thermo scientific

Septa selection guide

Overview

Different septa material for LC and GC applications

There are many different types of materials used to produce the septa found in LC and GC vial caps. This document will provide you with the technical guidance you need in order to make the right selection.

Choosing the right septa

When selecting which septa is right for your experiments, it is important to consider the following:

- **Instrument**—instruments use different injector needles and for some instruments, having pre-slit septa, or choosing a material with a lower shore (hardness) value will help reduce the chances of needle issues.
- **Compounds of interest**—if your compounds are volatile then choosing septa that will provide a tight seal is key to prevent compound loss
- **Solvents**—some solvents that are commonly used for GC and LC experiments can impact the septa integrity. Use our Chemical Resistance and Septa Solvent Compatibility Sections for more details

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Choosing the right septa

When choosing proper septa, there are many factors to consider: type of solvent or sample, slit or non-slit design, and reseal ability. These factors ultimately lead to material makeup of the septa. Depending on the material chosen, you must also determine the proper tip diameter and if the septa must be able to withstand multiple injections to avoid debris.

The chart below offers a starting point to help you select septa that will help prevent contamination and avoid damage.

Multiple injection? ↓	Storage temperature? ↓			Thin, fragile needle? ↓	Blunt, thick needle? ↓	Critical analysis? ↓	Low coring? ↓
Good resealability properties necessary ↓	-40 °C ↓	-40 °C ↓	-60 °C ↓	Soft and thin septa required ↓	Slit/pre-cut liner as penetration aid (HPLC) ↓	Very clean liner required ↓	Both sided PTFE laminated liners required ↓
natural rubber/TEF	**natural rubber/TEF; butyl/PTFE**	**red rubber/ PTFE**	**silicone/ PTFE**	**e.g. silicone/ PTFE**	**silicone/ PTFE, slit**	**silicone/ PTFE septa**	**PTFE/ silicone/ PTFE**

Need an answer quickly?

There is an on-line tool available to you for additional support. This tool factors in the type of experiment you are performing, the instrument model and type, solvent ,and detection technique and provided you with a suitable septa. The tool also provides you with a part number so you know what you need to order

Septa Selection Guide

An easy-to-use tool that ensures you find the right septa for your experimental requirements

thermofisher.com/septa

Septa selection guide

General chromatography vials: Septa material

In this section, the key attributes to the different septa available can be found.

PTFE/natural red rubber

PTFE/natural red rubber are moderately priced seals for GC and HPLC with good chemical properties. They are ideal for multiple injections due to high resealability, but not as easy to penetrate as PTFE/RR. Natural rubber septa are offered assembled into aluminum crimp seals.

PTFE/synthetic red rubber septa: (PTFE/RR)

PTFE/Synthetic red rubber septa are an economical choice for general GC and HPLC applications. Used primarily for routine analysis in gas chromatography with FID, TCD and FPD detectors or HPLC with UV/Vis or RI detectors, PTFE/Synthetic red rubber septa offer good resealability and excellent chemical inertness before puncture. The low durometer of red rubber allows for easy needle penetration even with thin bore GC needles. PTFE/Red rubber septa are not recommended for multiple injections with long run times or retention of samples for further analysis after initial puncture.

PTFE/silicone septa: (T/S)

PTFE/Silicone is the most versatile septum material offered in various formulations to address specific applications requirements. Extractables from PTFE/Silicone septa are generally at lower levels compared to other resealable materials. PTFE/Silicone septa are formulated for different hardness (durometer) meeting requirements of various needle types. Formulations offering highly consistent performance, lowest background/blank value, and good chemical compatibility, effective sealing/resealing and low penetration force make PTFE/silicone septa suitable for all types of chromatographic applications. A thin film of PTFE is laminated to the side of the septum that faces the sample to limit exposure of the elastomer to the solvent. PTFE/Silicone septa are ideal for use in most HPLC and GC applications where resealability and purity are critical.

Pre-slit PTFE/silicone septa

Pre-slit septa are offered in many of the same formulations as for non-slit PTFE/silicone septa and shares most of the physical and chemical characteristics. The septum is provided with a thin 0.005" PTFE layer laminated to highly pure silicone, and slit through the center for easier needle penetration and to release the vacuum that forms when a large volume of sample is withdrawn from a vial. This septum provides chromatographic characteristics similar to that of a septum without a slit, except that the ability to withstand exposure to aggressive solvents is slightly lessened. Pre-slit septa are highly recommended for autosamplers with thin gauge needles or higher volume injections where a vacuum creation in the vial can be an issue.

