|  |  |
| --- | --- |
| **HILTON FABRICATED STEEL KNIFE GATE VALVES**  **FOR ISOLATION SERVICE, FURNISH & INSTALL SPECIFICATION, Section 40 05 61.43** | **APPLICATION DATA 65.01-1**  Page 1  Dated November 2019 |

NOTE: This specification covers the requirements for furnishing and installing fabricated steel knife gate valves for isolation service. As noted in the footer, this is a Furnish and Install (F&I) specification; if the scope of work calls for furnishing the valve only, use the Furnish Only (FO) version of this specification.

Edit this specification for project specific requirements by adding, deleting, or revising text as necessary, including these introductory paragraphs. For “Choose an item” fields, click on the words “Choose an item” and select the desired item from the drop-down list. To enter a different item than listed in the drop-down list, click on the “Choose an item” option in the drop-down list and type the desired text. If the user is unsure how to complete a particular field, contact Hilton-DeZURIK for assistance.

PART 1 GENERAL

* 1. SCOPE OF WORK

1. Provide all labor, materials, equipment and incidentals required to furnish and install fabricated steel knife gate valves for isolation service as shown on the Drawings and specified herein.
2. The furnished equipment shall include:
   1. Fabricated steel knife gate valves.
   2. Valve actuators.
   3. Miscellaneous valve appurtenances.
   4. RELATED SECTIONS
3. Choose an item..
4. Choose an item..
5. Choose an item..
6. Choose an item..
   1. SUBMITTALS
7. Submit the following for approval prior to commencing fabrication in accordance with Section Choose an item..
   1. Drawings showing assembly details, materials of construction, bills of material, dimensions and weight.
   2. Individual electrical control schematics and wiring diagrams for each electric motor actuator with all external interfaces identified.
8. Submit the following for approval prior to shipping the valves in accordance with Section Choose an item..
   1. Certified hydrostatic shop test report.
   2. Certificate of Compliance certifying that the valves have been fabricated in accordance with applicable standards.
   3. Valve Manufacturer’s installation instructions.
   4. Operating and maintenance instructions prepared specifically for this project that include all required catalog cuts, drawings, equipment lists, descriptions, installation, and other information required to instruct operating and maintenance personnel unfamiliar with the valves and appurtenances.
9. Submit the following after installation of the valve in accordance with Section Choose an item..
   1. Field test report affirming that the valves were successfully installed and functionally tested in the presence of the valve Manufacturer in accordance with its installation instructions and that operator training was provided.
   2. REFERENCES
10. Where reference is made in this Section to one of the following standards, only the applicable requirements of the revision in effect at the time of the bid opening shall apply.
11. AMERICAN SOCIETY OF MECHANICAL ENGINEERS/AMERICAN NATIONAL STANDARDS INSTITUTE (ASME/ANSI)
    1. ASME/ANSI B16.10 – Face-to-Face and End-to-End Dimensions of Valves
    2. ASME/ANSI B16.5 – Pipe Flanges and Flanged Fittings
    3. ASME/ANSI B16.47 – Large Diameter Steel Flanges: NPS 26 through NPS 60 Metric/Inch Standard
12. ASTM INTERNATIONAL (ASTM)
    1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel
    2. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
    3. ASTM A193/A193M – Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
    4. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
    5. ASTM A276/A276M – Standard Specification for Stainless Steel Bars and Shapes
    6. ASTM A312/A312M – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
    7. ASTM B271/B271M – Standard Specification for Copper-Base Alloy Centrifugal Castings
    8. ASTM F593-17 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
    9. ASTM F1941 – Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric
13. AMERICAN WELDING SOCIETY (AWS)
    1. AWS A5.13:2010 – Specification for Surfacing Electrodes for Shielded Metal Arc Welding
    2. AWS D1.1/D1.1M – Structural Welding Code - Steel
    3. AWS D1.6/D1.6M – Structural Welding Code - Stainless Steel
14. AMERICAN WATER WORKS ASSOCIATION (AWWA)
15. AWWA C207-18 – Steel Pipe Flanges for Waterworks Service—Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)
16. AWWA C520-19 – Knife Gate Valves, Sizes 2 in. (50 mm) through 96 in. (2,400 mm)
17. AWWA C541-16 – Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates
18. AWWA C542-16 – Electric Motor Actuators for Valves and Slide Gates
19. MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSS)
20. MSS SP 6 – Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
21. MSS SP 81 – Stainless Steel, or Stainless-Steel-Lined, Bonnetless Knife Gate Valves With Flanged Ends
22. MSS SP 135 – High Pressure Knife Gate Valves
23. MSS SP 151 – Pressure Testing of Knife Gate Valves
24. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
25. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)
    1. QUALITY ASSURANCE
26. Qualifications
    1. Valves shall be the products of well-established, reputable and qualified firms who have a minimum of 10 years of experience in the design and manufacture of fabricated steel knife gate valves.
    2. The valves shall be designed, fabricated, tested, and installed in accordance with accepted industry practices and methods and shall comply with this Section where applicable.
27. Certifications
    1. The valve Manufacturer shall furnish a certificate that affirms compliance with the applicable standards referred to herein.
28. Provide a qualified and factory trained service representative of the valve Manufacturer to provide the services specified below. Person-day requirements listed are exclusive of travel time and do not relieve the Contractor of the obligation to place the equipment in operation as specified.
    1. Installation observation: Observe setting, leveling, alignment, and field erection of valve.
       1. Choose an item. person-days.
    2. Functional testing observation: Observe calibration and functional testing of valve.
       1. Choose an item. person-days.
    3. Valve Manufacturer training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts, and preparation to lead and teach classroom sessions. Training required to be provided by other manufacturers, such as the valve actuator Manufacturer, shall be arranged separately by the Contractor.
       1. Choose an item. person-days.
    4. DELIVERY, STORAGE, AND HANDLING
29. Care shall be taken in handling to avoid damage to the valves, actuators, appurtenances and finishes.
30. Prior to shipping, valve ports shall be suitably covered to avoid entry of foreign material.
31. Valve stems shall be coated with a protective coating which shall be maintained until the valve is placed into service.
    1. SPARE PARTS
32. Choose an item..
33. Choose an item..
34. Choose an item..

