ENT000395
Submitted: March 30, 2012

UNITED ENGINEERS & CONSTRUCTORS INC.
Philadelphia, Pennsylvania 19105

Specification

for

Service Water Piping

Westinghouse Electric Corporation
Indian Point Generating Station-Unit No. 2
Consolidated Edison Company of New York

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Rev. 3A: Jan. 2, 1981
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		U.E. & C. Specification No. 9321-01-248-35 TABLE OF REVISIONS		
Revision No.		Description	Comments	Signature
6A	1	Deleted requirement for insulated joints.		R Africa
6A	2	Revised cement lined steel piping welding recommendations		R Africa
6A	3	Revised Spec Classes SWT-CS, SWN-CS, SWN-SS & SWN-NF		R Africa
6A	4	Added new Spec Classes SWT-SS, SWN-MOSS & SWT-MOSS		R Africa
6A	5	Revised coating materials. Added more options for valves.		R Africa
6A	6	This revision is a comprehensive revision as it contains many major changes.		R Africa

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INDEX

INDEX (Cont'd)

SECTION I

GENERAL INFORMATION

Owner: .... Consolidated Edison Company of New York

Purchaser: .... Consolidated Edison Company of New York R-3A
4 Irving Place
New York, N.Y. 10003

Description:.. Specification for Service Water Piping System for Indian Point Generating Station, Unit No. 2

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

In this specification and data sheets, references to all inspections, permissions, resolutions, acceptances, documentation receipts and final approvals shall be the responsibility of Con Edison in lieu of Westinghouse or UE&C.

SECTION II

A. Scope of Work

1. Unless otherwise specified in the Purchase Order, furnish all labor and supervision, tools, equipment and material to completely shop detail, shop fabricate, cement line, coat and wrap, prepare for shipment and ship to the job site all cement lined and/or bitumastic coated City Water lines as designated by the Purchaser. R-4A Add. #1 R-3A

2. Unless otherwise specified in the Purchase Order, furnish all labor and supervision, tools, equipment and material to completely shop detail, shop fabricate, cement line, coat and wrap, prepare for shipment and ship to the job site all Service Water piping as shown on the drawings and in accordance with the requirements of this specification and including the following four (4) items listed below in paragraph 3. R-4A R-3A R-4A

3. Unless otherwise specified in the Purchase Order, furnish all labor and supervision, tools, equipment and material to completely shop detail, shop fabricate, prepare for shipment and ship to the jobsite all stainless steel, molybdenum stainless steel and/or non-ferrous Service Water piping as shown on the drawings and in accordance with the requirements of UE&C Specification 9321-01-248-18 and this specification and including the following four (4) items listed below. R-4A R-3A R6A

    a. All branch nozzles, vent, drain and instrument connections as required and shown on the drawings; R-4A

    b. All welded and flanged fittings for the system; R-4A

    c. All bolts, nuts, washers and gaskets for the system; R-4A

    d. Furnish three (3) certified copies of chemical and physical tests required by the ASTM specification and as required under Section III of this specification. R-4A

4. Unless otherwise specified in the Purchase Order, furnish supervision for the field handling and erecting, testing and placing into operation the Service Water system as shown on the drawings and including the following: R-4A R-3A

    a. Supervision of the installation of all valves and strainers furnished by Others; R-4A

4. Scope of Work (Cont'd)

   b. Supervision of the installation of all hangers furnished by Others, for piping within the various buildings; R-4A

   c. Recommendations for the design and supervision of the installation of pipe supports for piping in the area, above and below ground; R-4A

   d. Supervision of and inspection during hydrostatic test of the system; R-4A

   e. Supervision of repair of defects found during hydrostatic test; R-4A

   f. Supervision of backfilling operations for underground piping after hydrostatic testing. R-4A

5. Furnish and supervise the erection of other cement lined and bitumastic coated piping, not in the Service Water system, as designated by the Purchaser. R-4A R-3A

B. **Work by Others**

1. Furnish and deliver pumps, valves, strainers and accessories;

2. Hanger design, fabrication and delivery for piping within the buildings;

3. Furnish labor, equipment and material for excavation for underground piping;

4. Furnish labor and material for the installation of pipe supports in the yard area in accordance with the Seller's recommendations;

5. Furnish labor, equipment and material for the erection, hydrostatic testing, repair of defects and backfilling operations.

6. Furnish and deliver stainless steel, molybdenum stainless steel and/or non-ferrous piping for use in the Service Water system. R-3A Add. #1 R-6A

SECTION III

A. Fabrication of Piping

1. Drawings

   a. Drawings and data furnished by the Purchaser:

      (1) The Purchaser will supply one (1) transparency of the piping drawings.

   b. Drawings furnished by the Seller:

      (1) The Seller shall shop detail the Service Water system as outlined in Section II of this specification. Each detail sheet shall contain complete information for one finished fabrication and shall include applicable ASTM, AWWA and/or ANSI specifications, Sect. IX of the ASME B&PV Code, welding procedures and complete Bill of Material for the fabrication shown. The detail sheet shall contain piece mark and estimated weight for the finished fabrication. R-4A

      (2) The Seller shall make an isometric stretch-out for the piping system showing the location of shop and field welds and piece marks to agree with the piece marks on the Seller's detail sheets. The isometric will be used to record the certification of material, tests and examinations performed, welders symbols and qualifications required for complete quality control record. R-4A

      (3) The Seller shall mark the transparency (furnished by the Purchaser under 1.a. (1) above) with the location of field welds and with piece marks to agree with the piece marks on the Sellers detail sheets. The Seller will then make prints from this transparency for his use in detailing and fabrication and return a transparency as noted in (4) below.

(4) The Seller shall furnish and distribute prints and transparencies for the Purchaser's review. All documents shall be sent to the Design and Quality assurance personnel who are stated in the purchase order. R-5A R-6A

A. Fabrication of Piping (Cont'd)

Transparency, (see (3) above).	1	—
Stretch-out, (see (2) above).	2 + 1 transparency	2
Detail sheets, (see (1) above).	2 + 1 transparency	2

(5) Detail sheets will be examined for overall dimensions and conformance with this specification. The Purchaser will mark the detail sheets with information regarding exact location and description of instrument taps, vent and drain connections where required, and return on copy either approved or marked showing changes required. When changes are required, detail sheets shall be re-submitted promptly, with revisions clearly marked, until finally approved. When approved, the detail sheet is released for fabrication.

(6) The Seller shall furnish four (4) prints and three (3) transparencies of the detail sheets and isometrics upon receipt of approval. These shall be submitted to the Design personnel who are stated in the purchase order. Add. #1 R-5A R-6A

(7) Instructions contained herein, pertaining to the number of prints and transparencies to be furnished, supersede the instructions contained in paragraphs II - 4 and 5 of the Special Conditions No. 9321-442 for Purchase of Equipment and Material.

2. Fabrication

a. Codes and Standards:

(1) Unless otherwise specified in the Purchase Order, the fabrication of all piping shall meet the requirements of the latest edition of the American National Standards Institute, Code for Pressure Piping, ANSI B31.1. 1

A. Fabrication of Piping (Cont'd)

(2) The cement lining of the piping system shall be in accordance with Tentative AWWA Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe, AWWA C205-62T or latest revision.

(3) The exterior surfaces of underground portions of the piping system shall be cleaned, primed and coated with coal-tar enamel with a bonded asbestos felt wrapper. All materials and applications shall be in accordance with AWWA Standard for Coal-Tar Enamel Protective Coatings for Steel Water Pipe, AWWA C203-62, together with Section A1.2 and A3.1 of the Appendix of this Standard.

