Entergy Nuclear Northeast
Indian Point Energy Center – Unit No. 2

Specification

For

Fabrication of Piping Systems
Turbine Generator Plant

Specification No. 9321-01-248-18

Incorporating Specifications
From:
United Engineers & Constructors Inc.
&
Westinghouse Electric Corporation

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Rev. 0	October 14, 1966
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Rev. 16	April 1, 2002
Rev. 17	August 31, 2004
Rev. 18	January 15, 2010

* Includes U. E. & C. Addenda Nos. 1 thru 15 and updating of Technical Society Data.

U.E.&C. Specification No. 9321-01-248-18

TABLE OF REVISIONS

Revision No.	Description	Comments	Date
9	Added 3 new sections	Response to an OIR	4/23/96
	as follows:	(96-02-0161-01)	
	Class A-3, Prefix STV		
	Class D-3, Prefix MPS		
	Class D-3, Prefix STD		
	Pages 7A, 19A & 19B		
10	Revised Class A-1	For Wet Steam Piping	12/20/96
		Replacement	
	Revised Class A-2	"	
	Revised Class A-3	"	
	Revised Class D-1	"	
	Revised Class D-5	"	
	For Class A-3, Revised	"	
	Prefix 5EX & STV		
11	Revised Class B-2	Response to an OIR	7/18/97
		(95-E043230)	
12	Revised Class A-1	For Wet Steam	11/30/99
	Revised Class A-3	Piping Replacement	
	Revised Class A-6	"	
	Revised Class D-3	"	
	Revised Class D-7	"	

			U.E. & C. Specification No. 9321-01-248-18 TABLE OF REVISIONS			
Rev. No.		**Description**	**Comments**		**Date**	**Reference Document**
13		Revised Class A-1	Valve END; typo B.W. to S.W. (Ref. CR 199906197) Revised Remark No. 2 Added Remark No. 3 (Ref. OIR 98-E00218).		11/16/00	
13		Revised Class A-2	Revised Remark No. 2		11/16/00	
13		Revised Class A-3 (5EX)	Revised Remark No. 2		11/16/00	
13		Revised Class A-3 (STV)	Revised Remark No. 2		11/16/00	
13		Revised Class A-6	Revised Remark (***)		11/16/00	
13		Revised Class B-1	Long Loop Recirc Cleanup Sys Mod No. SGR-00-12405-M		11/16/00	
13		Revised Class B-2	SGBD lines 45, 46, 47, and 48 (Ref. CR 199904292)		11/16/00	
13		Revised Class D-1	Revised Remark No. 2		11/16/00	
13		Revised Class D-3 (5EX)	Revised Remark No. 2		11/16/00	
13		Revised Class D-5	Revised Remark No. 2		11/16/00	
13		Revised Class D-7	Revised Remark No. 2		11/16/00	
13		Revised Class E-2	Typo; Pipe Schedule 10		11/16/00	
13		Added Class H-1A	SG Wet Layup Sys Mod. No. RES-12396-00		11/16/00	
13		Added Class H-1B	SG Wet Layup Sys Mod. No. RES-12396-00		11/16/00	
13		Revised Class H-2	Polypropylene Lined Pipe (Ref. CR 200002872) PTFE Lined Pipe		11/16/00	

Rev. No.	Description	Comments	Date	
13	Revised Class H-6	Polypropylene Lined Pipe (Ref. CR 200002872) PTFE Lined Pipe	11/16/00	
13	Added Class H-7	CPVC Pipe; Sodium Hypochlorite System Mod No. FMX-96-11892-M	11/16/00	
13	Revised Class K3-SS	Typo; Pipe Grade, add TP-316	11/16/00	
13	Revised Class 151	Added Note 4 (Ref. CR 199807613)	11/16/00	
14	Revised Class N-2	Typo: Corrected Temperature and Pressure values per CR 200009925	3/12/01	
14	Revised Class N-2	Added Class N-2 for City Water application for Sodium Hypochlorite System Mod. FMX-96-11892-M	3/12/01	
15	Revised Class G-1 (HS)	Allows the use of 316 stainless steel fittings.	2/22/02	
15	Revised Class H-1A (CF)	Allows the use of stellite seat material for 3/4" valves for S/G Wet Lay-up	2/22/02	
15	Revised Class K-3 (IA)	Allows the use of 0.065" wall for 3/4" copper tubing.	2/22/02	
15	Revised Class P-1 (SB)	Allows the use of threaded connections for piping 2 inch diameter and smaller.	2/22/02	
16	Electronic Version	Convert Specification 9321-01- 248-18 to electronic format.	3/22/02	N / A
16	Remove Part B, Exhibit A,	This information is contained in	4/1/02	N / A
	(Symbols for Process Flow Diagrams) pages 2 – 5 and Exhibit B, page 6 (Instrumentation Symbols)	Dwg. 9321-C-2016, "Flow Diagram Symbols" and procedure DG-01, "Preparation of Drawings".		This information does not lend itself to electronic format and is contained in other documents.
16	Revise Class A-5 (4EX)	Allow the use of A691 EFW, Grade 2 1/4 Cr, Class 20, schedule 10 material for 20” diameter pipe.	4/1/02	CR 200108529

Rev. No.	Description	Comments	Date	
16	Revise Class A-6 (3EX)	Allow the use of A691 EFW, Grade 2 1/4 Cr, Class 20 schedule 10 material for 20" & 28" diameter pipe.	4/1/02	CR 200108529
16	Revise Class D-3 (5EX)	Allow the use of schedule 40 for 10" & larger pipe diameter.	4/1/02	CR 200108529
16	Revise D-7 (3EX, 2EX, 1EX)	Allow the use of A335, Grade P22, schedule 40 material for 3" - 6" diameter pipe.	4/1/02	CR 200108529
17	Add Gasket Material Requirements	Add Section III.A.g to address spiral wound edge gaskets and updated Appendix A, on cleanliness to IP-3 TS-MS-012 and TS-MS-028.	8-24-04	IP3-2004-01241 CA-004
17	Correction of Miscellaneous typo's	Cleaned up format errors and typo's. Removed statement, "the latest edition of", from section A.2.a, and added "1955 Edition". Deleted sketches A, B, and C.	8-24-04	N / A
18	Incorporated DRN-05-05518, DRN-05-05809, DRN-06-00331, DRN-07-02286, DRN-07-02926, 07-P357, 07-P358, 07-P1129, 09-P1522, 09-P1523 and CR IP2-1998-07613	Revised Classes A-1, A-2, A-3, A-5, B-1, B-2, C-1, D-1, D-7, D-8, E-1, E-2, J-1, K-3, N-1 and 151. Updated gasket information in paragraph g.3. Cleaned up format errors and typo's.	1/15/2010	DRNs are approved specification changes and were incorporated as written into this revision of the specification

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SECTION I

GENERAL INFORMATION

Owner:…….	Entergy Nuclear Northeast	R-16
Purchaser:……..	United Engineers & Constructors Inc. 1401 Arch Street, Philadelphia, Pennsylvania 19105	
Description:……..	Specification for Fabrication of Piping Systems for Indian Point Generating Station, Unit No. 2	

Assumption of Westinghouse and UE&C Authority by Con Edison R-3A

Purchase of Con Edison, Indian Point Energy Center, Unit No. 2 by Entergy Nuclear Northeast R-16

In this specification and data sheets, references to all inspections, permissions, resolutions, acceptances, documentation receipts and final approvals shall be the responsibility Entergy Nuclear Northeast in lieu of Westinghouse or UE&C. R-16

SECTION II

A. Scope of Work:

Furnish all labor and supervision, tools, equipment and material to completely shop detail, shop fabricate, inspect, test, clean, prepare for shipment and deliver to the jobsite all piping systems 3" and larger as shown on the drawings and in accordance with the requirements of this specification and including the following:

1. All branch nozzles, vent, drain, sample and instrument connections as required and shown on the drawings connecting to piping systems 3" and larger;

2. All welded and flanged fittings for the above systems;

3. All bolts, nuts, washers, gaskets and backing rings for the above systems;

4. Extra loose material, for small items listed in (3) above, 10% in excess of the amount actually required except that the excess shall not be less than one (1);

5. All bored sections of pipe;

6. Installation of flow nozzles, which are furnished by Others, in accordance with the instructions of the Supplier;

7. Shipment of flow meter runs, after installation of flow nozzles, to meter manufacturer for calibration of his equipment, if required;

8. Openings and closure plugs where required for field radiography of pipe welds;

9. Connection to piping of all welded hanger, anchor, support and restraint lugs which are furnished by Others;

10. All end plates for piping penetrations of the Containment Building for all sizes of piping;

11. Furnish three (3) certified copies of the results of chemical and physical tests as required by the ASTM specifications and as required under Section III of this specification.

B. Work by Others:

1. Unloading, storage and erection of shop fabricated piping assemblies.
2. Field fabrication of piping systems 2-1/2” in size and smaller.
3. Hanger design, fabrication and erection.
4. Insulation, weather-proofing and finish painting.
5. Valves, traps, orifice plates, strainers, expansion joints and accessories.
6. Flow nozzles-supplied to Seller for installation in shop fabricated pipe.
7. Plumbing.
8. Potable water connection to Unit No. 1 supply header and piping to Unit 2 services.
9. Yard fire protection piping.
10. Standpipe fire protection piping.
11. Heating, ventilation and air conditioning systems.
12. Crossover piping (reheater-moisture separator to low pressure turbines).
13. Crossunder piping (high pressure turbine exhaust to moisture separators).
14. Steam piping from turbine stop valves to high pressure turbine casing inlet.
15. Reactor coolant system piping including pressurizer surge line and all branch connections to reactor coolant piping, up to the first weld and including all instrument connections.
16. Underground equipment and floor drains in Primary Auxiliary Building, Fuel Storage Building and trenches.
17. Floor and wall sleeves.
18. Service Water piping.
19. Circulating Water piping.

SECTION III

A. Fabrication of Piping:

1. Drawings:

   Drawings will be submitted and distributed in accordance with the Special Conditions No. 9321-442 for Purchase of Equipment and Material dated October 1, 1966, and Addendum No. 1 thereto, dated February 6, 1967.

2. Fabrication:

   a. Codes

      The fabrication of all piping shall meet the requirements of the American National Standards Institute, Code for Pressure Piping, ANSI B31.1, 1955 Edition, as modified by appropriate nuclear cases. R-17 R-3

   b. Materials

      (1) All pipe materials shall be in accordance with the Piping Schedule and Material. No substitutions of specified material shall be made without prior written approval of the Purchaser. R6A

      (2) The Seller shall supply certification and test data clearly showing the chemical and physical properties of all materials incorporated as a part of the work in accordance with the applicable ASTM specification.

      (3) Three copies of the certifications and test data, identified as to end use, shall be furnished to the Purchaser.

   c. Workmanship

      (1) All workmanship shall be in accordance with the methods and procedures of best recognized pipe fabrication and must be done in a good and workmanlike manner and the latest revision of applicable ANSI Standards. R-3

      (2) Flanges or welded nozzles, branch connections, welding outlets, adaptors and taps shall be true and faced at right angles to the axis of the pipes to insure accurate fit. Connections shall not extend inside the pipe.

      (3) Bends, offsets and branch connections shall be made true to the sizes, dimensions, angles and radii indicated on the drawings, with ends true and faced at right angles to the axis of the pipe.

A. Fabrication of Piping: (continued)

(4) Bends shall be made to five (5) times the nominal pipe diameter, except where shown otherwise on the drawings. Bends shall be made hot with sand packing. Finished bends shall be smooth in contour and free from buckles and distortion. The cross section of the pipe shall not be changed by more than 5% from the original dimensions. Out-of-roundness of bends at welding ends, prior to machining, shall conform to the permissible out-of-roundness given in the ASTM specifications for the particular pipe material. The wall thickness of the thinnest section of the bend shall not be less than the minimum wall thickness allowable under the latest revision of the American National Standards Institute Code for Pressure Piping ANSI B31.1 for the design pressure and temperature and the material used and shall include a 0.065" corrosion allowance. R-3

(5) Bends made to three (3) times the nominal pipe diameter, which are hot-coined to a uniform wall thickness, may be substituted for five (5) diameter bends with the prior approval of the Purchaser.

d. Specific Requirements

(1) Piping shall be fabricated in the largest practical sections to minimize the number of field joints.

(2) Mitering of pipe to form elbows is permitted only where shown clearly on the drawings.

(3) Branch connections may be made with either welding tees, forged branch welding outlet fittings, Bonney Forge or equal, or reinforced branch welded connections made in accordance with Section 6 of the American National Standards Institute Code for Pressure Piping ANSI B31.1 latest revision, and in accordance with the following restrictions: R-3

For radioactive service, when the branch size equals the run size, use welding tee; when the branch size is greater than one-half the run size, use reducing welding tee; when the branch size is less than or equal to one-half the run size, use either welded branch connections, branch outlet fitting or reducing welding tee.

For non-radioactive service, when branch size equals the run size, use welding tee; when the branch size is less than the run size, use either welded branch connection, branch outlet fitting or reducing welding tee.

A. Fabrication of Piping: (continued)

(4) Branch welding outlet fittings shall be forged steel, flared for improved flow where attached to the run, reinforced against external stresses and shall be of ANSI schedule number and pressure—temperature rating compatible with that of the piping to which it is attached. In large sizes these may be furnished as castings. R-3

(5) The use of extruded outlet headers will not be approved by the Purchaser.

(6) Socket welding and threaded connections on pipe lines shall be made by half coupling or forged outlet fittings, Bonney Forge or equal. Fittings and couplings shall be of sufficient weight to satisfy reinforcement requirements and pressure-temperature ratings compatible with the pipe to which it is attached. Half couplings shall be machine beveled to provide for a full penetration weld. The holes in pipe headers made for these connections shall be drilled the same size as coupling inside diameter. All burrs shall be removed and threaded couplings shall be retapped after welding.

(7) Openings for field radiography shall be provided in fabricated piping for which either random 10% or random 20% or 100% radiographic examination is required under Section III-B, Inspection and Tests.

(8) Openings for radiography shall be provided with threaded closure plugs in accordance with Dravo Corp. detail E-2366-X22 Add #1

e. Welding

(1) Welding shall, at all times, be acceptable to authorized representatives of the Purchaser and the Hartford Steam Boiler Inspection and Insurance Company.

(2) Welding shall be in accordance with Chapter Five (5) the American National Standards Institute, Code for Pressure Piping ANSI B31.1. R-3

(3) Welding shall be done in accordance with United Engineers' Welding Specifications or alternate specifications approved by the Purchaser.

(4) Welding procedures, welders and welding operators shall be qualified in accordance with Section IX, Welding Qualifications, of the ASME Boiler and Pressure Vessel Code. Three (3) certified copies of qualification tests shall be furnished to the Purchaser. In case of conflict between ASME Section IX and other Codes or Standards, Section IX shall govern. R-3A

A. Fabrication of Piping: (continued)

(5) The expense of instructing, testing and qualification of welders shall be borne by the Fabricator.

(6) All material used in welding, preheating and stress relieving shall be in accordance with the American National Standards Institute, Code for Pressure Piping ANSI B31.1 and is subject to approval by the Purchaser. R-3

(7) All pipe ends in carbon steel piping 3" and larger in diameter shall be prepared for field welding in accordance with the American National Standards Institute, Code for Pressure Piping ANSI B31.1 Chapter V, or as required at equipment connections. R-3 Add.#1

(8) All pipe ends in carbon steel piping 3" and larger in diameter shall be prepared for shop welding in accordance with the American National Standards Institute, Code for Pressure Piping ANSI B31.1 Chapter V, or alternate approved by the Purchaser. R-3

(9) All pipe ends in stainless steel piping 3" and larger in diameter shall be prepared for field welding in accordance with Westinghouse's Drawing No. 498B932 or as required at equipment connections. R-3B

(10) All pipe ends in stainless steel piping 3" and larger in diameter shall be prepared for shop welding in accordance with Westinghouse's Drawing No. 498B932 or alternate approved by the Purchaser.

(11) Backing rings may not be used in Class 1 seismic piping systems. Welding shall be done using the inert gas shielded tungsten arc process employing a consumable insert ring and welding grade argon gas on the reverse side. Add. #11

(12) Welding procedures employing the inert gas tungsten arc welding process with the uniform addition of filler metal and with welding grade argon gas on the reverse side may be substituted for the same process using a consumable insert ring provided that the finish weld is 100% radiographed in accordance with Section III, Para. B2b of this specification. Add.#11

A. Fabrication of Piping: (continued)

f. Heat Treatment

(1) Heat treatment for piping systems shall be in accordance with the American National Standards Institute, Code for Pressure Piping ANSI B31.1, latest revision. R-3

(2) Post-bending solution anneal heat treatment is required for hot-bent austenitic stainless steel pipe bends. The bends or entire pipe assembly shall be uniformly heated to a range 1,900 to 1,950°F. This temperature shall be maintained for one hour plus one hour per inch of wall thickness followed by rapid cooling using water quench (preferred method), water spray, or high velocity air blast.

(3) Stress relieving shall be performed after all attachments, including hanger lugs, are made.

(4) Welds in stainless steel piping shall not be stress relieved.

(5) Three (3) copies of stress relief charts shall be furnished to the Purchaser.

(6) Post-bending heat treatment is not required for hot-bent carbon steel pipe bends, provided the bending temperature does not exceed 1,700°F. Add. #1

A. Fabrication of Piping: (continued)

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Entire g
Section

g. Flange Bolting Hardware and Gasket Material Requirements

A flanged joint is composed of three separate and independent, although inter-related components: the flanges, the gasket and the bolting. Proper controls must be exercised in the selection and application for all these elements to attain a joint that has acceptable leak tightness. Special techniques, such as controlled bolt tightening, may be necessary to achieve a tight joint in service. Therefore, the requirements in this section shall govern unless otherwise noted on the applicable procedure, material data sheet, drawing, or modification as well as the installation and assembly requirements (specified in both 0-MS-411 and FFX 002-94) that are as important as the components mentioned above in achieving a flange joint that is leak tight and maintains its integrity under all operating conditions.

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g.1. Bolting Hardware for Flange Classes - 300 to 1,500

Stud/Bolt - ASTM A-193 Grade B7, threaded according to ANSI B1.1 Class 2A fit; sizes 1” and smaller in diameter - coarse thread series; sizes 1 1/8” and larger diameter - 8 pitch thread series; length shall be according to ASME B16.5 to allow at least 2 threads exposed beyond the nut.

Nut - ASTM A-194 Grade 2H, Hexagon semi-finished, ANSI Standard Heavy Series threaded to ANSI B1.1 Class 2B; coarse thread series for sizes 1” diameter and smaller; and 8 pitch threads for sizes 1 1/8” diameter and larger.

Washer - ASTM F-436, Type 1, Hardened steel.

g.2. Bolting Hardware for Flange Classes - 125 and 150

Same as g.1, 300 to1500 Class flanges, but with the following additions: A-193 Grade B7 bolts (hex or square head) and studs, threaded to ANSI B1.1 Class 2A fit, and length to ASME B16.5.

A. Fabrication of Piping: (continued)

g.3. Flange Gaskets

a) Material requirements shall be as specified in Section g.5.

Joint Type	Flange Material	ASME Pipe Size / Flange Class	Gasket Material / Design
Raised Face	Stainless Steel, Low Alloy Steel and Carbon Steel	≥ 24" NPS/900 Class ≥ 12" NPS/1500 Class ≤ 1.5" NPS/All Classes	Spiral wound, inner & outer ring style, 300 series stainless steel plies, high purity flexible graphite filler. ASME B16.20 design to match Flange Class and NPS. (See Notes 1, 2 & 3)
Raised Face	Stainless Steel, Low Alloy Steel and Carbon Steel	All NPS other than above / all Classes except 125	Spiral wound, outer ring style gaskets may be used but the preferred use is the spiral wound, anti-radial buckling, outer ring style (e.g. Garlock Edge) with 300 series stainless steel plies, high purity flexible graphite filler and ASME B16.20 design to match Flange Class and NPS. (See Notes 4 & 6.)
Flat Face	Stainless Steel, Carbon Steel, Cast Iron & Aluminum	All NPS / 125 & 150 Classes	ASME B16.21 design to match Flange Class and NPS. (See Notes 5 & 6 for materials and applications.)

Notes:

Note1: EPRI Report TR-111472, Assembling Bolted Connections Using Spiral-Wound Gaskets recommends that, in addition to those diameters and pressure ratings specified in the table above, spiral wound, inner & outer ring style gaskets should be used on any flange with a reported history of gasket buckling. The report also recommends that inner rings specified for Class 900 and 1500 be sized appropriately to preclude intrusion of the inner ring inside the bore.

Note 2: EPRI Report TR-111472, in addition, states that small size flanges (≤ 1.5"NPS) in horizontal runs should use gaskets with an outer ring. Flanges 1.5 inches NPS and less have four bolts and dimensions that will permit the gasket to drop to the point where the raised face can come down on the live portion of the gasket rather than on the outer ring. **R-18**

Note 3: EPRI Report TR-111472 further states that orifice plates and extensively reworked flanges that have smooth faces should also use inner ring style gaskets to prevent the gasket from sliding radially inward as it is compressed (creep.)

A. Fabrication of Piping: (continued)

Note 4: EPRI Report TR-111472 also states that the efficiency and function of a gasket is best achieved when the gasket is centered within the bolt circle, the maximum compressive load that can be applied to the resilient active portion of the gasket is limited and the gasket is specially designed to prevent radial buckling. To this end, spiral-wound gaskets specially designed to prevent radial buckling are preferred subject to the flange rating restrictions in this table.