PART 2 PRODUCTS

* 1. APPROVED MANUFACTURERS

1. If the Bidder proposes to furnish a valve manufactured by other than an approved Manufacturer, the alternative Manufacturer and valve model shall be identified in the bid. If an alternative Manufacturer and valve model is not submitted with the bid, it shall be assumed that the bid has been submitted with a valve supplied by an approved Manufacturer. In the case where the Bidder proposes the valve of an alternative Manufacturer, the acceptability of the valve will not be considered by the Owner until after the effective date of the agreement. If upon subsequent consideration the alternative valve is deemed to be not acceptable by the Owner, the Bidder shall furnish the valve of an approved Manufacturer at no additional cost.
   1. Choose an item..
   2. Choose an item..
   3. Choose an item..
   4. DESIGN
2. General.
   1. The valve design shall be verified using SolidWorks or a similar finite-element stress analysis program to demonstrate the integrity and proper functionality of the valve at the design pressure with the body and flanges unconstrained.
   2. The valve shall meet the applicable requirements of MSS SP-81, MSS SP-135, or AWWA C520.
   3. The valve shall be designed with a relief groove to allow the gate to push solid particles aside to prevent material packing in the seat area. If required, groove flush ports shall be provided and fabricated from the same material as the wetted parts.
   4. For motor operated valves, valve yokes shall be designed to support the operator and resist movement or twisting at the stall thrust capacity of the operator.
   5. Valves shall have a pressure retaining bonnet that fully encloses the gate. The bonnet shall be rated at the same pressure as the valve body and shall not include an internal gate packing or gate wiper. A packing gland shall be located at the top of the bonnet to provide a tight seal around the stem. The packing shall be replaceable without disassembling the valve or removing the valve from the pipeline.
   6. The valve stem shall have an integral back-seating ring to allow repacking under pressure. The back-seating ring sealing surface shall be designed to mate with the bottom of the packing gland.
   7. The valve stem shall Acme threaded.
   8. The valve shall be designed so that all required lubrication can be performed with the valve installed.
   9. Metal-seated valves shall be full-port design with the clear port ID equal to or greater than the pipe ID.
   10. Resilient-seated valves shall be designed with a clear port ID equal to or greater than 90% of the pipe ID.
   11. Resilient seals shall be designed to fit in a self-retaining groove that is cut into the seat ring and be replaceable without removing the valve from the pipeline. The seal shall not require mechanical fasteners or sealants to hold it in place.
   12. Provide gate guides for valves where the valve stem is not installed in the vertical position. Gate guides shall fully support the gate and allow it to seat as required.
   13. The pressure class of valve flanges shall be equal to or greater than the pressure rating of the valve.
   14. Wherever possible, components of the same type shall be the product of one manufacturer.
3. Valve service.
   1. Choose an item..
4. Valve type.
   1. Choose an item..
5. Valve size.

