

## Metal seated engineered valves for severe service— reliability with innovative process solutions.

Advantages of HVOF Thermal Spray Coatings.

At Flo-Tite we always focus on combining coatings and actual working conditions to help our customer select our metal seated valves. Our goal is to design high quality materials that perform well in harsh working conditions with extended service life.

Many of Flo-Tite's competitors offer a standard stainless-steel cast ball and seat with a hard chrome plating. Flo-Tite takes a major step forward to offer its standard metal seated valves with a stainless forged ball and seat ring with chromium carbide coatings.

### Advantage of HVOF thermal spray coating.

Metal to metal sealing surface coatings are designed to protect against wear due to galling of the sealing surfaces. Coatings also protect from corrosive, erosive, and abrasive wear caused by the media that is flowing through them.

A properly deposited HVOF carbide coating will have very low porosity content, high hardness, and excellent adhesion.

Chromium carbide offers wear resistance in high temperature environments. It is an excellent alternative to chrome plating and tungsten carbide coatings depending on the severe conditions. Chromium carbide coatings provide less wear resistance than tungsten carbide, however it can offer better heat and oxide resistance at higher temperatures under corrosive conditions.

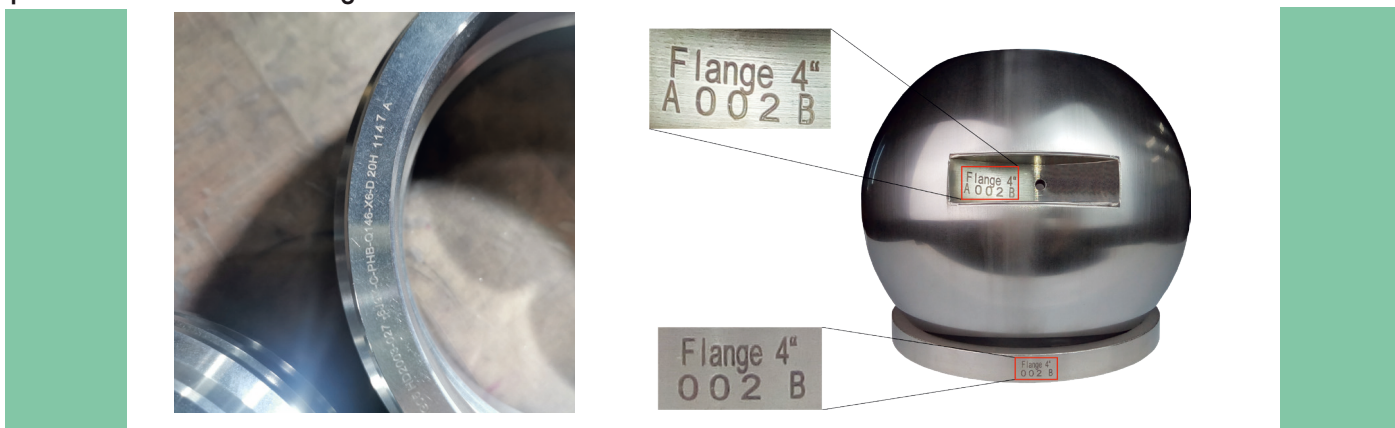
Chromium carbide coatings are good candidates for applications with high temperature environments ranging from over 1004° F to 1499° F (504° C to 815° C) requiring resistance to abrasion, cavitation, fretting, or particle erosion.

There are a variety of coatings on the market, Flo-Tite prefers chromium carbide for performance, longevity, and reliability.

## Parts Traceability

### Ball and Seat

Keeping in mind the safety (from risk of spills, accidents and injuries) and efficiency of facilities/plants where our valves are installed, Flo-Tite follows products labeling and identification practice as per ASME MSS SP25 and API 6D. Apart from the valve body tag-plate, metal seated ball valves have identification numbers engraved on the ball and seats for greater traceability of parts and ease of replacement during preventive or predictive maintenance regimes.



### Valve Body and End Caps

Flo-Tite offers Material Test Reports (MTRs), its quality assurance document that verifies metal's chemical and physical properties such as material composition and its grade, mechanical strength, heat treatments, and test results as per international standards and engineering specifications. Heat numbers are engraved on the valve body and end caps for better traceability of our products. MTRs offered by Flo-Tite comply with EN10204 3.1 standard which reinforce our commitment of supplying high quality products to the valued customers for a variety of industrial applications.

# What is HVOF

High-Velocity, Oxy-Fuel, (HVOF) Devices Are A Subset of Flame Spray. There are two distinct differences between conventional flame spray and HVOF. HVOF utilizes confined combustion and an extended nozzle to heat and accelerate the powdered costing material. Typical HVOF devices operate at hypersonic gas velocities, I.E. greater than Mach 5. The extreme velocities provide kinetic energy which help Produce Coatings that are very dense and very well adhered in the As-Sprayed Condition.

