Fittings, Flanges, and Unions

MSS-SP-43 standard practice for light weight stainless steel butt welding fittings

MSS-SP-95 forged carbon steel branch outlet fittings-socket welding, Threaded and Butt Welding Ends boiler and pressure vessels code, and section VIII, division 1, pressure vessels and section IX, welding qualification

2.4 AWS Standards :-

A5.11 Specification for Nickel and Nickel Alloy covered welding electrodes

A5.14 specification for Nickel and Nickel-Alloy Bare Welding Rods and Electrodes

3. Terminology :-

3.1 Terms defined in Terminology B 899 shall apply unless otherwise defined in this standard.

4. Ordering Information :-

4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification . Examples of such requirements include, but are not limited to, the following :

4.1.1 Quantity , number of fittings of each kind,

4.1.2 Description of fitting and Nominal Dimensions (standard or special),

4.1.3 Alloy Composition,

4.1.4 Condition (temper) if applicable.

4.1.5 If neither grade of N06625 is specified, Grade 1 will be supplied.

4.1.6 For each Grade of WP fittings ordered , a Class should also be indicated

4.1.6.1 Grade CR fittings shall not be substituted for fittings ordered to Grade WP, but Grade WP may be furnished for Grade CR.

4.1.6.2 For all Classes of WP fittings, unless S, W, WX, or WU is specified by the purchaser, any class may be furnished at the option of the supplier.

4.1.7 Purchaser Inspection – state which tests or inspections are to be witnessed (Section 10),

4.1.8 Samples for Product (Check) Analysis – state whether samples should be furnished (6.3),

4.1.9 Test reports (Section 12),and

4.1.10 Supplementary requirements, if any.

5. Materials and Manufacture :-

5.1 material – The material for wrought welding fittings may consist of forgings , rods, bars, plates, sheets, and seamless or welded pipe that conform to all requirements of the ASTM specification for the particular product and alloy referred to in table 2 .

5.2 Manufacture :

5.2.1 Forging or shaping operations may be performed by hammering , pressing , piercing, extruding, upsetting, rolling, bending, or fusion welding, or by a combination of two or more of these operations . The forming procedure shall be so applied that it will not produce injurious defects in the fittings.

5.2.2 Grade WP fittings ordered as class S shall be of seamless construction and shall meet all requirements of ASME B16.9 or B16.11 .

5.2.3 All classes of fittings shall have the welders, welding operations, and welding procedures qualified under the provision of section IX of the ASME boiler and pressure vessel code.

5.2.4 Grade WP fittings ordered as class W shall meet the requirements of ASME B16.9 and shall have all pipe welds made by the starting material manufacturer or the fitting manufacturer with the addition of filler radiographically examined throughout the entire length in accordance with paragraph UW-51 of section VIII, division 1, of the ASME boiler and pressure vessel code, except as exempt by 5.2.4.1, and 5.2.4.2.

5.2.4.1 The weld in the starting pipe, made to one of the pipe or tube product specification listed in Table 2, shall not require radiography, provided that no filler metal is used in making the weld.

5.2.4.2 Instead of the radiographic examination, and at the option of the manufacturer, welds made by the fitting manufacturer may be ultrasonically examined in accordance with the code requirements stated in 5.2.6 .

5.2.5 Grade WP fittings ordered as class WX shall meet the requirements of ASME B16.9 and shall have all welds, whether made by the fittings manufacturer or the starting material manufacturer, radiographically examined throughout their entire length in accordance with paragraph UW-51 of section VIII, division 1, of the ASME boiler and pressure vessel code, exempt by 5.2.5.1. The radiography for this code, except may be done either prior to or after forming at the option of the manufacturer.

5.2.5.1 Instead of the radiographic examination, and at the option of the manufacturer, welds, whether made by the fitting manufacturer or the starting material manufacturer, may be ultrasonically examined in accordance with the code requirements stated in 5.2.6.

5.2.6 Grade WP fittings ordered as class WU shall meet the requirements of ASME B16.9 and shall have all welds, whether made by the fitting manufacturer of the starting material manufacturer, ultrasonically examined throughout their entire length in accordance with Appendix 12 of section VIII, division 1, of the ASME boiler and pressure vessel code. The ultrasonic examination of welds for this class may be performed either prior to or after forming at the option of the manufacturer.

5.2.7 Personnel performing NDE examination shall be qualified in accordance with SNT-TC-1A.

5.2.8 Fitting covered in MSS SP-43, MSS SP-95, or MSS SP-97, and ordered as CR*** shall meet the requirements of MSS SP-43, MSS SP-95, MSS SP-97, respectively, and do not require non-destructive examination .

