1.0 Purpose

The purpose of this specification is to establish the minimum requirements for the rebuilding and/or repair of steel valves manufactured to ASME Standards.

2.0 Scope

This specification shall apply to any organization performing rebuilding and/or repair of valves at their facility or at any NRG owned or operated facility.

3.0 Definitions

3.1 ANSI - American National Standard Institute

3.2 ASME - American Society of Mechanical Engineering

3.3 ASNT – American Society of Non-Destructive Testing

3.4 ASTM - American Society for Testing and Materials

3.5 NRG – NRG Energy, Inc.

3.6 MSS - Manufacturers Standardization Society

3.7 NBI – National Board or Boiler and Pressure Vessel Inspectors

3.8 Vendor – The responsible repair organization

4.0 References

4.1 ANSI/ASME B1.20.1, “Pipe Threads, General Purpose (Inch)”

4.2 ANSI/NB-23, “National Board Inspection Code”

4.3 ASME Boiler & Pressure Vessel Code, Section VIII, “Rules for Construction of Pressure Vessels”

4.4 ASME Boiler & Pressure Vessel Code, Section IX, “Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators”

4.5 ASME B16.5, “Pipe Flanges and Flanged Fittings”

4.6 ASME B16.10, “Face-to-Face and End-to-End Dimensions of Valves”

4.7 ASME B16.25, “Buttwelding Ends”

4.8 ASME B16.34, “Valves - Flanged, Threaded and Welding End”

4.9 ASME B16.37, “Hydrostatic Testing of Control Valves”

4.10 ASNT TC-1A, “Personnel Qualification and Certification in Nondestructive Testing"

4.11 ASTM A488, “Standard Practice for Steel Castings, Welding Qualification of Procedures and Personnel”

4.12 MSS SP-6, “Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings”

4.13 MSS SP-61, “Pressure Testing of Valves”

The latest edition of the above codes, standards, and specifications shall apply. In the event of conflicts between this specification and the references cited above, the Vendor shall notify NRG, who will make the final judgment and interpretation.

5.0 Responsibility

5.1 The Vendor shall have and maintain a quality control system that will assure that all requirements of the specification are met. Exceptions to and deviations from this specification shall be clearly delineated in the Vendor's bid for disposition by NRG.

5.2 The Vendor shall notify NRG at least five days in advance of any designated witness or hold points.

5.3 The Vendor shall conduct all acceptance tests and inspections at their facility prior to shipment, unless prearranged with NRG.

5.4 The Vendor shall identify clearly in their proposal any and all subcontractors intended to be used. All subcontractors must be approved by NRG prior to the issuance of a purchase order.

5.5 NRG shall provide the Vendor with all available design information including the body/bonnet, trim, and seat materials.

5.6 NRG may conduct routine surveillance of valve activities to verify that all work is being completed in compliance with this specification.

5.7 NRG shall have free access to the Vendor's facilities to review any relevant procedures or documentation, to verify the Vendor's compliance with their own Quality Program and NRG's requirements, and to witness any portion of the fabrication, machining, and/or testing.

6.0 Inspection

6.1 All valves shall be completely disassembled upon receipt.

6.2 After disassembly, all components shall be cleaned by chemical solutions, shot blasting or sand blasting. The cleaning procedure shall consist of methods non injurious to the metal or part being processed.

6.3 All components shall be carefully inspected and their degree of usefulness determined, after which they shall be processed, if possible in accordance with this specification. If valve components are rejected, they shall be scrapped and replaced with new components of the latest design and material, with prior approval from NRG.

6.4 Following dismantling and cleaning, wall thickness measurements of the body and bonnets shall be taken to assure that all are within acceptable standard limits for the particular valve.

6.5 All flanged-end valves shall be inspected and confirmed that face-to-face and flange thicknesses are within dimensional tolerances of ASME 16.5 and ASME 16.10, unless special dimensions are required as specified by drawing and/or purchase order.

7.0 Valve Internal Repairs

7.1 When the general condition of the valve warrants, all screwed-in type seat rings shall be removed for inspection of threads and body seat surfaces and necessary repairs made.

7.2 All seating surfaces, whether repaired or not, shall be blue checked for proper contact. The percentage of blue contact shall be commensurate with the valve's leakage classification.