(4) Stainless steel, molybdenum stainless steel, and non-ferrous piping shall not be exterior coated or cement lined. R-4A R-3A R-6A

(5) All piping replacements under 2 1/2" shall be stainless steel. Where stainless steel and copper nickel have failed molybdenum stainless steel shall be used. In addition, for piping systems with low flow or no flow, it is recommended that molybdenum stainless steel be used. R-6A

b. Materials:

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

(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.

A. Fabrication of Piping (Cont'd)

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 revisions of applicable standards of the ANSI, ASTM, ASME and AWWA.

(2) Flanged 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.

A. Fabrication of Piping (Cont'd)

(3) 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.

d. Specific Requirements:

(1) Piping shall be shop 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 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-1

When branch size equals the run size use a welding tee; when the branch size is less than the run size use either a weldolet, weld branch connection or reducing welding tee. R-4A

(4) Socket welding and threaded connections on pipelines shall be made by half coupling or forged outlet fittings, Bonney Forge or equal. Fittings and couplings shall be of sufficient wall thickness to satisfy reinforcement requirements and pressure--temperature ratings compatible with the pipe to which it is attached. 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. R-4

(5) Fabrication of piping shall be completed prior to cement lining and coal-tar coating wherever possible. Add. #2

A. Fabrication of Piping (Cont'd)

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) All welding shall be in accordance with Chapter Five (5) of the American National Standards Institute, Code for Pressure Piping ANSI B31.1. R-4A

R-1

(3) All welding shall be done in accordance with UE&C Specification 9321-01-248-18 and Con Edison Welding Specifications or alternate specifications approved by the Purchaser. R-3A R-4A

(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.

(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-1

(7) All piping ends shall be prepared for shop welding in accordance with the American National Standards Institute, Code for Pressure Piping ANSI B31.1 Chapter Five (5) or alternate approved by the Purchaser. Minimum partial weld penetration shall be 1/16". Where this is impractical, flanged joints shall be used (slip-on flanges with external fillet welds). R-1 R-4A

(8) All cement lined pipe ends shall be prepared for field welding by machined bevel of approximately 27 1/2° with a 1/8-inch land. Where fittings having a bevel of 37 1/2° or 45° are to be joined to the pipe in the field, the pipe shall be beveled to a smaller angle making the included groove angle approximately 55° in all cases. Minimum partial weld penetration shall be 1/16". Where this is impractical, flanged joints shall be used (slip-on flanges with external fillet welds). R-4A
A standard butt weld prep can be used <u>only</u> <u>if</u> post welding access exists for application of internal pipe coatings. R-6A

For replacement piping, refer to CLASS SWT-CS & SWN-CS for notes on joining cement lined steel piping. For other materials, a standard butt weld can be used.

(9) Machine beveling may be machine controlled flame cut, if done prior to cement lining. Add. 1

B. **Examinations and Tests** R-4A

1. Prior to Fabrication:

All materials to be used in the fabrication of the piping system 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 (Prior to Coating and Lining as applicable): R-3

a. Examinations to assure quality of welds shall be performed and shall be of the liquid penetrant or magnetic particle type. R-4A R-3A

b. Liquid penetrant examinations shall be performed in accordance with the ASME Boiler & Pressure Vessel Code, Section VIII, Appendix 8. The acceptance standard shall be accordance with ANSI B31.1 paragraph 136.4.4. R-4A

c. Magnetic particle examination may be substituted where appropriate for liquid penetrant inspection of butt welds. If the substitution is made, the magnetic particle examination shall be in accordance with the ASME Boiler & Pressure Vessel Code, Section VIII, Appendix 6. The acceptance standard shall be in accordance with ANSI B31.1 paragraph 136.4.3. R-4A R-3A

d. Branch welds shall be liquid penetrant examined on the outside surface of the finished weld and if accessible, at the inside weld root. R-4A

e. Liquid penetrant dyes and developers shall be free of chlorides.

f. 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.

B. Examinations and Tests (Cont'd)

g. Shop hydrostatic testing of the completed piping subassemblies 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 ANSI B31.1, paragraph 137. R-1

B. Examinations and Tests (Cont'd)

3. After Coating and Lining:

   a. The finished fabrication shall be inspected for conformance with this specification and the AWWA Standards AWWA C203-62 and AWAA C205-62T as to thickness and continuity of the lining and coating.

   b. All outside surfaces of coated and wrapped pipe shall be tested with an approved electrical holiday detector.

   c. The electrical equipment used to test the enamel in the shop as well as in the field shall be the portable, low amperage, adjustable voltage, pulse-type holiday detector, Model E-P manufactured by the Tinker & Rasor Company of San Gabriel, California, or equal. The holiday detector shall be furnished with a coil spring electrode for the larger coated plate areas, and a suitable brush type electrode for the smaller coated bolt and structural surfaces.

   d. The operating voltage of the detector shall be within the range of 8,000 to 12,000 volts. Due to variables, such as relative humidity and temperature, the detector voltage shall be adjusted twice daily; once just before starting work in the morning, and again just before starting work in the afternoon.

   e. The operating voltage of the detector shall be determined by the following procedure:

      (1) Select a coated and wrapped portion at the overlap of the felt approximately 15" from the end of one pipe length. This location is required because it represents the maximum thickness of the coating and wrapping on the pipe.

      (2) Deliberately puncture the coating and wrapping with a sharp knife point, awl, ice pick, or a similarly sharply pointed tool.

      (3) Move the detector electrode back and forth over the puncture and reduce the voltage until the detector does not indicate the known holiday.

B. Examinations and Tests (Cont'd)

(4) Place a strip of dry 15 pound coal-tar saturated pipe line felt over the known holiday, move the detector electrode back and forth over the felt strip and slowly increase the voltage until the detector starts to indicate the known holiday under the felt strip. R-6A

f. After the voltage has been properly adjusted, as outlined above, the electrode shall be passed over the coated and wrapped surfaces, one time only, at the rate of approximately 35' to 50' per minute.

g. Any evidence of holidays or missed places will be indicated by an electric spark between the electrode and the metal surface. All holiday or missed places so indicated shall be marked by chalk or crayon and promptly repaired. In making repairs the felt shall be cut from around the holiday. The bared area shall be repaired by an application of hot enamel over which shall be applied a bonded patch of 15 pound coal-tar saturated pipe line felt. R-6A

C. Cleaning and Painting

1. Straight lengths of pipe and fittings shall be internally cleaned by power wire brush.

2. Internal surfaces of pipe shall be ground smooth and flush after welding or drilling operations wherever accessible.

3. 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.

4. Final cleaning and sealing of the fabrications shall be done in an area free of dirt and dirt producing operations. R-1

5. The outside surfaces of all above ground 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 shall have a light coating of Deoxaluminite, as manufactured by Special Chemical Corp.

6. The exterior coating of enamel and wrap shall be neatly cut back 6" from each end of each piece of fabrication to permit field welding. The ends of each fabrication thus left uncoated and unwrapped shall be primed only.

7. After the coating work has been completed and holiday tested, the pipe shall be given a coat of whitewash on all exterior surfaces, with the exception of the primed ends and that portion of the coating and wrapping which is approximately 2 inches from each primed end. The whitewash shall be of a composition that will remain white and will not readily brush from the surfaces of the pipe.

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.

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 and gaskets 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.

