FLOWSERVE

Nordstrom Dynamic Balance® Valves
For Slurry Service

Experience In Motion

Dynamic Balance® Hard Surfaced Valves

For slurry services, Flowserve Nordstrom Dynamic Balance valves can be supplied with the plug and body hard surfaced with nickel or cobalt base alloys. These materials provide a protective coating which greatly reduces erosion of the plug seating surfaces.

With additional hard surfacing in high erosion areas, hard surfaced Dynamic Balance valves provide excellent resistance to abrasion in coal, limestone, iron ore, copper ore and other slurries. For these severe services, hard surfacing extends valve life and improves valve performance significantly.

Flowserve Sulphur Springs Operations has extensive experience in applying hard surfacing materials. Special vacuum furnaces keep the base metal of the plug in a controlled, heated atmosphere where the coating alloy can be fused to base metal with optimum adherence. Fully trained technicians take the hard surfaced plugs and lap these into the matching bodies. A valve shell test is performed to prove pressure containment, and a seat test is performed with normal adjustment to prove the integrity of the seat. To prevent stress cracking of the hard surfacing material, these tests are performed at the valve maximum operating pressure.

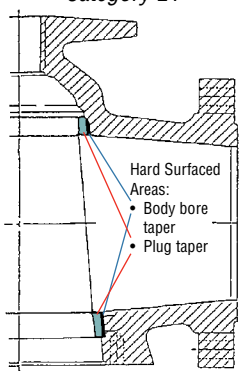
Slurry Valve Design Categories

Nordstrom Dynamic Balance valve materials of construction fall within a basic range of construction categories, A, B, C, D, E, F, H, J, and K (see Nordstrom catalog NVABR1004). Of these, category E was developed for valves used in abrasive applications at temperatures ranging from -20°F to 450°F (-29°C to 427°C).

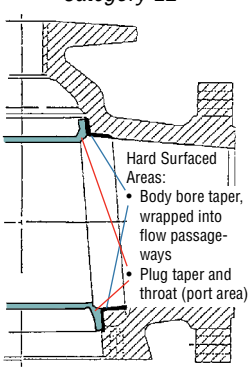
Category E valves are constructed from carbon steel material with a hard surfaced body and plug. Since slurry applications may be more severe than general abrasive applications, and may require different degrees of hard surfacing, Flowserve Sulphur Springs Operations has divided category E valves into three erosion categories: E1, E2 and E3.

Construction Features	Category E1	Category E2	Category E3
Hard surfaced body taper bore	√	√	√
Hard surfaced “wrap” area into body flow passageway		√	
Hard surfaced entire body flow passageway			√
Hard surfaced plug taper	√	√	√
Hard surfaced plug throat (port area)		√	√
Check valve in bottom balance hole (large end) of the plug		√	√
Weld up hole in middle of large end of the plug		√	√
One sealant “purge” hole in body (at circular groove)		√	
Two sealant “purge” holes in body (at circular groove)			√
Two sealant injection points			√