Note 5: Typical sheet thickness 1/16" for pipe ≤ 14" NPS and 1/8" for pipe > 14". Sheet gasket thickness up to 1/8" may be required for pipe ≤ 14" NPS based on flange condition and parallelism.

Note 6: Sheet gaskets for raised or flat face flanges. See g.5 and g.5.1 for radiation and prohibited compound limits:

* General-purpose applications, Blue-Gard 3000 & Blue-Gard 3400 < 400°F continuous service, Garlock 9850 < 650°F continuous service. R-18
* Service ≥ 450°F, to prevent blowout at high pressure, grafoil sheet (Garlock Style 3125-SS, SGL Hochdruck precut with 316 stainless steel insert.) Grafoil sheet without stainless steel insert (Garlock Style 3123) may be substituted where gasket fabrication by cutting would not be practical because of the insert.
* Operating temperature < 300°F - water service only EPDM (Ethylene Propylene Rubber) 60 - 70 Shore A Durometer.
* Gas applications, Gore-Tex expanded PTFE (Garlock Gylon 3545.)
* Oil applications, Gore-Tex expanded PTFE (Garlock Gylon 3545 or Garlock Style 3750.)
* Steam applications, Garlock Graph-Lock Style 3128 Hochdruck. Garlock 9850 > 150 psig, contact Garlock Engineering. Blue-Gard 3000 & Blue-Gard 3400, contact Garlock Engineering for all steam applications. R-18

g.4. Isolation Kit and Torque Requirements

a) For systems susceptible to corrosion, dissimilar metal connections shall use galvanic isolation kits: insulating gasket, washers, and bolt sleeves. See 0-MS-411 for torque requirements.

b) Galvanic isolation is not required for similar flange material combinations that utilize similar fastener materials: CS or Cr-Mo to CS or Cr-Mo, austenitic SS to austenitic SS, ferritic SS to ferritic SS, martensitic SS to martensitic SS, and 6% Mo SS to 6% Mo SS , Cu-Ni to Cu-Ni, Cu-Ni to Al-Bronze, Ni-Cu to Ni-Cu. For any other material combinations, galvanic isolation is required regardless of the bolting material used unless approved by Engineering.

A. Fabrication of Piping: (continued)

g.5. Elastomer and Non-Metallic Material Requirements

Elastomers and other non-metallic materials used in piping fabrications shall not contain prohibited materials exceeding the limits specified in Para. g.5.1 below. All such materials (e.g. EPDM) shall be able to withstand, without damage, an integrated radiation dose of 2×10^8 rads minimum. Types of materials shall comply with Section III.A.2.g of this specification. Alternate materials shall have Entergy's approval prior to being furnished.

g.5.1 The Supplier shall assure that the following prohibited compounds shall be eliminated as possible base metal contaminating sources during manufacture and fabrication of all piping materials. Organic carbon and low melting point elements such as lead, zinc, cadmium, tin, bismuth, antimony, sulfur, mercury and their compounds shall not exceed the limits specified herein or the applicable ASTM material specification limits on impurities, whichever is lower:

a) Total halogen content (free and chemically combined) shall not exceed 200 ppm by weight when measured in accordance with ASTM D808.

b) Total low melting point metals (lead, copper, cadmium, bismuth, zinc, mercury, antimony and tin) content shall not exceed 300 ppm by weight, and no individual metal shall exceed 200 ppm by weight, except that mercury shall be controlled to 50 ppm maximum as determined by spectrographic methods.

c) Sulfur content shall not exceed 0.5 percent by weight when measured in accordance with ASTM D129.

d) Components that contain asbestos or other EPA classified toxic materials are prohibited. This prohibition includes gaskets even though the item is encapsulated or the asbestos fibers are impregnated with binder material.

e) Teflon tape shall not be used on threaded joints unless specifically authorized by Entergy.

g.5.2 The Supplier shall assure that the above contaminating sources do not occur due to improper selection of cleaning materials, lubricants, mallets, U-tube manometers, NDE test materials and instruments, markers and packaging materials.

g.5.3 The Supplier and its sub-suppliers shall assure, by proper cleanliness procedures, that these elements and their compounds do not exist on the surfaces of the finished products.

g.5.4 Any materials necessary for welding, preheating, or stress relieving of fabricated piping assemblies shall be in accordance with the specified edition of ASA B31.1 "Power Piping".

B. Inspection and Tests:

1. Prior to Fabrication:

   All materials to be used in the fabrication of piping systems are to receive a thorough visual examination for damage, conformance to specifications and evidence of having successfully passed mill tests in accordance with the applicable ASTM specification. Damaged material will be rejected or repaired. Procedure for repair of damaged material will require the Purchaser's approval.

2. After Fabrication:

   a. Inspections to assure quality of welds shall be performed and shall be radiographic, liquid penetrant, or magnetic particle as listed below for the various classes and services of piping systems.

   b. Radiographic inspection of butt welds shall be performed and evaluated in accordance with the ASME Boiler & Pressure Vessel Code, Section VIII, paragraph UW-51, for both random and 100% radiography. Add. #4

   c. Liquid penetrant inspection shall be performed in accordance with the ASME Boiler & Pressure Vessel Code, Section VIII, Appendix VIII. The acceptance standard shall be in accordance with that defined in the ANSI Code Case N-10. R-3

   d. Magnetic particle inspection may be substituted for liquid penetrant inspection of butt welds in carbon steel pipe. If the substitution is made, the magnetic particle inspection shall be in accordance with the ASME Boiler & Pressure Vessel Code, Section VIII, Appendix VI.

   e. Radiographic inspection to the specified 10 or 20% random extent will require the welding inspector to select at random (preferably by use of a Table of Random Numbers), 10 or 20 completed circumferential welds out of each one hundred representative welds of each welders work.

   f. Evidence of unacceptable quality corresponding to random 10% and 20% radiography shall be considered cause to require up to 100% radiography inspection of welds made by each welder against whom defects are revealed.

   g. For the purposes of random 10% and random 20% radiography, the Seller may drill access holes in the finished fabrication. Access holes and plugs shall be in accordance with Dravo Corp.'s detail E-2366-X22. After drilling access holes, the inside of the pipe shall be ground smooth and flush. Add. #1,4

   h. Root pass liquid penetrant will not be required for piping where the nominal wall thickness is ¼-inch or less. Add. #4

B. Inspection and Tests: (continued)

i. Branch welds shall be liquid penetrant inspected on both the outside surface of the finished weld and if accessible, at the inside weld root.

j. Liquid penetrant dyes and developers shall be free of chlorides and halides.

k. The finished fabrication shall be inspected for conformance with dimensions, angles, radii and planes shown on the piping drawings and shop details and shall be within the dimensional tolerances set up by the applicable Pipe Fabrication Institute standards.

l. Shop hydrostatic testing of the completed piping sub-assemblies is not required; however, the Seller shall certify that all materials and welds furnished to the Purchaser shall be capable of withstanding the hydrostatic tests as governed by the American National Standards Institute Code for Pressure Piping ASA B31.1-1955, paragraph 121. R-3 R-17

B. Inspection and Tests: (continued) Add. # 4

	ROOT PASS LIQUID PENETRANT		FINISHED WELD LIQUID PENETRANT		RADIOGRAPHY BUTT WELDS ONLY			
CLASS	SOCKET WELDS (3)	BUTT WELDS	SOCKET WELDS (4)	BUTT WELDS	RANDOM 10%	RANDOM 20%	100%	
151N			X	X	X S.W.			Add. #12
151R		X	X	X		X S.W.		Add #12
152N			X	X			Note 1	
152R		X	X	X				
301N			X	X	X	Note 2		Add #12
301R		X	X	X		X		
302N			X	X	X	Note 2		Add #12
302R		X	X	X		X		
601N			X	X	X	Note 2		Add #12
601R		X	X	X			X	
602N			X	X	X	Note 2		Add #12
602R		X	X	X		X		
901N			X	X		X		
901R		X	X	X			X	
902N			X	X		X		
902R		X	X	X			X	
903N			X	X		X		
903R		X	X	X			X	
1501N			X	X		X		
1501R		X	X	X			X	
1502N			X	X		X		
1502R		X	X	X			X	
2501N			X	X		X		
2501R		X	X	X			X	
2502N			X	X		X		
2502R		X	X	X			X	
2503N			X	X		X		
2503R		X	X	X			X	
2505			X					

NOTE 1: Component Cooling Water (ACS) inside the Containment Building to and from the Residual Heat Exchangers.

NOTE 2: Where 10% random radiography of each welders work is required of field welds in pipe material having a wall thickness of 0.251" or less, 20% random radiography of all the welds in the system may be substituted. Add #12

NOTE 3: Examine TIG root pass visually to assure a sound root closure weld. Add #15

NOTE 4: The finished surface of socket welds in reactor coolant, safety injection, residual heat removal, chemical and volume control, and component cooling systems piping shall be 100 per cent liquid penetrant inspected. For piping systems other than the aforementioned, the finished surface of socket welds in piping subjected to operating conditions in excess of either 150 psig pressure or 212^{O}F temperature shall be liquid penetrant inspected. Add #15

S.W. = Shop Welds only.

B. Inspection and Tests: (continued)

Add. #4

Class A-1

1. Main Steam:

   a. 18” and larger butt welds; 100% radiography.

2. Main Steam line branches in Class 1 area (i.e. from Steam Generator to and including second valve), steam supply to Auxiliary Feed Pump Turbine.

   a. 2-1/2” to 16” butt welds; liquid penetrant or magnetic particle inspection of root pass and finish weld and 20% random radiography.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

   c. All branch connections 2” and larger; 100% radiography of connecting weld. Add. #8

Class B-1 and B-2 Add. #4

1. Boiler Feed Discharge:

   a. 12” and larger butt welds; 100% radiography.

2. Boiler Feed line branches in Class 1 area (i.e. from second valve outside Containment Building to Steam Generator), including Auxiliary Feed Pump discharge lines.

   a. 2-1/2” and larger butt welds; liquid penetrant or magnetic particle inspection of root pass and finish weld and 20% random radiography.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

   c. All branch connections 2” and larger; 100% radiography of connecting weld. Add. #8

Class C-3 Add. #4

1. Auxiliary Feed Pump suction line from Condensate Storage Tank:

   a. 2-1/2” and larger butt welds; liquid penetrant or magnetic particle inspection of root pass and finish weld and 20% random radiography.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

B. Inspection and Tests: (continued)

Class D-1 Add. #4

1. Reheater Drains:

   a. 12” and larger butt welds; 100% radiography.

Class J-3 Add. #8

1. Closed cooling water system for instrument air compressors.

   a. 2 ½” and larger butt welds; liquid penetrant or magnetic particle inspection of finish weld.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

Class K-2 and K-3 Add. #4

1. Instrument Air piping from Instrument Air compressors to all Nuclear Plant Services.

   a. Butt welds; liquid penetrant or magnetic particle inspection of finish weld.

   b. Socket weld; liquid penetrant inspection of finish weld.

Class N-1 Add. #4

1. Diesel Oil system:

   a. 2 ½” and larger butt welds; liquid penetrant or magnetic particle inspection of root pass and finish weld and 20% random radiography.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

Class N-2 Add. #4

1. Diesel Generator Starting Air system:

   a. 2 ½” and larger butt weld; liquid penetrant or magnetic particle inspection of root pass and finish weld and 20% random radiography.

   b. 2” and smaller socket welds; liquid penetrant inspection of finish weld.

C. Cleaning and Painting:

1. Straight lengths of carbon steel pipe and carbon steel fittings shall be internally cleaned to completely remove mill scale by power wire brush or grit blasting. Straight lengths of stainless steel pipe and stainless steel fittings shall be internally cleaned by power wire brush using 18-8 stainless steel wire brush not previously used on any other material. Wire brushing or grit blasting should be done after fabrication if conditions and equipment permit, but may be done prior to fabrication. Add. #1

2. Internal surfaces of pipe shall be ground smooth and flush after welding or drilling operations wherever accessible. Grinding on stainless steel pipe and fittings shall be done using iron-free aluminum oxide.

3. Pipe bends shall be cleaned after forming. Bends in carbon steel pipe may be cleaned using aluminum oxide or chilled iron grit; the use of silicon is prohibited. Bends in stainless steel pipe may be cleaned by acid pickling. Pickling must be done after solution anneal heat-treatment specified in Section III-A. Shot blasting will not be permitted. Add. #1

4. Immediately prior to sealing, the fabrication shall be wiped or swabbed out to remove all loose material, rust, grinding and blasting grit, oil and grease leaving the inside surfaces clean and smooth. No preservative coating will be applied. Add. #1

5. Final cleaning and sealing of the fabrications shall be done in an area free of dirt and dirt producing operations.

6. The outside surfaces of all carbon steel piping fabrications shall be painted with one coat of rust inhibiting, heat resistant primer or heat resistant, clear lacquer. Painting may be done after final preparation for shipment provided all surfaces are suitably protected. Weld ends on carbon steel fabrications shall be coated with Deoxalumnite, as manufactured by Special Chemical Corp. Add. #1

7. Stainless steel and aluminum fabrications shall not be painted or oiled.

8. Each fabrication shall have piece marks in at least two separate and distinct places. The piece marks shall correspond to piece marks on detail sheets specified in Section III-A.

9. The Seller shall submit a detailed cleaning procedure for the review and approval of the Purchaser. The cleaning procedure shall be in accordance with Appendix A. Add. #3 R-18

C. Cleaning and Painting: (continued) Add. #3

10. After approval by the Purchaser, the piping for the Nuclear Steam Supply Plant shall be cleaned in accordance with the Procedure.

D. Preparation for Shipment:

1. The fabricated piping shall be prepared for shipment by suitable mounting on skids or pallets, bracing, bundling and covering to prevent damage during shipment.

2. Pipe ends prepared for field welding shall be provided with spun-metal type caps securely fastened. Bent shim metal or other types of caps are not acceptable as protective covers.

3. Flanged connections shall be provided with one-inch thick, marine grade plywood blind flanges, bolted on.

4. Socket welding connections shall be provided with spun-metal caps securely fastened.

5. Screwed connections shall be provided with carbon steel plugs or caps. Cast iron plugs and caps are not acceptable.

6. All spun-metal caps and blind flanges shall be sealed using a heavy duty, pressure sensitive, waterproof tape.

7. Loose material, such as bolts, nuts, gaskets and backing rings shall be securely packaged in waterproof containers. Each package shall contain material of the same type and size and a description of the contents shall be given in at least two separate and distinct locations on each package.

8. All materials used and preparations made for shipment shall be suitable for an extended period of outdoor storage at the plant site without allowing the entrance of moisture, dirt or animals.

E. General Notes: Add. #1

1. Steel pipe, when used with screwed fittings and valves, shall be Schedule 80 pipe if either of the following conditions apply:

    1. Steam systems with design pressure 250 psig and above.

    2. Water systems with design pressure 100 psig and above and with design temperature 220^{o}F and above.

Add. #5

2. All underground piping shall be coated and wrapped in accordance with AWWA Spec. C-203.

PIPING SCHEDULE & MATERIALS

for Specification 9321-01-248-18
for Fabrication of Piping System

Part A - Piping Schedule and Materials – Turbine Generator Plant

This section of the specification contains material specifications for piping systems in the Turbine Generator Plant according to the services as listed in the Index of Piping Systems – Turbine Generator Plant. The piping material sheets each contain a complete list of services for the particular class of piping.

Each material sheet also contains a symbol which will be used as a prefix for piping detail sheets and piece numbers, hanger detail sheets and hanger numbers and valve numbering system.

INDEX TO PIPING SYSTEM - TURBINE GENERATOR PLANT

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
A-1	MS	Main steam piping from steam generator to: Turbine generators; Auxiliary feedwater pump turbine; Reheaters-moisture separators; Boiler feed pump turbines; Steam seal regulator; Turbine by-pass (dump) lines to condenser; Steam jet air ejectors. Valve steam leakoff to gland steam condenser Valve by-passes Trap piping on above lines through last stop valve Instr. piping on above lines through first stop valve Reheater balance line Reheater balance line vent to condenser Steam to boiler feed pump turbine glands	18	1/15/10	5, 5A	
A-2	6EX	Extraction steam to No. 6 heaters	18	1/15/10	6	
A-3	5EX STV	Extraction steam to No. 5 heaters Dried extraction (Bleed) steam from moisture preseparators outlet to No. 5 heaters extraction header	18	1/15/10	7 7A	
A-4	RS	Steam from reheaters-moisture separators to Boiler feed pump turbines	3A	5/3/78	8	
A-5	4EX	Extraction steam to No. 4 heaters	18	1/15/10	9	6
A-6	3EX	Extraction steam to No. 3 heaters and to flash evaporator. Boiler feed pump turbine exhaust to condenser. Supply and leakoff from BF pump turbine glands.	13	11/16/00	10	6
B-1	BFD	Boiler feed pump discharge piping through last valve and pump recirc. line vents and drains. Auxiliary feedwater pump discharge through last valve. Auxiliary feedwater pump recirculation through breakdown orifice to last valve. Stop valve by-passes, vents, drains and instrument piping through first stop valve. Long Loop Recirculation Cleanup System	18	1/15/10	11	

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
B-2	MFD	Boiler feed pump discharge piping from last valve to steam generator. Auxiliary feedwater pump discharge piping after last valve to main boiler feed lines and to Condensate System. Steam Generator Blowdown lines 45, 46, 47, and 48.	18	1/15/10	12	
B-3	BFR	Boiler feed pump recirculation.	0	12/1/67	13	
B-4		Deleted				8
C-1	CD	Condensate pump discharge: through heaters No. 1 to No. 5 to BF pump suct.; to exhaust casing spray through steam jet air ejectors; gland steam condenser and recirc. line through last valve at condenser through flash evaporator; dump line to condensate storage tank; to boiler feed pump seals and boiler feed pump seal water collecting tank. to heater drain pumps cold injection. Aux. FW pump recirc. from last valve to cond. Dump line.	18	1/15/10	14,14A	6
C-2	CS	Condensate pump suction from condensers. Hotwell dump line to low level trip pot. Drains and instr. piping through 1st stop valve on above lines Condenser hotwell instrument piping through 1st stop valve Cond. suction header vents to condenser	8A	6/1/95	15	
C-3	CT	Make-up to Condenser from condensate storage tank. Condensate to auxiliary feedwater pump suction. Condensate transfer line from Unit No. 1 Condensate recirc. line from last valve to cond. Hotwell dump and condensate transfer pump and low level trip pot vents to condenser. Condensate pump vents to condenser Line vents, drains and instr. piping through 1st stop valve on above lines. Condensate pump seal water lines. Brine heater drain pumps suction and discharge to drains collecting tank and discharge tunnel Boiler feed pump seal water collecting tank to condenser. Condensate storage tank vent, overflow and drain.	8A	6/1/95	16,16A	6

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
C-4	CS	Flash evaporator brine recycle pumps suct. & disch.	8A	6/1/95	15A	6
C-5	CT	BF pump turbine drip tank drain pumps suct. and disch.	8A	6/1/95	16B	6
D-1	MS	Reheater drain tanks to No. 6 heaters and stop valves at condensers Reheater drains to reheater drain tanks. Reheater drain tank vent to Reheater Reheater vent to condenser Scavenging steam from reheaters to No. 6 htrs, extr. stm. line	18	1/15/10	17	
D-2	6EX	Drain lines from No. 6 heaters to LCV Vent lines from No. 6 htrs to condenser Htr No. 6 relief valve inlet piping, shell drain & instr. piping through 1st stop valve	3A	5/3/78	18	
D-2	6EX	No. 6 htr drains from LCV to heater drain tank	0	12/1/67	18A	
D-3	5EX MPS STD	Drain lines from No. 5 heaters to htr drain tank Vent lines from No. 5 htrs to condenser Heater No. 5 drains through last condenser stop valve Heater drain tank vents to Heater No. 5 Heater No. 5 relief valve inlet piping & shell drain Heater drain tank drain to last condenser stop valve Heater No. 5 instr. piping through 1st stop valve. Discharge line from moisture preseparators to separating tanks. Drain lines from moisture preseparator separating tanks to heater drain tank.	13 9 9	11/16/00 4/23/96 4/23/96	19 19A 19B	
D-4	HD	Heater drain pump discharge to BF pump suction header.	3A	5/3/78	20	
D-5	5EX	Heater drain pump suction from drain tank Moisture separator drain to LCV	13	11/16/00	21	
D-5	5EX	Moisture separator drain from LCV to dr. coll. Tk	8A	6/1/95	21A	
D-6	4EX	Drain lines from No. 4 htrs to No. 3 htrs and through last stop valve at cond. Vent lines from No. 4 heaters to cond. Heater No. 4 relief valve inlet piping shell drain and instr. piping through 1st stop valve	8A	6/1/95	22	
D-7	3EX 2EX 1EX	Drain lines from heaters No. 1, 2 and 3 Misc. drains and vents from last stop valve to cond. Heaters Nos. 1, 2 and 3 instr. piping through 1st stop valve	18	1/15/10	23,23A	