PTFE/silicone/PTFE septa: (T/S/T)

A layer of inert PTFE film is laminated to each side of high-purity, medium durometer silicone to form a septum that is resistant to coring, but still maintains good resealing characteristics. T/S/T septa are recommended for the most critical applications such as ultratrace analysis, where there is a longer time between injections. T/S/T septa provide superior performance with any autosampler employing a large diameter, blunt-tip needle. T/S/T septa can have benefits when working with solvents that tend to attack silicone by protecting both sides of the elastomer.

PTFE disk septa

A solid disk of 0.010" thick pure PTFE offers superior chemical inertness against the most aggressive solvents. The thin membrane allows for penetration by most normal gauge metal HPLC needles. PTFE septa are not resealable and should not be used with highly volatile solvents, short cycle times or multiple injection methods. PTFE septa are rarely used for GC applications.

Polyethylene (PE) septa and integral molded closures

Chemically resistant polyethylene septa are molded into single-piece caps. The surface for needle penetration is 0.01" thick, allowing for use with most HPLC autosamplers. Polyethylene septa are not resealable and are intended for single injection use with aqueous based sample mixtures.

Polypropylene (PP) septa and integral molded closures

Chemically resistant polypropylene septa are available molded into single piece caps or as 0.01" thick disks inserted into closures. The surface for needle penetration is 0.01" thick, allowing for use with most HPLC autosamplers. Polypropylene septa are not resealable and are intended for single injection use with aqueous based sample mixtures. Polypropylene septa offer better solvent compatibility compared to polyethylene, but piercing force is slightly higher.

Viton (V1) septa

Viton septa are used in situations where a resealable septum is required for a sample matrix that aggressively attacks all other materials. Viton offers chemical resistance similar to PTFE along with limited ability to reseal after initial puncture. Viton septa have a high resistance to piercing and due to their high cost are considered to be the septum of last resort when all other materials are unsuitable.

Septa selection guide

Headspace and sample preparation applications: Septa material

These septa often require elevated temperatures and should only be used with suitable headspace caps (crimp or screw caps). The temperatures below are for guidance.

Gray butyl stopper

An economical septum. Gray butyl stoppers do not provide a PTFE film barrier and are not suitable for use with alkanes, benzene, chlorinated solvents or cyclohexane. Butyl rubber stoppers are preferred for analysis of fixed gases and where absolute resistance to moisture penetration is required.

Gray PTFE/red rubber septa

Good solvent resistance, good resealing characteristics, resistant to coring. An economical choice where a PTFE barrier is desired. PTFE facing improves solvent compatibility until initial puncture.

PTFE/white silicone purepack septa

Excellent choice for general volatiles analysis. Septa are packed in a glass PurePak jar to assure low background, low permeability, and the highest performance of any headspace septum. PTFE/Silicone septa provide excellent resealing characteristics and broad chemical compatibility.

Gray PTFE/molded black butyl septa (Pharmafix style)

C4020-36 is a molded septum featuring a PTFE-faced center surface that does not extend to the edges of the septum. The PTFE center area provides good resistance to a wide variety of solvents. The center puncture area is resistant to coring and will reseal after several punctures. The grey butyl outer sealing edge conforms well to the rim of the vial affecting a more positive seal against loss of fixed gases.

PTFE/blue high-purity silicone septum

Translucent blue silicone is specially formulated and treated to reduce background from extractables or outgassing of volatile contaminants. The silicone elastomer layer is dense but still easily pierced by most headspace sampling needles.

Black rubber septa

Black Rubber septa are molded from a higher density rubber compound compared to the standard red rubber. This septum has characteristics similar to the gray butyl stopper. The Black rubber septum is an economical choice for applications where reduced levels of vapor penetration are desired.

Temperature stability chart

	Min. temp °C	Max. temp °C	Min. temp °F	Max. temp °F
PTFE/Natural red rubber	-10	+85	14	+185
PTFE/Synthetic: (PTFE/RR) red rubber septa	-30	+110	-22	+230
PTFE/ High-performance red rubber septa	-40	+110	-40	+230
PTFE/Silicone septa: (T/S)	-60	+200	-76	+392
PTFE/Silicone/PTFE septa: (T/S/T)*	-60	+200	-76	+392
PTFE septa*	-200	+250	-328	+482
Butyl/Chlorobutyl/Bromobutyl stopper or septa	-20	+125	-4	+257
Gray PTFE/Red rubber	-40	+120	-40	+248
PTFE/White silicone purepack septa	-60	+200	-76	+392
Gray PTFE/Molded black butyl (pharmafix) septa	-20	+125	-4	+257
Black rubber septa	-20	+100	-4	+212

*This septum is used for liquid injection. 20 mm version is not available.

