VICI VALCO Materials

Properties of Metals

Stainless steel, Type 316

This is the standard tubing material for chromatography, suitable for a wide variety of applications. It is cold drawn seamless, not welded, with close tolerances held on both ID and OD. Stainless steels may be used for most chromatographic applications. Type 316 is most commonly used for HPLC because of its superior chloride ion resistance.

Hastelloy C® Series

This is the material most often recommended for corrosion resistance – it works when nothing else will. This versatile nickel-chromium molybdenum alloy has excellent resistance to most acids including nitric, formic and acetic acids; strong oxidizers such as ferric and cupric chlorides; wet chlorine; sea water and brine solutions; and mixtures containing nitric or oxidizing acids with chlorine ions. The best choice for most special applications where HPLC grade stainless cannot be used, Hastelloy C has excellent resistance to pitting, stress corrosion cracking, and oxidizing atmospheres up to temperatures well beyond any other standard components of the chromatographic system.

Nitronic 60

Chemical resistance is similar to Type 316 stainless, but its resistance to galling and oxidation make it superior to Type 316 or 303 in the majority of applications. This is the standard material in Valco and Cheminert metal valve lines.

Properties of Polymers

PAEK

Polyaryletherketone is the generic name for the family of polyketone compounds. (See PEEK.) PAEK includes PEK, PEEK, PEKK, and PEKEKK, which differ in physical properties and, to a lesser degree, in inertness. VICI uses a range or proprietary PAEK-based composites
(PEEK and others) for valve and fitting components. These composites resist all common HPLC solvents and dilute acids and bases. However, concentrated or prolonged use of halogenated solvents may cause the polymer to swell. Avoid concentrated sulfuric or nitric acids (over 10%).

PVDF

PVDF, polyvinylidene fluoride, has excellent resistance to most mineral and organic acids, aliphatic and aromatic hydrocarbons, and halogenated solvents. Poor resistance to acetone, MEK, THF, and potassium and sodium hydroxide. Often supplied as Kynar®.

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Rotor Materials

Valcon E

A polyarylethereketone/PTFE composite, the E material receives wide use in GC applications and in HPLC applications where the temperature requirement is higher than what can be handled by the H material and where a lower pressure limit can be tolerated. (Standard specs are 400 psi at 225°C, but higher pressure ratings are possible at reduced temperatures). However, this polymer cannot be used in prolonged contact with high concentrations of sulfuric and nitric acids, DMSO, THF, or liquid methylene chloride.

Valcon E3

This designation indicates a proprietary polyimide blend with chemical properties similar to Valco T, but with higher compressive strength.

Valcon H

This composite, a carbon fiber reinforced, PTFE-lubricated inert engineering polymer, has long been the standard for typical HPLC applications in which pressures are around 5000psi and temperatures are not more than 75°C. It is not unusual for these valves to be ordered for use at 10,000 psi. However, at that point the lifetime may be shortened by as much at 50%.

Valcon T

This polyimide/PTFE/carbon composite has been used successfully for many years and still cannot be surpassed when applications demand operating temperatures in the 250°C-350°C range. However at temperatures below 150°C there is a tendency for the seal material to stick to the valve body, making the valve difficult to turn and causing the rotor to crack in extreme cases. The T material is susceptible to attaché from steam, ammonia, hydrazines (anhydrous liquids or vapor), primary and secondary amines, and solutions having a pH of 10 or more. Chemical reagents which act as powerful oxidizing agents (nitric acid, nitrogen tetroxide, etc.) must also be avoided.

**Information provided by VICI Valco (http://www.vici.com/ref/ref.php)*