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
D-8	V	Steam generator safety valve vent piping. Steam seal regulator safety valve vent piping. Feedwater heater relief valve piping. High pressure cyl. relief valve exhaust. Diesel exhaust piping.	18	1/15/10	24	
E-1	CV	Air ejector vents to atmosphere Circulating water priming ejectors to atmosphere. Steam jet air ejector vent to Containment Building.	18	1/15/10	25	
E-2	CA	Air removal piping from cond. and cond. water boxes.	18	1/15/10	26	
F-1	LO	Lube oil conditioning and transfer piping. Diesel Generator Lube Oil Piping.	8A	6/1/95	27	6
F-2	FO	Fuel oil to auxiliary boilers.	8A	6/1/95	28	6
F-3	IO	Ignition (light) oil for auxiliary boilers.	8A	6/1/95	29	6
G-1	HS	Generator hydrogen supply.	15	2/22/02	30	6
G-2	PG	Carbon dioxide supply from globe valve downstream of pressure regulator to generator.	6A	9/1/90	31	6
G-2	PG	Carbon dioxide supply from Unit No. 1 storage and vaporizing unit through vaporizer - Superheater to globe valve downstream of pressure-regulator	6A	9/1/90	31A	6
H-1	CF	Chemical feed system	8A	6/1/95	32	6
H-1A	CF	SG Wet Layup system (recirculation piping)	15	2/22/02	32A	
H-1B	CF	SG Wet Layup system (chemical addition piping)	13	11/16/00	32B	
H-2	CL	Chlorination system.	13	11/16/00	33	6
H-3	AF	Flash evaporator acid feed system to mixing section	8A	6/1/95	34	6

INDEX TO PIPING SYSTEM - TURBINE GENERATOR PLANT

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
H-4	AF	Flash evaporator acid feed from mixing section to flash evaporator.	8A	6/1/95	34A	6,13
H-5	CL	Chlorination System (Seismic Class 1) for essential water system	8A	6/1/95	34B	R-5A
H-6	CL	Chlorination System (for 175 psig max.)	13	11/16/00	34C	R-5A
H-7	CL	Chlorination System (for 150 psig max.)	13	11/16/00	34D	
J-1	CC	Closed cooling water system for conventional plant	18	1/15/10	35	
J-2	PW	Primary water system and make-up from flash evaporator Flash evaporator vents and drains	8A	6/1/95	36	6
J-3	CC	Closed cooling water system for Instrument Air Comp.	6A	9/1/90	35A	6, 8
J-4	MW	City water make-up for various services	8A	6/1/95	36A, 36B	6, 8
K-1	SA	Service air system	8A	6/1/95	37	6
K-2	IA	Instrument air system from compressor to instrument air dryer	8A	6/1/95	38	6
K-3	IA	Instrument air system from instrument air dryer to instrument trans. air lines from instr. to control room panels and local receivers. Multiple conductor runs from junction boxes to control room "DeKoron Metl-Cor" or equal.	18	1/15/10	39	
K-3SS	IA	Instrument air system from instrument air dryer to instrument trans. air lines from instr. to control room panels and local receivers. Multiple conductor runs from junction boxes to control room "DeKoron Metl-Cor" or equal.	13	11/16/00	39A	
K-4	IH	Instrument piping above 100 psig.	OA	5/03/78	40	6
K-5	IL	Instrument piping below 100 psig.	O	12/01/67	41	6
L-1	PCA	Penetration cooling air system	8A	6/1/95	42	6

Rev. 13 - Nov. 16, 2000
Rev. 15 - February 22, 2002
Rev. 18 – Jan. 15, 2010

Rev. 8A - June 1, 1995
Rev. 7A - July 21, 1992
Rev. 5A - Dated August 20, 1985

Class	Prefix	Service	Latest Rev.	Date	Page No. (a)	Add No.
M-1	SP	Sampling system	1A	5/03/78	43	6
N-1	DF	Diesel generator fuel oil system	18	1/15/10	44	
N-2	DA	Diesel generator starting air system. City Water. (In Unit 1 Screenwell House only.)	14	03/12/01	45	6
N-3	JW	Diesel generator jacket water system	8A	6/1/95	46	6
P-1	SB	Steam headers from service boiler to PRV Service boiler blow-off and drains Steam to deaerator Blowdown tank drains	15	2-22-02	47	6
P-2	SBF	Service B.F.P. suction and deaerator drains.	8A	6/1/95	48	6
P-3	SBF	Service B.F.P. suction and deaerator drains.	8A	6/1/95	49	6
P-4	AS	Steam to and condensate from carbon dioxide vaporizer superheaters	8A	6/1/95	50	10
Heat-ing Equip.	UH	Condensate from condensate return units to service boiler deaerator.	8A	6/1/95	47A	8
Z-1	MPS	Discharge line from moisture preseparators to separating tanks	4A	5/21/84		
Z-2	MPS	Discharge line from moisture preseparators to separating tanks	4A	5/21/84		

CLASS A-1

PREFIX MS

PRESSURE 1085 PSIG

TEMP. °F 600

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 5
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 6A) Sept. 1, 1990; 7A) July 21, 1992; 7B) February 9, 1995; 10) December 20, 1996; 12) November 30, 1999; 13) November 16, 2000; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
28"	A-672 EFW	B 70 Class 21	.912 minimum wall	R-6A
20" & 24"	A-106	C	60	
4" to 18"	A-106	B	80	
2½ & 3"	A-106	B	40	
2" & Smaller	A-106	B	80	
4" & Smaller	A-335	P11or P22	80	R-7B, R-18
**2½ & 3"	A-312 Type 316H		40	R-10
**2" & Smaller	A-312 Type 316H		80S	R-10
**4" -8"	A-312 Type 316H		80S	R-10
***1"-3"	A-335	P22	40	R-18
***4"-16'	A-335	P22	80	R-18

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
28"	A-216 WCB	600#ANSI	B.W.	S.S.	S.S.	S.S.	
2½ to 24"	A-216 WCB	600#ANSI	B.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-105*	600#ANSI	S.W.	S.S.	S.S.	S.S.	R-13
2½ to 4"	A-234 (WP11)	600#ANSI	B.W.	S.S.	S.S.	S.S.	R-7B
2" and Smaller	A-182 (F11 or F22)	600#ANSI	S.W.	S.S.	S.S.	S.S.	R-7B, R-13, R-18
***3"	A-182 (F22)	600#ANSI	B.W.	S.S.	S.S.	S.S.	R-18

FITTINGS	MATERIAL	SERIES	END	SCHEDULE	
2½ to 28"	A-234 WPB		B.W.	To suit pipe	
2" & Smaller	A-105*	3000#	S.W.		R-3A
2½ to 4"	A-234 (WP11)		B.W.	To suit pipe	R-7B
2" & Smaller	A-182 (F11 or F22)	6000#	S.W.		R-7B, R-18
**2" & Smaller	A-182, Type 304H Forged	3000#	S.W.	To suit pipe	R-10
**3"-8"	A-403, Seamless, WP 316H		B.W.	To suit pipe	R-10
***3"-16"	A-234, WP22, CL1		B.W.	To suit pipe	R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½ to 28"	A-234 WPB	600#ANSI	W.N.	R.F.	To suit pipe	
2" & Smaller	A-105*	600#ANSI	S.W.	R.F.	To suit pipe	
**2½ to 28"	A182, Type 304H	600#ANSI	W.N.	R.F.	To suit pipe	R-12

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H*	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½ & Larger: Commercial split type with short nubs. No backing rings from steam generator to second valve.

UNIONS None

CLASS	A-1
PREFIX	MS
PRESSURE	1085 PSIG
TEMP. °F	600

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 5A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 6A) Sept. 1, 1990; 7A) July 21, 1992; 7B) February 9, 1995; 10) December 20, 1996; 12) November 30, 1999; 13) November 16, 2000; 18) January 15, 2010

SERVICE

1. Main Steam piping from Steam Generator to Turbine, including drips and drains through second valve.
2. Main Steam piping to Auxiliary Feedwater Pump Turbines.
3. Main Steam Headers to:
    a. Reheaters
    b. Boiler Feed Pump Turbines
    c. Steam Seal Regulator
    d. Turbine by-pass (dump) steam lines to Condensers
    e. Steam Jet Air Ejectors (priming and holding)
4. Valve Stem Leak-Off to Gland Steam Condenser
5. Valve by-passes
6. Trap piping on above lines through last stop valve
7. Instrument piping on above lines through first stop valve
8. Reheater balance line
9. Reheater balance line vent to condenser
10. Steam to boiler feed pump turbine glands

Remarks:

1. (*) Denotes specification updated as of 6/28/74
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13
3. Threaded connections are permitted for condensate drain piping on the exhaust side of the #22 ABFP turbine casing and piping system for condensate drain lines associated with MST-67, MST-68, MST-69, and MST-114. R-13
4. (***) Denotes specification update for ER 03-2-209. R-18

CLASS A-2

PREFIX 6EX

PRESSURE 450 psig max.

TEMP. °F 450 max.

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 2A) May 3, 1978
2) February 3, 1967 10) December 20, 1996
13) November 16, 2000 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
18"	A-106	B	30	
10" - 16"	A-106	B	30	
8" & Smaller	A-106	B	40	
**½" -8"	A-312, Seamless Type 304H		40S	R-10
2" & Smaller	A-335	P11 or P22	40	R-18

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & Larger	A-216 WCB	300#ANSI	B.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-105*	600#ANSI	S.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-182 (F11 or F22)	600#ANSI	S.W.	S.S.	S.S.	S.S.	R-18

FITTINGS	MATERIAL	SERIES	END	SCHEDULE	
2½" & Larger	A-234 WPB	-----	B.W.	To suit pipe	
2" & Smaller	A-105*	3000#	S.W.		R-2A
**2" & Smaller	A-182, Type 304H Forged	3000#	S.W.		R-10, R-18
**2½"-12"	A-403, Seamless, Type 304H		B.W.	40S	R-10
2" & Smaller	A-182 (F11 or F22)	3000#	S.W.		R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2½" & Larger	A-105*	300#ANSI	W.N.	R.F.	To suit pipe
2" & Smaller	A-105*	300#ANSI	S.W.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H*	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger use flanges
2" & Smaller F.S. S.W. 3000#*Steel to stainless ground joint.

SERVICE

1. Extraction (Bleed) Steam to No. 6 Heaters including, stop valve by-passes, line vents, instrument piping through first stop valve and trap piping through last stop valve.

Remarks:

1. (*) Denotes specification updated as of 6/28/74
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

CLASS A-3

PREFIX 5EX

PRESSURE 250 psig max.

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 7
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 6A) Sept. 1, 1990; 7B) February 9, 1995; 8A) June 1, 1995; 10) December 20, 1996; 12) November 30, 1999; 13) November 16, 2000; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
28"	A-672 EFW	A 55 Class 11	0.375" Wall	R-6A
14" & 18"	A-53 Seamless or ERW	B	20	
10" to 12"	A-53 Seamless or ERW	B	20	
3" & 8"	A-53 Seamless or ERW	B	40	
2½ & Smaller	A-106	B	40	
4" & Smaller	A-335	P11	80	R-7B
**18"	A-312, Seamless, Type 304H		0.375" Wall	R-10
3" & Smaller	A-312, Seamless, Type 304H		0.300" Wall	R-10
**28"	A-312, Seamless, Type 304H		0.375" Wall	R-12

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & Larger	A-216 WCB	300#ANSI	B.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-105*	600#ANSI	S.W.	S.S.	S.S.	S.S.	
2½ to 4"	A-234 (WP11)	600#ANSI	B.W.	S.S.	S.S.	S.S.	R-7B
2" and Smaller	A-182 (F11)	600#ANSI	S.W.	S.S.	S.S.	S.S.	R-7B

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½ & Larger	A-234 WPB	-----	B.W.	To suit pipe	
2" & Smaller	A-105*	3000#	S.W.		R-3A
2½ to 4"	A-234 (WP11)	-----	B.W.	To suit pipe	R-7B
2" & Smaller	A-182 (F11)	6000#	S.W.		R-7B
**2" & Smaller	A-182, F-304H	3000#	S.W.		R-10, R-18
**2½" & Larger	A-403, Type 304H		B.W.	To Suit Pipe	R-10

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½ & Larger	A-105*	300#ANSI	W.N.	R.F.	To suit pipe	
2" & Smaller	A-105*	300#ANSI	S.W.	R.F.	To suit pipe	
**2½ to 28"	A-182, Type 304H	300#ANSI	W.N.	R.F.	To suit pipe	R-12

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H*	Hex	Semi-finished	
GASKETS	MATERIAL: 304 S.S.	TYPE: Flexitallic	THICKNESS	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* steel to stainless ground joint.

SERVICE

1. Extraction (Bleed) Steam No. 5 Heaters including, stop valve by-passes, line vents instrument piping through first stop valve and trap piping through last stop valve.

Remarks:
1. (*) Denotes specification updated as of 6/28/74.
2. (**)Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

CLASS A-3

PREFIX STV

PRESSURE 250 psig max.

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: April 23, 1996 Specification No.: 9321-01-248-18 Part A*

Revision: 9) April 23, 1996 10) December 20, 1996
13) November 16, 2000 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
28"	A-672 EFW	A 55 Class 13	0.375" Wall	
20"	A-53 Seamless	B	Standard (20)	
**20"	A-312 Seamless, Type 304H		0.375" Wall	R-10
**3" & Smaller	A-312 Seamless, Type 304H		0.300" Wall	R-10

VALVES
None

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
20"	A-234 WPB		B.W.	To Suit Pipe	
**20"	A-403, WP-304H		B.W.	To Suit Pipe	R-10
**2" & Smaller	A-182, Type 304H	3000#	S.W.		R-10, R-18

FLANGES
None

BOLTS
None

NUTS
None

GASKETS
None

BACKING RINGS
None

UNIONS
None

SERVICE
1. Dried Extraction (Bleed) Steam from Moisture Pre-separator outlet to No. 5 Heaters Extraction Header.

Remarks:

1. (*) Denotes specification updated as of 6/28/74.
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

Westinghouse Electric Corporation
Indian Point Energy Center-Unit No.2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967
3) December 1, 1967

CLASS A-4

PREFIX RS

PRESSURE 205 psig

TEMP. ^{O}F 505

PIPE	MATERIAL	GRADE	SCHEDULE
12" & Larger	A-106	B	20
10" & Smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2 ½" & Larger	A-216-WCB	300#ANSI	B.W.	S.S.	S.S.	S.S.
2" & Smaller	A-105*	600#ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	R-3A
2 ½" & Larger	A-234 WPB	---	B.W.	To suit pipe	
2" & Smaller	A-105*	3000#	S.W.		

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2 ½" & Larger	A-105*	300#ANSI	W.N.	R.F.	To suit pipe
2" & Smaller	A-105*	300#ANSI	S.W.	R.F	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	---
NUTS	A-194 Gr.2H*	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2 ½" & Larger: Commercial split type with short nubs.

UNIONS 2 ½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* steel to stainless ground joint.

SERVICE

1. Steam from Reheater-Moisture Separator to Boiler Feed Pump Turbine including stop valve by-passes, line vents, instrument piping through first stop valve and trap piping through last stop valve.

Remarks: (*) Denotes specification updated as of 6/28/74.

CLASS A-5

PREFIX 4EX

PRESSURE Full vacuum to 100 psig max.

TEMP. °F 400

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Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966 4A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967 8A) June 1, 1995
4) May 16, 1968 16) April 1, 2002
18) January 15, 2010

PIPE	MATERIAL	GRADE	CLASS	SCHEDULE	
14" - 20"	A-53 Seamless or ERW	B		10	
20"	A691	2 ¼ Cr	22	10	R-16
8" - 12"	A-53 Seamless or ERW	B		20	
3" - 6"	A-53 Seamless or ERW	B		40	
*2½ & Smaller	A-106	B		40	
2" & Smaller	A-335	P11 or P22		40	R-18

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & Larger	A-216 WCB	150#ANSI	B.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-105**	600#ANSI	S.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-182 (F11 or F22)	600#ANSI	S.W.	S.S.	S.S.	S.S.	R-18

FITTINGS	MATERIAL	GRADE	SERIES	ENDS	SCHEDULE	
20"	A-234	WP22	-----	B.W.	To suit pipe	R-16
2½ & Larger	A-234 WPB		-----	B.W.	To suit pipe	
2" & Smaller	A-105*		3000#	S.W.		R-4
2" & Smaller	A-182 (F11 or F22)		3000#	S.W.		R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½ & Larger	A-181 Class 60	150#ANSI	W.N.	R.F.	To suit pipe	R6A
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	R.F.	To suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H**	Hex	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** integral ground joint.

SERVICE

1. Extraction (Bleed) Steam No. 4 Heaters including line vents, instrument piping through first stop valve and trap piping through last stop valves.

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.

CLASS	A-6
PREFIX	3EX
PRESSURE	Full vacuum to 50 psig
TEMP. °F	300

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 10
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 4) May 16, 1968*; 4A) May 3, 1978; 6A) Sept. 1, 1990; 8A) June 1, 1995; 12) November 30, 1999; 13) November 16, 2000; 16) April 1, 2002

PIPE	MATERIAL	GRADE	CLASS	SCHEDULE	
48"	A-672 EFW	A-55 Class 11		.625" wall	
28"	A-672 EFW	A-55 Class 11		.3125" wall	
20" & 28"	A-691 EFW	2-1/4 Cr	22	10	R-16
14" - 20"	A-53 Seamless or ERW	B		10	
8" - 12"	A-53 Seamless or ERW	B		20	
3" - 6"	A-53 Seamless or ERW	B		40	
2½" & Smaller	A-106	B		40	

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & Larger	A-216 WCB	150#ANSI	B.W.	S.S.	S.S.	S.S.
2" & Smaller	A-105**	600#ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	GRADE	SERIES	ENDS	SCHEDULE	
20" & 28"	A-234	WP22		B.W.	To suit pipe	R-16
2½ & Larger	A-234 WPB		-----	B.W.	To suit pipe	
2" & Smaller	A-105**		3000#	S.W.		
***2½ & Larger	A-403, Type 304H		-----	B.W.	To suit Pipe	R-12
***2" & Smaller	A-182, Type F304H		3000#	S.W.		R-12

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½ & Larger	A-181 Class 60	150#ANSI	W.N.	R.F.	To suit pipe	R-6A
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	R.F.	To suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B**	Square		
	A-193 Gr. B7			R-8A
NUTS	A-194 Gr. 2H**	Hex	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** integral ground joint.

SERVICE

1. Extraction (bleed) steam No. 3 heaters.
2. Extraction (bleed) steam to flash evaporator.
3. Boiler feed pump turbine exhaust to condenser.
4. Line vents, instrument piping through first stop valve and trap piping through last stop valve on above lines.
5. Supply and leakoff from boiler feed pump turbine glands.

Remarks:
(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.
(***) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded R-13

CLASS B-1

PREFIX BFD

PRESSURE 1440 psig

TEMP. °F 450

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 11
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 4) May 16, 1968*; 4A) May 3, 1978; 6A) Sept. 1, 1990; 8A) June 1, 1995; 13) November 16, 2000; 16) April 1, 2002; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
30"	A-672 EFW	B70 Class 21	1.260" minimum wall	R-6A
24"	A-106	B	100	
18" - 20"	A-106	C	80	
8" - 16"	A-106	B	100	
6" & Smaller	A-106	B	80 / 160	R-16
***30”	A-312, Seamless, Type 304H		1.260” minimum wall	R-13
***16”	A-312, Seamless, Type 304H		100	R-13

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
3" & Larger	A-216 WCB	900#ANSI	B.W.	S.S.	S.S.	S.S.
2½"	A-216 WCB	1500#ANSI	B.W.	S.S.	S.S.	S.S.
* 2" & Smaller	A-216 WCB	1500#ANSI	S.W.	S.S.	S.S.	

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
30"	A-234 WPC	-----	B.W.	1.260" min wall	R-8A
2½" - 24"	A-234 WPB	-----	B.W.	To suit pipe	
2" & Smaller	A-105**	3000#	S.W.	_____	R-4A
***2½” & Larger	A-403, Type 304H	-----	B.W.	to suit pipe	R-13

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2½ - 24"	A-105**	900#ANSI	W.N.	R.F.	To suit pipe
2" & Smaller	A-105**	900#ANSI	S.W.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H**	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.
* No backing rings from check valve outside containment building to steam generator or auxiliary feedwater pump discharge.