5.2.9 All joints welded with filer metal shall be finished in accordance with the requirements of paragraph UW-35 (a) of section VIII, division 1, of the ASME boiler and pressure vessel code .

5.2.10 Radiographic examination of the weld buildup on cold-formed stub ends shall not be required provided that all the following steps are adhered to :

5.2.10.1 The weld procedure and welders or welding operators meet the requirements of 5.2.3.

5.2.10.2 All weld surfaces are liquid penetrant examined in accordance with Appendix 8 of section VIII , division 1 of the ASME boiler pressure vessel code.

5.2.10.3 Repair of areas in the weld is permitted, but 5.2.10.1 and 5.2.10.2 must be repeated.

5.2.10.4 Fittings shall be marked with the symbol WBU following the alloy designation (for example : WPN-WBU).

5.2.11 Stub ends may be produced with the entire lap added as weld metal to a straight pipe section provided the welding satisfies the requirements of 5.2.3 for qualifications and 5.3 for heat treatment.

5.2.11.1 Grade WP**** Class W – Radiographic examination of the welds, made with the addition of filler metal, is required, see 5.2.4.

5.2.11.2 Grade WP**** Class WX – Radiographic examination of all welds, made with or without the addition of filler metal, is required. See 5.2.5.

5.2.11.3 Grade WP****Class WU – Ultrasonic examination of all welds, made with or without the addition of filler metal, is required. See 5.2.6.

5.2.11.4 Grade CR – non-destructive examination is not required. See 5.2.8.

5.2.12 Stub ends may be produced with the entire lap added by the welding of a ring, made from plate or flat bar of the same alloy grade and composition, to the outside of a straight section of pipe, provided the weld is a double welded full penetration joint and satisfies the requirements of 5.2.3 for qualifications and 5.3 for heat treatment.

5.2.12.1 Grade WP****Class W – Radiographic examination of all welds, made with the addition of filler metal, is required. See 5.2.4.

5.2.12.2 Grade WP****Class WX – Radiographic examination of all welds, made with or without the addition of filler metal, is required. SEE 5.2.5.

5.2.12.3 Grade WP****Class WU – ultrasonic examination of all welds, made with or without the addition of filler metal, is required. See 5.2.6.

5.2.12.4 Grade CR – non-destructive examination is not required. See 5.2.8.

5.3 Heat Treatment – all fittings shall be furnished heat treated. See Table 3 for recommended heat treatments. All forming or welding shall be done and completed prior to any final heat treatment. For seamless fittings made without forming, heat treatment, if any, shall be agreed upon between purchaser and manufacturer.

TABLE 2 Permissible Raw Materials

Marking[A]		Product and Designation[B]				
Corrosion Resistant Fittings	ASME Pressure Fittings	Alloy	UNS Designation	Pipe or Tube	Plate, Sheet, or strip	Bar Forging and Forging Stock
CRN	WPN	Ni	N02200	B161	B162	B160, B564
CRNL	WPNL	Ni, Low C	N02201	B161	B162	B160
CRNC[c]	WPNC[c]	Ni-Cu	N04400	B165	B127	B164, B564
CRHX	WPHX	Ni-Cr-Mo-Fe	N06002	B619,B 622, B626	B435	B572
CRHG	WPHG	Ni-Cr-Fe-Mo-Cu	N06007	B619, B622, B626	B582	B581
CRHC 22	WPHC 22	Low C-Ni-Mo-Cr	N06022	B619, B622, B626	B575	B574, B564, B462, B 472
CRV602	WPV602	Ni-Cr-Fe	N06025	B 163, B 167	B168	B166, B462, B 472
CR HG 30	WP HG 30	Ni-Cr-Fe-Mo-Cu	N06030	B 619, B 622, B 626	B582	B 581, B462, B 472
CRHG35	WPHG35	Ni-Cr-Mo	N06035	B 619, B622, B6263	B575	B574, B564, B 462, B472
CRV45TM	WPV45TM	Ni-Cr-Fe	N06045	B 163, B 167	B168	B166, B462, B472
CR2120	WP2120	Ni-Cr-Mo low C	N06058	B 619, B 622, B626	B575	B564, B574, B462, B472
CR5923	WP5923	Low C-Ni-Cr-Mo	N06059	B 619, B622, B 626	B575	B564, B574, B462, B472
CR HC 2000	WP HC 2000	Low C-Ni-Cr-Mo-Cu	N06200	B 619, B 622, B 626	B575	B564, B574, B462, B472
CRM21	WPM21	Low C-Ni-Cr-Mo-Ta	N 06210	B 619, B 622, B 626	B575	B564, B574
CRH230	WPH230	Ni-Cr-W-Mo	N06230	B 619, B 622, B 626	B435	B572, B564
CR HC 4	WP HC 4	Low –C-Ni-Mo-Cr	N06455	B 619, B 622, B 626	B575	B574
CRNCI	WPNCI	Ni-Cr-Fe	N06600	B 167, B 516, B517	B168	B166, B564

