

Microseal User Manual

Introduction

The Merlin Microseal™ is a microvalve alternative to the conventional silicone rubber septa used in gas chromatography (GC). Its unique design gives it high pressure capability and resistance to wear which results in long life and excellent chromatographic performance. The Microseal is available in three versions for all major GC manufacturers' instruments.

How the Microseal Works

A GC injection port septum performs two discrete functions. It seals the port while the syringe needle is inserted and also while the needle is not inserted. The Microseal is distinct from traditional septa in that the Microseal has two independent sealing mechanisms to perform these functions. O-rings seal the syringe needle during sample injection. A duckbill valve seals the injection port during analysis, but allows the needle to slide through without damage. In contrast, a conventional septum is repeatedly pierced by the syringe needle and eventually leaks or sheds septum particles into the injection port liner.

Because the two seals perform separate, individual functions and are only slightly distorted in operation rather than being pierced, the Microseal can be made from a high-temperature, wear-resistant fluorocarbon elastomer. In combination with the cone-tipped needle, this means the Microseal will not shed pieces into the injection port, even after thousands of injections.

The cut-away views show the location of the individual seals and the diagram at the lower right illustrates the following sequence of Microseal functions.

1. Pressure in the injection port, aided by a stainless steel spring, squeezes the duckbill closed and maintains a tight seal on the port. Higher pressures seal it more tightly.
2. As the syringe needle enters the Microseal, the wiper rib removes any particles adhering to the needle.
3. The O-rings then make a sliding seal around the needle.
4. As the needle penetrates further, the tip pushes the duckbill valve open and slides into the injection port. The O-rings maintain the seal around the needle.
5. As the needle is withdrawn from the Microseal after sample injection, the spring pushes the duckbill valve closed before the needle leaves the O-rings. The port remains sealed during the injection process.

Choosing a Microseal

Three versions of the Microseal are available.

General Purpose Microseal (P/N 410) - Formerly known as the "High Pressure Microseal," this Microseal is recommended for use in most GC applications with injection port pressures between 3 and 100 psi (20 - 690 Kpa). The General Purpose Microseal is the best choice for most GC applications.

Special purpose Microseals are also available for for low inlet system pressures and solid phase microextraction (SPME).

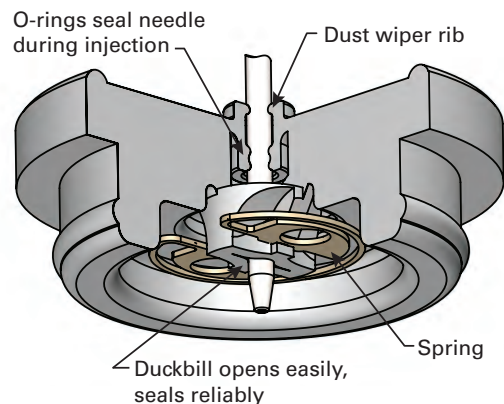
Low Pressure Microseal (P/N 310) - Formerly known as the "Original Microseal," this is recommended for injection port pressures between 1 and 45 psi (7 -310 Kpa). Particularly useful for fast GC/MS applications with 530 micron columns. The Low Pressure Microseal is made from a softer elastomer and does not have the needle wiping rib.

SPME Microseal (P/N 21-01) - This Microseal was developed with a stiffer elastomer specifically for 23 gauge SPME probes, which have a square end instead of the cone shaped tip characteristic of syringe needles. These probes can cause additional wear and this version provides extended lifetime for SPME.