UNIONS None

SERVICE
1. Boiler feed pump discharge through last valve including No. 6 heater by-pass.
2. Boiler feed pump recirculation line vents and drains only.
3. Auxiliary feedwater pump discharge through last valve.
4. Auxiliary feedwater pump recirculation through breakdown orifice to last valve.
5. Stop valve by-passes, line vents and drains and instrument piping through first stop valve.
6. Long Loop Recirculation Cleanup System. R-13
7. AFW pump and turbine drive bearing cooling water outlet of valves BFD-73-1 and BFD-74 R-18

Remarks:
(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.
(***) Use for piping and piping components that are susceptible to erosion/corrosion as enveloped by Long Loop Recirculation Cleanup System Modification No. SGR-00-12405-M. R-13

CLASS B-2

PREFIX BFD

PRESSURE 1085 psig

TEMP. °F 450

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 11) July 18, 1997; 13) November 16, 2000; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
18"	A-106	C	60	
8" - 16"	A-106	B	80	
6" & Smaller	A-106	B	80	
2" (****)	A-106	B	80	R-13

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
None (**)							R-11 R-18
2" (****)	A-105	800#	SW	S.S.	S.S.	S.S.	R-13

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
18"	A-234 WPB	---	B.W.	80	
2½" - 6"	A-234 WPB	---	B.W.	80	
2" & Smaller	A-105*	3000#	S.W.	-	R-3A
2" (****)	A-105*	3000#	S.W.	-	R-13

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" - 24"	A-105	900#ANSI	W.N.	R.F.	To Suit Pipe	R-11
2" & Smaller	A-105	900#ANSI	S.W.	R.F.	To Suit Pipe	R-11

	MATERIAL	HEAD	FINISH	
BOLTS	A-193 Gr. B-7	Full Threaded Bolt Studs		R-11
NUTS	A-193 Gr. 2H	HEX	Semi-Finished	R-11

GASKETS	MATERIAL	TYPE	THICKNESS	
	304SS	Flexitallic		R-11

BACKING RINGS None

UNIONS None

SERVICE

1. Boiler Feed Pump discharge piping from last valve to Steam Generator.
2. Auxiliary Feedwater Pump discharge piping after last valve to main Boiler Feed lines and to Condensate System. R-11
3. Steam Generator Blowdown lines 45, 46, 47, and 48. R-13

Remarks:

(*) Denotes specification updated as of 6/28/74

(**) Per Class B-1 spec. Page 11. R-11 R-18

(****) The design temperature for Steam Generator Blowdown lines 45, 46, 47, and 48 is 556°F. This application is permissible for material, grade and schedule shown. Refer to CR 199904292 response for justification. R-13

CLASS	B-3
PREFIX	BFR
PRESSURE	1440 psig max.
TEMP. ^{O}F	450

UNITED ENGINEERS & CONSTRUCTORS INC. PAGE 13
Westinghouse Electric Corporation
Indian Point Energy Center Unit No. 2
Entergy Nuclear Northeast

Date: Dec. 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision:

PIPE 4" to 8"	MATERIAL A-335		GRADE P-22		SCHEDULE XXS	
VALVES 2 ½" & Larger	MATERIAL A-217 WC6	SERIES* 900#ANSI	END B.W.	STEM S.S.	DISC S.S.	SEAT S.S.
FITTINGS 4" to 8"	MATERIAL A-182 F-22	SERIES ---	ENDS B.W.	SCHEDULE XXS		
FLANGES None	MATERIAL	SERIES	TYPE	FACING	BORE	
BOLTS	MATERIAL None		HEAD		FINISH	
NUTS	None					
GASKETS None	MATERIAL		TYPE		THICKNESS	
BACKING RINGS	None					
UNIONS	None					

SERVICE

1. Boiler Feed Pump recirculation to Drains Collecting Tank.

Remarks: (*) Denotes specification identification added as of 6/28/74.

Westinghouse Electric Corporation
Indian Point Energy Center-Unit No.2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967

CLASS C-1

PREFIX CD

PRESSURE 665 psig

TEMP. ^{O}F 400

PIPE	MATERIAL	GRADE	SCHEDULE	
30"	A-072-EFW	B70 Class 21	.626" minimum wall	R-6A
24" & smaller	A-106	B	40	

VALVES	MATERIAL	SERIES**	END	STEM	DISC	SEAT
2 ½" & larger	A-216 WCB	300#ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600#ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2 ½" & larger	A-234 WPB	---	B.W.	To suit pipe	
2" & smaller	A-105**	3000#	S.W.		R-3A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2 ½" & larger	A-105**	300#ANSI	W.N.	R.F.	To suit pipe
2" & smaller	A-105**	300#ANSI	S.W.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr.B-7	Full threaded bolt studs	
NUTS	A-194 Gr.2H**	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2 ½" & larger: Commercial split-type with short nubs

UNIONS None

SERVICE

1. Condensate Pump Discharge:
   (a) through Heaters No. 1 to 5 to Boiler Feed Pump suction including Heater by-pass line;
   (b) to Exhaust Casing Spray;
   (c) through Steam Jet Air Ejectors, Gland Steam Condenser and recirculation line through last stop valve at Condenser.

d. through flash evaporator;

e. dump line to condensate storage tank;

f. to boiler feed pump seals and boiler feed pump seal water collecting tank.

*g. To heater drain pumps cold injection.

2. Stop valve by-passes, line vents and drains and instrument piping through first valve for above lines.

3. Auxiliary feedwater pump recirculation from last valve to condensate dump line.

4. AFW pump and turbine drive bearing cooling water outlet of valves BFD-73-1 and BFD-74 to recirculation line. R-18

Remarks

1. (*) Added by Addenda No. 6
2. (**) Denotes Spec. updated as of 6/28/74.

CLASS C-2

PREFIX CS

PRESSURE 30 psig to full vacuum

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE	
48"-54"	A-672 EFW	A-55 Class 11	0.625" wall	R-6A
30"	A-672 EFW	A-55 Class 11	0.3125" wall	
8"-24"	A-53 Seamless or ERW	B	20	
3"-6"	A-53 Seamless or ERW	B	40	
2½" & smaller	A-106	B	40	

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
8"-30" Butterfly	A-216 C1.B	125# ANSI Drilling	Flgless.	S.S.	C.I.	Rubber	
2½"-6"	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.	
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.	

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
30"-54"	Fabricated				
2½"-24"	A-672, A-55	-----	B.W.	to suit pipe	R-6A
2" & smaller	A-234 WPB	-----	B.W.	20	
	A-105*	3000#	S.W.	-----	R-3A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
24"-54"	A-181 Class 60	125#ANSI	S.O.	F.F.	To suit pipe	
2½"-20"	A-181 Class 60	125#ANSI	W.N.	F.F.	To suit pipe	R-6A
2" & smaller	A-181 Class 60	125# ANSI	S.W.	F.F.	To suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B7	Square		R-8A

NUTS A-194 Gr. 2H* Hex. Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	Rubber	Full Face	1/8"

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* integral ground joint.

SERVICE

1. Condensate Pump suction from Condensers.
2. Drains and instrument piping through first stop valve on above lines.
3. Condenser Hotwell instrument piping through first stop valve.
4. Hotwell dump line to low level trip pot.
5. Condensate suction header vents to Condenser.

Remarks:

1. (*) Denotes specification updated as of 6/28/74.

CLASS	C-4
PREFIX	CS
PRESSURE	50 psig to full vacuum
TEMP. °F	250

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 15A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968* 8A) June 1, 1995
1A) May 3, 1978

PIPE	MATERIAL	GRADE	SCHEDULE
36"	A-155 EFW	C-55 C12	.500 wall
12"-24"	A-53 Seamless or ERW	B	.375 wall
3"-10"	A-53 Seamless or ERW	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
Butterfly	A-126 C1.B	125# ANSI	Flgless	S.S.	Ni-resist	Hycar
2½" & larger	A-216 WCB	150# ANSI	*B.W.	S.S.	S.S.	S.S.
(*)2½" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½"-36"	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.		R-1A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
24"-36"	A-181 Gr. I	150# ANSI	S.O.	R.F.	To suit pipe
2½"-20"	A-181 Gr. I	150# ANSI	W.N.	R.F.	To suit pipe
2" & smaller	A-181 Gr. I	150# ANSI	S.W.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 3000#** F.S. S.W. Integral ground joint.

SERVICE

1. Flash Evaporator Brine Recycle Pumps suction and discharge.

Remarks:

1. (*) Added by Addenda No. 6
   (**) Denotes specification updated as of 6/28/74.

CLASS C-3

PREFIX CT

PRESSURE 150 psig to full vacuum

TEMP. °F 225 maximum

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966 4A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967 8A) June 1, 1995
4) May 16, 1968*

PIPE	MATERIAL	GRADE	SCHEDULE
14"-20"	A-53 Seamless or ERW	B	10
8"-12"	A-53 Seamless or ERW	B	20
3"-6"	A-53 Seamless or ERW	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½"-20"	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½"-20"	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.	-----	R-4A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½"-20"	A-181 Class 60	150# ANSI	W.N.	R.F.	To suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	To suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS	
	Garlock Blue-Gard 3000	Flat ring	1/16"	R-6A

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.
None for service No. 2

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** integral seat, ground joint.

SERVICE

1. Make-up to Condenser from Condensate Storage Tank.
2. Condensate to Auxiliary Feedwater Pump suction. (See notes 1 and 2.)
3. Condensate transfer line from Unit No. 1.
4. Condensate recirculation line from last valve to Condenser.
5. Hotwell Dump and Condensate Transfer Pump suction from low level trip pot and discharge.

* NOTES:

1. To be Schedule 40 pipe to end of Class I piping.
2. Weld end preparation to be in accordance with UE&C's Dwg. 5000-LL-1147.

6. Condensate Pump vents to Condenser.
7. Hotwell Dump and Condensate Transfer Pump and Low Level Trip Pot vents to Condenser.
8. Condensate Pump seal water lines.
9. Brine Heater Drain Pumps suction and discharge to Drains Collecting Tank and Discharge Tunnel.
10. Boiler Feed Pump seal water collecting tank to condenser.
11. Condensate Storage Tank vent, overflow and drain.
12. Line vents and drains and instrument piping through first stop valve on above lines.

Remarks
1. (*) Added by Addenda No. 6
2. (**) Denotes Spec. updated as of 6/28/74

CLASS	C-5
PREFIX	CT
PRESSURE	50 psig to full vacuum
TEMP. °F	150

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 16B*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 8A) June 1, 1995
6A) Sept. 1, 1990

PIPE	MATERIAL	GRADE	SCHEDULE
2½" & larger	A-53 seamless	B	40
2"	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105**	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* integral seat, ground joint.

SERVICE

1. Boiler feed pump turbine drip tank drain pumps suction and discharge.

Remarks:

1. (*) Added by Addenda No. 6
   (**) Denotes specification updated as of 6/28/74.

CLASS D-1

PREFIX MS

PRESSURE 1085 psig

TEMP. °F 600

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 10) December 20, 1996; 13) November 16, 2000; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
4" & larger	A-106	B	80	
3"	A-106	B	40	
2½" & smaller	A-106	B	80	
**½"-10"	A-312, Seamless, Type 316H		80S	R-10
***1" - 3"	A-335	P22	40	R-18

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.	
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.	
***3"	A182 (F22)	600# ANSI	B.W.	S.S.	S.S.	S.S.	R-18

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB		B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.	to suit pipe	R-3A
**2½"-10"	A-403, Seamless, WP-316		B.W.	to suit pipe	R-10
**2" & Smaller	A-182, Type 304H	3000#	S.W.	to suit pipe	R-10
***3"-16"	A-335, WP22, CL1		B.W.	to suit pipe	R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-105*	600# ANSI	W.N.	R.F.	to Pipe I.D.	
2" & smaller	A-105*	600# ANSI	S.W.	R.F.	to suit pipe	
**2½"-10"	A-181, F-316 Forged	600# ANSI	W.N.	R.F.	to suit pipe	R-10

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type short nubs.

UNIONS None

SERVICE

1. Reheater Drain Tanks to Heaters No. 6 and stop valves at Condensers.
2. Reheater Drains to Reheater Drain Tank.
3. Reheater Drain Tank vent to Reheater.
4. Reheater Vents to Condenser.
5. Scavenging Steam from Reheaters to Heaters No. 6 Extraction Steam line.

Remarks:
1. (*) Denotes Spec. updated as of 6-28-74
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13
3. (***) Denotes specification update for ER 03-2-209. R-18

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967
3) December 1, 1967

CLASS D-2

PREFIX 6 EX

PRESSURE 450 psig

TEMP. °F 450

PIPE	MATERIAL	GRADE	SCHEDULE
10" & larger	A-106	B	30
8" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
2 ½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2 ½" & larger	A-234 WPB	---	B.W.	to suit pipe	
2" & smaller	A-105*	3000#	S.W	---	R-3A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2 ½" & larger	A-105*	300# ANSI	W.N.	R.F.	to suit pipe
2" & smaller	A-105*	300# ANSI	S.W	R.F.	to suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H*	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2 ½" & larger: Commercial split type with short nubs.

UNIONS 2 ½" & larger, use flanges

SERVICE
1. Drain lines from No. 6 Heaters to level control valve.
2. Vent lines from No. 6 Heaters to Condenser (Operating & Start-up).
3. Heater No. 6 relief valve inlet piping.
4. Heater No. 6 shell drain.
5. Heater No. 6 instrument piping through first stop valve.

REMARKS
1. (*) Denotes Spec. updated as of 6/28/74

Date: Dec. 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision:

CLASS	D-2
PREFIX	6EX
PRESSURE	450 psig
TEMP. ^{O}F	450

PIPE	MATERIAL		GRADE		SCHEDULE	
10” & smaller	A-335		P5		40	
VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
2 ½” & larger	A-217-WC6	300# ANSI	B.W.	S.S.	S.S.	S.S
FITTINGS	MATERIAL	SERIES	ENDS		SCHEDULE	
2 ½” & larger	A-234-WP5	---	B.W.		to suit pipe	
FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2 ½” & larger	A-182-F5	300# ANSI	W.N.	R.F.	to suit pipe	
	MATERIAL		HEAD		FINISH	
BOLTS	A-193 Gr. B-7		Full threaded bolt studs			
NUTS	A-194 Gr. 2H*		Hex.		Semi-finished	
GASKETS	MATERIAL		TYPE		THICKNESS	
	304 S.S.		Flexitallic			
BACKING RINGS	None					
UNIONS	None					

SERVICE

1. No. 6 Heater drains from level control valve to Heater Drain Tank.

REMARKS

1. (*) Denotes Spec. updated as of 6/28/74

CLASS D-3

PREFIX 5EX

PRESSURE 250 psig

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 19
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967 8A) June 1, 1995
3) December 1, 1967 12) November 30,1999
13) November 16, 2000 16) April 1, 2002

PIPE	MATERIAL	GRADE	SCHEDULE	
10" & larger	A-53 seamless or ERW	B	20	
3"-8"	A-53 seamless or ERW	B	40	
2½" & smaller	A-106	B	40	
**10" & larger	A-312, Seamless, Type 304H	B	20 / 40	R-12, R-16

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.	-----	R-3A
**2½" & larger	A-403, Type 304H	-----	B.W.	to suit pipe	R-12
**2" & smaller	A-182, Type F304H	3000#	S.W.		R-12

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-105*	300# ANSI	W.N.	R.F.	to suit pipe	
2" & smaller	A-105*	300# ANSI	S.W.	R.F.	to suit pipe	
**2½" to 28"	A-182, Type 304H	300# ANSI	W.N.	R.F.	to suit pipe	R-12

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* steel to stainless ground joint.

SERVICE
1. Drain lines from No. 5 Heaters to Heater Drain Tank.
2. Vent lines from No. 5 Heaters to Condenser.
3. Heaters No. 5 drains through last stop valve at Condenser.
4. Heater Drain Tank vents to Heaters No. 5
5. Heater No. 5 relief valve inlet piping.
6. Heater Drain Tank drain to last stop valve at Condenser.
7. Heaters No. 5 shell drain.
8. Heaters No. 5 instrument piping through first stop valve.

Remarks:
1. (*) Denotes Spec. updated as of 6-28-74
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

CLASS D-3

PREFIX MPS

PRESSURE 250 psig

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 19A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: April 23, 1996 Specification No.: 9321-01-248-18 Part A*

Revision: 9) April 23, 1996

PIPE	MATERIAL	GRADE	SCHEDULE
1" O.D.	A-106	B	160

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
1"	A-105	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
1"	A-105	3000#	S.W.	-----

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
None					

BOLTS
None

NUTS
None

GASKETS
None

BACKING RINGS
None

UNIONS
None

SERVICE

1. Discharge line from Moisture Pre-Separators to Separating Tanks.

Remarks:

1. (*) Denotes Spec. updated as of 6-28-74

CLASS D-3

PREFIX STD

PRESSURE 250 psig

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 19B
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: April 23, 1996 Specification No.: 9321-01-248-18 Part A*

Revision: 9) April 23, 1996

PIPE	MATERIAL	GRADE	SCHEDULE
10"	A-53 seamless	B	40
1" O.D.	A-106	B	160

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
10"	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.
1"	A-105	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
10"	A-234 WPB	-----	B.W.	To suit pipe
1"	A-105	3000#	S.W.	

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
None					

BOLTS
None

NUTS
None

GASKETS
None

BACKING RINGS
None

UNIONS
None

SERVICE

1. Drain lines from Moisture Pre-Separator Tanks to Heater Drain Tank.

Remarks:

1. (*) Denotes Spec. updated as of 6-28-74

CLASS D-4

PREFIX HD

PRESSURE 730 psig

TEMP. ^{O}F 400

UNITED ENGINEERS & CONTRACTORS INC. PAGE 20
Westinghouse Electric Corporation
Indian Point Energy Center-Unit No.2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A**

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967
3) May 16, 1968*

PIPE	MATERIAL	GRADE	SCHEDULE
16" – 24"	A-106	3	60
10" – 14"	A-106	3	XS (.500" wall)
8" & smaller	A-106	3	40

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
2 ½" & larger	A-216 WCB	400# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES**	ENDS	SCHEDULE	
2 ½" & larger	A-234-WPB	---	B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.	---	R-3A

FLANGES	MATERIAL	SERIES**	TYPE	FACING	BORE
2 ½" & larger	A-105**	400# ANSI	W.N.	R.F.	to suit pipe
2" & smaller	A-105**	400# ANSI	S.W.	R.F	to suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H**	Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2 ½" & larger: Commercial split-type with short nubs.

UNIONS None

SERVICE
1. Heater Drain Pump discharge to Boiler Feed Pump suction header including line vents and drains and instrument piping through first stop valve.

REMARKS 1. (*) Added by Addenda No. 6
(**) Denotes Spec. updated as of 6/28/74

CLASS D-5

PREFIX 5EX

PRESSURE 202 psig

TEMP. °F 389°F

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 4, 1966
2) February 3, 1967
3) December 1, 1967
3A) May 3, 1978
8A) June 1, 1995
10) December 20, 1996
13) November 16, 2000

PIPE	MATERIAL	GRADE	SCHEDULE	
12" & larger	A-53 seamless or ERW	B	20	
3"-10"	A-53 seamless or ERW	B	40	
2½" & smaller	A-106	B	40	
**½"-10"	A-312, Seamless, Type 304H		40S	R-10

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105*	3000#	S.W.	-----	R-3A
**2" & smaller	A-182 Forged, Type 304	3000#	S.W.		R-10
		3000#	S.W.	-----	
**2½ - 10"	A-403, seamless, Type 304H		B.W.	40S	R-10

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2½" & larger	A-105*	300# ANSI	W.N.	R.F.	to suit pipe
2" & smaller	A-105*	300# ANSI	S.W.	R.F.	to suit pipe

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr.	Square		R-8A
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* steel to stainless ground joint.

SERVICE

1. Heater Drain Pump suction from Drain Tank.
2. Moisture Separator drain to level control valve at Drains Collecting Tank and to Heater Drain Tank.

Remarks:
1. (*) Denotes Spec. updated as of 6-28-74.
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

CLASS	D-5
PREFIX	5EX
PRESSURE	202 psig
TEMP. °F	389°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 21A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: Dec. 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
4"-6"	A-335	P-22	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
4"-6"	A-217 WC6	300# ANSI	B.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
4"-6"	A-182 F22	-----	B.W.	40

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
4"-6"	A-182 F22	300# ANSI	W.N.	R.F.	to suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-307 Gr. B* or A-193 Gr. B7	Square	-----
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS None.

UNIONS None.

SERVICE

1. Moisture Separator drain from level control valve to Drains Collecting Tank.

Remarks:

1. (*) Denotes Spec. updated as of 6-28-74.

R-8A

CLASS	D-6
PREFIX	4EX
PRESSURE	Full vacuum to 100 psig
TEMP. °F	400°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 22
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966
2) February 3, 1967
3) December 1, 1967
3A) May 3, 1978
6A) Sept. 1, 1990
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
8" & larger	A-53 seamless or ERW	B	20
3"-6	A-53 seamless or ERW	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105*	3000#	S.W.	-----	R-3A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr. B7	Square		R-8A

NUTS	A-194 Gr. 2H*	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & larger: Commercial split type with short nubs.

UNIONS 2½" & larger, use flanges.
2" & smaller, F.S. S.W. 3000#* Integral ground joint.

SERVICE

1. Drain lines from No. 4 Heaters to No. 3 Heaters and through last stop valve at Condensers.
2. Vent lines from No. 4 Heater to Condensers. (Operating & Start-up)
3. Heater No. 4 relief valve inlet piping.
4. Heater No. 4 shell drain.
5. Heater No. 4 instrument piping through first stop valve.

Remarks:

1. (*) Denotes Spec. updated as of 6-28-74

CLASS	D-7
PREFIX	3EX, 2EX, 1EX
PRESSURE	Full vacuum to 50 psig
TEMP. °F	300°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 23
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966; 2) February 3, 1967; 3) December 1, 1967; 3A) May 3, 1978; 6A) Sept. 1, 1990; 8A) June 1, 1995; 12) November 30, 1999; 13) November 16, 2000; 16) April 1, 2002; 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
8" & larger	A-53 seamless or ERW	B	20	
3"-6"	A-53 seamless or ERW	B	40	
3"-6"	A-335 seamless	P22	40	R-16
2½" & smaller	A-106	B	40	
**2½" & smaller	A-312, Seamless, Type 304H		40	R-12
8" & larger	A-691	1¼ Cr or 2¼ Cr	20	R-18

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	GRADE	SERIES	ENDS	SCHEDULE	
3" – 6"	A-335 Seamless	P22	-----	B.W.	to suit pipe	R-16
2½" & larger	A-234 WPB		-----	B.W.	to suit pipe	
2" & smaller	A-105*		3000#	S.W.		R-3A
**2½" & larger	A-403, Type 304H		-----	B.W.	to suit pipe	R-12
8" & larger	A-234	WP11 or WP22		B.W.	to suit pipe	R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr.	Square		R-8A
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type short nubs.

UNIONS 2½" & larger, use flanges.
2" & smaller, F.S. S.W. 3000#* Integral ground joint.

