## SECTION 46_XX_XX
### CONCENTRIC SLIP-ON FLANGED ELASTOMER CHECK VALVE

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes:
   1. Elastomer Duckbill Check Valves for Backflow Prevention for Outfalls

B. Related Sections:
   1. (provided by the engineer)
   2. (provided by the engineer)
   3. (provided by the engineer)

### 1.02 REFERENCES

A. ASTM D2000 Standard Classification System for Rubber Products
B. ASTM D1418 Standard Practice for Rubber & Rubber Lattices-Nomenclature
C. ASTM A240 Type 316 Stainless Steel
D. ASTM A123 Galvanized Steel

### 1.03 SUBMITTALS

A. The following documents must be submitted in their entirety within one complete package; submittal packages not including all these items will be deemed incomplete and rejected without review. The following is an itemized list of documents to be included within the submittal package:
   a. Valve Dimensional Drawing including orientation of valve on pipe
   b. US Manufacturer's Certification Document
   c. Verification of Independent Laboratory Testing for Head Loss and Velocity tests of duckbill check valves
   d. Verification of Independent Laboratory Testing for manufacturing consistency of duckbill check valves of the same size and construction
   e. Finite Element Analysis (FEA) conducted
   f. Hydraulic Curve for each size valve showing head loss versus flow and backpressure rating
   g. Installation, Operation and Maintenance Manual

B. The following defines the specific requirements for each submittal item:
   a. Valve Dimensional Drawing – the drawing shall be a scaled version of the actual valve, generic drawings with listed dimensions will not be accepted. Dimensions required in the drawing include the following**:**
      i. Overall length
      ii. Flange dimensions
      iii. Overall height at the bill

iv. Length of opening at the bill
v. Orientation of the curvature at the bill
vi. Location of lifting clevis (36" & larger)
vii. Elastomer material is used in construction
viii. Metallic material is used for retaining rings

b. US Manufacturer's Certification Document - the valve manufacturer shall certify in a written document that they have a minimum of 15 years' experience in fabrication and installations within the United States of America for valves of the same size as required within these specifications and that the valves provided for this project were, in their entirety, fabricated, vulcanized and packaged within the United States of America.

c. Verification of Independent Laboratory Testing for Head Loss and Velocity – the valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing to determine head loss and jet velocity characteristics on a representative set of duckbill valves. The testing must include multiple constructions (stiffness) within each size designated by backpressure rating and must have been conducted for free discharge (discharge to atmosphere) and submerged conditions.

d. Verification of Independent Laboratory Testing for Backpressure Capacity - the valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing to determine the backpressure capacity of the duckbill check valves with respect to their construction designation (thickness and fabric reinforcing ratio).

e. Verification of Independent Laboratory Testing for Manufacturing Consistency - the valve manufacturer shall provide summary documentation of a report conducted by an Independent Laboratory for hydraulic testing where multiple valves (at least 4) of the same size and construction (stiffness) were tested to validate the submitted head loss characteristics and to prove the repeatability and consistency of the manufacturing process to produce the same hydraulic characteristics.

f. Verification of Finite Element Analysis (FEA) - the valve manufacturer shall provide summary documentation of Finite Element Analysis modeling on representative duckbill valve sizes to determine deflection, stress and strain characteristics under various load conditions. Modeling must have been done for flowing conditions (positive differential pressure) and reverse differential pressure.

g. Hydraulic Curve – the hydraulic curve shall be developed from the testing conducted by the Independent Laboratory for head loss and backpressure characteristics. Each valve curve shall indicate the head loss versus flow, the backpressure capacity of the valve and operating point as defined within the required operating conditions defined within these specifications.

## 1.04 WARRANTY

A. Valves shall be warranted by the manufacturer for defects in materials and workmanship for a period of 2 years (24 months) from date of shipment.

## PART 2 PRODUCTS

## 2.01 GENERAL

A. (provided by the engineer)

## 2.02 ELASTOMER DUCKBILL CHECK VALVE FOR BACKFLOW PREVENTION FOR OUTFALLS

A. Manufacturers
   a. Tideflex® Series 35 or pre-approved equal

B. Design
   a. Valve
      i. Valves are to be flow operated.
      ii. Valves shall be designed to mate to specified pipe flange dimensions and attach by vendor furnished stainless steel or galvanized steel mounting rings.
      iii. The port area shall contour down to a duckbill to allow passage of flow in one direction while preventing reverse flow.
      iv. The duckbill is concentric and is flared equidistant from centerline to form a duckbill shape.
      v. The flange and flexible duckbill sleeve shall be one piece elastomer construction with nylon reinforcement.
      vi. The flange drilling shall conform to ASME B16.1 Class 125/ASME B16.5, Class 150 standards or as specified by the engineer.
      vii. The valve shall be furnished with galvanized or stainless steel back-up rings for installation.
      viii. The Manufacturer’s name, location, model and serial number shall be bonded onto the exterior of the valve.

   b. Bill
      i. The bill shall be thinner, formed into a curved shape and more flexible than the valve body.
      ii. The bill slit must be at least 1.57 times the nominal pipe diameter.
      iii. The bill shall be curved at a minimum of 90 degrees from direction of flow and permanently set through vulcanization.
      iv. The bill curvature shall be integral to the valve body to provide closure of the bill opening under static conditions as well as dynamic backpressure conditions during periods of zero flow.

c. Support
   i. Metallic support is required on valves 30" & larger to provide additional structural support during static and dynamic operating conditions. The support shall be completely encapsulated within the top portion of the valve.
   ii. A lifting clevis shall be installed at the valve bill on 36" & larger valves.

C. Materials
   a. Valve
      i. One-piece elastomer construction with nylon reinforcement.

   b. Mounting Rings
      i. ASTM A240 316 Stainless Steel or A123 Galvanized Steel

D. Testing
   a. Certified test reports shall be available upon request.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

A. Install valves as specified in section (filled in by the engineer) and the manufacturer's instructions.
   a. Valve bill opening shall be installed exactly vertical to maintain equal loads on each side of the valve under static and dynamic operation.

B. (verbiage by engineer instructing how discharge piping should be installed)

**3.02 COMMISSIONING**

A. Field testing (verbiage by engineer)

**End of Section**