

## Bray Materials Selection Guide

The Bray Materials Selection Guide for butterfly valve seats and discs is intended to be used exactly as its name implies - as a "guide" to aid in selection of the most cost effective butterfly valve materials. The information tabulated herein is based upon valve usage experience, data from elastomer, metal and other suppliers, data from customers and experienced elastomer compounders, and data from published references and literature. Though Bray believes the material recommendations to be valuable in selecting appropriate materials, one must recognize there are a variety of factors which exist for each specified field application. Some of the factors which must be considered are temperature, concentration, velocity, aeration, pressure, presence of other materials in the media, operating frequency, flow conditions, suspended abrasive particles, etc. Each of these factors may have a severe effect on the performance of the material. In addition, these factors can exist in field applications in an endless number of different combinations. As a result, it is not possible to develop a material recommendation chart which accounts for all the given combination of factors for each corrosive media. In addition, the grade of elastomers and compound itself will determine elastomer performance. With this understanding,

Bray explicitly states:

No representation, guarantee, warranty, or responsibility, express or implied, is made by the Bray Material Selection Guide herein because of the complexity and infinite combinations of concentration mixtures, flow conditions, temperatures, and other application factors possible in actual service. All responsibility regarding the suitability of materials chosen for an application lies solely with the customer and/or engineering company hired by the customer to assist him. Bray cannot guarantee the accuracy of this Material Selection Guide nor assume responsibility for the use thereof. If one is in doubt, it is always best to test first.

### Materials Selection Guide – How to Use

a) Corrosive Media Column – All media are listed alphabetically. All oil, water, and planting solution media have been listed under their group heading for convenience. Some chemicals having a common laymen's name have been referenced as such. In a resilient seated butterfly like Bray's design, the seat and disc are the only valve parts exposed to the line media.

Bray's selection of seat materials includes various elastomers and Teflon lined elastomers. The variety of disc materials includes metal and elastomer, nylon, or Teflon covered metals. Thus, to best analyze the materials offered for a particular media application, Bray has grouped the materials into two groups – disc materials and seat/disc materials. Please note that since Bray offers elastomers and Teflon as both a seat or as a covering for discs, we have called the second grouping seat/disc materials.

b) Physical State Column – This condition identifies the physical state of the corrosive media at room temperature as Gas, Liquid or Solid. Note that almost all solids are conveyed in solution and only a few media such as cement, baking soda, flour, sugar, sulfur, etc. are pneumatically conveyed as solids.

c) Condition Column – These columns define any unique condition parameters of the media for rating the materials. If no conditions are specified, it should be assumed the concentration is any level 0 – 100% and to allowable temperature is the seat material's temperature rating except for nylon covered ductile iron. With regard to disc materials the nylon covered ductile iron disc is covered with Nylon 11. This material is rated for temperatures well over 95°C (200°F). For purposes of the Material Selection Guide, however, we have chosen to limit the A rating of Nylon covered discs in continual service to 60°C (140°F) and would like to use nylon covered discs, please call Bray's Inside Sales Department for further information on your specific application.

For example:

Corrosive Media	Physical State	Disc Materials							Seat/Disc Materials					
		Condition	DI	NDI	Al Br	316 SS	Coating	Condition	EPDM	NBR	FKM	PTFE S20/21	PTFE S22/23	UHMWPE
Stannous Chloride	Solid		N	A*	N	A		<10%,<140°F	B	A*	A	A	A	A
Stannous Chloride	Solid							<10%,<140°F	B	A*	A	A	A	A

Since no conditions are specified for Disc Materials, one should assume nylon covered ductile iron is the recommended material for content temperatures up to 60°C (140°F), and 316 stainless steel above 60°C (140°F). Of course, Nylon 11 may actually be suitable for temperatures much greater than 60°C (140°F), as stated previously.

d) Disc Materials and Seat/Disc Materials – Under each grouping, the primary materials offered by Bray have been graded for their suitability to the media and conditions stated. The grading system is as follows:

A – Recommended, generally little or minor effect based on valve usage experience and recommendations from suppliers.

B – May sometimes be used depending upon the conditions of application such as concentration and temperature. Testing is recommended before full-scale usage.

N – Not recommended for usage.

Blank – Insufficient evidence available.

e) Recommended Materials for Disc and Seat/Disc – For each media and condition, we have placed an asterisk by the disc and seat material recommended by Bray. The material given an asterisk depends on two factors:

1) The material is rated A for compatibility with the media conditions;

2) It is the most economical Bray material offered as a disc in combination with the most economical seat material.

For example:

Corrosive Media	Physical State	Disc Materials						Seat/Disc Materials					
		Condition	DI	NDI	Al Br	316 SS	Coating	Condition	EPDM	NBR	FKM	PTFE S20/21	PTFE S22/23
Carbon Tetrachloride	Liquid	<75°	N	B	B	A*		N	N	N	B	A*	N

If the carbon tetrachloride for your media is <24°C (75°F), you must choose a 316 disc, not AB, because Bray does not offer an AB disc with a Teflon seat. If the temperature is >24°C (75°F), one should not assume we do not have a suitable valve material code. Remember, Bray carries EPDM, Buna-N, and Teflon molded disc-stems, thus one should select a Teflon disc stem and a Teflon seat for this application.

f) Coating of Disc Materials – When a disc coating is recommended, it will be noted in this column. The most economical Bray coating material will be noted with an asterisk. An example of reading the Material Selection Guide with a recommended disc coating is as follows:

Corrosive Media	Physical State	Disc Materials						Seat/Disc Materials						
		Condition	DI	NDI	Al Br	316 SS	Coating	Condition	EPDM	NBR	FKM	PTFE S20/21	PTFE S22/23	UHMWPE
Hydrochloric Acid	Liquid	<5%	N	A*	N	N		<15%,<75°F	A*	N	A	A	A	A
Hydrochloric Acid	Liquid	<5%	N	A*	N	N		<37%,<75°F	A*	N	B	A	A	A
Hydrochloric Acid	Liquid	<37%	N	B	N	N	A* EPDM		N	N	N	B	A*	

If one has a concentration of Hydrochloric Acid less than 5% at any temperature, Bray recommends an NDI disc and EPDM seat. If the condition is a concentration less than 37% or more at any temperature, Bray recommends a Series 22/23 Teflon disc stem and seat, or a disc and stem that has EPDM coating.