General chromatography vials: Septa properties

Rubber	Used primarily for routine analysis in gas chromatography. Offers moderate resealability and good chemical inertness. Not recommended for multiple injections or holding samples for further analysis. PTFE is protective layer that once broken exposes rubber to chemical attack
PTFE/red rubber – AC6, 6RT1	Low durometer of rubber allows ease of needle penetration. A popular and economical septa for general GC purposes
PTFE/rubber – AC7, 8RT1	Harder grade of rubber for use with piercing needle. Most popular and economical septa for general GC purposes in Agilent systems
Pre-slit PTFE/red rubber – 8RT1X	Pre-slit, high quality red rubber with a thin (0.003") layer PTFE. For applications using a very thin-gauge syringe needle or in instances when a vacuum may form in the vial
Silicone rubber	High quality, silicone rubber laminated to PTFE. Use when excellent resealing qualities are a must. Septum resists coring and is recommended when multiple injections are required. Preferred septa for use in liquid chromatography applications
PTFE/silicone – ST1, ST15, ST18, ST2	A white medium hardness silicone with red PTFE protective layer available in a range of thickness
PTFE/silicone – ST101, ST14	• A very pure soft silicone laminated to PTFE. Septum resists coring and is recommended for instruments with fine gauge needles • Also recommended for LC-MS and GC-MS due to high purity
PTFE /silicone – ST143, ST144	A very soft silicone laminated to PTFE. Use with flexible needle
PTFE /silicone/PTFE – TST1, TST11	• A layer of PTFE on each side of medium hardness silicone. Most resistant to coring with above average resealing characteristics • Recommended for most demanding applications such as trace analysis, longer time between injections or for internal standards • Use with Gilson instruments and with any autosampler using large diameter, blunt-tip syringe needles
Pre-slit PTFE/silicone – ST1X, ST101X, ST14X	Pre-slit, high quality pure white silicone faced with PTFE. For applications using a very thin-gauge syringe needle or in instances when a vacuum may form in the vial. Highly recommended for Shimadzu and Hitachi autosampler units
PTFE and fluoropolymers	Very good chemical resistance and used as a protective layer for less resistant elastomers
PTFE – T, T02	For single injections and short sample cycles. This type of septa is not resealable
Viton – V1	Viton provides the best chemical resistance with limited resealability. Recommended for chlorinated solvents. Due to Viton's intrinsic hardness, these septa are not suitable for finer-gauge syringe needles
Integral plastic seal	Moulded as part of the cap
Polyethylene – PE, Polypropylene – PP	Chemically resistant but for one time use only with no resealability. Free of Fluoropolymer coating so suitable for PFOA analysis

Note: These septa often require elevated temperatures and should only be used with suitable headspace caps (crimp or screw caps). These temperatures values shown in this table are for guidance.

