

	Block Valve Packing Systems (This practice is appropriate for attachment to Inquiry or Purchase Document)	IP 3-12-8	
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		Rev. 2	June 2000

Changes shown by ➤

SCOPE

- I ➤ 1.1 This practice covers the design, materials, packing arrangements, and installation and testing requirements for rising-stem and quarter-turn valve stem packing systems.
- I 1.2 Control valves, special valves, and injection packing systems are **not covered** by this practice.
- I 1.3 **An asterisk (*)** indicates that additional information is required. If a job is contracted, this additional information is furnished in the Job Specification.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I * 2.1 The following Standard shall be used with this International Practice, when specified: **United States EPA Code of Federal Regulations, Title 40, Part 60, Appendix A**, Method 21-Determination of Volatile Organic Compounds Leaks.

DEFINITIONS

- I ➤ 3.1 **Special Valve:** Class 900 and higher valves, or valves designated to require a special packing system with specified component tolerance and clearances, regardless of frequency of use, e.g., POWERFORMING block valves, FCCU slide valves, etc.
- I ➤ 3.2 **Packing Types** are defined as follows:
 - Type 1 packing** consists of an all graphite packing ring arrangement as shown in [Figure 1](#).
 - Type 2 packing** consists of an all elastomer or plastic packing ring arrangement (PTFE or PFE, unless otherwise specified) as shown in [Figure 2](#).
- I * 3.3 **Special Packing** is a packing set for special valves. Special packing requirements shall be specified.
- I 3.3 **Individual packing rings** for Type 1 and Type 2 packing sets specified herein are defined as follows:
 - Style A** Interlaced braided graphite filament or solid 100 lb/ft³ (1600 kg/m³) minimum density compound carbon ring, with corrosion inhibitor. To be used only as end wiper rings in packing combinations.
 - Style B1** Die-formed flexible graphite with corrosion inhibitor. 70 - 90 lb/ft³ (1120 - 1440 kg/m³) nominal die-formed density; used as sealing rings in packing combinations.
 - Style B2** Die-formed flexible graphite with corrosion inhibitor. 70 lb/ft³ (1120 kg/m³) nominal die-formed density; used as sealing rings in packing combinations.
 - Style C** Elastomer/plastic packing sealing rings. Material to be specified in purchase order.
- I 3.4 **Valve usage** for the purpose of this practice, is as follows:
 - Infrequently Cycled Valve:** Used on average less than once per month.
 - Frequently Cycled Valve:** Used on average more than once per month.
- I 3.5 **Stem straightness** is the deviation from a true straight line.
- I 3.6 **Stem cylindricity** is a measure of the non-circularity of the stem, as measured by deviation from the surface of a true cylinder centered on the stem center line.

DESIGN

E 4.1 The **packing** shall be selected to **control fugitive emissions** in compliance with local **environmental regulations**.

R * 4.2 **Packing system selection** shall be per the table below for the service, unless otherwise specified.

SERVICE	FLUID TEMPERATURE RANGE	PACKING TYPE	STYLES
Hydrocarbons (including vapors), hydrogen, H ₂ S (including sour water), steam and condensate, organic solvents, caustic, air, inert gases, additives, water (including salt/brackish), ammonia, amines	-400°F (-240°C) to 1000°F (540°C) ⁽¹⁾	Type 1	A, and B1 or B2
Acids, halogens, oxygen and other strong oxidizers	-450°F (-268°C) to 450°F (232°C)	Type 2 ⁽²⁾⁽³⁾	C

Notes:

- * (1) Use over 1000°F (540°C) or colder than -400°F (-240°C) requires approval of the Owner's Engineer.
- * (2) Type 1 packings may be used in services where low concentrations of strong oxidizers exist with approval of the Owner's Engineer.
- * (3) Type 2 packings shall not be used in a valve designated to be fire safe, unless a secondary fire safe packing, completely independent of the primary packing is used, and is approved by the Owner's Engineer. Actual packing temperature shall not be less than -80°F (-62°C).

R 4.3 **Type 1 packing systems** shall have an active zinc, passive barium molybdate, or passive phosphorus based **corrosion inhibitor**, either embedded in each graphite ring or in the form of a surface coat. **Separate zinc washers** between packing rings **shall not be used**. **Barium molybdate** based corrosion inhibitors shall **not** be used in **HF acid** services.

R 4.4 **Bushings (spacers)**, not additional rings of packing, shall be used to take up excess depth, if any, in the stuffing box. Bushing material shall be either the same nominal chemical composition as the valve body or stem (preferred), or alternatively, 95% plus pure carbon bushings with corrosion inhibitor may be used when the bottom of the stuffing box is flat.

R 4.5 **Graphite based die-formed rings, braided rings and bushings** shall have a minimum carbon content of 95%, no more than 100 ppm leachable chloride content, and no more than 1500 ppm sulfur content, and shall not contain binders, lubricants or other additives.

R 4.6 **Type 1 end (wiper) rings** shall be Style A. The inside (sealing) rings may be either Style B1 or B2 (Style B2 preferred) for infrequently cycled valves, and shall be Style B2 for frequently cycled and repacked valves.

R 4.7 **Type 1 or Type 2 packing ring** cross sections may be other than rectangular if they are supplied as a manufacturer's standard configuration.

R * 4.8 **Five ring packing sets** shall be used on **API-600** and **ASME B16.34** gate valves, and other rising stem valves unless otherwise approved by the Owner's Engineer.

R 4.9 Unless otherwise approved by the Owner's Engineer, **four ring packing sets** shall be used on all quarter-turn valves (ball, plug and butterfly types) except that for quarter turn valves NPS 1 (25 mm) and smaller, the wiper rings may be eliminated.

R 4.10 **Endless die-formed packing rings** shall be used on all new and shop reconditioned valves.

R * 4.11 When **tandem packing sets with lantern ring** are specified, the lantern ring shall be of the same nominal chemistry as the valve body or stem, and shall be configured as shown in **Figure 3**, for all-graphite packing systems unless otherwise specified. Non-graphite tandem packing sets, if used, shall have materials and configuration specified.

R * 4.12 Use of **live-loaded glands** for packing systems shall be approved by the Owner's Engineer.