

**INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS**

IAPMO GUIDE CRITERIA

FOR

SOLENOID TYPE WATER CONTROL VALVES

IGC 123-2008

1. PURPOSE

- 1.1** The purpose of this standard is to establish a generally accepted standard for an electrically operated domestic water shutoff-valve, e.g., a solenoid valve. Its purpose is to serve as a guide for producers, distributors, architects, engineers, contractors, installers, inspectors and users; to promote understanding regarding materials, manufacture and installation; and to provide for identifying the valves that comply with this standard.
- 1.2** The provisions of this standard are not intended to prevent the use of any alternate material, or method of construction, provided any such alternate meets or exceeds the intent of this standard.

2. SCOPE

- 2.1** This standard covers the physical requirements, method of testing, materials and marking and identification.

3. REFERENCED STANDARDS

All standards referenced herein shall be the current edition of that standard.

ANSI/ ASME B1.20.1
NSF/ANSI 61

Pipe Threads, General Purpose (Inch)
Drinking Water System Components - Health Effects

4. DEFINITIONS

- 4.1 Solenoid Valve.** A solenoid valve is a combination of two basic functional units: a.) A solenoid (electro-magnet) with its core. b.) A valve body containing one or more orifices. Flow through an orifice is shut off or allowed by the movement of the core when the solenoid is energized or de-energized. The valve will have a solenoid mounted directly on the valve body. The core is enclosed in a sealed tube, providing a compact, packless assembly.

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- 4.2 Direct Acting Valves.** When the solenoid is energized in a direct acting valve, the core directly opens the orifice of a normally closed valve. The valve will operate at pressures from 0 psi to its rated maximum. The force needed to open the valve is proportional to the orifice size and fluid pressure. As the orifice size increases, so does the force required. To open large orifices, while keeping solenoid size small, internal pilots are used.
- 4.3 Internal Pilot Operated Valve.** This valve has a pilot and bleed orifice that enables them to use line pressure for operation. When the solenoid is de-energized, the pilot orifice is closed and full line pressure is applied to the top of the piston or diaphragm through the bleed orifice, providing seating force for tight closure. When the solenoid is energized, the core opens the pilot orifice, relieving pressure from the top of the piston or diaphragm via the outlet side of the valve. The line pressure, itself, opens the valve by lifting the diaphragm or piston off the main orifice. The internal pilot operated valve requires the hung-type diaphragm or piston that is held open mechanically by the solenoid core. The valve opens and remains open with zero pressure drop. The hung-type diaphragm or piston type operated valve is necessary, due to the fact, that in many instances an appliance or fixture that is Included In the water system may bleed off the line pressure when the valve is closed. If that were to occur, the line pressure could drop below the minimum pressure required to keep the hung-type diaphragm or piston closed, and would result in the valve opening and repressurizing the line. If there were a leak somewhere in the system, the valve would become useless and the resulting water damage would occur.

5. DIMENSION & TOLERANCE REQUIREMENTS

- 5.1 Valve & Pipe Size.** The sizing of the valve shall take into consideration the size of the piping installed in the water supply system and the C_v flow factor of the valve. Valves shall have a minimum C_v according to the table shown below.

<u>Inlet Pipe Diameter</u>	<u>C_v Flow Factor</u>
3/4 inch	5
1 inch	13
1-1/4 inch	15
1-1/2 inch	22.5

The C_v shall be calculated using the following equations.

$$C_v = \frac{\text{GPM}}{F_g \times F_{sg}} \quad \text{where: } F_{sg} = \frac{1}{\sqrt{\text{S.G.}}}$$

S.G. = specific gravity @ 14.7 psia and 60°F

F_g = graph factor from valve manufacturer

- 5.2 Valve Construction.** The valve shall be of normally closed construction.