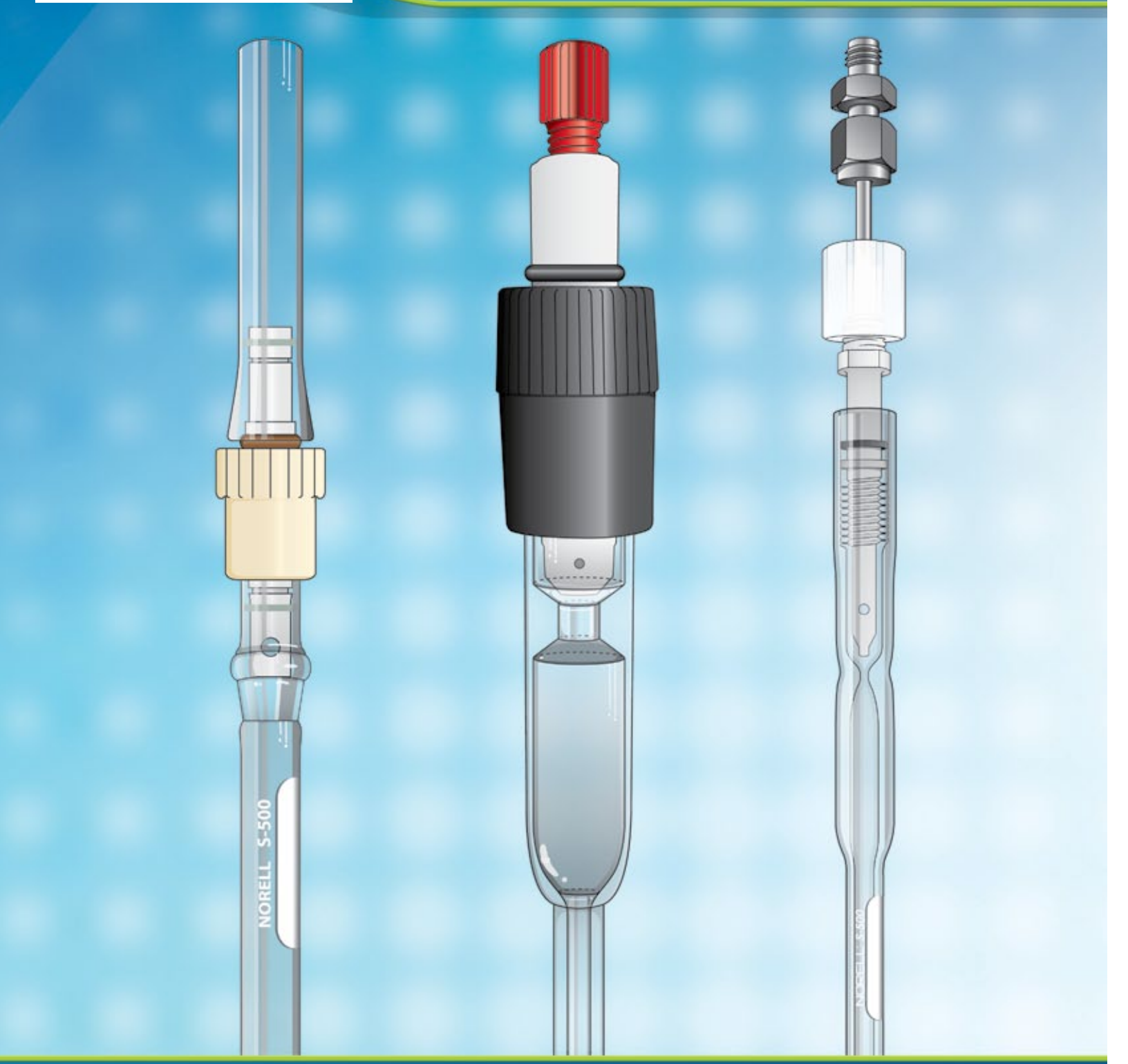
NORELL®

Your Source for NMR/EPR Tubes & Accessories



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ORDERING AND GENERAL INFORMATION

distributed by

Cambridge Isotope Laboratories, Inc.

3 Highwood Drive
Tewksbury, MA 01876, USA

Tel: 978-749-8000
Fax: 978-749-2768
Email: cilsales@isotope.com

Customer Service
US Toll Free: 800-322-1174
Canada Toll Free: 800-643-7239

www.isotope.com

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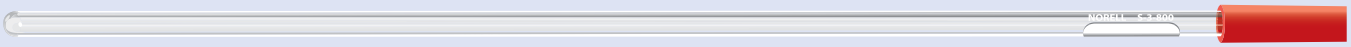
NOTES

Select Series™ FOR HIGH-RESOLUTION NMR

Manufactured from ASTM Type 1 Class A Glass, Commonly Referred to as Pyrex®

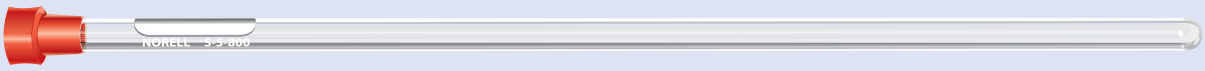
Our "Select Series" NMR tubes are manufactured out of ASTM Type 1 Class A glass, commonly referred to as Pyrex® 7740 (Corning), Duran® (Schott Glass), or Kimax® KG-33 (Kimble) glass. Key properties that make this glass type desirable for NMR are its high degree of thermal shock resistance and low expansion coefficient. This allows for a greater margin of safety from breakage when used in variable temperature applications and freeze/thaw cycling, or under any other application where large temperature variations are required in the experiment. Each NMR tube is checked for concentricity and camber specifications utilizing the latest computer technology. At Norell we have taken NMR tube manufacturing to a new level of science.

3mm Ultra-Precision & High-Throughput NMR Sample Tubes



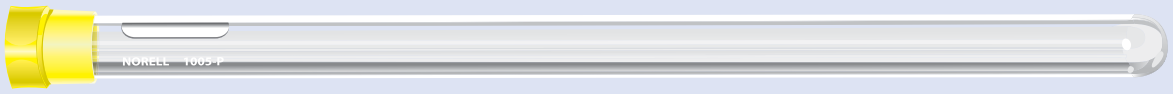
Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
S-3-900-7	900	2.99 ± 0.004	2.41 ± 0.006	0.0020	0.0030	7	5
S-3-900-8	900	2.99 ± 0.004	2.41 ± 0.006	0.0020	0.0030	8	5
S-3-800-7	800	2.99 ± 0.005	2.41 ± 0.010	0.0025	0.0038	7	5
S-3-800-8	800	2.99 ± 0.005	2.41 ± 0.010	0.0025	0.0038	8	5
S-3-600-7	600	2.99 ± 0.006	2.41 ± 0.012	0.0040	0.0060	7	5
S-3-600-8	600	2.99 ± 0.006	2.41 ± 0.012	0.0040	0.0060	8	5
S-3-500-7	500	2.99 ± 0.010	2.41 ± 0.015	0.0050	0.0130	7	5
S-3-500-8	500	2.99 ± 0.010	2.41 ± 0.015	0.0050	0.0130	8	5
S-3-400-7	400	2.99 ± 0.013	2.41 ± 0.020	0.0070	0.0190	7	5
S-3-400-8	400	2.99 ± 0.013	2.41 ± 0.020	0.0070	0.0190	8	5
S-3-300-7	300	2.99 ± 0.025	2.41 ± 0.025	0.0070	0.0250	7	5
S-3-300-8	300	2.99 ± 0.025	2.41 ± 0.025	0.0070	0.0250	8	5
S-3-200-7	200	2.99 ± 0.030	2.41 ± 0.030	0.0100	0.0380	7	5
S-3-200-8	200	2.99 ± 0.030	2.41 ± 0.030	0.0100	0.0380	8	5
S-3-HT-7	HT	2.99 ± 0.030	2.41 ± 0.030	0.0110	0.0400	7	25
S-3-HT-8	HT	2.99 ± 0.030	2.41 ± 0.030	0.0110	0.0400	8	25

5mm Ultra Precision NMR Sample Tubes



Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
S-5-900-7	900	4.97 ± 0.004	4.20 ± 0.006	0.0020	0.0030	7	5
S-5-900-8	900	4.97 ± 0.004	4.20 ± 0.006	0.0020	0.0030	8	5
S-5-800-7	800	4.97 ± 0.005	4.20 ± 0.012	0.0025	0.0038	7	5
S-5-800-8	800	4.97 ± 0.005	4.20 ± 0.012	0.0025	0.0038	8	5
S-5-600-7	600	4.97 ± 0.006	4.20 ± 0.012	0.0040	0.0060	7	5
S-5-600-8	600	4.97 ± 0.006	4.20 ± 0.012	0.0040	0.0060	8	5
S-5-500-7	500	4.97 ± 0.013	4.20 ± 0.025	0.0050	0.0130	7	5
S-5-500-8	500	4.97 ± 0.013	4.20 ± 0.025	0.0050	0.0130	8	5
S-5-400-7	400	4.97 ± 0.013	4.20 ± 0.025	0.0070	0.0190	7	5
S-5-400-8	400	4.97 ± 0.013	4.20 ± 0.025	0.0070	0.0190	8	5
S-5-300-7	300	4.97 ± 0.025	4.20 ± 0.025	0.0070	0.0250	7	5
S-5-300-8	300	4.97 ± 0.025	4.20 ± 0.025	0.0070	0.0250	8	5
S-5-200-7	200	4.97 ± 0.030	4.20 ± 0.030	0.0090	0.0350	7	5
S-5-200-8	200	4.97 ± 0.030	4.20 ± 0.030	0.0090	0.0350	8	5

10mm Ultra-Precision NMR Sample Tubes



Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
S-10-600-7	600	10.00 ± 0.006	8.76 ± 0.012	0.004	0.006	7	5
S-10-600-8	600	10.00 ± 0.006	8.76 ± 0.012	0.004	0.006	8	5
S-10-500-7	500	10.00 ± 0.013	8.76 ± 0.025	0.005	0.007	7	5
S-10-500-8	500	10.00 ± 0.013	8.76 ± 0.025	0.005	0.007	8	5

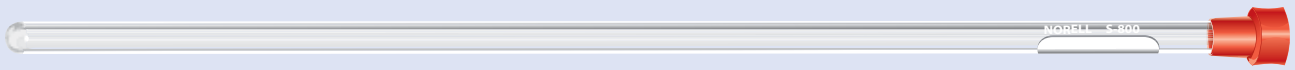
NMR tubes are manufactured with round bottoms and are available with flat bottoms upon request.
We manufacture all NMR tubes in any length upon request.

STANDARD SERIES™ FOR ROUTINE NMR

Manufactured from ASTM Type 1 Class B glass, commonly referred to as N-51A

Our "Standard Series" NMR tubes are manufactured out of ASTM Type 1 Class B glass, commonly referred to as N-51A. Applications that are suited for using this type of glass are routine NMR where samples are run under room temperatures with no thermal gradients. It is therefore not recommended to fuse this glass with standard vacuum manifolds and the like, since these are generally made out of Type 1 Class A glass. Each NMR tube is checked for concentricity and camber specifications utilizing the latest computer technology. At Norell we have taken NMR tube manufacturing to a new level of science.

