Thermo Scientific Nalgene Plastics Technical Guide

- Bottles and Carboys
- Filterware
- Tubing
- Centrifuge Ware
- General Use and Care

NALGENE®

Thermo SCIENTIFIC

Introduction

Thank you for using NALGENE® Brand Products in your laboratory.

This technical guide provides you with care and use information when using NALGENE plastic labware. We've condensed over 50 years of plastics experience into this short guide. This technical guide can help you answer everyday queries about chemical resistance, temperature compatibility, centrifugation rotor speed and other plastic-related topics.

Overview: Plastics can be used in a wide variety of laboratory applications and environments. While resistant to breakage compared to glass products, even the sturdiest plastic labware can show its age when repeatedly used in demanding applications. Consult the NALGENE Technical guide to ensure that you are using the right NALGENE plastic products under your particular laboratory conditions. Look for these telltale signs to see if it's time to replace your plastic laboratory products due to age or chemical attack.

> ***Severe yellowing*** can indicate that plastic is starting to degrade due to age or UV light exposure.
>
> ***Chemical and physical stresses*** are seen in many plastics in the form of "hazing" or "stress cracks." These are easily seen in visually clear resins such as Polycarbonate, Polystyrene, and PETG. Products showing extreme hazing and cracking should be replaced.
>
> ***Temperature:*** Extreme temperatures and periodic heating or freezing can affect plastics. Temperature levels also affect the chemical resistance rating of plastics. Use only plastic products engineered and manufactured for extreme temperatures or harsh chemicals. This will avoid possible product failure and loss of experimental materials.

See the table of contents for a complete listing of resource information found within this manual.

NALGENE Quality: Your work demands reliable, accurate labware. NALGENE products back up your efforts with every manufacturing run and with our enhanced product testing. The following is a list of certifications and testing that NALGENE products comply with:

- ISO 13485 certified manufacturing facilities
- Certificates of Conformance Lot Control
- Leakproof testing
- Sterility assurance testing for sterile products
- Technical service available 5 days a week
- Customer service easily reached every work day
- Customer Notification Program
- Validated Resins for
    a. Food and Beverage Use
    b. USP Testing
    c. European Testing

Statement of Content: Look for regular updates on the NALGENE product website --www.NALGENElabware.com. The site is constantly refreshed with updated information, the latest use and care tips plus new products. Quickly search extensive on-line databases to match centrifuge tubes to your rotors, confirm the chemical compatibility of your plastic labware or request certificates of compliance.

The information contained in this brochure should only be considered a general guide to using plastic labware. Contact us with specific questions on your unique situation. Testing of the product in your actual application is always encouraged. Information in this piece does not imply warranty or specific use and care information. Check our website or Labware Catalog for warranty and specific use and care information.

Request a free NALGENE catalog by calling 1-800-276-2543.

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NALGENE®. SMART MOVE.

When it comes to critical laboratory processes, details matter. That's why relying on the quality of NALGENE is a proven strategy.

Today's laboratory science opens the way to the breakthroughs of tomorrow. And quality in lab processes helps ensure that you never miss a step. The proven manufacturing and validation of NALGENE scientific products helps protect your work from contamination, waste, and inefficiency. From bottles and carboys to culture vessels and cryoware, NALGENE products are an investment in your work. And your future.

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SCIENCE. UNCOMPROMISED.™

www.NALGENE.com

Table of Contents

Bottles & Carboys

NALGENE® quality is built into every product we manufacture. Every bottle and carboy manufactured, every resin selected, every quality test performed ensures the highest quality performance available in today's laboratory setting.

Leakproof

NALGENE bottles and closures are engineered to work together. They are guaranteed leakproof because we make and test both components as a system. Most NALGENE closures have no liner that can wear, crease, leak, cause contamination or fall out. The result; your ultimate protection for handling valuable or sensitive materials.

Superior Quality

NALGENE plastic containers are designed and manufactured for tough applications under rigorous laboratory conditions.

Use them when you cannot afford the risks of glass or commodity plastic containers—risks such as leakage, breakage or contamination from undisclosed additives.

Stringent Inspection and Testing Ensures Quality and Reliability

To ensure their quality and reliability, NALGENE containers and closures are inspected and performance-tested from design and development through all stages of manufacturing. In addition to compliance with applicable U.S. and international product standards, we insist that our containers meet our own requirements to achieve the level of excellence that our customers expect.

We purchase only top-quality premium-grade resins for our containers. We test incoming resins for acceptability and consistency so that we can provide you with a quality product. Our bottle and carboy products contain no fillers, extenders or plasticizers.

We offer a leakproof closure system and test this as part of our routine inspection.

Consistent wall thickness is important. Containers are inspected during production to ensure compliance with wall thickness specifications. This means you purchase a container that is always strong and durable.

For details on these NALGENE Quality Assurance Procedures, contact Technical Support at 1-800-625-4327 (U.S. and Canada, 1-585-586-8800 outside of North America) or e-mail Techanical.Nalgene@thermofisher.com.

Anatomy of a NALGENE Bottle

NALGENE bottles... you can't beat the system.

Closure is one-piece, linerless. Works with the bottle to create a **guaranteed leakproof system.**

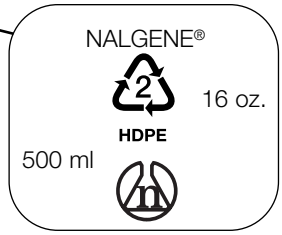
Shrink Ring at the neck of most NALGENE bottles is molded so the inside surface is smooth, minimizing content entrapment.

Heavy-Duty Uniform Walls* are generally thicker and very resistant to splitting or puncturing.

Bottom has curved inner corners for easy cleaning. Stable base has permanent, molded-in resin code and volume.

Seal Ring is molded inside the closure. Fits tightly against the beveled inner edge (chamfer) of the bottle neck. This makes the NALGENE bottle a leakproof system. No closure liner to wear, crease or cause contamination.

Threads on bottles and closures have continuous, straight-shouldered semi-buttress threads, not low-quality round threads.



*Unlike many competitive plastic bottles, most NALGENE bottles (up to four liters) are injection blow-molded. This allows more precise molding of the neck area and chamfer and more consistent wall thickness distribution. Injection blow-molded bottles feature a smoother, more stable bottom with less molded-in stress for greater product reliability. There are no pinch-offs to cause creases or splits which could harbor contaminants.

NALGENE bottles - better than glass because they're lighter weight and give better protection against leakage, breakage and contamination.
If you find a NALGENE bottle or carboy that we say is leakproof and it isn't, tell us and we'll replace it. That's the NALGENE guarantee.
NALGENE bottles and carboys are leakproof at ambient temperature and pressure when used with their NALGENE closures, except as noted in individual listings for certain materials and designs.

Testing proves the unique NALGENE closure/bottle system is leakproof.

Leak testing bottles, carboys and other containers with closures smaller than 100 mm (except jars with screw closures) - A standard test closure, with a fitting to allow pressure application, is screwed onto a randomly selected production container. The container is filled with water and inverted. Pressure of 2 psig (a greater pressure differential than the products are likely to experience in actual service) is applied for two minutes. If no water escapes, the container is leakproof.

Leak testing closures - In a complementary procedure, a fitting to allow pressure application is attached to the bottom of a standard test bottle. Water is added, a closure is screwed on and the container is inverted. Pressure is applied as described above. Closure is checked after two minutes to assure that no water has escaped.

Leak testing bottles, carboys and other containers with large closures (100 mm or 120 mm), and all jars with screw closures - A standard test closure is screwed onto a container filled with water. The container is inverted or laid on its side for 15 minutes. If no water escapes, the container is leakproof. Closures are tested in a complementary procedure using standard test containers.

Cutting down on contamination - NALGENE does not add plasticizers or extenders such as phthalates to any NALGENE bottle or carboy, thus eliminating a source of sample contamination.

Quick Selection Shape Guide

Narrow Mouth Bottles & Carboys

Application Benefit

- Leakproof
- Boston round shape is most common design
- Narrow mouth is easier to pour from
- Carboys with or without dispensing spigot

Size Range

- Bottles 4mL – 6L
- Carboys 6L – 50L

Wide Mouth Bottles & Carboys

Application Benefit

- Wide opening
- Easy cleaning
- Easy dispensing
- Carboys with or without dispensing spigot

Size Range

- Bottles 30mL – 6L
- Carboys 6L – 50L

Square Bottles & Carboys

Application Benefit

- Space saving footprint for storage space
- Offered sterile in some configurations

Size Range

- Bottles 30mL – 4L
- Carboys 5, 10 & 20L

Rectangular Bottles & Carboys

Application Benefit

- Leakproof
- Rectangular design
- Space saving footprint
- Carboys with or without dispensing spigot

Size Range

- Bottles 4mL – 6L
- Carboys 6L – 20L

Space Saving Bottles & Carboys

Application Benefit

- Space saving design
- Horoizontal carboy for tight spaces
- Flexible bottle bags can be stored in limited space

Size Range

- Flexible Bottles 500mL – 3L
- Carboys 8 & 15L sizes

Jugs and Jerricans

Application Benefit

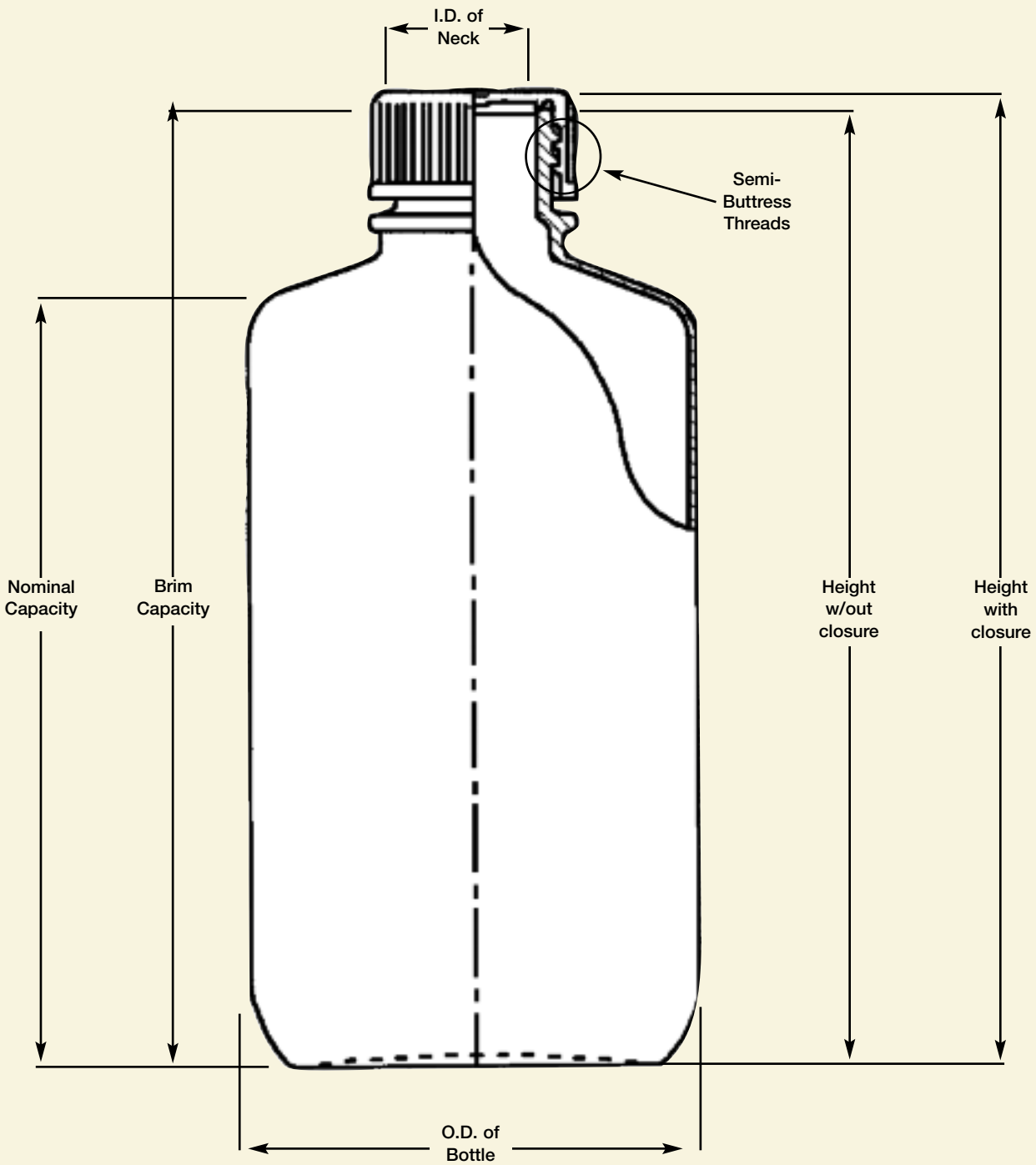
- Intermediate Size
- Heavy duty construction

Size Range

- Jugs 4L – 8L
- Carboys 6L – 20L

Bottle Specifications

NALGENE®



Bottle Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
4 ml (1/8 oz.)	Bottle, NM	2002-9125	4.2	HDPE	Natural	13	71-2150-0130	8/5/16	41/1 5/8	39/1 1/2	16/5/8
	Bottle, NM	2004-9125	4.2	HDPE	Amber	13	71-2171-0130	8/5/16	41/1 5/8	39/1 1/2	16/5/8
	Bottle, NM	2006-9125	4.2	PP	Natural	13	71-2150-0130	8/5/16	41/1 5/8	39/1 1/2	16/5/8
	Bottle, NM	2035-0005	9.8	PETG	Clear	20	34-2158-0021	11/7/16	46/1 7/8	44/1 3/4	22/7/8
7.5 ml (1/4 oz.)	Bottle, NM	2002-9025	12	HDPE	Natural	20	71-2150-0200	14/9/16	45/1 3/4	43/1 11/16	25/1
	Bottle, NM	2003-9025	12	LDPE	Natural	20	71-2150-0200	14/9/16	45/1 3/4	43/1 11/16	25/1
	Bottle, NM	2004-9025	12	HDPE	Amber	20	71-2171-0200	14/9/16	45/1 3/4	43/1 11/16	25/1
	Bottle, NM	2006-9025	12	PP	Natural	20	71-2150-0200	14/9/16	45/1 3/4	43/1 11/16	25/1
	Bottle, NM	2035-0010	15	PETG	Clear	20	34-2158-0021	11/7/16	56/2 1/4	54/2 1/8	24/15/16
15 ml (1/2 oz.)	Bottle, NM	2002-9050	18	HDPE	Natural	20	71-2150-0200	14/9/16	58/2 9/32	56/2 7/32	25/1
	Bottle, NM	2003-9050	18	LDPE	Natural	20	71-2150-0200	14/9/16	58/2 9/32	56/2 7/32	25/1
	Bottle, NM	2004-9050	18	HDPE	Amber	20	71-2171-0200	14/9/16	58/2 9/32	56/2 7/32	25/1
	Bottle, NM	2006-9050	18	PP	Natural	20	71-2150-0200	14/9/16	58/2 9/32	56/2 7/32	25/1
	Jar, Straight-Side, WM	2116-0015	16	PC	Clear	38	71-2150-0380	29/1 1/8	46/1 13/16	43/1 11/16	31/1 7/32
	Jar, Straight-Side, WM	2118-9050	16	PP	Natural	38	71-2150-0380	29/1 1/8	46/1 13/16	43/1 11/16	31/1 7/32
	Bottle, NM	1600-0001	35	FEP	Clear	20	71-2174-0200	14/9/16	75/2 15/16	72/2 13/16	32/1 1/4
	Bottle, NM	DS1630-0001	35	PFA	Natural	20	71-2172-0020	14/9/16	75/2 15/16	72/2 13/16	32/1 1/4
	Bottle, NM	2002-0001	34	HDPE	Natural	20	71-2150-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 5/16
	Bottle, NM	2003-0001	34	LDPE	Natural	20	71-2150-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 5/16
	Bottle, NM	2004-0001	34	HDPE	Amber	20	71-2171-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 5/16
	Bottle, NM	2006-0001	34	PP	Natural	20	71-2150-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 5/16
	Bottle, Square	2015-0030	39.5	PC	Clear	20	71-2150-0200	14/9/16	64/2 1/2	61/2 7/8	38/1 1/2 Square
	Bottle, Square	2016-0030	39.5	PP	Natural	20	71-2150-0200	14/9/16	64/2 1/2	61/2 7/16	38/1 1/2 Square
	Bottle, Square	2018-0030	39.5	HDPE	Natural	20	71-2150-0200	14/9/16	64/2 1/2	61/2 3/8	38/1 1/2 Square
	Media Bottle, Sterile	2019-0030	39.5	PETG	Clear	20	71-2151-0200	14/9/16	64/2 1/2	61/2 3/8	38/1 1/2 Square
	Bottle, Env. Sample, NM	DS2085-0001	34	HDPE	Amber	20	71-2171-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 3/8
	Bottle, NM	2035-0020	27	PETG	Clear	20	34-2158-0021	11/7/16	65/2 1/2	63/2 1/2	30/1 1/8
30 ml (1 oz.)	Bottle, Env. Sample, NM	2089-0001	34	HDPE	Natural	20	71-2150-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 3/8
	Bottle, PassPort, NM	2099-0001	35	HDPE	Natural	20	71-2150-0200	14/9/16	61/2 3/8	58/2 5/16	34/1 3/8
	Bottle, WM	2103-0001	35	LDPE	Natural	28	71-2150-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
	Bottle, WM	2104-0001	35	HDPE	Natural	28	71-2150-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
	Bottle, WM	2105-0001	35	PP	Natural	28	71-2150-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
	Bottle, WM	2106-0001	35	HDPE	Amber	28	71-2171-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
	Jar, Straight-Side, WM	2116-0030	32	PC	Clear	43	71-2150-0430	33/1 9/32	48/1 7/8	43/1 11/16	36/1 7/16
	Jar, Straight-Side, WM	2118-0001	32	PP	Natural	43	71-2150-0430	33/1 9/32	48/1 7/8	43/1 11/16	36/1 7/16
	Bottle, Env. Sample, WM	DS2185-0001	39	HDPE	Amber	28	71-2171-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
	Bottle, Env. Sample, WM	2189-0001	39	HDPE	Natural	28	71-2150-0280	21/1 3/16	63/2 1/2	60/2 3/8	34/1 3/8
60 ml (2 oz.)	Bottle, NM	1600-0002	65	FEP	Clear	20	71-2174-0200	14/9/16	84/3 5/16	82/3 1/4	39/1 7/16
	Bottle, NM	DS1630-0002	65	PFA	Natural	20	71-2172-0020	14/9/16	84/3 5/16	82/3 1/4	39/1 7/16
	Bottle, NM	2002-0002	65	HDPE	Natural	20	71-2150-0200	14/9/16	85/3 5/16	83/3 9/32	37/1 7/16
	Bottle, NM	2003-0002	65	LDPE	Natural	20	71-2150-0200	14/9/16	85/3 5/16	83/3 9/32	37/1 7/16
	Bottle, NM	2004-0002	66	HDPE	Amber	20	71-2171-0200	14/9/16	85/3 5/16	83/3 9/32	37/1 7/16
	Bottle, NM	2006-0002	70	PP	Natural	20	71-2150-0200	14/9/16	85/3 5/16	83/3 9/32	37/1 7/16
	Bottle, Square	2015-0060	78	PC	Clear	24	71-2150-0240	18/11/16	83/3 9/32	81/3 3/16	41/1 5/8 Square
	Bottle, Square	2016-0060	78	PP	Natural	24	71-2150-0240	18/11/16	83/3 9/32	81/3 3/16	41/1 5/8 Square
	Bottle, Square	2018-0060	78	HDPE	Natural	24	71-2150-0240	18/11/16	83/3 1/4	81/3 3/16	41/1 5/8 Square
	Media Bottle, Sterile	2019-0060	78	PETG	Clear	24	71-2151-0240	18/11/16	82/3 1/4	80/3 1/8	41/1 5/8 Square
	Bottle, Env. Sample, NM	DS2085-0002	69	HDPE	Amber	20	71-2171-0200	14/9/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, Env. Sample, NM	2089-0002	69	HDPE	Natural	20	71-2150-0200	14/9/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, PassPort, NM	2099-0002	65	HDPE	Natural	20	71-2150-0200	14/9/16	84/3 5/16	82/3 1/4	39/1 1/2
	Bottle, WM	2103-0002	70	LDPE	Natural	28	71-2150-0280	21/13/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, WM	2104-0002	70	HDPE	Natural	28	71-2150-0280	21/13/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, WM	2105-0002	70	PP	Natural	28	71-2150-0280	21/13/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, WM	2106-0002	70	HDPE	Amber	28	71-2171-0280	21/13/16	86/3 3/8	83/3 9/32	39/1 1/2
	Bottle, WM, Square	2110-0002	68	PP	Natural	28	71-2150-0280	21/13/16	83/3 3/16	79/3 1/8	36/1 7/16 Square
	Bottle, WM, Square	2114-0002	68	HDPE	Natural	28	71-2150-0280	21/13/16	83/3 3/16	79/3 1/8	36/1 7/16 Square
	Jar, Straight-Side, WM	2116-0060	60	PC	Clear	53	71-2150-0530	43/1 11/16	45/1 7/8	43/1 11/16	48/1 7/8
	Jar, Straight-Side, WM	2117-0060	60	PMP	Clear	53	71-2150-0530	43/1 11/16	45/1 7/8	43/1 11/16	48/1 7/8
	Jar, Straight-Side, WM	2118-0002	60	PP	Natural	53	71-2150-0530	43/1 11/16	45/1 7/8	43/1 11/16	48/1 7/8
	Bottle, Env. Sample, WM	DS2185-0002	70	HDPE	Amber	28	71-2171-0280	21/13/16	86/3 3/8	83/3 1/4	38/1 1/2
	Bottle, Env. Sample, WM	2189-0002	70	HDPE	Natural	28	71-2150-0280	21/13/16	86/3 3/8	83/3 1/4	38/1 1/2
	Bottle, Env. Sample, WM	33-2189-0002	70	HDPE	Natural	28	71-2150-0280	21/13/16	86/3 3/8	83/3 1/4	38/1 1/2
125 ml (4 oz.)	Bottle, NM	1600-0004	140	FEP	Clear	24	71-2174-0240	17/11/16	115/4 1/2	112/4 3/8	46/1 13/16
	Bottle, NM	1630-0004	140	PFA	Natural	38-430	71-2172-0384	24/15/16	127/5	121/4 3/16	46/1 13/16
	Bottle, NM	DS2000-0004	145	PVC	Clear	24	71-2150-0240	18/11/16	115/4 1/2	112/4 3/8	46/1 13/16
	Bottle, NM	2002-0004	137	HDPE	Natural	24	71-2150-0240	18/11/16	101/4	99/3 7/8	50/1 5/16