CR603GT	WP603GT	Ni-Cr-Fe-Al	N06603	B 163, B167, B516, B517	B168	B166, B564
CRNCMC	WPNCMC	Ni-Cr-Mo-Cb	N06625	B444, B704, B705	B443	B446, B564
CRIN686	WPIN686	Low C-Ni-Cr-Mo	N06686	B163,B619, B622, B626	B575	B564, B574, B462, B472
CR626Si	WP626Si	Ni-Cr-Mo-Si	N06219	B444, B704, B705	B443	B446, B564
CR HG3	WP HG3	Ni-Cr-Fe-Mo-Cu	N06985	B B619, B 622, B 626	B582	B581
CR20CB	WP 20CB	Cr-Ni-Fe-Mo-Cu-Cb stabilized	N08020	B464, B468, B729	B463	B472, B473, B462
CR3127	WP3127	Low C-Ni-Fe-Cr-Mo-Cu	N08031	B619, B 622, B 626	B625	B564, B649, B462, B472
CRH120	WPH120	Ni-Cr-Fe	N08120	B407,B514,B515	B409	B408, B564
CR330	WP330	Ni-Fe-Cr-Si	N08330	B535, B710	B536	B511, B512
CR6XN	WP6XN	Fe-Ni-Cr-Mo-N	N08367	B675, B676, B690	B688	B472, B564, B691, B462
CRNIC	WPNIC	Ni-Fe-Cr	N08800	B407, B514, B515	B409	B408, B564
CRNIC10	WPNIC10	Ni-Fe-Cr	N08810	B407, B514, B515	B409	B408, B564
CR NIC11	WPNIC11	Ni-Fe-Cr	N08811	B 407	B409	B408, B564
CRNICMC	WPNICMC	Ni-Fe-Cr-Mo-Cu	N08825	B 423, B704, B705	B424	B425, B564
CR904L	WP904L	Low C-Ni-Fe-Cr-mo-Cu	N08904	B673, B674, B677	B625	B649
CR1925	WP 1925	Low C-Ni-Fe-Cr-Mo-Cu	N08925	B673, B674, B677	B625	B649
CR1925N	WP 1925N	Low C-Ni-Fe-Cr-Mo-Cu-N	N08926	B673, B674, B677	B625	B649
CR HB	WP HB	Ni-Mo	N10001	B 619, B 622, B 626	B333	B335
CR HN	WP HN	Ni-Mo-Cr-Fe	N10003	B 619, B 622, B 626	B434	B573
CR H242	WP H242	Ni-Mo-Cr-Fe	N10242	B 619, B 622, B 626	B434	B573, B564
CR HC 276	WP HC 276	Low C-Ni-Mo-Cr	N10276	B 619, B 622, B 626	B575	B574, B564, B462, B472
CRB10	WPB10	Low C-Ni-Mo-Cr-Fe	N10624	B 619, B 622, B 626	B333	B335, B564
CRVB4	WPVB4	Ni-Mo	N10629	B 619, B 622, B 626	B333	B335, B564, B462, B472
CR HB2	WP HB2	Ni-Mo	N10665	B 619, B 622, B 626	B333	B335, B564, B462, B472
CR HB3	WP HB3	Ni-Mo	N10675	B 619, B 622, B 626	B333	B335, B564, B462, B472
CRH160	WPH160	Ni-Co-Cr-Si	N12160	B 619, B 622, B 626	B435	B564, B572
CR3033	WP3033	Low C-Cr-Ni-Fe-N	R20033	B 619, B 622, B 626	B625	B564, B649, B472, B462
CRH556	WPH556	Ni-Fe-Cr-Co	R30556	B 619, B 622, B 626	B435	B572

6. Chemical Composition :-

6.1 The material shall conform to the requirements as to chemical composition for the respective material prescribed in Table 2.

6.2 Records of chemical analysis made in accordance with the application listed in Table 2 shall be certification that the material of the fitting meets requirements of this specification.

6.3 If a product (check) analysis is made by the purchaser, the material shall conform to the requirements for product (check) analysis prescribed for the respective product in Table 2 and Specification B 880. For check analysis.

6.4 In fittings of welded construction, the alloy content of the deposited weld metal shall conform to that required of the base metal or for equivalent weld metal as given in the AWS Filler metal specification A5.11 and A5.14.

