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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

06 SEP 2017

DEPARTMENT ORDER
NO. 111
Series of 2017 09.14.17

SUBJECT: Amendments to DPWH Standard Specification for Item 1603 – Installation of Valves

It has been the thrust of the Department to provide effective standard specifications in the implementation of various infrastructure projects. As such, there is a need to set an upgraded standard specification for water supply and plumbing devices for regulating and controlling the flow and pressure of fluids. The attached amendment to **DPWH Standard Specification for Installation of Valves, Item 1603** (*henceforth renamed as* ***"Valves"***) is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the revised 1995 edition of the DPWH Standard Specifications for Public Work Structures (Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply Systems), Volume III, 1995 Edition.

This Order shall take effect immediately.

MARK A. VILLAR
Secretary

14.1.2 FET/RGT

Department of Public Works and Highways
Office of the Secretary
WIN7U01510

DPWH Standard Specification for
ITEM 1603 –VALVES

1603.1 Description

This Item shall consist the furnishing and installation of valves required as shown on the Plans/Drawings and in accordance with this Specification.

1603.2 Material Requirements

Bronze/Brass gate, globe and check valves which are corrosion resistant shall conform to *Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) MSS SP-42 Specification for Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged Butt Weld Ends.* Valve stems shall be copper silicon alloy conforming to *American Society of Mechanical Engineers (ASME) ASTM B98M Specification for Copper-Silicon Alloy Rod, Bar and Shapes.* All valves shall be full line size. And valves with 50 mm or smaller sizes shall be threaded and have brass bodies, while valves larger than 50 mm shall be cast iron or brass bodies.

1603.2.1 Gate Valve

Gate valves with sizes 50 mm or smaller shall be bronze material with screwed-in bonnet, non-rising stem, solid wedge disc and threaded ends pressure rating PN20. And for valves with sizes larger than 50 mm, it shall be Iron Body Bronze Mounted (IBBM) valves, cast iron body bronze trim valves, with bolted bonnet, non-rising stem, solid wedge disc, flanged ends, and renewable seat rings. Each gate valve shall be a full-way type with working parts of non-corrosive material.

1603.2.2 Globe Valve

Composition of globe valves shall be bolted bonnets, guided faced disc, outside screw and yoke, and flanged ends. For valves sizes 50 mm or smaller it shall be brass material and for 51 mm or larger it shall be cast-iron or brass subject as what is shown on the approved Plans.

1603.2.3 Double Regulating Valve

Double regulating valve with sizes 50 mm or smaller shall be bronze material. For sizes 51 mm or larger, the valve shall be cast iron material. Valve shall be fitted with Ethylene Propylene Diene Monomer Rubber (EPDM) coated regulating disk, double regulating device and indicator, flanged in accordance with *British Standards (BS) 4504 PN16 Flanged Dimensions.* For inside screw, non-rising copper alloy stem with back seating feature shall be used.

1603.2.4 Check Valve

For double door type check valves, it shall have cast iron body, aluminum bronze or stainless steel disc, stainless steel spring and hinge pin, and butyl rubber sheet. For wafer style type check valves, it shall also have cast iron or semi-steel body, bronze disc, stainless steel spring, and butyl rubber sheet.

1603.2.5 Butterfly Valve

Composition of butterfly valve shall be cast iron or ductile iron for the body while bronze, aluminum-bronze or stainless steel for the disc. It will be Type 416 Stainless Steel for the stem and Ethylene Propylene Diene Monomer Class Rubber (EPDM) for the seat.

1603.2.6 Pressure Reducing Valve

For domestic water lines applications, pressure reducing valves shall be bronze material. For Fire Protection Systems, pressure reducing valves are separated in two (2) categories. Valves with 50 mm or smaller sizes shall be made of bronze while valves larger than 50 mm shall be cast iron material. For pressure reducing valve used as temperature and relief valve, either cast-iron or bronze material shall be used.

1603.2.7 Ball Valve

Ball valve sizes 50 mm or smaller shall have bronze or brass body, chromium plated or stainless steel ball, steel handle with vinyl grip, and replaceable teflon seats. For sizes 51 mm or larger, valves shall have steel body, chrome or nickel plated steel or stainless steel ball, replaceable teflon seats, steel stem and handle. Each ball valve shall be a full-way type with working parts of non-corrosive material.

1603.2.8 Float Valve

The valve shall have 'O' ring piston seals and resilient seated disk with dezincification resistant bronze fabricated approved solder and shall be hydraulically tested to ensure buoyancy and constructed in accordance with *BS 1968 Specification for Floats for Ball Valves*. Floats for valve sizes 80 mm and above shall be made of copper.

1603.2.9 Automatic Air Valve

The body of automatic air valve shall be bronze material including the accessories complimentary to the valve subject on what is shown on the approved Plans.