Headspace and sample preparation applications: Septa properties

Butyl rubber/chlorobutyl rubber	An economical choice for low temperature (< 125°C) or low-pressure applications choice. Not suitable for alkanes, benzene, chlorinated solvents or cyclohexane without a protective PTFE layer.
Grey bromobutyl stopper – B3P	Does not provide PTFE barrier. Use for gas sampling due to low permeability
Black chlorobutyl – CB3	Does not provide PTFE barrier. Use for gas sampling due to low permeability
Grey bromobutyl/black PTFE – CBT3	Has PTFE barrier that makes it suitable for work with general organic solvents with low gas permeability
Grey PTFE/black bromobutyl molded – CBT3B	Specially molded seal with PTFE insert. Sealing surface of Butyl and PTFE affects a more positive seal than non-PTFE-faced septa. Good sealing characteristics, excellent resistance to most solvents with reduced coring and high puncture tolerance. PTFE provides increased chemical resistance
Silicone rubber	Excellent septa choice for volatiles with very low background peaks and low permeability. Also ideal for alcohols and aqueous samples. Good resealing characteristics and resistant to coring
Natural PTFE/blue silicone – ST3, ST201	Best septa choice when temperatures are over 125°C
Natural PTFE/red silicone – ST3HT	High temperature formulated seal with low bleed. Best septa choice when temperatures are up to 300°C
Blue silicone/red PTFE – ST144	Thin 1.4 mm seal with PTFE face for use with Fisons® and Carlo Erba® instruments. Resealing capability limited due to thinner silicone layer
Aluminum/white silicone – AS3	Reflective aluminium face protects the silicone seal. The white silicone is suitable for use up to 170°C
Aluminum/red silicone – ASH3	Reflective aluminium face protects the silicone seal. The red silicone is suitable for use at temperatures up to 250°C
Blue silicone/natural PTFE – ST101	Soft silicone with clean formulation for minimal interference. Thinner seal suitable for solvent washing, solvent extraction and SPME application with some resealing. Not for direct headspace applications
Freezer bungs – 2FB3	Butyl bungs for sealing of lyophilized products. Compatible with low storage temperatures and low gas permeability
PTFE/silicone ring – LLX	Thin PTFE layer with sealing ring to give secure closure for strong solvents. For use in liquid extraction or SPME stage during sample preparation. Does not reseal. Single use only

Septa hardness

This table provides an overview of the septa hardness and thickness. The hardness testing of plastics is most commonly measured by the shore (durometer) test. This method measures the resistance of plastics toward indentation and provides an empirical hardness value. Shore hardness, is the preferred method for rubbers/elastomers and is also commonly used for 'softer' plastics such as fluoropolymers. Most septa hardness values are stated in shore A. The results obtained from this test are a useful measure of relative resistance to piercing of various grades of polymers. This gives guidance on the type of needle that will penetrate the seal and whether thinner gauge needles may be used.

General chromatography vials

Septa material	Hardness °shore	Thickness (mm)
TST1 Red PTFE/white silicone/red PTFE	57	1.0
CBT1 Gray chlorobutyl/PTFE	52	1.0
ST14 Blue silicone/PTFE	50	1.2
6RT1/AC6 Synthetic rubber/PTFE	38	1.0
ST101 Blue silicone/PTFE	30	1.0
ST143 White silicone/PTFE	20	1.4
ST144 Blue silicone/red PTFE	20	1.4
V1 Viton	62	1.0
AC7 Natural rubber/PTFE	60	1.0
8RT1 Synthetic rubber/PTFE	58	1.0
ST2 White silicone/red PTFE	57	2.0
ST18 White silicone/red PTFE	57	1.8
ST15 White silicone/red PTFE	57	1.5
ST1 White silicone/red PTFE	57	1.0

Headspace and storage applications

Septa material	Hardness °shore	Thickness (mm)	Max. temp °C
CBT3B bromobutyl/PTFE (moulded)	52	3	120
CBT3 bromobutyl/PTFE	52	3	120
CB3 chlorobutyl	52	3	120
ST3 blue silicone/PTFE	45	3	200
ST3HT red silicone/PTFE	45	3	300
ST201 blue silicone/PTFE	45	2	200
AS3 white silicone/aluminium	45	3	170
ASH3 red silicone/aluminium	45	3	250

Chemical resistance

This chart provides a guideline for the chemical resistance of materials used for vials and closures. Because so many factors can affect chemical resistance, it may be necessary to test your product under your actual conditions of use.

Effects of chemicals on plastics

Chemicals can affect the strength, flexibility, surface appearance, color, dimensions, and weight of a plastic. These changes are caused by (1) an attack on the polymer chain resulting in oxidation, reaction of functional groups, and depolymerization; (2) dissolution in a solvent and solvent absorption or permeation that causes softening and swelling; and (3) stress cracking from a "stress-cracking agent."

Environmental stress cracking is the failure of a plastic in the presence of certain types of chemicals, but it is not a result of a chemical attack. Simultaneous presence of three factors causes stress cracking: tensile stress in the plastic, its inherent stress-cracking susceptibility, and a stress-cracking agent. Common stress-cracking agents are detergents, surface active chemicals, lubricants, oils, ultrapure water, and plating additives such as brighteners and wetting agents. Relatively small concentrations of stress-cracking agent may be sufficient to cause cracking.