7. Mechanical Properties and Other Requirements :-

7.1 tensile Requirements :-

7.1.1 (All Table 2 alloys except for UNS N06625 Grade 1 or Grade 2)

7.1.1.1 Material used in the manufacture of the fittings shall conform to the requirements for tensile properties as properties as prescribed for the respective in Table 2.

7.1.1.2 Finished fittings shall conform to the properties for the respective material and temper as prescribed in the specification referred to in table 2. When required, the properties of fittings made from forging stock shall be as agreed upon between the producer and the purchaser.

7.1.2 tensile Requirements (For fittings made to meet the mechanical properties of UNS N06625 Grade 1):

7.1.2.1 at the option of the manufacturer, the material used in the manufacturer of UNS N06625 Grade 1 fittings shall conform to the mechanical property requirements of either UNS N06625 Grade 1 or Grade 2 as prescribed for the respective product in Table 2.

7.1.2.2 Tensile tests are required in accordance with 7.1.2.3.

7.1.2.3 Tensile tests are required per lot (Note s2.3) per furnace charge. Tensile specimens may be obtained from a fitting or a representative test piece (Note S2.2). Tensile specimens representing fittings of welded construction, made with the addition of filler metal, are to include the weld and be prepared so that the weld is at the specimen's mid length location.

7.1.2.4 TABLE 3 Heat Treatment

Corrosion Resistant Fittings	ASME Pressure Fittings	Alloy	UNS Designation	Heat Treatment[A,B] DEG F (DEG C)	Quench
CRN	WPN	Ni	N02200	1650-1700 (900 TO 928)†	Rapid Air/Water
CRNL	WPNL	Ni-Low C	N02201	1650-1700 (900 TO 928)	Rapid Air/Water

CRNC[c]	WPC[c]	Ni-Cu	N04400	1650-1700 (900 TO 928)	Rapid Air/Water
CR HX	WPHX	Ni-Cr-Mo-Fe	N06002	2150(1177)[D]	Rapid Air/Water
CR HG	WPHG	Ni-Cr-Fe-Mo-Cu	N06007	2100-2150 (1150 To 1177)	Rapid Air/Water
CR HC 22	WPHC22	Low C-Ni-Mo-Cr	N06022	2050(1121)[D]†	Rapid Air/Water
CRV602	WPV602	Ni-Cr-Fe	N06025	2200(1204)[E]	Rapid Air/Water
CR HG 30	WPHG30	Ni-Cr-Fe-Mo-Cu	N06030	2150(1177)[D]	Rapid Air/Water
CRHG35	WPHG35	Ni-Cr-Mo	N06035	2050(1121)	Rapid Air/Water
CRV45TM	WPV45TM	Ni-Cr-Fe	N06045	2150(1177)	Rapid Air/Water
CR5923	WP5923	Low C-Ni-Cr-Mo	N06059	2050(1121)	Rapid Air/Water
CR HC 2000	WPHC2000	Low C-Ni-Cr-Mo-Cu	N06200	2075-2125 (1135-1163)	Rapid Air/Water
CRM21	WPM21	Low C-Ni-Cr-Mo-Ta	N06210	[E]	[E]
CRH230	WPH230	Ni-Cr-W-Mo	N06230	2150-2250 (1177-1232)	Rapid Air/Water
CR HC 4	WPHC4	Low C-Ni-Mo-Cr	N06455	1950 (1065)[D]	Rapid Air/Water
CR NCI	WPNCI	Ni-Cr-Fe	N06600	1800-1850 (983 to 1010)	Rapid Air/Water
CR603GT	WP603GT	Ni-Cr-Fe-Al	N06603	2175(1189)	Rapid Air/Water
CRNCMC	WPNCMC	Ni-Cr-Mo-Cb	N06625 Gr1	1600(871)	Rapid Air/Water
CRNCMC	WPNCMC	Ni-Cr-Mo-Cb	N06625 Gr2	2000(1093)[D]†	Rapid Air/Water
CRIN686	WPIN686	Low C-Cr-Ni-Mo	N06686	2150(1177)	Rapid Air/Water
CR626Si	WP62Si	Ni-Cr-Mo-Si	N06219	2050(1121)†	Rapid Air/Water
CR HG3	WPHG3	Ni-Cr-Fe-Mo-Cu	N06985	2100-2150 (1147 to 1177)	Rapid Air/Water
CR20CB	WP20CB	Cr-Ni-Fe-Mo-Cu-Cb stabilized	N08020	1700-1850 (927 to 1010)	Rapid Air/Water
CR904L	WP904L	Low C-Ni-Fe-Cr-Mo-Cu	N08904	1985-2100 (1085 to 1150)	Rapid Air/Water
CR3127	WP3127	Low C-Ni-Fe-Cr-Mo-Cu	N08031	2175(1189)	Rapid Air/Water
CR H120	WPH120	Ni-Cr-Fe	N08120	2175-2225	Rapid