Bottle Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
	Bottle, NM	2003-0004	140	LDPE	Natural	24	71-2150-0240	18/11/16	101/4	99/37/8	50/115/16
	Bottle, NM	DS2004-0004	140	HDPE	Amber	24	71-2171-0240	18/11/16	101/4	99/37/8	50/115/16
	Bottle, NM	2006-0004	140	PP	Natural	24	71-2150-0240	18/11/16	101/4	99/37/8	50/115/16
	Bottle, WM, Rect.	2007-0004	140	HDPE	Natural	28	71-2150-0280	21/13/16	102/4	99/37/8	61x38/23/8x11/2
	Bottle, WM, Rect.	2009-0004	140	HDPE	Amber	28	71-2171-0280	21/13/16	102/4	99/37/8	61x38/23/8x11/2
	Bottle, Square	2015-0125	175	PC	Clear	38-430	71-2160-0384	28/11/8	110/45/16	105/41/8	54/21/8 Square
	Bottle, Square	2016-0125	175	PP	Natural	38-430	71-2160-0384	28/11/8	110/45/16	105/41/8	54/21/8 Square
	Bottle, Square	2018-0125	175	HDPE	Natural	38-430	71-2160-0384	28/11/8	110/45/16	105/41/8	54/21/8 Square
	Media Bottle, Sterile	2019-0125	175	PETG	Clear	38-430	71-2151-0384	28/11/8	110/45/16	105/41/8	54/21/8 Square
	Bottle, Env. Sample, NM	DS2085-0004	143	HDPE	Amber	24	71-2171-0240	18/11/16	104/43/32	102/4	50/115/16
	Bottle, Env. Sample, NM	2089-0004	143	HDPE	Natural	24	71-2150-0240	18/11/16	104/43/32	102/4	50/115/16
	Bottle, PassPort, NM	2099-0004	140	HDPE	Natural	24	71-2150-0240	18/11/16	101/4	98/37/8	51/2
125 ml	Bottle, WM	2100-0004	134	FEP	Clear	33	71-2174-0330	25/1	117/45/8	113/47/16	46/113/16
(4 oz.)	Bottle, WM	2103-0004	150	LDPE	Natural	38	71-2150-0380	28/11/8	99/37/8	96/33/4	50/2
	Bottle, WM	2104-0004	150	HDPE	Natural	38	71-2150-0380	28/11/8	99/37/8	96/33/4	50/2
	Bottle, WM	2105-0004	150	PP	Natural	38	71-2150-0380	28/11/8	99/37/8	96/33/4	50/2
	Bottle, WM	2106-0004	150	HDPE	Amber	38	71-2171-0380	28/11/8	99/37/8	96/33/4	50/2
	Bottle, WM	2107-0004	140	PMP	Clear	33	71-2150-0330	28/11/8	114/41/2	112/47/16	46/113/16
	Jar, Straight-Side, WM	2116-0125	182	PC	Clear	70	71-2154-0700	64/21/2	74/215/16	64/21/2	64/21/2
	Jar, Straight-Side, WM	2117-0125	182	PMP	Clear	70	71-2154-0700	64/21/2	74/215/16	64/21/2	64/21/2
	Jar, Straight-Side, WM	2118-0004	182	PP	Natural	70	71-2154-0700	64/21/2	74/215/16	64/21/2	64/21/2
	Jar, Straight-Side, WM	2119-0125	182	PC	Gray	70	71-2154-0700	64/21/2	74/215/16	64/21/2	64/21/2
	Bottle, Env. Sample, WM	DS2185-0004	150	HDPE	Amber	38	71-2171-0380	28/11/8	100/35/16	96/33/4	51/2
	Bottle, Env. Sample, WM	2189-0004	150	HDPE	Natural	38	71-2150-0380	28/11/8	100/35/16	96/33/4	51/2
	Bottle, Fluorinated, WM	2197-0004	150	FLPE	Natural	38	—	28/11/8	99/315/16	96/33/4	50/2
	Bottle, PassPort, WM	2199-0004	150	HDPE	Natural	38	71-2150-0380	28/11/8	99/315/16	96/33/4	50/2
	Bottle, Low Particulate	382099-0125	150	HDPE	Natural	24	71-2150-0240	18/11/16	101/4	99/37/8	50/2
	Bottle, Biotainer	2515-0125	174	PC	Lt. Blue	38	—	28/11/8	105/41/8	—	52/21/16 Square
	Bottle, NM	2002-0006	185	HDPE	Natural	24	71-2150-0240	18/11/16	125/415/16	122/413/16	54/21/8
	Bottle, WM, Square	2110-0006	185	PP	Natural	38	71-2150-0380	28/11/8	102/4	103/41/16	51/2 Square
	Bottle, WM, Square	2114-0006	185	HDPE	Natural	38	71-2150-0380	28/11/8	106/4	103/41/16	51/2 Square
175 ml	Bottle, NM, Dilution	2500-0280	210	PSF	Clear	28-415	71-2150-0280	21/13/16	153/6	150/515/16	45/13/4 Square
(6 oz.)	Bottle, WM, Dilution	2500-0380	220	PSF	Clear	38-415	71-2150-0380	28/11/8	153/6	150/515/16	45/13/4 Square
	Bottle, NM, Dilution	2505-0280	210	PPCO	Natural	28-415	71-2150-0280	21/13/16	153/6	150/515/16	45/13/4 Square
	Bottle, WM, Dilution	2505-0380	220	PPCO	Natural	38-415	71-2150-0380	28/11/8	153/6	150/515/16	45/13/4 Square
	Bottle, NM	1600-0008	240	FEP	Clear	24	71-2174-0240	17/11/16	134/59/32	131/55/32	60/23/8
	Bottle, NM	1630-0008	240	PFA	Natural	38-430	71-2172-0384	24/15/16	146/53/4	139/51/2	59/25/16
	Bottle, NM	DS2000-0008	280	PVC	Clear	24	71-2150-0240	17/11/16	131/55/32	129/51/16	60/23/8
	Bottle, NM	2002-0008	285	HDPE	Natural	24	71-2150-0240	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, NM	2003-0008	285	LDPE	Natural	24	71-2150-0240	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, NM	2004-0008	285	HDPE	Amber	24	71-2171-0240	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, NM	2006-0008	285	PP	Natural	24	71-2150-0240	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, WM, Rect.	2007-0008	300	HDPE	Natural	38	71-2150-0380	28/11/8	117/45/8	114/41/2	76x51/3x2
	Bottle, WM, Rect.	2009-0008	300	HDPE	Amber	38	71-2171-0380	28/11/8	117/45/8	114/41/2	76x51/3x2
	Bottle, Square	2015-0250	325	PC	Clear	38-430	71-2160-0384	28/11/8	146/53/4	142/59/16	57/21/4 Square
	Bottle, Square	2016-0250	325	PP	Natural	38-430	71-2160-0384	28/11/8	146/53/4	142/59/16	61/23/8 Square
	Bottle, Square	2018-0250	325	HDPE	Natural	38-430	71-2160-0384	28/11/8	146/53/4	142/59/16	61/23/8 Square
	Media Bottle, Sterile	2019-0250	325	PETG	Clear	38-430	71-2151-0384	28/11/8	146/53/4	142/59/16	61/23/8 Square
	Bottle, Env. Sample, NM	DS2085-0008	289	HDPE	Amber	24	71-2171-0240	18/11/16	133/51/4	131/55/32	61/23/8
	Bottle, Env. Sample, NM	2089-0008	289	HDPE	Natural	24	71-2150-0240	18/11/16	133/51/4	131/55/32	61/23/8
	Bottle, Fluorinated, NM	2097-0008	285	FLPE	Natural	24	—	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, PassPort, NM	2099-0008	285	HDPE	Natural	24	71-2150-0240	18/11/16	133/51/4	130/51/8	61/23/8
	Bottle, WM	2100-0008	260	FEP	Clear	43	71-2174-0430	33/15/16	128/41/32	122/413/16	59/25/16
	Bottle, WM	2103-0008	290	LDPE	Natural	43	71-2150-0430	33/15/16	131/55/32	127/5	61/23/8
	Bottle, WM	2104-0008	290	HDPE	Natural	43	71-2150-0430	33/15/16	131/55/32	127/5	61/23/8
	Bottle, WM	2105-0008	290	PP	Natural	43	71-2150-0430	33/15/16	131/55/32	127/5	61/23/8
	Bottle, WM	2106-0008	290	HDPE	Amber	43	71-2171-0430	33/15/16	131/55/32	127/5	61/23/8
	Bottle, WM	2107-0008	270	PMP	Clear	43	71-2150-0430	33/15/16	125/415/16	122/413/16	58/25/16
250 ml	Bottle, WM, Square	2110-0008	290	PP	Natural	43	71-2150-0430	33/15/16	116/49/16	112/47/16	61/23/8 Square
(8 oz.)	Bottle, WM, Square	2114-0008	290	HDPE	Natural	43	71-2150-0430	33/15/16	116/49/16	112/47/16	61/23/8 Square
	Jar, Straight-Side, WM	2116-0250	310	PC	Clear	70	71-2154-0700	64/21/2	119/411/16	109/49/32	75/215/16
	Jar, Straight-Side, WM	2117-0250	310	PMP	Clear	70	71-2154-0700	64/21/2	119/411/16	109/49/32	75/215/16
	Jar, Straight-Side, WM	2118-0008	310	PP	Natural	70	71-2154-0700	64/21/2	119/411/16	109/49/32	75/215/16
	Jar, Straight-Side, WM	2119-0250	310	PC	Gray	70	71-2154-0700	64/21/2	119/411/16	109/49/32	75/215/16
	Bottle, Env. Sample, WM	DS2185-0008	300	HDPE	Amber	43	71-2171-0430	33/15/16	131/55/32	127/5	61/27/16
	Bottle, Env. Sample, WM	2189-0008	300	HDPE	Natural	43	71-2150-0430	33/15/16	131/55/32	127/5	61/27/16
	Bottle, Fluorinated, WM	2197-0008	290	FLPE	Natural	43	71-2150-0430	33/15/16	131/55/32	127/5	61/27/16

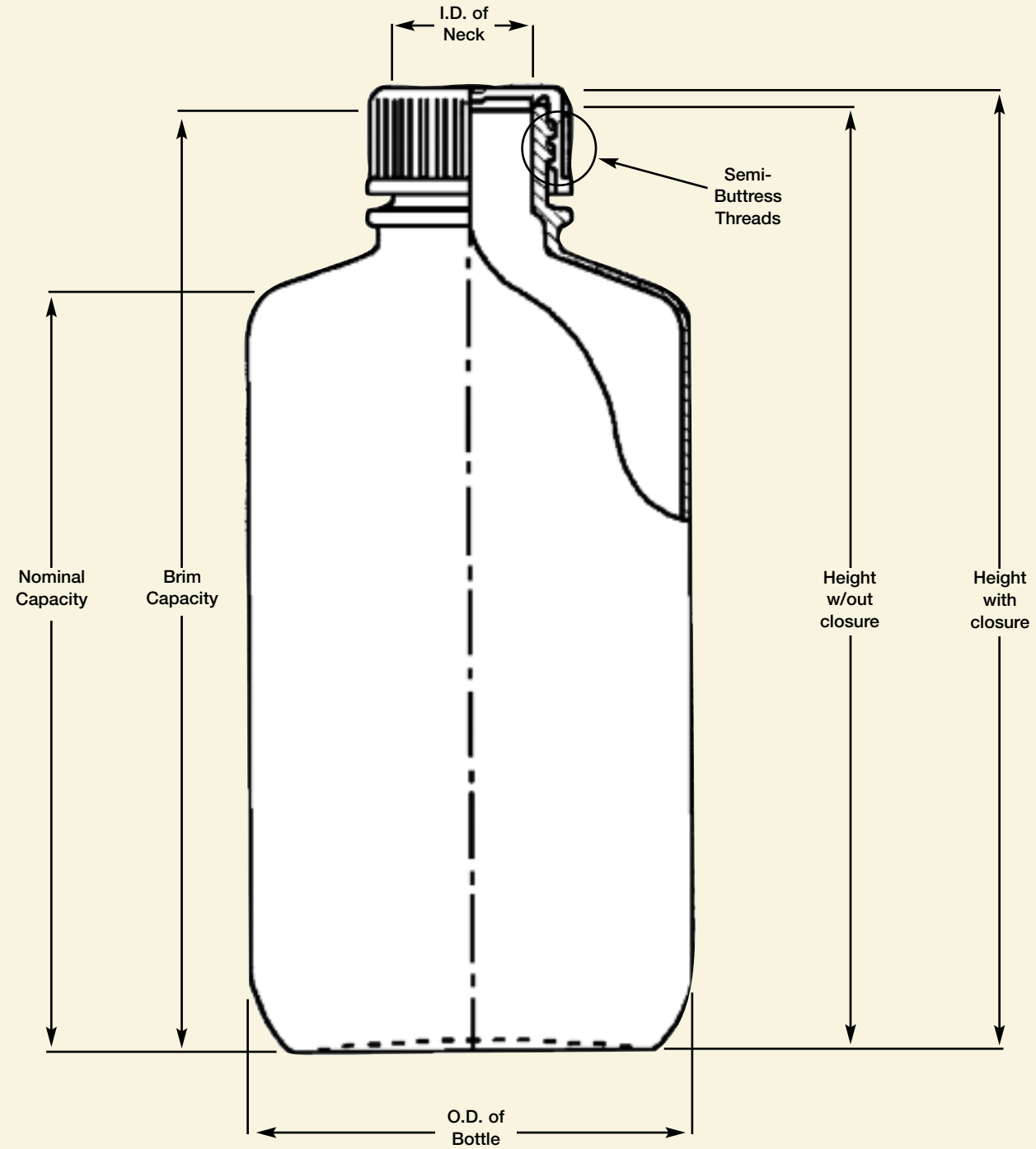
Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
	Bottle, PassPort, WM	2199-0008	290	HDPE	Natural	43	71-2150-0430	33/1 5/16	131/5 5/32	127/5	61/2 7/16
	Bottle, Fluorinated, Solvent Wash	2421-0250	250	FLPE	Natural	24	—	18/1 1/16	173/6 13/16	130/5 1/8	61/2 3/8
	Bottle, Validation	DS2127-0250	250	PC	White	53B	71-2160-0430	45/1 3/4	135/5 5/16	129/5 1/8	74/2 15/16
	Bottle, Low Particulate	382099-0250	250	HDPE	Natural	24	71-2150-0240	18/1 1/16	133/5 1/4	130/5 1/8	61/2 3/8
	Bottle, NM	1600-0016	520	FEP	Clear	28	71-2174-0280	20/1 3/16	166/6 9/16	162/6 3/8	73/2 7/8
	Bottle, NM	DS1620-0016	520	FEP	Black	28	71-2173-0280	20/1 3/16	166/6 9/16	162/6 3/8	73/2 7/8
	Bottle, NM	1630-0016	520	PFA	Natural	38-430	71-2172-0384	24/1 5/16	181/7 1/8	176/6 15/16	72/3 13/16
	Bottle, NM	DS2000-0016	550	PVC	Clear	28	71-2150-0280	20/1 3/16	170/6 11/16	165/6 1/2	73/2 7/8
	Bottle, NM	2002-0016	525	HDPE	Natural	28	71-2150-0280	21/1 3/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	2002-9016	525	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	2003-0016	525	LDPE	Natural	28	71-2150-0280	21/1 3/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	2003-9016	525	LDPE	Natural	38-430	71-2160-0384	27/1 1/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	2004-0016	525	HDPE	Amber	28	71-2171-0280	21/1 3/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	2006-0016	525	PP	Natural	28	71-2150-0280	21/1 3/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, WM, Rect.	2007-0016	560	HDPE	Natural	48	71-2150-0480	37/1 1/2	147/5 3/4	142/5 9/16	94x60/3 13/16x2 3/16
	Bottle, WM, Rect.	2009-0016	560	HDPE	Amber	48	71-2171-0480	37/1 1/2	147/5 3/4	142/5 9/16	94x58/3 11/16x2 3/16
	Bottle, Square	2015-0500	600	PC	Clear	38-430	71-2160-0384	28/1 1/8	177/7	173/6 13/16	74/2 2/16 Square
	Bottle, Square	2016-0500	600	PP	Natural	38-430	71-2160-0384	28/1 1/8	177/7	173/6 13/16	74/2 2/16 Square
	Bottle, Square	2018-0500	600	HDPE	Natural	38-430	71-2160-0384	28/1 1/8	177/7	173/6 13/16	74/2 2/16 Square
	Media Bottle, Sterile	2019-0500	600	PETG	Clear	38-430	71-2160-0384	28/1 1/8	177/7	173/6 13/16	74/2 2/16 Square
	Bottle, Env. Sample, NM	DS2085-0016	555	HDPE	Amber	28	71-2171-0280	21/1 3/16	171/6 3/4	168/6 5/8	73/2 7/8
500 ml (16 oz.)	Bottle, Env. Sample, NM	2089-0016	520	HDPE	Natural	28	71-2150-0280	21/1 3/16	171/6 3/4	168/6 5/8	73/2 7/8
	Bottle, Fluorinated, NM	2097-0016	525	FLPE	Natural	28	—	21/1 3/16	171/6 3/4	168/6 5/8	73/2 7/8
	Bottle, PassPort, NM	2099-0016	525	HDPE	Natural	28	71-2150-0280	21/1 3/16	171/6 3/4	168/6 5/8	73/2 7/8
	Bottle, WM	2100-0016	545	FEP	Clear	48	71-2174-0480	38/1 1/2	165/6 1/2	159/6 1/4	71/2 13/16
	Bottle, WM	2103-0016	545	LDPE	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, WM	2104-0016	545	HDPE	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, WM	2105-0016	550	PP	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, WM	2106-0016	545	HDPE	Amber	53	71-2171-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, WM	2107-0016	520	PMP	Clear	48	71-2150-0480	38/1 1/2	155/6 1/8	152/6	71/2 13/16
	Bottle, WM, Square	2110-0016	570	PP	Natural	53	71-2150-0530	43/1 11/16	146/5 3/4	141/5 9/16	74/2 15/16 Square
	Bottle, WM, Square	2114-0016	570	HDPE	Natural	53	71-2150-0530	43/1 11/16	146/5 3/4	141/5 9/16	74/2 15/16 Square
	Jar, Mason	2115-0500	600	PP	Natural	70	71-2154-0700	61/2 3/8	175/6 7/8	165/6 1/2	75/3
	Jar, Straight-Side, WM	2116-0500	675	PC	Clear	120	71-2155-1200	112/4 7/16	88/3 7/16	76/3	112/4 7/16
	Jar, Straight-Side, WM	2117-0500	675	PMP	Clear	120	71-2155-1200	112/4 7/16	88/3 7/16	76/3	112/4 7/16
	Jar, Straight-Side, WM	2118-0016	675	PP	Natural	120	71-2155-1200	112/4 7/16	88/3 7/16	76/3	112/4 7/16
	Jar, Straight-Side, WM	2119-0500	675	PC	Gray	120	71-2155-1200	112/4 7/16	88/3 7/16	76/3	112/4 7/16
	Bottle, Env. Sample, WM	DS2185-0016	575	HDPE	Amber	53	71-2171-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, Env. Sample, WM	2189-0016	575	HDPE	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, Fluorinated, WM	2197-0016	550	FLPE	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, PassPort, WM	2199-0016	550	HDPE	Natural	53	71-2150-0530	44/1 3/4	168/6 5/8	164/6 7/16	73/2 7/8
	Bottle, Large, NM	2205-0016	625	PC	Clear	38-430	71-2160-0384	27/1 1/16	180/7 1/16	175/6 7/8	82/3 7/32
	Bottle, Low Particulate	382099-0500	550	HDPE	Natural	28	71-2150-0380	21/1 3/16	170/6 11/16	167/6 9/16	73/2 7/8
	Bottle, NM	1600-0032	1,050	FEP	Clear	38	71-2174-0380	26/1 1/32	203/8	198/7 13/16	90/3 9/16
	Bottle, NM	DS1620-0032	1,050	FEP	Black	38	71-2173-0380	26/1 1/32	203/8	198/7 13/16	90/3 9/16
	Bottle, NM	1630-0032	1,050	PFA	Natural	38-430	71-2172-0384	24/1 5/16	216/8 1/2	210/8 1/4	90/3 9/16
	Bottle, NM	DS2000-0032	1,140	PVC	Clear	38	71-2150-0380	26/1 1/32	206/8 1/8	203/8	91/3 9/16
	Bottle, NM	2002-0032	1,060	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 9/16
	Bottle, NM	2003-0032	1,060	LDPE	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 9/16
	Bottle, NM	2004-0032	1,060	HDPE	Amber	38-430	71-2171-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 9/16
	Bottle, NM	2006-0032	1,060	PP	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 9/16
	Bottle, WM, Rect.	2007-0032	1,180	HDPE	Natural	53	71-2150-0530	44/1 3/4	180/7 1/16	175/6 7/8	125x71/4 15/16x2 13/16
	Bottle, WM, Rect.	2009-0032	1,170	HDPE	Amber	53	71-2171-0530	44/1 3/4	180/7 1/16	175/6 7/8	125x71/4 15/16x2 13/16
	Bottle, Square	2015-1000	1,225	PC	Clear	38-430	71-2160-0384	28/1 1/8	220/8 11/16	215/8 7/16	94/3 11/16 Square
	Bottle, Square	2016-1000	1,225	PP	Natural	38-430	71-2160-0384	28/1 1/8	220/8 11/16	215/8 7/16	94/3 11/16 Square
	Bottle, Square	2018-1000	1,225	HDPE	Natural	38-430	71-2160-0384	28/1 1/8	220/8 11/16	215/8 7/16	94/3 11/16 Square
	Media Bottle, Sterile	2019-1000	1,225	PETG	Clear	38-430	71-2151-0384	28/1 1/8	220/8 11/16	215/8 7/16	94/3 11/16 Square
	Bottle, Env. Sample, NM	DS2085-0032	1,090	HDPE	Amber	38-430	71-2171-0384	27/1 1/16	217/8 9/16	213/8 3/8	92/3 5/8
	Bottle, Env. Sample, NM	2089-0032	1,090	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	217/8 9/16	213/8 3/8	92/3 5/8
	Bottle, Fluorinated, NM	2097-0032	1,060	FLPE	Natural	38-430	—	27/1 1/16	216/8 1/2	212/8 3/8	91/3 5/8
1 Liter (32 oz.)	Bottle, PassPort, NM	2099-0032	1,060	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 5/8
	Bottle, WM	2100-0032	1,030	FEP	Clear	53	71-2174-0530	43/1 11/16	209/8 7/32	201/7 11/16	91/3 5/8
	Bottle, WM	2103-0032	1,100	LDPE	Natural	63	71-2150-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, WM	2104-0032	1,100	HDPE	Natural	63	71-2150-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, WM	2105-0032	1,100	PP	Natural	63	71-2150-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, WM	2106-0032	1,100	HDPE	Amber	63	71-2171-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, WM	2107-0032	1,090	PMP	Clear	53	71-2150-0530	43/1 11/16	203/8	201/7 15/16	89/3 1/2
	Bottle, WM, Square	2110-0032	1,190	PP	Natural	63	71-2150-0630	53/2 1/16	181/7 1/8	176/6 15/16	95/3 3/4 Square

Bottle Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
	Bottle, WM, Square	2114-0032	1,190	HDPE	Natural	63	71-2150-0630	53/2 1/16	181/7 1/8	176/6 15/16	95/3 3/4 Square
	Jar, Straight-Side, WM	DS2113-1000	1,075	PFA	Natural	120	—	111/4 3/8	132/5 3/16	130/5 3/32	107/4 7/32
	Jar, Straight-Side, WM	2116-1000	1,230	PC	Clear	120	71-2155-1200	112/4 7/16	151/5 5/16	130/5 3/8	112/4 7/16
	Jar, Straight-Side, WM	2117-1000	1,230	PMP	Clear	120	71-2155-1200	112/4 7/16	151/5 5/16	137/5 3/8	112/4 7/16
	Jar, Straight-Side, WM	2118-0032	1,230	PP	Natural	120	71-2155-1200	112/4 7/16	151/5 5/16	137/5 3/8	112/4 7/16
	Jar, Straight-Side, WM	2119-1000	1,230	PC	Gray	120	71-2155-1200	112/4 7/16	151/5 5/16	137/5 3/8	112/4 7/16
	Jar, Mason	2115-1000	1,200	PP	Natural	70	71-2154-0700	61/2 3/8	213/8 3/8	201/7 15/16	94/3 11/16
	Bottle, Heavy Duty	2125-1000	1,100	HDPE	Natural	53B	71-2160-0530	39/1 1/2	226/9 1/8	220/8 7/8	93/3 11/16
	Bottle, Heavy Duty	2126-1000	1,100	PP	Natural	53B	71-2160-0530	39/1 1/2	226/9 1/8	220/8 7/8	93/3 11/16
1 Liter	Bottle, Env. Sample, WM	DS2185-0032	1,090	HDPE	Amber	63	71-2171-0630	52/2 1/16	199/7 13/16	195/7 11/16	91/3 5/8
(32 oz.)	Bottle, Env. Sample, WM	2189-0032	1,090	HDPE	Natural	63	71-2150-0630	52/2 1/16	199/7 13/16	195/7 11/16	91/3 5/8
	Bottle, Fluorinated, WM	2197-0032	1,100	FLPE	Natural	63	71-2150-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, PassPort, WM	2199-0032	1,100	HDPE	Natural	63	71-2150-0630	53/2 1/16	199/7 7/8	195/7 11/16	91/3 5/8
	Bottle, Large, NM	2205-0032	1,180	PC	Clear	38-430	71-2160-0384	27/1 1/16	221/8 11/16	217/8 1/2	99/3 7/8
	Carboy w/Tubulation	2302-0001	1,100	LDPE	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	213/8 3/8	91/3 5/8
	Bottle, Biotainer	2515-1000	1,200	PC	Lt. Blue	48	36-2515-0480	37/1 15/72	201/7 29/32	–	98/3 27/32 Square
1.5 Liter	Bottle, NM	2104-0048	1,560	HDPE	Natural	63	71-2150-0630	52/2 1/16	284/11 3/16	278/11	91/3 5/8
	Bottle, Low Particulate	382099-1000	1,100	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	216/8 1/2	212/8 3/8	91/3 5/8
	Bottle, NM	1600-0064	2,200	FEP	Clear	38-430	71-2174-0384	25/1	245/9 5/8	239/9 7/16	121/4 3/4
	Bottle, Rect.	2007-0064	2,120	HDPE	Natural	63	71-2150-0630	51/2	242/9 1/2	234/9 3/16	152x84/6x3 5/16
	Bottle, Rect.	2009-0064	2,000	HDPE	Amber	63	71-2171-0630	51/2	242/9 1/2	234/9 3/16	152x84/6x3 5/16
	Bottle, Square	2015-2000	2,400	PC	Clear	53B	71-2160-0530	39/1 1/2	271/10 11/16	265/10 7/16	116/4 9/16
	Media Bottle, Sterile	2019-2000	2,400	PETG	Clear	53B	71-2151-0053	39/1 1/2	271/10 11/16	265/10 7/16	116/4 9/16
	Bottle, Fluorinated, NM	2097-0005	2,100	FLPE	Natural	38-430	—	27/1 1/16	250/9 13/16	246/9 11/16	120/4 3/4
	Bottle, WM	2100-0064	2,050	FEP	Clear	53	71-2174-0530	43/1 11/16	232/9 1/8	228/9	119/4 11/16
2 Liter	Bottle, EP Tox, WM	2101-2200	2,300	FEP	Clear	100	—	89/3 1/2	241/9 1/2	235/9 1/4	119/4 11/16
(1/2 gal.)	Jar, Mason	2115-2000	2,135	PP	Natural	70	71-2154-0700	61/2 3/8	244/9 5/8	233/9 3/16	120/4 3/4
	Bottle, Large, WM	2120-0005	2,140	HDPE	Natural	100	71-2150-1000	89/3 1/2	244/9 5/8	235/9 1/4	119/4 11/16
	Bottle, Large, WM	2121-0005	2,200	PP	Natural	100	71-2150-1000	89/3 1/2	244/9 5/8	235/9 1/4	120/4 3/4
	Bottle, Large, Fluorinated, WM	2124-0005	2,140	FLPE	Natural	100	71-2150-1000	89/3 1/2	244/9 5/8	235/9 1/4	120/4 3/4
	Bottle, Heavy Duty	2125-2000	2,200	HDPE	Natural	53B	71-2160-0530	39/1 1/2	260/10 1/4	254/10	119/4 11/16
	Bottle, Heavy Duty	2126-2000	2,200	PP	Natural	53B	71-2160-0530	39/1 1/2	260/10 1/4	254/10	119/4 11/16
	Bottle, NM	2202-0005	2,100	LDPE	Natural	38-430	71-2160-0384	25/1	249/9 3/16	244/9 5/8	121/4 3/4
	Bottle, NM	2203-0005	2,200	PP	Natural	38-430	71-2160-0384	25/1	249/9 3/16	244/9 5/8	121/4 3/4
	Bottle, Large, NM	2204-0005	2,100	PP	Amber	38-430	71-2171-0384	25/1	249/9 3/16	244/9 5/8	121/4 3/4
	Bottle, Large, NM	DS2205-0210	2,275	PC	Clear	38-430	71-2160-0384	25/1	249/9 3/16	244/9 5/8	121/4 3/4
	Carboy, w/Tubulation	2302-0005	2,100	LDPE	Natural	38-430	71-2160-0384	25/1	249/9 3/16	244/9 5/8	121/4 3/4
	Bottle, Biotainer	2515-2000	2,400	PC	Lt. Blue	48	36-2515-0480	36/1 13/32	265/10 7/16	—	116/4 9/16 Square
2.5 Liter	Bottle, Large, NM	DS2205-0250	2,730	PC	Clear	38-430	71-2160-0384	25/1	295/11 5/8	290/11 7/16	121/4 3/4
(5/8 gal.)											
3 Liter	Jar, Mason	2115-3000	3,325	PP	Natural	70	71-2154-0700	61/2 3/8	246/9 11/16	236/9 5/16	155/6 1/8
(4/5 gal.)											
	Bottle, Fluorinated, NM	2097-0010	4,160	FLPE	Natural	38-430	—	26/1 1/32	334/13 1/8	330/13	153/6
	Bottle, PassPort, NM	2099-0010	4,300	HDPE	Natural	38-430	71-2160-0384	27/1 1/16	334/13 1/8	330/13	153/6
	Bottle, Large, WM	2120-0010	4,200	HDPE	Natural	100	71-2150-1000	89/3 1/2	288/11 5/16	279/11	153/6
	Bottle, Large, WM	2121-0010	4,300	PP	Natural	100	71-2150-1000	89/3 1/2	288/11 5/16	279/11	153/6
	Bottle, Large, WM, Square	2122-0010	4,300	PP	Natural	100	71-2150-1000	89/3 1/2	282/11 1/8	277/10 15/16	142/5 9/16 Square
4 Liter	Bottle, Large, WM, Square	2123-0010	4,300	HDPE	Natural	100	71-2150-1000	89/3 1/2	292/11 1/2	284/11 13/16	142/5 9/16 Square
(1 gal.)	Bottle, Heavy Duty	2125-4000	4,100	HDPE	Natural	83B	71-2160-0830	65/2 9/16	338/13 5/16	327/12 7/8	155/6 1/8
	Bottle, Heavy Duty	2126-4000	4,100	PP	Natural	83B	71-2160-0830	65/2 9/16	338/13 5/16	327/12 7/8	155/6 1/8
	Bottle, NM	2202-0010	4,300	LDPE	Natural	38-430	71-2160-0384	25/1	333/13 1/8	328/12 15/16	152/6
	Bottle, NM	2203-0010	4,400	PP	Natural	38-430	71-2160-0384	25/1	333/13 1/8	328/12 15/16	152/6
	Bottle, Large, NM	2204-0010	4,300	PP	Amber	38-430	71-2171-0384	25/1	333/13 1/8	328/12 15/16	152/6
	Bottle, Large, NM	DS2205-0010	4,500	PC	Clear	38-430	71-2160-0384	25/1	333/13 1/8	328/12 15/16	152/6
	Jug, w/Handle	2220-0010	4,000	LDPE	Natural	38-430	71-2160-0384	25/1	304/11 15/16	301/11 7/8	152/6
	Jug, w/Handle	2221-0010	4,100	PP	Natural	38-430	71-2160-0384	25/1	304/11 15/16	301/11 7/8	152/6
	Carboy, w/Tubulation	2302-0010	4,200	LDPE	Natural	38-430	71-2160-0384	25/1	333/12 15/16	328/13	152/6
	Carboy, w/Spigot	2318-0010	3,800	LDPE	Natural	38-430	71-2160-0384	26/1 1/32	335/13 3/16	330/13	154/6 1/6
	Bottle, Biotainer (Jug)	2589-4000	3,900	HDPE	Natural	38	—	28/1 7/64	299/11 49/64	—	143/5 5/8 Square
	Bottle, Biotainer (Jug)	2589-4099	3,900	HDPE	Natural	38	—	28/1 7/64	299/11 49/64	—	143/5 5/8 Square
	Bottle, Biotainer (Jug)	342589-4000	3,900	HDPE	Natural	38	—	28/1 7/64	299/11 49/64	—	143/5 5/8 Square