CLASS	D-7
PREFIX	3EX, 2EX, 1EX
PRESSURE	Full vacuum to 50 psig
TEMP. °F	300°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 23A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966
2) February 3, 1967
3) December 1, 1967
3A) May 3, 1978
6A) Sept. 1, 1990
8A) June 1, 1995
12) November 30, 1999
13) November 16, 2000
16) April 1, 2002
18) January 15, 2010

SERVICE

1. Drain lines from No. 3 Heaters to No. 2 Heaters & Condensers.
2. Drain lines from No. 2 Heaters to No. 1 Heaters & Condensers.
3. Drain lines from No. 1 Heaters to Condensers.
4. Vent lines from Nos. 1, 2 and 3 Heaters to Condensers.
5. Heaters No. 1, 2 and 3 shell drains.
6. Heaters No. 1, 2 and 3 relief valve inlet piping.
6A. Extraction (bleed) steam to Heaters 1 & 2. R-18
7. Heaters No. 4 and 5 drains from last stop valve to Condenser.
8. Heater Drain Tank drain from last stop valve to Condenser.
9. Reheater drains from last stop valve to Condenser.
10. Reheater vents from last stop valve to Condenser.
11. Heaters No. 1, 2 and 3 instrument piping through first stop valve.

Remarks:

1. (*) Denotes Spec. updated as of June 28, 1974.
2. (**) Use for replacement piping that is susceptible to erosion/corrosion or found to be eroded/corroded. R-13

CLASS D-8

PREFIX V

PRESSURE 100 psig

TEMP. °F 350°F and 1100°F for Service No. 5 only.

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 24
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 4A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967 8A) June 1, 1995
4) June 3, 1970* 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
14" & larger	A-53 seamless or ERW	B	20 and 60***	R-18
8"-12"	A-53 seamless or ERW	B	30	
3"-6	A-53 seamless or ERW	B	40	
2½" & smaller	A-106	B	40	

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2" & smaller	A-105	600# ANSI	S.W.	S.S.	S.S.	S.S.	R-6A

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105**	3000#	S.W.	-----	R-4A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N. or S.O.	R.F. or F.F.	to suit pipe	R-6A, R-18
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** Integral ground joint.

SERVICE

1. Steam Generator safety valve vent piping.
2. Steam Seal Regulator safety valve vent piping.
3. Feedwater Heater relief valve piping beyond valve.
*4. High Pressure Cylinder Relief Valve exhaust.
5. Diesel Exhaust Piping. R-6A

Remarks:
1. (*) Added by Addenda No. 13
2. (**) Denotes Spec. updated as of 6-28-74
3. (***) Increased schedule for Appendix R DG exhaust pipe for tornado missile and wind load per EC 5000033794. R-18

CLASS E-1

PREFIX CV

PRESSURE +1.0 psig

TEMP. °F 400

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 25
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 3A) May 3, 1978
2) February 3, 1967 6A) Sept. 1, 1990
3) December 1, 1967 8A) June 1, 1995
18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE
14" & larger	A-53 seamless or ERW	B	20
8"-12"	A-53 seamless or ERW	B	30
3"-6"	A-53 seamless or ERW	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105*	3000#	S.W.	-----	R-3A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60/A-105	150# ANSI	W.N.	R.F.	to suit pipe	R-6A, R-18
2" & smaller	A-181 Class 60/A-105	150# ANSI	S.W.	R.F.	to suit pipe	R-18

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B*	Square		
	A-193 Gr. B7			R-8A
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* integral ground joint.

SERVICE

1. Air ejector vents to atmosphere.
2. Circulating Water Priming Ejectors to atmosphere.
3. Steam Jet Air Ejector Vent to Containment Building.

Remarks:
1. (*) Denotes specification updated as of 6/28/74.

CLASS E-2

PREFIX CA

PRESSURE 50 psig to full vacuum

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 26
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 29, 1966 Specification No.: 9321-01-248-18 Part A*

Revision: 1) October 14, 1966 6A) Sept 1, 1990
2) December 1, 1967 8A) June 1, 1995
2A) May 3, 1978 13) November 16, 2000
18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
14"-20"	A-53 seamless or ERW	B	10	R-13
8"-12"	A-53 seamless or ERW	B	20	
3"-6"	A-53 seamless or ERW	B	40	
2½" & smaller	A-106	B	40	

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	to suit pipe	
2" & smaller	A-105*	3000#	S.W.	-----	R-2A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60/A-105	150# ANSI	W.N.	R.F.	to suit pipe	R-6A, R-18
2" & smaller	A-181 Class 60/A-105	150# ANSI	S.W.	R.F.	to suit pipe	R-18

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr. B7	Square		R-8A
NUTS	A-194 Gr. 2H*	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS	
	Garlock Blue-Gard 3000	Ring	1/16"	R-6A

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#* integral ground joint.

SERVICE

1. Air removal piping from Main Condensers to Steam Jet Air Ejectors (priming and holding).
2. Air removal from Condenser water boxes through circulating Water Priming Ejectors.

Remarks:
(*) Denotes specification updated as of 6/28/74.

CLASS F-1

PREFIX LO

PRESSURE 50 psig

TEMP. °F 170 max.

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 27*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 11, 1967* Specification No.: 9321-01-248-18 Part A*

Revision: 1) December 1, 1967 6A) Sept 1, 1990
1A) May 3, 1978 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2½" & larger	A-106	B	40
2" & smaller	A-106	B	80

TUBING Stainless steel or copper in accordance with Specification Class 153 or 155. R6A

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	Flgd.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
2½" & larger	A-234 WPB	-----	B.W.	***40
2" & smaller	A-105**	3000#	S.W. or Scrd	-----R-1A

TUBING Per Specification Class 153 or 155 R6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	
2" & smaller	A-105**	150# ANSI	S.W. or Scrd***	R.F.	to suit pipe	R6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B** or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	Vellumoid	Ring	1/16"

BACKING RINGS 2½" & Larger: Split commercial type with short nubs at field welds only

UNIONS None. Use flanges

SERVICE Lube Oil Conditioning and Transfer piping
Diesel Generator Lube Oil Piping R6A

SPECIAL REQUIREMENTS: All piping is to be cleaned, acid pickled and internally coated with a rust preventative (Gulf Coat TD or equal)

1. Air removal piping from Main Condensers to Steam Jet Air Ejectors (priming and holding).
2. Air removal from Condenser water boxes through circulating Water Priming Ejectors.

Remarks:
1. (*) Added by Addenda No. 6
2. (**) Denotes specification updated as of 6/28/74. R6A
3. (***) Screwed joints permitted only if seal welded.

CLASS F-2

PREFIX FO

PRESSURE 165 psig

TEMP. °F 150

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968* 6A) Sept 1, 1990
1A) May 3, 1978 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2½" & larger	A-106	B	40
2" & smaller	A-106	B	80

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	A-216 WCB	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	A-105**	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	To suit pipe	
2" & smaller	A-105**	3000#	S.W. or Scrd	-----	R-1A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B** or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	Vellumoid	Ring	1/16"

BACKING RINGS 2½" & Larger: Split commercial type with short nubs.

UNIONS None.

SERVICE

1. Fuel Oil to auxiliary boiler.

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.

CLASS F-3

PREFIX IO

PRESSURE 100 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 29
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968* 6A) Sept. 1, 1990
2) May 3, 1978 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2½" & larger	A-106	B	40
2"	A-106	B	80

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105**	3000#	S.W.	-----	R-1A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square		R-8A
NUTS	A-307 Gr. B** or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	Vellumoid	Ring	1/16"

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS None

SERVICE

*1. Ignition (light) oil for auxiliary (service) boiler.

Remarks:
(*) Added by Addenda No. 6
(**) Denotes Spec. updated as of 6-28-74

CLASS G-1

PREFIX HS

PRESSURE 150 psig

TEMP. °F 130

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 30
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978 6A) Sept. 1, 1990
15) February 22, 2002

PIPE	MATERIAL	GRADE	SCHEDULE	
2" & Smaller	A-106	B	80	
2" & Smaller	A-312	TP304 or TP-316	80S	R-15

TUBING	MATERIAL			
1/8" O.D.	A-213 or A-269, Soft Annealed	TP304 or TP-316	0.035" Wall	R-15
¼"-¾" O.D.	A-213 or A-269, Soft Annealed	TP304 or TP-316	0.065" Wall	R-15

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2" & Smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.	
2" & Smaller	A-182 F316	600# ANSI	S.W.	S.S.	S.S.	S.S.	R-15
Tubing**							R-15

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2" & Smaller	A-105*	3000#	S.W.	-----	R-OA
2" & Smaller	A-182 F304 or F316	3000#	S.W.	-----	R-15
¾" & Smaller Tube**					R-15

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2" & Smaller	A-181 Class 60 or A-105	150# ANSI	S.W.	R.F.	To suit pipe	R-6A, R-15
2" & Smaller	A-182 F304 or F316	150# ANSI	S.W.	R.F.	To suit pipe	R-15

	MATERIAL	HEAD	FINISH		
BOLTS	A-193 Gr. B7 or	Square	----		R-15
	A-307 Gr. B				R-15

NUTS			
	A-194 Gr. 2H*	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS	
	Vellumoid	Full Face	1/16"	
	Garlock Blue-Card 3000***	Ring	1/16"	R-15

BACKING RINGS None

UNIONS 2" & smaller, Threaded or S.W., 3000#, S.S. A-182 Gr. F-304 R-15

SERVICE

1. Generator hydrogen supply from pressure regulating station relief valve to Generator.

NOTE: Underground pipe shall be coated and wrapped.

Remarks:

(*) Denotes specification updated as of 6/28/74

(**) Valves and manifolds for use on tubing systems shall be Whitey or Nupro, Type 316SS with Swagelok ends. Tubing fittings - Crawford Swagelok TP316SS or SW, TP304 or TP316SS, Cajon or equal. R-15

(***) For use on stainless steel piping and tubing R-15

Westinghouse Electric Corporation
Indian Point Energy Center-Unit No.2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) July 23, 1970*
1A) May 3, 1978 6A) Sept. 1, 1990

CLASS G-2

PREFIX PG

PRESSURE 150 psig

TEMP. °F 100

PIPE	MATERIAL	GRADE	SCHEDULE
3" & Larger	A-53 Seamless	B	80
2 ½" & smaller	A-106	B	80

VALVES	MATERIAL	SERIES**	END	STEM	DISC	SEAT
2 ½" & Larger	A-216 WCB	150#ANSI	B.W.	S.S.	S.S.	S.S.
2" & Smaller	A-105**	600#ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2 ½" & Larger	A-234 WPB	---	B.W.	40	
2" & Smaller	A-105**	3000#	S.W.	---	R-1A

FLANGES	MATERIAL	SERIES**	TYPE	FACING	BORE	
2 ½" & Larger	A-181 Class 60	150#ANSI	W.N	F.F.	To suit pipe	
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	F.F.	To suit pipe	R-6A

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	---
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS	
	Garlock Blue-Gard 3000	Full Face	1/16"	R-6A

BACKING RINGS 2 ½" & Larger: Split commercial type with short nubs.

UNIONS None

SERVICE

1. *Carbon Dioxide supply from globe valve downstream of pressure regulator to Generator.

NOTE: Underground pipe shall be coated and wrapped.

Remarks:
(*) Added by Addenda No. 14
(**) Denotes specification updated as of 6/28/74

UNITED ENGINEERS & CONSTRUCTORS INC. PAGE 31A*
Westinghouse Electric Corporation
Indian Point Energy Center-Unit No. 2
Entergy Nuclear Northeast

Date: July 23, 1970* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 6A) Sept. 1, 1990

CLASS G-2

PREFIX PG

PRESSURE 400 psig

TEMP. °F 0

PIPE	MATERIAL	GRADE	SCHEDULE
3" & Larger	A-53 Seamless	B	80
2 ½" & Smaller	A-106	B	80

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
2 ½" & Larger	A-216 WCB	150#ANSI	B.W.	S.S.	S.S.	S.S.
2" & Smaller	A-105**	600#ANSI	B.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE		
2 ½" & Larger	A-234 WPB	---	B.W.	40		
2" & Smaller	A-105**	3000#	S.W.	---		R-OA

FLANGES	MATERIAL	SERIES**	TYPE	FACING	BORE	
2 ½" & Larger	A-181 Class 60	150#ANSI	W.N.	F.F.	To suit pipe	R-6A
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	F.F.	To suit pipe	

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	---
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS	
	Garlock Blue-Gard 3000	Full Face	1/16"	R-6A

BACKING RINGS 2 ½" & Larger: Split commercial type with short nubs.

UNIONS None

SERVICE

1. Carbon dioxide supply from Unit No. 1 storage and vaporizing unit through Vaporizer – Superheater to globe valve downstream of pressure regulator.

Remarks:
(*) Added by Addenda No. 14
(**) Denotes Specification updated as of 6/28/74

CLASS H-1

PREFIX CF

PRESSURE Vac. - 1440 psig

TEMP. °F 600 maximum

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 32*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A***

Revision: 1) October 3, 1968 ** 8A) June 1, 1995
1A) May 3, 1978

PIPE	MATERIAL	GRADE	SCHEDULE
1/2"	A-312	TP-304	80S **

TUBING			
3/8"	A-269 Seamless	TP-304	0.065" wall

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
3/8" - 1/2"	A-182F22	1500# **	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
1/2"	A-182F304	3000#	S.W.	----------	R-1A
3/8"	304 S.S.	-----	S.W. Tube	To suit tube	
3/8" - 1/2"	304 S.S.	-----	Swagelok		

FLANGES**	MATERIAL**	SERIES	TYPE**	FACING**	BORE**
All Sizes	A-182F304		S.W.	R.F.	To suit pipe

	MATERIAL**	HEAD**	FINISH	
BOLTS	A-307 Gr. B*** or A-193 Gr. B-7	Square	-----	R-8A
NUTS	A-194 Gr. 2H***	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS None

UNIONS None

SERVICE

1. Chemical feed system

Remarks:
(*) Added by Addenda No. 6
(**) Added by Addenda No. 9
(***) Denotes Specification updated as of 6/28/74

CLASS H-1A

PREFIX CF

PRESSURE 175 psig

TEMP. °F 200

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 32A
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: November, 2000 Specification No.: 9321-01-248-18 Part A***

Revision: 13) November 16, 2000
15) February 22, 2002

PIPE	MATERIAL	GRADE	SCHEDULE
3" & larger	A-106	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
3" & larger	A-216 WCB	150#	B.W.	S.S.	S.S.	S.S.	
2" & smaller	A-216 WCB	600#	S.W.	S.S.	S.S.	S.S.	
3/4"	A-216 WCB	600#	S.W.	S.S.	S.S.	Stellite	R-15

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
3" & larger	A-105	-----	B.W.	To suit pipe
2" & smaller	A-105	3000#	S.W.	

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
3" & larger	A-105	150#	W.N.	R.F.	To suit pipe
2" & smaller	A-105	150#	W.N.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B-7	Full threaded bolt studs	
NUTS	A-194 Gr. 2H	Heavy Hex	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	1/8"

BACKING RINGS None

UNIONS None

SERVICE

1. Steam Generator Wet Layup System – Recirculation piping from blowdown isolation valves to recirculation pumps; from recirculation pumps to auxiliary feedwater isolation valves.

Remarks:

1. Class H-1A is added to envelop only those piping and piping components associated with the Sargent and Lundy Modification for Steam Generator Wet Layup System, Modification No. RES-12396-00, as described under Paragraph “Service 1” above.

CLASS	H-1B	**UNITED ENGINEERS & CONSTRUCTION INC.**	PAGE 32B
PREFIX	CF	**Westinghouse Electric Corporation** **Indian Point Energy Center - Unit No. 2** **Entergy Nuclear Northeast**	
PRESSURE	175 psig	Date: November, 2000	Specification No.: 9321-01-248-18 Part A***
TEMP. °F	200	Revision: 13) November 16, 2000	

PIPE	MATERIAL	GRADE	SCHEDULE
¾" & smaller	A-312	TP-304	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
¾" & smaller	A-182 F304	150#	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
¾" & smaller	A-182 F304	3000#	S.W.	-----
¼"	304 S.S.	3000#	Swagelok	-----

UNIONS 2" & smaller, Threaded 3000#, S.S. A-182 Gr. F-304

SERVICE

1. Steam Generator Wet Layup System – Chemical addition piping from chemical addition tank to recirculation pump suction.

Remarks:

1. Class H-1B is added to envelop only those piping and piping components associated with the Sargent and Lundy Modification for Steam Generator Wet Layup System , Modification No. RES-12396-00, as described under Paragraph "Service 1" above.

CLASS H-2

PREFIX CL

PRESSURE 35 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 33*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A***

Revision: 1) June 3, 1970 **
8A) June 1, 1995
13) November 16, 2000

PIPE	MATERIAL	GRADE	SCHEDULE	LINING THICK	
1" to 2"	Saran Lined Steel		Standard	5/32"	
1" to 2"	Polypropylene Lined Steel		40	5/32" (nominal)	R-13
1" to 2"	PTFE Lined Steel		40	5/32" (nominal)	R-13

VALVES	MATERIAL	SERIES***	END	STEM	DISC	SEAT	
1" to 2" Grinnell Saunders Type	Cast Iron Saran Lined	125#ANSI	Flg'd		Diaphragm		
1" to 2" Grinnell Saunders Type	Cast Iron Polypropylene Lined	125#ANSI	Flg'd		Diaphragm		R-13

FITTINGS	MATERIAL	SERIES***	ENDS	SCHEDULE	
1" to 2"	Cast Steel Saran Lined	150#ANSI	Flg'd	To suit tube	
1" to 2"	Cast Steel Polypropylene Lined	150#ANSI	Flg'd	To suit tube	R-13
1" to 2"	Cast Steel PTFE Lined	150#ANSI	Flg'd	To suit tube	R-13

FLANGES	MATERIAL	SERIES***	TYPE	FACING	BORE	
1" to 2"	Forged Steel	150#ANSI	Screwed** or Rotatable	F.F.	To suit pipe	R-13

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B*** or A-193 Gr. B-7	Square	-----	R-8A
NUTS	A-194 Gr. 2H***	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS	
	Hypalon**	Half or full	Standard	

BACKING RINGS None

UNIONS None

SPACERS		
	Saran	
	Polypropylene	R-13
	PTFE	R-13

SERVICE

1. Chlorination system

Remarks:
(*) Added by Addenda No. 6
(**) Added by Addenda No. 13
(***) Denotes Specification updated as of 6/28/74.

CLASS H-3

PREFIX AF

PRESSURE 150 psig

TEMP. °F 100 max.

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 34
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978 6A) Sept. 1, 1990 8A) June 1, 1995

PIPE	MATERIAL		GRADE		SCHEDULE		
2" & Smaller	A-106		B		80		
VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2" & Smaller	Alloy 20	150#ANSI	Flg'd	S.S.		Dipolyene	
FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE			
2" & Smaller	A-105*	300#	S.W.	----------			R-OA
FLANGES	MATERIAL	SERIES*	TYPE	FACING	BORE		
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	R.F.	To suit pipe		R-6A
	MATERIAL		HEAD		FINISH		
BOLTS	A-307 Gr. B* or A-193 Gr. B-7		Square		-----		R-8A
NUTS	A-307 Gr. B* or A-194 Gr. 2-H		Hex.		Semi-finished		R-8A
GASKETS	MATERIAL		TYPE		THICKNESS		
	Solid Teflon or Teflon covered Asbestos		Ring		1/16"		

BACKING RINGS None

UNIONS None

SERVICE

1. Flash Evaporator Acid Feed system to mixing section

Remarks:

(*) Denotes Specification updated as of 6/28/74

CLASS	H-4
PREFIX	AF
PRESSURE	150 psig
TEMP. °F	100 maximum

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 34A*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A***

Revision: 1) June 3, 1970**
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
4"	A-312	TP-304	40S

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
None						

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
4"	A403 WP304	---	B.W.	40

FLANGES**	MATERIAL	SERIES***	TYPE	FACING	BORE
4"	A-182 F304	150#ANSI	W.N.	R.F.	To suit pipe

	MATERIAL	HEAD	FINISH
BOLTS	A-307 Gr. B*** or A-193 Gr. B7	Square	-----
NUTS	A-194 Gr. 2H	Hex.	Semi-finished

GASKETS**	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS None

UNIONS None

SERVICE

1. Flash evaporator acid feed from mixing section to flash evaporator.

Remarks:

(*) Added by Addenda No. 6
(**) Added by Addenda No. 13
(***) Denotes Specification updated as of 6/28/74

R-8A

CLASS	H-5
PREFIX	CL
PRESSURE	175 psig
TEMP. °F	100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 34B
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: Aug. 20, 1985 Specification No.: 9321-01-248-18 Part A

Revision: 5A, Aug. 20, 1985
8A) June 1, 1995

PIPE

2" and smaller Alloy UNSN 08020 as per ASTM B464 seamless.

VALVES

2" and smaller 150# ANSI, Alloy UNSN 08020, ASTM B462, Socket Weld Ends.

FITTINGS

2" and smaller 3000# ANSI, Alloy UNSN 08020, ASTM B462, Socket Weld Ends.

BLIND FLANGES

6" 150#ANSI, Alloy UNSN 08020, ASTM B462.

BOLTS

A307 Gr. B, ASTM A307-80. R-8A
or A193 Gr. B7

NUTS

A194 Gr. H, ASTM A194-80A.

GASKETS

Hypalon

SERVICE

Chlorination System (seismic Class 1) for essential service water system.