5mm Ultra-Precision, High-Precision & Precision NMR Sample Tubes



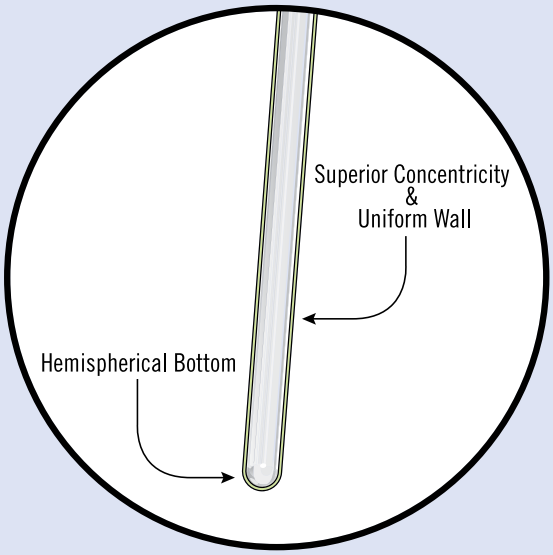
Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
509-UP-7	600	4.97 ± 0.006	4.20 ± 0.012	0.004	0.006	7	5
509-UP-8	600	4.97 ± 0.006	4.20 ± 0.012	0.004	0.006	8	5
508-UP-7	500	4.97 ± 0.013	4.20 ± 0.025	0.005	0.013	7	5
508-UP-8	500	4.97 ± 0.013	4.20 ± 0.025	0.005	0.013	8	5
507-HP-7	400	4.97 ± 0.013	4.20 ± 0.025	0.007	0.019	7	5
507-HP-8	400	4.97 ± 0.013	4.20 ± 0.025	0.007	0.019	8	5
506-P-7	300	4.97 ± 0.025	4.20 ± 0.025	0.007	0.025	7	25
506-P-8	300	4.97 ± 0.025	4.20 ± 0.025	0.007	0.025	8	25
XR-55™-7	300	4.97 ± 0.025	4.20 ± 0.025	0.010	0.038	7	25
XR-55™-8	300	4.97 ± 0.025	4.20 ± 0.025	0.010	0.038	8	25
505-P-7	200	4.97 ± 0.030	4.20 ± 0.030	0.010	0.040	7	25
505-P-8	200	4.97 ± 0.030	4.20 ± 0.030	0.010	0.040	8	25

STANDARD SERIES™ FOR ROUTINE NMR

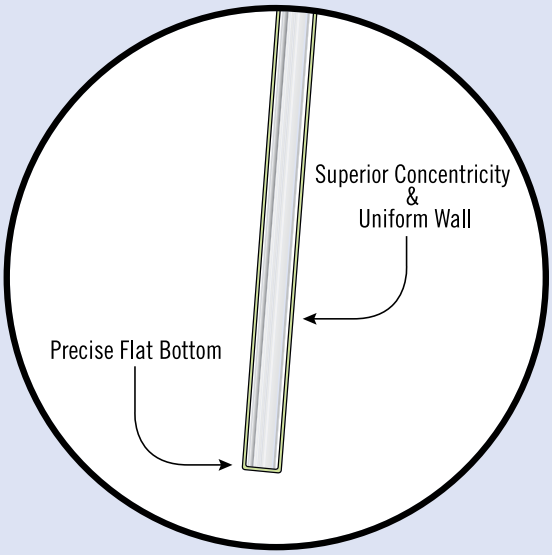
5mm Economy High-Throughput NMR Sample Tubes

Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
502-7	HT^{PLUS}	4.97 ± 0.050	4.20 ± 0.050	0.020	0.070	7	50
502-8	HT^{PLUS}	4.97 ± 0.050	4.20 ± 0.050	0.020	0.070	8	50
552-7	HT^{PLUS}	4.97 ± 0.050	4.20 ± 0.050	0.020	0.070	7	5
552-8	HT^{PLUS}	4.97 ± 0.050	4.20 ± 0.050	0.020	0.070	8	5
ST500-7	HT	4.97 ± 0.070	4.20 ± 0.070	0.025	0.075	7	100
ST500-8	HT	4.97 ± 0.070	4.20 ± 0.070	0.025	0.075	8	100
ST550-7	HT	4.97 ± 0.070	4.20 ± 0.070	0.025	0.075	7	5
ST550-8	HT	4.97 ± 0.070	4.20 ± 0.070	0.025	0.075	8	5

NORELL® Round Bottom NMR Tube



NORELL® Flat Bottom NMR Tube

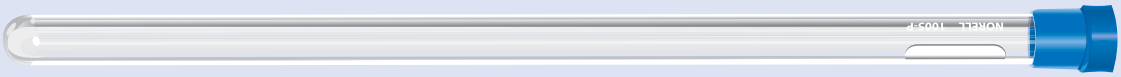


Through our advanced manufacturing process, the NMR tube bottoms are uniformly hemispherical and consistent, thereby minimizing shimming and susceptibility differences among samples. This uniformity extends throughout the wall thickness of the tubes, maximizing the concentricity among tubes and lots. This translates to more consistent placement of the contained sample volumes in today's advanced, highly homogeneous, high field NMR magnets.

NMR tubes are manufactured with round bottoms and are available with flat bottoms upon request.
We manufacture all NMR tubes in any length upon request.

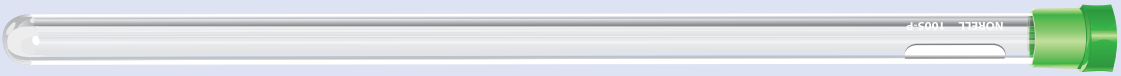
STANDARD SERIES™ FOR ROUTINE NMR

10mm Ultra-Precision & Precision NMR Sample Tubes



Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
1008-UP-7	400	10.00 ± 0.013	8.76 ± 0.025	0.005	0.070	7	5
1008-UP-8	400	10.00 ± 0.013	8.76 ± 0.025	0.005	0.070	8	5
1005-P-7	300	10.00 ± 0.013	8.76 ± 0.025	0.020	0.013	7	5
1005-P-8	300	10.00 ± 0.013	8.76 ± 0.025	0.020	0.013	8	5

10mm Economy NMR Sample Tubes



Item No.	MHz	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ±(mm)	Length (in)	Packed In Lots Of
1001-7	200	10.00 ± 0.013	8.76 ± 0.025	nominal	nominal	7	100
1001-8	200	10.00 ± 0.013	8.76 ± 0.025	nominal	nominal	8	100

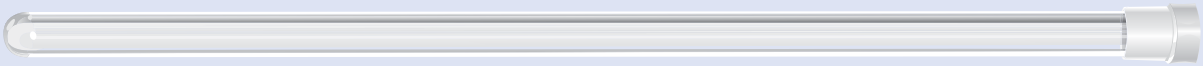
NMR tubes are manufactured with round bottoms and are available with flat bottoms upon request.
We manufacture all NMR tubes in any length upon request.

SPECIAL PURPOSE SAMPLE TUBES

5mm Suprasil® Quartz NMR Sample Tubes

Recommended for Boron NMR [< 0.01 ppm Boron] and/or UV catalyzed reactions in the region above 190nm [90%T @ 190nm].

Item No.	MHz	O.D. (mm)	I.D. (mm)	Length (in)
S-5-200-SQTZ-7	200	4.97 ± 0.030	4.20 ± 0.030	7
S-5-200-SQTZ-8	200	4.97 ± 0.030	4.20 ± 0.030	8
S-5-500-SQTZ-7	500	4.97 ± 0.013	4.20 ± 0.025	7
S-5-500-SQTZ-8	500	4.97 ± 0.013	4.20 ± 0.025	8
S-5-600-SQTZ-7	600	4.97 ± 0.006	4.20 ± 0.012	7
S-5-600-SQTZ-8	600	4.97 ± 0.006	4.20 ± 0.012	8



S-4-2-EPRSQ-250S

Suprasil® Quartz EPR Sample Tubes

Recommended for UV catalyzed reactions in the region at and above 190nm. Provides greater reduction of background noise than natural quartz and is used primarily in studies where greater signal sensitivity is needed. Supplied with tapered fluoropolymer caps.

Item No.	O.D. (mm)	I.D. (mm)	Wall (mm)	Length (mm)
S-4-EPRSQ-250S	4.0	3.0	0.50	250
S-4-EPRSQ-250P	3.98 ± 0.015	2.95 ± 0.025	0.51	250
S-5-EPRSQ-250S	5.0	4.0	0.50	250
S-5-EPRSQ-178P	4.97 ± 0.013	3.98 ± 0.08	0.50	178
S-5-EPRSQ-200P	4.97 ± 0.013	3.98 ± 0.08	0.50	200
S-5-EPRSQ-250P	4.97 ± 0.013	3.98 ± 0.08	0.50	250

5mm Natural Quartz NMR Sample Tubes

Recommended for Boron NMR [< 0.1 ppm Boron] and/or UV catalyzed reactions in the region above 210nm [90%T @ 210nm]. Available in packs of 5.

Item No.	MHz	O.D. (mm)	I.D. (mm)	Length (in)	Packed In Lots Of
S-5-200-QTZ-7	200	4.97 ± 0.030	4.20 ± 0.030	7	5
S-5-200-QTZ-8	200	4.97 ± 0.030	4.20 ± 0.030	8	5
S-5-500-QTZ-7	500	4.97 ± 0.013	4.20 ± 0.025	7	5
S-5-500-QTZ-8	500	4.97 ± 0.013	4.20 ± 0.025	8	5
S-5-600-QTZ-7	600	4.97 ± 0.006	4.20 ± 0.012	7	5
S-5-600-QTZ-8	600	4.97 ± 0.006	4.20 ± 0.012	8	5

S-5-600-QTZ

SPECIAL PURPOSE SAMPLE TUBES

Natural Quartz EPR Sample Tubes

Norell EPR tubes produce lower background signals and have better resistance to breakage than competitor brands. Our special annealing process reduces background noise along with the benefit of protecting against tube breakage. Additionally, we have designed a new fluoropolymer closure system around our fire-polished tube ends that prevents sample loss during temperature gradients. Available in both standard and ultra precision. Supplied with tapered fluoropolymer caps.

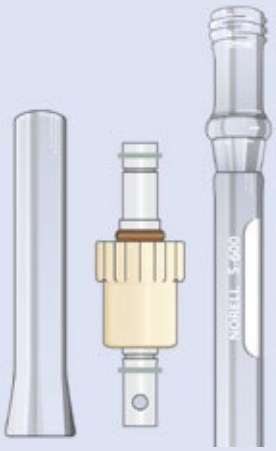
S-4-2-EPR-250S

Item No.	O.D. (mm)	I.D. (mm)	Wall (mm)	Length (mm)	Packed In Lots Of
S-4-2-EPR-250S	4.0	2.0	1.00	250	5
S-4-EPR-250S	4.0	3.0	0.50	250	5
S-4-EPR-250P	3.98 ± 0.015	2.95 ± 0.025	0.51	250	5
S-5-EPR-250S	5.0	4.0	0.50	250	5
S-5-EPR-250P	4.97 ± 0.013	4.14 ± 0.008	0.41	250	5

Valved NMR Tubes for Vacuum & Reduced Pressure

Handle your NMR sample without flame-sealing your tubes. Fluoropolymer covered o-ring eliminates material incompatibilities. Completely greaseless fluoropolymer assembly, which is easy to use and to disassemble for cleaning. Includes female joint for quick attachment to your vacuum rack.

Item No.	MHz	Length (in)
S-5-300-VT-7	300	7
S-5-300-VT-8	300	8
S-5-400-VT-7	400	7
S-5-400-VT-8	400	8
S-5-500-VT-7	500	7
S-5-500-VT-8	500	8
S-5-600-VT-7	600	7
S-5-600-VT-8	600	8



S-5-600-VT-7

A vacuum level of 10-7 kPa (10-6 torr) can be attained with this valve. While this valve can also withstand an internal positive pressure to 500 kPa (5 bar, 72 psi), the VT Valved NMR Tube series is intended principally for vacuum work. When pressurizing internally (by heating the NMR tube, for instance), the valve must be fully closed, so that the female vacuum adapter joint (the short glass tube that slips over the top of the PTFE valve stem, sealing against the upper o-rings) cannot be used to apply or be exposed to a positive pressure.

The adjoining table presents a selection of 5 mm O.D. NMR tubes joined to vacuum or pressure valves. However, other tube diameters, lengths, additional MHz ratings and tube materials (such as quartz), are available. Please inquire within to receive a quote on your custom requirements, as we are continually striving to provide the utmost service and satisfaction to our customers!

SPECIAL PURPOSE SAMPLE TUBES

INTERMEDIATE PRESSURE VALVED NMR SAMPLE TUBES

Norell, Inc. is pleased to announce the introduction of a new NMR sample tube product line, featuring a glass/ PTFE pressure valve permanently joined to your choice of a wide selection of available NMR sample tubes.

*This valve incorporates an advanced seal design that is superior to alternative valves currently available from other manufacturers. A fluoroelastomer o-ring imparts resilience and a high degree of chemical resistance. A PTFE sheath, forming the primary seal, completely covers the fluoroelastomer o-ring, creating the ultimate barrier against aggressive, reactive substances while providing a totally inert surface.

These pressure tubes facilitate experiments requiring conditions such as pressurized inert atmosphere blanketing, addition of reactive gaseous reagents under pressure, containment of low boiling point solvents or samples at elevated temperatures, and so on.

We recommend that the maximum operating pressure should be limited to 600 kPa (6 bar, 87 psi) when using a thin wall pressure tube, up to 1200 kPa (12 bar, 175 psi) if using a heavy wall pressure tube. (Please see accompanying table for complete details).