Bottle Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
5 Liter (1 1/4 gal.)	Bottle, Heavy Duty	2126-5000	5,400	PP	Natural	83B	71-2160-0830	64/2 1/2	414/16 5/16	402/15 13/16	156/6 1/8
	Bottle, Biotainer	2551-0010	5,900	PC	Lt. Blue	48	36-2515-0480	37/1 15/32	299/11 49/54	—	155/6 17/32 Square
	Bottle, Biotainer	342551-0010	5,900	PC	Lt. Blue	48	36-2515-0480	37/1 15/32	299/11 49/54	—	155/6 17/32 Square
6 Liter (1 1/2 gal.)	Jerrican	2240-0015	7,900	HDPE	Natural	53B	71-2160-0530	36/1 7/16	335/13 7/32	328/12 7/8	176x213/6 5/16x8 3/8

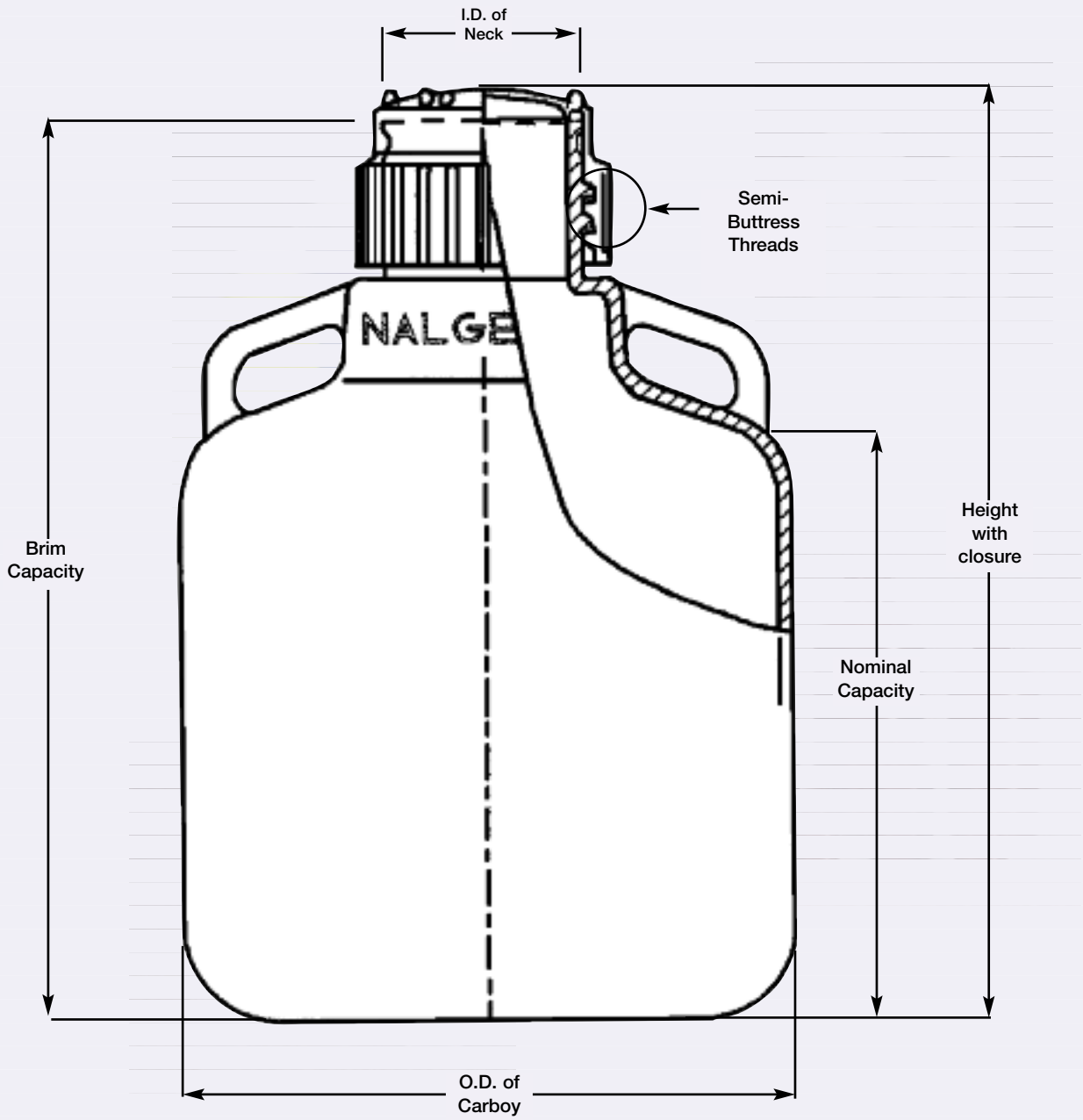


For containers greater than 50 liters, see "Tanks" or "Bioprocess/Culture Ware" in the NALGENE Labware catalog, or visit www.NALGENElabware.com.

*No. 11-1/2 Rubber Stopper. Other helpful information molded into most NALGENE products includes our flask insignia, NALGENE trademark and, where appropriate, the size in ounces, milliliters or both.

Carboy Specifications

NALGENE®

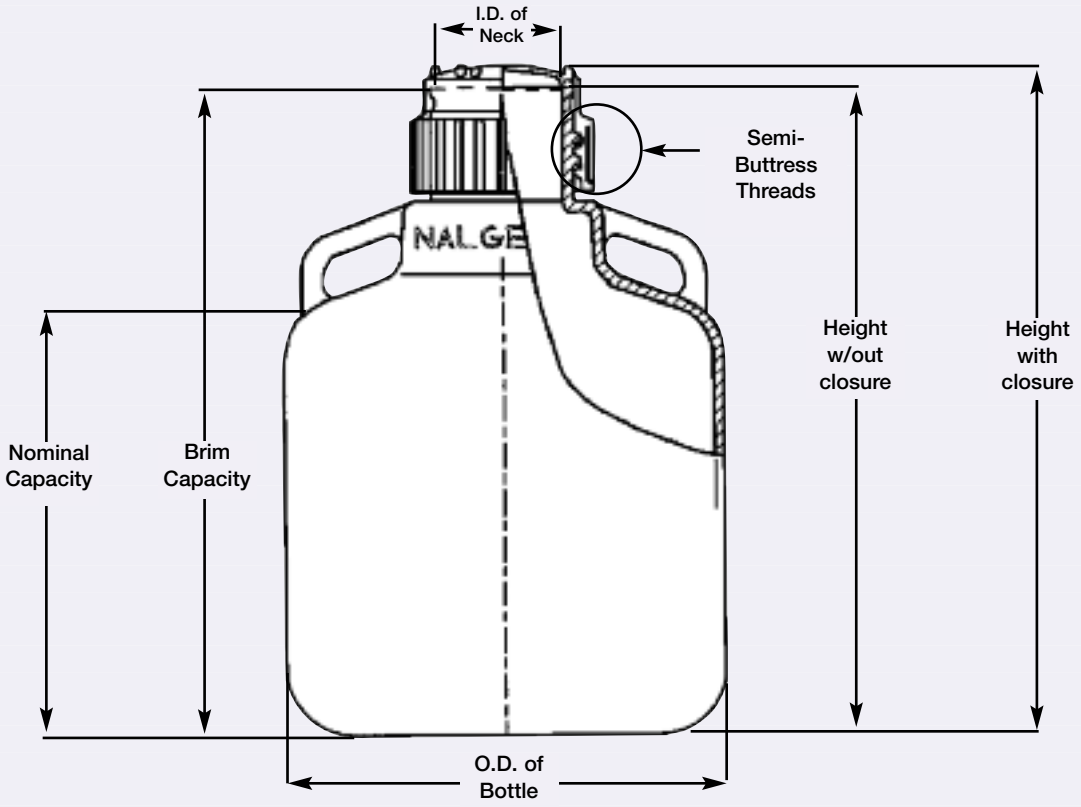


Carboy Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
6 Liter (1 1/2 gal.)	Jerrican	2240-0015	7,900	HDPE	Natural	53B	71-2160-0530	36/1 7/16	335/13 7/32	328/12 7/8	176x213/6 5/16x8 3/8
8 Liter (2 gal.)	Bottle, NM	2202-0020	8,000	LDPE	Natural	53B	71-2160-0530	37/1 7/16	409/16 1/8	405/15 15/16	193/7 5/8
	Bottle, NM	2203-0020	8,100	PP	Natural	53B	71-2160-0530	37/1 7/16	409/16 1/8	405/15 15/16	193/7 5/8
	Bottle, Large, NM	2204-0020	8,000	PP	Amber	53B	71-2171-0530	37/1 7/16	409/16 1/8	405/15 15/16	193/7 5/8
	Bottle, Large, NM	DS2205-0020	9,000	PC	Clear	53B	71-2160-0530	37/1 7/16	409/16 1/8	405/15 15/16	193/7 5/8
	Jug, w/Handle	2220-0020	7,900	LDPE	Natural	53B	71-2160-0530	39/1 1/2	385/15 5/32	378/14 7/8	195/7 11/16
	Jug, w/Handle	2221-0020	8,000	PP	Natural	53B	71-2160-0530	39/1 1/2	385/15 5/32	378/14 7/8	195/7 11/16
	Lowboy	2323-0008	9,000	HDPE	Natural	63	71-2150-0630	44/1 3/4	159/6 1/4	156/6 1/8	305x366/12x14 3/8
	Lowboy, Autoclavable	2324-0008	9,000	PP	Natural	63	71-2150-0630	44/1 3/4	159/6 1/4	156/6 1/8	305x366/12x14 3/8
	Carboy, Rectangular, Fluorinated, w/Spigot	DS2327-0020	8,800	FLPE	Natural	100	71-2150-1000	89/3 1/2	358/14 1/8	351/13 13/16	216x147/8 1/2x5 3/16
9 Liter (2 1/4 gal.)	Carboy, Rectangular	2211-0020	9,100	HDPE	Natural	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rectangular	2212-0020	9,100	PP	Natural	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rectangular	DS2213-0020	9,100	PC	Clear	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rect., w/Tubulation	2303-0020	8,800	HDPE	Natural	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rect., w/Spigot	2320-0020	8,800	HDPE	Natural	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rect., w/Spigot	2321-0020	8,800	PP	Natural	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
	Carboy, Rect., w/Spigot	2322-0020	8,800	PC	Clear	100	71-2150-1000	86/3 3/8	361/14 3/16	351/13 13/16	220x153/8 11/16x6 1/32
10 Liter (2 1/2 gal.)	Carboy, Fluorinated, NM	2097-0020	12,500	FLPE	Natural	83B	—	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, NM, w/Handles	2210-0020	12,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, Vacuum w/Handles	2226-0020	12,000	PP	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, WM, w/Handles	2234-0020	12,000	LDPE	Natural	100	71-2150-1000	88/3 1/2	343/13 1/2	338/13 5/16	250/9 7/8
	Carboy, WM, Autoclavable	2235-0020	12,000	PP	Natural	100	71-2150-1000	88/3 1/2	343/13 1/2	338/13 5/16	250/9 7/8
	Jerrican	2240-0025	12,000	HDPE	Natural	53B	71-2160-0530	38/1 1/2	376/14 13/16	368/14 1/2	246x199/9 11/16x7 13/16
	Jerrican, Fluorinated	2242-0025	12,000	FLPE	Natural	53B	—	37/1 1/2	376/14 13/16	368/14 1/2	246x199/9 11/16x7 13/16
	Carboy, Autoclavable, w/Handles	2250-0020	12,500	PP	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, Transparent	2251-0020	12,500	PC	Clear	83B	71-2160-0830	66/2 5/8	394/15 1/2	381/15	253/9 15/16
	Carboy, Amber	2256-0020	12,500	HDPE	Amber	83B	—	66/2 5/8	389/15 5/16	378/14 7/8	244/9 5/8
	Carboy, w/Tubulation	2301-0020	12,000	PP	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	379/14 13/16	245/9 5/8
	Carboy, w/Tubulation	2302-0020	12,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	285/1 17/32
	Carboy, Transparent, w/Spigot	2317-0020	12,000	PC	Clear	83B	71-2160-0830	66/2 5/8	394/15 1/2	381/15	253/9 15/16
	Carboy, w/Spigot	2318-0020	12,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, Autoclavable, w/Spigot	2319-0020	12,000	PP	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Jug, Safety Dispensing	2340-0020	12,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
	Carboy, Biotainer	2551-0020	13,600	PC	Lt. Blue	48	—	37/1 7/16	337/13 17/64	—	255/10 1/32 Square
	Carboy, Biotainer	2551-1020	13,600	PC	Lt. Blue	48	—	37/1 7/16	337/13 17/64	—	255/10 1/32 Square
	Carboy, w/3" Welded Sanitary Flange	2630-0010	12,000	PP	Natural	—	—	73/2 7/8	353/13 7/8	353/13 7/8	250/9 7/8
	Carboy, w/Sanitary Flange	2640-0020	12,500	PP	Natural	83B	71-2160-0830	64/2 1/2	389/15 5/16	376/14 13/16	250/9 7/8
13 Liter	Jerrican, with Port	2243-0013	15,200	HDPE	Natural	53; 38-430	71-2160-0530	38/1.5	378/14.9	378/14.9	229x189/11.4x7.45
	Jerrican	2242-9013	15,200	HDPE	Natural	53	71-2160-0530	38/1.5	378/14.9	378/14.9	229x189/11.4x7.45
15 Liter (4 gal.)	Carboy, NM, w/Handles	2210-0040	18,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	429/16 7/8	419/16 1/2	285/1 17/32
	Carboy, WM, w/Handles	2234-0030	18,000	LDPE	Natural	100	71-2150-1000	88/3 1/2	389/15 5/16	379/14 7/8	286/11 1/4
	Lowboy	2323-0015	16,000	HDPE	Natural	63	71-2150-0630	44/1 3/4	210/8 1/4	206/8 1/8	371x371/14 5/8x14 5/8
	Lowboy, Autoclavable	2324-0015	15,500	PP	Natural	63	71-2150-0630	44/1 3/4	210/8 1/4	206/8 1/8	371x371/14 5/8x14 5/8
20 Liter (5 gal.)	Carboy, Fluorinated, NM	2097-0050	25,000	HDPE	Natural	—	—	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, NM, w/Handles	2210-0050	23,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Rectangular	2211-0050	22,500	HDPE	Natural	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy, Rectangular	2212-0050	22,500	PP	Natural	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy, Rectangular	DS2213-0050	23,900	PC	Clear	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy	2214-0050	20,800	HDPE	Natural	70	71-2151-0070	59/2 5/16	396/15 5/8	396/15 5/8	231x319/93/32x12 9/16
	Carboy, Vacuum w/Handles	2226-0050	24,000	PP	Natural	83B	71-2160-0830	64/2 1/2	533/21	521/20 1/2	284/11 3/16
	Carboy, WM, w/Handles	2234-0050	23,000	LDPE	Natural	100	71-2150-1000	88/3 1/2	493/19 3/8	480/18 7/8	287/11 9/32
	Carboy, WM, Auto., w/Handles	2235-0050	23,000	PP	Natural	100	71-2150-1000	88/3 1/2	493/19 3/8	480/18 7/8	287/11 9/32
	Jerrican	2240-0050	23,800	HDPE	Natural	53B	71-2160-0530	41/1 5/8	452/17 13/16	447/17 5/8	320x245/125/8x9 5/8
	Jug, Heavy-Duty, WM	2241-0050	24,000	HDPE	Natural	120	71-2155-1200	104/4 3/32	455/17 7/8	442/17 3/8	315x246/123/8x9 5/8
	Jerrican, Fluorinated	2242-0050	23,800	FLPE	Natural	53B	—	41/1 5/8	452/17 13/16	447/17 5/8	320x245/125/8x9 5/8

Carboy Specifications

Nominal Capacity	Description	Catalog Number	Approx. Brim Cap., ml	Material	Color	Screw Closure Size, mm	Closure Cat. No.	I.D. Neck, mm/in.	Hgt. w/ Closure, mm/in.	Hgt. w/out Closure, mm/in.	O.D. Bottle, mm/in.
	Carboy, Biotainer	2551-0050	23,900	PC	Lt. Blue	48	—	37/1 7/16	493/19 13/32	—	255/10 1/32 Square
	Carboy, Autoclavable, w/Handles	2250-0050	24,000	PP	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Transparent	2251-0050	24,000	PC	Clear	83B	71-2160-0830	66/2 5/8	536/21 3/32	528/20 13/16	290/11 3/8
	Carboy, Sanitary	2261-0050	22,500	PC	Transparent	3-in. Sanitary	N/A	68/237	498/19 5/8	328/12 15/16	250/9 13/16
	Carboy, w/Tubulation	2301-0050	22,500	PP	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	281/11 3/32
	Carboy, w/Tubulation	2302-0050	22,800	LDPE	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Rect., w/Tubulation	2303-0050	22,500	HDPE	Natural	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
20 Liter	Carboy, w/Spigot	2317-0050	22,500	PC	Clear	83B	71-2160-0830	66/2 5/8	536/21 3/32	528/20 13/16	290/11 3/8
(5 gal.)	Carboy, w/Spigot	2318-0050	22,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Autoclavable, w/Spigot	2319-0050	22,500	PP	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Rect., w/Spigot	2320-0050	22,500	HDPE	Natural	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy, Rectangular	2321-0050	22,500	PP	Natural	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy, Rect., w/Spigot	2322-0050	22,500	PC	Clear	100	71-2150-1000	86/3 3/8	399/15 11/16	389/15 5/16	229x320/9x12 5/8
	Carboy, Rect., Fluorinated, w/Spigot	2327-0050	22,500	FLPE	Natural	100	71-2150-1000	89/3 1/2	384/15 1/8	379/14 5/16	229x320/9x12 5/8
	Jug, Safety Dispensing	2340-0050	22,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, w/3" Welded Sanitary Flange	2630-0020	22,500	PP	Natural	—	—	73/2 1/8	495/19 1/2	495/19 1/2	286/11 1/4
	Carboy, w/Sanitary Flange	2640-0050	24,000	PP	Natural	83B	71-2160-0830	64/2 1/2	528/20 13/16	518/20 3/8	286/11 1/4
	Carboy, Single-Use	342289-0050	23,000	HDPE	Natural	83	71-2160-0830	64/2 1/2	502/19 11/16	495/19 13/32	285/11 1/4
	Carboy, NM, w/Handles	2210-0065	28,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	594/23 3/8	584/23	287/11 9/32
25 Liter	Carboy, w/Tubulation	DS2302-0065	27,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	594/23 3/8	584/23	287/11 9/32
	Carboy, w/Spigot	2318-0065	27,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	594/23 3/8	584/23	287/11 9/32
	Carboy, NM, w/Handles	2210-0130	54,000	LDPE	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16
50 Liter	Carboy, Autoclavable, w/Handles	2250-0130	55,000	PP	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16
(13 gal.)	Carboy, w/Tubulation	DS2302-0130	55,600	LDPE	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16
	Carboy, w/Spigot	2318-0130	53,500	LDPE	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16
	Carboy, Autoclavable, w/Spigot	2319-0130	53,500	PP	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16
	Carboy, w/3" Welded Sanitary Flange	2630-0050	55,000	PP	Natural	—	—	73/2 7/8	645/25 3/8	645/25 3/8	379/14 15/16
	Carboy, w/Sanitary Flange	2640-0130	55,000	PP	Natural	83B	71-2160-0830	64/2 1/2	678/26 11/16	668/26 5/16	379/14 15/16



For containers greater than 50 liters, see "Tanks" or "Bioprocess/Culture Ware" in the NALGENE Labware catalog, or visit www.NALGENElabware.com.

*No. 11-1/2 Rubber Stopper. Other helpful information molded into most NALGENE products includes our flask insignia, NALGENE trademark and, where appropriate, the size in ounces, milliliters or both.

Centrifuge Ware

NALGENE® Brand Centrifuge Ware offers a wide selection of centrifuge tubes, bottles, closures and adapters in many different sizes and resin types to fit your assay requirements. Molded from advanced bioanalytical-grade resins, their high purity means low extractables and leaching in your application. It's easy to find the right size, style and product support you need, just visit www.NALGENElabware.com for our chemical resistance and rotor matching guides.

NALGENE Conical and Round Bottom tubes are available in PMP, PPCO, PC, and TEFZEL ETFE resins designed to fit your application's need for mechanical strength, autoclavability, temperature, and chemical resistance. The conical tubes have easy-to-read molded-in gradations. The round tubes are available lipped or nonlipped and feature uniform wall thickness for greater strength and usability.

NALGENE Oak Ridge™ Centrifuge Tubes are available in PPCO, PC, PS and Teflon FEP resins with linerless, non-contaminating closures for unsurpassed leakproof performance in today's demanding applications. NALGENE Centrifuge Bottles are available with round or conical bottom, in a full range of sizes from 250mL to 1L, in PPCO, PC, Teflon FEP, and HDPE resins. Whether it's cell culture harvesting, protein biochemistry or phenol extractions, it's simple to find the right bottle! Closures and adapters are available separately.

NALGENE labware is for research use only, not for *In Vitro* diagnosis or parenterals.

Centrifuge Ware

NALGENE Centrifuge Ware

In conformance with industry nomenclature, NALGENE Centrifuge Tubes and Bottles use "nominal capacity" to express dimensional, not volumetric, tube and bottle sizes. In lipped centrifuge tubes that do not accommodate a leakproof closure, the nominal capacity and the volume capacity are equivalent. Centrifuge tubes and bottles that are threaded to provide a leakproof closure are manufactured to express dimensional rotor requirements. Maintaining the dimensional rotor requirements results in a loss of total volume. Brim capacities are noted for those products where the loss in volume is >10%.

Biohazard: NALGENE Oak Ridge™ Centrifuge tubes meet OSHA standard 29 CFR Part 1910.1030 for use as protection against bloodborne pathogens.

WARNING! All centrifuge ware must be filled to 80% of total capacity for proper performance unless otherwise noted.

IMPORTANT! NALGENE Oak Ridge™ centrifuge tubes are supplied with a linerless, non-contaminating screw closure. Those items described as leakproof will not leak during ordinary use. To assure leakproof service, especially at speeds greater than 10,000 x g or when spinning hazardous materials, NALGENE sealing cap assemblies (Cat. No. DS3132) are recommended. See individual listings.

Use and Cleaning Guide

Inspection

Centrifuge ware is subjected to high g-forces while spinning, which can lead to failure. Safe laboratory practice requires that all centrifuge ware be inspected before each use. Plastic centrifuge ware is easy to inspect; it requires no special equipment. Initially, the effect of excessive stress in plastic can be seen as cloudiness and discoloration or as "crazing," i.e. minute cracks visible when the tube is held at an angle in front of a bright light. With continued use, a crazed tube will develop larger cracks or will fail. Tubes should be discarded if cracks are readily visible to the unaided eye.

Rotor Balancing

Consult your centrifuge operator's manual for instructions on rotor balancing and handling. Proper rotor handling, cleaning and balancing are extremely important. Because plastics have different densities, tubes and bottles of different styles or materials should not be arranged randomly in the rotor.

Tube and Bottle Selection

NALGENE brand products make it easy for you to select the right centrifuge tube or bottle for your application. You'll find just what you'll need to make the right selection at www.NALGENElabware.com. The site includes product information in the NALGENE on-line catalog, comprehensive rotor matching, capacity and rotor speed recommendations, plus product-specific chemical resistance information.

Recommended Guidelines

- Be sure to check the tube or bottle chemical resistance to both sample and solvent.
- Consider operating temperature when selecting a tube or bottle. The Low-High Speed Selector guide lists the maximum RCF at 4°C and 22°C. Use this information as a guideline.
- Be aware: plastic tubes will undergo some degree of softening or hardening outside these ranges.
- Additionally, temperature is not the only variable that causes deformation; centrifugal force, duration, type of rotor, fill volume and even tube angle all have an effect.

Your safest policy is to pre-test all tubes or bottles under actual conditions, but using water rather than samples. Carefully follow the rotor manufacturer's guidelines and product insert sheet information to ensure proper performance.

Cleaning

Disposable centrifuge ware should be discarded after one use. NOTE: When handling hazardous materials, decontaminate tubes prior to disposal. To clean reusable NALGENE centrifuge ware, we suggest the following procedure:

- To loosen any residuals, presoak the tubes or bottles in NALGENE L900 detergent. (See "General Cleaning"in the Reference Tech Section for specific recommendations.) Soak overnight to loosen stubborn residue.
- Remove residue with a non-abrasive brush, or with a rubber or fluoropolymer policeman.
- Wash and rinse product thoroughly, with distilled water as a final rinse.
- Air dry.

Sterilization

PP, PPCO, PMP, FEP and ETFE products can be autoclaved repeatedly under normal conditions, 20 minute cycle at 121°C/15 psig (1 bar). PC and PSF products can be autoclaved under these same conditions, but autoclaving will cause deterioration in mechanical strength and will shorten their usable life. If you autoclave PC or PSF products, be sure to follow the inspection guidelines as noted above.When autoclaving NALGENE centrifuge ware, follow these guidelines:

- Clean and rinse tubes or bottles thoroughly with distilled water before autoclaving. Certain chemicals, including detergents, which have no appreciable effect on resins at room temperatures may cause deterioration at autoclaving temperatures.
- For bottles or tubes with closures, remove closures (cap and plug) completely before autoclaving to prevent collapse of container when cooling.

All NALGENE centrifuge ware can also be sterilized with ethylene oxide gas or compatible chemical disinfectants.

Effects of Chemicals

Chemicals can affect the strength, flexibility, surface appearance, color, dimensions and weight of plastic parts. Chemical resistance is influenced by temperature, duration and frequency of exposure, chemical concentration and centrifugal force. Physical changes which may be caused by chemical exposure include:

- Absorption of solvents, resulting in softening or swelling of the plastic
- Permeation of solvent through the plastic
- Dissolution of polymer in the solvent
- Stress-cracking, which may occur as a result of chemical exposure combined with external stress of centrifugal forces on tubes or bottles, which can be worsened by improper fit in a rotor cavity.

Refer to the Centrifuge Ware Chemical Resistance Chart for information on specific materials.