SECTION IV

A. Installation

1. All fabricated piping shall be so handled as to insure that no damage is done to the fabrication, lining or coating. R-3A

2. Service Water piping shall be installed as shown on the drawings and in accordance with the latest revisions of applicable codes or standards of the ANSI, ASME and AWWA. R-1, R-4A

B. Inspection and Repair of Coated and Wrapped Pipe

1. Before each section of underground piping is placed, the coated and wrapped surfaces shall be inspected by a holiday detector as described in Section III-B. All holidays, or missed places, as well as damaged areas shall be repaired by hand-brushing a thick layer of hot Bitumastic enamel over the area. Should any long abrasions be discovered on which the wrapping has been completely broken, it will be necessary to scrape off any damaged coating and wrapping, reprime the surfaces then coat any damaged area of the pipe with a sufficient amount of the hot enamel. The abraded area should then be covered with felt, applied simultaneously with a bonding second coat of enamel.

C. Welding

1. Carbon Steel R-6A

a. Any cracking or broken edges in the cement lining must be repaired before aligning the joint for welding. Repairs are to be made in accordance with AWWA Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe, AWWA C205-62T. The ends of the pipe and fittings shall be cleaned of all scale, rust, oil or other foreign matter. The protective coating of Deoxaluminite need not be removed. The ends of the cement lining shall be coated with sealing compound as recommended by the lining contractor.

b. The parts to be welded shall be spaced approximately 1/32-inch apart before tacking. Tack welds shall be small in size and shall be made with 1/8-inch electrode. Tack welds may be left in the finish weld. All welding, including tack welds that are not removed, shall be performed to the requirements of this Specification's Section III e.

C. Welding (Cont'd)

c. Welds shall be made by the metallic arc process (see Section III,A,e.) The current used shall be direct-current with the base material on the negative side. Filler metal shall conform to ASME Section II, SFA5.1 AWS Class E6010. R-4A R-6A

d. The first pass shall be a stringer bead using a 1/8-inch electrode and a current of 80-90 amps. Care shall be taken to minimize heat input such as to not burn through the root land or damage the concrete lining of the pipe. The second and succeeding passes shall have woven beads using 1/8 inch electrodes and a current of 90-100 amps.

e. Where internal coating can be applied post welding, standard butt weld procedures can be used.

2. Stainless Steel R-6A

All welding shall be made with Company reviewed and approved ASME B&PV Code, Section IX qualified procedure(s). The parts to be welded shall be spaced 1/16 inch $\pm$ 1/32 inch apart before tacking. Tack welds shall be small in size. The welding of the root shall be by the GTAW process. Cover passes may be made with the SMAW process. The weld ferrite content and heat input shall be in accordance with NRC Reg. Guide 1.31 and 1.44.

The filler metal for Type 316 stainless steel shall be E316 or ER316.

3. 90/10 Copper Nickel R-6A

All welding shall be made with Company reviewed and approved ASME B&PV Code, Section IX qualified procedure(s). The parts to be welded shall be spaced 1/16 inch $\pm$ 1/32 inch apart before tacking. Tack welds shall be small in size. The welding shall be the GTAW process or GTAW root with SMAW remainder.

The filler metal for 90/10 Copper Nickel shall be SFA 5.7, AWS Class ERCuNi.

4. **Molybdenum Stainless Steel**

All welding shall be made with Company reviewed and approved ASME B&PV Code, Section IX qualified procedure(s). The parts to be welded shall be spaced 1/16 inch ± 1/32 inch apart before tacking. Tack welds shall be small in size. The welding shall be the GTAW process or GTAW root with SMAW remainder.

The filler metal for the Molybdenum Stainless Steel shall be Inco 625 filler specified as SFA 5.14, AWS Class ERNiCrMo-3.

D. Welds in Underground Pipe

1. After the field welds have been made, the surfaces approximately 6" on each side of the joint shall be cleaned, primed and coated and wrapped. All weld spatter shall be removed by chipping or scraping. All dirt, charred primer, rust and other foreign matter shall be removed by wire-brushing, scraping or sand-blasting to a uniform gray finish. Any grease or oil shall be removed by clean wiping rags saturated with coal-tar solvent. All white-wash with 7" of the pipe end shall be removed by wire-brushing and wiping with cal-tar solvent.

2. After the surfaces have been cleaned, the area shall be primed using the same coal-tar primer specified and used on the pipe.

3. After the primer has dried, but not later than 15 days after application of primer, the exterior joint surfaces shall receive an application of coal-tar enamel by hand daubing in a neat and workmanlike manner, followed by a bonded single wrap of 15 pound coal-tar saturated asbestos pipe line felt. The enamel shall be the same as used on the pipe and shall be 3/32" thick plus or minus 1/32" and the existing felt shall be overlapped not less than one inch.

4. Following the repair and completion of field touch-up and joint coating, all of the coating at the field joints shall be tested electrically for flaws, such as cracks, pinholes, and holidays, as specified in Section III-B. All imperfections revealed by the test shall be immediately covered by an additional coat of hot coal-tar enamel of the same composition as the original coating.

SECTION V

PIPING SCHEDULE & MATERIALS

For Specification 9321-01-248-35
For Service Water Piping

A. Piping Schedule and Materials

This section of the specification contains material specifications for service water piping systems. The following Classes of Service Water Piping are defined in this section.

CLASS SWT-CS	CARBON STEEL – CEMENT LINED
CLASS SWT-SS	STAINLESS STEEL
CLASS SWN-CS	CARBON STEEL-CEMENT LINED
CLASS SWN-SS	STAINLESS STEEL
CLASS SWN-NF	COPPER & MONEL ALLOY
CLASS SWN-MOSS	MOLYBDENUM STAINLESS STEEL
CLASS SWT-MOSS	MOLYBDENUM STAINLESS STEEL

CLASS SWT-CS R-6A

PRESSURE 150 psig

TEMP. °F 150 maximum

CARBON STEEL –

CEMENT LINED

UNITED ENGINEERS & CONSTRUCTORS, INC. Pg. V-1 Sh. 1
Westinghouse Electric Corporation
Indian Point Generating Station-Unit No. 2
Consolidated Edison Company of New York

Date: March 31, 1967 **Specification No.**:
Revision: 1) June 2, 1975 9321-02-248-35
2A) June 30, 1980 4A) March 9, 1981
5A) Oct. 20, 1982 6A) February, 1999

PIPE	MATERIAL		GRADE	SCHEDULE	
12"-24"	A-53 Seamless	See Notes 1&2&5	B	.375" Wall	R-6A
1"-10"	A-53 Seamless	See Notes 1&2&5	B	40	R-6A
Under 1"	Stainless Steel pipe in accordance with CLASS 301**				R-2A
*** Under 2½"	Use CLASS SWT-MOSS or CLASS SWT-SS				R-6A

TUBING

Under 1" Stainless Steel in accordance with CLASS 153**

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	TYPE	
8" & Lrgr.	A-126 Gr. B	150# ANSI*	Flangeless	S.S.	Ni-Resist	Rubber	Butterfly	
2½" Lrgr	A-216 WCB(3)	150# ANSI*	B.W.	S.S.	S.S.	S.S.	Gate, Check	R-6A
	or A-126 Gr. A or B	125# ANSI	Flanged	Brz.	-	Brz.	Gate, Globe	
2" & smlr	I.B.B.M. B-62 Al. 836	200# 150# ANSI	Scrwd Brz.	Brz. B-21 Al. 485	Brz. B-62 Al. 836	Brz.	Gate, Check	R-6A
*** Under 2½"	Use CLASS	SWT-SS						R-6A
***8" & Lrgr.	Use CLASS	SWT-SS(4)	(Butterfly)					R-6A
*** 2½" & Lrgr.	Use CLASS	SWT-SS	(Gate, Check and Globe)					R-6A