Cautionary Note: Glass can be an unpredictable material, especially if it has been scratched or subjected to rough handling. As such, EXTREME CAUTION should be exercised when using glass at elevated pressure or temperature, because it has the potential to fail suddenly and catastrophically. Therefore, anyone attempting to use glass components, such as NMR sample tubes at elevated or reduced pressures and/or temperatures should ensure that adequate personal protection, such as explosion shields, full face coverage shields, heavy gloves, etc., are employed to protect oneself against flying glass fragments if a glass component fails explosively.

The valve accepts 1/16 inch O.D. PTFE tubing, a common laboratory instrumentation pressure line. The required components, a 1/16 inch ferrule and matching compression nut, are included with the valve assembly. The valve easily and quickly connects and disconnects by means of the single compression nut.

All components of the valved pressure tube consist of either glass or polymer, as described in more detail below, allowing safe use in high magnetic field environments.

The sample tube portion, manufactured from ASTM Type 1 Class A glass (Pyrex® or an equivalent) is available in lengths of 7 inch or 8 inch, with thin, medium or heavy wall construction, and field strength ratings of 300, 400, 500 and 600 MHz.

This glass type tolerates a maximum temperature of about 230°C, and resists sudden temperature changes, or thermal shock, very well without breakage, but sudden temperature changes should be restricted to a range of 120°C or less.

The pressure valve portion possesses superior chemical and corrosion resistance. The glass shell, also formed from ASTM Type 1 Class A glass, matches that of the sample tube, thereby minimizing breakage of the joint caused by internal strain or thermal shock.

The valve stem, composed of PTFE fluoropolymer (polytetrafluoroethylene) is completely inert and resists virtually all solvents, reactive chemicals and reagents, and deterioration induced by corrosive conditions.

SPECIAL PURPOSE SAMPLE TUBES

INTERMEDIATE PRESSURE VALVED NMR SAMPLE TUBES (Cont.)

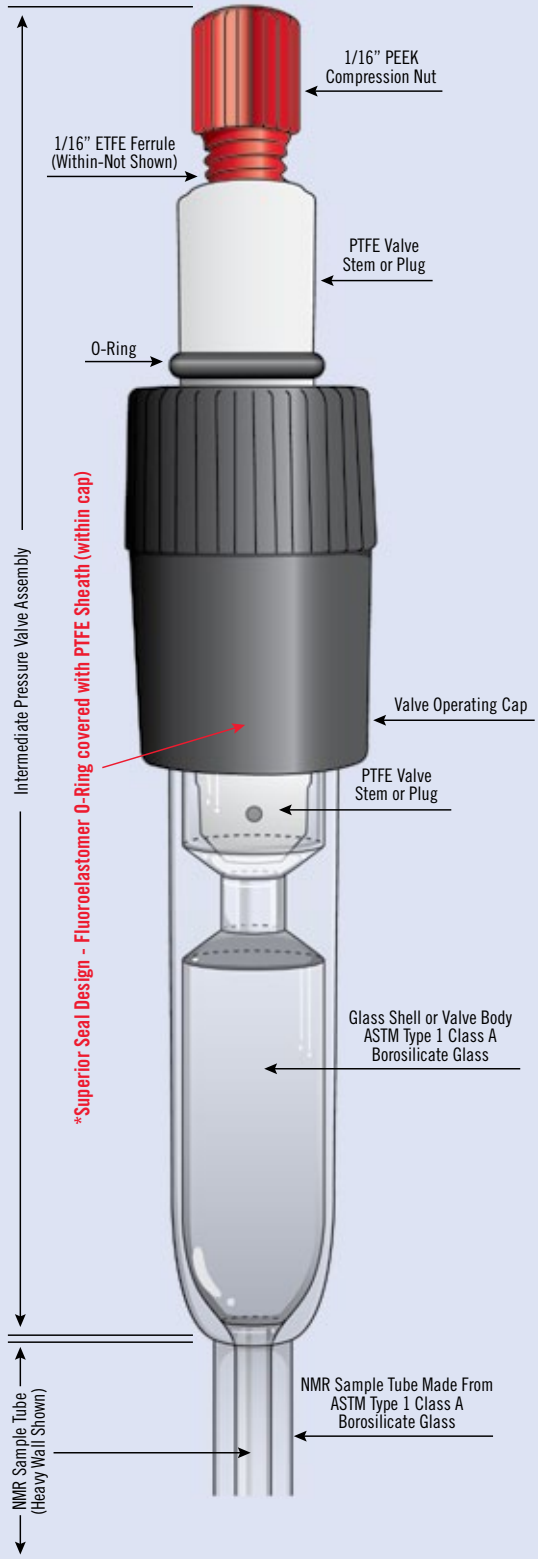
The ferrule, or sealing nut (included with the valve), used to seal the pressure supply tubing to the valve, also displays excellent corrosion and chemical resistance. Constructed from ETFE (ethylene-tetrafluoroethylene) fluoropolymer, this material combines excellent mechanical properties, such as toughness, high impact strength, long flex life, medium stiffness and good abrasion resistance with nearly the same level of chemical resistance shown by the fully fluorinated polymers such as PTFE.

The compression nut (also included with the valve) is machined from PEEK (polyether ether ketone). This material is an advanced, high-performance polymer having excellent mechanical properties, ensuring long life and reliable performance throughout numerous connecting and disconnecting operations. It is a very hard material, with a very high degree of tensile strength, stiffness and dimensional stability, along with excellent chemical resistance.

*Fluoroelastomer O-Ring covered with PTFE Sheath

Item No.	MHz	Tube Length (Inch)	Tube Wall	Recommended Maximum Operating Pressure		
				kPa	bar	psi
S-5-300-IPV-7	300	7	thin	600	6	87
S-5-300-MW-IPV-7	300	7	medium	900	9	130
S-5-300-HW-IPV-7	300	7	heavy	1200	12	175
S-5-300-IPV-8	300	8	thin	600	6	87
S-5-300-MW-IPV-8	300	8	medium	900	9	130
S-5-300-HW-IPV-8	300	8	heavy	1200	12	175
S-5-400-IPV-7	400	7	thin	600	6	87
S-5-400-MW-IPV-7	400	7	medium	900	9	130
S-5-400-HW-IPV-7	400	7	heavy	1200	12	175
S-5-400-IPV-8	400	8	thin	600	6	87
S-5-400-MW-IPV-8	400	8	medium	900	9	130
S-5-400-HW-IPV-8	400	8	heavy	1200	12	175
S-5-500-IPV-7	500	7	thin	600	6	87
S-5-500-MW-IPV-7	500	7	medium	900	9	130
S-5-500-HW-IPV-7	500	7	heavy	1200	12	175
S-5-500-IPV-8	500	8	thin	600	6	87
S-5-500-MW-IPV-8	500	8	medium	900	9	130
S-5-500-HW-IPV-8	500	8	heavy	1200	12	175
S-5-600-IPV-7	600	7	thin	600	6	87
S-5-600-MW-IPV-7	600	7	medium	900	9	130
S-5-600-HW-IPV-7	600	7	heavy	1200	12	175
S-5-600-IPV-8	600	8	thin	600	6	87
S-5-600-MW-IPV-8	600	8	medium	900	9	130
S-5-600-HW-IPV-8	600	8	heavy	1200	12	175

Intermediate Pressure Valve shown with a typical 5mm heavy wall tube, such as Item Number S-5-600-HW-IPV-8



HIGH PRESSURE VALVED NMR SAMPLE TUBES

Norell, Inc. is pleased to introduce another addition to the Valved NMR Sample Tubes product line. This latest addition, featuring a High Pressure Valve constructed entirely from glass and fluoropolymer, can be permanently joined to your choice of a wide array of NMR sample tubes.

These pressure tubes facilitate experiments requiring conditions such as pressurized inert atmosphere blanketing, addition of reactive gaseous reagents under pressure, containment of low boiling solvents or samples at elevated temperatures and so on.

The valve design includes significant improvements not found in similar versions from other manufacturers. The Norell High Pressure Valve requires no special tools or tubing preparation procedures prior to use. Secure, leak-free connections to standard 1/8" O.D. laboratory instrumentation pressure tubing need only be made finger-tight, unlike competitor's versions that often leak at this connection point even after tightening with a wrench.

We supply the necessary components of the compression tube fitting (consisting of a compression nut, ferrule and gripper) with the High Pressure Valve assembly, whereas other manufacturers do not. The special compression fittings do not permanently attach to the pressure line. This permits removal and reuse in other locations or connection to different gas supplies without installing dedicated metallic double ferrule fittings at each point of use.

We also include a short length of 1/8" O.D. Type 316 stainless steel tube to provide versatility when making pressure connections.

For instance, the tube may be inserted into a flexible 1/8" I.D. braid-reinforced PVC or other pressure hose, and secured with a small worm-drive hose clamp.

The supplied tube can also be permanently attached to an optional 1/8" Type 316 stainless steel union (shown in the accompanying illustration, not included with the basic valve purchase but available separately as Item Number HPV-1/8X1/8-UNION) to form a secure, leak-proof transition to metallic double ferrule or Swagelok type fittings, such as may be present on an existing pressure line.

Lastly, a new 1/8" O.D. pressure supply line, having no permanently affixed fittings or ferrules, may be coupled directly to the High Pressure Valve utilizing the supplied compression nut and components.

The included compression fitting components seal equally well on both metallic and non-metallic tubing, permitting use with stainless steel, brass or other metallic tubing as well as highly inert and chemically resistant non-metallic tubing such as heavy wall PTFE.

HIGH PRESSURE VALVED NMR SAMPLE TUBES (Cont.)

Likewise, the valve stem, or piston, of the High Pressure Valve, also composed of PTFE fluoropolymer, is completely inert and resists virtually all solvents, reactive chemicals and reagents, and deterioration induced by corrosive conditions. The PTFE stem incorporates a wiper portion that serves as the primary seal, while a fluoroelastomer o-ring forms a secondary backup seal, protected by the primary PTFE wiper seal.

The sample tube portion, manufactured from ASTM Type 1 Class A glass (Pyrex® or an equivalent) tolerates a maximum temperature of about 230°C, and resists sudden temperature changes, or thermal shock, very well without breakage, but sudden temperature changes should be restricted to a range of 120°C or less.

The glass shell of the high pressure valve, also formed from ASTM Type 1 Class A glass, matches that of the sample tube, thereby minimizing breakage of the joint caused by internal strain or thermal shock

The Norell High Pressure Valve remains compatible with and can be connected to existing metallic double ferrule compression tube fittings, such as Swagelok®, Parker A-LOK®, Yor-Lok®, Let-Lok® and other brands, but completely leak-free connections cannot be guaranteed when used with these types of metallic fittings.

We have found that metallic double ferrule fittings cannot seal well to softer materials such as PTFE. Normally this should not present a problem when using innocuous gases such as argon or nitrogen, for instance, but a potential problem arises when using corrosive, toxic, flammable or otherwise hazardous gases.