A Note on the "Unbreakability" of NALGENE Centrifuge Ware: NALGENE centrifuge tubes and bottles should not break or crack if used in a properly fitting rotor and run according to our recommendations regarding chemical resistance, temperature limits, relative centrifugal force ratings, use of closures, washing and autoclaving. If the limits are exceeded, the tube or bottle may fail during centrifugation (i.e. may crack or break). However, unlike glass, a NALGENE tube or bottle will not shatter, thus minimizing the risk to users and equipment.

Rotor Matching Guide

INSTRUCTIONS: *Internet*

Search our comprehensive database.

Visit www.NALGENElabware.com/centrifugeware

This online selection guide provides you with a convenient way of matching NALGENE centrifuge ware with the application in which you are using it. Variables for the proper selection of centrifuge ware include details about the centrifuge to be used, centrifugation speed, and reagents.

Our Rotor Matching Database contains information on approximately 100,000 rotors from many centrifuge manufacturers including:

- ALC/Astell
- Beckman
- Eberbach Labtools
- Eppendorf/Brinkman
- FIBER Lite
- Fisher/Marathon
- Forma
- Hettich
- Hitachi
- Kokusan
- Kabota
- MSE
- PTI
- Savant
- Shelton Scientific
- Sigma/Bruan
- Spintron
- Thermo Scientific
- Tomy

Your search will only take a few seconds to complete. It's easy to use: just specify manufacturer and rotor and any other known parameters; then click on start searching.

Please specify manufacturer and rotor and any other known parameters...

Manufacturer:

Rotor:

NALGENE Catalog No.: (ex. 3118-0050)

Tube Volume: ml

Press "Start Searching" to Begin Your Search.

Start Searching | Start Over

INSTRUCTIONS: *Printed*

To use the print version of the rotor matching guide included in this guide, follow the steps below:

1. Refer to the Rotor Matching Guide that matches the centrifuge rotor you are using (Beckman or Thermo Scientific).*
2. Locate the rotor you are using in the left column.
3. Locate the capacity of the tube or bottle you are using in the top row of the chart.
4. Note the reference code listed under that capacity.
5. Proceed to where the rotor and tube/bottle size intersect and note the manufacturer adapter(s) required, if any, to use that size tube or bottle in your rotor. If there is no entry, that size tube or bottle cannot be used in that rotor. "Direct" or "Dir." indicates that the tube or bottle can be used directly in the rotor without an adapter.
6. Refer to the Low- and High-Speed Selector Guide and locate the reference code identified in Step 4.
7. Determine the catalog number of the tube or bottle that will fulfill the requirements of your application. If you are not sure, refer to the tube or bottle descriptions.
8. Confirm that the product has the appropriate chemical resistance by referring to the Centrifuge Ware Chemical Resistance Chart.

*For rotor matching information for other rotors or for a complete Rotor Matching Guide (including IEC) please contact Technical Service at Telephone: 1-800-625-4327, Fax: 1-800-625-4363 or email Technical.Nalgene@thermofisher.com or visit our website at www.NALGENElabware.com.

Beckman Rotor

ml Ref. Code	10 AD or AE	12 AG	15 AH	15 AJ
AA-10			870329	870329
AA-24		342641	Direct	Direct
AH-4		345783 or 324951	347312	
GH-3.7	344147 & 344137 or 355803	355803 or 344147 & 344137	355804 or 355805	355803 or 355805 or 344147 & 344137
JA-10		356994	356994 or 366470 & 340142	

Low-and High-Speed Centrifuge Ware Selector Guide

Product Ref. Code	Nominal Vol. (ml)	Cat. No.	Description	Nominal Dim. Dia. x Ht. (mm)	Material
AD	10	3114-0010	Oak Ridge	16.0 x 81.5	FEP
AD	10	3115-0010	Oak Ridge	16.0 x 82.0	PSF
AD	10	3118-0010	Oak Ridge	16.1 x 81.7	PC
AD	10	3119-0010	Oak Ridge	16.0 x 81.4	PPCO
AE	10	3137-0010	Oak Ridge	16.1 x 82.8	PSF

Beckman Rotor/NALGENE® Centrifuge Ware Matching Guide

Table shows the correct Beckman and/or NALGENE adapter or combination of adapters.

All information is believed accurate. A trial run should be made for a specific application.

Beckman Rotor — Centrifuge Tube & Bottle Capacity (ml) and Reference Code

mL Ref. Code	10 AD or AE	12 AG	15 AH	15 AJ	16 AK or AM	35 AW	50 BA, BB, BC or BD	50 AZ	85 BE	175 BJ or BK	250 BM, BN, BS or BT	250 BP	290 BW	450 or 500 BX or CA	1000 CB	1000 CC
AA-10			870329	870329		DS3147-0050	Direct									
AA-24		342641	Direct	Direct												
AH-4		345783 or 324951	347312		342952	342952 & DS3147-0050	342953	342953		346126 & DS3126-0175	346126					
GH-3.7	344147 & 344137 or 355803	355803 or 344147 & 344137	355804 or 355805	355803 or 355805 or 344147 & 344137	355805 or 344147 & 344138	355808 & DS3147-0050 or 355807 or 355806 & DS3147-0050 or 344147 & 344139 & DS3147-0050	355808 or 355806 or 344147 & 344139	355807 or 355806 or 355808		349849				349945		
JA-10		356994	356994 or 366470 & 340142			356996 & DS3147-0050 or 336469 & 340142 & DS3147-0050	336469 or 336469 & 340142			340142 & DS3126-0175 or 362750 & DS3126-0175	340142 or 362750	362750 & DS3124-0010	362750	BX is Direct		
JA-14		356995	336470 or 356995			336469 & DS3147-0050 or 356997 & DS3147-0050	336469 or 356997				Direct					
JA-17	342327 & 870329	870329			870329	DS3147-0050	Direct									
JA-18		347539 & 870329				347539 & DS3147-0050	347539		Direct							
JA-20.1	342327				Direct											
JA-20		870329			870329	DS3147-0050	Direct									
JA-21	Direct															
JS-13.1	342327 & 870329	870329				DS3147-0050	Direct									
JS-13					870329	DS3147-0050	Direct									
JS-3.0	341977		339102	339102	339102	339103 & DS3147-0050	339103	339103	339104	339108 & DS3126-0175 or 356983 & 339108 & DS3126-0175	339108	DS3124-0010 or 339108 & DS3124-0010	339108	339109	344040 or 359096	339129
JS-4.0	341977		339102	339102	339102	339103 & DS3147-0050	339103	339103	339104	339108 & DS3126-0175 or 356983 & 339108 & DS3126-0175	339108	DS3124-0010 or 339108 & DS3124-0010	339108	339109	344040 or 356096	339129
JS-4.2	341977		339102	339102	339102	339103 & DS3147-0050	339103	339103	339104	339108 & DS3126-0175 or 356983 & 339108 & DS3126-0175	339108	DS3124-0010 or 339108 & DS3124-0010	339108	339109	344040 or 356096	339129
JS-5.2	341977		339102	339102	339102	339103 & DS3147-0050	339103	339103	339104	339108 & DS3126-0175 or 356983 & 339108 & DS3126-0175	339108	DS3124-0010 or 339108 & DS3124-0010	339108	339109	344040 or 356096	339129
JS-7.5		356995	336470 or 356995			362214 & DS3147-0050 or 362213 or 336469 & DS3147-0050 or 356997 & DS3147-0050	336469 or 356997 or 362214			DS3126-0175 or 336389 & DS3126-0175 or 356983 & 339108	Direct	336389 or DS3124-0010	Direct			
TA-10	342327 & 870329	870329				DS3147-0050	Direct									
TA-24	342641	342641	Direct	Direct	Direct											
TH-4	339279 or 359159 & 359162 or 359159 & 359484 or 359480 & 359162 or 359480 & 359484	339279	339276	339276	339276 or 359159 & 359163 or 359159 & 359485 or 359480 & 359163 or 359480 & 359485	339273 & DS3147-0050 or 359159 & 359164 & DS3147-0050 or 359159 & 359486 & DS3147-0050 or 359480 & 359164 & DS3147-0050 or 359480 & 359486 & DS3147-0050	339273 or 359159 & 359164 or 359159 & 359486 or 359480 & 359164 or 359480 & 359486	339273		339288 & DS3126-0175 or 339228 & 356983 & DS3126-0175 or 359159 & 356985 & DS3126-0175 or 359480 & 356985 & DS3126-0175	339288	339288	339288			

KEY: Direct (Dir.) = No adapter required. An empty space indicates that you cannot use that size tube or bottle with that rotor. NALGENE catalog numbers are underlined and bold.
All information is believed accurate; a trial run should be made, using water, under actual conditions to determine suitability for a specific application.

Thermo Scientific Sorvall Rotor/NALGENE® Centrifuge Ware Matching Guide

All information is believed accurate. A trial run should be made for a specific application.

Table shows the correct Thermo Scientific Sorvall and/or NALGENE adapter or combination of adapters.

Thermo Scientific Sorvall Rotor

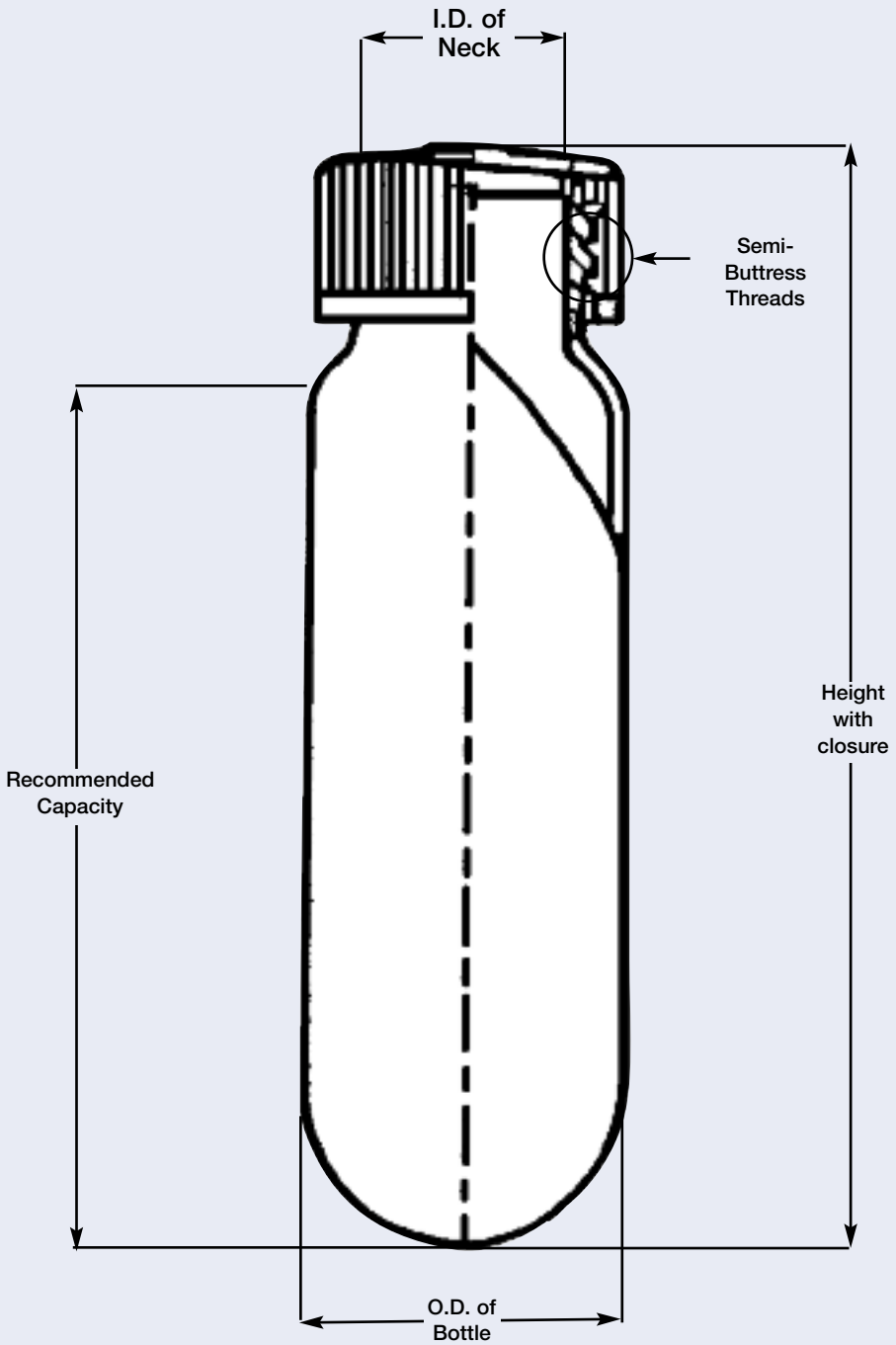
Centrifuge Tube & Bottle Capacity (ml) and Reference Code

mL Ref. Code	10 AD, AE	12 AG	15 AH	15 AJ	16 AK, AM	28, 38 AP, AX	35 AW	50 AZ	50 BA, BB, BC, BD	100 BG	175 BJ, BK	250 BM, BN, BS, BT	250 BP	290 BW	450, 500 BX, CA	1000 CB, CC
GS-3	00389 & 00614	00389 & 00614	00456 & 00614		00456 & 00614	00614 & 00449	00614 & 03072 & DS3147-0050				00614 & 00516 or 00614 & 00516 & DS3126-0175	00614 & 00516 or 00614 & DS3125-0250	00614 & 00516 & DS3124-0010	00614 & 00516 or 00614 & DS3125-0250	Direct	
GSA	00389	00389	00456		00456	00449	03072 & DS3147-0050				00516 or DS3126-0175	00424 or 00516 or DS3125-0250	00424 or 00439 or 00516 & DS3124-0010	00516 or DS3125-0250		
H-1000B, H-2000B	00833 or 00847 or 00883 or 00884	00833 or 00847 or 00883	00884 or 11018 & 11152 & 11148 or 00830 & 11152 & 11018	00833 or 00884	00845 or 00884	00419 & 00830 or 00846	00830 & 11152 & DS3147-0050 or 00830 & DS3147-0050 or 00904 & DS3147-0050 or 11018 & 11152	00830	00830 or 00830 & 11152 or 00904		00186 & 03095 or 00186 & DS3126-0175	00186	00186 & DS3124-0010	00186		
HG-4L, H-4000, H-6000, H-6000A	00384 or 00385 or 00462 & 00441 & 00402 or 00462 & 00441 & 00425 or 00894 & 00402 or 00894 & 00425	00385 or 00462 & 00441 & 00402 or 00894 & 00402	00892 or 00894 & 00367	00385	00462 & 00440 or 00462 & 00440 & 03667 or 00462 & 00441 & 00363 or 00462 & 00441 & 00367 or 00462 & 00441 & 00382 or 00892 or 00892 & 03667 or 00894 & 00363 or 00894 & 00367 or 00894 & 00382	00419 & 00894 or 00419 & 00441 & 00462	00390 or 00390 & 00420 or 00462 & 00441 & DS3147-0050 or 00894 & DS3147-0050	00894	00462 & 00441 or 00894	00462 & 00504	00443 & 00511 & 03095 or 00443 & 00511 & DS3126-0175 or 00443 & 00462 & DS3126-0175	00443 & 00511 or 00444 & 00511 or 00462 & 00443	00443 & 00511 & DS3124-0010 or 00462 & 00443 & 00439 or 00462 & 00443 & DS3124-0010 or 00443 & 0511 & 00439	00443 & 00511 or 00443 & 00462	00444 & 00511 or 00444 & 00462	Direct
HL-4, HL-8	00513 & 00634 & 00402 or 00513 & 00634 & 00425 or 00598 & 00563	00513 & 00634 & 00402 or 00598 & 00563	00513 & 00634 & 00363 or 00515 & 00635 & 00386 or 00515 & 00636 & 00386 or 00598 & 00565	00515 & 00636 & 00386 or 00598 & 00565	00513 & 00634 & 00363 or 00513 & 00634 & 00367 or 00513 & 00634 & 00382 or 00515 & 00636 & 00386 or 00598 & 00565	00419 & 00513 & 00634	00513 & 00634 & DS3147-0050 or 00515 & 00624 & 00629 & 00630 or 00515 & 00629 & 00624 & 00631 & DS3147-0050 or 00598 & 00648 & DS3147-0050 or 00627 & 00624 & 00630 or 00627 & 00624 & 00631 & DS3147-0050	00513 & 00634 & 00420 or 00515 & 00629 & 00624 & 00631 or 00627 & 00624 & 00631	00513 & 00634 or 00515 & 00624 & 00629 & 00631 or 00598 & 00648 or 00627 & 00624 & 00631		00479 & DS3126-0175	00479	00479 & DS3124-0010	00479		
SS-34, SA-600	00363 or 00402 or 00425	00402			00363 or 00367 or 00382	00419	DS3147-0050		Direct							

KEY: Direct (Dir.) = No adapter required. An empty space indicates that you cannot use that size tube or bottle with that rotor. NALGENE catalog numbers are underlined and bold.
All information is believed accurate; a trial run should be made, using water, under actual conditions to determine suitability for a specific application.

For the latest rotor matching data, visit www.NALGENElabware.com

NALGENE®

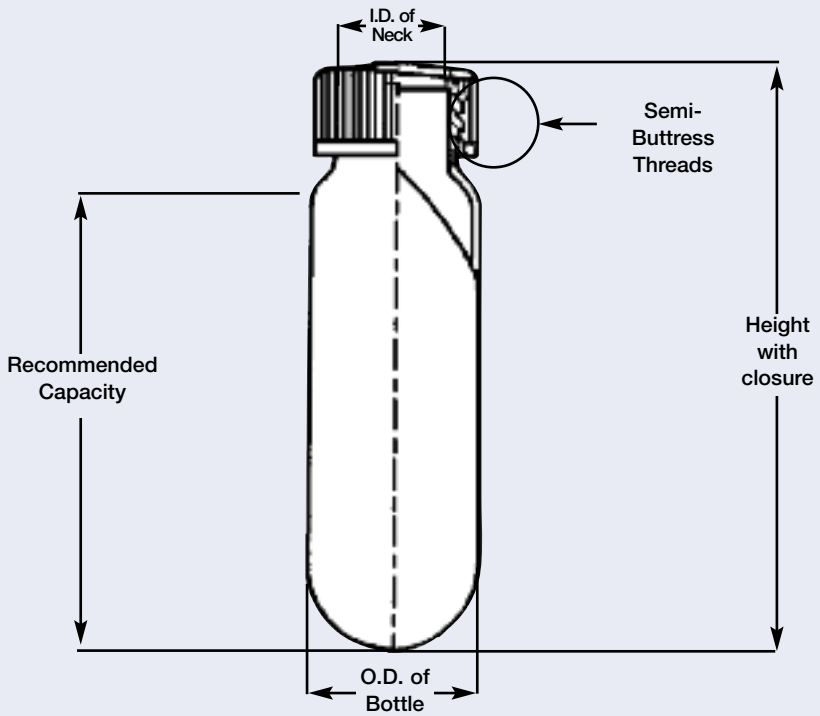

I.D. of
Neck
Semi-
Buttress
Threads
Recommended
Capacity
Height
with
closure
O.D. of
Bottle

Low & High Speed Selector Guide

Product Ref. Code	Nominal Vol., ml	Catalog Number	Description	Nom. Dim. Dia. x Ht., mm	Material	Maximum RCF 4°C	Maximum RCF 22°C	Closure Cat. No.	Sealing Cap Cat. No.	Rack† Cat. No.
AD	10	3114-0010	Oak Ridge tube, Screw top	16.0 x 81.5	FEP	50,000	50,000	71-2174-0130	DS3131-0013	5970-0x16
AD	10	3115-0010	Oak Ridge tube, Screw top	16.0 x 82.0	PSF	50,000	50,000	71-2150-0130		5970-0x16
AD	10	3118-0010	Oak Ridge tube, Screw top	16.1 x 81.7	PC	50,000	50,000	71-2150-0130		5970-0x16
AD	10	3119-0010	Oak Ridge tube, Screw top	16.0 x 81.4	PPCO	50,000	50,000	71-2150-0130		5970-0x16
AE	10	3138-0010	Oak Ridge tube, Sealing Cap	16.1 x 82.3	PC	50,000	50,000	Included		5970-0x16
AE	10	3139-0010	Oak Ridge tube, Sealing Cap	16.0 x 82.0	PPCO	50,000	50,000	Included		5970-0x16
AG	12	3110-0120	Round tube, Open top	15.9 x 103.0	PPCO	50,000	50,000	DS3111-0016		5970-0x16
AG	12	3117-0120	Round tube, Open top	16.0 x 103.5	PC	50,000	50,000	DS3111-0016		5970-0x16
AH	15	3103-0015	Conical bottom tube, Open top	16.9 x 118.9	PPCO	6,000	6,000	DS3111-0017		5970-0x16
AH	15	3105-0015	Conical bottom tube, Open top	16.9 x 120.2	PC	6,000	6,000	DS3111-0017		5970-0x16
AJ	15	3110-0150	Round tube, Open top	15.9 x 113.9	PPCO	50,000	50,000	DS3111-0016		5970-0x16
AJ	15	3117-0150	Round tube, Open top	16.1 x 114.3	PC	50,000	50,000	DS3111-0016		5970-0x16
AK	16	3138-0016	Oak Ridge tube, Sealing Cap	18.2 x 106.9	PC	50,000	50,000	Included		5970-0x20
AK	16	3139-0016	Oak Ridge tube, Sealing Cap	17.9 x 106.6	PPCO	50,000	50,000	Included		5970-0x20
AM	16	3110-0160	Round tube, Open top	18.0 x 99.3	PPCO	50,000	50,000	DS3111-0018		5970-0x20
AM	16	3117-0160	Round tube, Open top	18.1 x 100.6	PC	50,000	50,000	DS3111-0018		5970-0x20
AP	28	3118-0028	Oak Ridge tube, Screw top	25.4 x 101.8	PC	50,000	50,000	71-2150-0200		5930-0025
AP	28	3119-0028	Oak Ridge tube, Screw top	25.4 x 101.9	PPCO	50,000	50,000	71-2150-0200		5930-0025
AS	30	3114-0030	Oak Ridge tube, Screw top	25.7 x 93.7	FEP	50,000	20,000	71-2174-0200	DS3131-0020	5930-0025
AS	30	3115-0030	Oak Ridge tube, Screw top	25.7 x 94.5	PSF	50,000	50,000	71-2150-0200	DS3132-0020	5930-0025
AS	30	3118-0030	Oak Ridge tube, Screw top	25.7 x 94.5	PC	50,000	50,000	71-2150-0200	DS3132-0020	5930-0025
AS	30	3119-0030	Oak Ridge tube, Screw top	25.5 x 94.3	PPCO	50,000	50,000	71-2150-0200	DS3132-0020	5930-0025
AT	30	3137-0030	Oak Ridge tube, Sealing Cap	25.7 x 101.6	PSF	50,000	50,000	DS3132-0020	DS3132-0020	5930-0025
AT	30	3138-0030	Oak Ridge tube, Sealing Cap	25.7 x 101.6	PC	50,000	50,000	DS3132-0020	DS3132-0020	5930-0025
AT	30	3139-0030	Oak Ridge tube, Sealing Cap	25.5 x 101.4	PPCO	50,000	50,000	DS3132-0020	DS3132-0020	5930-0025
AW	35	3146-0050	Conical Oak Ridge tube, Sealing Cap	28.8 x 114.1	PC	50,000	50,000	71-2150-0240	DS3132-0024	5930-0025
AW	35	3148-0050	Conical Oak Ridge tube, Sealing Cap	28.6 x 113.8	PPCO	50,000	50,000	71-2150-0240	DS3132-0024	5930-0025
AX	38	3110-0380	Round tube, Open top	25.4 x 89.1	PPCO	50,000	50,000	DS3111-0025		5930-0025
AX	38	3117-0380	Round tube, Open top	25.5 x 89.4	PC	50,000	50,000	DS3111-0025		5930-0025
AZ	50	3103-0050	Conical bottom tube, Open top	28.6 x 133.4	PPCO	6,000	6,000	DS3111-0029		5970-0030
AZ	50	3105-0050	Conical bottom tube, Open top	28.9 x 134.5	PC	6,000	6,000	DS3111-0029		5970-0030
BA	50	3114-0050	Oak Ridge tube, Screw top	28.8 x 107.7	FEP	50,000	20,000	71-2174-0240	DS3131-0024	5970-0030
BA	50	3115-0050	Oak Ridge tube, Screw top	29.0 x 107.7	PSF	50,000	50,000	71-2150-0240	DS3132-0024	5970-0030
BA	50	3118-0050	Oak Ridge tube, Screw top	28.8 x 107.0	PC	50,000	50,000	71-2150-0240	DS3132-0024	5970-0030
BA	50	3119-0050	Oak Ridge tube, Screw top	28.8 x 106.7	PPCO	50,000	50,000	71-2150-0240	DS3132-0024	5970-0030
BB	50	3137-0050	Oak Ridge tube, Sealing Cap	29.0 x 115.3	PSF	50,000	50,000	DS3132-0024	DS3132-0024	5970-0030
BB	50	3138-0050	Oak Ridge tube, Sealing Cap	28.8 x 115.0	PC	50,000	50,000	DS3132-0024	DS3132-0024	5970-0030
BB	50	3139-0050	Oak Ridge tube, Sealing Cap	28.8 x 114.1	PPCO	50,000	50,000	DS3132-0024	DS3132-0024	5970-0030
BC	50	3110-0500	Round tube, Open top	28.7 x 103.3	PPCO	50,000	50,000	DS3111-0030		5970-0030
BC	50	3117-0500	Round tube, Open top	29.3 x 103.8	PC	50,000	50,000	DS3111-0030		5970-0030

Low & High Speed Selector Guide

Product Ref. Code	Nominal Vol., ml	Catalog Number	Description	Nom. Dim. Dia. x Ht., mm	Material	Maximum RCF 4°C	Maximum RCF 22°C	Closure Cat. No.	Sealing Cap Cat. No.	Rack† Cat. No.
BD	50	3110-9500	Round tube with lip, Open top	28.7 x 104.2	PPCO	50,000	50,000	DS3111-0029		5970-0030
BD	50	DS3112-0050	Round tube with lip, Open top	28.7 x 101.1	LDPE	10,000	7,000	DS3111-0029		5970-0030
BD	50	3117-9500	Round tube with lip, Open top	28.7 x 106.4	PC	50,000	50,000	DS3111-0029		5970-0030
BE	85	3118-0085	Oak Ridge tube, Screw top	38.2 x 105.7	PC	50,000	50,000	71-2150-0330		
BG	100	3110-1000	Round tube with lip, Open top	31.8 x 164.1	PPCO	50,000	50,000	DS3111-0032		5970-0030
BG	100	3117-1000	Round tube with lip, Open top	31.8 x 165.1	PC	50,000	50,000	DS3111-0032		5970-0030
BJ	175	3143-0175	Conical Wide-Mouth Bottle, Sealing Cap	61.5 x 143.5	PPCO	27,500	27,500	DS3132-0058	DS3132-0058	
BJ	175	3144-0175	Conical Wide-Mouth Bottle, Sealing Cap	61.4 x 144.3	PC	27,500	27,500	DS3132-0058	DS3132-0058	
BK	175	3145-0175	Conical Wide-Mouth Bottle, Sterile	61.5 x 135.6	PS	5,800	5,800	71-2150-0530		
BM	250	3120-0250	Bottle, Screw top	61.8 x 127.7	PPCO	27,500	27,500	71-2150-0380	DS3131-0038	
BM	250	3122-0250	Bottle, Screw top	61.8 x 127.6	PC	27,500	27,500	71-2150-0380	DS3131-0038	
BN	250	3121-0250	Wide-mouth bottle, Screw top	61.2 x 131.9	HDPE	8,000	8,000	71-2150-0430		
BP	250	3123-0250	Spherical Bottom Bottle, Screw top	61.9 x 145.8	PC	27,500	27,500	71-2150-0380	DS3131-0038	
BS	250	3127-0250	Bottle, Screw top	60.0 x 128.8	FEP	4,000	NR	71-2174-0380	DS3131-0038	
BT	250	3140-0250	Wide-Mouth Bottle, Sealing Cap	61.5 x 135.1	PC	27,500	27,500	DS3132-0058	DS3132-0058	
BT	250	3141-0250	Wide-Mouth Bottle, Sealing Cap	60.7 x 133.4	PPCO	27,500	27,500	DS3132-0058	DS3132-0058	
BX	450	3140-0500	Wide-Mouth Bottle, Sealing Cap	69.5 x 160.0	PC	13,700	13,700	DS3132-0063	DS3132-0063	
BX	450	3141-0500	Wide-Mouth Bottle, Sealing Cap	69.5 x 160.0	PPCO	13,700	13,700	DS3132-0063	DS3132-0063	
BZ	500	3120-0500	Bottle, Screw top	73.8 x 169.8	PPCO	4,800	4,800	71-2150-0480		
CA	500	3120-9500	Bottle, Screw top	69.5 x 170.2	PPCO	13,700	13,700	71-2150-0480		
CA	500	3122-0500	Bottle, Screw top	69.5 x 169.6	PC	13,700	13,700	71-2150-0480		
CB	1000	3120-1000	Bottle, Screw top	97.5 x 184.5	PPCO	7,100	7,100	71-2150-0630	DS3132-0063	
CB	1000	3122-1000	Bottle, Screw top	97.6 x 188.4	PC	7,100	7,100	71-2150-0630	DS3132-0063	
CC	1000	3120-1010	Bottle, Screw top	97.7 x 179.0	PPCO	7,100	7,100	71-2150-0630	DS3132-0063	
CC	1000	3122-1010	Bottle, Screw top	98.1 x 180.2	PC	7,100	7,100	71-2150-0630	DS3132-0063	



Nominal Dimensions include any required NALGENE® adapters and sealing caps, sealing cap assemblies, where appropriate.