7.3 Repaired seating surfaces shall be lapped.

7.4 Bonnet-back seating surfaces, whether integral to the bonnet or a separate component, shall be refinished maintaining the correct stem bore and radii.

7.5 All valve stems shall be refinished and closely inspected for signs of corrosion, erosion, pitting, cracks, etc. in order to obtain maximum packing service life. Surface finish on all stems shall be 32 RMS or better.

7.5.1 Depositing spray metal on valve stems is prohibited.

7.5.2 Repair to stems by welding is acceptable provided the procedures and methods used are in accordance with the applicable ASTM/ASME material specification and Section 9.0 of this specification.

7.5.3 All yoke nuts (yoke sleeves) shall be thoroughly cleaned and inspected for wear in the operating thread area and on the flange. Repairs are prohibited on any yoke nut.

7.6 Worn disc or plug faces may be repaired by weld-deposited metal provided that the deposit composition is equivalent to the original seat face composition and all heat treatment requirements for the particular composition are met. The use of spray metal depositing or any mechanical means to build up worn plugs or discs is prohibited.

7.7 The use of shims of any kind behind seat rings is prohibited. The edges (I.D. & O.D.) of all seat rings shall be chamfered with a radius to prevent scouring of seat faces.

7.7.1 On threaded seat rings, a thread lubricant may be used in the assembly of seat rings to body provided it is not used to correct for worn threads.

7.7.2 On drop-in seal welded seat rings, the maximum clearance between the body bore and seat ring O.D. shall be .010" on the diameters.

7.7.3 Care shall be taken to insure all seal-welded seat rings are tightly seated to the body.

7.8 On refitting of disc to seat rings, ample allowance for wear shall be provided by having the seat face of the discs protrude a substantial amount above the inside diameter of the body ring. Seating surfaces may be lubricated with a light oil as an extra precaution against seizing and galling. The use of grease for this purpose is prohibited.

7.9 When necessary, flange faces and ring grooves shall be refinished in accordance with MSS SP-6.

7.10 The bonnet flange bolting material, unless otherwise specified, shall meet the bolting requirements of ASME B16.34.

7.11 Bonnet-flange joint gaskets shall be steel, iron, or thermiculite (e.g., flexitallic) suitable for the pressure/temperature rating of the valve. The metallic material of the gasket shall have corrosion resistance at least equal to that of the valve body.

7.12 Valves shall not be packed unless authorized in writing by NRG.

8.0 Valve Body Repairs

8.1 The following standards and specifications shall be adhered to wherever applicable when making valve body repairs: ASME B1.20.1, ASME B16.5, ASME B16.10, ASME B16.25, ASME B16.34, MSS SP-6, and MSS SP-25.

8.2 Steel valves may have isolated areas of low wall thickness repaired by welding provided welding methods and procedures are in accordance with the applicable valve ASTM/ASME material specification and Section 9.0 of this specification.

8.3 Base material may be repaired by welding, but shall not exceed 10 percent of the surface area of the forging or 33-1/3 percent of the wall thickness of the finished forging or 3/8", whichever is less, without prior approval of NRG.

8.4 When written approval is obtained, the limitations set forth in Paragraph 8.3 may be exceeded, but all other requirements of this specification shall apply.

8.5 All defects shall be completely removed prior to welding by chipping or grinding to sound metal. Tools for base metal preparation and cleaning used on P-8, P-43, and P-45, shall not have been used on P-1, P-3, P-4, or P-5A steels. These tools shall be uniquely marked and their use retained exclusively for P-8, P-43 and P-45.

8.5.1 Side wall(s) shall have a 30 degree minimum angle as measured from the normal to the component axis. The excavation shall be smooth with a rounded bottom and free of re-entry angles.

8.5.2 Prior to repair welding, the repair cavity shall be examined by liquid penetrant, magnetic particle, or ultrasonic testing in accordance with Paragraph 10.0. Acceptance criteria standards included in ASME B16.34, Mandatory Appendices II, III, and IV shall apply.

8.6 Weld repairs of valve bodies shall be documented on the Valve Repair Data Sheet, Attachment 1, or similar format. In addition, a weld map shall be prepared showing the exact location and the approximate size of the defect.