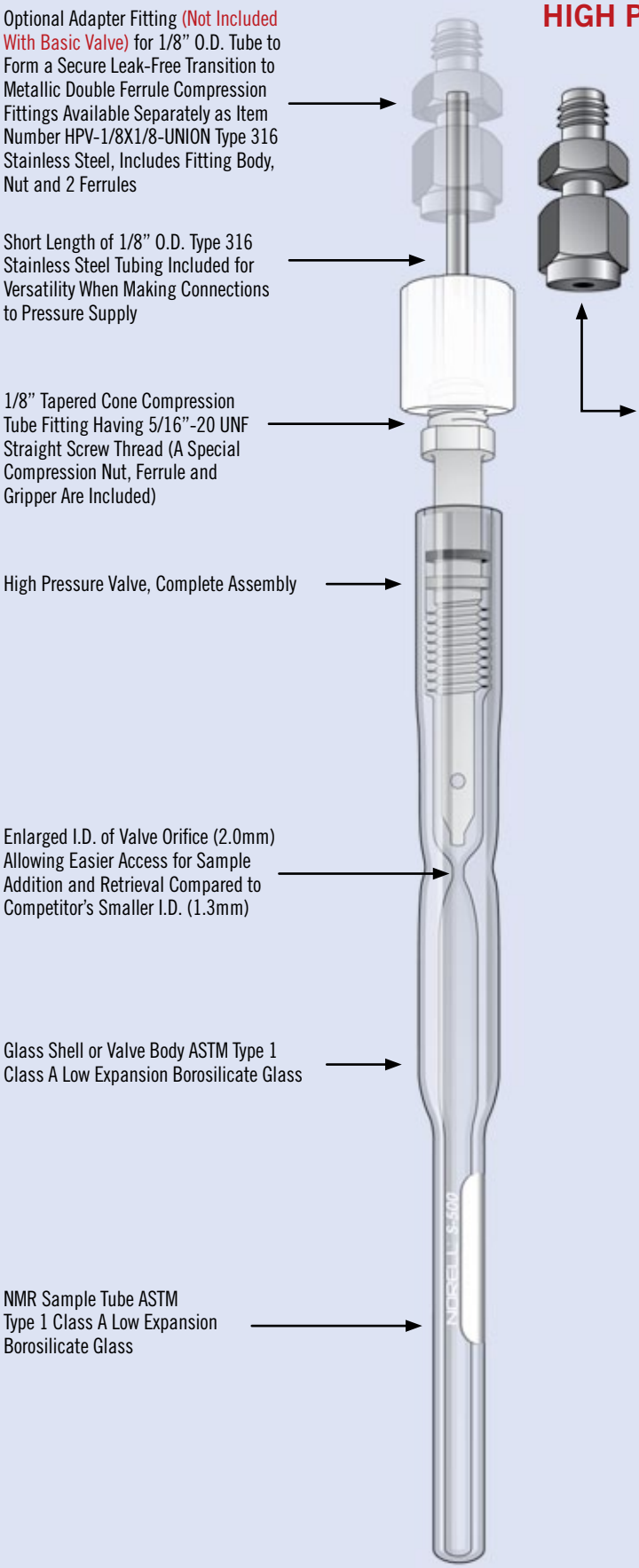
Therefore, with the basic valve purchase, we include the special sealing components to ensure an effective seal when working with potentially hazardous materials.

We recommend that the maximum operating pressure should be limited to 1400 kPa (14 bar, 200 psi) when using this valve with a 5 mm O.D. heavy wall tube. (Please see accompanying table for complete details.)

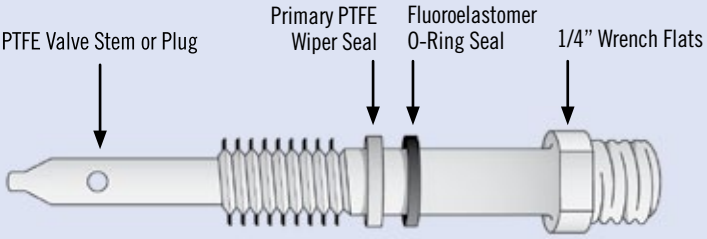
Cautionary Note: Glass can be an unpredictable material, especially if it has been scratched or subjected to rough handling. As such, EXTREME CAUTION should be exercised when using glass at elevated pressure or temperature, because it has the potential to fail suddenly and catastrophically. Therefore, anyone attempting to use glass components, such as NMR sample tubes at elevated or reduced pressures and/or temperatures should ensure that adequate personal protection, such as explosion shields, full face coverage shields, heavy gloves, etc., are employed to protect oneself against flying glass fragments if a glass component fails explosively.

The table below presents a selection of 5 mm O.D. NMR tubes joined to the High Pressure Valve, but other tube diameters, lengths, additional MHz ratings and tube materials (such as quartz) are available. Please inquire to receive a quote for your custom requirements, as we are continually striving to provide the utmost service and satisfaction to our customers!

SPECIAL PURPOSE SAMPLE TUBES



HIGH PRESSURE VALVED NMR SAMPLE TUBES (Cont.)



Accessories for High Pressure Valved NMR Sample Tubes

Item Number	Description
HPV-1/8X1/8-UNION	Optional Union Adapter, Type 316 Stainless Steel, for 1/8" metallic double ferrule line termination
HPV-1/4-WRENCH	Wrench, ¼" double open-end, 15° and 75° angled openings, forged steel

Item No.	MHz	Tube Length (Inch)	Tube Wall	Recommended Maximum Operating Pressure		
				kPa	bar	psi
S-5-300-HPV-7	300	7	thin	700	7	100
S-5-300-MW-HPV-7	300	7	medium	1050	10.5	150
S-5-300-HW-HPV-7	300	7	heavy	1400	14	200
S-5-300-HPV-8	300	8	thin	700	7	100
S-5-300-MW-HPV-8	300	8	medium	1050	10.5	150
S-5-300-HW-HPV-8	300	8	heavy	1400	14	200
S-5-400-HPV-7	400	7	thin	700	7	100
S-5-400-MW-HPV-7	400	7	medium	1050	10.5	150
S-5-400-HW-HPV-7	400	7	heavy	1400	14	200
S-5-400-HPV-8	400	8	thin	700	7	100
S-5-400-MW-HPV-8	400	8	medium	1050	10.5	150
S-5-400-HW-HPV-8	400	8	heavy	1400	14	200
S-5-500-HPV-7	500	7	thin	700	7	100
S-5-500-MW-HPV-7	500	7	medium	1050	10.5	150
S-5-500-HW-HPV-7	500	7	heavy	1400	14	200
S-5-500-HPV-8	500	8	thin	700	7	100
S-5-500-MW-HPV-8	500	8	medium	1050	10.5	150
S-5-500-HW-HPV-8	500	8	heavy	1400	14	200
S-5-600-HPV-7	600	7	thin	700	7	100
S-5-600-MW-HPV-7	600	7	medium	1050	10.5	150
S-5-600-HW-HPV-7	600	7	heavy	1400	14	200
S-5-600-HPV-8	600	8	thin	700	7	100
S-5-600-MW-HPV-8	600	8	medium	1050	10.5	150
S-5-600-HW-HPV-8	600	8	heavy	1400	14	200
S-10-500-HPV-7	500	7	thin	520	5.2	75
S-10-500-HPV-8	500	8	thin	520	5.2	75
S-10-600-HPV-7	600	7	thin	520	5.2	75
S-10-600-HPV-8	600	8	thin	520	5.2	75

SPECIAL PURPOSE SAMPLE TUBES

S-5-600-SC

Screw-Cap NMR Sample Tubes

Convenient screw cap access with the security of a fluoropolymer seal. Supplied with open top cap & fluoropolymer / silicone septum for quick and clean access with a 22 gauge standard point needle.

Item No.	MHz	Length (in)
S-5-300-SC-7	300	7
S-5-300-SC-8	300	8
S-5-400-SC-7	400	7
S-5-400-SC-8	400	8
S-5-600-SC-7	600	7
S-5-600-SC-8	600	8

Bruker Microbore NMR Sample Tubes

BMT-S-5-800-8

New ultra-precision NMR tubes for Bruker's microprobes offer complete reliability and reproducibility over other brands. Features include a tapered lower stem mounted on a high-precision 800 MHz rated 5mm Select Series™ NMR tube that performs perfectly even under severe temperature gradients. Data integrity is completely assured thanks to our high quality manufacturing standards.

Item No.	Stem O.D. (mm)	Stem I.D. (mm)	Stem Length (mm)	Overall Length (in)	Capillary Volume (µl)
BMT-S-5-800-8-W/1.0mm Stem	1.0 ± 0.025	0.58 ± 0.013	50	8	13
BMT-S-5-800-8-W/1.7mm Stem	1.7 ± 0.025	1.3 ± 0.013	50	8	65
BMT-S-5-800-8-W/2.0mm Stem	2.0 ± 0.025	1.6 ± 0.013	50	8	100
BMT-S-5-800-8-W/2.5mm Stem	2.5 ± 0.025	2.1 ± 0.013	50	8	175
BMT-S-5-800-8-W/3.0mm Stem	3.0 ± 0.025	2.41 ± 0.013	50	8	215

SPECIAL PURPOSE SAMPLE TUBES

Constricted

Constricted NMR Sample Tubes

Constricted NMR tubes offer a convenient way to seal your sample from air or other contaminants. Simply heat the constricted portion using a suitable source, and gently twist and pull on the open end to seal. Also allows samples to be stored under vacuum or inert gas.

O.D.	Constricted I.D. (mm)
3mm - 10mm	1.2 ± 0.05

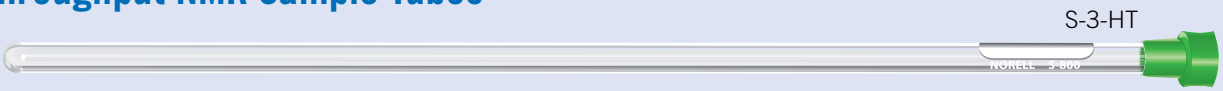
Amberized

Amberized NMR Sample Tubes

Amberized NMR tubes offer photosensitive materials protection from visible and ultraviolet radiation. Typical absorbance (ABS) is between 0.5 and 1.0 (50% to 100%) from 650 to 300 nm and 1.0 (100%) from 300 to 190 nm.

O.D.
3mm - 10mm

High-Throughput NMR Sample Tubes



S-3-HT

Recommended for use with our Optimizer Inserts™ (page 17)

Ideal for reducing salt effects when running buffered solutions for bio-samples. Only Norell can satisfy the many customer requests for a high-throughput NMR tube that features both high-precision, as required in today's high-field spectrometers, and economy in price. Made from ASTM Type 1 Class A borosilicate glass for reproducibility and durability. Specially designed for one-time use for routine NMR, our high-precision NMR tubes will outperform more expensive competitor brands. See for yourself. Available in packs of 25.

Item No.	O.D. (mm)	I.D. (mm)	Concentricity (mm)	Camber ± (mm)	Length (in)	Packed In Lots Of
S-3-HT-7	2.99 ± 0.030	2.41 ± 0.030	0.011	0.040	7	25
S-3-HT-8	2.99 ± 0.030	2.41 ± 0.030	0.011	0.040	8	25
S-4-HT-7	3.99 ± 0.030	3.20 ± 0.030	0.011	0.040	7	25
S-4-HT-8	3.99 ± 0.030	3.20 ± 0.030	0.011	0.040	8	25
S-4.25-HT-7	4.24 ± 0.030	3.34 ± 0.030	0.011	0.040	7	25
S-4.25-HT-8	4.24 ± 0.030	3.34 ± 0.030	0.011	0.040	8	25

SPECIAL PURPOSE SAMPLE TUBES

Heavy Wall NMR Sample Tubes

Heavy wall (1.4 mm) NMR tubes offer the ultimate protection from breakage, either through rapid changes in temperature or pressure, or from mishandling. Recommended for use with hazardous or radioactive samples, where sample containment is critical. Available either constricted and/or amberized.

Item No.	MHz	O.D. (mm)	I.D. (mm)	Wall (mm)	Length (in)	Packed In Lots Of
S-5-500-HW-7	up to 500	4.97 ± 0.013	2.20 ± 0.025	1.4	7	5
S-5-500-HW-8	up to 500	4.97 ± 0.013	2.20 ± 0.025	1.4	8	5
S-5-500-HW-9	up to 500	4.97 ± 0.013	2.20 ± 0.025	1.4	9	5
S-5-400-HW-7	up to 400	4.97 ± 0.013	2.20 ± 0.025	1.4	7	5
S-5-400-HW-8	up to 400	4.97 ± 0.013	2.20 ± 0.025	1.4	8	5
S-5-400-HW-9	up to 400	4.97 ± 0.013	2.20 ± 0.025	1.4	9	5
S-5-300-HW-7	up to 300	4.97 ± 0.025	2.20 ± 0.025	1.4	7	5
S-5-300-HW-8	up to 300	4.97 ± 0.025	2.20 ± 0.025	1.4	8	5
S-5-300-HW-9	up to 300	4.97 ± 0.025	2.20 ± 0.025	1.4	9	5

S-5-500-HW-7

Medium Wall NMR Sample Tubes

Medium wall (0.8 mm) NMR tubes offer added protection from breakage while keeping 94% of the sample volume. Can be used for student use or in auto-sampling systems. Available either constricted and/or amberized.