CLASS H-6

PREFIX CL

PRESSURE 175 psig

TEMP. °F 100°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 34C
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: August 20, 1985 Specification No.: 9321-01-248-18 Part A*

Revision: 5A, August 20, 1985
8A) June 1, 1995
13) November 16, 2000

PIPE	MATERIAL	GRADE	SCHEDULE	LINING THICK	
1" to 2"	Saran Lined Steel		Standard	5/32"	
1" to 2"	Polypropylene Lined Steel		40	5/32" (nominal)	R-13
1" to 2"	PTFE Lined Steel		40	5/32" (nominal)	R-13

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
1" to 2"	Cast Iron Saran Lined Grinnell Saunders Type	125# ANSI	Flg'd		Diaphragm		
1" to 2"	Cast Iron Polypropylene Lined Grinnell Saunders Type	125# ANSI	Flg'd		Diaphragm		R-13

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
1" to 2"	Cast Steel Saran Lined	150# ANSI	Flg'd	To suit pipe	
1" to 2"	Cast Steel Polypropylene Lined	150# ANSI	Flg'd	To suit pipe	R-13
1" to 2"	Cast Steel PTFE Lined	150# ANSI	Flg'd	To suit pipe	R-13

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
1" to 2"	Forged Steel	150# ANSI	Screwed	F.F.	To suit pipe

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B-7	Square	-----	R-8A
NUTS	A-194 Gr. 2H	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	Hypalon	Half or full	Standard

BACKING RINGS None

UNIONS None

SPACERS Saran
Polypropylene R-13
PTFE R-13

SERVICE

1. Chlorination system

CLASS	H-7
PREFIX	CL
PRESSURE	150 psig
TEMP. °F	100°F

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 34D
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: November, 2000 Specification No.: 9321-01-248-18 Part A*

Revision: 13) November 16, 2000

PIPE	MATERIAL	CELL CLASSIFICATION			SCHEDULE
1/2" to 2"	CPVC Type IV (ASTM D-1784)	23447			80
VALVES	MATERIAL	CELL CLASSIFICATION	END	DISC	SEAT
1/2" to 2"	150# ANSI CPVC (ASTM D-1784)	23447	Socket Type or Flanged	Ball	PTFE
FITTINGS	MATERIAL	CELL CLASSIFICATION	ENDS		SCHEDULE
1/2" to 2"	CPVC (ASTM D-1784, ASTM F-439)	23447	Socket Type		80
FLANGES	MATERIAL		FACING		SCHEDULE
	150# ANSI CPVC (ASTM F-439)		Full Face		80
	MATERIAL	HEAD		FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B-7	Square Stud Bolts		-----	
NUTS	A-194 Gr. 2H	Hex		Semi-finished	
GASKETS	MATERIAL		TYPE		THICKNESS
	Viton, Hypalon or PTFE		Full Faced		Standard

BACKING RINGS None

UNIONS None

SERVICE

1. Chlorination system upgrade per Modification No. FMX-96-11892-M.

CLASS J-1

PREFIX CC

PRESSURE 100 psig

TEMP. °F 145°F
220°F***

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968* 8A) June 1, 1995
6A) September 1, 1990 18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE
3" & Larger	A-53 seamless or ERW	B	40
2½" & Smaller	A-106	B	40

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
2½" & Larger	A-216 WCB	150 #ANSI	B.W.	S.S.	S.S.	S.S.	
Globe							
2" & Smaller (Crane No. 14½P or equal)	B-62	150# ANSI	Screwed	Brz.	S.S.	S.S.	
	***A-105	600# ANSI	SW	SS	SS		R-18
Gate							
2" & Smaller (Crane No. 431 UB or equal)	B-62	150# ANSI	Screwed	Brz.	Brz.	Brz.	

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & Larger	A-234 WPB	-----	B.W.	To suit pipe	
2" & Smaller	A-197	300 # ANSI	Screwed		
2" & Smaller	A-105***	3000# ANSI	S.W.		R-18

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & Larger	A-181 Class 60	150 #ANSI	W.N. or ***S.O.	F.F.	To suit pipe	R-6A, R-18
2" & Smaller	A-181 Class 60	150 #ANSI	S.O.	F.F.	To suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B* or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS	
	Red Rubber	Full face	1/8"	
	***Garlock Blue-Gard Style 3200	Full face	1/8"	R-18

BACKING RINGS 2½" & Larger: split commercial type with short nubs.

UNIONS 2½" & Larger, use flanges; 2" & Smaller, 300# M.I. screwed, ground joint.

SERVICE

*1. Closed cooling water system for conventional plant

REMARKS
1. (*) Added by Addenda No. 6
(**) Denotes Specification updated as of 6-28-74
(***) For Appendix R DG Mod only (EC 5000033794) R-18

Westinghouse Electric Corporation
Indian Point Energy Center-Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A***

Revision: 1) July 19, 1968** 6A) Sept. 1, 1990
1A) May 3, 1978

CLASS	J-3
PREFIX	CC
PRESSURE	100 psig
TEMP. ^{O}F	145^{O}F

PIPE	MATERIAL	GRADE	SCHEDULE
2 1/2" & Larger	A-106	B	40
2" & Smaller	A-106	B	40

VALVES	MATERIAL	SERIES***	END	STEM	DISC	SEAT
2 ½" & Larger	None					
2" & Smaller	A-105***	600#ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2 ½" & Larger	A-234 WPB	--	B.W.	40	
2" & Smaller	A-105***	3000#	S.W.	--	R-1A

FLANGES	MATERIAL	SERIES***	TYPE	FACING	BORE	R-6A
2 ½" & Larger	A-181 Class 60	150#ANSI	W.N.	R.F.	To suit pipe	
2" & Smaller	A-181 Class 60	150#ANSI	S.W.	R.F.	To suit pipe	

	MATERIAL	HEAD	FINISH
BOLTS	A-193 Gr. B7	Full threaded bolt studs	--
NUTS	A-194 Gr. 2H***	Hex.	Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS None

UNIONS 2" and Smaller; 300# M.I. screwed, ground joint.

SERVICE**

1. Closed cooling water system for instrument air compressors.
   a. 2 1/2" and Larger butt welds; liquid penetrant or magnetic particle inspection of finish weld.
   b. 2" and Smaller socket welds; liquid penetrant inspection of finish weld.

REMARKS

1. (*) Added by Addenda No. 6
   (**) Added by Addenda No. 8
   (***) Denotes Specification updated as of 6/28/74

CLASS J-2

PREFIX PW

PRESSURE 150 psig

TEMP. °F 375

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 36
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
12" & smaller	A-312	TP304	10S

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & larger	A-351 CF8	150# ANSI	B.W.	S.S.	S.S.	S.S.	
2" & smaller	A-182 F304	150# ANSI	S.W.	S.S.	S.S.	S.S.	
2" & smaller	A-182 F304	1500# ANSI	S.W.	S.S.	S.S.	S.S.	(check)

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" - 12"	A-403 WP304	-----	B.W.	10S	
2" & smaller	A-182 F304	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2½" - 12"	A-182 F304	150# ANSI	W.N.	R.F.	to suit pipe
2" & smaller	A-182 F304	150# ANSI	S.W.	R.F.	to suit pipe

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B* or A-193 Gr. B-7	Square		R-8A
NUTS	A-194 Gr. 2H	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS None

UNIONS None

SERVICE

1. Primary Water System.
2. Primary Water makeup from Flash Evaporator including Distillate Pumps suction and discharge.
3. Flash Evaporator vents to Vacuum Pump and Condenser.
4. Flash Evaporator Vent Condenser drains.

Remarks:

(*) Denotes Spec. updated as of 6-28-74

CLASS J-4

PREFIX MW

PRESSURE 100 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 36*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A***

Revision: 1) July 19, 1968**
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE	
2½"-4"	A-53 ERW galvanized	B	40	
2" & smaller	A-53 ERW galvanized	B	40	(Services 1, 2 & 3)
2" & smaller	B-88	Type K	Nominal	(Services 4, 5 & 6)

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & larger	I.B.B.M.	125# ANSI	Flg'd.	Bronze	Bronze	Bronze	
2" & smaller	B-62	150# ANSI	Scr'd.				(Ser. 1, 2 & 3)
2" & smaller	B-62	150# ANSI	Solder				(Ser. 4, 5 & 6)

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	M.I. galv.	300# ANSI	Scr'd.		(Ser. 1,2 & 3)
2" & smaller	M.I. galv.		Scr'd.		(Ser. 4,5 & 6)
2" & smaller	Wrought copper		Solder		

** FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2½" - 12"	A-182 F304	150# ANSI	W.N.	R.F.	to suit pipe
2" & smaller	A-182 F304	150# ANSI	S.W.	R.F.	to suit pipe

use flat face flanges at iron body valves.

2" & smaller None

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B-7	Square		R-8A
NUTS	A-307 Gr. B*** or A-194 Gr. 2-H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	Red rubber	Ring	1/16"

BACKING RINGS None

UNIONS 2" & Smaller, 300# M.I. screwed, ground joint.

SERVICE

1. City water through water treatment plant to service boiler deaerator.
2. City water booster pump suction and discharge.
3. Emergency make-up from existing treated water header.
4. City water make-up to expansion tanks for closed cooling water system in the control building and heater bay.
5. Make-up to diesel generator jacket water system.
6. City water for various nuclear services.

REMARKS

(*) Added by Addenda No. 6
(**) Added by Addenda No. 8
(***) Denotes Specification updated as of 6-28-74

CLASS K-1

PREFIX SA

PRESSURE 150 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 37
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978
6A) September 1, 1990
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
3" & larger	A-53 seamless or ERW	B	40
2½" & smaller	A-106	B	80

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	B-61	200# ANSI	Screwed	Brz.	Brz.	S.S. (Globe)

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105*	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B* or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	Red Rubber	Ring	1/16"

BACKING RINGS Split commercial type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, 300# screwed M.I. ground joint.

SERVICE

1. Service air system.

Remarks:
1. (*) Denotes Spec. updated as of 6-28-74

CLASS K-2

PREFIX IA

PRESSURE 150 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 38
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978
6A) September 1, 1990
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
3" & larger	A-53 seamless	B	40
2½" & smaller	A-106	B	80

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.	R-OA
2" & smaller	A-105*	600# ANSI	S.W.	S.S.	S.S.	S.S.	

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105*	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	R-6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B* or A-194 Gr. 2H	Hex.	Semi-finished	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS	
	Red Rubber-duck* insert	Ring	1/16"	R-3

BACKING RINGS 2½" & Larger, Split commercial type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000# steel to stainless ground joint.

SERVICE

1. Instrument Air System-Compressor to Instrument Air Dryers. R-OA
2. Instrument air supply to various air systems (SEE UE&C Dwg 9321-F-2726)

Remarks:
1. (*) Denotes Spec. updated as of 6-28-74

CLASS	K-3
PREFIX	IA
PRESSURE	150 psig
Temp. °F	100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 39
Westinghouse Electric Corporations
Indian Point Energy Center – Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.:9321-01-248-18

Revision:
4A) May 21, 1984
7A) July 21, 1992
15) February 22, 2002
18) January 15, 2010

PIPE	MATERIAL	GRADE	SCHEDULE	
¼" OD, 3/8" OD	B-68	Soft Annealed	0.035" wall	
½" OD	B-68	Soft Annealed	0.049" wall	
3/4" OD	B-68	Soft Annealed	0.049" or 0.065" wall	R-15
1"	B-88	Type "K"	Nominal	
1½", 2"	B-88	Type "K"	Nominal	
1", 1¼" & 1½"	B-43	-----	Extra Strong	R-18
3" (3.125"O.D.)	B-75	Annealed	0.109" wall	R-7A

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
½" & Smaller	B-62	3000#	Screwed	Brz.	Needle	Composition	
3/4" & Larger	B-62	150#	Screwed	Brz.		Composition	

FITTINGS	MATERIAL	SERIES	END	SCHEDULE	
¼" –2" –3"	Wrought copper	-----	Solder	Intermediate fittings	R-7A
¼" thru 3/4"	Swaged comp-ression	-----	-----	Terminal conn. at instrument	
¼" thru 1½"	Cast bronze	250#	Screwed		

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
None					

BOLTS None

NUTS None

GASKETS None

BACKING RINGS None

UNIONS	MATERIAL	Series	Type	
¼" – 1"	Cast Bronze	250#	Screwed (**)	R-18
½" – 1 ½"	Copper		Solder (**)	R-18

SERVICE
1. Instrument air system from Instrument Air Dryers to instruments.
2. Instrument transmitted air lines from instrument to control room panels and local receivers.
3. Multiple conductor runs from junction boxes to control room "Dekoron Metl-Cor" or equal.

REMARKS
1. (*) denotes specification identification added as of 6-28-74.
2. (**) As required for piping connections. R-18

CLASS K3-SS

PREFIX IA

PRESSURE 150 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: September 1, 1990 Specification No.: 9321-01-248-18 Part A

Revision: 6A) September 1, 1990 13) November 16, 2000
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE	
3" & smaller	A-312 seamless	TP-304 or TP-316	40S	R-13

TUBING	MATERIAL		
1/8"-½" O.D.	A-213 or A-269, Soft Annealed	TP-304 or TP-316	.035" Wall
3/4" O.D.	A-213 or A-269, soft Annealed	TP-304 or TP-316	.065" Wall

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
2" smaller	A-182 F316	600# ANSI	S.W.	S.S.	S.S.	S.S.
2½" & 3"	A-351 CF8M	150# ANSI	B.W.	S.S.	S.S.	S.S.

TUBING See Remarks

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
2" & smaller	A-182 F304 or F316	3000#	S.W.	
2½" - 3"	A-403 WP304 or WP316		B.W.	40S

TUBING Crawford Swagelok TP316SS or SW Tube fittings, TP304 or TP316SS, Cajon or equal.

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
2" & smaller	A-182 F304 or F316	150# ANSI	S.W.	R.F.	to suit pipe
2½"-3"	A-182 F304 or F316	150# ANSI	W.N.	R.F.	to suit pipe

BOLTS	MATERIAL	HEAD	FINISH	
	A-307 Gr. B or A-193 Gr. B7	Square	-----	R-8A

NUTS A-194 Gr. 2H Hex. Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	Rubber with duck fabric insert	Ring	1/16"

BACKING RINGS None

UNIONS None

SERVICE
1. Instrument air system from Instrument Air Dryers to instruments.
2. Instrument transmitter air lines from instrument to control room panels and local receivers.
3. Multiple conductor runs from junction boxes to control room "Dekoron Metl-Cor" or equal.

Remarks:
Valves and manifolds for use on tubing systems shall be Whitey or Nupro, Type 316SS with Swagelok ends.

CLASS K-4

PREFIX IH

PRESSURE 1440 psig max.

TEMP. °F 600 max.

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18
Revision: OA) May 3, 1978 Part A*

PIPE	MATERIAL	GRADE	SCHEDULE
¼", ½"	A-106	B	80
TUBING			
¼" O.D	A-192	A	0.065" wall
3/8" O.D	A-192	A	0.065" wall
½" O.D	A-192	A	0.065" wall

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
¼", ½"	A-105 *	6000#	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
¼", 3/8", ½"	A-105 *	3000#	S.W. – pipe	_____	R-OA
¼", 3/8", ½"	A-105 *	suit tube	S.W. – tube	suit tube	
¼", 3/8", ½"	A-105 *	swagelok	tube	--	

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
None					

BOLTS None

NUTS None

GASKETS None

BACKING RINGS None

UNIONS None

SERVICE

1. Instrument piping beyond first valve to primary elements on Turbine Generator Plant equipment and piping at pressures above 100 psig.

NOTE: Source and intermediate fittings on tubing runs shall be tube socket weld fittings. Terminal connection at instrument shall be swaged tube compression fitting.

Remarks:

1. (*) Denotes Specification updated as of 6/28/74.

CLASS K-5

PREFIX IL

PRESSURE Vac-100 psig

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC.
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18
Revision: Part A*

PIPE	MATERIAL	GRADE	SCHEDULE
¼", ½", 1"	B-43	--	Standard

TUBING			
¼" O.D	B-68	Soft Annealed	0.035" wall
½" O.D ¾" O.D.	B-68	Soft Annealed	0.049" wall

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
¼"	B-62	150#	Screwed	Brz.		Composition
½", ¾"	B-62	3000#	Screwed	Brz.		Composition

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
¾" & Smaller See Note:				

FLANGES None

BOLTS None

NUTS None

GASKETS None

BACKING RINGS None

UNIONS See Note:

SERVICE

1. Instrument piping beyond first valve to primary elements on Turbine Generator Plant equipment and piping at pressures above 100 psig. Outdoor runs shall be pre-insulated, pre-wired traced, 3/8" O.D., carbon steel tubing, "Dekoron 2150" or equal.

NOTE: Source and intermediate fittings on tubing runs shall be wrought copper solder fittings. Terminal connection at instrument shall be swaged tube compression fitting. Underground tubing shall be coated and wrapped in accordance with AWWA C-203.

Remarks:

1. (*) Denotes Specification Identification added as of 6/28/74.

CLASS L-1

PREFIX PCA

PRESSURE 150 psig

TEMP. °F 150

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 42
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968 6A) Sept 1, 1990
1A) May 3, 1978 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
3" & larger	A-53 seamless or ERW	B	40
2½" & smaller	A-106	B	40

* VALVES	MATERIAL	SERIES**	END	STEM	DISC	SEAT
2½" & larger	Cast Iron	125# ANSI	Flgd.		C.S.	C.I.
2" & smaller	Cast Iron	125# ANSI	Scr'd.		C.S.	C.I.

FITTINGS	MATERIAL	SERIES**	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105**	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES**	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B or A-193 Gr. B7	Square	-----	R-8A

NUTS A-194 Gr. 2H Hex. Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS	
	Garlock Blue-Gard 3000	Ring	1/16"	R-6A

BACKING RINGS 2½" & Larger: Commercial split type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** steel to stainless steel joint.

SERVICE

1. Hot penetration cooling air system.

Remarks:
1. (*) Added by Addenda No. 6
2. (**) Denotes specification updated as of 6/28/74. R6A
3. (***) Screwed joints permitted only if seal welded.

Date: Dec. 1, 1967 Specification No.: 9321-01-248-18 Part A**

Revision: 1) May 16, 1968*
1A) May 3, 1978

CLASS M-1

PREFIX SP

PRESSURE Vac-1440 psig

TEMP. ^{O}F 600 maximum

*PIPE	MATERIAL	GRADE	SCHEDULE
¼" – 1 – ½"	A-312	TP304	80

*TUBING			
¼"O.D.-1/2"OD	A-269 Seamless	TP304	.035" wall

*VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
¼"-1-1/2"	A-182 F22	6000#	S.W.	S.S.	S.S.	S.S.

*FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
¼"-1-1/2"	A-182 F304	3000#	S.W.	---	R-1A
¼"-1"	304 S.S.	---	S.W. tube	To suit pipe	
1/8"-1/2"	304 S.S.	---	Swagelok		

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
None					

	MATERIAL	HEAD	FINISH
BOLTS	None		

NUTS None

GASKETS	MATERIAL	TYPE	THICKNESS
None			

BACKING RINGS None

UNIONS None

SERVICE
1. Sampling Systems

*NOTE: Source and intermediate fittings on tubing runs shall be tube socket weld fittings. Cajon or equal. Terminal connection at sampling coil shall be swaged tube compression fitting.

REMARKS:
1. (*) Added by Addenda No. 6
2. (**) Denotes Specification Identification added as of 6/28/74

CLASS N-1

PREFIX DF

PRESSURE 50 psig
100 psig****

TEMP. °F 100

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 44*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 6A) Sept 1, 1990 8A) June 1, 1995 18) January 15, 2009

PIPE/HOSE	MATERIAL	GRADE	SCHEDULE	
2½" & larger	A-106	B	80	
2" & smaller	A-106	B	80	
3" hose & braided Connector (See Note 2)	A-312 Type 304 or 316			R-18

TUBING Stainless steel or copper in accordance with Specification Class 153 or 155 R-6A

VALVES	MATERIAL	SERIES**	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES**	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.***	80	
2" & smaller	A-105**	3000#	S.W. or Scrd	-	R-OA

TUBING Per Specification Class 153 or 155 R-6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	F.F.	to suit pipe	
2" & smaller	A-181 Class 60	150# ANSI	S.W. or ***screwed	F.F.	to suit pipe	R-6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A193 Gr B7	Square		R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS	
Below ground	Garlock Blue-Gard 3000	Full face	1/16"	R-6A
Above ground	Vellumoid	Full face	1/16" (See Note 1)	

BACKING RINGS 2½" & Larger: Split commercial type with short nubs.

UNIONS None - Use flanges.
3000# ASTM A-105**** R-18

SERVICE
1. Diesel generator fuel oil system

NOTES:
1. Manhole gasket must be 1/8"
2. Replaces 3" rigid C.S. spool piece on fuel oil storage tank equalizing line. Entire assembly, including flanges, shall be of stainless steel construction. R-18

Special Requirements: All piping is to be cleaned, acid pickled and internally coated with a rust preventative (Gulf Coat TD or equal).