Included: Closures are provided; no replacement closures are available.

† The "x" represents the color code digit for the catalog number. Available colors are white, yellow, orange, blue, green and red.

* For use above 20,000 RCF always pre-test tubes.

Centrifuge Ware Chemical Resistance

This chemical resistance chart is intended as a general guide only. Because of the difficulty in quantifying and organizing this information, no comprehensive data has been published on the chemical resistance of centrifuge ware.

BEFORE an actual run with a particular chemical, we strongly advise that you make a short trial run. You may also want to observe the effect of storing the chemical in the tube or bottle overnight.

If any doubt exists regarding a particular application, contact Technical Support at 1-800-625-4327; email Technical.nalgene@thermofisher.com.

	Teflon* (FEP)	Tefzel* (ETFE)	Polypropylene Copolymer (PPCO)	Polycarbonate (PC)	Polyethylene (PE)	Polypropylene (PP)	Polysulfone (PSF)
2-Butanol	S	S	S	U	S	S	M
2-Butyl Alcohol	S	S	S	U	S	S	M
2-Mercaptoethanol	S	S	S	U	S	S	U
2-Propanol	S	S	S	U	S	S	U
3-Pentanone	S	M	U	U	U	M	U
Acetaldehyde, 100%	S	S	M	U	U	M	U
Acetic Acid, 5%	S	S	S	M	S	S1	S
Acetic Acid, 10%	S	S	S	M	M	S1	M
Acetic Acid 60%	S	S	S	U	M	M	U
Acetic Acid (Glacial)	S	S	M	U	U	M	U
Acetic Anhydride	S	S	M	U	U	M	U
Acetone	S	M	U	U	U	M	U
Acetonitrile	S	S	M	U	S	M	U
Acetophenone	S	S	M	U	M	M	U
Acetylene	S	S	U	U	U	M	–
Alconox (detergent)	S	S	S	U	M	S	M
Allyl Alcohol	S	S	S	U	U	S	M
Aluminum Chloride	S	S	S	S	S	S	S
Aluminum Fluoride	S	S	S	S	S	S	S
Aluminum Potassium Sulfate	S	S	S	S	S	S	S
Aluminum Sulfate	S	S	S	M	S	S	S
Ammonia	S	S	S1	U	S	S	M
Ammonium Acetate	S	S	S	U	S	S	M
Ammonium Carbonate, saturated	S	S	S	U	S	S	U
Ammonium Carbonate	S	S	S	U	S	S	–
Ammonium Chloride, saturated	S	S	S2	M	S2	S	S
Ammonium Chloride	S	S	S	M	S	S	S
Ammonium Hydroxide, 10%	S	S	S	U	S	S1	U
Ammonium Hydroxide, 28%	S	S	S	U	S	S1	U
Ammonium Hydroxide, Concentrated (30%)	S	S	S	U	S	S1	U
Ammonium Nitrate	S	S	S	M	S	S	S
Ammonium Persulfate	S	S	S	M	S	S	S
Ammonium Phosphate	S	S	S	M	S	S	S
Ammonium Sulfate, 77%	S	S	S	M	S	S	S
Ammonium Sulfate, saturated (77%)	S	S	S	M	S	S	S
Ammonium Sulfide, saturated	S	S	S	U	S	S	U
Ammonium Sulfide	S	S	S	U	S	S	U
Amyl Acetate	S	S	U	U	U	U	U
Amyl Alcohol	S	S	S	M	M	M	M
Aniline	S	S	U	U	U	M	U
Aqua Regia	S	S	U	U	U	U	U
Barium Salts	S	S	S	S	S	S	S
Benzaldehyde	S	S	M	U	U	M	U
Benzenamine	S	S	U	U	U	M	U
Benzene	S	S	U	U	U	U	U
Benzoic Acid	S	S	S	S	S	S	M
Benzyl Alcohol	S	S	U	U	U	U	U
beta-Mercaptoethanol	S	S	S	S	S	S	M
Boric Acid	S	S	S	S	S	S	S
Butane	S	S	M	U	U	S2	U
Butyl Acetate	S	S	U	U	U	U	U
Butyl Alcohol	S	S	M	U	S	S	M
Calcium Bisulfate	S	S	S	U	S	S	S
Calcium Chloride	S	S	S	M	S	S1	S
Calcium Hypochlorite	S	S	S	U	S	S	M

	Teflon* (FEP)	Tefzel* (ETFE)	Polypropylene Copolymer (PPCO)	Polycarbonate (PC)	Polyethylene (PE)	Polypropylene (PP)	Polysulfone (PSF)
Calcium Salts	S	S	S	U	S	S	M
Carbon Dioxide	S	S	S	S2	S	S	S
Carbon Disulfide	S	S	U	U	U	M	U
Carbon Tetrachloride	S	S	U	U	U	U	U
Cesium Acetate	S	S	S	S	S	S	S
Cesium Bromide	S	S	S	S	S	S	S
Cesium Chloride	S	S	S	S	S	S	S
Cesium Formate	S	S	S	S	S	S	S
Cesium Iodide	S	S	S	S	S	S	S
Cesium Sulfate	S	S	S	S	S	S	S
Chlorine, dry gas	S	S	U	M	M	U	U
Chlorine, water solution	S	S	M	M	U	M	U
Chlorine, wet gas	S	S	M	M	U	M	U
Chlorobenzene	S	M	U	U	U	U	U
Chloroethane	S	S	U	U	U	U	U
Chloroform	S	M	U	U	U	U	U
Chlorosulphonic Acid	S	M	U	U	U	U	U
Chromic Acid, 10%	S	S	S	M	S	S1	M
Chromic Acid, 30%	S	S	S1	M	M	S1	U
Chromic Acid, 50%	S	S	S1	U	U	M	U
Chromic Acid, 80%	S	S	S1	U	M	U	U
Citric Acid, 10%	S	S	S	M	M	S	S
Citric Acid	S	S	S	M	M	S	S
Copper Salts	S	S	S	S	S	S	S
Copper Sulfate	S	S	S	S	S	S	S
Cresol Mixture	S	M	M	U	U	U	U
Culture Media	S	S	S	S	S	S	S
Cyclohexane	S	S	M	U	M	M	U
Cyclohexanol	S	S	S	U	S	S	M
Cyclohexanone	S	S	M	U	M	M	U
Decalin	S	S	U	U	U	U	U
Deoxycholate	S	M	S	S	S	S	S
Dextran (Sulfate)	S	S	S	S	S	S	S
Dextran	S	S	S	S	S	S	S
Diacetone	S	M	M	U	U	S	U
Dibutyl Phthalate	S	M	M	U	U	M	U
Dichloroethane	S	M	U	U	U	U	U
Dichloroethylene	S	M	U	U	U	U	U
Diethyl Ether	S	M	U	U	U	U	U
Diethyl Ketone	S	M	U	U	M	M	U
Diethylpyrocarbonate (DEPC)	S	M	S	U	S	S	U
Dimethylformamide	S	M	S	U	S	S	U
Dimethylsulfoxide (DMSO)	S	M	S	U	S	S	U
Dioxane	S	S	M	U	M	M	U
Ethanol, 5%	S	S	S	M	S	S	S
Ethanol, 10%	S	S	S	M	S	S	M
Ethanol, 50%	S	S	S	U	S	S	M
Ethanol, 70%	S	S	S	U	M	S	U
Ethanol, 95%	S	S	S	U	M	S	U
Ethanol, 96%	S	S	S	U	M	S	U
Ethanol, 100%	S	S	S	U	M	S	U
Ethanolamine	S	S	S	U	S	S	U
Ethyl Acetate	S	S	S	U	M	M	U
Ethyl Alcohol, 5%	S	S	S	M	S	S	S
Ethyl Alcohol, 10%	S	S	S	M	S	S	M

Key:
S = Satisfactory
S1 = Satisfactory, may cause discoloration.
S2 = Satisfactory below 26°C only
M = Marginal; may be satisfactory for use in a centrifuge, depending on length of exposure and speed. Testing under operating conditions is suggested before actual run.
U = Unsatisfactory; not recommended.
U1 = WARNING/EXPLOSION HAZARD! To prevent the possibility of personal injury, do not use any chemical rated "U1" with an aluminum closure. In case of rotor failure, these chemicals can react with aluminum to cause an explosion.
– = No assurance of performance; a trial run should be made to determine suitability for a specific application.

Centrifuge Ware Chemical Resistance

	Teflon* (FEP)	Tefzel* (ETFE)	Polypropylene Copolymer (PPCO)	Polycarbonate (PC)	Polyethylene (PE)	Polypropylene (PP)	Polysulfone (PSF)
Ethyl Alcohol, 100%	S	S	S	U	M	S	U
Ethyl Alcohol, 50%	S	S	S	U	S	S	M
Ethyl Alcohol, 70%	S	S	S	U	M	S	U
Ethyl Alcohol, 95%	S	S	S	U	M	S	U
Ethyl Alcohol, 96%	S	S	S	U	M	S	U
Ethyl Chloride	S	S	U	U	U	U	U
Ethylene Dichloride	S	S	U	U	U	U	U
Ethylene Glycol	S	S	S	U	S	S	M
Ethylene Oxide Gas (ETO)	S	S	S	M	S	S	S
Ethylene Oxide, 100%	S	S	U	U	U	M	S
Fatty Acids - Saturated	S	S	S	U	M	S	M
Fatty Acids - Unsaturated	S	S	S	U	M	S	M
Ferric Chloride	S	S	S	M	S	S	S
Ferric Sulfate	S	S	S	S	S	S	S
Ferrous Chloride	S	S	S	M	S	S	S
Ferrous Sulfate	S	S	S	S	S	S	S
Ficoll-Hypaque	S	S	S	S	S	S	S
Fluoboric Acid	S	S	S	–	S	S	S
Formaldehyde, 5%	S	S	S	M	S	S1	S
Formaldehyde, 40%	S	S	S	M	M	M	M
Formalin, 5%	S	S	S	M	S	S1	S
Formalin, 40%	S	S	S	M	M	M	M
Formalin	S	S	S	M	M	M	M
Formic Acid, 3%	S	S	S	M	S	S	S
Formic Acid, 10%	S	S	S	M	S	S	M
Formic Acid, 100%	S	S	S	U	M	S	U
Formic Acid	S	S	S	U	M	S	S
Fuel Oil	S	S	U	M	U	M	S2
Furfural	S	S	U	U	U	U	U
Gallic Acid	S	S	S	U	S	S	U
Gasoline	S	S	U	U	M	U	U
Glutaraldehyde	S	S	S	S	S	S	M
Glycerine	S	S	S	S	S	S	S
Glycerol	S	S	S	S	S	S	S
Guanidine Hydrochloride	S	S	S	S	S	S	S
Haemo-Sol (detergent)	S	S	S	M	S	S	S
Hexane	S	S	U	U	U	M	U
Hydrochloric Acid, 5%	S	S	S	S	S	S	M
Hydrochloric Acid, 10%	S	S	S	M	S	S	M
Hydrochloric Acid, 30%	S	S	S	U	S	M	U
Hydrochloric Acid, 37%	S	S	S	U	S	M	U
Hydrochloric Acid, 50%	S	S	S	U	S	M	U
Hydrochloric Acid, Concentrated (38%)	S	S	S	U	M	M	U
Hydrocyanic Acid	S	S	S	–	S	S	–
Hydrofluoric Acid, 10%	S	S	S	M	S	S	M
Hydrofluoric Acid, 38%	S	S	S	U	S	S	U
Hydrofluoric Acid, 50%	S	S	S	U	M	S	U
Hydrofluoric Acid, 60%	S	S	S	U	M	M	U
Hydrofluoric Acid, 70%	S	S	S	U	M	M	U
Hydrofluoric Acid, 100%	S	S	S	U	M	M	U
Hydrofluoric Acid, Concentrated (53%)	S	S	S	U	M	M	U
Hydrogen Peroxide, 3%	S	S	S	S	S	S	S
Hydrogen Peroxide, 10%	S	S	S	S	S2	S	S
Hydrogen Peroxide, 30%	S	S	M	S	M	S2	S2
Hydrogen Peroxide, 100%	S	S	U	U	U	U	U
Hydrogen Peroxide, Concentrated (94%)	S	S	U	U	U	U	U
Hydrogen Sulfide, dry gas	S	S	S	M	S	S	–
Hydrogen Sulfide, wet gas	S	S	S	M	S	S	–
Hydroquinone	S	S	–	–	S	S	–
Iodine Solution	S	S1	S1	M	M	S1	–
Iodoacetic Acid	S1	S	S1	S	S1	S1	S1

	Teflon* (FEP)	Tefzel* (ETFE)	Polypropylene Copolymer (PPCO)	Polycarbonate (PC)	Polyethylene (PE)	Polypropylene (PP)	Polysulfone (PSF)
Iso-Butanol	S	S	S	U	S	S	U
Iso-Butyl Alcohol, 100%	S	S	S	U	S	S	U
Iso-Butyl Alcohol	S	S	S	U	S	S	U
iso-Octane	S	S	U	U	U	U	U
iso-Propanol, 100%	S	S	S	U	S	S	U
Isobutyl Alcohol	S	S	S	U	S	S	U
Isopropanol, 100%	S	S	S	U	S	S	U
Isopropyl Alcohol, 100%	S	S	S	U	S	S	U
Kerosene	S	S	M	U	M	M	U
Lacquer Thinner	S	S	U	U	U	U	U
Lactic Acid, 20%	S	S	S	S	S	S	U
Lactic Acid, 50%	S	S	S	M	S	S	U
Lactic Acid, 100%	S	S	S	M	S	S	U
Lauryl Alcohol	S	–	–	–	M	S	–
Lead Acetate	S	S	S	M	S	S	S
Magnesium Chloride	S	S	S	S	S	S	S
Magnesium Hydroxide, saturated	S	S	S	U	S	S	M
Magnesium Hydroxide	S	S	S	U	S	S	M
Magnesium Sulfate	S	S	S	S	S	S	S
Maleic Acid	S	S	S	M	S	S	M
Manganese Salts	S	S	S2	–	–	–	–
Mercaptoacetic Acid	S	S	S	U	U	U	U
Mercuric Chloride	S	S	S	S	S	S	–
Mercury Salts	S	S	S	S	S	S	–
Mercury	S	S	S	U	S1	S	S
Methanol, 10%	S	S	S	M	S	S	S
Methanol, 100%	S	S	S	U	M	S1	M
Methanol	S	S	S	U	M	S1	M
Methyl Alcohol (10%)	S	S	S	M	S	S	S
Methyl Alcohol, 100%	S	S	S	U	M	S1	M
Methyl Ethyl Ketone (MEK)	S	M	S	U	U	M	U
Methyl Isobutyl Ketone (MIBK)	S	S	M	U	U	S	U
Methylene Chloride	S	S	U	U	U	U	U
Metrizamide	S	S	S	S	S	S	S
Milk	S	S	S	S	S	S	S
n-Butyl Alcohol	S	S	S	U	S	S	M
n-Butyl Phthalate	S	S	M	U	U	U	U
n-Pentanol	S	S	S	M	S	S	M
n-Propanol	S	S	S	U	S	S	U
Naphthalene, 100%	S	S	U	U	U	M	U
Nickel Chloride	S	S	S	S	S	S	S
Nickel Salts	S	S	S	S	S	S	S
Nickel Sulfate	S	S	S	S	S	S	S
Nitric Acid, 10%	S	S	S1	S	S	S	M
Nitric Acid, 30%	S	S	S1	M	M	S	M
Nitric Acid, 50%	S	S	S1	U	U	M	U
Nitric Acid, 60%	S	M	U	U	U	U	U
Nitric Acid, 70%	S	M	U	U	U	U	U
Nitric Acid, 95%	S	M	U	U	U	U	U
Nitric Acid, Concentrated (70%)	S	M	U	U	U	U	U
Nitric Acid, fuming	S	U	U	U	U	U	U
Nitrobenzene	S	S	U	U	U	M	U
Oil, Cottonseed	S	–	S	M	M	S	U
Oil, Linseed	S	S	M	U	M	M	U
Oil, Mineral	S	S	M	U	U	U	U
Oil, Other	S	S	M	U	U	U	U
Oil, Paraffin	S	S	M	U	U	U	U
Oil, Petroleum	S	S	M	U	U	U	U
Oil, Silicone	S	S	S	M	S	M	M
Oil, Vegetable	S	–	S	M	M	S	M

Key:
S = Satisfactory **S1** = Satisfactory, may cause discoloration. **S2** = Satisfactory below 26°C only
M = Marginal; may be satisfactory for use in a centrifuge, depending on length of exposure and speed. Testing under operating conditions is suggested before actual run.
U = Unsatisfactory; not recommended.
U1 = WARNING/EXPLOSION HAZARD! To prevent the possibility of personal injury, do not use any chemical rated "U1" with an aluminum closure. In case of rotor failure, these chemicals can react with aluminum to cause an explosion.
– = No assurance of performance; a trial run should be made to determine suitability for a specific application.

Centrifuge Ware Chemical Resistance

	Teflon* (FEP)	Tefzel* (ETFE)	Polypropylene Copolymer (PPCO)	Polycarbonate (PC)	Polyethylene (PE)	Polypropylene (PP)	Polysulfone (PSF)
Oleic Acid	S	S	S	M	M	S	M
Oxalic Acid, 50%	S	S	S	M	S	S	S
Oxalic Acid	S	S	S	M	S	S	S
Oxygen	S	S	S	S	S	S	S
Palmitic Acid	S	S	S	—	S	S	—
Paraffin, White	S	S	M	M	S	M	—
Paraffin	S	S	M	M	S	M	—
Perchloric Acid, 10%	S	S	S	U	M	S	U
Perchloric Acid, 70%	S	M	M	U	U	M	U
Perchloric Acid, Concentrated (70%)	S	M	M	U	U	M	U
Petroleum Ether	S	M	U	U	U	U	U
Petrol	S	S	U	U	U	U	U
Phenol, 5%	S	S	M	U	M	M	U
Phenol, 50%	S	M	U	U	U	U	U
Phenol, Liquified, 92%	S	U	U	U	U	U	U
Phenol	S	U	U	U	U	M	U
Phosphoric Acid, 10%	S	S	S	S	S	S	S
Phosphoric Acid, 25%	S	S	S	M	S	S	S
Phosphoric Acid, 30%	S	S	S	U	S	S	S
Phosphoric Acid, 50%	S	S	S	U	S	S	S
Phosphoric Acid, 85%	S	S	S	U	U	S	S
Phosphoric Acid, 95%	S	S	M	U	U	S	S
Phosphoric Acid, Concentrated (88%)	S	S	S	U	U	S	S
Phosphate Trichloride	S	S	U	U	U	U	—
Picric Acid	S	S	M	U	M	M	U
Potassium Acetate	S	S	S	S	S	S	S
Potassium Bromide	S	S	S	S	S	S	S
Potassium Carbonate, saturated	S	S	M	U	S	S	M
Potassium Carbonate	S	S	M	U	S	S	M
Potassium Chlorate	S	S	S	U	M	S	U
Potassium Chloride, saturated	S	S	S	S	S	S	S
Potassium Chloride	S	S	S	S	S	S	S
Potassium Hydroxide, 5%	S	S	S	U	S	S	M
Potassium Hydroxide, 10%	S	S	S	U	S	S	M
Potassium Hydroxide, 45%	S	S	S	U	S	S	U
Potassium Hydroxide, Concentrated (50%)	S	S	S	U	S	S	U
Potassium Iodide	S	S	S	—	S2	S	S
Potassium Permanganate	S	S	S1	S	S	S2	S1
Potassium Sulfate	S	S	S	S2	S	S	S
Propane	S	S	M	U	U	U	M
Pyridine, 5%	S	S	M	U	U	M	M
Pyridine, 50%	S	M	M	U	U	M	U
Pyridine	S	M	U	U	U	M	U
Rubidium Bromide	S	S	S	S	S	S	S
Rubidium Chloride	S	S	S	S	S	S	S
Sera	S	S	S	S	S	S	S
Silver Cyanide	S	S	S	S	S	S	S
Silver Nitrate	S	S	S	S	S	S	S
Sodium Bicarbonate	S	S	S	S	S	S	S
Sodium Bisulfate	S	S	S	S	S	S	—
Sodium Borate	S	S	S	S	S	S	S
Sodium Bromide	S	S	S	S	S	S	S
Sodium Carbonate, 2%	S	S	S	M	S	S1	S
Sodium Carbonate	S	S	S1	M	M	S1	M
Sodium Chlorate	S	S	S	S	S	S	S
Sodium Chloride, 10%	S	S	S	S	S	S	S
Sodium Chloride, Saturated (36%)	S	S	S	S	S	S	S
Sodium Cyanide	S	S	S	—	S	S	S
Sodium Dichromate	S	S	S	M	S	S	S
Sodium Dodecyl Sulfate (SDS)	S	M	S	S	U	S	S
Sodium Hydroxide, 1%	S	S	S	M	S	S	S
Sodium Hydroxide, 10%	S	S	S	U	M	S	M
Sodium Hydroxide, <01%	S	S	S	M	S	S	S
Sodium Hydroxide, >1%	S	S	S	U	M	S	M
Sodium Hydroxide, Concentrated (50%)	S	S	S	U	U	S	U
Sodium Hypochlorite, 5%	S	S	S1	S	M	S	S
Sodium Hypochlorite	S	S	M	M	M	M	S
Sodium Iodide	S	S	S	S	S	S	S
Sodium Metaborate	S	S	S	U	U	S	U
Sodium Nitrate, 10%	S	S	S	S	S	S	S
Sodium Nitrate	S	S	S	S	S	S	S
Sodium Perborate	S	S	M	—	U	M	—
Sodium Peroxide	S	S	M	S	U	M	—
Sodium Phosphate	S	S	S	M	S	S	S
Sodium Silicate	S	S	S	U	S	S	U
Sodium Sulfate	S	S	S	S	S	S	S
Sodium Sulfide	S	S	S	U	S	S	U
Sodium Sulfite	S	S	S	S	S	S	S
Sodium Thiosulfate	S	S	S	M	S	S	S
Solution 555, 20%	S	S	S	S	S	S	S
Stearic Acid	S	S	S	S	M	S2	S
Sucrose, Alkaline	S	S	S	U	S	S	M
Sucrose	S	S	S	S	S	S	S
Sulfosalicylic Acid	S	S	S	S	S	S	S
Sulfur Chloride	S	S	U	U	U	U	—
Sulfur Dioxide	S	S	S2	M	S2	S2	M
Sulfuric Acid, 10%	S	S	S	M	S	S	S1
Sulfuric Acid, 50%	S	S	S	U	S	M	S2
Sulfuric Acid, 60%	S	S	M	U	M	U	M
Sulfuric Acid, 75%	S	S	M	U	M	M	M
Sulfuric Acid, Concentrated (96%)	S	S	M	U	U	M	U
Sulfuric Acid, fuming	S	M	U	U	U	U	U
Tannic Acid	S	S	S	S	M	S	S
Tartaric Acid	S	S	S2	S	M	S	S
Tetrahydrofuran (THF)	S	S	U	U	U	U	U
Tetralin	S	S	U	U	U	U	U
Toluene	S	S	U	U	U	U	U
Trichloracetic Acid (TCA), 10%	S	S	S	S	S2	S	M
Trichloroacetic Acid (TCA)	S	M	S	M	S2	S	U
Trichloroethane	S	S	U	U	U	U	U
Trichloroethylene	S	S	U	U	U	U	U
Triethanolamine	S	S	S	U	S2	M	U
Tris Buffer, neutral pH	S	S	S	S	S	S	S
Trisodium Phosphate (TSP)	S	S	S	U	S	S	U
Triton X-100	S	M	S	U	S	S	U
Turpentine	S	S	U	U	U	U	U
Urea	S	S	S	S	S	S	S
Urine	S	S	S	S	S	S	S
Water, Distilled	S	S	S	S	S	S	S
White Spirits	S	S	U	U	U	U	U
Xylene	S	S	U	U	U	U	U
Zephiran Chloride, 1%	S	S	S	S	S	S	S
Zephiran Chloride, 7%	S	S	S	M	S	S	M
Zinc Chloride	S	S	S	S	S	S	S
Zinc Sulfate	S	S	S	S	S	S	S

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The new NALGENE® MF75™ PES membrane.

Prepare your lab for top speeds.

Supor® machV PES membrane technology: Available exclusively in NALGENE MF75 filter units.

Fast, low binding, and easy to use.

NALGENE

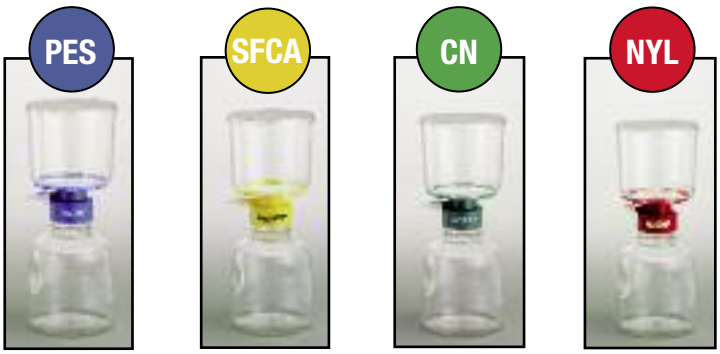
SCIENCE. UNCOMPROMISED.™

Supor® is a registered trademark of Pall Corporation.