FITTINGS	MATERIAL	SERIES	ENDS	SCHEDULE	
All sizes (See Notes 1 & 2)	A-234 WPB	See Note 6	B.W.	To Match Pipe	R-6A
2½" & Larger	A-234-WPB	See Note 6	B.W.	To Match Pipe	R-6A
*** Under 2½"	Use CLASS SWT-SS				R-6A

March 9, 1981 **Rev. 4A**
Spec. 9321-01-248-35
June 30, 1980 **Rev. 2A**
March, 1999 **Rev. 6A**

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
All sizes (See Notes 1 & 2)	A-181 Gr. 1 Note 6	150# ANSI*	W.N. or S.O.	F.F.	To Match Pipe	R 6-A
2½ Lrgr.	A-181 Gr. 1 Note 6	150# ANSI*	W.N. or S.O.	F.F.	To Match Pipe	R-6A
*** Under 2½"	Use CLASS SWT-SS					R-6A

FASTENERS	MATERIAL	HEAD	FINISH	
				R-6A
BOLTS OR STUDS	A-307 Gr. B A-193 Gr. 7 or Gr. B8M C1.2	Square Full Threaded Bolt Studs	-	R-5A
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished	R-5A

GASKETS	MATERIAL	TYPE	THICKNESS	
	Red Rubber EPDM(4)	Full Face	1/8"	R-6A

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service water from valve pit (downstream of Section X1 boundary) through generator plant.

NOTE 1: All pipe and fittings are to be Cement Lined in accordance with AWWA, Spec. C-205. As an alternate, Palmer Enecon Corp. internal linings. Ceramalloy CL + and Ceramalloy CP + may be used. The CL + is the paste form used for material buildup. The CL + is the liquid form used for final smooth finishing.

NOTE 2: All pipe below ground is to be coated and wrapped in accordance with AWWA, Spec. C-203.

NOTE 3: All wetted (Carbon steel parts) surfaces to be epoxy coated. R-6A

NOTE 4: Either West American Rubber Co. compound #80-K-202 or #80-K-203 may be used as alternates to Red Rubber. Refer to note 9 of Spec. CLASS SWN-CS and Section VI for more details. R-6A

NOTE 5: Alternate material for replacement is A 106 Gr. B R-6A

NOTE 6: Alternate material for replacement is A 181 CLASS 70 or A 105 R-6A

* June 2, 1975

** Piping Specification 9321-01-248-18

*** Recommended alternates for replacements

REMARKS

1. Insulation joints are not required. See Reference 1. (Existing insulation joints do not have to be removed unless repairs are required). R-6A

2. Cement lined piping replacements and repairs should be performed using flanged connections. For existing piping, slip-on flanges should be used. New installations should use factory flanged/cement lined piping. Welding carbon steel cement lined pipe to carbon steel cement lined pipe is permissible only if post welding access exists for application of internal pipe coatings. R-6A

CLASS SWT-SS R-6A

PRESSURE 150 psig

TEMP. °F 160 maximum

STAINLESS STEEL

Consolidated Edison Company of New York
Indian Point Generating Station - Unit No. 2

Date: February, 1999 (New) (R-6A) Specification No. 9321-01-248-35

PIPE	MATERIAL	GRADE	SCHEDULE
12" - 24"	A312 (4)	TYPE 304	.375" Wall
10" under	A312 (4)	TYPE 304	40S
* Under 2½"	Use CLASS SWT-MOSS		

TUBING	MATERIAL	GRADE	SCHEDULE
1/4" - 3/4" OD	A213 (2)**	304 or 316	0.065" Wall
1/4" – 3/4" OD	A249 (2)**	304 or 316	0.065" Wall
1/4" - 3/4" OD	A269 (2)**	304 or 316	0.065" Wall

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	TYPE
8" & Lrgr.	A-126 Gr. B	150# ANSI	Flangeless	S.S.	Ni-Resist	Rubber (3)	Butterfly
2½" & Lrgr	A-351 CF8M	150# ANSI	B.W.	S.S.	Monel	Monel	Gate, Check
* All Sizes	A351, CF8M	150# ANSI	B.W./S.W. Flanged or Flangeless (5)	S.S.	Monel	Monel.	Gate, Check Globe, Butterfly

FITTINGS – PIPE	**MATERIAL**	**SERIES**	**END**	**SCHEDULE**
All sizes	A403 WP304	-	B.W. (pipe)	To Match Pipe
2" & Under	A182 F304	3000#	S.W. (pipe)	40S

FITTINGS – TUBE	**MATERIAL**	**SERIES**	**TYPE**	**SCHEDULE**
All sizes tube fittings (6)	304 or 316	-	S.W. (tube)	-
All sizes tube fittings (7)	304 or 316	-	Swage (tube)	-
* 2" & Under	Use CLASS SWT-MOSS			

FLANGES	**MATERIAL**	**SERIES**	**TYPE**	**FACING**	**BORE**
All sizes	A-182 F304	150# ANSI	W.N./S.O.	F.F.	To Match Pipe

FASTENERS	**MATERIAL**	**HEAD**	**FINISH**
BOLTS OR STUDS	A-307 Gr. B A-193 Gr. 7 or Gr. B8M C1.2	Square Full Threaded Bolt Studs	- -
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished

GASKETS	**MATERIAL**	**TYPE**	**THICKNESS**
	Red Rubber EPDM(1)	Full Face	1/8"

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service water from valve pit (downstream of Section XI boundary) through turbine generator plant.

* Recommended alternates for replacements. Where stainless steel has failed, molybdenum stainless steel shall be used (refer to CLASS SWT-MOSS). Also for piping systems with low flow or no flow, it is recommended that molybdenum stainless steel be used. Refer to SECTION III, Part A, Fabrication of Piping, Item 5, Page III-A-3.

** In accordance with CLASS 153, Piping Specification 9321-01-248-18.

REMARKS

1. West American Rubber Co. Compound #80-K-202 or alternately #80-K-203. The K-203 material is normally used for electrical insulation purposes as it contains less than 5% Carbon black. The K-202 material is conductive as it contains less than 50% Carbon Black. Since electrical insulating joints are no longer required, either material can be used. Refer to Reference 1.

2. Soft annealed, seamless suitable for bending and flaring.

3. Full synthetic lining, replaceable, Buna N or manufacturer's recommendation subject to approval from Con Edison Engineering.