8.7 After repair welding Standard Class Valves, the welded area shall be ground smooth or machined when specified to the original contour and shall be completely free of surface defects. Each repaired area of the base material shall be reexamined in accordance with Paragraph 10.4.

8.8 Machining dimensions of repair welds and weld build-up assembly shall be maintained per applicable manufacturer's drawings.

9.0 Welding

9.1 Prior to start of work, the Vendor shall submit all special process procedures necessary in the performance of work to NRG for approval. Documentation submittals shall include, but not be limited to welding procedures, procedure and personnel qualifications and heat treatment procedures in accordance with the ASME Code.

9.2 The welding procedure and weld operator shall be qualified in accordance with ASME Section IX or ASTM A488 on Standard Class and Special Class Valves.

9.3 Preheating shall be performed using electric resistance method and strip chart recorders. If other methods are preferred, they must be approved by NRG before use.

9.4 The minimum preheat temperature shall be established for a distance of 12" around the area to be welded.

9.5 Interpass temperatures shall be checked with contact pyrometers or other suitable methods that will not contaminate materials.

9.6 The preheat must be applied before starting each cycle of welding and held continuous during all interpasses and cover passes. Interruptions may be made provided 50 percent of the wall thickness or 3/4", whichever is less, is welded with this initial cycle of welding. There is no requirement for the amount of welding on subsequent cycles.

9.7 Post weld heat treatment (PWHT) shall be accomplished using the electric resistance method and strip chart recorders. If other methods are preferred, they must be approved by NRG before use.

9.8 At least two chromel alumel thermocouples potentiometers shall be attached to each weld 180 degrees apart during PWHT. Large

items or unequal material thickness may require additional thermocouples.

9.9 Insulation should be used during PWHT and cool down from all cycles to insure uniformity. Specific temperatures, heating and cooling rates, and time at temperature shall be in accordance with recommended weld procedure specification, as noted in Attachment 1.

9.10 Weld repairs shall be heat treated in accordance with the PWHT requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Subsection C. The exemptions applicable to fabrication welds including groove, fillet, and circumferential butt welds also apply to repair welds. PWHT (solution treatment) of repair welds in austenitic stainless steels is neither required nor prohibited.

10.0 Non-destructive Examination and Testing

10.1 All nondestructive examination shall be performed in accordance with the applicable sections of ASME or any other applicable codes and follow the acceptance criteria of the applicable codes.

10.2 NDE personnel shall have current qualifications and certifications in accordance with the requirements of ASNT TC-1A.

10.3 Vendor shall provide, if requested, the applicable procedures, personnel qualifications and certification to NRG for review and record purposes.

10.4 Weld repairs to Standard Class Valve bodies shall be reexamined by liquid penetrant, magnetic particle, ultrasonic and/or radiographic examination as follows.

10.4.1 When specified, radiographic examination of the valve body shall be performed in accordance with ASME Section V with acceptance criteria standards of ASME B16.34, Mandatory Appendix I.

10.4.2 Liquid penetrant inspection of repair welds shall be performed after final machining. No linear indications or blowholes are permitted.

10.4.3 The reexamination by magnetic particle or liquid penetrant methods of a repaired area originally disclosed by magnetic particle or liquid penetrant examination shall be performed after PWHT (if PWHT is required).

10.4.4 The reexamination by radiography or ultrasonic methods of a repaired area originally disclosed by radiography or ultrasonic examination may be performed either before or after PWHT when PWHT is performed. The acceptance standards shall be as in the original examination.

10.5 For Special Class Valves, refer to ASME B16.34, Paragraph 8.3 for nondestructive examination requirements and ASME B16.34, Paragraph 8.4 for the rules for defect removal and repair of cast, forged, rolled, wrought, and fabricated valve bodies and bonnets or covers.

10.6 Work performed that is not in compliance with the applicable Code(s) or approved by NRG shall be reconciled at the Vendor's expense.

10.7 When performing radiographic inspections, a variable intensity film viewer and a densitometer shall be available on site for reviewing of all radiographic film by NRG.