				(1189-1220)	Air/Water
CR330	WP330	Ni-Fe-Cr-Si	N08330	1900(1038)	Rapid Air/Water
CR6XN	WP6XN	Fe-Ni-Cr-Si	N08367	2025(1107)	Rapid Air/Water
CRNIC	WPNIC	Ni-Fe-Cr	N08800	1800-1900 (983 to 1038)[3]†	Rapid Air/Water
CRNIC10	WPNIC10	Ni-Fe-Cr	N08810	2100-2150 (1147 to 1177)[3]	Rapid Air/Water
CRNIC11	WPNIC11	Ni-Fe-Cr	N08811	2100-2150 (1147 to 1177)[3]	Rapid Air/Water
CRNICMC	WPNICMC	Ni-Fe-Cr-Mo-Cu	N08825	1700-1800 (930 to 983)[3]†	Rapid Air/Water
CR1925	WP1925	Low C-Ni-Fe-Cr-Mo-Cu	N08925	1800-1900 (983 to 1083)†	Rapid Air/Water
CR2120	WP2120	Low C-Ni-Cr-Mo	N06058	2075(1135)	Rapid Air/Water
CR1925N	WP1925N	Low C-Ni-Fe-Cr-Mo-Cu-N	N08926	2150(1177)	Rapid Air/Water
CRHB	WPHB	Ni-Mo	N10001	1950(1065)[D]	Rapid Air/Water
CRHN	WPHN	Ni-Mo-Cr-Fe	N10003	2150 (1177)[D]	Rapid Air/Water
CR H242	WPH242	Ni-Mo-Cr-Fe	N10242	1925-2025 (1050-1105)	Rapid Air/Water
CR HC 276	WPHC276	Low C-Ni-Mo-Cr	N10276	2050(1121)[D]	Rapid Air/Water
CRB10	WPB10	Low C-Ni-Mo-Cr-Fe	N10624	2050(1121)	Rapid Air/Water
CRVB4	WPVB4	Ni-Mo	N10629	1975 (1080)	Rapid Air/Water
CR HB2	WPHB2	Ni-Mo	N10665	1950 (1065)[D]	Rapid Air/Water
CR HB3	WPHB3	Ni-Mo	N10675	1950 (1065)[D]	Rapid Air/Water
CRH160	WPH160	Ni-Co-Cr-Si	N12160	2025(1107)[D]	Rapid Air/Water
CR3033	WP3033	Low C-Cr-Ni-Fe-N	N20033	2050(1121)	Rapid Air/Water
CRH556	WPH556	Ni-Fe-Cr-Co	N30556	2150(1177)[D]	Rapid Air/Water

8. Dimensions :-

8.1 Fittings or components produced in accordance with this specification shall have sizes, shapes, and dimensions in accordance with those specified in ASME 16.9, ASME 16.11, MSS SP-43, MSS SP-95, MSS SP-97, ASME H34.1, ASME H34.2, or ASME H34.3.

9. Workmanship, Finish, and Appearance
10. Inspection
11. Rejection and Rehearing
12. Certification :-

12.1 Test reports are required for all fittings covered by this specification. Each test report shall include the following information.

12.1.1 the year date of the specification and class to which the fitting was furnished,
12.1.2 Heat numbers or serial number traceable to heat numbers,
12.1.3 Chemical analysis for all starting materials,
12.1.4 Mechanical properties for all starting materials, or actual mechanical properties if tension testing was required,
12.1.5 For construction with filler metal added, weld metal chemical analysis or AWS classification,
12.1.6 For welded stub ends, the construction method per 5.2.11 or 5.2.12 shall be stated,
12.1.7 Heat treatment per table 3,
12.1.8 Results of all non-destructive examination,
12.1.9 Result of all tests required by supplementary requirements and the order, and
12.1.10 Statement that the fitting was manufactured, sampled, tested and inspected in accordance with the specification and was found to meet the requirements.

13. Product Marking
14. Keywords :-

14.1 nickel alloy fittings

SUPPLEMENTARY REQUIREMENTS :-

S1. Product Analysis
S2. Tension Test
S3. Liquid Penetrant test
S4. Hydrostatic Test
S5 Bar Stock Fittings
S6. Positive Material Identification Examination