4. New piping and replacements to be seamless stainless steel.

5. Socket weld for 2" and under only.

6. Socket weld tube fittings shall be Cajon or equal.

7. Swaged tube compression fittings shall be Swagelok or equal.

CLASS	SWN-CS	R-6A
PRESSURE	150 psig	
TEMP. °F	160 maximum	

CARBON STEEL –

CEMENT LINED

UNITED ENGINEERS & CONSTRUCTORS INC.
Westinghouse Electric Corporation
Indian Point Generating Station - Unit No. 2
Consolidated Edison Company of New York

Date: March 31, 1967 Specification No.: 9321-01-248-35
Revision: 1) June 2, 1975 4A) March 9, 1981
2A) June 20, 1980 5A) Oct. 20, 1982
3A) Jan. 2, 1981 6A) February, 1999

PIPE	MATERIAL	GRADE	SCHEDULE	
12" – 24"	A-53 Seamless} (1) (2) (3) (4)	B	.375" Wall	
1" - 10"	A-53 Seamless} (1) (2) (3) (4)	B	40	
** Under 2½"	Use CLASS SWN-MOSS or CLASS SWN-SS			R-6A

TUBING

Refer to CLASS SWN-SS or CLASS SWN-MOSS R-6A

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
Butterfly	A-216 WCB	150# ANSI*	Flangeless	S.S.	SS or CS	Rubber (6)	R-6A
Gate, Globe & Check	A-216 WCB(7)	150# ANSI*	B.W. or Flanged FF	B-62	B-62	B-62	R-6A
All Valves	Use CLASS SWN-SS (A351, CF8M) as replacements/Alternates						R-6A

FITTINGS-PIPE	MATERIAL	SERIES	END	SCHEDULE	
All sizes (See Notes 1,2, & 4)	A-234 WPB	-	B.W.	To Match Pipe	

FITTINGS-TUBE	MATERIAL	SERIES	TYPE	SCHEDULE	
All sizes (11)	304 or 316	-	S.W.		R-6A
All sizes (12)	304 or 316	-	Swage		R-6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
All sizes (See Notes 1 & 2)	A-181 Gr. 1 or A-105	150# ANSI*	W.N. or S.O.	F.F.	To Match Pipe	R-6A R-5A

FASTENERS	MATERIAL	HEAD	FINISH	
BOLTS OR STUDS	A-307 Gr. B A-193 Gr. 7 or Gr. B8M C1.2	Square Full Threaded Bolt Studs	-	R-5A
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished	R-5A

GASKETS	MATERIAL	TYPE	THICKNESS
	Red Rubber (8) EPDM (9)	Full Face	1/8"

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service Water Pump Discharge through Nuclear Steam Supply Plant.

NOTES

1. All pipe and fittings are to be Cement Lined in accordance with AWWA Spec. C-205. As an alternate, Palmer Enecon Corp. internal linings. Ceramalloy CL+ and Ceramalloy CP+ may be used. The CL+ is the paste form used for material buildup. The CL+ is the liquid form used for final smooth finishing. R-6A

2. All piping below ground is to be coated and wrapped in accordance with AWWA Spec. C203.

3. A-106 Grade B also acceptable. R-3A

4. All piping 2" and under located above ground and outside the containment building shall be stainless steel or non-ferrous in accordance with SWN-SS page V-4 or SWN-NF page V-5. R-4A

5. Disc may be coated.

6. Full synthetic lining, replaceable, BUNA N or manufacturer's recommendation also acceptable subject to Con Edison Engineering approval.

7. All wetted surfaces to be Epoxy coated.

8. Outside containment building only.

9. West American Rubber Co. compound #80-K-202 or alternately West American Rubber Co. compound #80-K-203. The K-203 material is normally used for electrical insulation purposes as it contains less than 5% Carbon Black. The K-202 material is conductive as it contains less than 50% Carbon Black. Since insulating joints are no larger required, either material can be used. R-6A

10. Soft annealed, suitable for bending and flaring.

11. Socket weld fittings shall be Cajon or equal.

12. Swaged tube compression fittings shall be Swagelok or equal.

REMARKS

See Con Edison Dwg. A208120 for "Insulation Joint Detail for 150 lb. Flanged Joints for Service Water service - VOID. R-6A

Insulation joints are no longer required as of March 1998. See Reference 1. R-6A

Cement lined piped replacements and repairs should be performed using flanged connections. For existing piping, slip on flanges should be used. New installations should use factory flanged/Cement lined piping. Welding carbon steel cement lined pipe to carbon steel cement lined pipe is permissible only if post welding access exists for application of internal pipe coatings. R-6A

* June 2, 1975

** Recommended alternates. Where stainless steel has failed, molybdenum stainless steel shall be used (refer to CLASS SWN-MOSS). Also, for piping systems with low flow or no flow, it is recommended that molybdenum stainless steel be used. Refer to SECTION III, Part A, Fabrication of Piping, Item 5, Page III-A-3.

CLASS SWN-SS R-6A

PRESSURE 150 psig

TEMP. °F 160 maximum

STAINLESS STEEL

Consolidated Edison Company of New York
Indian Point Generating Station - Unit No. 2

Date: September 18, 1973 Specification No.: 9321-01-248-35

Revision:				
	1)	June 2, 1975	4A)	March 9, 1981
	2A)	June 20, 1980	5A)	Oct. 20, 1082
	3A)	Jan. 2, 1981	6A)	Feb., 1999

PIPE	MATERIAL	GRADE	SCHEDULE	
12" – 24"	A-312 (7)	TYPE 304	.375" Wall	R-6A
10" & under	A-312 (7)	TYPE 304	40S	R-6A
*** Under 2½"	Use CLASS SWN-MOSS			R-6A

TUBING	MATERIAL	GRADE	SCHEDULE
1/4" - 3/4" OD	A213 (4)	304 or 316	0.065" Wall
1/4" – 3/4" OD	A249 (4)	304 or 316	0.065" Wall
1/4" - 3/4" OD	A269 (4)	304 or 316	0.065" Wall

*** Use CLASS SWN-MOSS

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	
Butterfly	A-216 WCB	150# ANSI*	Flangeless	S.S.	C.S (5)	Rubber (6)	R-6A
Gate, Globe & Check	A-351 CF8M	150# ANSI*	B.W./S.W.	S.S.	Monel	Monel	R-6A
**Butterfly Gate, Globe & Check	A-351 CF8M	150# ANSI*	B.W./S.W. (8) Flanged/ Flangeless	S.S.	Monel	Monel	R-6A

FITTINGS-PIPE	MATERIAL	SERIES	END	SCHEDULE
All sizes	A403 WP304	-	B.W./S.W. (pipe)	To Match Pipe
2" & under (1)	A182 F304	3000#	S.W. (pipe)	40S

FITTINGS-TUBE	MATERIAL	SERIES	TYPE	SCHEDULE	
All sizes (9)	304 or 316	-	S.W. (tube)	-	R-6A
All sizes (10)	304 or 316	-	Swage (tube)	-	R-6A
*** 2" Under	Use CLASS SWN-MOSS				R-6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
All sizes	A-182 F304	150# ANSI*	W.N./S.O.	F.F.	To Match Pipe	R-6A

FASTENERS	MATERIAL	HEAD	FINISH	
BOLTS OR STUDS	A-307 Gr. B A-193 Gr. 7 or Gr. B8M C1.2	Square Full Threaded Bolt Studs	-	R-5A
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished	R-5A

GASKETS	MATERIAL	TYPE	THICKNESS	
	Red Rubber (2) EPDM (3)	Full Face	1/8"	(R-3A)

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service Water Pump Discharge through Nuclear Steam Supply Plant.

REMARKS

1. Connections such as half-couplings, "0-lets", etc. located outside the containment building above ground. R-4A R-3A

2. Outside containment building only.

3. West American Rubber Co. compound #80-K-202 or Alternately #80-K-203. The K-203 material is normally used for insulation purposes as it contains less than 5% Carbon Black. The K-202 material is conductive as it contains less than 50% Carbon Black. Since insulating joints are not required, either material can be used. R-6A

4. Soft annealed, seamless suitable for bending and flaring. R-4A

5. Coated with epoxy or other material. Subject to approval from Con Edison Engineering. R-4A

6. Full synthetic lining, replaceable, Buna N or manufacturer's recommendation subject to approval from Con Edison Engineering.