10.8 NDE Reports shall include as a minimum:

10.8.1 Detailed description of the subject examined
10.8.2 Method and description of examination
10.8.3 Procedure used (include number) with revision number or date
10.8.4 Person(s) conducting examination and level of certification
10.8.5 Person issuing report and level of certification
10.8.6 Acceptance criteria used
10.8.7 Accept or reject status of item tested; if rejected, reason must be stated, and area of rejection clearly identified.
10.8.8 Applicable Code(s)

10.9 The Vendor shall perform shell leakage testing and seat closure testing in accordance with MSS SP-61.

10.10 The Vendor shall perform testing of control valves in accordance with ASME B16.37.

11.0 Identification Repair Plate

The Vendor shall furnish each valve with an identification plate riveted to the valve, upon which will be the basic information consisting of identification of the Vendor and the day, month and year in which the valve was repaired and pressure testing rating of valve.

12.0 Preparation for Shipment

12.1 For protection against corrosion, interval valve surfaces shall be coated with light rust preventive oil.

12.2 The external surfaces shall be painted. The valve stem shall not be painted. Painting of valve internals is prohibited unless specified.

12.3 Threaded opening in bodies and bonnets shall be fitted with suitable protectors.

12.4 The finish of flange faces and weld ends shall be protected with suitable protectors securely attached to the valves.

12.5 Documentation package as specified in Paragraph 11.0 shall be included with shipment. An extra copy shall be maintained by the Vendor for record purposes.

13.0 Quality Control

13.1 The Vendor shall develop and implement a quality control system for all work supplied under the scope of this specification. The Vendor’s quality program shall be documented by written policies, procedures and instructions. A copy of Vendor's quality program shall be available when the Vendor submits bid documents to NRG for review and approval. As a minimum, the Vendor's quality control system shall contain a method for document control, identification and control of material, control of measuring and test equipment, and control of special processes such as welding, heat treatment, and non-destructive examination.

13.2 The Vendor shall establish an inspection checklist for the inspection of all work under the scope of this contract. The inspection checklist shall identify the attributes and variables to be inspected with the accept/reject criteria for each. The inspection checklist shall, as a minimum, include a visual inspection of valve parts, nondestructive examinations (including accept/reject criteria),

dimensional and surfaces checks (including critical clearances, a blue check of all mating seating surfaces and stem run out), weld repair and machining, and valve reassembly.

13.3 The inspection checklists shall be submitted to NRG for review and approval. Work is not authorized to start until NRG has approved the Vendor's inspection checklists. The utilization of the preplanned inspection checklists does not relieve the Vendor of responsibility to comply with the requirements of codes and drawings.

13.4 The Vendor shall report deficiencies and discrepancies from the contract, specification, or drawing requirements on a Nonconformance Report Form. The Vendor shall obtain NRG's approval of the recommended disposition before proceeding with any work. The Vendor shall not use any nonconforming material in advance of receiving NRG's approval of the disposition of the NCR.

14.0 Documentation

14.1 Valve Repair Data Sheets, Attachment 1, or similar format, shall be provided to NRG. The Valve Repair Data Sheet shall include, as a minimum, the signatures of the responsible repair supervisor and the Vendor's QC representative.

14.2 All nondestructive examination reports of repair cavity and weld repair areas shall be provided to NRG.

14.3 If the scope of work involves repairs to safety relief valves, the Vendor's quality program must comply with ANSI/NB-23 and a copy of the current NBIC "VR" Certificate of Authorization shall be submitted with the Vendor's bid documents.

15.0 Attachments

15.1 Valve Repair Data Sheet (Sample)

VALVE REPAIR DATA SHEET

General Information:

Purchase Order: Station:

Valve Rating: Valve Mfg.

Valve Model No.: Valve Body Material Spec.:

Valve Type (globe, gate, etc.):

Weld Repair Yes/No

Weld Procedure Specification:

Material P-No: Filler Rod(s):

Preheat: Interpass Temp.:

Prep. NDE: _____Visual _____PT_____MT _____RT _____UT

Final NDE: _____Visual _____PT_____MT _____RT _____UT

Post Weld Heat Treatment Temp _____ Soak Time _____

(Attach Weld Maps and NDE Reports)

Test Data:

Hyro Press _____Hold Time _____

Leak Test Press _____Leakage Rate _____

Comments:

Vendor Certification:

Shop Supervisor _____Date _____

QC Representative _____Date _____