NALGENE® Filterware

Choose the Best Membrane for your Application

- PES (polyethersulfone)—blue collar. The ultimate cell and tissue culture media membrane. Low protein binding, low extractables, no external wetting agents, fast flow.
- SFCA (surfactant-free cellulose acetate)—yellow collar. Much cleaner than standard cellulose acetate. Low protein binding, no wetting agent. A NALGENE product exclusive!
- CN (cellulose nitrate)—green collar. The standard membrane for general filtering of buffers and solutions.
- NYL (nylon)—red collar. For special applications. No wetting agents. The lowest in extractables. Excellent alcohol resistance.



Easier to Use Shape

- The filter unit receivers have an ergonomic design.
- Tapered sides and “grip dimples” make the filter units and receivers easy to grip and handle.
- The wide base improves stability on the bench top.

Improved Identification

- Lot number, catalog number, membrane type, pore size and expiration date are printed on filter units, bottle tops and receivers for easy identification and lot traceability.

Great Performance

- Wider membranes mean faster flow with difficult to filter solutions. Only NALGENE has 90mm diameter membranes in 500ml and 1 liter sizes in all four of our membranes.

NALGENE Certified

- Every lot of MF75 filter units, bottle tops and receivers is NALGENE Certified. Each case contains documentation that the product is sterile, non-pyrogenic, non-cytotoxic and has passed strict performance integrity tests. We guarantee it!
- Sterile shelf life is 5 years.

NALGENE® MF75™ Filters with New Pall Supor® machV PES Membrane

Unbeatable speed, low binding and easy to use!

NALGENE, long the leader in laboratory filtration, is now even better. As part of an exclusive agreement, NALGENE MF75 Filter Units and Bottle-Top Filters are the only ones available with the new Pall 0.2μm Supor® machV membrane. Supor machV is an extremely clean, fast-flowing asymmetric PES membrane that provides outstanding throughput and low protein binding of cell culture media and other solutions. Combining the manufacturing and laboratory expertise of NALGENE with leading membrane technology from Pall provides you with a fast, reliable and easy-to-use vacuum filtration system.

These great new filters feature:

- The fast flowing filter to save you time in the lab.
- Supor machV PES, with low protein binding and low extractables, is the ideal membrane for sterilizing media.

All the other great features of NALGENE MF75 Filters.

- Easy-to-use ergonomic shape
- Lot identification right on the product
- Widest choice of filter unit and bottle top sizes
- Guaranteed leakproof closure system
- NALGENE Certified performance

NALGENE MF75 Series Filters allow rapid sterile filtration of even the most difficult to filter fluids such as serum. MF75 Series Filters with Pall 0.2μm Supor® machV membranes are available in 150mL, 250mL, 500mL, and 1L sizes.

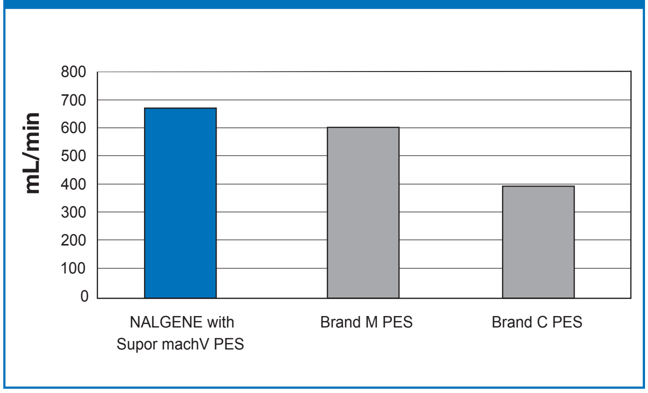
Each filter unit has a side-arm with a cellulosic vent plug, a quick-disconnect tubing adapter, and a leakproof threaded closure for the receiver. Graduations are provided on both the upper and lower receiver unit, allowing for easy sample assessment. The bottle top filters are designed to securely screw onto plastic or glass media bottles. All MF75 series filters are gamma sterilized and individually wrapped in easy-to-open bags.

NALGENE MF75 filter units and bottle top filters are the only products available with the Supor machV membranes.

NALGENE Filtration Products with polyethersulfone (PES) membrane:

- Polyethersulfone (PES), a universal tissue culture membrane
- Fast flow rate
- Our lowest protein binding membrane
- Inherently hydrophilic
- No external wetting agents/surfactants - low extractables
- Better chemical resistance than cellulosic (cellulose acetate, cellulose nitrate) membranes
- NALGENE certified*
- Non-cytotoxic, non-pyrogenic
- Radiation-sterilized

Average Flow Rate for 500 mL Filter Units RPMI 10% CBS



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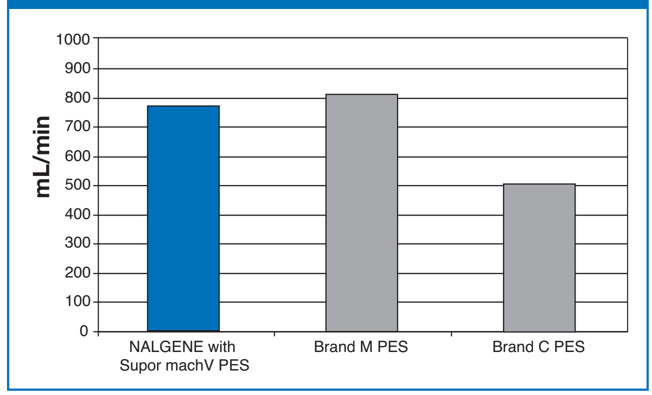
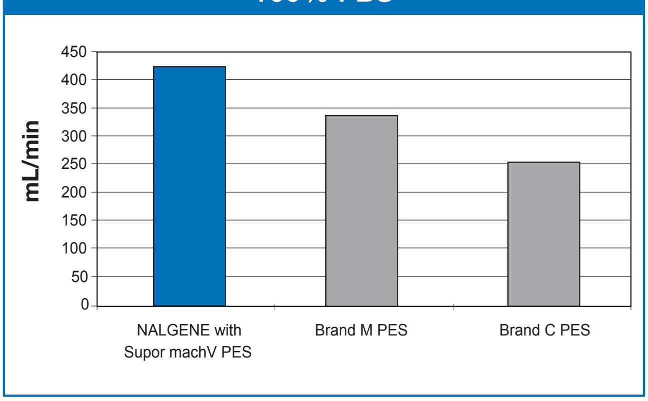


Average Flow Rate for 500 mL Filter Units 100% FBS



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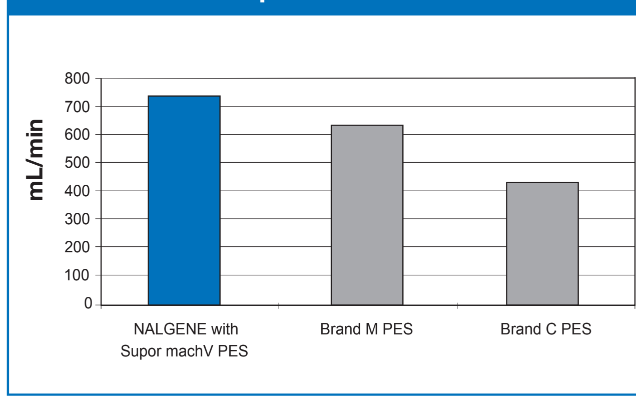


WARNING! All NALGENE Filterware is for research use only, not for *in vitro* diagnosis or parenterals.

171 Syringe Filters, polypropylene housing, cellulose acetate (CA) membrane

For cold sterilization of aqueous solutions, biological or immunological samples. Low protein binding, low extractables. Excellent for small-volume assays such as EIA and ELISA. Sample volume size: 0.5-1.0 ml. Inlet: Female Luer-Lok*; Outlet: Male Luer slip. Non-sterile.

190, 191 Syringe Filters, Modified acrylic housing; cellulose acetate (CA) or surfactant-free cellulose acetate (SFCA) membrane

Cat. No. 190-series are packaged in blister packs. Pore size and membrane type are printed on the unit. Sterile version is certified sterile, non-cytotoxic and non-pyrogenic. Do not autoclave. Sample volume size: 10-50 ml. For cold sterilization of aqueous solutions, biological or immunological samples and cell culture media components. Low protein binding, low extractables. SFCA contains no wetting agents. Inlet: Female Luer-Lok*; outlet: Male Luer-Lok. **Sterile**

195, 196 Syringe Filters, nylon membrane; polypropylene housing

For universal filtration of HPLC and GC solvents and DMSO. Chemically-resistant to a wide range of solvents. Inherently hydrophilic, contain no wetting agents or plasticizers. Low level of extractables. Inlet: Female Luer-Lok*; Outlet: Male Luer slip. Compatible with Zymark® Benchmate™ Systems. Sterile version is certified sterile, non-cytotoxic and non-pyrogenic. Pore size and membrane type printed on unit. Sample volume size: 10-50 ml. **Autoclavable/Sterile**

A

199 Syringe Filters, polypropylene housing; Teflon* PTFE membrane

For filtration of aggressive chemicals, including acids and non-aqueous solvents, such as those used in GC and HPLC. For filtration of air and gases. Wet membrane with alcohol before use with aqueous solutions. Compatible with Zymark® Benchmate™ Systems. Useful for sterile venting with NALGENE reusable filter holders, Cat. Nos. 300, DS0310 and DS0320. Pore size and membrane type printed on unit. Sample volume size: 10-50 ml. Inlet: Female Luer-Lok**; Outlet: Male Luer slip. Non-sterile. **Autoclavable**

A

468 Capsule Filter, (PES) polyethersulfone membrane, polypropylene housing

The low protein binding PES membrane is ideal for cell culture media. 500cm^2 membrane surface area permits rapid filtration of 5 to 50 liters of fluid. Attached 67mm diameter clear filling bell on outlet reduces splatter and helps maintain sterile technique. Vent maximizes recovery of unfiltered fluid and minimizes air locking. Operates with 1/4 turn. Stepped hose barb inlet and outlet fits standard 6-12 mm (1/4-1/2 in.) I.D. diameter tubing. Maximum operating conditions: 72 psi (5 bar) @ 40°C. Catalog number and lot number printed on each capsule for easy reordering and traceability. Each capsule filter is double bagged.

- Used to filter large volumes of media, buffer or salt solutions
- Scale up from the bench top to pre-production or production
- Asymmetric PES membrane gives faster flow than normal PES to quickly and easily process up to 50 liters of fluid **Sterile/Autoclavable**

A

*Luer-Lok is a registered trademark of Becton-Dickinson

Syringe Filter Application Guide

	Cat. No.	Application	Volume	Prefilter/ membrane/housing	Pore size, µm	Memb. dia.,	Filter area	Housing burst pressure (psig/bar)	Bubble Point (psig/bar)	Hold Up Vol., after air purge	Nom. Flow Rate, water at 14.7/1 psig/bar (ml/min.)
	171-0020 Non-sterile bulk-packed	Cleaning of micro/immunological reagents, enzymes, antibodies	0.5-1 ml	C.A. membrane PP housing	0.2	4 mm	7 mm^2	75/5.1	45/3.1	10µm	3
	171-0045 Non-sterile bulk-packed	Prefiltration of micro/immunological reagents	0.5-1 ml	C.A. membrane PP housing	0.45	4 mm	7 mm^2	75/5.1	28/1.9	10µm	10
	176-0020 Non-sterile bulk-packed	Cleaning of aqueous solutions, HPLC solvents, alcohols and DMSO	0.5-1 ml	Nylon membrane PP housing	0.2	4 mm	7 mm^2	75/5.1	40/2.7	10µm	1
	176-0045 Non-sterile bulk-packed	Prefiltration and clarification of aqueous solutions, HPLC solvents, alcohols and DMSO	0.5-1 ml	Nylon membrane PP housing	0.45	4 mm	7 mm^2	75/5.1	29/1.9	10µm	3
S 	180-1320 Sterile individually blister-packed	Sterilization of microbial media, proteinaceous solutions and tissue culture reagents	2-10 ml	PES membrane Modified acrylic housing	0.2	13 mm	0.8 cm^2	75/5.1	35/2.4	20µm	22†
	187-1320 Non-sterile bulk-packed; autoclavable	Cleaning of organic solvents and alcohols; venting of air, gases	2-10 ml	PTFE membrane PP housing	0.2	13 mm	0.8 cm^2	100/7.1	13/0.9	30µm	15††
	187-1345 Non-sterile bulk-packed; autoclavable	Prefiltration and clarification of organic solvents and alcohols; venting of air, gases	2-10 ml	PTFE membrane PP housing	0.45	13 mm	0.8 cm^2	100/7.1	7/0.5	30µm	28††
	189-2000 Non-sterile bulk-packed	Prefiltration and clarification of highly viscous solutions, removal of large particulates	N/A	Glass-Fiber prefilter; Modified acrylic housing from suspensions	N/A	25 mm	5.3 cm^2	75/5.1	N/A	N/A	N/A
S 	190-2520/190-9920 Sterile, individually blister-packed	Sterilization of microbial media, proteinaceous solutions and tissue culture reagents	10-50ml	SFCA membrane Modified acrylic housing	0.2	25 mm	5.3 cm^2	75/5.1	45/3.1	0.25 ml	90
S	190-2545/190-9945 Sterile, individually blister-packed	Prefiltration/clarification of aqueous solutions/alcohols, prefiltration of serum and other proteinaceous samples	10-50ml	SFCA membrane Modified acrylic housing	0.45	25 mm	5.3 cm^2	75/5.1	28/1.9	0.25 ml	180
S 	190-2580 Sterile, individually blister-packed	Prefiltration, serial filtration and clarification of aqueous solutions, serum and alcohols. Removal of cell residues	10-50ml	C.A. membrane Modified acrylic housing	0.8	25 mm	5.3 cm^2	75/5.1	7/0.5	0.25 ml	300
	191-2020 Non-sterile bulk-packed	Cleaning of aqueous and proteinaceous solutions and alcohols	10-50ml	SFCA membrane Modified acrylic housing	0.2	25 mm	5.3 cm^2	75/5.1	45/3.1	0.25 ml	90
	191-2045 Non-sterile bulk-packed	Prefiltration/clarification of aqueous solutions/alcohols, prefiltration of serum and other proteinaceous samples	10-50ml	SFCA membrane Modified acrylic housing	0.45	25 mm	5.3 cm^2	75/5.1	28/1.9	0.25 ml	180
	191-2080 Non-sterile bulk-packed	Prefiltration, serial filtration and clarification of aqueous solutions, serum and alcohols. Removal of cell residues	10-50ml	C.A. membrane Modified acrylic housing	0.8	25 mm	5.3 cm^2	75/5.1	7/0.5	0.25 ml	300
S 	192-2520 Sterile, individually blister-packed	Two-stage filtration (prefilter/membrane) for sterilization of highly viscous solutions and/or with high particle loads	10-200ml	Glass-fiber pre-filter; C.A. membrane modified acrylic housing	0.2	25 mm	5.3 cm^2	75/5.1	45/3.1	0.2 ml	90
S 	194-2520 Sterile, individually blister-packed	Sterilization of microbial media, proteinaceous solutions and tissue culture reagents	10-100 ml	PES membrane Modified acrylic housing	0.2	25 mm	5.3 cm^2	75/5.1	42/2.8	0.15 ml	175†
S 	194-2545 Sterile, individually blister-packed	Sterilization of microbial media, proteinaceous solutions and tissue culture reagents	10-100 ml	PES membrane Modified acrylic housing	0.45	25 mm	5.3 cm^2	75/5.1	30/2.1	0.15 ml	300†
S 	195-2520 Sterile, individually blister-packed	Sterilization of tissue culture media, cleaning of aqueous solutions, HPLC solvents, alcohols and DMSO	10-50ml	Nylon membrane PP housing	0.2	25 mm	2.8 cm^2	90/6.2	42/2.8	0.15 ml	35*
S 	195-2545 Sterile, individually blister-packed	Prefiltration and clarification of aqueous solutions, HPLC solvents, alcohols and DMSO	10-50ml	Nylon membrane PP housing	0.45	25 mm	2.8 cm^2	90/6.2	25/1.7	0.15 ml	95*
	196-2020 Non-sterile bulk-packed; autoclavable	Cleaning of aqueous solutions, HPLC solvents, alcohols and DMSO	10-50ml	Nylon membrane PP housing	0.2	25 mm	2.8 cm^2	90/6.2	42/2.8	0.15 ml	35*
	196-2045 Non-sterile bulk-packed; autoclavable	Prefiltration and clarification of aqueous solutions, HPLC solvents, alcohols and DMSO	10-50ml	Nylon membrane PP housing	0.45	25 mm	2.8 cm^2	90/6.2	25/1.7	0.15 ml	95*
	199-2020 Non-sterile bulk-packed; autoclavable	Cleaning of organic solvents and alcohols, venting of air and other gases	10-50ml	Teflon PTFE membrane; PP housing	0.2	25 mm	2.8 cm^2	90/6.2	15/1.0**	0.25 ml	45**
	199-2045 Non-sterile bulk-packed; autoclavable	Prefiltration and clarification of organic solvents and alcohols, venting of air and gases	10-50ml	Teflon PTFE membrane; PP housing	0.45	25 mm	2.8 cm^2	90/6.2	6/0.4**	0.25 ml	80**
	DS0222-0020 Non-sterile bulk-packed; autoclavable	Cleaning of organic solvents and alcohols, venting of air and other gases	0.2-5L	PTFE membrane; PP housing	0.2	50 mm	20 cm^2	60/4.1	13/0.9**	1.0 ml	5000§
	DS0222-0045 Non-sterile bulk-packed; autoclavable	Prefiltration and clarification of organic solvents and alcohols, venting of air and gases	0.2-5L	PTFE membrane; PP housing	0.45	50 mm	20 cm^2	60/4.1	7/10.5**	1.0 ml	8500§

S Indicates sterile product † at 45 psig/3.1 bar with water †† at 15 psig/1.0 bar with methanol * Water at 13.5 psig ** Isopropanol § Air at 1.4 psig/0.1 bar

Filterware/Chemical Resistance for Membranes and Housings

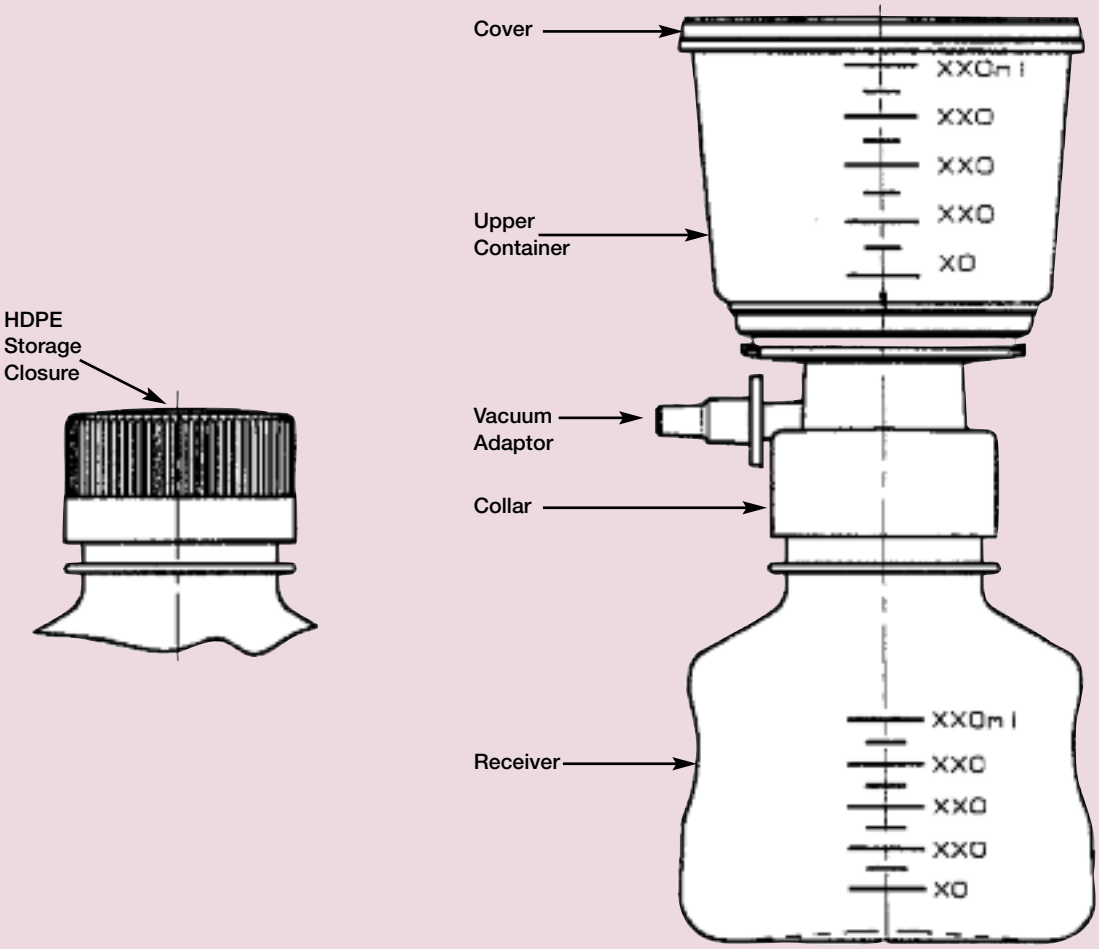
This chemical resistance information is intended as a general guide only. For more complete information, visit our web site. Since actual chemical resistance depends on many variables, such as temperature, pressure and length of exposure, you may want to test under your own conditions.

Key:
- S - Satisfactory
- M - Marginal, may be satisfactory for short-term contact and/or small volume filtration. Trial testing is advised.
- U - Unsatisfactory
- — - No data available
- C.A. - Cellulose acetate
- C.N. - Cellulose nitrate
- SFCA - Surfactant-free cellulose acetate
- GFP - Glass-fiber prefilter
- HDPE - High Density Polyethylene
- NYL - Nylon
- PES - Polyethersulfone
- PTFE - Teflon PTFE
- PS - Polystyrene
- PSF - Polysulfone
- ACR - Acrylic
- PP - Polypropylene

		Membranes						Housings				
	Chemicals	C.N.*	C.A./ SFCA	GFP	NYL	aPES	PTFE	HDPE	PS	PSF	ACR	PP
	Acetic acid, 25 %	S	M	M	M	S	S	S	M	M	M	S
Acids	Acetic acid, 100% (glacial)	U	U	M	M	M	S	S	U	U	U	S
	Formic acid, 25%	S	M	S	U	S	S	S	U	M	M	S
	Formic acid, 100%	M	U	S	U	M	S	S	U	U	U	S
	Hydrochloric acid, 25%	U	U	S	U	S	S	S	S	M	M	S
	Hydrochloric acid, 37% (conc.)	U	U	S	U	S	S	S	M	U	M	S
	Nitric acid, 25%	M	M	M	U	U	S	S	U	M	M	S
	Nitric acid, 60%	U	U	S	U	U	S	M	U	U	U	M
	Phosphoric acid, 25%	S	S	—	U	—	S	S	M	S	M	S
	Sulfuric acid, 25%	S	M	S	U	U	S	S	S	S	S	S
	Sulfuric acid, 98% (conc.)	U	U	M	U	U	S	M	U	U	U	M
Alcohols	Amyl alcohol	S	S	S	S	U	S	S	M	M	M	S
	Benzyl alcohol	M	M	S	S	U	S	M	U	U	U	S
	Ethanol (ethyl alcohol), 70%	M	S	S	S	M	S	M	M	S	U	S
	Ethanol (ethyl alcohol), 98%	U	S	S	S	M	S	S	M	M	U	S
	Ethylene glycol	M	S	S	S	M	S	S	S	S	M	S
	Glycerol	S	S	S	S	M	S	S	S	S	M	S
	Isopropanol	M	S	S	S	M	S	S	S	M	U	S
	Methanol (methyl alcohol), 98%	U	S	S	S	M	S	S	M	M	U	S
	n-Propanol (propyl alcohol)	M	M	S	S	M	S	S	S	M	U	S
	Phenol	U	U	S	S	U	S	U	U	U	U	U
	Propylene glycol	U	M	S	S	M	S	S	S	M	M	S
Bases	Ammonium hydroxide, 25%	U	M	U	S	U	S	S	M	U	S	S
	Ammonium hydroxide, 1N	S	S	S	S	S	S	S	S	S	S	S
	Potassium hydroxide, 1N	U	U	S	S	S	S	S	S	M	S	S
	Sodium hydroxide, 5%	U	M	S	S	S	S	S	S	M	S	S
	Sodium hydroxide, 1N	U	M	S	S	M	S	S	S	S	S	S
	Sodium hydroxide, 6N	U	U	M	M	M	S	S	S	U	S	S
Esters	Amyl acetate	U	M	S	S	U	S	S	U	U	U	S
	Benzyl benzoate	S	S	—	S	U	S	—	U	U	U	M
	Butyl acetate	U	M	S	S	U	S	S	U	U	U	M
	Ethyl acetate, Methyl acetate	U	U	S	S	U	S	S	U	U	U	M
	2-Ethoxyethyl acetate	U	U	S	S	S	S	S	—	U	—	S
	Methyl cellosolve acetate	U	U	S	U	S	S	—	U	U	M	M
	Propyl acetate	U	M	S	S	U	S	S	U	U	U	M
Hydrocarbons (aliphatic)	Gasoline	S	S	S	S	M	S	M	U	U	U	M
	Hexane	S	S	S	S	U	S	S	U	M	M	M
	Kerosene	S	S	S	S	S	S	M	U	M	U	M
Hydrocarbons (aromatic)	Toluene	S	S	S	S	M	S	U	U	U	U	M
	Xylene	S	S	S	S	U	S	M	U	U	U	M
Hydrocarbons (halogenated)	Carbon tetrachloride	S	M	S	S	U	S	S	U	U	U	M
	Chloroform	S	U	S	S	U	S	M	U	U	U	U
	Freon	S	S	S	S	M	S	S	U	U	U	M
	Methylene chloride	M	U	S	S	U	S	M	U	U	U	M
	Monochlorobenzene	S	S	S	S	U	S	U	U	U	U	U
	Perchloroethylene	S	S	S	S	M	S	U	U	U	U	M
	1,1,1-Trichloroethane	M	U	S	S	M	S	M	U	U	U	U
	1,1,2.-Trichloroethane	U	U	S	S	M	S	M	U	U	U	U
	Trichloroethylene	S	S	S	S	U	S	U	U	U	U	M
Ketones	Acetone	U	U	S	S	U	S	U	U	U	U	M
	Cyclohexanone	U	U	S	S	U	S	M	U	U	U	M
	Methyl ethyl ketone	U	U	S	S	U	S	U	U	U	U	M
Miscellaneous	Acetonitrile	U	U	S	S	M	S	S	U	U	U	S
	Acrylamide	S	S	S	S	S	S	S	S	S	S	S
	Dimethylsulfoxide (DMSO)	U	U	S	S	U	S	S	M	U	U	S
	Dioxane	U	U	S	S	M	S	S	U	U	U	S
	Ethyl ether	M	M	S	S	S	S	M	U	U	U	M
	Formaldehyde, 30%	S	M	S	S	S	S	S	U	M	U	S
	Hydrogen peroxide, 30%	U	S	S	S	—	S	S	S	S	M	S
	Methyl cellosolve	U	U	S	S	—	S	—	U	U	U	S
	Pyridene	U	U	S	M	U	S	U	U	U	U	U
	Tetrahydrofuran	U	U	S	S	U	S	M	U	U	U	U

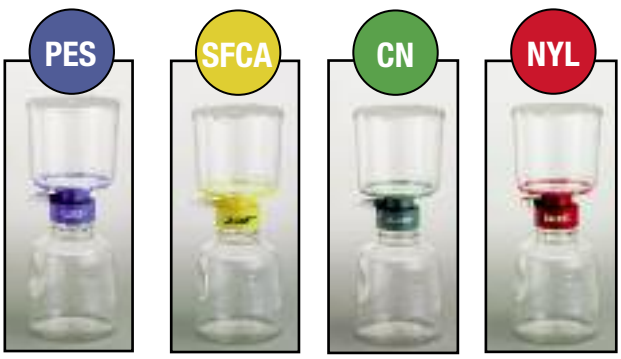
*Do not use C.N. membranes for EDTA or TRIS.