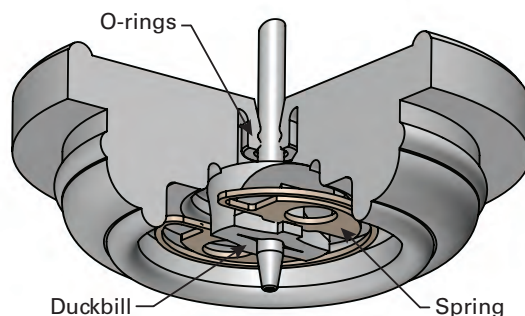


General Purpose, Low Pressure, and SPME Microseals

Microseal Cut-Away Views

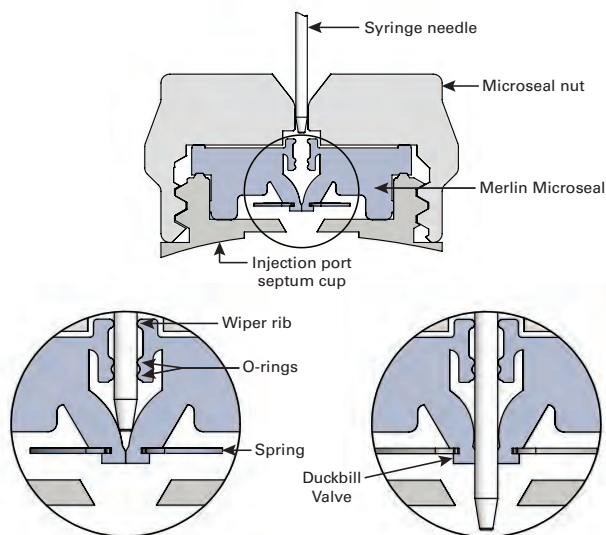


General Purpose and SPME Microseals



Low Pressure Microseal

Microseal Injection Sequence



O-rings make sliding seal around needle

Needle forces duckbill valve open

Injection Port Adapters for Microseals

All Microseals are compatible with all adapters. The table at the end of this manual lists Merlin part numbers for all adapters and Microseals. Additional information about individual adapters can be viewed at www.merlinic.com/products/merlin-microseal.

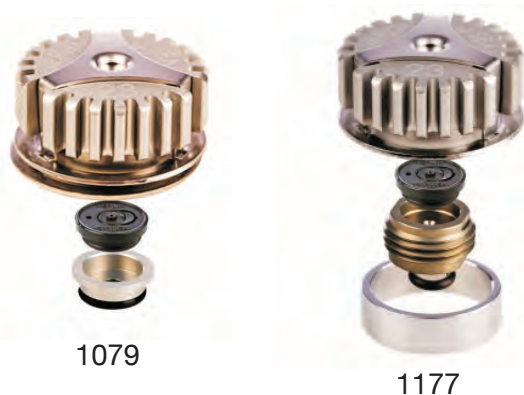
Agilent

Microseals fit directly in the Agilent septum cup and require only a Merlin Microseal nut. No additional adapter is required.



Bruker/Varian

Separate Microseal adapters are available for 1079 and 1177 Bruker/Varian injection ports. The Microseal nuts incorporate the microswitch start assemblies.



1079

1177

PerkinElmer

The Microseal adapter for the PerkinElmer injection ports mounts directly to the port. The Microseal nut has the correct autosampler alignment detail.



Shimadzu

A Microseal adapter is available for injection ports on Shimadzu Models GC-2010 and GC-2025. The Microseal nut has alignment details for the Shimadzu AOC-20 series and AOC-5000 autoinjectors.



Thermo Scientific

Thermo Scientific Company has designed their own Microseal adapters. An adapter kit for PTV and S/SL injection ports is available directly from Thermo Scientific authorized distributors. Also available from Thermo Scientific are kits to align their autosamplers with their Microseal adapters. More information is available at www.merlinic.com/products/merlin-microseal/thermo-port-adapter.

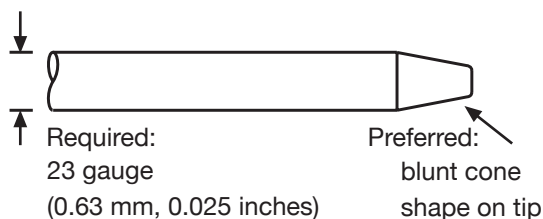
Microseal Installation

1. Follow the standard procedure to prepare the instrument for a septum change.
2. Remove the standard injection port nut and the septum. Remove any pieces of septum that are stuck to the injection port. Clean or replace the injection port liner to remove any septum particles which may have accumulated from silicone rubber septa.
3. If your instrument requires a Microseal adapter, mount it on the injection port finger-tight.
4. Place the Microseal in the septum cup. Push it down gently with your finger to seat it in the septum cup.
5. Screw on the Microseal nut finger-tight. Do not overtighten.