Item No.	MHz	O.D. (mm)	I.D. (mm)	Wall (mm)	Length (in)	Packed In Lots Of
S-5-500-MW-7	up to 500	4.97 ± 0.013	3.43 ± 0.025	0.8	7	5
S-5-500-MW-8	up to 500	4.97 ± 0.013	3.43 ± 0.025	0.8	8	5
S-5-500-MW-9	up to 500	4.97 ± 0.013	3.43 ± 0.025	0.8	9	5
S-5-400-MW-7	up to 400	4.97 ± 0.013	3.43 ± 0.025	0.8	7	5
S-5-400-MW-8	up to 400	4.97 ± 0.013	3.43 ± 0.025	0.8	8	5
S-5-400-MW-9	up to 400	4.97 ± 0.013	3.43 ± 0.025	0.8	9	5
S-5-300-MW-7	up to 300	4.97 ± 0.025	3.43 ± 0.025	0.8	7	5
S-5-300-MW-8	up to 300	4.97 ± 0.025	3.43 ± 0.025	0.8	8	5
S-5-300-MW-9	up to 300	4.97 ± 0.025	3.43 ± 0.025	0.8	9	5

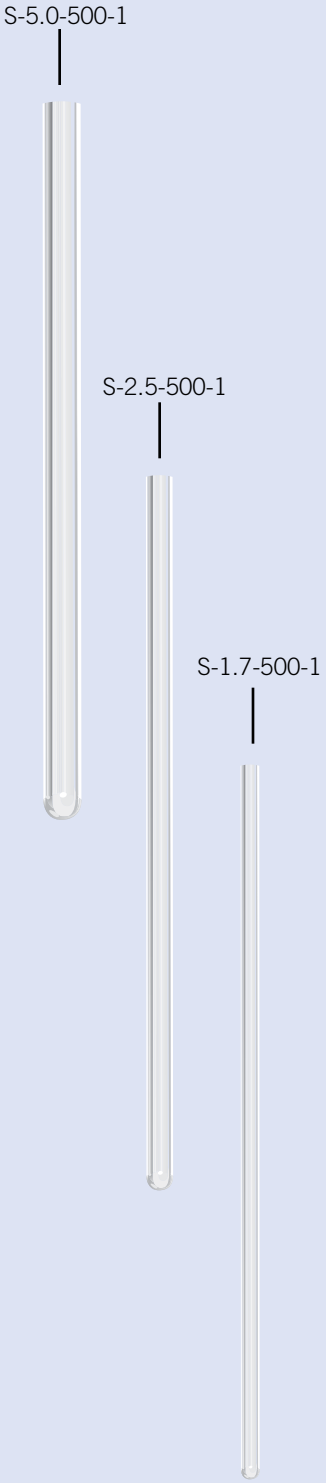
S-5-500-MW-7

SPECIAL PURPOSE SAMPLE TUBES

Bruker MATCH™ System NMR Sample Tubes

We have recently introduced a new line of ultra-precision machined NMR tubes specifically made for the Bruker MATCH™ System. Featured are eight different tube sizes you can choose from, depending on sample volume. For added convenience, we have color-coded caps to match tube sizes.

*Recommended sample volumes by Bruker Biospin™. Use 3.0mm to 5.0mm OD tubes for 5mm RT probe, and 1.0mm to 3mm OD tubes for 3mm Cryo-Probe. 1.0mm size not recommended for dedicated 1mm Bruker Probe.



Item No.	O.D. (mm)	I.D. (mm)	Length (mm)	Sample Volume (µl)*	Packed In Lots Of
S-1.0-500-1	1.00 +0.010 -0.025	0.58 ± 0.010	100mm	12	5
S-1-0.73-500-1	1.00 +0.010 -0.025	0.73 ± 0.010	100mm	19	5
S-1.7-500-1	1.70 +0.010 -0.025	1.30 ± 0.010	100mm	45	5
S-2.0-500-1	2.00 +0.010 -0.025	1.60 ± 0.010	100mm	70	5
S-2.5-500-1	2.50 +0.010 -0.025	2.10 ± 0.010	100mm	120	5
S-3.0-500-1	2.99 +0.010 -0.025	2.41 ± 0.010	100mm	160	5
S-4.0-500-1	3.99 +0.010 -0.025	3.20 ± 0.010	100mm	310	5
S-4.25-500-1	4.25 +0.010 -0.025	3.43 ± 0.010	100mm	370	5
S-5.0-500-1	4.97 +0.010 -0.025	4.20 ± 0.010	100mm	490	5

Tapered Fluoropolymer Caps for Bruker MATCH™ Tubes

Tapered Fluoropolymer Caps

Cap Item No.	Tube Item No.	Color	Packed In Lots Of
TCM100	S-1.0-500-1	Black	5
TCM170	S-1.7-500-1	Natural	5
TCM200	S-2.0-500-1	Yellow	5
TCM250	S-2.5-500-1	Red	5
TCM300	S-3.0-500-1	Green	5
TCM400	S-4.0-500-1	Blue	5
TCM425	S-4.25-500-1	Natural	5
TCM500	S-5.0-500-1	Black	5

Integrated Closure System

Introducing our new Sample Vault™ Series NMR tubes with NorLoc™ caps (U.S. Patent No. 8,054,080), engineered for a new generation of high-throughput lab automation systems. Designed to be used with 96 position carriers using 103.5 mm (4") long NMR tubes with open port caps, or 178 mm (7") long NMR tubes with closed port caps. NorLoc™ caps have superior holding and sealing capabilities which eliminate cap/tube failure in your instrument. Our patent pending design incorporates a blue band positioned on the NMR tube that aligns with the base of the cap, indicating a properly locked position. Our NorLoc™ cap and Sample Vault™ tube is an integrated closure system for fail-safe delivery of your sample into the magnet. We offer Sample Vault™ tubes in both 3mm & 5mm for use up to 700 MHz and up to 950 MHz. Our proven quality and innovative engineering speaks for itself.

- Engineered for a new generation of high-throughput lab automation systems.
- Two precision types available for up to 700 MHz and up to 950 MHz spectrometers.
- Superior NorLoc™ cap (U.S. Patent No. 8,054,080) attaches semi-permanently for multiple use and for critical applications.
- Choice of two NorLoc™ caps either closed port cap or open port cap, giving you the ultimate in choice of sample sealing.
- Closures are available to seal the NorLoc™ Open Port caps. They are made of a soft, resilient silicone rubber that forms a very effective seal, with a high degree of inertness, solvent resistance and high temperature capability (up to 200°C). The closures are easily removed, and may be trimmed to length with a knife blade or scissors.
- Safe for cold refrigeration storage, works with cryo-probes and variable temperature studies.

Sample Vault™ Series NMR Tube Specifications

Packed in Lots of 96 with Caps. Choose Open or Closed Port.

Item No.	MHz Rating	Cap Type	OD	Wall Size	Concentricity	Camber	Length
SVCP-5-103.5-96	Up to 700 MHz	Closed	5 mm	0.38 mm	40 µm	60 µm	103.5 mm
SVOP-5-103.5-96	Up to 700 MHz	Open	5 mm	0.38 mm	40 µm	60 µm	103.5 mm
SVCP-5-178-96	Up to 700 MHz	Closed	5 mm	0.38 mm	40 µm	60 µm	178 mm (7")
SVOP-5-178-96	Up to 700 MHz	Open	5 mm	0.38 mm	40 µm	60 µm	178 mm (7")
SVCP-3-103.5-96	Up to 700 MHz	Closed	3 mm	0.38 mm	40 µm	60 µm	103.5 mm
SVOP-3-103.5-96	Up to 700 MHz	Open	3 mm	0.38 mm	40 µm	60 µm	103.5 mm
SVCP-3-178-96	Up to 700 MHz	Closed	3 mm	0.38 mm	40 µm	60 µm	178 mm (7")
SVOP-3-178-96	Up to 700 MHz	Open	3 mm	0.38 mm	40 µm	60 µm	178 mm (7")
SVCP-Super-5-103.5-96	Up to 950 MHz	Closed	5 mm	0.38 mm	20 µm	30 µm	103.5 mm
SVOP-Super-5-103.5-96	Up to 950 MHz	Open	5 mm	0.38 mm	20 µm	30 µm	103.5 mm
SVCP-Super-5-178-96	Up to 950 MHz	Closed	5 mm	0.38 mm	20 µm	30 µm	178 mm (7")
SVOP-Super-5-178-96	Up to 950 MHz	Open	5 mm	0.38 mm	20 µm	30 µm	178 mm (7")
SVCP-Super-3-103.5-96	Up to 950 MHz	Closed	3 mm	0.38 mm	20 µm	30 µm	103.5 mm
SVOP-Super-3-103.5-96	Up to 950 MHz	Open	3 mm	0.38 mm	20 µm	30 µm	103.5 mm
SVCP-Super-3-178-96	Up to 950 MHz	Closed	3 mm	0.38 mm	20 µm	30 µm	178 mm (7")
SVOP-Super-3-178-96	Up to 950 MHz	Open	3 mm	0.38 mm	20 µm	30 µm	178 mm (7")

Medium Wall and Heavy Wall Sample Vault™ NMR Tubes

Packed in Lots of 5 with Caps. Choose Open or Closed Port.

Item No.	MHz Rating	Cap Type	OD (mm)	ID (mm)	Wall (mm)	Length (mm)	Concentricity	Camber
SVCP-Super-5-MW-103.5-5	Up to 950 MHz	Closed	4.97 ± 0.013	3.43 ± 0.025	0.8	103.5	20 µm	30 µm
SVOP-Super-5-MW-103.5-5	Up to 950 MHz	Open	4.97 ± 0.013	3.43 ± 0.025	0.8	103.5	20 µm	30 µm
SVCP-Super-5-HW-103.5-5	Up to 950 MHz	Closed	4.97 ± 0.013	2.20 ± 0.025	1.4	103.5	20 µm	30 µm
SVOP-Super-5-HW-103.5-5	Up to 950 MHz	Open	4.97 ± 0.013	2.20 ± 0.025	1.4	103.5	20 µm	30 µm

NorLoc™ Caps for the Sample Vault™ Series

Packed in Lots of 96. Choose Open or Closed Port.

Item No.	Cap Type	Cap Color	Size
SVCP-NORLOC-3	Closed Port	Red	3 mm
SVOP-NORLOC-3	Open Port	White	3 mm
SVCP-NORLOC-5	Closed Port	Red	5 mm
SVOP-NORLOC-5	Open Port	White	5 mm

Closures to Seal the NorLoc™ Open Port Caps

This closure will fit both the 3mm and 5mm NorLoc™ Open Port caps.

Item No.	Description	Color	Packed in Lots of
SVC-NORLOC-SRS	Tapered Silicone Rubber Plug	Clear Translucent	50 100

ACCESSORIES

H-PH-1

Hamilton pH Electrodes for NMR Sample Tubes

For uncompromising quality in precision pH measurements, there are two electrodes to choose from, depending on your sample matrix. Model H-PH-1 is specific for sample measurements between 0 to 14 pH, and model H-PH-1P is specific for samples containing proteins, with a range between 2 to 11 pH. Both have a standard S7 connector end. Length of electrode portion is 180mm long and 3mm wide. Electrolyte solutions sold separately. For use with 5mm and 10mm NMR tubes.

pH electrodes do not come with connecting cables.
These need to be ordered separately.

Item No.	Description	pH Range	Temp. Range	Frit	Electrolyte
H-PH-1	pH electrode for standard solutions	0-14	0-80 C	Ceramic	3M KCl
H-PH-1P	pH electrode for solutions containing proteins	2-11	0-60 C	Ceramic	Protelyte®
H-KCl-1	3M KCl electrolyte for H-PH-1 electrode, 100ml	-	-	-	-
H-KCl-2	3M KCl electrolyte for H-PH-1 electrode, 500ml	-	-	-	-
H-PRO-1	Protelyte® electrolyte for H-PH-1P electrode, 100ml	-	-	-	-

BNC-1

Hamilton pH Electrode Meter Connecting Cables

BNC Connectors (USA)	Length (m)
BNC-1	1
BNC-3	3
BNC-5	5

DIN Connectors (EUROPE)	Length (m)
DIN-1	1
DIN-3	3
DIN-5	5

Pasteur Pipettes

Designed for NMR Tubes

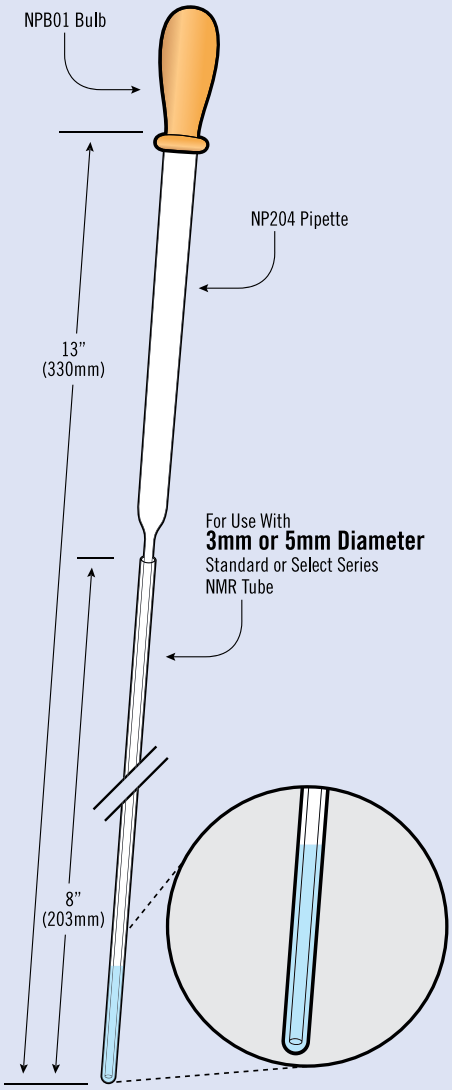
• Our new pipettes display a uniformly drawn tip that can easily access the bottom of our 8" (203mm) long 5mm NMR tubes.