1603.3 Construction Requirements

Valves shall be installed as specified herein and as shown on the drawings. All valves shall be newly manufactured and provided with a position indicator. Flanged valves may be raised or plain faced with serrated gasket surface. When operating out of a buried valve which is located more than 1.50 meters below the ground surface, extension shall be installed in the valve box. The bottom of the extension shall be securely fastened to the operating nut of the valve and the top of the extension shall be centered in the valve box. All valves 100 mm and larger mounted in excess of 2.15 m above the floor in mechanical rooms shall be equipped with chain operators, extend chains to within 2 m of floor. Arrows are used to indicate direction of flow on check, globe, non-return, and eccentric plug valves. A control valve shall be installed immediately ahead of each water supplied appliance and immediately ahead of each slip joint or non-metallic fixture supply or appliance supply. All required shutoff or control valves shall be accessible, a single control valve shall be installed on a water supply line ahead of any automatic metering valve which supplies a battery of

fixtures. All materials shall conform to the applicable requirements of the American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM) Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS), and British Standards (BS) for valve installation as per approval of the Engineer.

1603.3.1 Gate Valve

Furnished gate valves 300 mm and smaller shall be designed for minimum nominal pressure PN16 non-shock water and gas working pressure or PN20 as specified. Valves 350 mm to 610 mm shall be designed to a minimum pressure PN10. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No gate valve shall be installed without the approval of the Engineer.

1603.3.2 Globe Valve

Globe valves shall be designed for minimum nominal pressure PN20 non-shock water. Globe valve sizes 50 mm or smaller shall also be designed for gas working pressure. Valves shall have union bonnets, integral seats, and renewable teflon discs. Valves shall remit disc and bonnet replacement without removing valves from piping. For sizes 51 mm or larger, valves shall be designed for nominal pressure PN16 water and gas working pressure. Discs and seats shall be renewable without removing valves from line. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No globe valve shall be installed without the approval of the Engineer.

1603.3.3 Double Regulating Valve

Double regulating valve sizes 50 mm or smaller shall be designed for a nominal pressure PN20. It shall be composed of parabolic and slotted disk double regulating device, screwed bonnet, rising stem, hand wheel operated with micrometer style indicator. Double regulating valve with sizes 51 mm or larger shall be designed for a minimum pressure of PN16. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No double regulating valve shall be installed without the approval of the Engineer.

1603.3.4 Check Valve

For water and gas application sizes 50 mm or smaller, check valves shall be designed for minimum nominal pressure PN20 non-shock water and gas working pressures. Valves shall have renewable discs, side plugs and re-grindable integral seats. Discs shall be renewable and seats shall be re-grindable without removing the valves from the line. For valves used for water application, sizes 51 mm or larger shall be silent type, spring loaded of the double door or wafer style. Valves shall be designed for minimum nominal pressure PN16 non-shock water working pressure. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No check valve shall be installed without the approval of the Engineer.

1603.3.5 Butterfly Valve

Butterfly valves shall be designed for minimum nominal pressure PN16 for water service. Valves shall have extended necks. Operator shall have 10-position lever lock for sizes 50 – 100 mm and totally enclosed and sealed worm gear actuators with 4 arm or wheel handle for sizes 150 mm and larger. Infinite adjustment and memory stop options shall be included. Valves shall be bi-directional suitable for drop-tight shut-off at full rated pressure with flow in either direction. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No butterfly valve shall be installed without the approval of the Engineer.

1603.3.6 Pressure Reducing Valves

1603.3.6.1 Domestic Water Lines

Pressure reducing valves shall be pilot-controlled, hydraulically operated, diaphragm type with a low by-pass capability. The low-flow by-pass capability shall be achieved by using balanced direct acting pressure reducing valve as an integral part of the main valve. At very low flows when the main valve is almost completely closed to prevent the possibility of cavitation, the direct acting valve shall by-pass the main valve and maintain flow.

The pressure reducing valves shall be suitable for maximum working pressure that exist within the system and downstream pressure should be site adjustable between 200,000 Pascal to 400,000 Pascal. Refer to the Plans or drawings for the locations at which pressure reducing valve shall be required.

1603.3.6.2 Fire Protection Services

When required for installation in the Fire Protection Systems, the Pressure Reducing Valve shall be direct acting and site adjustable type. The Pressure reducing valve shall be Underwriters Laboratories (UL) listed and Factory Manual (FM) approved.

1603.3.6.3 Domestic Water Temperature and Pressure Relief Valve

On hot water storage tanks, provide an ASME rated thermostatic, self-closing, temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater standard pressure setting of 600 kPa and standard temperature setting of 100 degrees Celcius. Relief valve pipe is needed to discharge to the floor drain.

1603.3.7 Ball Valve

Ball valves shall be non-blowout stem design. Quarter turn of handle shall fully open or close the valve. Handle position shall indicate whether valve is open or closed. Handle stops shall be a permanent integral part of the body. Valves with 50 mm or smaller sizes shall be standard port, 2-piece construction with screwed ends. Valves shall be designed for minimum nominal pressure PN25.

For sizes 51 mm or larger, valves shall be standard port with flanged ends. Valves shall be designed for minimum PN16 working pressure. Where required for installation in the fire protection system, the ball valves shall be FM approved. All valves shall be in accordance with *ASME B16.34 Standard for Valves – Flanged, Threaded, and Welding End.* No ball valve shall be installed without the approval of the Engineer.