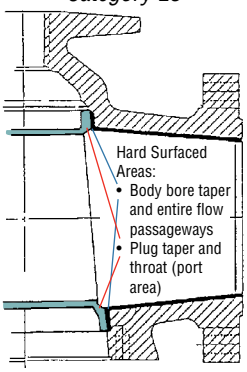
Category E1



Category E2

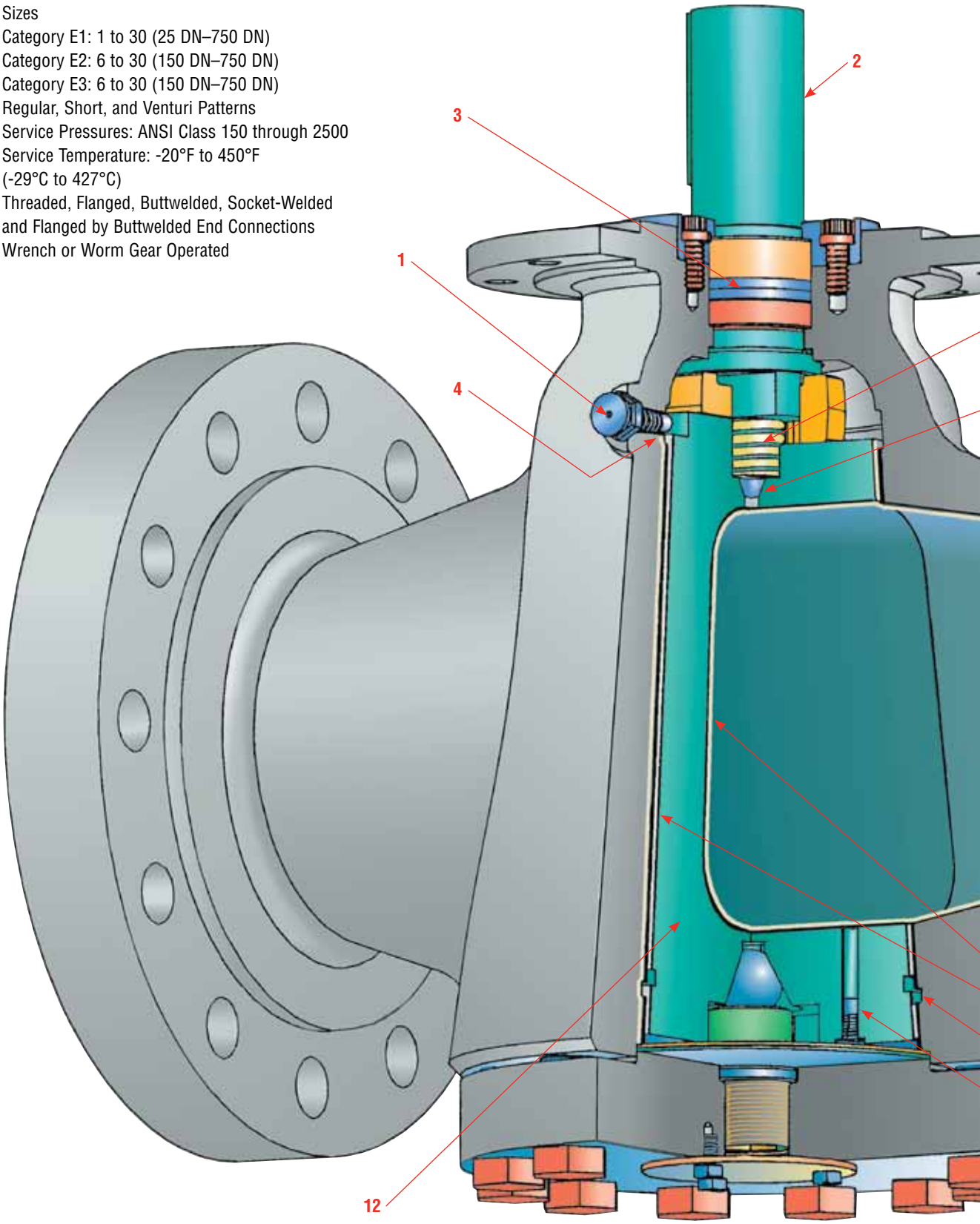


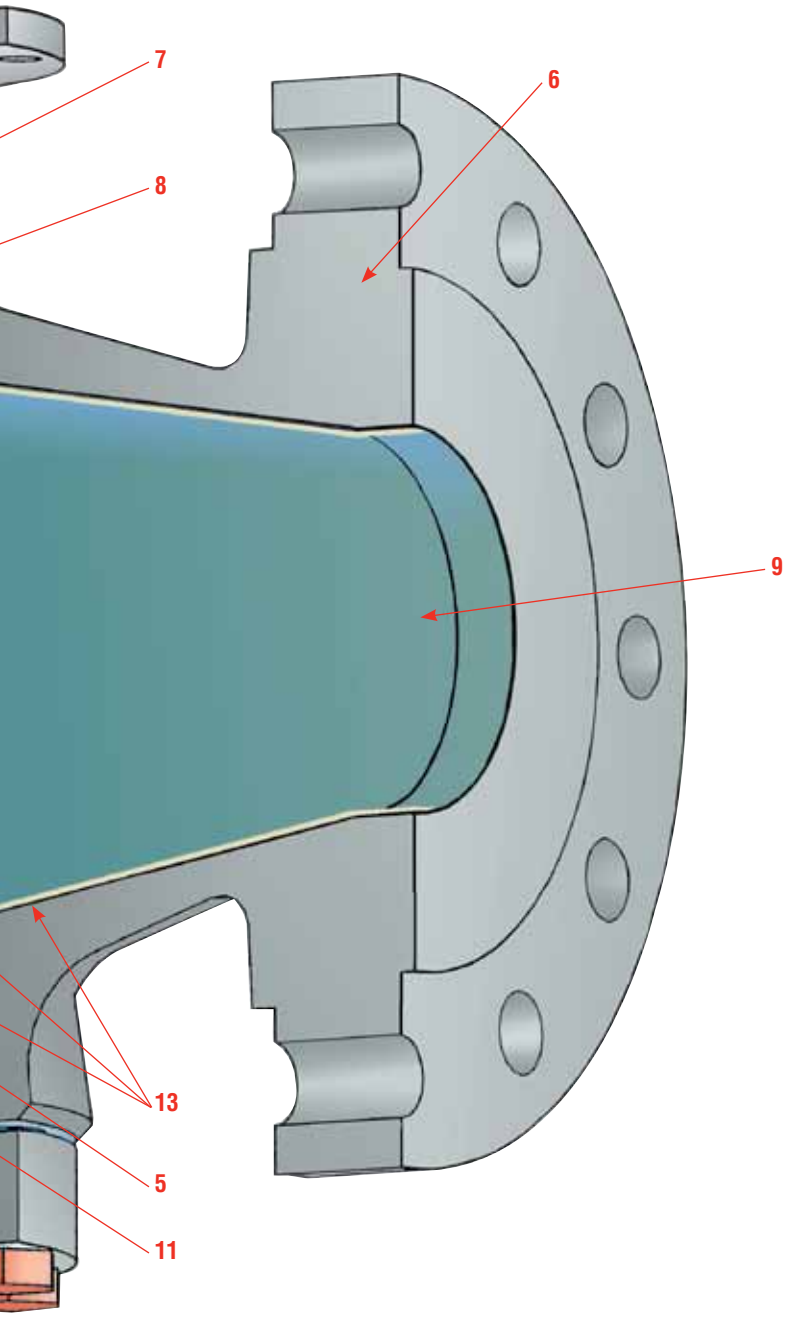
Category E3



Valve Data

- Sizes
  Category E1: 1 to 30 (25 DN–750 DN)
  Category E2: 6 to 30 (150 DN–750 DN)
  Category E3: 6 to 30 (150 DN–750 DN)
- Regular, Short, and Venturi Patterns
- Service Pressures: ANSI Class 150 through 2500
- Service Temperature: -20°F to 450°F
  (-29°C to 427°C)
- Threaded, Flanged, Buttwelded, Socket-Welded
  and Flanged by Buttwelded End Connections
- Wrench or Worm Gear Operated





Features

1. **Giant Button Head Sealant Injection Fitting** permits restoration of seats for drop-tight shutoff when required.
2. **Blowout Proof Stem** treated with PTFE coating to reduce overall valve torque.
3. **Stem Packing** has been specifically designed by Flowserve Nordstrom Valves and uses a combination of graphite and TFE. The stem packing is pressure-energized (no external adjustments necessary).
4. **Sealant Check Valve** prevents escape of sealant from pressurized sealant system.
5. **Sealant Grooves** provides a complete sealant system surrounding the ports.
6. **Heavy-Wall Body**
7. **Plug Balancing Spring** designed to pre-load the plug to prevent vibration or thermal cycling from wedging the plug into the body taper regardless of installed position.
8. **Balance Hole with Ball Check** ensures that pressure above the plug is the same as or greater than the plug port.
9. **Body Flow Passageway**
10. **Body Purge Hole (not shown)** for flushing slurry media from the sealant grooves.
11. **Bottom Balance Hole with Check Valve** maintains pressure equalization between the plug port and the bottom of the plug while the check valve prevents slurry particles from entering the cavity below the plug.
12. **Plug** hard surfaced and coated with permanently bonded low-friction coefficient coating.
13. **Hard Surfacing** light shading shows representative sections which may be hard surfaced.