Choose an item..

1. Flow media.
2. Choose an item..
3. Maximum flow rate.
4. Choose an item..
5. Normal operating pressure.
6. Choose an item..
7. Maximum operating pressure.
8. Choose an item..
9. Valve design pressure.
10. Choose an item..
11. Gate configuration.
12. Choose an item..
13. Valve shutoff type.
14. Choose an item..
15. Valve seat material and type.
16. Choose an item..
17. Flange face type.
18. Choose an item..
19. Valve style.
20. Choose an item..
21. Flange drilling standard.
22. Choose an item..
23. Valve orientation.
24. Choose an item..
25. Valve stem type.
26. Choose an item..
27. Other design requirements.
28. Choose an item..
29. Choose an item..
30. Choose an item..
    1. MATERIALS
31. Material source restrictions.
    1. Choose an item..
32. Body and flanges.
    1. Choose an item..
33. Bonnet.
34. Choose an item..
35. Gate.
36. Choose an item..
37. Stem.
    1. Choose an item..
38. Backseat ring.
    1. Choose an item..
39. Stem extensions.

* 1. Choose an item..

1. Stem guides.
   1. Choose an item..
2. Stem guide bushing.
   1. Choose an item..
3. Stem cover.
   1. Choose an item..
4. Metal seats.
   1. Choose an item..
5. Resilient seats.
   1. Choose an item..
6. Packing gland.
   1. Choose an item..
7. Packing.
   1. Choose an item..
8. Yoke.
   1. Choose an item..
9. Floor stand.
   1. Choose an item..
10. Fasteners.
    1. Choose an item..
11. Gate guides.
    1. Choose an item..
    2. FABRICATION
12. Flange faces shall be machined and grooved with a spiral serrated finish.
13. Flange bolt holes shall be:
    1. Choose an item..
14. Gate surface finish shall be:
    1. Choose an item..
15. For valves consisting of a carbon steel body and stainless steel wetted parts, the stainless steel body cladding and gasket face rings shall be fully welded to the carbon steel body. Floating liners are not acceptable.
16. Provide valve with brass or Type 316 stainless steel nameplate attached with Type 316 stainless steel rivets. Nameplates shall have stamped letters and shall include serial number, pressure rating, and other essential information.
17. For stainless steel bolting, except where Nitronic 60 or bronze nuts are provided, use graphite-free anti-seize compound to prevent galling.
18. Uni-directional valves shall be marked to indicate the seat side of the valve.
19. Painting and coating.
    1. External surfaces of the valve shall be free of grease or oil and machined surfaces shall be protected with an anti-corrosive preparation.
    2. Carbon steel surfaces of valve shall be painted:
       1. Choose an item..
    3. Paint color shall be:
       1. Choose an item..
    4. ACTUATORS
20. General.
    1. The valve Manufacturer shall mount and test all actuators at the factory.
    2. Actuator shall include all necessary appurtenances required to operate and monitor the position of the valve.
    3. Where the valve maximum operating pressure is less than the valve pressure rating, the actuator shall be sized based on the maximum operating pressure.
    4. All actuators shall be capable of moving the valve from the full open to full close position and in reverse.
    5. Actuators shall be capable of being removed from the valve without dismantling the valve or removing the valve from the line.
21. Electric.
    1. Acceptable manufacturers.
       1. Rotork.
       2. AUMA.
       3. Limitorque.
       4. Choose an item..
    2. Electric actuators shall conform to AWWA C542-16 insofar as applicable and specified herein.
    3. Electrical service available.
       1. Choose an item..
    4. Electric actuators shall be configured to provide for multi-turn operation and be coupled with gearboxes as required to obtain the required speed and operating torque.
    5. Gate travel speed.
       1. Choose an item..
    6. Instrumentation and Controls.