7. Piping replacements to be seamless. R-6A

8. Socket weld for 2" and under only.

9. Socket weld tube fittings shall be Cajon or equal. R-3A

10. Swaged tube compression fittings shall be Swagelok or equal. R-4A

* June 2, 1975

** Recommended alternates for replacements

*** Recommended alternates. Where stainless steel has failed, molybdenum stainless steel shall be used (refer to CLASS SWN-MOSS). Also, for piping systems with low flow or no flow, it is recommended that molybdenum stainless steel be used. Refer to SECTION III, Part A, Fabrication of Piping, Item 5, Page III-A-3.

CLASS SWN-NF (R-6A)

PRESSURE 150 psig

TEMP. °F 160 maximum

COPPER AND MONEL

Consolidated Edison Company of New York
Indian Point Generating Station - Unit No. 2

Date: January 2, 1981 Specification No.: 9321-01-248-35
Revision: 4) March 9, 1981
5A) October. 20, 1982
6A) February, 1999

PIPE	MATERIAL	ALLOY NO.	WALL THICKNESS - INCHES	
1"	B-466 (2)	706 (1) or 715 (1)	0.126 or 0.133 (Alternate)	R-6A
2"	B-466 (2)	706 (1) or 715 (1)	0.120 or 0.154 (Alternate)	R-6A
3"	B-466 (2)	706 (1) or 715 (1)	0.120 or 0.216 (Alternate)	R-6A
4"	B-466 (2)	706 (1) or 715 (1)	0.109 or 0.237 (Alternate)	R-6A
10"	B-466 (2)	706 (1) or 715 (1)	0.187 or 0.365 (Alternate)	R-6A

* Under 2½" Use CLASS SWN-MOSS

TUBING

¼" – 3/4" O.D.	Monel B165	400	0.065" wall	R-5A

VALVES	MATERIAL	SERIES	ENDS	STEM	DISC	SEAT	
Butterfly	Monel	150# ANSI	Flangeless	Monel	Monel	EPT (ASTM D2000-75)	
Stop Valves	B-165 (2)	150# ANSI	Flanged -FF	Monel K-500	B-127	B-127 or 164	
Gate, Globe & Check	Monel 400	150# ANSI	Flanged -FF	-	Colmonoy #4	Stellite 21	
Gate, Globe & Check	B-148 A.1. 952(2)	150# ANSI	SW	B-148 A1. 952	B-148 A1. 952		
Gate, Globe & Check	B-62 A1. 836(2)	150#ANSI	Flanged-FF	B-21 A1. 485	B-62 A1. 836 (2)	Bronze	
Barstock Needle	Monel	5000#	Female NPT or Swage (tube)				R-5A

FITTINGS	MATERIAL	SERIES	END	SCHEDULE	
All sizes	B395 A1. 706 LD(2) or 715 LD(2)	-	B.W. S.W. (for 2" & Under)	To Match Pipe	
¼"- 3/4" O.D. tube	Monel	-	Swage (tube) (4)		R-6A

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE	
All sizes	B171 A-171 A1. 706(2) or 715) (2)	150# ANSI	W.N./SQ/S.W.	F.F.	To Match Pipe	R-6A

FASTENERS	MATERIAL	HEAD	FINISH	-
BOLTS OR STUDS	A-307 Gr. B B-193 Gr. 7 or Gr. B8M Cl.2	Square Full Threaded Bolt Studs	- -	R-5A
NUTS	A-194 Gr. 2H Or Gr. 8M	Hex.	Semi-Finished	R-5A

GASKETS	MATERIAL	TYPE	THICKNESS
	EPDM (3)	Full Face	1/8"

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service Water Pump Discharge through Nuclear Steam Supply Plant.

NOTE:

1. Light drawn preferred, annealed acceptable; for welding application.

2. Or equivalent.

3. West American Rubber Co. compound #80-K-202 for non-insulating joints. West American Rubber Co. compound #80-K-203 for insulating joints. The K-203 material is normally used for electrical insulation purposes as it contains less than 5% carbon black. The K-202 material is conductive as it contains less than 50% carbon black. Since insulating joints are no longer required , either material can be used. R-6A

4. Swaged tube compression fittings shall be Swagelok or equal. R-5A

* Recommended alternates. Where stainless steel has failed, molybdenum stainless steel shall be used (refer to CLASS SWN-MOSS). Also, for piping systems with low flow or no flow, it is recommended that molybdenum stainless steel be used. Refer to SECTION III, Part A, Fabrication of Piping, Item 5, Page III-A-3.

REMARKS:

See Con Edison Dwg. A208120 for " Insulating Joint Detail for 150 lb. Flanged Joints for Service Water service – VOID. Insulation joints are no longer required as of March 1998. See Reference 1. R-6A

CLASS	SWN-MOSS (R-6A)
PRESSURE	150 psig
TEMP. °F	160 maximum

MO. STAINLESS STEEL (10)

Consolidated Edison Company of New York
Indian Point Generating Station - Unit No. 2

Date: March, 1999 (New)

Specification No.: 9321-01-248-35

PIPE	MATERIAL	UNS ALLOY NUMBER	SCHEDULE
12" – 24"	B675, or B676, or B804, (5) Or A249, or A312 (6)	N08367 S31254	0.375" Wall 0.375" Wall
10" & under	B675, or B676, or B804, (5) Or A249, or A312 (6)	N08367 S31254	40S 40S

TUBING	MATERIAL	UNS ALLOY NUMBER	SCHEDULE
1/4" - 3/4" OD	B676 (4, 5)	N08367	0.065" Wall
1/4" – 3/4" OD	A249 (4, 6)	S31254	0.065" Wall

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT
Gate, Globe, Check & Butterfly	A-351, CF8M	150# ANSI	B.W./S.W.(9) Flanged or Flangeless	S.S.	Monel	Monel

FITTINGS-PIPE	MATERIAL	UNS ALLOY NUMBER	END	SCHEDULE
2½" & Up	B366, or B462	N08367	B.W.(pipe)	To Match Pipe
2" & under (1)	B366, or B462	3000# N08367	S.W. (pipe)	40S

FITTINGS-TUBE	MATERIAL	SERIES	TYPE	SCHEDULE
All sizes (7)	304 or 316	-	S.W. (tube)	-
All sizes (8)	304 or 316	-	Swage (tube)	-

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
All sizes	A-182 F304	150# ANSI*	S.O.	F.F.	To Match Pipe

FASTENERS	MATERIAL	HEAD	FINISH
BOLTS OR STUDS	A-307 Gr. B A-193 Gr. 7 or Gr. B8M Cl.2	Square Full Threaded Bolt Studs	-
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished

GASKETS	MATERIAL	TYPE	THICKNESS
	Red Rubber (2) EPDM (3)	Full Face	1/8"

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service Water Pump Discharge through Nuclear Steam Supply Plant.

REMARKS:

1. Connections such as half-couplings, "O-lets", etc. located outside the containment building above ground.

2. Outside containment building only.

3. West American Rubber Co. compound #80-K-202 or alternately or #80-K-203. The K-203 material is normally used for electrical insulation purposes as it contains less than 5% Carbon Black. The K-202 material is conductive as it contains less than 50% Carbon Black. Since insulating joints are not required, either material can be used.

4. Soft annealed, seamless suitable for bending and flaring.

5. Material is known as alloy AL6XN manufactured by Allegeny Ludlam.

6. Material is known as alloy 254SMO manufactured by Avesta.

7. Socket weld tube fittings shall be Cajon or equal.

8. Swaged tube compression fittings shall be Swagelok or equal.

9. Socket weld for 2" and under only.

10. This CLASS of Specification is for replacements only per SECTION III, Part A. Fabrication of Piping, Item 5, Page III-A-3 of this specification.