## Hardening Methods of Sealing Surface

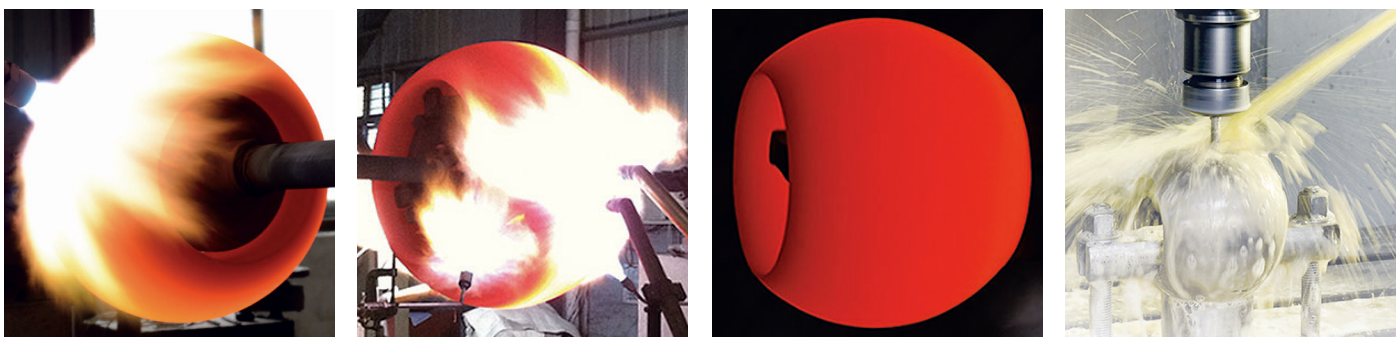
In order to ensure reliable sealing of valves under ranges of temperature and pressures, multiple advanced hardening techniques of Valve-Balls And Valve Seats are adopted.

The Specific Configurations Are Shown In The Following Table.

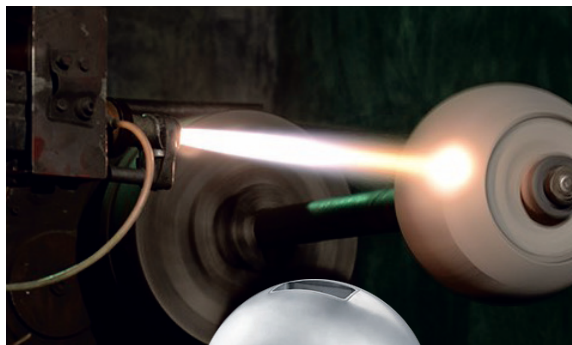
No	Part	Hard Face				Maximum Temp.
		Method	Material	Thickness	Hardness	
1	Ball	High Velocity Oxygen Fuel (HVOF)	CrC	≥ 0.15	HRC ≥ 65	550° C 1022° F
	Seat	High Velocity Oxygen Fuel (HVOF)	CrC	≥ 0.15	HRC ≥ 65	550° C 1022° F
2	Ball	High Velocity Oxygen Fuel (HVOF)	WC	≥ 0.15	HRC ≥ 70	500° C 932° F
	Seat	High Velocity Oxygen Fuel (HVOF)	WC	≥ 0.15	HRC ≥ 70	500° C 932° F
3	Ball	Spray Welding	Ni-Alloy	0.5~1.5	HRC 58~62	500° C 932° F
	Seat	Weld Overlay	Stellite	2~3	HRC 47~52	500° C 932° F
4	Ball	High Velocity Oxygen Fuel (HVOF)	Stellite	≥ 0.15	HRC 52~57	500° C 932° F
	Seat	Weld Overlay	Stellite	2~3	HRC 47~52	500° C 932° F

## Materials and Manufacturing Standards

Test Item	Reference Standard	Description
Material Composition	GB19356/ISO14232	Characterization and thermal spraying of powders.
Microhardness	ISO4516	Micro-indentation testing of metallic and inorganic compounds.
Coating Thickness	ISO2064	Measurement of metallic and inorganic coatings thickness.
Porosity	E2109	Determination of area percentage porosity on metallographic specimens of thermal sprayed coatings.
Adhesive Strength	ASTM C633	Adhesion or cohesion strength of thermal spray coatings.
Material	ASTM A182 F316	Austenitic Cr-Ni forged solution annealed stainless steel.
Coating	Cr3C2-NiCr	High velocity oxy-fuel sprayed chromium carbide-nickel chromium powder coating.



# Metal Seated Valves Tailored to Your Specifications



Unique Problem Solving Designed Ball Valves eliminate the most common Problems found in Typical Ball Valve Designs.