Remarks:
(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74
(***) Screwed joints permitted only if seal welded
(****) For Appendix R DG Fuel Oil System only (EC 5000033794) R-18

CLASS N-2

PREFIX DA

PRESSURE 350 psig

TEMP. °F 200°

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 45*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978
6A) Sept 1, 1990
8A) June 1, 1995
14) March 12, 2001

PIPE	MATERIAL	GRADE	SCHEDULE
2" smaller	A-106 or	B	80
	A-312 or A376	TP304 or TP316	40

TUBING: Stainless steel or Copper in accordance with Specification Class 153 or 155 with 0.065" wall thickness

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2" & smaller	A-105** or	600# ANSI	S.W.	S.S.	S.S.	S.S.	
	A-182 F304 or F316	600# ANSI	S.W.	S.S.	S.S.	S.S.	R6A

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2" & smaller	A-105** or	3000#	S.W. or Screwed	-----	R-OA
	A-182 F304 or F316	3000#	S.W.		R6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2" & smaller	A-105** or	300# ANSI	S.W.	R.F.	to suit pipe	
	A-182 F304 or F316	300# ANSI	S.W.	R.F.	to suit pipe	R6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A

NUTS: A-194 Gr. 2H** — Hex. — Semi-finished

GASKETS	MATERIAL	TYPE	THICKNESS
	Garlock Blue-Card 3000	Ring	1/16"

BACKING RINGS: None

UNIONS: 2" & Smaller, F.S. S.W. 3000#** steel to stainless ground joint, or S.S. S.W. 3000# integral ground joint. R6A

SERVICE

1. Diesel generator starting air system
2. City Water System (***) R14

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.
(***) Denotes use for City Water System in conjunction with the Sodium Hypochlorite System upgrade, P/N 11892-96, located in Unit #1 Screenwell House. R14 R14

CLASS N-3

PREFIX JW

PRESSURE 50 psig

TEMP. °F 200°

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 46*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 6A) Sept 1, 1990 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2" smaller	A-106	B	80

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2" & smaller	A-105**	600# ANSI	S.W. or screwed	S.S.	S.S.	S.S.	R6A

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2" & smaller	A-105**	3000#	S.W. or screwed	-----	R-6A R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2" & smaller	A-105**	150# ANSI	S.W. or screwed	R.F.	to suit pipe	R6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	Red Rubber	Ring	1/16"

BACKING RINGS None

UNIONS 2" & Smaller, F.S. S.W. or screwed 3000#** steel to stainless steel joint. R6A

SERVICE

1. Diesel generator jacket water system

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.

CLASS P-1

PREFIX SB

PRESSURE 300 psig

TEMP. °F 420

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 47*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: December 1, 1967 Specification No.: 9321-01-248-18 Part A***

Revision: 1) May 29, 1968** 6A) Sept 1, 1990
1A) May 3, 1978 8A) June 1, 1995
15) February 22, 2002

PIPE	MATERIAL	GRADE	SCHEDULE
3" & larger	A-53 seamless	B	40
**2½" & smaller	A-106	B	40 (80 for Service 2)

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT	
2½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.	
2" & smaller	A-105 ***	600# ANSI	S.W./Scr'd	S.S.	S.S.	S.S.	R-15

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105***	3000#	S.W./Scr'd	-----	R-1A, R-15

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	300# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	300# ANSI	S.W./Scr'd	R.F.	to suit pipe	R-15

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B*** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H***	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	1/16"

BACKING RINGS Split commercial type with short nubs.

UNIONS 2½" & Larger, use flanges.
2" & Smaller, F.S. S.W. 3000#** steel to stainless ground joint.

SERVICE
1. Steam headers from service boiler to pressure reducing valve.
**2. Service boiler blow-off piping and drains. (All pipe and fittings Sch. 80).
3. Steam to deaerator.
4. Blowdown tank drains.

Remarks:
(*) Added by Addenda No. 6
(**) Added by Addenda No. 7

CLASS	Heating Equipment
PREFIX	UH
PRESSURE	35 psig
TEMP. °F	260

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 47A*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: July 19, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: 6A) September 1, 1990
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
3" larger	A-53 Seamless	B	40
2½" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	Flg'd.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	Scr'd.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE
2½" & larger	A-234 WPB	-----	B.W. or	40
2" & smaller	A-105**	3000#	Scr'd.	-----

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 80	150# ANSI	W.N.	(R.F. or	to suit pipe	
2" & smaller	Use unions			F.F.)		R-6A

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	-----

BACKING RINGS 2½" & Larger: Commercial split type with short nubs

UNIONS 2½" & Larger, use flanges
2" & Smaller, forged steel, screwed, 300#

SERVICE

1. Condensate from Condensate Return units to service boiler deaerator.

Remarks:
(*) Added by Addenda No. 8
(**) Denotes specification updated as of 6/28/74.

CLASS P-2

PREFIX SBF

PRESSURE 450 psig

TEMP. °F 220

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 48*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 6A) September 1, 1990 8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2½" & larger	A-53 Seamless	B	40
2" & smaller	A-106	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	300# ANSI	B.W.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W. or	40	
2" & smaller	A-105**	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	300# ANSI	W.N.	R.F.	to suit pipe	R-6A
2" & smaller	A-181 Class 60	300# ANSI	S.W.	R.F.	to suit pipe	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs

UNIONS 2½" & Larger, use flanges
2" & Smaller, F.S. S.W. 3000# steel to stainless ground joint

SERVICE

1. Service boiler feed pump discharge to service boilers.
2. Service boiler feed pumps recirculation.

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.

CLASS P-3

PREFIX SBF

PRESSURE 3 psig

TEMP. °F 220°

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 49*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 16, 1968* Specification No.: 9321-01-248-18 Part A**

Revision: OA) May 3, 1978 8A) June 1, 1995
6A) September 1, 1990

PIPE	MATERIAL	GRADE	SCHEDULE
3" - 8"	A-53 ERW	B	40

VALVES	MATERIAL	SERIES*	END	STEM	DISC	SEAT
2½" & larger	A-216 WCB	150# ANSI	Flg'd.	S.S.	S.S.	S.S.
2" & smaller	A-105**	600# ANSI	S.W.	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
2½" & larger	A-234 WPB	-----	B.W.	40	
2" & smaller	A-105**	3000#	S.W.	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2½" & larger	A-181 Class 60	150# ANSI	W.N.	R.F.	40	R-6A
2" & smaller	A-181 Class 60	150# ANSI	S.W.	R.F.	40	

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-194 Gr. 2H**	Hex.	Semi-finished	

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	

BACKING RINGS 2½" & Larger: Commercial split type with short nubs

UNIONS 2½" & Larger, use flanges
2" & Smaller, F.S. S.W. 3000# steel to stainless ground joint

SERVICE

1. Deaerator to B.F.P. suction

2. Deaerator drains

Remarks:

(*) Added by Addenda No. 6
(**) Denotes specification updated as of 6/28/74.

CLASS P-4

PREFIX AS

PRESSURE 165 psig

TEMP. °F 360°

UNITED ENGINEERS & CONSTRUCTION INC. PAGE 50*
Westinghouse Electric Corporation
Indian Point Energy Center - Unit No. 2
Entergy Nuclear Northeast

Date: May 24, 1969* Specification No.: 9321-01-248-18 Part A*

Revision: OA) May 3, 1978
8A) June 1, 1995

PIPE	MATERIAL	GRADE	SCHEDULE
2" & Smaller	A-106	B	40

VALVES	MATERIAL	SERIES**	END	STEM	DISC	SEAT
2" & Smaller	A-105*	600# ANSI	Screwed	S.S.	S.S.	S.S.

FITTINGS	MATERIAL	SERIES**	ENDS	SCHEDULE	
2" & Smaller	A-105*	3000#	Screwed	-----	R-OA

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
2" & smaller	Use unions					

	MATERIAL	HEAD	FINISH	
BOLTS	A-307 Gr. B** or A-193 Gr. B7	Square	-----	R-8A
NUTS	A-307 Gr. B** or A-194 Gr. 2H	Hex.	-----	R-8A

GASKETS	MATERIAL	TYPE	THICKNESS
	304 S.S.	Flexitallic	---

BACKING RINGS

UNIONS 2" & Smaller, F.S. S.W. 3000#** integral ground joint

SERVICE

1. Steam to and condensate from CO_2 Vaporization - Superheaters

Remarks:

(*) Added by Addenda No. 10
(**) Denotes specification updated as of 6/28/74.

Con-Edison – Indian Point Unit 2

UNITED ENGINEERS & CONSTRUCTORS INC.

PIPING SCHEDULE & MATERIAL

CLASS	Z-1	R-4A
SYMBOL	MPS	
DESIGN PRESS.	250 psig & 1.5 in HGA	
DESIGN TEMP	400^{O}F	

PIPE

- 20” Stainless Steel ASTM A 312, Type 304H, 0.375” Wall Thickness
- 3” and Smaller Stainless Steel ASTM A 312, Type 304H, 0.300” Wall Thickness

FITTINGS

- 2 ½” and Larger, ASTM A-403, WP-304H, Butt Weld To Match Pipe
- 2” and Smaller, ASTM A-182, F-304H, 3000# Socket Weld

FLANGES	None
VALVES	300# ANSI Design
BOLTING	None
GASKETS	None
UNIONS	None
BACKING RINGS	None, use open butt weld

SERVICE

Discharge line from Moisture Pre-Separators to Separating Tanks.

REMARKS

1. Added by Addendum dated May 21, 1984

Con-Edison – Indian Point Unit 2

UNITED ENGINEERS & CONSTRUCTORS INC.

PIPING SCHEDULE & MATERIAL

CLASS	Z-2	R-4A
SYMBOL	MPS	
DESIGN PRESS.	250 psig & 1.5 in HGA	
DESIGN TEMP.	400^{O}F	

PIPE

- 20” Chrome Moly ASTM A 335 P22, 0.375” Wall Thickness
- 3” and Chrome Molly ASTM A 335 P22, 0.300” Wall Thickness

FITTINGS

- 2-1/2” and Larger, ASTM A-234, WP-22, Butt Weld To Match Pipe
- 2” and Smaller, ASTM A-182, F-22, 3000# Socket Weld

FLANGES	None
VALVES	300# ANSI Design
BOLTING	None
GASKETS	None
UNIONS	None
BACKING RINGS	None, use open butt weld

SERVICE

Discharge line from Moisture Pre-Separators to Separating Tanks.

REMARKS

1. Added by Addendum dated May 21, 1984

Part B

Piping Schedule and Materials – Nuclear Steam Supply Plant

Index

Piping System Symbols

Piping system symbols shown on the drawings for the Nuclear Steam Supply Plan are to be interpreted as in the following example:

8-AC-151R

The first number indicates the nominal pipe size (8”); the letters indicate the service as shown on Part B, Page 1 (AC-Auxiliary Coolant system); the second number indicates the piping class as shown on Part 3, pages 5 through 24, (Class 151 shown on page 6); the suffix indicates either radioactive (R) or non-radioactive (N) service as explained on page 2.

EQUIPMENT SPECIFICATION COVER SHEET
Westinghouse Form 54341

EQUIPMENT SPECIFICATION G569866
DATED 8/18/64
REVISION NO. 2
DATED 4/29/66
SUPERCEEDS PREVIOUS REVISIONS

EQUIPMENT MATERIALS SPECIFICATION
PIPE AND FITTINGS

SHOP ORDER NO. 225

FORM SIMPLIFIED TO SHOW
PERTINENT DATA ONLY

WESTINGHOUSE ELECTRIC CORPORATION
Atomic Power Division
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Part B
Spec. No. 9321-01-248-18

EQUIPMENT SPECIFICATION

PIPING SYSTEM SERVICE DESIGNATIONS

Designation	Service
CH	Chemical & Volume Control
SL	Sampling Line
WD	Waste Disposal
RC	Reactor Coolant
SI	Safety Injection
AC	Auxiliary Coolant

Formerly WAPD E-Spec. G-569866 Rev. No. 2

WESTINGHOUSE ELECTRIC CORPORATION
ATOMIC POWER DIVISION

WAPD FORM 412

PIPING CLASSIFICATION

Design Conditions

Class*	Pressure Psig	Temperature** °F	Material
077	75	200	Aluminum Alloy
151	150	500	Stainless Steel
152	150	500	Carbon Steel
153	150	400	Stainless Steel Tubing
154	150	650	Carbon Steel Tubing
155	150	150	Copper Tubing
301	370	650	Stainless Steel
302	300	650	Carbon Steel
601	600	600	Stainless Steel
602	600	650	Carbon Steel
901	900	650	Stainless Steel
902	1095	200	Stainless Steel
903	900	650	Carbon Steel
1501	1400	650	Stainless Steel
1502	1030	650	Carbon Steel
2501	2580	650	Stainless Steel
2502	2500	400	Stainless Steel
2503	2500	650	Carbon Steel
2505	2500	650	Stainless Steel Tubing
2506	2500	650	Carbon Steel Tubing

*The suffix N or R may be added to a piping specification Class No. (such as 151N or 151R) to signify non-radioactive or radioactive service, respectively. The piping materials within the scope of this piping specification for any Class No. are in no way affected by the choice of these suffixes N or R.

**Temperature corresponds to design pressure indicated. Other pressure-temperature relationships are noted on individual specification sheets.

EQUIPMENT SPECIFICATION

GENERAL NOTES

1. Stainless steel pipe shall conform to ANSI B36.19 for sizes ½" through 12" and wall thickness schedules 10S through 80S. Stainless steel pipe outside of the scope of ANSI B36.19 shall conform to ANSI B36.10. (R-3)

2. Carbon steel pipe shall conform to ANSI B36.10. (R-3)

3. Flanges shall conform to ANSI B16.5. (R-3)

4. Socket weld fittings and socket joints shall conform to ANSI B16.11. (R-3)

5. Where welded manufacture is permitted under a given piping classification, the longitudinal seams of welded pipe and fittings shall have a 100% joint efficiency. This weld integrity shall be certified as verified by radiographic, ultrasonic or equivalent examination approved by WAPD.

6. Stainless steel materials of carbon content less than 0.04 percent shall not be substituted for materials specified herein without specific and written approval from WAPD.

7. Tubing may be purchased of either seamless or welded construction; however, welded tubing is acceptable to WAPS only if the following requirements are met and certified with the purchase of welded tubing.

   a. The longitudinal weld seam shall be inspected for freedom from all defects and subsequently drawn to exact size similarly as in seamless tube manufacture.

   b. The finished longitudinal weld seam has a 100 percent joint efficiency and is not discernable by visual examination.

   c. The finished tubing material shall be soft annealed and suitable for uniform flaring and bending.

8. The Shop Fabricator shall be responsible for the purchase of pipe of sufficient wall thickness to a minimum wall thickness required by ANSI Code subsequent to any shop pipe bending operations. Minimum pipe wall thicknesses specified herein or derived from ANSI schedule numbers do not necessarily include sufficient excess wall thickness to account for wall thinning during the bending process. (R-3)

a. 9. Materials of ASTM A105 may be substituted where ASTM A181 Class 60 is specified.

R6A (R-3)

WESTINGHOUSE ELECTRIC CORPORATION
ATOMIC POWER DIVISION

Formerly WAPD E-Spec. G-569866 Rev. No. 2 (R-3)

10. The WAPD piping specification class numbers such as 151, 601, 901, 1501, 2501, etc., are not necessarily compatible with the primary service ratings 150#, 600#, 900#, 1500#, 2500#, etc. associated with ANSI B16.5. For example WAPD piping class 2501 on page 20 specified 1500# ANSI B16.5 flanges – 2500# flanges. (R-3)

PIPING SPECIFICATION
CLASS 077

Design Conditions

Pressure 75 psig
Maximum Temperature 200°F

Material: Aluminum of ASTM specification listed below for each item.

Pipe

Size	All sizes
Construction	Seamless
ASTM Spec.	B 241 alloy 6063 Temper T6
Schedule	40

Fittings

Size	2” and smaller	2-1/2” to 12”
Type	Wrought	Wrought
Joint	Socket Weld	Butt Weld
ASTM Spec	B 361, WP 6063	B 361, WP 6063
Rating	125#	Schedule 40

Flanges

Size	All sizes
Type	Forged
Joint	Lap Joint
ASTM	A 181 Class 60
Rating	150#

PIPING SPECIFICATIONS
CLASS 151

Design Conditions

Pressure	150 psig	210 psig	240 psig
Maximum Temperature	500°F	300°F	200°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

(R-3A)	Size	2" and smaller	2 ½" to 12"	14" to 24"
	Construction	Seamless or welded	Seamless or welded	Seamless or welded
	ASTM Spec	A 312 Type 304	A 312 Type 304	A 358 or A 312
(R-3A)	Schedule	10S or 40S	40S	

Fittings

	Size	2" and smaller	2 ½" to 4"	5" to 12"	14" to 24"
	Type	Forged	Seamless	Seamless	Welded
	ASTM Spec	Socket weld	Butt weld	Butt weld	Butt weld
(R-3)	Rating	A 182 F 304	A 403 WP 304	A 403 WP 304	A 403 WP 304
(R-3A)		3000#	Schedule 40S	Schedule 40S	¼" Wall

Flanges

	Size	2" and smaller	2-1/2" to 4"	5" to 12"	14" to 24"
	Type	Forged	Forged	Forged	Forged
	Joint	Socket weld	Weld neck	Weld neck	WN or SO
	ASTM Spec	A 182 F 304	A 182 F 304	(R-3) A 182 F 304	A 182 F 304
	Rating	150# RF	150# RF	150# RF	150# RF
(R-3A)	Bored to	Schedule 10S or 40S	Schedule 40S	Schedule 40S	¼" Wall

NOTES:

1. "Speedline" fittings (except aligning connectors and insert flanges) – as manufactured by Horace T. Potts Company of Philadelphia, Pa. May be used in sized 4" and smaller.
2. "Featherlite" 150# wrought fittings made by W-S Fittings Works of H. K. Porter Co., Inc. may be substituted where the maximum service temperature does not exceed 75% of the above design temperatures.
3. 304 L pipe and fittings may be used in sizes ½" to 24". Add. #6
4. The use of pipe schedule 10S is permissible for 8 inch nominal wall pipe size for lines 327, 328 and 329 (Reference Calculation FMX-00118-00 and CR response 199807613) R-13, R-18

PIPING SPECIFICATION
CLASS 152

Design Conditions

Pressure	150 psig
Maximum Temperature	500°F

Material: Carbon Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"	12" to 24"
Construction	Seamless or welded	Seamless or welded
ASTM Spec	A 53 or A 106 Grade A or B	A 53 Grade A or B
Schedule	40	3/8" Std. Wall

Fittings

	Size	2" and smaller	2-1/2" to 10"	12" to 24"
	Type	Forged	Seamless	Seamless or welded
	Joint	Socket weld	Butt weld	Butt weld
(R-3)	ASTM Spec	A 105	A 234-WPB	A 234-WPB
(R-3)	Rating	3000#	Schedule 40	3/8" Std. Wall

Flanges

	Size	2" and smaller	2-1/2" to 10"	12" to 24"
	Type	Forged	Forged	Forged
	Joint	Socket Weld	Weld neck	WN or SO
	ASTM Spec	A 181 Class 60	A 181 Class 60	A 181 Class 60 R6A (R-3)
	Rating	150# RF	150# RF	150# RF
	Bored to	Schedule 40	Schedule 40	3/8" Std. Wall

Notes: 1. (*) Denotes ASTM A105 may be substituted (R-3).

PIPING SPECIFICATION
CLASS 153

Design Conditions

Pressure 150 psig
Maximum Temperature 400°F

Material: Stainless Steel Tubing, ASTM A213, A 249, or A 269 Type 304 or 316 soft annealed suitable for bending and flaring.

Sizes:

Actual O.D. Inch	Wall Thickness inches
¼	.065
3/8	.065
½	.065
¾	.065

Swaged fittings shall be Crawford Swagelok or Tylok of TP 316 stainless steel material. Socket weld tub fittings shall be of TP304 or TP316 stainless steel material as manufactured by Cajon Company, or approved equal.

PIPING SPECIFICATION
CLASS 154

Design Conditions

Pressure 150 psig
Maximum Temperature 650°F

(R-3) Material: Carbon Steel Tubing, soft annealed seamless, A 192 or A 179.

Sizes:

Actual Tube Size Inch	Wall Thickness inches
¼	.065
3/8	.065
½	.065
¾	.065

Swaged fittings shall be Crawford Swagelok or Tylok carbon steel fittings. Socket weld tube fittings shall be carbon steel manufactured by Cajon Company or approved equal.

PIPING SPECIFICATION
CLASS 155

Design Conditions

Pressure 150 psig
Maximum Temperature 150°F

Material: Copper Tubing, ASTM B 68, or B 75 Type DHP, soft annealed, suitable for bending and flaring.

Sizes:

Actual O.D. Inch	Wall Thickness Inch
¼	0.030
3/8	0.032
½	0.032
¾	0.035

Fittings: Crawford Swagelok or Tylok (Brass)

PIPING SPECIFICATION
CLASS 301

Design Conditions

Pressure	370 psig	495 psig	550 psig
Maximum Temperature	650°F	300°F	200°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 12"
Construction	Seamless or welded
ASTM Spec	A 312 Type 304
Schedule	40S

Fittings

	Size	2" and smaller	2-1/2" to 12"
	Type	Forged	Seamless or welded
	Joint	Socket weld	Butt weld
	ASTM Spec	A 182 Type 304	A 403 Type 304
(R-3)	Rating	3000#	Schedule 40S

Flanges

Size	2" and smaller	2-1/2" to 12"
Type	Forged	Forged
Joint	Socket weld	Welding neck
ASTM Spec	A 182 – F 304	A 182 – F 304
Rating	300# RF	300# RF
Bored to	Schedule 40S	Schedule 40S

PIPING SPECIFICATION
CLASS 302

Design Conditions

Pressure	300 psig
Maximum Temperature	650°F

Material; Carbon Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"	12" to 18"
Construction	Seamless or welded	Seamless or welded
ASTM Spec	A 53 Grade A or B	A 53 Grade A or B
Schedule	40	3/8" Std. Wall

Fittings

	Size	2" and smaller	2-1/2" to 10"	12" to 18"
	Type	Forged	Seamless or welded	Seamless or welded
	Joint	Socket weld	Butt weld	Butt weld
(R-3)	ASTM Spec	A 105	A 234 – WPB	A 234 – WPB
(R-3)	Rating	3000#	Schedule 40	3/8" Std. Wall

Flanges

Size	2" and smaller	2-1/2" to 10"	12" to 18"	
Type	Forged	Forged	Forged	
Joint	Socket weld	Welding neck	WN or SO	
ASTM Spec	A 181 Class 60 (*)	A 181 Class 60 (*)	A 181 Class 60 (*) R6A	(R-3)
Rating	300# RF	300# RF		
Bored to	Schedule 40	Schedule 40		

Notes: 1. (*) Denotes ASTM A105 may be substituted. (R-3)

PIPE SPECIFICATION
CLASS 601

Design Conditions

Pressure	600 psig	700 psig	875 psig	500 psig
Maximum Temperature	600°F	400°F	200°F	400°F (see note below)

Material: Stainless Steel of ASTM Specifications listed below for each item.