• Manufactured from borosilicate glass that meets the requirements of both the USP (United States Pharmacopeia) Type I specification and the Type I Class B specification for the ASTM E438 standard (formerly known as the American Society for Testing and Materials, now ASTM International). Glass meeting these specifications possesses superior chemical resistance, and is the least reactive glass available, exhibiting a very low level of extractable material which can otherwise contaminate very sensitive or highly purified samples. This type of glass also withstands thermal shock very well because of its comparatively low coefficient of thermal expansion.

• In addition to being ideally suited for use in all 5mm NMR tubes, including our medium wall NMR tubes with walls up to 0.8mm, our pipettes also accommodate our 3mm NMR tubes of 7" (178mm) length with walls up to 0.38mm in our Select Series and Sample Vault Series.

• Our pipettes can contain a total volume of 2.5ml. Because NMR tubes of 5mm diameter and less generally require no more than 1ml sample volume, our pipettes provide ample volume while allowing a margin of safety resulting from the large remaining headspace.

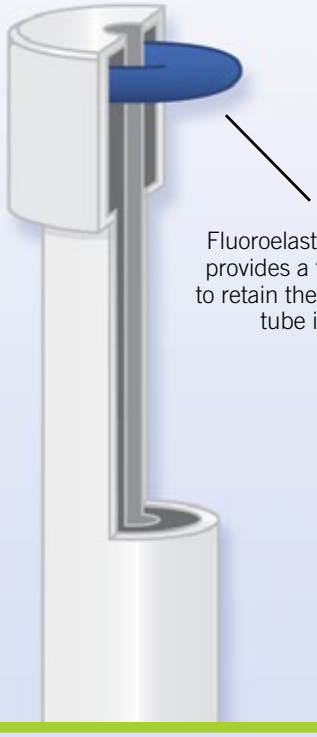
• The uppermost part, or body, of our pipette measures 7mm in outer diameter, permitting use with most rubber bulbs and other pipetting devices commonly stocked in a typical laboratory.



Item No.	Description	Packed In Lots Of
NP204	long tip, 8" (203mm) point	100
NPB01	1ml Rubber Pipette Bulb	12

ACCESSORIES

Optimizer Inserts™ for 5mm Spinner Turbines



Fluoroelastomer O-Ring provides a frictional grip to retain the NMR sample tube in place

5mm O.D. Insert for use with a Varian Spinner Turbine

10mm O.D. Insert for use with a Varian Spinner Turbine

Precision adapter, made from a proprietary formulation of acetal homopolymer resin, holds 1.5mm, 1.7mm, 2.0mm, 2.5mm, 3mm, 4mm or 4.25mm NMR tubes in 5mm spinner turbine. Available for Agilent/Varian, Bruker & Jeol spectrometers. Does not include spinner turbine. U.S. Patent #7,728,593.

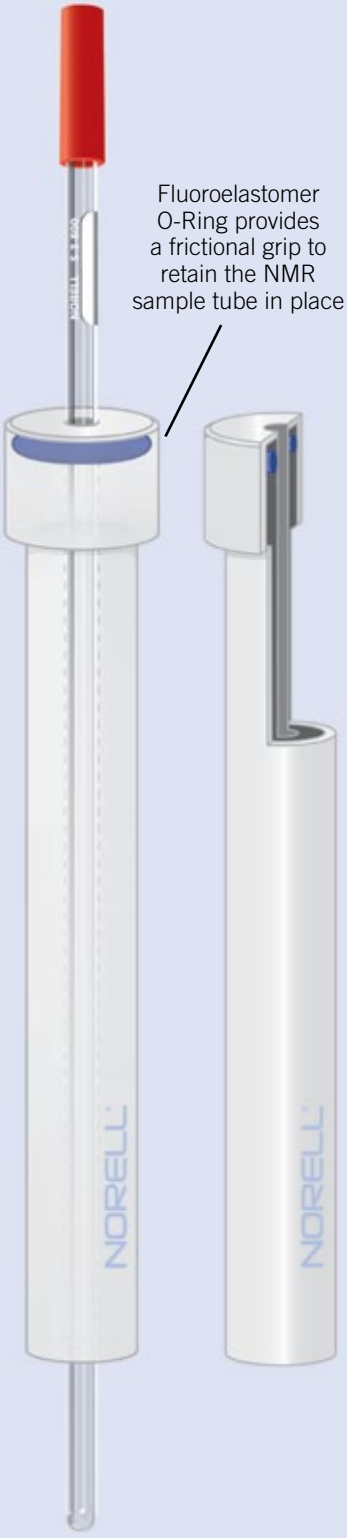
- Individual precision adapters hold 1.5mm, 1.7mm, 2.0mm, 2.5mm, 3mm, 4mm or 4.25mm NMR tubes in 5mm spinner turbine
- Suited for method development to optimize sensitivity and resolution of NMR Spectra
- Ideal for analyzing biological samples or buffered solutions with high salt concentration
- Run sample in seven NMR tube sizes to determine optimal sample volume without purchase of new Spinner Turbines
- Available for Agilent/Varian, Bruker & *upon request*, Jeol Spinner Turbines

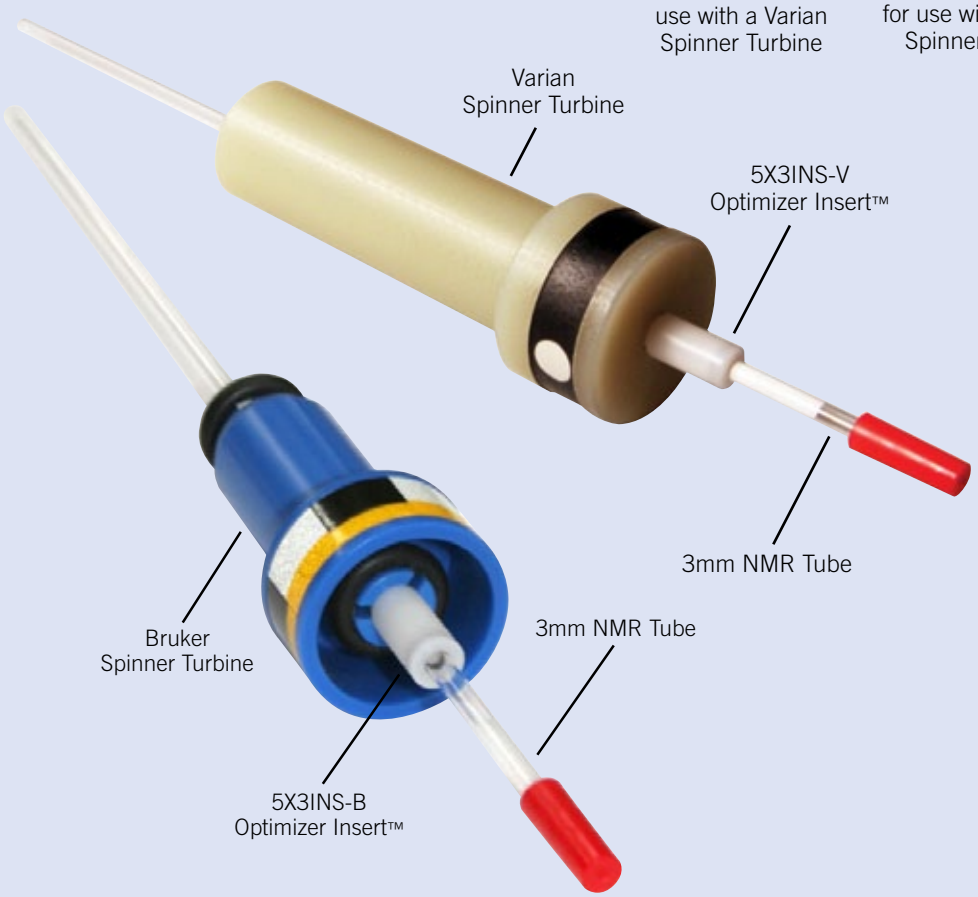
Optimizer Inserts™ for 5mm Spinner Turbines

Item No.	Tube Size (mm)	Spinner Type
5X1.5INS-B	1.50	Bruker
5X1.5INS-V	1.50	Agilent/Varian
5X1.7INS-B	1.70	Bruker
5X1.7INS-V	1.70	Agilent/Varian
5X2INS-B	2.00	Bruker
5X2INS-V	2.00	Agilent/Varian
5X2.5INS-B	2.50	Bruker
5X2.5INS-V	2.50	Agilent/Varian
5X3INS-B	3.00	Bruker
5X3INS-V	3.00	Agilent/Varian
5X4INS-B	4.00	Bruker
5X4INS-V	4.00	Agilent/Varian
5X4.25INS-B	4.25	Bruker
5X4.25INS-V	4.25	Agilent/Varian
10X1.5INS-AV	1.50	Agilent/Varian
10X1.7INS-AV	1.70	Agilent/Varian

5mm O.D. Insert for use with a Varian Spinner Turbine

10mm O.D. Insert for use with a Varian Spinner Turbine





ACCESSORIES

High Performance Spinner Turbine Toroids

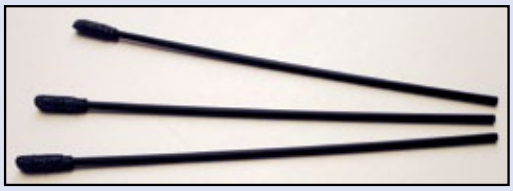
For your spinner turbine maintenance and repair, Norell, Inc. offers superior, high performance replacement components for the standard o-rings as supplied by the spinner turbine manufacturer. The Norell high-performance components are precision toroids manufactured from fluorosilicone elastomer, an advanced aerospace material having enhanced properties. Fluorosilicone elastomer maintains low temperature flexibility without sacrificing high temperature capability or chemical and solvent resistance as compared to other standard materials of construction. Additionally, fluorosilicone elastomer displays superior resistance to sunlight and ozone degradation, two common causes of failure of other elastomeric materials.

Item No.	Spinner Size (mm)	Spinner Type
HPT5B	5	Bruker
HPT5V	5	Varian
HPT3B	3	Bruker
HPT3V	3	Varian

Exclusive NORELL® HPT5B

Exclusive NORELL® HPT5V

SB-5 Spinner Brush



Item No.	Description
SB-5	5mm Spinner Brush

ACCESSORIES

Fluoropolymer Liners

For NMR studies where chemical compounds such as hydrofluoric acid, ammonium bifluoride and concentrated hydroxide solutions are present. Our fluoropolymer tube liners have a thin-wall construction that minimizes filling-factor losses. Supplied with a PTFE plug closure.