NALGENE®



Filter Units

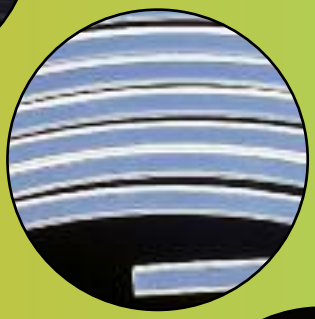
Materials	
Upper Container	PS
Cover	PS
Collar	PS
Receiver	PS
Storage Closure	White HPDE
Adaptor	White LPDE
Gasket	Foamed LPDE
Membrane	Per Catalog ordered
Vent Plug	CA
Pre-Filter	Glass Fiber (156-XXXX & 158-XXXX Only)



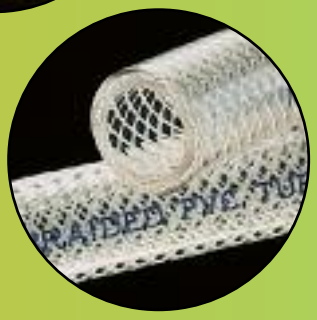
NALGENE® Tubing

General Purpose
NALGENE 180
PVC Tubing

NALGENE 50 Silicone Tubing
Peristaltic Pump Tubing



Chemical Resistant
NALGENE 890 Teflon
FEP & 870 Teflon PFA
Tubing



NALGENE 980
PVC Braided
Tubing

NALGENE Tubing Connectors

NALGENE® Tubing Products include a full range of premium tubing in a wide variety of sizes. Choose from three formulations of clear plastic tubing, manufactured from polyvinyl chloride (PVC). Specialty tubing products include linear low-density polyethylene (LLDPE), polypropylene (PP), Teflon* FEP and PFA, ester-based polyurethane (PUR) and platinum-cured silicone.

NALGENE connectors and accessories are timesaving, easy to use, and most are available in convenient smaller package quantities. The different styles of connectors, valves and fittings are manufactured from high quality food-grade resins.

*Teflon is a registered trademark of DuPont.

Material	ASTM	180	380	980	890	870	50/65	280	489	689
Resin		PVC	PVC	PVC, Reinforced	FEP	PFA	Silicone, Platinum cured	PUR, Ester	LLDPE	PP
Equivalence		Tygon® R-3603	Tygon® B-44-3/ B-44-4X/ S-50-HL	Tygon® B-44-4x I.B.						
Regulatory Compliance		USDA, Food Grade USP VI	USDA, Food Grade, 3-A, NSF-51 USP VI	USDA, Food Grade	USDA, Food Grade	USDA, Food Grade	USDA, Food Grade, 3-A, USP VI	N/A	USDA, Food Grade	USDA, Food Grade
Durometer (Shore)	D2240	55 (A)	65 (A)	65 (A)	58 (D)	60 (D)	50 (A)/65 (A)	85 (A)	50 (D)	75 (D)
Specific Gravity	D792	1.19	1.20	1.20	2.17	2.15	1.15	1.18	0.92	0.90
Operating Tmp. Range (°F)	D789	–25 to 160	–10 to 175	–5 to 180	–103 to 400	–454 to 500	–80 to 450	–70 to 185	–100 to 175	–25 to 250
Operating Tmp. Range (°C)	D2117 D746	–32 to 71	–23 to 79	–21 to 82	–75 to 205	–268 to 260	–62 to 232	–56 to 85	–73 to 79	–4 to 121
Vacuum		Very Low†	Very Low	No Vac.	Full Vac.	Full Vac.	No Vac.	Very Low	Full Vac.	Full Vac.
Sterilization*		Autoclave Gas Chemical	Autoclave Gas Chemical	Gas Chemical	Autoclave Gas Chemical	Autoclave Gas Chemical	Autoclave Gas Chemical Radiation	Gas	Gas Chemical	Autoclave
Tensile Strength, psi	D638 D412	1650	2200	2000	3000	3000	1250	6000	1700	3700
Color		Crystal Clear	Crystal Clear	Clear	Transparent	Transparent	Translucent	Transparent	Translucent	Translucent
Odor		Slight	Slight	Slight	None	None	None	Slight	Slight	None
Taste Imparted		None	None	None	None	None	None	None	None	None
Tear Strength		Good	Good	Very Good	Good	Good	Fair	Excellent	Very Good	Excellent
Bend Radius		4 x O.D.	5 x O.D.	6 x O.D.	8 x O.D.	10 x O.D.	4 x O.D.	6 x O.D	8 x O.D.	10 x O.D.
Elongation, (%)	D638 D412	450	400	350	300	300	750	550	600	200
Flame Resistance	D568	Self-ext.	Self-ext.	Self-ext.	Self-ext.	Self-ext.	Burns	Burns	Slow Burn	Slow Burn
Abrasion Resistance		Very Good	Very Good	Good	Very Good	Very Good	Fair	Excellent	Good	Excellent
Corrosion Resistance		Excellent	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent
Permeability** N_2 O_2 CO_2		0.5 – 2 1 – 6 10 – 35	0.5 – 2 1 – 6 10 – 35	0.5 – 2 1 – 6 10 – 35	20 60 135	18 65 150	2,765 7,960 20,130	0.3 – 5 1 – 10 4 – 25	20 60 280	4 25 90

*STERILIZATION GUIDELINES:

- Autoclaving (121°C, 15 psig for 20 minutes) – Clean and rinse item with distilled water before autoclaving. Certain chemicals which have no appreciable effect on resins at room temperature may cause deterioration at autoclaving temperatures unless removed with distilled water beforehand.
- Gas – ethylene oxide formaldehyde. • Disinfectants – benzalkonium chloride, formalin, ethanol, etc. • Dry Heat – 170°C (338°F).
- Radiation – gamma irradiation at 2.5 Mrad with unstabilized plastic. For additional information, refer to the "Reference/Sterilizing" section of the current NALGENE Labware Catalog or contact Technical Service at Telephone: 1-800-625-4327 or Fax: 1-800-NALGENE, E-mail Technical.nalgene@thermofisher.com (Outside the US: Telephone: +1 585 899 7198; Fax: +1 585 899 7195). In Europe: Telephone: +44 01432.263933; Fax: +44 (0) 1432 376567 (UK). Technical Support Telephone: +32 (0) 1647 0713.

**Permeability (approx.) – Units: $\left\{\frac{\text{cc} - \text{mm}}{\text{sec} - \text{cm}^2 - \text{cm Hg}}\right\} \times 10^{-10}$

†Except 180 PVC Vacuum Tubing

Note: Burial of tubing not recommended. Tubing should be encased in a pipe. For detailed physical and/or chemical properties information, contact Technical Support or visit our website at http://www.NALGENElabware.com.

Tygon and PharMed are registered trademarks of Saint-Gobain Performance Plastics.

Not intended for medical or medical device use.
NALGENE 180 and 980 PVC Tubing contain DEHP [Bis (2-ethylhexyl)] phthalate, a commonly used plasticizer. It is known to the state of California Environmental Protection Agency that this chemical causes cancer or reproductive toxicity.

Material	180	380	980	890	870	50/65	280	489	689
Acids–Weak	E	E	E	E	E	E	F	E	E
Acids–Strong	F	F	F	E	E	G	N	E	E
Alcohol–Aliphatic	G	G	G	E	E	G	N	E	E
Aldehydes	N	N	N	E	E	N	F	G	G
Bases–Weak	E	E	E	E	E	E	G	E	E
Bases–Strong	G	G	G	E	E	G	F	G	G
Esters	N	N	N	E	E	F	N	G	G
Hydrocarbons–Aliphatic	F	F	F	E	E	N	E	F	G
Hydrocarbons–Aromatic	N	N	N	E	E	N	N	F	F
Hydrocarbons–Halogenated	N	N	N	E	E	N	N	N	F
Ketones	N	N	N	E	E	N	N	G	G
Oxidizing Agents–Strong	F	F	F	E	E	G	N	F	F

Before using NALGENE® tubing with a particular chemical, it is strongly advised that you test it under your own conditions. If any doubt exists regarding a particular application, contact Technical Service.

E – 30 days of constant exposure causes no damage.
G – Little or no damage after 30 days of constant exposure to the reagent.
F – Some effect after 7 days of constant exposure to the reagent.
N – not recommended for continuous use.

Material	180	380	980	890	870	50/65	280	489	689
Dairy	X	X						X	
Food & Beverage	X	X				X		X	X
Machinery			X				X	X	X
Dental*	X	X	X						
Office Machines/Computers			X	X	X		X		
Refrigeration		X	X	X	X			X	
Transportation			X				X		
Environmental	X			X	X	X			
Instrumentation	X	X	X				X	X	X
Biotech/Pharmaceutical*	X	X		X	X	X			
Peristaltic Pumps	X	X				X			

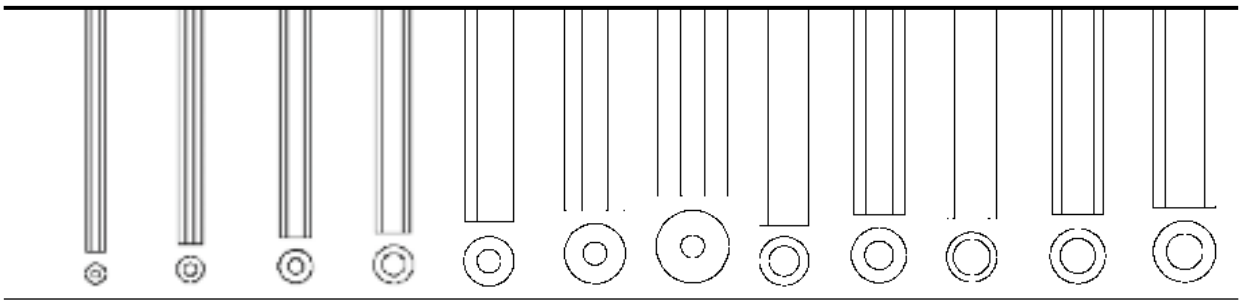
*NALGENE tubing is not a medical device as defined by Class VI criteria set forth in the current US Pharmacopeoia, as amended.

Inches Diameter	180/380/580 Inside ± (in)	980 Inside ± (in)	280/290 Inside ± (in)	489/689 Outside ± (in)	870/890 Outside ± (in)	50/65 Inside ± (in)
1/16 and under 1/8	.003	—	.005	.007	.003	.005
1/8 and under 5/16	.008	.012	.009	.007	.003	.005
5/16 and under 1/2	.010	.012	.012	.007	.004	.008
1/2 and under 3/4	.010	.015	.018	.010	.005	.015
3/4 and under 1 1/8	.015	.015	.025	.015	_	.020
1 1/8 and under 1 3/4	.020	.020	.035	.020	_	_
1 3/4 and under 2 1/2	.031	.031	—	.035	—	—
Wall Thickness						
0 to 1/16	.003	—	.005	.006	.003	.005
1/16 to 1/8	.003	—	.006	.008	.003	.005
1/8 to 1/4	.005	—	.009	—	—	.008
1/4 to 3/8	.010	—	—	—	—	—
3/8 to 1/2	.015	—	—	—	—	—

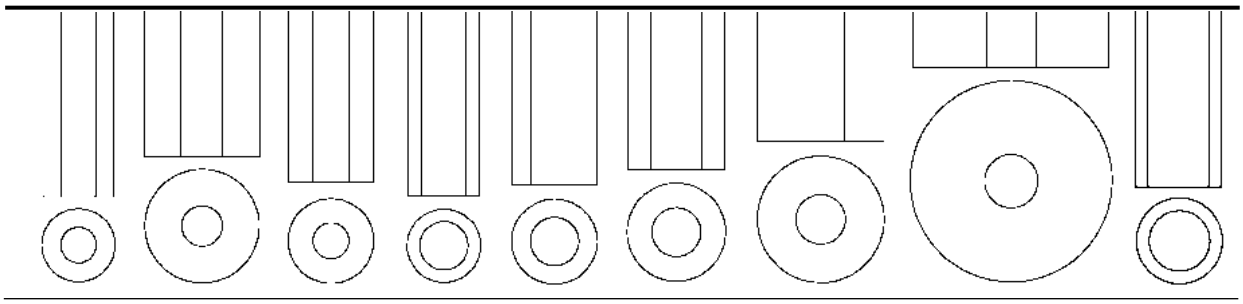
Metric Diameter	180/380/580 Inside ± (mm)	980 Inside ± (mm)	280/290 Inside ± (mm)	489/689 Outside ± (mm)	870/890 Outside ± (mm)	50/65 Inside ± (mm)
1.6 and under 3.2	.08	—	.13	.18	.08	.13
3.2 and under 7.9	.13	.32	.24	.18	.08	.13
7.9 and under 12.7	.20	.32	.32	.18	.10	.21
12.7 and under 19.1	.26	.39	.48	.26	.13	.38
19.1 and under 28.4	.39	.39	.65	.39	_	.50
28.4 and under 44.5	.52	.52	.91	.52	_	_
44.5 and under 63.5	.79	.79	—	.91	—	—
63.5 and under 76.2	1.17	—	—	—	—	—
76.2 and under 101.6	1.58	—	—	—	—	—
Wall Thickness						
0 to 1.6	.08	—	.13	.16	.08	.13
1.6 to 3.2	.08	—	.16	.20	.08	.13
3.2 to 6.4	.13	—	.24	—	—	.21
6.4 to 9.5	.26	—	—	—	—	—
9.5 to 12.7	.39	—	—	—	—	—

Tubing Sizer

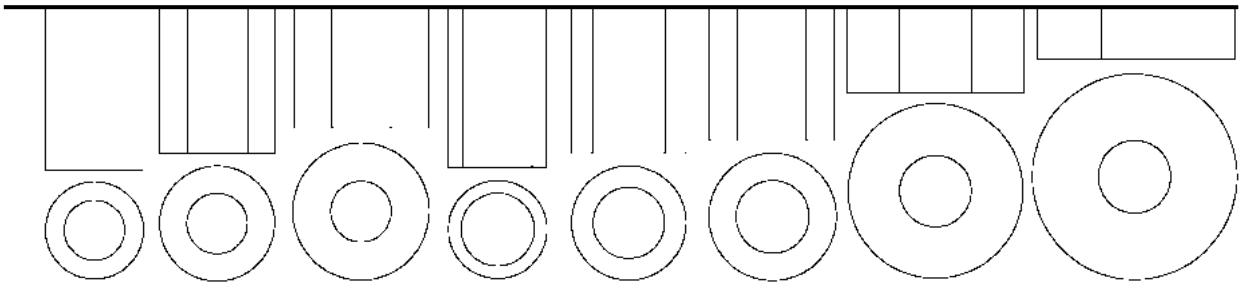
Hold a piece of your current tubing on top of the sizing chart to determine the best size for your needs. This guide includes many of the most popular tubing sizes. For those tubing sizes not listed, please contact Tech Support at: Technical.nalgene@thermofisher.com.



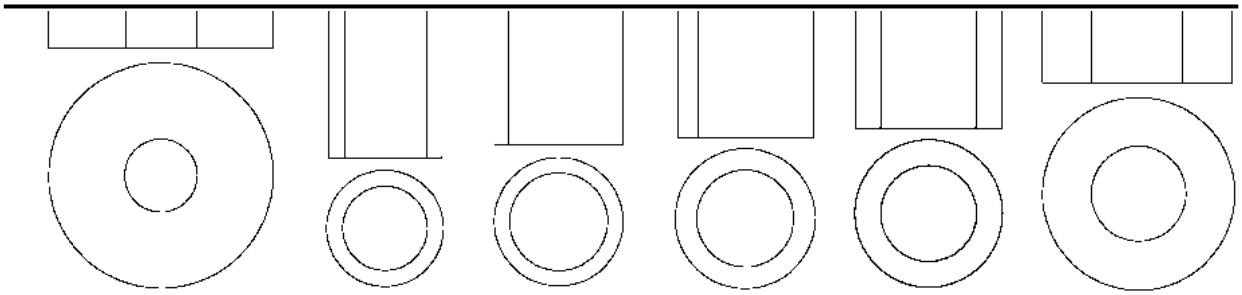
I.D.	1/32" (0.8mm)	1/16" (1.6mm)	3/32" (2.4mm)	1/8" (3.2mm)	1/8" (3.2mm)	1/8" (3.2mm)	1/8" (3.2mm)	5/32" (4mm)	5/32" (4mm)	3/16" (4.8mm)	3/16" (4.8mm)	3/16" (4.8mm)
O.D.	3/32 (2.4)	1/8 (3.2)	5/32 (4)	3/16 (4.8)	1/4 (6.4)	5/16 (7.9)	3/8 (9.5)	1/4 (6.4)	9/32 (7.1)	1/4 (6.4)	9/32 (7.1)	5/16 (7.9)
Wall	1/32 (0.8)	1/32 (0.8)	1/32 (0.8)	1/32 (0.8)	1/16 (1.6)	3/32 (2.4)	1/8 (3.2)	3/64 (1.2)	1/16 (1.6)	1/32 (0.8)	9/64 (1.2)	1/16 (1.6)



I.D.	3/16" (4.8mm)	3/16" (4.8mm)	3/16" (4.8mm)	1/4" (6.4mm)	1/4" (6.4mm)	1/4" (6.4mm)	1/4" (6.4mm)	1/4" (6.4mm)	5/16" (7.9mm)
O.D.	3/8 (9.5)	9/16 (14)	7/16 (11)	3/8 (9.5)	7/16 (11)	1/2 (12.7)	5/8 (15.8)	1 (25.4)	7/16 (11)
Wall	3/32 (2.4)	3/16 (4.8)	1/8 (3.2)	1/16 (1.6)	3/32 (2.4)	1/8 (3.2)	3/16 (4.8)	3/8 (9.5)	1/16 (1.6)

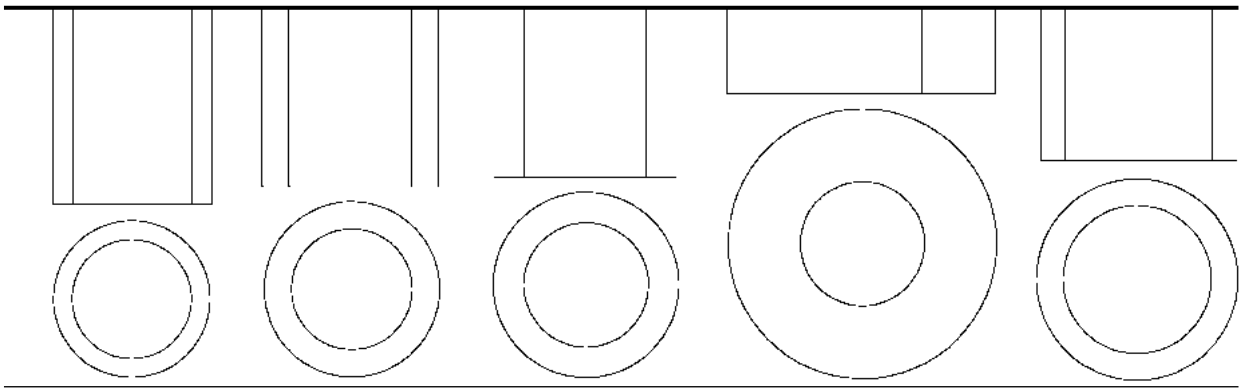


I.D.	5/16" (7.9mm)	5/16" (7.9mm)	5/16" (7.9mm)	3/8" (9.5mm)	3/8" (9.5mm)	3/8" (9.5mm)	3/8" (9.5mm)	3/8" (9.5mm)
O.D.	1/2 (12.7)	9/16 (14)	11/16 (17.4)	1/2 (12.7)	9/16 (14)	5/8 (15.8)	7/8 (22)	1 (25.4)
Wall	3/32 (2.4)	1/8 (3.2)	3/16 (4.8)	1/16 (1.6)	3/32 (2.4)	1/8 (3.2)	1/4 (6.4)	5/16 (7.9)

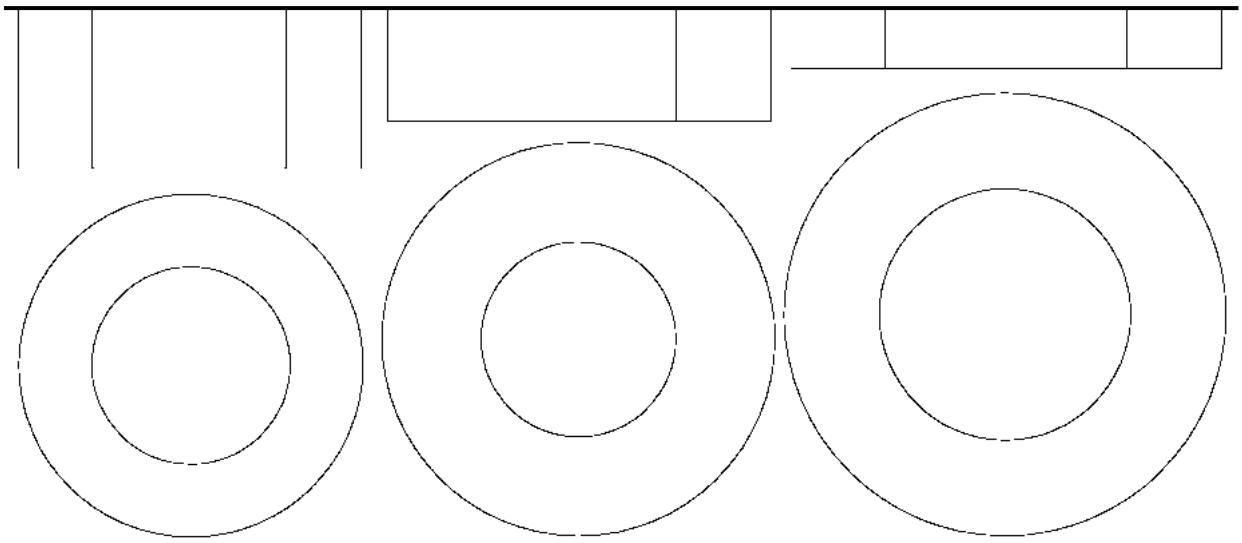


I.D.	3/8" (9.5mm)	7/16" (11mm)	1/2" (12.7mm)	1/2" (12.7mm)	1/2" (12.7mm)	1/2" (12.7mm)
O.D.	1 1/8 (29)	9/16 (14)	5/8 (15.8)	11/16 (17.4)	3/4 (19)	1 (25.4)
Wall	3/8 (9.5)	1/16 (1.6)	1/16 (1.6)	3/32 (2.4)	1/8 (3.2)	1/4 (6.4)

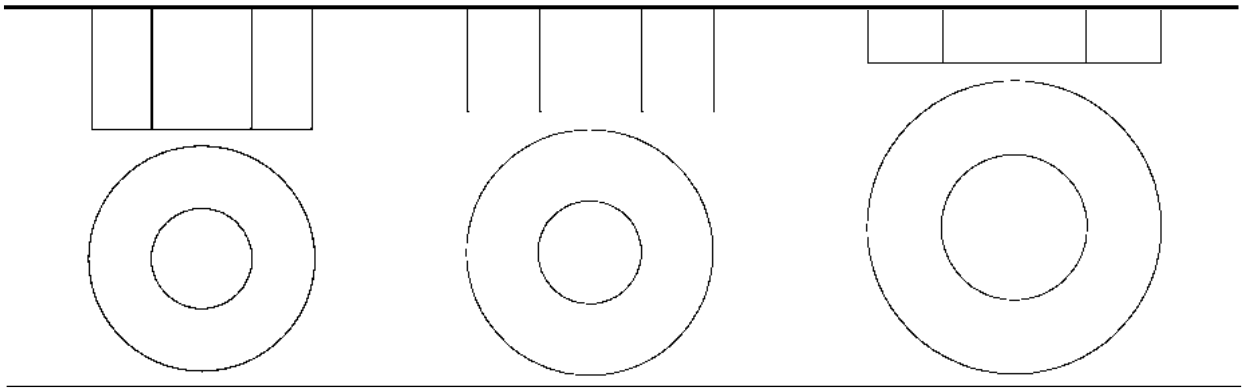
Tubing Sizer, Contd.



I.D.	1/8" (15.8mm)	5/8" (15.8mm)	5/8" (15.8mm)	5/8" (15.8mm)	3/4" (19mm)
O.D.	13/16 (21)	7/8 (22)	15/16 (24)	1 3/8 (35)	1 (25.4)
Wall	3/32 (2.4)	1/8 (3.2)	5/32 (4)	3/8 (9.5)	1/8 (3.2)

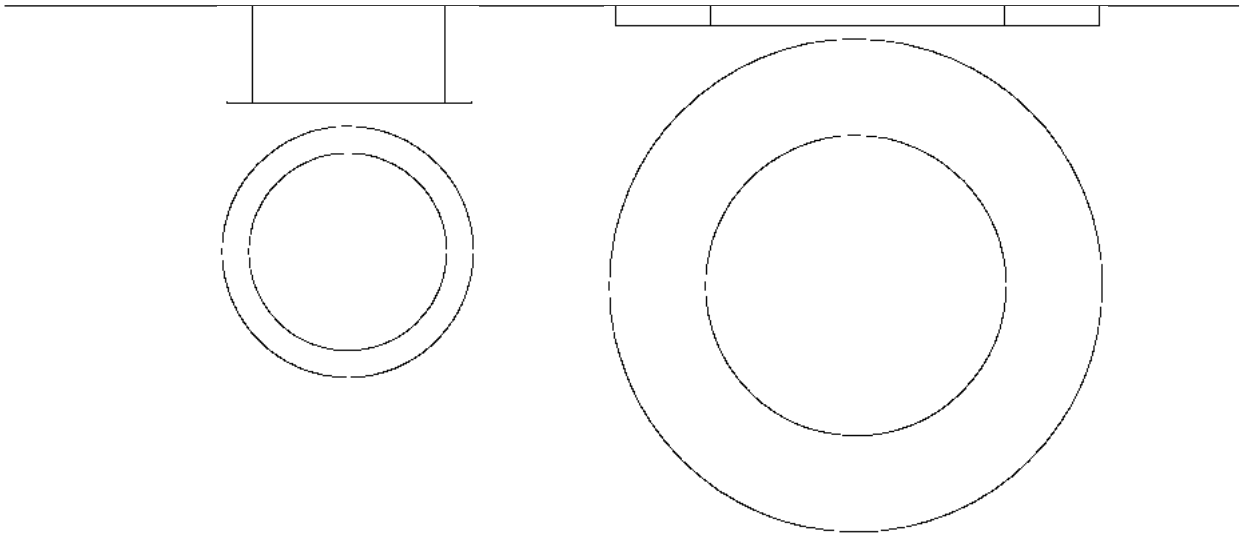


I.D.	1" (25.4mm)	1" (25.4mm)	1 1/4" (32mm)
O.D.	1 3/4 (44.4)	2 (51)	2 1/4 (57.1)
Wall	3/8 (9.5)	1/2 (12.7)	1/2 (12.7)



I.D.	1/2" (12.7mm)	1/2" (12.7mm)	3/4" (19mm)
O.D.	1 1/8 (29)	1 1/4 (32)	1 1/2 (38)
Wall	5/16 (7.9)	3/8 (9.5)	3/8 (9.5)

Tubing Sizer, Contd.