Pipe (R-3B)

Size	½" to 10"	12" only	14" & 16"
Construction	Seamless or welded	Seamless or welded	Seamless or welded
ASTM Spec	A 312 Type 304	A 376 or A 358	Class 1 Gr. 304
Schedule	40S	3/8" Std. Wall	Schedule 40

Fittings (R-3B)

Size	2" and smaller	2-1/2" to 10"	12" only	14" & 16"
Type	Forged	Seamless or welded	Seamless or welded	Seamless or welded
Joint	Socket weld	Butt weld	Butt weld	Butt weld
ASTM Spec	A 182 F 304	A 403 WP 304	A 403 WP 304	A 403 WP 304
(R-3) Rating	3000#	Schedule 40S	3/8" Std. Wall	Schedule 40

Flanges (R-3B)

Size	2" and smaller	2-1/2" to 10"	12" only	14" & 16"
Type	Forged	Forged	Forged	Forged
Joint	Socket weld	Welding neck	Welding neck	Welding neck
ASTM Spec	A 182 F 304	A 182 F 304	A 182 F 304	A 182 F 304
Rating	600# RF	600# RF	600# RF	600# RF
Bored to	Schedule 40S	Schedule 40S	3/8" Std. Wall	Schedule 40

Note: A 300# RF Flange of Grade F 316 may be substituted for the 600# RF flange of Grade F 304 specified above, but only for the 500 psig/400°F design condition.

PIPING SPECIFICATION
CLASS 602

Design Conditions

Pressure	600 psig
Maximum Temperature	650°F

Material: Carbon Steel of ASTM Specifications listed below for each item.

Pipe

Size	2" and smaller	2-1/2" to 10"	12" only
Construction	Seamless	Seamless	Seamless
ASTM Spec	A106 Grade A	A 106 Grade B	A 106 Grade B
Schedule	40	40	3/8" Std. Wall

Fittings

	Size	2" and smaller	2-1/2" to 10"	12" only
	Type	Forged	Seamless	Seamless
	Joint	Socket weld	Butt weld	Butt weld
(R-3)	ASTM Spec	A 105	A 234 – WPB	A 234 – WPB
(R-3)	Rating	3000#	Schedule 40	3/8" Std. Wall

Flanges

	Size	2" and smaller	2-1/2" to 10"	12" only
	Type	Forged	Forged	Forged
	Joint	Socket weld	Welding neck	Welding neck
(R-3)	ASTM Spec	A 105	A 105	A 105
	Rating	600# RF	600# RF	600# RF
	Bored to	Schedule 40	Schedule 40	3/8" Std. Wall

PIPING CLASSIFICATION
CLASS 901

Design Conditions

Pressure	900 psig	1100 psig	1300 psig
Maximum Temperature	650°F	400°F	300°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"	12"
Construction	Seamless or welded	Seamless or welded
ASTM Spec	A 312 Type 304	A 312 Type 316
Schedule	80S	80S

Fittings

Size	2" and smaller	2-1/2" to 10"	12"
Type	Forged	Seamless or welded	Seamless or welded
Joint	Socket weld	Butt weld	Butt weld
ASTM Spec	A 182 F 304	A 403 WP 304	A 403 WP 316
Rating	3000#	80S	80S

Flanges

Size	2" and smaller	2-1/2" to 10"	12"
Type	Forged	Forged	Forged
Joint	Socket weld	Welding neck	Welding neck
ASTM Spec	A 182 F 304	A 182 F 304	A 182 F 304
Rating	1500#	900# RF	900# RF
Bored to	Schedule 80S	Schedule 80S	Schedule 80S

Note: A 600# RF flange of Grade F 316 may be substituted for the 900# RF flange of Grade F 304 specified above for all the pressure/temperature design conditions listed above.

PIPING CLASSIFICATION
CLASS 902

Design Conditions

Pressure	1095 psig
Maximum Temperature	200°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"	12"
Construction	Seamless or welded	Seamless or welded
ASTM Spec	A 312 Type 304	A 312 Type 304
Schedule	40S	80S

Fittings

Size	2" and smaller	2-1/2" to 10"	12"
Type	Forged	Seamless or welded	Seamless or welded
Joint	Socket weld	Butt weld	Butt weld
ASTM Spec	A 182 F 304	A 403 WP 304	A 403 F 304
(R-3) Rating	3000#	Schedule 40S	Schedule 80S

Flanges

Size	2" and smaller	2" to 10"	12"
Type	Forged	Forged	Forged
Joint	Socket weld	Welding neck	Welding neck
ASTM Spec	A 182 F 304	A 182 F 304	A 182 F 304
Rating	600# RF	600# RF	600# RF
Bored to	Schedule 40S	Schedule 40S	Schedule 80S

PIPING SPECIFICATION
CLASS 903

Design Conditions

Pressure	900 psig
Maximum Temperature	650°F

Material: Carbon Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 4"	5" to 12"
Construction	Seamless	Seamless
ASTM Spec	A 106 Grade B	A 106 Grade B
Schedule	40	80

Fittings

	Size	2" and smaller	2-1/2" to 4"	5" to 12"
	Type	Forged	Seamless	Seamless
	Joint	Socket weld	Butt weld	Butt weld
(R-3)	ASTM Spec	A 105	A 234 – WPB	A 234 – WPB
(R-3)	Rating	3000#	Schedule 40	Schedule 80

Flanges

	Size	2" and smaller	2-1/2" to 4"	5" to 12"
	Type	Forged	Forged	Forged
	Joint	Socket weld	Welding neck	Welding neck
(R-3)	ASTM Spec	A 105	A 105	A 105
	Rating	600# RF	600# RF	600# RF
	Bored to	Schedule 40	Schedule 40	Schedule 80

PIPING CLASSIFICATION
CLASS 1501

Design Conditions

Pressure	1400	1500	1575
Maximum Temperature	650°F	350°F	200°F

Material: Stainless steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"	12" to 14"
Construction	Seamless or welded	Seamless or welded
ASTM Spec	A 312 TP 316	A 312 or A 358 TP 316
Schedule	80S	Min. Wall = 0.58"

Fittings

Size	2" and smaller	2-1/2" to 10"	12" to 14"
Type	Forged	Seamless or welded	Seamless or welded
Joint	Socket weld	Butt weld	Butt weld
ASTM Spec	A 182 F 304	A 403 WP 316	A 403 WP 316
Rating	3000#	80S	Wall to suit pipe

Flanges

Size	2" and smaller	2-1/2" to 10"	12" to 14"
Type	Forged	Forged	Forged
Joint	Socket weld	Weld neck	Weld neck
ASTM Spec	A 182 F 316	A 182 F 316	A 182 F 316
Rating	1500# RF	900# RF	900# RF
Bored to	Schedule 80S	Schedule 80S	To suit pipe

PIPING SPECIFICATION
CLASS 1502

Design Conditions

Pressure	1030 psig
Maximum Temperature	650°F

Material: Carbon Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 10"
Construction	Seamless
ASTM Spec	A 106 Grade B
Schedule	80

Fittings

	Size	2" and smaller	2-1/2" to 10"
	Type	Forged Socket weld	Seamless
	Joint	A 105	Butt weld
(R-3)	ASTM Spec	3000#	A 234 – WPB
	Rating		Schedule 80

Flanges

	Size	2" and smaller	2-1/2" to 10"
	Type	Forged	Forged
	Joint	Socket weld	Butt weld
(R-3)	ASTM Spec	A 105	A 105
	Rating	600# RF	600# RF
	Bored to	Schedule 80	Schedule 80

PIPING SPECIFICATION
CLASS 2501

Design Conditions

Pressure	2580 psig	2510 psig
Maximum Temperature	650°F	680°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 12"
Construction	Seamless
ASTM Spec	A 376 Type 316
Schedule	160

Fittings

Size	2" and smaller	2-1/2" to 12"
Type	Forged	Seamless
Joint	Socket weld	Butt weld
ASTM Spec	A 182 F 316	A 403 WP 316
(R-3) Rating	6000#	Schedule 160

Flanges

Size	2" and smaller	2-1/2" to 12"
Type	Forged	Forged
Joint	Socket weld	Welding neck
ASTM Spec	A 182 F 316	A 182 F 316
Rating	1500# RF	1500# RF
Bored to	Schedule 160	Schedule 160

NOTES:
1. Piping sizes 3" and larger purchased to A 376 for the surge line and all branch piping connected to the main reactor coolant loops and up to the first and second isolation stop valves shall include the supplementary requirements S2, S4, and S6 listed under the A 376 specifications.
2. Wall thicknesses corresponding to ANSI schedules 120 and 140 permissible only upon written approval from WAPD. (R-3)
3. Design of sizes 14" O.D. and larger subject to WAPD approval.
4. Fittings 3" and larger in the R.C.S. branch piping up to the second isolation valve shall comply with the ultrasonic supplementary requirements of S4 listed under ASTM A-403. (R-3A)

PIPING SPECIFICATION
CLASS 2502

Design Conditions

Pressure	2500 psig	2100 psig	3200 psig
Maximum Temperature	400°F	650°F	200°F

Material: Stainless Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 1"	1-1/2" to 2"	2-1/2" to 12"
Construction	Seamless	Seamless	Seamless
ASTM Spec	A 312 Type 316	A 312 Type 304	A 312 Type 304
Schedule	Schedule 80S	Schedule 160	160

Fittings

Size	1" and smaller	1-1/2" to 2"	2-1/2" to 12"
Type	Forged	Forged	Seamless
Joint	Socket weld	Socket weld	Butt weld
ASTM Spec	A 182 F 316	A 182 F 304	A 403 F 304
(R-3) Rating	3000#	6000#	Schedule 160

Flanges

Size	1" and smaller	1-1/2" to 2"	2-1/2" to 12"
Type	Forged	Forged	Forged
Joint	Socket weld	Socket weld	Welding neck
ASTM Spec	A 182 F 316	A 182 F 316	A 182 F 316
Rating	1500# RF	1500# RF	1500# RF
Bored to	Schedule 80S	Schedule 80S	Schedule 160

NOTE: Wall thicknesses corresponding to ANSI Schedules 120 and 140 are permissible subject to WAPD written approval. (R-3)

PIPING SPECIFICATION
CLASS 2503

Design Conditions

Pressure	2500 psig
Maximum Temperature	650°F

Material: Carbon Steel of ASTM Specification listed below for each item.

Pipe

Size	½" to 12"
Construction	Seamless
ASTM Spec	A 106 Grade B
Schedule	160

Fittings

	Size	2" and smaller	2-1/2" to 12"
	Type	Forged	Seamless
	Joint	Socket weld	Butt weld
(R-3)	ASTM Spec	A 105	A 234 – WPB
(R-3)	Rating	6000#	Schedule 160

Flanges

	Size	2" and smaller	2-1/2" to 12"
	Type	Forged	Forged
	Joint	Socket weld	Welding neck
(R-3)	ASTM Spec	A 105	A 105
	Rating	1500# RF	1500# RF
	Bored to	Schedule 160	Schedule 160

PIPING SPECIFICATION
CLASS 2505

Design Conditions

Pressure 2500 psig
Maximum Temperature 650°F

Material: Stainless Steel Tubing, A 249, A 213 or A 269, Soft annealed

Tube Size (Actual O.D.)	Wall Thickness
¼	.065
3/8	.065
½	.065
¾	.065

For Swaged Fitting Joints: Use Crawford Swagelok of Tylok Fittings (Stainless Steel TP 316)

For Socket Welded Joints: Use socket weld tube fittings manufactured by Cajon Company, or approved equal (Stainless Steel TP 316)

PIPING SPECIFICATION
CLASS 2506

Design Conditions

Pressure 2500 psig
Maximum Temperature 650°F

Material: Carbon Steel Tubing, Soft Annealed, Seamless or Welded, (R-3)
ASTM A 178, A 179 and A 192

Nominal Tube Size inch (Actual O.D.)	Wall Thickness inches
¼	.065
3/8	.065
½	.065
¾	.065

Swaged fittings shall be Crawford Swagelok or Tylok carbon steel fittings. Socket weld tube fitting shall be carbon steel manufactured by Cajon Company (or approved equal).

GASKETS

Type of Joint	Flange Material	ASA Flange Rating	Gasket	
Raised Face	Stainless Steel	150# to 1500#	Flexitallic gasket style CG, Type 304 stainless steel and non-asbestos filler	R6A
Raised Face	Carbon Steel	300# to 1500#	Flexitallic gasket style CG, Type 304 stainless steel and non-asbestos filler	R6A
Raised Face	Carbon Steel	150#	Garlock Bluegard 3000 flat ring, 1/16” thick, dimensions to ANSI B 16.21	(R-3)
Flat Face	Carbon Steel & Aluminum	75#	Garlock Bluegard 3000 full face, 1/16” thick, dimensions to ANSI B 16.21 Or Red rubber, flat ring, 1/16” thick, dimensions to ANSI B 16.21 for temperature below 220^{o}F for water service only	R6A (R-3) (R-3)
Lap Joint	Steel Flange with Aluminum Stub End	75#	Use roofing felt (or equivalent) and bolt insulators to prevent cathodic action between aluminum stub and steel flange	

BOLTS AND NUTS

Flange Rating	300 to 2500 pounds	
Type	Stud bolts with two nuts	
Stud	ASTM A-193 Grade B7, continuously threaded per ANSI B 1.1 Class 2A fit, sizes 1 inch and smaller in diameter - coarse thread series, sizes 1-1/8 inch and larger in diameter - 8 pitch thread series, length to ANSI B 16.5.	R-3
Nut	ASTM A-194 Grade 2H, Hexagon semi-finished, American Standard heavy series threaded to ANSIB 1.1 Class 2B; coarse thread series for sizes 1 inch in diameter and smaller, and 8 pitch threads for sizes 1-1/8 inches and larger in diameter.	R-3

Flange Rating	150 pounds	
Type	Machine bolt and nut	
Bolt	ASTM A-307 Grade B, unfinished regular square head, threaded to ANSI 31.1 coarse thread series Class 2A fit; length to ANSI B 16.5.	R-3
	or A193 Grade B7	R-8A
Nuts	ASTM A-194 Grade 2H (same as used with studs)	

EXHIBIT C. VALVE NUMBERING SYSTEM

I. Instrumentation and Control Valve Tag Numbers

The Westinghouse tag numbering system for instrumentation is derived from I.S.A. R. P. 5.1 and used Arabic numbers for channel identification. Blocks of numbers are pre-assigned for each of the plant systems. If a valve is part of a control channel, such as a flow control valve, it receives the control channel number for its tag number. Valve independent of a control channel, such as a solenoid operated sampling valve, will be numbered as described under item II. Manual and Remove Valve Numbers.

The blocks of numbers have been assigned as follows for instrumentation and control valves:

Channel No.	System	
100 through 199	Chemical and Volume Control System	
400 through 499	Reactor Coolant System	
600 through 699	Auxiliary Coolant System	(R-3B)
900 through 949	Sampling System and Safety Injection System	(R-3B)
1000 through 1099	Waste Disposal System and Ventilation System*	

II. Manual and Remove Valve Numbers

Manual and remote valves will be given two identification numbers

a) The valve location number will be shown on the process and engineering flow diagrams and will be referred to in operating instructions to indicate the method of system operation. Each manual or remote valve will have a unique valve location number. These numbers will be assigned in blocks by system as shown below. These blocks of numbers have been selected so that they will not conflict with instrument channel and control valve numbers.

* If either system is within Westinghouse scope.

EXHIBIT C. VALVE NUMBERING SYSTEM

Valve No.	System	
200 through 399	Chemical and Volume Control System	
500 through 599	Reactor Coolant System	
700 through 899	Auxiliary Coolant System	R-3B
950 through 999	Sampling System and Safety Injection System	
1100 through 1299	Waste Disposal System and Ventilation System*	

Each manual and remote valve will be listed on a valve list by location number.

b) The valve type number will be used on engineering flow diagrams and piping layouts to identify all identical valves. Thus, all two inch, 1500 pound, stainless steel globe valves with bellows seals would have the same valve type number and could be used interchangeable in the field. Valve type tags will be used and no valve location tags will be provided. (It should be understood that unless otherwise marked, flow through all globe valves shall be from under the seat).

The valve type number will designate the following:

Size

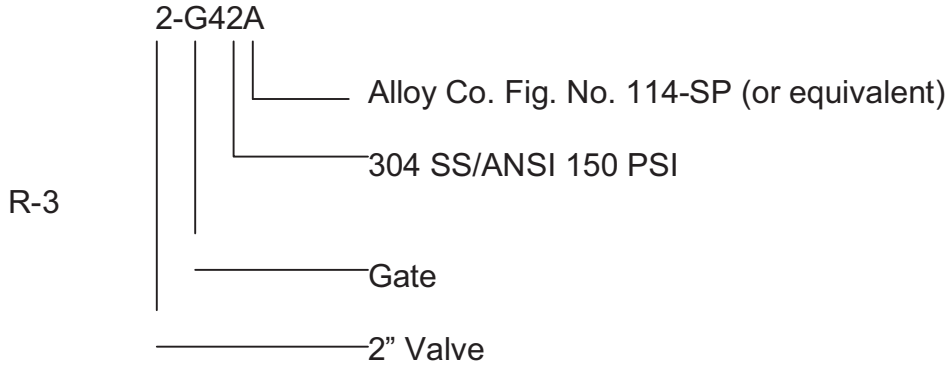
Body Type

Operator Type

Material/ANSI Pressure Class R-3

Construction Type

(Example)



* If either system is within Westinghouse scope.

EXHIBIT C. VALVE NUMBERING SYSTEM

These numbers will be based on the following:

Size – ½", ¾", etc. – Nominal valve size

Body Type -

A – Angle

B – Ball

C – Check

G – Gate

P – Plug

T – Globe

RV - Safety or Relief

X - Special (3-way, 4-way, Saunders Patent, needle, etc.)

Operator Type -

D - Air Diaphragm

M - Electric Motor

P - Air Piston

S – Solenoid

(Lack of letter in valve type number indicates valve is manual of self-actuated.)

Except for Sampling System solenoid operated valves, more than one or two identical valves with operators are seldom purchased. Since operator orientation, number and type of contact switches, fail position, port type, flow and pressure drop characteristics, accessories, etc., results in few identical valves, the valve location number will be used for most valves with operators. If, however, it is considered advantageous, a unique valve type number will be assigned to identical valves with operators.

EXHIBIT C. VALVE NUMBERING SYSTEM

Material/ANSI Pressure Class

	ANSI Pressure Rating									
Body Material	50	125	150	200	300	400	600	900	1500	UP
Cast Iron	10	11	12	13	14					
Bronze or Brass	20	21	22	23	24					
Steel	30	31	32	33	34	35	36	37	38	
304 Stainless Steel	40	41	42	43	44	45	46	47	48	
316 Stainless Steel	50	51	52	53	54	55	56	57	58	
Special Materials	60	61	62	63	64	65	66	67	68	

Construction Type –

A letter suffix A, B, C, D, etc., will be assigned to identify design variations for valves of similar body type and material/ANSI pressure class. For example, G42A, G42B, G42C, etc., would identify each variation in valve trim, figure number, end preparation and special features such as backseats, leak-offs, cleaning, and inspection requirements.

In the case of special valves denoted by body type X, the suffix letter D will indicate diaphragm type valves (Saunders Patent) and the suffix letter N will indicate needle type valves. Design variations of these valve types will be handled by additional suffix letters A, B, C, D, etc.

Safety and Relief Valves

In addition to the use of valve location numbers for valves with operators, valve location numbers will be used to identify most safety and relief valves. At the present time the number of variations in set pressures, inlet and outlet end preparations, materials and port sizes does not appear to warrant assigning valve type numbers.

APPENDIX A

PIPE CLEANLINESS

1.0 CLEANLINESS AND CLEANING PROCEDURES

It is the intent, and requirement of this Specification that the highest degree of cleanliness be obtained and maintained through manufacture, fabrication, delivery, storage, construction, erection, start-up and to the completion of work.

1.1. GENERAL

The final required cleanliness of all the completed systems of the primary plant is the responsibility of the Contractor who shall obtain the required final cleanliness to the full satisfaction of the intent of this procedure in all systems.

1.2 CLEANLINESS CRITERIA

Revision 17 of this Specification here-by incorporates the requirements, criteria, and specifications of IP-3 Specification TS-MS-012 Rev. 1, and all applicable addenda, and Specification TS-MS-028 Rev. 0, and all applicable addenda.