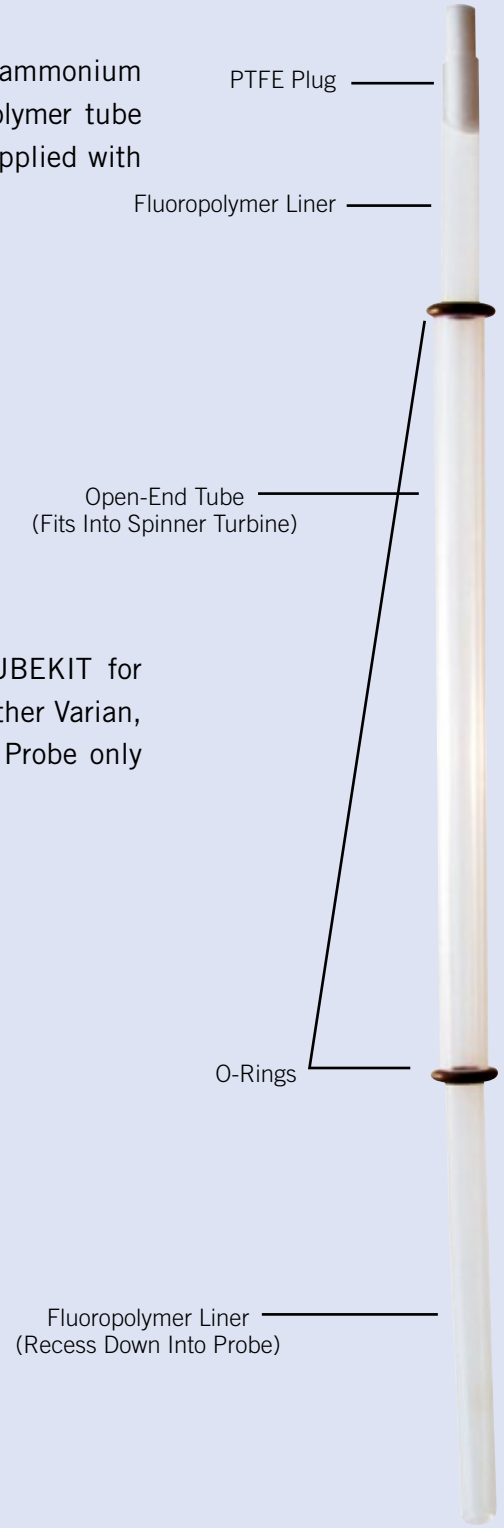
Item No.	Tube Size	Volume at 50mm
TL-5-7	5mm	approx. 0.35ml
TL-10-7	10mm	approx. 2.00ml

Fluoropolymer Liner Tube Kits for 29SI and 11B

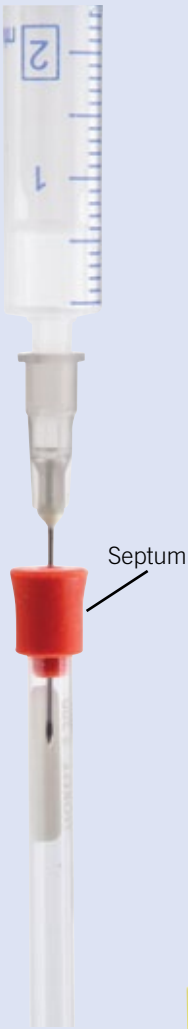
For Silicon and Boron NMR, we recommend the use of either TL-5-TUBEKIT for 3-5mm probes or TL-10-TUBEKIT for 10mm probes. Kit is designed for either Varian, Bruker, or JEOL spinners as a holding device for the fluoropolymer liner. Probe only "sees" fluoropolymer, allowing for excellent ^{29}Si and ^{11}B spectra.

Item No.	Contents
TL-5-TUBEKIT	two o-rings & one 5mm open-end tube
TL-10-TUBEKIT	two o-rings & one 10mm open-end tube

TL-5-Tubekit



ACCESSORIES



5mm & 10mm NMR Tube Septa

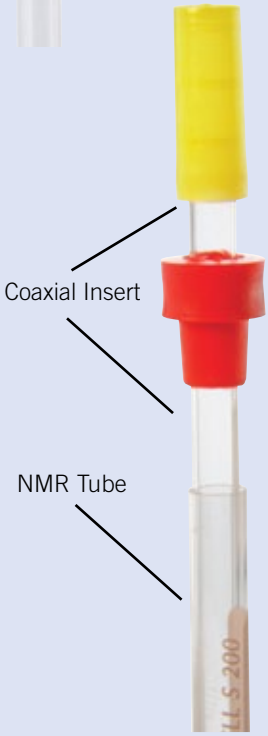
Precision seal rubber septa for 5mm & 10mm NMR tubes. Used for multiple injections with syringe needle.

Item No.	Color	Packed In Lots Of
SEPTA-5-W	White	100
SEPTA-5-R	Red	100
SEPTA-10-W	White	100
SEPTA-10-R	Red	100

SEPTA-5-R

Coaxial Inserts for NMR Sample Tubes

(5mm & 10mm) for external lock & reference solvents. Precision inner cell for use with 5mm & 10mm thin wall NMR tubes. Available for Bruker & Varian spectrometers.



			Stem Specifications			
Item No.	Tube	Probe	O.D. (mm)	Length (mm)	Capacity (µl)	Sample Capacity
NI5CCI-B	5mm	Bruker	2	50	100	490µL
NI5CCI-V	5mm	Varian	2	60	120	590µL
NI10CCI-B*	10mm	Bruker	3	50	215	2.61ml
NI10CCI-V*	10mm	Varian	3	60	260	3.14ml
NI5CCI-B-QTZ	5mm	Bruker	3	50	175	285µL
NI5CCI-V-QTZ	5mm	Varian	3	60	210	340µL

*10mm insert for Bruker & Varian includes our 1008-UP 7" NMR tube

Bruker MATCH™ System Tube Rack

Designed by Bruker Biospin™, offers convenient and secure bench top placement of MATCH™ NMR tubes, tube holders, and Bruker spinner turbines. Can hold up to 10 of each in rack.

Item No.
BTR1000

BTR1000

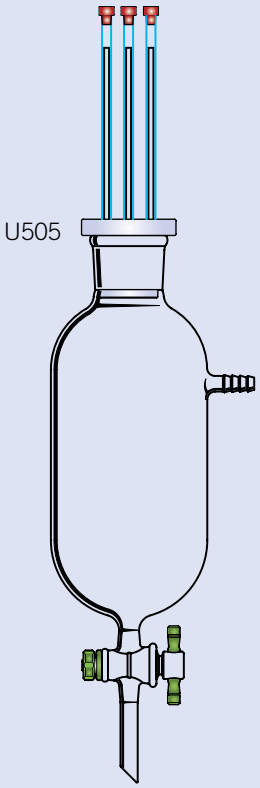
72 Position NMR Tube Rack

This sturdy rack made from polypropylene has upper deck with holes and lower deck with indentations to support tube ends. The sides have carrying handles. Dimensions are 21cm wide x 11cm deep x 22cm high.

Item No.	Description
TR500	for 5mm NMR tubes

TR-500

ACCESSORIES



NMR Tube Cleaner, 5 Position

Comprised of an all glass and fluoropolymer design, the U505 will clean five NMR tubes of the same, or various, lengths and diameters. Fluoropolymer adapter has five positions with flexible 1/8" fluoropolymer tubing supplied in 9" lengths that can be cut to desired height. The NMR tube is placed over the tubing and seats in the adapter, leaving a small space between the end of the fluoropolymer tubing and the inside bottom of the NMR tube. With the stopcock in the closed position, the reservoir is connected to a low vacuum source. Cleaning solvent is added into the adapter followed by air drying to complete the process in seconds. Flexible tubing and adapter design reduces breakage. Stopcock permits easy draining of solvent. Hose connection is 10mm at the largest serration.

Item No.	Description
U505	for 5mm NMR tubes

Tube Washing Unit

Our NMR Sample Tube Washing Unit is made of borosilicate glass. It is a "must" for anyone confronted with the tedious task of cleaning NMR sample tubes. Wash, rinse and dry your NMR tubes - all in one single step!

Item No.	Description
U500	for 5mm NMR tubes

ACCESSORIES

5mm NMR Tube Carrier

Carrier can be clipped to your pocket. Provides safe transport of NMR samples.

Item No.	Color	Packed In Lots Of
PTC-5-7R	Red	1
PTC-5-7W	White	1
PTC-5-7B	Blue	1
PTC-5-7-RWB	1 of each	1 of each

PTC-5-7

NRS-250 Surfactant

For clean & residue-free NMR sample tubes & labware NRS-250, the "NO RESIDUE SURFACTANT" is the ultimate in cleanliness for your NMR sample tubes, glassware and equipment. It leaves no residue after rinsing. NRS-250 removes silicone oils and greases, cedar oil, tar, blood, apiezon oils and greases, Canada Balsam, polyethylene resins, distillation residues, organic materials, and many other stubborn contaminants.

Item No.	Size (kg)	Packed In Lots Of
NRS-250	1	1

NRS-250

Standard NMR Tube Caps

MORE Cap colors FOR BETTER SOLVENT LABELING CAPABILITIES

Our standard NMR tube caps are now available in 12 different colors for better solvent labeling capabilities. We are happy to present these caps to you in order to make your experiments easier and more efficient. TC-5-EVA is available in the following colors: Assorted (AS), Sky (S), Red (R), Pink (PK), Aqua (A), Fuchsia (F), Green (G), Blue (B), Yellow (Y), Purple (P), Orange (O), White (W), Black (BK). When placing an order, simply add a hyphen and the corresponding lot amount.

TC-5-EVA

TC-10-LPE

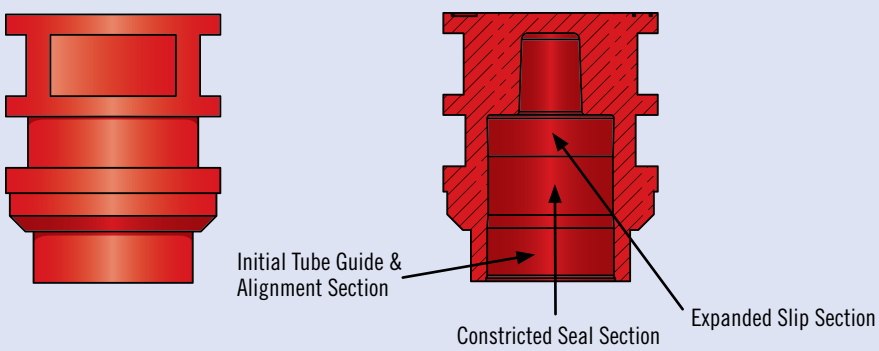
Item No.	Description	Material	Color
TC-3-LPE-R	3mm Tube Cap	Low Density Polyethylene	RED
TC-4-EVA-Y	4mm Tube Cap	Ethylene-Vinyl Acetate	YELLOW
TC-4.25-EVA-Y	4.25mm Tube Cap	Ethylene-Vinyl Acetate	YELLOW
TC-5-EVA-AS	5mm Tube Cap	Ethylene-Vinyl Acetate	ASSORTED
TC-5-EVA-S	5mm Tube Cap	Ethylene-Vinyl Acetate	SKY
TC-5-EVA-PK	5mm Tube Cap	Ethylene-Vinyl Acetate	PINK
TC-5-EVA-A	5mm Tube Cap	Ethylene-Vinyl Acetate	AQUA
TC-5-EVA-F	5mm Tube Cap	Ethylene-Vinyl Acetate	FUCHSIA
TC-5-EVA-R	5mm Tube Cap	Ethylene-Vinyl Acetate	RED
TC-5-EVA-G	5mm Tube Cap	Ethylene-Vinyl Acetate	GREEN
TC-5-EVA-B	5mm Tube Cap	Ethylene-Vinyl Acetate	BLUE
TC-5-EVA-Y	5mm Tube Cap	Ethylene-Vinyl Acetate	YELLOW
TC-5-EVA-P	5mm Tube Cap	Ethylene-Vinyl Acetate	PURPLE
TC-5-EVA-O	5mm Tube Cap	Ethylene-Vinyl Acetate	ORANGE
TC-5-EVA-W	5mm Tube Cap	Ethylene-Vinyl Acetate	WHITE
TC-5-EVA-BK	5mm Tube Cap	Ethylene-Vinyl Acetate	BLACK
TC-10-LPE-R	10mm Tube Cap	Low Density Polyethylene	RED
TC-10-LPE-B	10mm Tube Cap	Low Density Polyethylene	BLUE
TC-10-LPE-G	10mm Tube Cap	Low Density Polyethylene	GREEN
TC-10-LPE-Y	10mm Tube Cap	Low Density Polyethylene	YELLOW

NORELL NorLoc™ Closed Port 5mm NMR Tube Cap

The standard 5mm NMR tube cap has been around for many years, and has usually functioned satisfactorily. However, many users can attest to the significant flaws inherent in the traditional NMR tube cap, especially when faced with the chore of capping numerous sample tubes.