Mixing and/or diluting certain chemicals in plastic labware can be potentially hazardous. The reactive combination of compounds of two or more classes may cause a synergistic or undesirable chemical effect, resulting in an increased temperature that can affect chemical resistance (as temperature increases, resistance to attack decreases), causing product failure. Other factors that also affect chemical resistance include pressure, internal or external stresses (e.g., centrifugation), length of exposure, and concentration of the chemical. Always pre-test your specific usage and follow correct lab safety procedures.

Attention: Please be aware that, although several polymers may have excellent resistance to various flammable organic chemicals and solvents, OSHA H CFR 29 1910.106 for flammable and combustible materials or other local regulations may restrict the volume of solvents that may legally be stored in an enclosed area.

Effects of chemicals on glass

Clear and amber borosilicate glass exhibit a high degree of chemical resistance with a few exceptions: Some chemicals can etch the surface of glass. Surface etching does not usually affect the dimensional characteristics of glass, but it can release chemical components into the sample solution.

Physical characteristics of plastic resin and septa

Code	Description	Appearance	Temp max ºc	Temp min ºc	Autoclavable	Dry heat	Gamma	Microwavable	Ethylene oxide	Analytical purity	Fragmentation*	Hardness†	Resealability‡
HDPE	High-density polyethylene	Opaque	120	-35	No	No	Yes	Yes	Yes	Method dependent	Medium	Hard	No resealability
LDPE	Low-density polyethylene	Translucent	100	-40	No	No	Yes	Yes	Yes	Method dependent	Low	Medium hard	No resealability
TPX	Polymethylpentene	Transparent	175	0	Yes	No	Yes	Yes	Yes	Method dependent	Low	Very hard	N/A
PP	Polypropylene	Translucent	135	-20	Yes	No	No	Yes	Yes	Method dependent	Low	Medium hard	No resealability
PTFE	Polytetrafluoroethylene	White	260	-200	Yes	Yes	Yes	Yes	Yes	Very high	Low	Very hard (very thin)	No resealability
RR	RedRubber/PTFE	Red/ivory	110	-30	No	No	No	No	No	Medium	Medium	Medium hard	Medium
Butyl	Gray butyl rubber	Opaque gray	125	-20	Yes	No	Yes	Yes	Yes	Method dependent	Low to medium	Soft to medium	Highly resealable
T/S	Silicon/PTFE	White/red	200	-60	Yes	Yes	Yes	Yes	Yes	High	Low to medium	Soft	Highly resealable
T/S/T	PTFE/Silicon/PTFE	Red/white/red	200	-60	Yes	Yes	Yes	Yes	Yes	High	Very low	Soft	Good resealability
V1	Viton®	Black	230	-30	Yes	Yes	Yes	Yes	Yes	Medium	Medium	Hard	Low to medium

* Due to hardness and molecular structure (coring)
† Needle penetration
‡ In case of multiple injections

Septa solvent compatibility table

Septa material

AC6—Synthetic rubber/PTFE, AC7—Natural rubber/PTFE, B3P—Grey bromobutyl stopper, CBT1—Gray chlorobutyl/PTFE, CB3—chlorobutyl, CBT3—bromobutyl/PTFE, LDPE—Low-density polyethylene, HDPE—High-density polyethylene, PP—Polypropylene, PTFE—Polytetrafluoroethylene

Key: The first character indicates the characteristics of the septa prior to any injection

The second character in ( ) indicates the potential characteristics of the seal after an injection.

A = Recommended   B = Suitable for most purposes   C = Use with care   D = Not advisable   – = Not tested