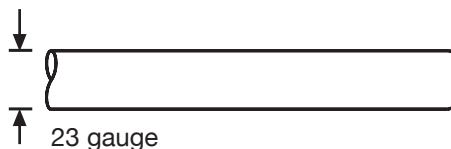
Choosing a Syringe

The Microseal only requires the correct 23 gauge syringe needle diameter and needle tip shape shown below to function properly. Syringes for autosamplers need the correct needle length, syringe barrel, and plunger configuration for compatibility. Microseals also work well with manual injection including the Merlin Microshot. Further information about Microseal syringe selection, including links to tables of recommended syringe part numbers is available at www.merlinic.com/products/merlin-microseal/syringes-for-microseal.

Microseal compatible syringe needles:

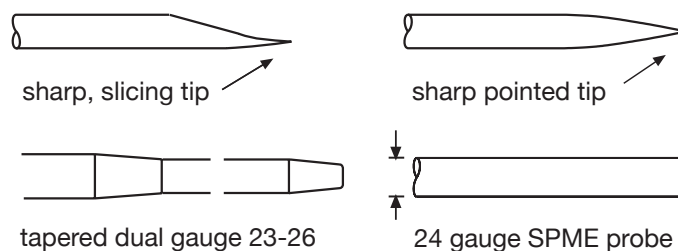


Microseal compatible SPME probes:



Sharp edged or sharp pointed needles can pierce and damage the duckbill seal. The 23/26 gauge tapered needles and 24 gauge SPME probes will not seal properly in the Microseal.

Do not use:



Microseal Performance

Microseals function well over the entire range of GC injection port temperatures (50 - 400C) and within the specified pressure ranges of 3 - 100 psi (20 - 690 Kpa) for the General Purpose and SPME versions and 1-45 psi (7 -310 Kpa) for the Low Pressure version. The resistance to wear is valuable in keeping the injection port liner free of septum particles which can cause sample adsorption or decomposition.

Microseal lifetimes can vary depending on sample composition, operating conditions and laboratory environment. Lifetimes range from over 10,000 injections to as few as 1,000.

When leaks occur they are typically caused by the accumulation of material in the duckbill lips. Traces of samples containing derivitizing reagents or high concentrations of non-volatile material can leave traces on the needle tip. The residue can gradually accumulate in the duckbill lips which can interfere with the ability of the duckbill to seal. A small amount of glass wool in the injection port liner can wick away sample from the tip of the needle to alleviate this problem. Microseal leaks add to the septum purge flow and are not as critical as leaks at a column fitting, for example.

Safety

Read and follow the directions and safety precautions in the instrument manual for replacing the septum.

1. The injection port and nut may be hot.
2. The injection port may be under pressure.
3. Wear safety glasses as you always do in the laboratory.
4. Use particular caution with flammable carrier gases like hydrogen.

Microseal Part Numbers

Part Description	Merlin P/N
For Agilent Instruments	
Low Pressure Microseal Kit (nut & 2 #310 Microseals)	304
Low Pressure Microseal Kit (nut & 1 #310 Microseal)	305
General Purpose Microseal Kit (nut & 2 #410 Microseals)	404
General Purpose Microseal Kit (nut & 1 #410 Microseal)	405
Microseal Nut	403
For Shimadzu Instruments	
Microseal Kit for Shimadzu (nut, adapter assembly, & 2 #410 Microseals)	61-12
For Bruker/Varian Instruments	
Microseal Kit for Varian 1079 (nut, adapter, o-ring, & 1 #410 Microseal)	21-11
Microseal Kit for Varian 1177 (nut, adapter, o-ring & 1 #410 Microseal)	22-11
For PerkinElmer Instruments	
Microseal Kit for PerkinElmer (nut, adapter, o-ring & 2 #410 Microseals)	51-12
Replacement Microseals	
Low Pressure Microseal (1 to 45 psi)	310
General Purpose Microseal (most applications, 3 to 100 psi)	410
Microseal for SPME Applications (3 to 100 psi)	21-01

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