The Norell NorLoc™ NMR tube cap features a patented design (U.S. Patent Number 8,054,080) that not only addresses many of the flaws in the traditional NMR tube cap, but the superior design of the NorLoc™ cap introduces many substantial improvements as well.

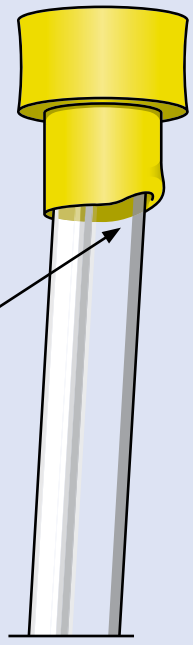
The NorLoc™ cap can be applied much more easily and quickly, thereby increasing personal safety and saving valuable time. It incorporates an advanced seal design, conferring superior holding and sealing capabilities. The superior retention of the cap to the tube forms a "vaulted seal" that safeguards precious or critical samples, even during refrigerated cold storage and variable temperature cycling and withstands repeated removals and reapplications. The NorLoc™ cap is entirely compatible with many existing high-throughput automated laboratory sample handling systems, safely delivering samples to and from 96 position tube racks, the NMR magnet and other peripheral devices.



NorLoc™ Caps for the Sample Vault™ Series & Traditional NMR Sample Tubes

Packed in Lots of 96. Choose Open or Closed Port.

Item No.	Cap Type	Cap Color	Size
SVCP-NORLOC-5	Closed Port	Red	5 mm
SVOP-NORLOC-5	Open Port	White	5 mm
SVCP-NORLOC-3	Closed Port	Red	3 mm
SVOP-NORLOC-3	Open Port	White	3 mm



Typical example of a common problem often encountered when cappping NMR tubes with the traditional style caps.

Closures to Seal the NorLoc™ Open Port Caps

This closure will fit both the 3mm and 5mm NorLoc™ Open Port caps.

Item No.	Description	Color	Packed in Lots of
SVC-NORLOC-SRS	Tapered Silicone Rubber Plug	Clear Translucent	50 100

ACCESSORIES

Screw Cap NMR Tube Caps

Supplied with a fluoropolymer backed silicone septum for clean, easy access with a 22 gauge standard point needle. Available with solid screw cap and no septum.

Item No.	Description	Thread	Packed In Lots Of
S-5-SC	5mm Screw Cap Tube Cap With Septum	8-425	12
S-5-SSC	Solid 5mm Screw Cap Tube Cap No Septum	8-425	12

Redesigned Fluoropolymer NMR Tube Caps

Redesigned tapered fluoropolymer closure system that works together with our fire-polished tube ends, offering superior sealing and sample integrity, preventing sample loss even during temperature gradients.

Item No.	Description
TC-3-PTFE	3mm White Tube Cap
TC-4-PTFE	4mm White Tube Cap
TC-5-PTFE	5mm White Tube Cap
TC-10-PTFE	10mm White Tube Cap

Polypropylene Syringes

These syringes are latex free, contain no rubber, no silicone oil, or styrene. Manufactured only from laboratory grade polypropylene and polyethylene, a positive safety stop is incorporated to prevent accidental spills. Packed in lots of 100.

Item No.	Description	Packed In Lots Of
SR100	1ml with 0.01ml graduations	100
SR300	3ml with 0.1ml graduations	100
SR500	5ml with 0.5ml graduations	100
SR1000	10ml with 0.5ml graduations	100
NDL22	hypodermic needle for use with disposable syringes (stainless steel, translucent hub 22 guage x 1")	100

PTFE Syringe Tubing

These 12" lengths of PTFE syringe tubing offer an excellent means to access the bottom of small inner diameter NMR tubes, allowing void-free filling with viscous solvents such as DMSO- d6 or deuterium oxide.

Likewise, this syringe tubing permits easy retrieval of sample solutions from small diameter NMR tubes, or through the narrow orifice of valved NMR tubes, for example.

The flexible, totally inert and chemically resistant PTFE tubing is supplied with a female Luer-lock hub on one end and a raw cut on the opposite end. The tubing can easily be cut and shortened to any desired length.

The Luer-lock hub fits the above syringes, or any other syringes having a male Luer taper connection, whether of the locking type or slip-tip type.

The Luer-lock hub, made from Kel-F® (also known as PCTFE, or polychlorotrifluoroethylene), has excellent chemical resistance, mechanical strength and deformation resistance.

The PTFE and Kel-F® materials of construction are virtually impervious to all common solvents, making the assembled syringe tubes washable and reusable many times over.

In the table below, several different gauge diameters of PTFE tubing are presented, allowing use with all Norell NMR tubes except 1mm O.D. The individual sizes may be purchased separately, or as a kit containing one of each size. Please note that, upon request, other gauge sizes from 30 to 7 are available, as well as custom lengths having a female hub on one end only or on both ends.

PTFE Syringe Tubing, 12 Inches Long, Kel-F® Female Luer-lock Hub on One End

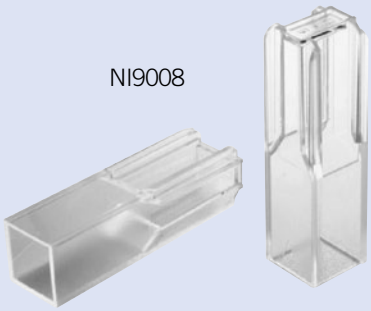
Item No.	Recommended Minimum Size NMR Tube	Tubing Size (Gauge Number)	Nominal O.D.		Nominal I.D.	
			inch	mm	inch	mm
NDL-PTFE-28X12	1.5mm O.D. thin wall tubes	28	0.033	0.84	0.015	0.38
NDL-PTFE-24X12	1.7mm O.D. thin wall tubes	24	0.040	1.02	0.022	0.56
NDL-PTFE-22X12	2.0mm O.D. thin wall tubes	22	0.046	1.17	0.028	0.71
NDL-PTFE-17X12	2.5mm O.D. thin wall tubes, High Pressure Valved tubes	17	0.071	1.80	0.047	1.19
NDL-PTFE-16X12	3.0mm O.D. thin wall tubes, 5.0mm O.D. heavy wall tubes	16	0.077	1.96	0.053	1.35
NDL-PTFE-12X12	5.0 and 4.0mm O.D. thin wall, 5.0mm O.D. medium wall, all larger size tubes	12	0.109	2.77	0.085	2.16
NDL-PTFE-KITX12 (contains one each of the above items)	Suitable for all above sizes (except 1.0 mm O.D.)	One each of the above sizes	As per above	As per above	As per above	As per above

ACCESSORIES

Standard 3.5ml & Semi-Micro 1.5ml Cuvettes

Two sizes are available; 3.5ml (standard) and 1.5ml (semi-micro). All cuvettes have a 10mm path length and are 45mm high. Internal width of the semi-micro size is 4mm. We also have cuvette caps made from polyethylene which are easy to insert and remove. The caps seal liquid tight, suitable for mixing and storage. Sold in lots of 500. Call for other custom sizes.

Item No.	Size	Packed In Lots Of
NI9007	3.5ml	500
NI9008	1.5ml	500
NI9010	cap for cuvette	500

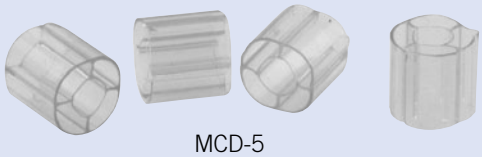


NI9008

Fluoropolymer FEP Multi-Channel™ Distillation Column Packing

This unique, lightweight, efficient distillation column packing was developed in our chemical R&D laboratories in the process of separation of H_2O from D_2O (heavy water) by distillation. Being chemically inert, with large contact surface area, it proved to be an excellent distillation column packing in the process of upgrading and separation by distillation of our deuterated solvents. We have determined the HETP (Height Equivalent to a Theoretical Plate) to be approximately 14.2 cm when using a standard test solution in a carefully controlled experimental apparatus, and we estimate that 100g of 5mm o.d. individual Multi-Channel™ units consists of 880 pieces, occupies 200 cm^3 in volume and offers about 2720 cm^2 in total surface area.

Item No.	Weight	Approx. Volume	Size	Approx. Pieces Per Pack	Surface Area
MCD-5	250g	500cm^3	5mm	2200	6800cm^2
MCD-10	250g	1100cm^3	10mm	1000	10,600cm^2

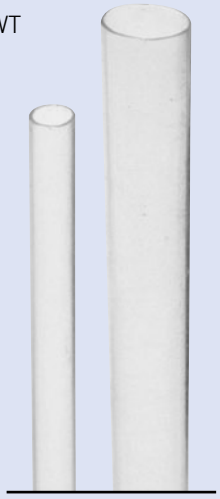


MCD-5

Thin-Wall Transparent Fluoropolymer FEP Tubing

Our thin-wall transparent fluoropolymer FEP tubing is manufactured from special virgin grade DuPont thermoplastic FEP fluoropolymer. Unlike PTFE tubing, this material can be heat sealed. This property offers extremely large possibilities for packaging and/or storage of samples (corrosives, liquids, solids, etc.). Our fluoropolymer tubing can also be used where snug and tight fit over glass or metal tubing is required. Sold in sections of 305mm (12") long. There are 4 sections contained in each package. The number after "TWT" indicates i.d. size in mm. (For example, TWT-5 has an inside diameter of 5 mm).

TWT



Item No.	O.D. (mm)	I.D. (mm)	Length (in)	Packed In Lots Of
TWT-3	3.52	3	12	4
TWT-4	4.91	4	12	4
TWT-5	5.60	5	12	4
TWT-6	6.55	6	12	4
TWT-7	7.68	7	12	4
TWT-8	8.54	8	12	4
TWT-9	9.55	9	12	4
TWT-10	10.63	10	12	4
TWT-12	12.78	12	12	4
TWT-312	(3-12mm inside diameter)*		12	1 set

* This package contains 1 of each size 3mm through 12mm (9tubes)

ACCESSORIES

Permanent Ink Ultra Fine Point Markers

Use this high quality, permanent ink, ultra fine point marker to clearly mark & organize all of your NMR Tube samples.

Item No.
MARKER-RED, MARKER-BLUE, or MARKER-BLACK

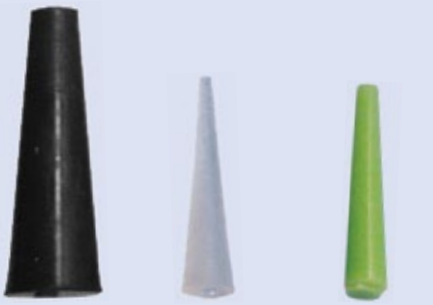
MARKER

Silicone Rubber Stoppers for NMR Sample Tubes

These stoppers can provide a solution for those difficult situations when a standard tube cap cannot be used, as, for instance, when space is a limiting factor. This problem occurs most often in solid state NMR work, when unique, compact or experimental probe designs may be encountered. The stoppers seal within the inner surface of the sample tube, and therefore do not extend beyond the outer periphery of the sample tube as does a standard tube cap.

They are made of a soft, resilient silicone rubber that forms a very effective seal without applying excessive force to the glass sample tube, thereby minimizing tube breakage. If desired, the stoppers can be easily trimmed to length with a knife blade or scissors. Being made from silicone rubber, they have a high degree of inertness, solvent resistance and high temperature capability (up to 200°C).

Item No.	Description	Color	Packed in Lots of
TS-1.5-3-SR	Will fit our thin wall tubes having an O.D. of 1.5mm to 3mm. (1.2mm to 2.4mm I.D)	clear translucent	50
TS-2.5-3-SR	Will fit our thin wall tubes having an O.D. of 2.5mm to 3mm. (2.1mm to 2.4mm I.D)	light green	50
TS-4-5-SR	Will fit our thin wall tubes having an O.D. of 4mm to 5mm. (3.2mm to 4.2mm I.D)	black	50
TS-10-SR	Will fit our thin wall 10mm O.D. tube. (8mm to 11.5mm I.D.)	clear translucent	10



TS-4-5-SR TS-1.5-3-SR TS-2.5-3-SR

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Cambridge Isotope Laboratories, Inc.

Cambridge Isotope Laboratories, Inc.
3 Highwood Drive
Tewksbury, MA 01876, USA

Tel: 978-749-8000
Fax: 978-749-2768
Email: cilsales@isotope.com

Customer Service
US Toll Free: 800-322-1174
Canada Toll Free: 800-643-7239
www.isotope.com

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Celebrating 47 Years of Precision