CLASS SWT-MOSS (R-6A)

PRESSURE 150 psig

TEMP. °F 160 maximum

MO. STAINLESS STEEL (8)

Consolidated Edison Company of New York
Indian Point Generating Station - Unit No. 2

Date: March, 1999 (New)

Specification No.: 9321-01-248-35

PAS

PIPE	MATERIAL	UNS ALLOY NUMBER	SCHEDULE
12" – 24"	B675, or B676, or B804, (3) or A249, or A312 (4)	N08367 S31254	0.375" Wall 0.375" Wall
10" & under	B675, or B676, or B804, (3) Or A249, or A312 (4)	N08367 S31254	40S 40S

TUBING	MATERIAL	UNS ALLOY NUMBER	SCHEDULE
1/4" - 3/4" OD	B676 (2, 3)	N08367	0.065" Wall
1/4" – 3/4" OD	A249 (2, 4)	S31254	0.065" Wall

VALVES	MATERIAL	SERIES	END	STEM	DISC	SEAT	TYPE
All sizes	A-351, CF8M	150# ANSI	B.W./S.W.(3) Flanged or Flangeless	S.S.	Monel	Monel	Gate, Check, Globe & Butterfly

FITTINGS-PIPE	MATERIAL	UNS ALLOY NUMBER	END	SCHEDULE
2½" & Up	B366, or B462	N08367	B.W. (pipe)	To Match Pipe
2" & Under	B366, or B462	3000# N08367	S.W. (pipe)	40S

FITTINGS-PIPE	MATERIAL	SERIES	TYPE	SCHEDULE
All sizes (5)	304 or 316	-	S.W. (tube)	-
All sizes (6)	304 or 316	-	Swage (tube)	-

FLANGES	MATERIAL	SERIES	TYPE	FACING	BORE
All sizes	A-182 F304	150# ANSI	S.O.	F.F.	To Match Pipe

FASTENERS	MATERIAL	HEAD	FINISH
BOLTS OR STUDS	A-307 Gr. B	Square	-
	A-193 Gr. 7 or Gr. B8M Cl.2	Full Threaded Bolt Studs	-
NUTS	A-194 Gr. 2H or Gr. 8M	Hex.	Semi-Finished

GASKETS	MATERIAL	TYPE	THICKNESS
	Red Rubber EPDM (1)	Full Face	1/8"

BACKING RINGS - None.

UNIONS – None; use flanges.

SERVICE – Service Water from valve pit (downstream of Section XI boundary) through turbine generator Plant.

REMARKS:

1. West American Rubber Co. compound #80-K-202 or alternately or #80-K-203. The K-203 material is normally used for electrical insulation purposes as it contains less than 5% Carbon Black. The K-202 material is conductive as it contains less than 50% Carbon Black. Since insulating joints are no longer required, either material can be used. See reference 1.

2. Soft annealed, seamless suitable for bending and flaring.

3. Material is known as alloy AL6XN manufactured by Allegeny Ludlam.

4. Material is known as alloy 254SMO manufactured by Avesta.

5. Socket weld tube fittings shall be Cajon or equal.

6. Swaged tube compression fittings shall be Swagelok or equal.

7. Socket weld for 2" and under only.

8. This CLASS of Specification is for replacements only per SECTION III, Part A, Fabrication of Piping, Item 5, Page III-A-3 of this specification.

SECTION VI

A. Gasket Material

1. Gasket Material: R-6A

Insulating joints are no longer required-refer to Reference 1. EPDM, in sheet form, manufactured by West American Rubber Company, compound No. 80-K-203 was formally used for this purpose and had the following properties:

Dielectric Strength:	200 V/mil min. per ASTM D-149	R-4A
Tensile Strength:	1500 psi ± 200 psi per ASTM D-412	R-4A
Elongation:	200% min. per ASTM D-412	R-4A
Hardness:	80 ± Shore A per ASTM D-2240	R-4A
Moisture Absorption:	1.6% max. per ASTM D-471	R-4A
Design Temp.:	300 °F per ASTM D-573	
Carbon Black:	Less than 5%	

The above is included for historical record purposes only. R-6A

Compound No. 80-K-202, having less than 50% Carbon Black may be used wherever No. 80-K-203 was used previously. Hence, compound No. 80-K-202 and 80-K-203 are alternates to each other – both inside or outside of Containment. R-6A

Vendor Address:

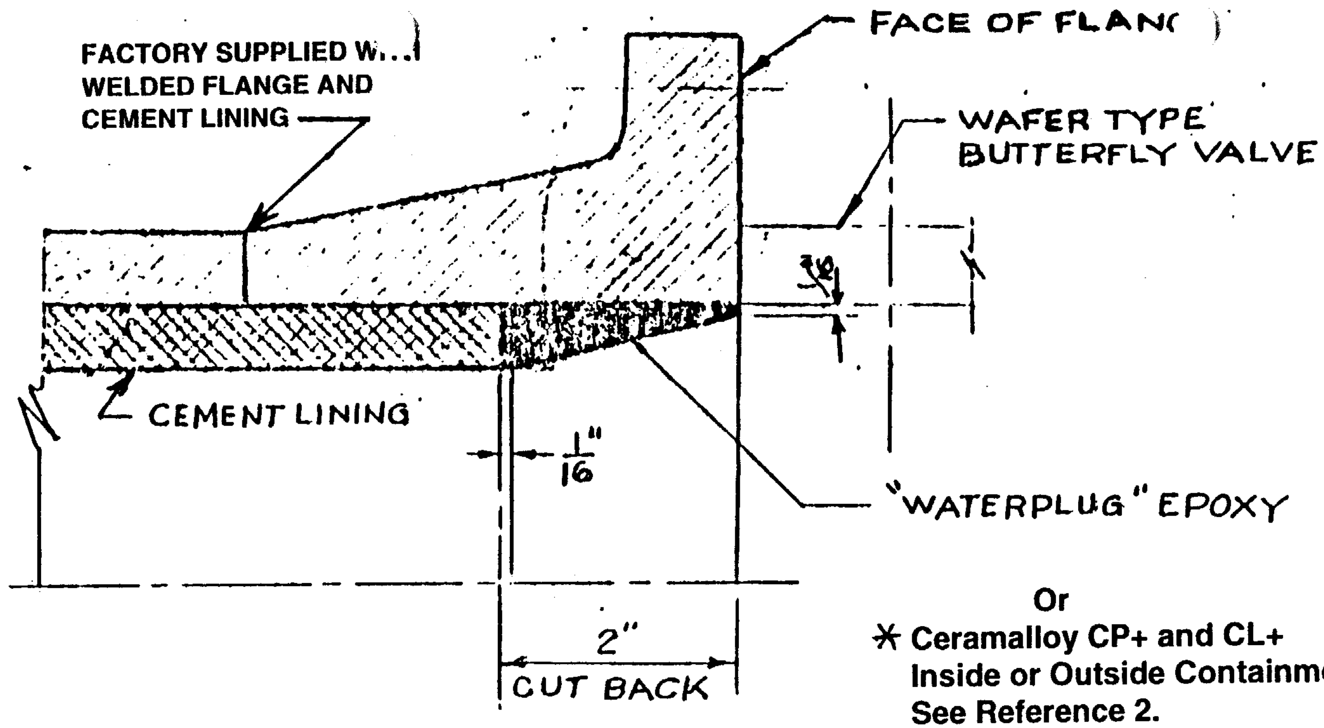
West American Rubber Co.
750 North Main Street
Orange, Calif. 92668
Phone: 714-532-3355

B. Drawings

1. By reference, Con Edison Drawing B208119, latest revision, is hereby made part of this specification.

2. By reference Con Edison Drawings C208141 and A264584, latest revisions, are hereby made part of this specification. R-6A

3. By reference, Con Edison Drawing B208120, covering Insulating Joints, is voided. R-6A



Or
* Ceramalloy CP+ and CL+ Inside or Outside Containment. See Reference 2.