Dynamic Balance Valves for Slurry Service

Feature	Benefit
Straight and smooth flow passage	Unobstructed flow
Seating surface not in contact with slurry when valve is in the open or closed position	No erosion of seats
No cavities or pockets in flow path	No collection of debris in the valve
Hard surfaced metal-to-metal seating	Resistance to erosion for dependable long life
Plug and body are individually ground and lap fit	Intimate seat contact for leak-tight shutoff
Quarter-turn operation	Quick to operate, easy to actuate
Pressure balanced plug	Predictable torque, confidence that valve will operate at remote locations
Fully contained pressurized sealant system	Pressurized sealant system protects seating surfaces from erosive characteristics of slurry. Provides drop-tight shutoff and allows for a replaceable seat, in-line and under pressure.
Adjustable plug	Extended valve life
Pressure-energized packing	Zero stem leakage with no adjustment required
Threadless, blowout proof stem	Predictable torque and safety
Option of automatic sealant injectors	Consistent, reliable, automatic maintenance

Slurry Questionnaire

To ensure that Flowserve Sulphur Springs Operations provides a slurry valve which will best meet your valving needs, we ask that the following information be provided at the time of the valve inquiry.

Valve Data

1. Size
2. Pressure class
3. Differential pressure (maximum)
4. Operating temperature (minimum and maximum)
5. Connecting pipe size and schedule

Slurry Data

1. The composition of the slurry mixture (both the solid and the liquid)
2. The weight density of the slurry mixture If unknown, please provide:
   a. The weight density of the solid
   b. The weight density of the liquid
   c. The liquid to the solid ratio (or solid to liquid)
3. The Miller number (hardness) of the solid in the slurry
4. The size of the solids in the slurry (Tyler Mesh size)
5. The maximum flow rate of the slurry mixture

Please feel free to provide comments or other information which will be helpful to Flowserve Sulphur Springs Operations in determining the appropriate Dynamic Balance slurry valve.

Slurry Pipelines with Nordstrom Plug Valves

Name	Location	Slurry
ASARCO	Montana, USA	Copper
Black Mesa Pipeline	Arizona, USA	Coal
Black Sea Slurry Pipeline	Murgul, Turkey	Copper
Bougainville Copper Pty., Ltd.	New Guinea	Copper
Calaveras Cement Company	California, USA	Limestone
Chevron Resources Company	Wyoming, USA	Phosphate
Cities Service Company	Arizona, USA	Copper
Compania Minera Dona Ines de Collahuasi	Chile	Copper
Consolidated Coal Company	Ohio, USA	Coal
Fosfertil	Brazil	Fertilizer
Freeport, Inc.	Indonesia	Copper
Kaiser Resources	B.C., Canada	Coal
Kelian Gold	Indonesia	Gold
Kennecott Minerals Company	New Mexico, USA	Copper
Kudremukh Iron Ore Company, Ltd.	Bangalore, India	Iron Ore
La Perla Minas de Fierro, S.A.	Mexico	Iron Ore
Minera Alumbrera Ltda	Argentina	Copper/Gold
Minera Escondida Limitada	Chile	Copper
Ok Tedi Mining	New Guinea	Copper
Pena Colorado	Mexico	Iron Ore
Queensland Cement	Australia	Limestone
Samarco Mineracao, S.A.	Brazil	Iron Ore
Savage River Mine	Tasmania	Iron Ore
Sicartsa Pipeline	Mexico	Iron Ore
Sidermex	Mexico	Coal
Velep Phosphate Pipeline	Brazil	Phosphate
Waipipi Iron Sands, Ltd.	New Zealand	Iron Ore
West Iranian Copper	Indonesia	Copper

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