       1. Choose an item..
22. Pneumatic.
    1. Acceptable manufacturers.
       1. DeZURIK.
       2. Parker.
       3. RDC.
       4. Choose an item..
    2. Pneumatic cylinder actuators shall conform to AWWA C541-16 insofar as applicable and specified herein.
    3. Compressed air available.
       1. Choose an item..
    4. Instrumentation and Controls.
       1. Choose an item..
23. Hydraulic.
    1. Acceptable manufacturers.
       1. Parker.
       2. RDC.
       3. Choose an item..
    2. Hydraulic cylinder actuators shall conform to AWWA C541-16 insofar as applicable and as specified herein.
    3. Hydraulic supply available.
       1. Choose an item..
    4. Instrumentation and Controls.
       1. Choose an item..
24. Manual.
    1. Maximum rim pull to seat and unseat valve at rated valve pressure.
       1. Choose an item..
    2. For a maximum handwheel rim pull greater than 60 pounds at the rated valve pressure, a bevel gear operator shall be provided. The bevel gear operator shall have fully enclosed steel gears, be permanently lubricated, and possess a gear ratio such that the maximum handwheel rim pull at the rated valve pressure does not exceed 60 pounds.
    3. SHOP TESTING
25. The valve Manufacturer shall test the valve at the factory.
26. Shell test.
    1. Hydrostatically test valve with water to 1.5 times the valve pressure rating with the gate partially open for a minimum three (3) minutes.
27. Leakage allowance: No visible leakage allowed.
28. Leakage through the packing gland shall not be cause for rejection as long as there is no leakage at the rated pressure.
29. Test valves with the bodies and flanges unconstrained to demonstrate the integrity of the design.
30. Gate/seat test.
    1. Hydrostatically test each valve gate with water to 1.1 times the valve operating pressure for a minimum three (3) minutes with the gate fully closed.
31. Test bi-directional valves in each direction with the required pressure on one side of the gate and atmospheric pressure on the other.
    * + 1. Leakage allowance, resilient-seated: None.
32. Test uni-directional valves in the direction of closure with the required pressure on one side of the gate and atmospheric pressure on the other.
    * + 1. Leakage allowance, resilient-seated: None.
        2. Leakage allowance, metal-seated: 40 ml per minute per inch of valve diameter.
33. Operational test.
    1. Stroke the valve fully open and close with the actuator two (2) times. Operation shall be smooth, with no unusual noise or vibration. Confirm proper setting for open and closed limit switches and the torque switch as necessary.
    2. Using the manual hand wheel on the actuator, open each valve approximately three to four inches, and then close.
34. Test report.
    1. Provide certified written test results of all shop testing.

PART 3 EXECUTION

1. EXECUTION
   1. INSTALLATION
2. The valve Manufacturer’s representative shall be present during installation and field testing of the valve per Paragraph 1.5, Quality Assurance.
3. Clean all debris and foreign material from inside of valve before installing.
4. Adequately support the valve at all times to prevent distortion and strain.
5. Install valve per valve Manufacturer’s installation instructions.
   1. FIELD TESTING
6. Perform field testing of the installed valve per the Owner’s instructions.
7. Provide a certified written report of the field testing results.
   1. OPERATOR TRAINING
8. Provide classroom and operation and maintenance instruction administered by the valve Manufacturer per Paragraph 1.5, Quality Assurance.
   1. FIELD TOUCH-UP PAINTING
9. After installation and field testing of the valve, apply touch-up paint to all scratched, abraded, and damaged shop coated finishes. Coating type and color shall match shop paint.

END OF SECTION