	Septa material									
Solvent	AC6*	AC7*	B3P**	CBT1*	CB3*	CBT3*	LDPE	HDPE	PP	PTFE
Acetic acid aqueous	A(A)	A(B)	A(B)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Acetone	A(A)	A(C)	A(A)	A(A)	A(A)	A(A)	D(D)	B(B)	B(B)	A(A)
Acetonitrile	A(A)	A(A)	–	A(A)	A(A)	A(A)	–	–	–	A(A)
Alcohols(aromatic)	A(B)	A(D)	–	A(B)	B(B)	A(B)	D(D)	D(D)	B(B)	A(A)
Alcohols(aliphatic)	A(A)	A(B)	A(B)	A(A)	A(A)	A(A)	D(D)	B(B)	B(B)	A(A)
Amyl acetate	A(A)	A(D)	A(C)	A(A)	A(A)	A(A)	D(D)	D(D)	–	A(A)
Aqueous solutions dilute	A(A)	A(A)	–	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Benzene	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Butyl alcohol	A(B)	A(A)	A(B)	A(B)	B(B)	A(B)	B(B)	B(B)	B(B)	A(A)
Carbon disulphide	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Carbon tetrachloride	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Chloroform	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Cyclohexane	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	–	–	–	A(A)
Cyclohexanol	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	B(B)	A(A)
Diethyl ether	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Dimethyl sulphoxide	A(C)	A(D)	D(D)	A(C)	C(C)	A(C)	–	–	–	A(A)
Dioxane	A(B)	A(D)	A(B)	A(B)	B(B)	A(B)	–	–	–	A(A)
Esters	A(B)	A(D)	A(C)	A(B)	B(B)	A(B)	D(D)	D(D)	B(B)	A(A)
Ethyl acetate	A(B)	A(D)	A(B)	A(B)	B(B)	A(B)	D(D)	D(D)	B(B)	A(A)
Ethyl alcohol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	D(D)	B(B)	B(B)	A(A)
Ethylene chloride	A(D)	A(D)	A(C)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Ethylene glycol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Formaldehyde	A(B)	A(B)	A(A)	A(B)	B(B)	A(B)	A(A)	A(A)	A(A)	A(A)
Glycol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Halogenated hydrocarbons	A(D)	A(C)	A(B)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Hexane	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	–	–	–	A(A)
Hydrochloric acid dilute	A(A)	A(C)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Iso-octane	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	–	–	–	A(A)
Ketones	A(A)	A(C)	A(B)	A(A)	A(A)	A(A)	D(D)	B(B)	B(B)	A(A)
MeOH/H_2O/Acetonitrile	A(A)	A(–)	–	A(A)	A(A)	A(A)	–	–	–	A(A)
Methanol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	–	–	–	A(A)
Methyl chloride	A(C)	A(D)	A(C)	A(C)	C(C)	A(C)	D(D)	D(D)	D(D)	A(A)
Methyl acetate	A(B)	A(C)	A(A)	A(B)	B(B)	A(B)	D(D)	D(D)	B(B)	A(A)
Methyl ethyl ketone	A(A)	A(D)	A(B)	A(A)	A(A)	A(A)	D(D)	B(B)	B(B)	A(A)
Methylene chloride	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Nitric acid dilute	A(A)	A(D)	A(B)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Pentane	A(D)	A(–)	–	A(D)	D(D)	A(D)	–	–	–	A(A)
Petroleum ether	A(D)	A(–)	–	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Sodium hydroxide	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Sulphuric acid dilute	A(D)	A(C)	A(B)	A(D)	D(D)	A(D)	A(A)	A(A)	A(A)	A(A)
Surfactants	A(A)	A(–)	–	A(A)	A(A)	A(A)	–	–	–	A(A)
Toluene	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	B(B)	A(A)
Trichloroethylene	A(D)	A(D)	D(D)	A(D)	D(D)	A(D)	D(D)	D(D)	D(D)	A(A)
Water	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)

* Available for 8 mm, 9 mm, 11 mm, 12 mm cap

** Available for 18 and 20 mm cap

Septa material

ST3/ST201–blue silicone/PTFE, ST2–White silicone/red PTFE, ST15/ST1–White silicone/red PTFE, ST14–Blue silicone/PTFE, ST144–Blue silicone/red PTFE, ST143–White silicone/PTFE, ST101–Blue silicone/PTFE, TST11–PTFE /silicone/PTFE, TST1–Red PTFE/white silicone/red PTFE, V1–VITON

Key: The first character indicates the characteristics of the septa prior to any injection

The second character in ( ) indicates the potential characteristics of the seal after an injection.

A = Recommended B = Suitable for most purposes C = Use with care D = Not advisable – = Not tested