When ball valves fail ,it's most likely related to a valve seat issue. *When choosing a ball valve for problem free operation, select a Flo-Tite Metal Seated Valve.*

## Maintenance Free

When designing a piping system that will have ball valves in hard to reach locations, select a metal seated valve in lieu of a standard soft seated ball valve.

## Allowable Industry Leakage Standard

Flo-Tite valves are designed to meet ANSI/FCI 70-2-1976 requirements, meeting a shut-off class of IV, V, or VI.

Class or Seat Type	Test Fluid	Test Pressure	Allowed Pressure	Notes
IV	Water or air	Lesser of 45-60 psig or max. pressured difference	0.01% of full rated valve capacity	Pressure and flow measured within - 10%
V	Water	Max. difference pressure or by agreement	5x10 ml per min per in. dia. Per pis	Pressure and flow measured within - 10%
VI	Air or nitrogen	Lesser of 45-60 psig or max. pressured difference	Per B16, 104 table to 3" nom. dia	Approx. 6 or less bubbles per min. per in of dia.

**Class V:** The most frequently specified leakage class in class Y and the Flo-Tite standard.

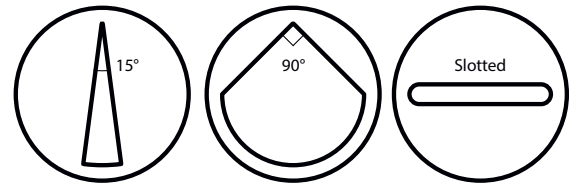
**Class VI:** is frequently misinterpreted as "bubble-tight". Actually, a certain amount of leakage is allowed. Coincidentally, this leakage often is measured by the number of bubbles of air that escapes per minute within the established test guidelines. The bubble-tight term is normally associated with resilient seat valves.

Flo-Tite's Metal Seated Valve options size range 1/4"–24"

Series	Range	Pressure	Design
Tri-Pro	1/4"–4"	3000/2250 PSI	3PC NPT/SW/BW/Flange 300/600
Full Flow	1/2"–24"	ANSI 150/300 Full Port	2PC Flanged End
EZ Series	3"–12"	ANSI 150/300 Reduced Port	2PC Flanged End
Sentinel	3/4"–20"	Class 150/200/600 V Port	1PC Flange End Segmented V-Ball
Multi-Port Trans-Flo	2"–12" 1/2"–4"	Class 150/300 Class 600	Flange Type Multi-Port Valves
Bottom Flo	1/4"–2 1/2"	2250 PSI Full Port/Diverter	3PC NPT/SW/BW Flanged Class 600
Titan	1/2"–2"	4500 PSI	3PC NPT/SW/BW Flanged 900 & 1500

## Control Valve Options

V-Ball Control Valves are ideal for applications where critical high performance characterized flow is required. The V-Ball options are available in most all metal seated valves designs.



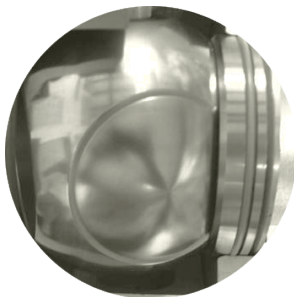
### Accurate Flow Control

Flo-Tite offers modulating V-port control valves. The V-ball is characterized to meet all custom flow requirements.

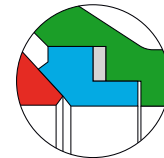
From simple on-off to modulating control applications See tech bulletin page 120.

Control ball or slotted V-ports 15, 30, 60, 90 deg and custom designed balls.

Escaping Ball



Scraper Seat Design



Red - Ball  
Blue - Seat  
Green - Body

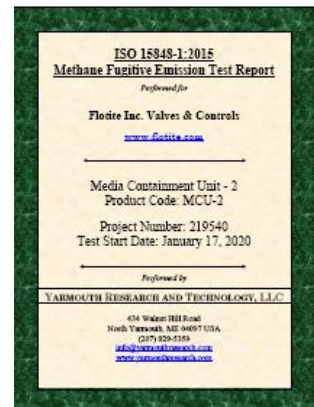
Flo-Tite's unique escaping ball design relieves ball-seat contact during the 90-degree rotation. Full ball seat contact is made at the beginning and at the end of the 90-degree stroke. This reduced contact results in longer life for both class V and VI shut-off with lower operating torques and improved overall performance.

The escaping ball designed is an exceptional design for metal seated valves.

Flo-Tite's Media Cap unit provides an added safety feature with the addition of a secondary set of graphite stem packing with a live loaded design using Belleville washers that automatically compensate for temperature and pressure fluctuation, maintaining a leak proof seal for an extended cycle life. This unit's focus is on safety with duplicate stem seals and added height which helps distance and protect the valve operator from dangerous high temperature heat.



High Temp Protective  
Fugitive Emission Cap / Safety Device  
ISO-15848-1:2015



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