TO PROVIDE VALVE BLADE CLEARANCE, CEMENT LINED FLANGES ADJACENT TO WAFER TYPE BUTTERFLY VALVES SHALL HAVE THE CEMENT LINING CUT BACK A DISTANCE OF 2" FROM THE FACE OF THE FLANGE. THE RESULTING EXPOSED SURFACE SHALL BE COATED WITH "WATER PLUG" EPOXY AS ILLUSTRATED ABOVE.

(Use "Water plug" epoxy outside of the Containment Building only). R-47
Inside or outside the Containment Building Sika-122 Cement or Petroleum Associates "Re-Sis-Tol" WS-62 splash zone coatings may be used.

SCALE: NONE

FIG.1 SPECIAL TREATMENT OF WAFER TYPE BUTTERFLY VALVE FLANGES

*Refer also to MSAP-98-00422-PGI

Reference 1

Lomm, Jeffrey H.
From: Altadonna, Robert
Sent: Tuesday, March 10, 1998 9:09 AM
To: Lomm, Jeffrey H.
Cc: Tuohy, James
Subject: FW: Insulating Kits

FYI, Please advise your Engineers and Designers.

-----Original Message-----
From: Mark, Jimmy T.
Sent: Monday, March 09, 1998 1:48 PM
To: Altadonna, Robert; Hurt, Rebecca
Cc: Skulte, Peteris
Subject: Insulating Kits

Elimination of Insulating Kits On Dissimilar Metal Flanged Joints In The Service Water System

We have observed during routine disassembly of service water flanged dissimilar metal joints that no significant localized wall loss due to the galvanic couplings between coated (cement or epoxy) carbon steel with stainless steel (300 series), copper nickel, or monel have taken place after many years of service. The original design of the conventional side Service Water System (Spec. Class SWT) specified stainless steel branch connections welded to carbon steel. With the carbon steel protected from the working fluid (service water) by a cement lining, these connections have been in service for over 23 years without corrosion problems. The key to preventing dissimilar metal corrosion between carbon steel and stainless steel, copper-nickel or monel is a good protective coating of the carbon steel material. The stainless steel, copper-nickel and monel materials are similar in galvanic behavior to each other.

In the early 1980's, the Nuclear Service Water Spec. (9321-01-248-35 class SWN) was revised to permit the use of stainless steel and copper nickel piping materials. Along with this change was a requirement to join the dissimilar metals using flanged joints with an electrical insulating kit consisting of an insulating gasket, insulating bolt sleeve, and insulating bolt head/nut washers. An electrical resistance test was to follow the installation.

Engineering has been informed by the Maintenance group which performs the resistance checks, that the resistance value specified on the drawing was not achievable after numerous field measurements. This was confirmed and verified at Indian Point 2 by Gas Engineering's Corrosion Control Group. The effects of a system's inherent natural electrical grounding, sediment within the piping, external dirt/condensation, gasket material properties, etc. invalidates the use of resistance readings as a measure of galvanic isolation in the field. The specified values can only be achieved with newly assembled components under shop bench top conditions.

As result of the observed lack of galvanic corrosion effects on dissimilar metal flanged joints in service water applications, Engineering is removing the requirement for insulating flanged joints provided that there is a sound protective coating on the internal surface of the carbon steel piping components adjacent to the dissimilar material flange. Engineering proposes that for new flanged dissimilar metal joints (modifications), and whenever flanged joints are opened for servicing, the condition of the mating components be documented to note the materials involved, pipe sizes, presence or absence of insulating sleeves and washers, and the presence and extent of localized pitting on the inside of the flanges or adjacent to the gaskets. An Engineering and/or QC inspection of the internal coating prior to assembly shall be performed. The date of disassembly, reassembly, and running time between servicing the various joints shall also be noted. This is to develop a documented rather than anecdotal basis for formally justifying the elimination of resistance readings for dissimilar metal flanged joints and the use of insulation kits. The information is to be kept in a log with Station Maintenance. The condition of joints dissembled for servicing shall be recorded and the joints may be reassembled without the insulating sleeves and washers.

3/9/98

Jimmy

ENECON® Corporation
The Fluid Flow
Systems Specialists

Michael Tedesco
Vice President

700 Hicksville Road
ENECON Center • Suite 110
Bethpage, NY 11714-3496 U.S.A.

July 27, 1998

Mr. Robert Riscica — 12 pgs — via fax: 212-777-4484
Con Ed - Irving Place — voice: 212-460-3326

Re: DBA / LOCA data - CeramAlloy CP+ / CL+

Dear sir:

Further to your recent conversation with Bill Woods, attached please find radiation exposure and LOCA test results for the CeramAlloy CP+ and CeramAlloy CL+ materials applied to panels as follows:

Panels E1 to E4	CL+ (Gray) / CL+(Blue)	System thickness: 20 – 24 mils
Panels F1 to F4	CL+(Bl) / CP+ / CL+(Bl)	System thickness: 130 mils

Also enclosed is information concerning sample preparation as well as exposure criteria, performance requirements, etc.

I am confident that this information will prove helpful. As always, if you have any questions or require anything further, please feel free to give either Bill or me a call.

Best regards,
ENECON Corporation

Michael Tedesco
Vice President

cc: Bill Woods

Tel: 516-349-0022 Fax: 516-349-5522
Internet: http://www.enecon.com
email: enecon@enecon.com

PALMER® INTERNATIONAL, INC.

P. O. Box 8, Worcester, PA 19490

TELEPHONE 215-584-4241 • 800-341-4403

4/7/95

To:

RE: Irradiation and DBA Testing on Ceramalloy CL+-CP+-CL+ System of Palmer International

Panels were prepared in accordance to ANSI N512. These panels were made of ASTM A36 type Carbon Steel. Dimensions were 2" x 4" x 1/8" and both corners and edges were rounded. The surface of the panels was grit blasted with #14 angular grit Aluminum Oxide to a 2 mil profile and then solvent cleaned with Acetone. The panels meet SSPC SP10 specification of surface preparation. The panels were coated and cured according to ANSI N512 paragraph 7.4.

Two panels designated as F1 and F2 were irradiated in accordance to ASTM 4082-89. It was decided the panels would be subjected to a total accumulative dose of 2.06×10^8 rads by Indian Point. Irradiation testing was performed by Sterigenics. It was calculated that the front and back of the panels were exposed to a final dose range of 2.919×10^8 - 3.324×10^8 rads. There was some discoloration and blistering of the panels. The blisters were all intact.

Panels designated as F3 and F4 were run along side F1 and F2 for DBA testing (ASTM D3911-89). Carboline performed the DBA on the PWR curve on all 4 panels. The acceptance criteria according to ASTM D3911-39 is: no delamination, peeling or cracking. If any blisters are present they must be intact. All criteria were met.

Fred Lauman

Fred Lauman
Technical Director