	Septa material										
Solvent	ST3/ ST201**	ST2*	ST18*	ST15/ ST1*	ST14*	ST144*	ST143*	ST101*	TST11	TST1*	V1*
Acetic acid aqueous	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	D(D)
Acetone	A(D)	A(B)	A(A)	A(A)	A(A)	A(D)	A(B)	A(A)	A(A)	A(B)	D(D)
Acetonitrile	A(A)	A1(–)	A(A)	A(A)	A(A)	A(A)	A(–)	A(A)	A(A)	A(–)	B(B)
Alcohols(Aromatic)	A(B)	A(A)	A(A)	A(A)	A(A)	A(B)	A(–)	A(A)	A(A)	A(–)	–
Alcohols(Aliphatic)	A(B)	A(–)	A(A)	A(A)	A(A)	A(B)	A(–)	A(A)	A(A)	A(–)	–
Amyl acetate	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	D(D)
Aqueous solutions dilute	A(A)	A(–)	A(A)	A(A)	A(A)	A(A)	A(–)	A(A)	A(A)	A(–)	–
Benzene	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Butyl alcohol	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(A)
Carbon disulphide	A(D)	A(–)	A(A)	A(A)	A(A)	A(D)	A(–)	A(A)	A(A)	A(–)	A(A)
Carbon tetrachloride	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Chloroform	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Cyclohexane	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Cyclohexanol	A(D)	A(–)	A(B)	A(B)	A(B)	A(D)	A(–)	A(B)	A(B)	A(–)	A(A)
Diethyl ether	A(D)	A(–)	A(B)	A(B)	A(B)	A(D)	A(–)	A(B)	A(B)	A(–)	D(D)
Dimethyl sulphoxide	A(D)	A(–)	A(A)	A(A)	A(A)	A(D)	A(–)	A(A)	A(A)	A(–)	C(C)
Dioxane	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	D(D)
Esters	A(B)	A(–)	A(B)	A(B)	A(B)	A(B)	A(–)	A(B)	A(B)	A(–)	–
Ethyl acetate	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	A(B)	D(D)
Ethyl alcohol	A(A)	A(B)	A(A)	A(A)	A(A)	A(A)	A(B)	A(A)	A(A)	A(B)	–
Ethylene chloride	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	–
Ethylene glycol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)
Formaldehyde	A(B)	A(B)	A(A)	A(A)	A(A)	A(B)	A(B)	A(A)	A(A)	A(B)	D(D)
Glycol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	–
Halogenated hydrocarbons	A(D)	A(–)	A(A)	A(A)	A(A)	A(D)	A(–)	A(A)	A(A)	A(–)	–
Hexane	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	–
Hydrochloric acid dilute	A(D)	A(–)	A(A)	A(A)	A(A)	A(D)	A(–)	A(A)	A(A)	A(–)	A(A)
Iso-Octane	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	–
Ketones	A(D)	A(–)	A(B)	A(B)	A(B)	A(D)	A(–)	A(B)	A(B)	A(–)	–
MeOH/H_2O/Acetonitrile	A(A)	A(A)	A(B)	A(B)	A(B)	A(A)	A(–)	A(B)	A(B)	A(–)	–
Methanol	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	D(D)
Methyl chloride	A(D)	A(D)	A(A)	A(A)	A(A)	A(D)	A(D)	A(A)	A(A)	A(D)	A(A)
Methyl acetate	A(D)	A(D)	A(B)	A(B)	A(B)	A(D)	A(D)	A(B)	A(B)	A(D)	D(D)
Methyl ethyl ketone	A(D)	A(D)	A(A)	A(A)	A(A)	A(D)	A(D)	A(A)	A(A)	A(D)	D(D)
Methylene chloride	A(D)	A(B)	A(B)	A(B)	A(B)	A(D)	A(–)	A(B)	A(B)	A(–)	–
Nitric acid dilute	A(D)	A(B)	A(B)	A(B)	A(B)	A(D)	A(B)	A(B)	A(B)	A(B)	A(A)
Pentane	A(D)	A(C)	A(C)	A(C)	A(C)	A(D)	A(–)	A(C)	A(C)	A(–)	–
Petroleum ether	A(D)	A(–)	A(C)	A(C)	A(C)	A(D)	A(–)	A(C)	A(C)	A(–)	–
Sodium hydroxide	A(A)	A(B)	A(A)	A(A)	A(A)	A(A)	A(B)	A(A)	A(A)	A(B)	D(D)
Sulphuric acid dilute	A(D)	A(D)	A(B)	A(B)	A(B)	A(D)	A(D)	A(B)	A(B)	A(D)	A(A)
Surfactants	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(–)	A(A)	A(A)	A(–)	–
Toluene	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Trichloroethylene	A(D)	A(D)	A(C)	A(C)	A(C)	A(D)	A(D)	A(C)	A(C)	A(D)	A(A)
Water	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	A(A)	B(B)

* Available for 8 mm, 9 mm, 11 mm, 12 mm cap

** Available for 18 and 20 mm cap

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