1603.3.8 Float Valve

Float valves shall be installed as indicated in the drawings to provide consistent level control in reserve supply water storage tanks. The valve shall meet the requirements for air gaps and shall be constructed throughout in approved materials and shall prevent back phoning. Inlet flow shall be co-axial with the piston movement, to ensure high discharge capacity and smooth, quiet operation. Bronze equilibrium float valves 80 mm and above shall be flanged end, flat faced and drilled to suit *EN 1092-1 Flange Dimensions* for PN16. Bronze equilibrium float valve up to 50 mm shall be screwed end parallel and shall be provided complete with back nut. Installation of Float Valve shall be as per manufacturer's recommendation approved by the Engineer.

1603.3.9 Automatic Air Valve

Automatic air valves shall have a bronze body with bolted cover and a 9 mm top outlet. They shall each incorporate a suitable float mounted on a stainless steel spindle terminating in needle valve for closure against a stainless steel seating at the outlet. For low pressure systems, the valve shall be provided with a test cock and a brazed float, but for medium and high pressure systems the float shall be of stainless steel.

Automatic air valves for low pressure systems shall incorporate an internal ball check valve at inlet to prevent air entry to the system. Automatic air valves for cold water services shall be to the approval of the local water authority. No automatic air valve shall be installed without the approval of the Engineer.

1603.3.10 Preparation and Installation of Valve

Provide valves at each piece of equipment to isolate equipment from its connection system. Locate valves as necessary to provide easy isolation and cleaning of strainers. Strainers shall be installed ahead of all automatic valves and elsewhere as indicated on the drawings. Provide a ball valve and 1.5 m of rubber hose in the blow off opening of each strainer. Unions shall be provided adjacent to each screwed type valve and shall be on the outlet side of the valve.

Properly align piping before installation of valves in an upright position, but if the Operator installed the piping below the valves it will not be accepted. Install valves as per recommendation of the manufacturer and approved by the Engineer. Install all valves with the stem in the upright position. Valves may be installed with the stem in the horizontal position only where space limitations do not allow installation in an upright position or where large valves are provided with chain wheel operators. Prior to flushing of piping systems, place all valves in the full-open position. Flanged valves shall be installed between flanges. All installation of valve shall be as per approval of the Engineer.

Unless otherwise specified, after final testing, all valves shall be internally and externally dried, and internally coated with grease or sealant. And, unless otherwise specified in the data sheet or purchase order, bronze and stainless steel valve shall not be painted or coated.

1603.3.11 Delivery, Storage and Handling

Each valve must be provided with factory applied plastic end caps. Maintain end caps through shipping, storage and handling as required to prevent pipe end damage and eliminate dirt and moisture from inside of valve. Store valves inside and protect from weather. Where necessary to store outside, elevate above grade and enclose with durable waterproof wrapping. Protect all fittings from moisture and dirt by storing inside and enclose with durable waterproof wrapping.

1603.3.12 Testing

Each valve shall be subjected to Shell, Seat closure, Pressure and Leak Tests to know if the valves are installed properly and functioning to its designed use. It shall be in accordance with MSS SP-61 Standard for Pressure Testing of Valves. Necessary changes and adjustments shall be made to ensure satisfactory operation of the valve or meter in the system. Mill certificate shall be provided for the quality of the valve. All tests shall be subject to the approval of the Engineer.

1603.3.13 Guarantee and Service

All equipment, materials and workmanship shall be guaranteed for a period of one (1) year from date of acceptance at any time within the period of guarantee and upon notification, the Contractor shall repair and rectify the deficiencies, including replacement of each Valve. Repair of casting by welding and/or impregnation is not permitted. Other repair methods shall receive prior approval of the Engineer.

1603.4 Method of Measurement

The quantity to be paid for shall be the installation and the number of valves installed.

1603.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 1603.4 Method of Measurement shall be paid for at the contract unit price for each of the particular item listed below that is included in the Bill of Quantities, which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment tools and incidentals as well as temporary works necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
1603 (1)	Gate Valve	Each
1603 (2)	Globe Valve	Each
1603 (3)	Double Regulating Valve	Each
1603 (4)	Check Valve	Each
1603 (5)	Butterfly Valve	Each
1603 (6)	Pressure Reducing Valve	Each
1603 (7)	Ball Valve	Each
1603 (8)	Float Valve	Each
1603 (9)	Automatic Air Valve	Each

References:

1) American Society of Mechanical Engineers ASME B16.34 – Valves – Flanged, Threaded, and Welding End
2) Journal regarding ASME B16.34 – www.valveandsealing.com
3) American Society for Testing and Materials ASTM B98M Specification for Copper-Silicon Alloy Rod, Bar and Shapes
4) Manufacturers Standardization Society of the Valve and Fittings Industry MSS SP-61-2009 Pressure Test of Valves
5) L&T Valves Catalogue
6) Uniform Plumbing Code 2000
7) British Standard BS-5154
8) European Standard EN 1092-1
9) Specifications for General Duty Valves for Plumbing Piping