I.D.	1" (25.4mm)	$1^{1}/_{2}$" (38mm)
O.D.	$1^{1}/_{4}$ (32)	$2^{1}/_{2}$ (63.5)
Wall	$^{1}/_{8}$ (3.2)	$^{1}/_{2}$ (12.7)

Reference/Use & Care Guide

The following material includes general guidelines on the use and care of plastic laboratory products. For more information, contact your NALGENE Labware Dealer . NALGENE Technical Support

North America

NALGENE and NUNC
Rochester, NY
Tel: 1-800-625-4327
NALGENE Technical Support
Technical.nalgene@thermofisher.com

Europe

(U.K.)
Tel: +44 (0)1432 263933
Fax: +44 (0)1432 376567
sales@nalgene.co.uk

Other Countries

International Department
NALGENE and NUNC
Rochester, NY USA
Tel: +1-585-899-7198
Fax: +1-585-899-7195
intlmktg@themofisher.com

General Cleaning

NALGENE recommends using non-alkaline detergents for cleaning plastic labware, especially those products made of polycarbonate, which is particularly sensitive to alkaline attack.

NALGENE L-900 Liquid Detergent (Cat. No. 900) is designed to clean all plastics at a neutral pH. A 5% solution in water is usually sufficient but can be increased to 20% for stubborn residue or heavily-soiled labware. L-900 Detergent can be used in automatic washers for lightly- to normally-soiled items.

Soak the labware in the detergent for up to 3 hours, then gently wash with a cloth or sponge. Soak heavily-soiled items in a 5 to 20% concentration in water for 4 or more hours prior to washing. Rinse with tap water and then distilled water.

- Do not use abrasive cleaners or scouring pads on any plastic labware.
- Periodically disassemble and clean spigots and threads on bottles and closures to prevent salt build-up, which can cause leakage.
- Most plastics, particularly the polyolefins (LDPE, HDPE, PP, PMP and PPCO) have non-wetting surfaces that resist attack and are easy to clean.

Dishwashers

Labware washing machines can be used with all resins except LLDPE, acrylic and PS, due to temperature limitations.

Special note on polycarbonate (PC)

Repeated washings in the dishwasher weaken the exceptional strength of PC. PC labware that has been exposed to high stresses (such as those caused by centrifugation or use in vacuum chambers) should always be washed by hand using a mild, neutral pH, non-abrasive detergent without sheeting agents, such as NALGENE L-900.

Keep the dishwasher cycle time to a minimum. Use the plastics cycle and set the water temperature at 135°F (57°C) or lower. Remove the labware as soon as possible after cooling is complete. Avoid excessive abrasion of plastics by covering metal spindles with soft material such as plastic tubing. Plastic labware should be weighted down and held in place with accessory racks.

Ultrasonic Cleaners

Ultrasonic cleaning units may be used to clean labware as long as the labware does not rest directly on the transducer diaphragm.

Special Problems

Greases and Oils

For many applications, washing with a mild detergent will remove greases and oils. When more rigorous cleaning is needed, organic solvents may be used with caution. Extended exposure to these solvents may cause some swelling of polyolefins. Rinse off all solvents before using labware. Use only alcohols on PC, PSF, PS and PVC; other organic solvents will attack these plastics. Do not use organic solvents with acrylic.

Organic Matter

Chromic acid solution will remove organic matter, but will eventually embrittle plastics. To minimize embrittlement, soak plastic for no more than 4 hours. The following formula is the recommended cleaning agent:

Using proper personal protection in a fume hood, dissolve 120 grams of sodium dichromate (Na_2, Cr_2O_7-$2H_2O$) in 1000 ml tap water. Carefully add 1600 mL concentrated sulfuric acid. Note: Because this solution generates considerable heat, we recommend external cooling. Do not mix in a plastic container.

This solution is designed to produce an excess of dichromate in the form of a precipitate which actually extends the useful life of chromic acid and dissolves as needed. This chromic acid solution can be used repeatedly until it begins to develop a greenish color, indicating a loss of potency. As a result of the excess dichromate built into this formula, the solution lasts much longer than commercially-available solutions.

Sodium hypochlorite solutions (bleach) are also effective in removing organic matter. Use at room temperature.

Centrifuge Ware

After centrifugation, loosen pellets by presoaking the tube or bottle overnight in a mild detergent solution (we recommend NALGENE L-900). Do not soak PC centrifuge ware in alkaline detergents. If the pellet contains microbiological or hazardous material, refer to Hazardous Matter section. After soaking, use a pipet or soft rubber policeman to further loosen the pellet. A soft bristle brush may be used if care is taken not to scratch the plastic.

Trace Level Cleaning

Summary of Average Element Content of 12 Plastics and Borosilicate Glass[1]

Material	No. of Elements	Total Conc., ppm	Major Constituents
PS	8 (8 N.D.*)	4	Na, Ti, Al
PSF	16 (12 N.D.)	17	Na, Fe, Ca
TFE	24	19	Ca, Pb/Fe, Cu
LDPE	18	23	Ca, Cl, K
PC	10	85	Cl, Br, Al
PMP	14	178	Ca, Mg, Zn
FEP	25	241	K, Ca, Mg
PVC-tubing	9	280	Fe, Zn, Sb
PP	21	519	Cl, Mg, Ca
HDPE	22	654	Ca, Zn, Si, Al, Na
ETFE	32	1,007	Cl, Pb, Si
PVC-rigid	7 (11 N.D.)	2,541	Sn, Ca, Mg
Borosilicate Glass	14	497,249	Si, B, Na

*N.D. = Not Detected

NOTE: Values listed in the chart above represent typical contents for major constituents. Various grades of plastics may vary from these values.

[1]Selection and Cleaning of Plastic Containers for Storage of Trace Element Samples, John R. Moody and Richard Lindstrom, ANALYTICAL CHEMISTRY, Vol. 49, Page 2264, December 1977.

As the chart "Summary of Average Element Content of 12 Plastics and Borosilicate Glass" shows, for most trace metal analysis, plastic is generally "cleaner" or less contaminated than glass or other materials. However, plastic does contain trace levels of certain metals. To minimize potential low-level contamination, remove these metals or leach them from plastic by soaking in 1N HCl and rinsing in distilled water. For extremely precise work, use HCl, followed by soaking in 1N HNO_3 and rinsing in distilled water. Soaking time may vary according to individual needs, but plastic should be soaked no longer than 8 hours. If more rigorous cleaning is desired, increase the concentration of acids used. **Caution:** concentrated nitric acid is a strong oxidizing agent and will embrittle many plastics.

To remove trace organics which contribute to trace metal absorption, clean plastic surfaces with alcohol, alkalies, alcoholic alkalies or chloroform. A final rinse of 1N HCl also minimizes absorption of trace elements.

Polysulfone (PSF), a resin used in NALGENE centrifuge tubes and reusable filterware, is extremely "cleanable". The following qualification testing was performed on NALGENE PSF centrifuge tubes at The University of Rhode Island Graduate School of Oceanography (URI-GSO).

URI-GSO was determining the concentration of trace metals in atmospheric aerosols and seawater from remote marine locations. They were measuring the input to the Pacific Ocean of heavy metals and other trace elements; pesticide, petroleum and plastic residues; other natural and man-made organic materials, as well as compounds causing acid rain. The trace metal concentrations in the samples were extremely low, so any labware used needed to be extremely cleanable to prevent leaching of contaminant's from the vesels or filtration equipment into the samples. In addition, the labware could not irreversibly adsorb metals from sample solutions. The labware in question included filter holders, which were used during procedures for extracting various trace metals from seawater samples.

The following cleaning procedure was used:

1. One-week soak in 1:1, analytical reagent HCl: deionized water,
2. Deionized water rinse,
3. One-week soak in 1:1, analytical reagent HNO_3: deionized water,
4. Deionized water rinse,
5. One-week soak in 1:1000, quartz redistilled HNO_3: deionized water,
6. Deionized water rinse,
7. One-week soak in 1:1000, quartz redistilled HNO_3: deionized water, and,
8. Deionized water rinse.

This cleaning procedure was generated from the procedures used at URI-GSO, J.R. Moody and R.M. Lindstrom Analytical Chemistry 49:2264 (1977) and conversations with faculty of the California Institute of Technology.

The following test procedure was used:

1. Approximately 25ml 1N quartz redistilled HNO_3 was put into five of the centrifuge tubes.
2. Approximately 25ml of 1 part per billion aluminum, copper, lead and zinc in 1N quartz redistilled HNO_3 was put into the other five centrifuge tubes.
3. The tubes were allowed to stand for one month, and the contents of the tubes were analyzed.

The analyses were performed by atomic absorption spectrophotometry on a Perkin Elmer 5000 equipped with an HGA 5000 utilizing Zeeman background correction. All standards used are traceable back to NBS (National Bureau of Standards).

The results and conclusions were:

1. The 1N quartz redistilled HNO3 had immeasurably low concentrations of metals (e.g., aluminum, copper and lead <0.1 parts per billion; zinc <0.01 parts per billion). **Therefore, once cleaned, polysulfone leaches insignificant amounts of these four metals into solution.**
2. The 1 part per billion aluminum, copper, lead and zinc solutions had, within experimental error, 1 part per billion aluminum, copper, lead and zinc. **Therefore, polysulfone does not adsorb these metals from an acidified solution.**

The analysis of aluminum, copper, lead and zinc involved a two-step extraction procedure. The first, a "liquid/liquid" extraction with an organic complexing agent, removed copper, lead and zinc. The second employed an iron hydroxide co-precipitation technique. Iron nitrate was added to the seawater and the pH was adjusted. Iron hydroxide and aluminum were filtered from the rest of the mixture. This is where the NALGENE reusable filter holders, molded of PSF, were used.

Hazardous Matter

Before labware contaminated with infectious or toxic materials is removed from the work area, it should be sterilized appropriately. Autoclaving is the preferred method for sterilization; however, any method of chemical disinfecting or heat sterilization appropriate for the particular plastic may be used (see below). Liquid waste containing biohazardous materials must always be decontaminated before disposal.

Labware that is contaminated with both biohazardous and radioactive material must first be sterilized. Methods for removing radioactive material depend on the isotope used, its quantity, half-life, material and solubility. For routine decontamination of non-infectious/non-toxic materials, first soak in decontaminant/cleaner for 24 hours at room temperature. Follow with several rinsings in distilled water. To accelerate decontamination, increase the cleaner concentration and solution temperature. Agitation and careful scrubbing with non-abrasive materials will also speed this process. Be particularly careful not to scratch PC. Always dispose of radioactive wastes and effluents properly.

For additional information on handling contaminated labware, contact your Biosafety/Radiation Safety Office, or refer to NIH Biohazards Safety Guide, Laboratory Safety Monograph and Radiation Safety Guide.

How to Remove Rnase or Dnase from Plastic Containers

Rnase, an enzyme that breaks down RNA, and Dnase, which breaks down DNA, are contaminant's that can interfere with nucleotide research. Dnase can be destroyed by autoclaving for 15 minutes at 121°C OR by following any of the procedures listed here. One or more of the following techniques will inhibit or remove Rnase from your plastic container. Match the resin code on the bottom of your NALGENE container with the correct technique.

1. Heat at 180°C for at least 8 hours[1]
2. Rinse in chloroform[1]
3. Soak in a 0.1% aqueous solution of diethyl pyrocarbonate[2] (DEPC) for 2 hours at 37°C; rinse several times with sterile (DEPC-treated) water[†]; heat to 100°C for 15 minutes OR autoclave for 15 minutes at 121°C on a liquid/slow exhaust cycle. (Heating or autoclaving will remove DEPC residues.) Note heating variations in the following chart.
4. Clean equipment with a detergent solution, rinse thoroughly with water and rinse with 95% ethanol to dry. Soak the equipment in a 3% hydrogen peroxide (H_2O_2) solution for ten minutes at room temperature. Rinse the equipment thoroughly with DEPC-treated water[1,3].
5. Soak equipment in 0.1N Sodium Hydroxide (NaOH) in 0.1% EDTA in water overnight and then rinse thoroughly with DEPC-treated water.

[1]Sambrook, J.; Fritsch, E.F.; Maniatis, T.; "Extraction and Purification of RNA"; **Molecular Cloning: A Laboratory Manual, Second Edition**; 7.3, Cold Spring Harbor Laboratory Press (1989).

[2]Caution: DEPC is a suspected carcinogen and should be handled with care. DEPC solutions are irritating to the eyes, mucous membranes and skin.

[3]Titus, David E.; Nucleic Acid Detection, Purification and Labeling; **Rapid Isolation of Total RNA; PROMEGA Protocols and Applications Guide, Second Edition**; pp. 125-126, 203; Promega Corporation (1991).

†DEPC-treated water: Add 0.1% DEPC to water and allow to sit for at least 12 hours at 37°C. Then heat the water to 100°C for 15 minutes or autoclave at 121°C (250°F) for 15 minutes.

RNase Removal Chart - Techniques

Plastic Resin	1(Heat)	2(Rinse)	3(Soak)	4(Soak)	5(Soak)	Comments
ETFE		X	X	X	X	
FEP	X	X	X	X	X	
HDPE		X*	X	X	X	Heat to 100°C for 20 minutes
LDPE		X*	X	X	X	Heat to 70°C for 120 minutes
PC			X+	X+		
PETG			X	X	X	Heat to 60°C overnight
PFA	X	X	X	X	X	
PP/PPCO		X*	X	X	X	
PMP		X*	X	X	X	
HIPS			X	X	X	Heat to 70°C for 120 min.
PVC			X	X	X	Heat to 60°C overnight
TPE			X	X	X	

*Rinse only, no long-term contact
+Rinse copiously to minimize chemical attack

Sterilizing Plastics

Autoclaving

Recommended autoclave cycle is 121°C, 15 psig (1 bar) for 20 minutes.
For best results, use a slow exhaust cycle.

The autoclavability of NALGENE products should be confirmed prior to use. This information can be found in our Reference/Physical Properties Guide on the inside back cover of the NALGENE Labware catalog and at www.NALGENElabware.com

Autoclaving represents one of the most severe application conditions to which NALGENE laboratory products may be subjected. Certain chemicals, which have no appreciable effect on plastics at room temperature, may cause deterioration at autoclaving temperatures. NALGENE recommends carefully cleaning with a neutral pH detergent prior to autoclaving to prevent contaminant's from baking into the surface. After cleaning, rinse thoroughly in distilled water before autoclaving.

NALGENE recommends an autoclave cycle at 121°C, 15 psig (1bar) for 20 minutes. Under these conditions the plastic is very near its Heat Deflection Temperature and any force, weight or pressure bearing on the product can contribute to deformation or collapse.

Plastic vessels and containers cannot be sealed when autoclaving.

For best results, products should be free standing and loosely covered, or with their closures resting on top and the threads must be completely disengaged. During the decompression phase of the autoclaving cycle, the pressure within the vessel must be allowed to equalize. Any material placed over the opening has the potential to cause a vacuum to form, resulting in implosion or collapse.

The following practices should be avoided when autoclaving plastic products.

- Stacking of jars, vessels and carboys.
- Placing the product in an autoclaving basket with other objects on top.
- Tightening of closure prior to cooling.
- Securing the opening with aluminum foil, Blue Steriwrap, gauze, cotton or tape.
- Placing detergent or wetting solutions in containers (except those made of fluoropolymers).

Cycle Times

Plastics transfer heat more slowly than glass or metal and may take longer to reach sterilizing temperatures in the autoclave. Because of differences in heat transfer characteristics between plastics and inorganic materials, the contents of plastic containers may take longer to reach sterilization temperature (121°C). Therefore, longer autoclaving cycles are necessary for liquids in large-volume plastic containers. Adequate cycles can be determined only by experience with specific liquids and containers.

NALGENE recommends autoclaving the carboy empty, sterilizing the media or other liquid by in-line filtration, and then transferring it directly into the sterilized container.

Carboys with spigot must always be autoclaved empty with the spigot removed and disassembled.

- Chemical additives in steam will attack transparent plastics and cause a permanently glazed surface after autoclaving.
- Some transparent plastics may absorb minute amounts of water vapor and appear cloudy after autoclaving. The clouding will disappear as the plastic dries. Clearing may be accelerated in a drying oven at 110°C.
- Use polypropylene copolymer (PPCO) bottles instead of polysulfone (PSF) with Tween in the autoclave.
- Test tube racks filled with tubes must be autoclaved on a flat surface.

Specific Plastic Considerations

Polypropylene, polymethylpentene, polypropylene copolymer, ETFE, FEP and PFA may be autoclaved repeatedly at 121°C, 15 psig. Cycles should be at least 15 minutes to ensure sterility.

Polycarbonate products are autoclavable. They must be thoroughly rinsed before autoclaving because detergent residues cause crazing and spotting. Autoclaving cycles should be limited to 20 minutes at 121°C. PC shows some loss of mechanical strength after repeated autoclaving and therefore may not function well under high-stress applications, such as centrifugation. Our PC vacuum chambers are considered “not autoclavable” for this reason.

Do not use strong alkaline detergents on polycarbonate. Do not use boiler steam containing alkaline chemical additives that may attack the plastic and cause the item to fail.

Polysulfone products are autoclavable. They are somewhat weakened by repeated autoclaving, although less than polycarbonate. If autoclaved repeatedly, polysulfone products will eventually fail under high-stress applications, such as high-speed centrifugation.

NALGENE PVC Tubing can be autoclaved, but ethylene oxide or chemical disinfectant is preferred. If you autoclave it, follow these guidelines:

Clean and rinse tubing thoroughly, including final rinse with distilled or deionized water. Coil tubing loosely and keep ends open. Wrap in muslin or linen; tape or tie loosely. Place on a non-metallic tray in the autoclave so wrapped tubing is not touching wall or rack of autoclave. Do not stack anything on the tubing. Use 15-minute cycle at 121°C, 15 psig. Restore clarity of tubing by drying approximately 2 hours at a temperature no higher than 75°C.

NALGENE Silicone Tubing can be autoclaved for 30 minutes at 121°C, 15 psig in muslin cloth or sterilizing paper.

Products made of the following plastics are not autoclavable under any conditions: polystyrene, polyvinyl chloride (except PVC tubing), styrene acrylonitrile, acrylic, low-density and high-density polyethylene, polyurethane and polyethylene teraphthalate G Copolyester.

Sterilizing – Other Methods

Gas: All of the resins mentioned above may be gas-sterilized (ethylene oxide, formaldehyde). We recommend allowing an appropriate aeration time suited to the particular application before reusing the item.

Chemical Disinfectants: In general, all of the aforementioned plastics can be subjected to commonly-used disinfectants (quaternary ammonium compounds, iodophors, formalin, benzalkonium chloride, ethanol, etc.). There may be some surface attack (crazing) when using a more chemically aggressive disinfectant on the less resistant plastics (PS, SAN, PVC, PC, acrylic, PETG) with prolonged use.

Dry Heat: Dry heat sterilization is recommended only for ACL (acetal or polyoxymethylene), ECTFE (ethylene-tetrafluoroethylene copolymer), ETFE (ethylene-tetrafluoroethylene), FEP (fluorinated ethylene propylene), PPCO (polypropylene copolymer), PC (polycarbonate), PFA (perfluoroalkoxy), PMP (polymethylpentene), PP (polypropylene) and TFE (tetrafluoroethylene). Maximum temperatures and minimum sterilization times at each temperature for each of these resins are given in the following table:

Dry Heat Sterilization

Resins	Temperature	Time
FEP, PFA, PMP*, TFE	170°C (338°F)	60 min.
PSF	160°C (320°F)	120 min.
ECTFE, ETFE	150°C (302°F)	150 min.
	140°C (284°F)	180 min.
PPCO*, PC, PP*	121°C (250°F)	Overnight

*with no load, no stacking

Microwaving: In general, all plastics allow transmission of microwaves. Among commonly-used plastics, PMP and PSF are most transparent to microwaves. We recommend their use when the chemical and temperature resistance of PMP and PSF are compatible with the material to be heated. Use fluoropolymers when aggressive chemicals, such as acids or solvents, are being heated; proper venting is essential. **Closure threads must be completely disengaged before heating bottles or containers in a microwave oven.**

Pre-Sterilized NALGENE Labware

How is the sterility of NALGENE Labware assured?

Some NALGENE labware is sterilized and tested after assembly, and sterility is guaranteed as long as the packaging is intact. Two methods of sterilization are used – ethylene oxide gas and gamma irradiation. Disposable filtration, sterile media bottles and cryogenic products are sterilized following the Association for Advancement of Medical Instrumentation (AAMI) recommended practices.

Ethylene Oxide

Ethylene oxide (EtO) is used for sterilization where low temperature and pressure are necessary (the material to be sterilized cannot be autoclaved). The labware is exposed to EtO in chambers where temperature, humidity and pressure are carefully controlled and monitored. NNI may use three methods to assess the outcome of the EtO procedure. **External color indicators** on the packaging demonstrate exposure to the gas but not sterility. **Biological indicators** are used to evaluate sterility. These indicators are resistant strains of bacterial spores, usually Bacillus subtillis var. niger, whose failure to grow demonstrates the effectiveness of the EtO cycle. **Sterility testing** may be performed on filterware after the sterilization process. As with biological indicators, the criterion for confirming sterility is the absence of microbial growth.

After EtO sterilization, the labware is quarantined until all test results are known. This quarantine period lasts from 7 to 14 days and assures adequate time for the outgassing of EtO and possible residues.

NALGENE labware sterilized by EtO includes syringe units, analytical units and funnels.

Gamma Irradiation

During this procedure, the labware is exposed to high-energy ionizing gamma radiation from a Cobalt 60 source at room temperature. Product sterility is achieved by an accumulated absorbed radiation dosage measured in kilogray (kGy). Dosage levels are selected by a process verification dose experiment, which includes bioburden determination and sterility testing. The sterility of the product is assured by dosimetric release, which confirms that the specified minimum dose has been delivered to the product.

NALGENE labware sterilized by gamma irradiation includes all of our tissue culture filter units, our filter unit receivers, cryoware and PETG bottles.

Other Testing

NALGENE sterile labware products may also undergo testing for bioburden, pyrogens and cytotoxicity. Details on these tests are available from Technical Service. Certification of sterility and compliance with specifications will be supplied upon written request. Write to Quality Assurance Department, Thermo Fisher Scientific, NALGENE® Products, 75 Panorama Creek Drive, Rochester, New York 14625 USA.

[1]All materials (including plastic housings and caps) used in our tissue culture units are tested and shown to be noncytotoxic, using both mouse fibroblast L929 cells and the more sensitive human diploid lung cell line WI-38. Guess, W.L., Rosenbluth, S.A., Schmidt, B., and Autian, J., Agar diffusion method for toxicity screening of plastics on cultured cell monolayers. J. Pharm Sci., 54:1, p 1545-7, 1965.

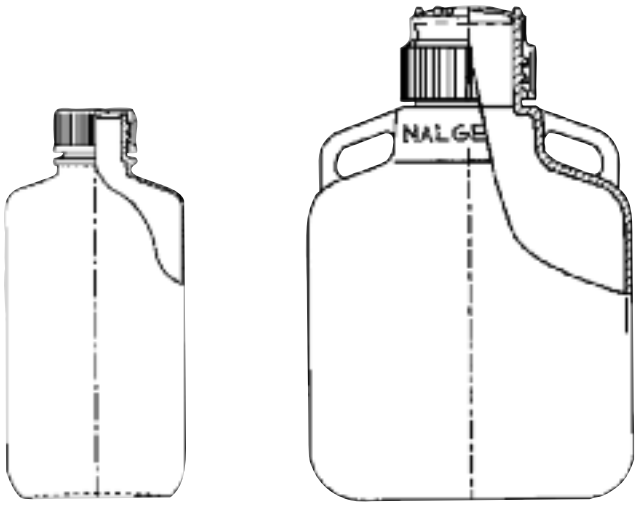
Autoclaving

NALGENE plasticware recommended autoclaving cycle is 121˚C, 15 psig for 20 minutes

For best results use slow exhaust cycle.

Autoclavable resins include:

- Polycarbonate*
- Polymethylpentene
- Polypropylene
- Polypropylene Copolymer
- Polysulfone
- PVC (tubing)**
- Silicone tubing
- Teflon FEP
- Teflon PFA



NALGENE recommends the following autoclave cycle of 121˚C, 15 psi for 20 minutes. In order to ensure proper sterilization of internal and external container surfaces, containers should not have a closure or any other obstruction over the container opening. Clean and rinse item with distilled water before autoclaving. Certain chemicals will be compatible with resins at room temperature, but could cause deterioration at autoclaving temperatures. Tubing should be coiled and flat.

Avoid these practices when autoclaving plastic products:

1. **Do Not** stack jars, bottles, and carboys
2. **Do Not** place the product in an autoclaving basket with other objects placed on top
3. **Do Not** tighten the closure – removing closure is better
4. **Do Not** place aluminum foil, gauze, cotton, tape or steri-wrap over the opening

The above guidelines are for empty containers. NALGENE does not provide any validation information on autoclaving with liquid inside any of our products. The consumer must perform all validation work.

Do to our inability to control all of the variables involved in autoclaving, NALGENE does not make any statement on the autoclavable life expectancy of our products.

Plastic Resin Information

The Environmental Impact of NALGENE Products

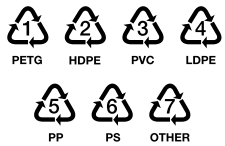
NALGENE is very sensitive to the impact its products and packaging have on the environment and has taken several steps to make them more environmentally friendly:

- We review all new NALGENE products for environmental impact, recyclability and reusability.
- We review all packaging in an effort to reduce packaging and improve recyclability.
- We only use packaging peanuts made without CFCs (chlorofluorocarbons) and we reuse the peanuts that we receive when we ship our own products.
- We have eliminated the use of heavy-metal-based colorants in products produced at NALGENE Rochester.
- We offer a complete line of reusable products designed to eliminate the amount of waste released into the waste stream. For nearly every disposable NALGENE product, there is an equivalent reusable product available. Your rep can help you choose the appropriate reusable equivalent, or you can call Technical Support at 1-800-625-4327 or email Technical.nalgene@thermofisher.com. International customers, contact our International Department at +1 585-899-7198, Fax +1 585-899-7195, intlmktg@thermofisher.com. In Europe, contact us at Tel +44 (0) 1432 263933, Fax +44 (0) 1432 376567, sales@nalgene.co.uk.

Recycling NALGENE Products and Packaging

The recycling process involves sorting plastic products by resin type for reclamation and using them to produce high-quality recycled resins for use as raw material in new products.

To make that easier, the Society of the Plastics Industry (SPI) has developed a system to identify the types of plastics used in plastic containers. At least 36 states have enacted legislation requiring these codes, which immediately identify the resin to recyclers. Each resin NNI uses has been assigned a specific number.



NOTE: The number 7 has been assigned to “OTHER” resins. We do not use the word “OTHER”. Instead, we indicate the specific resin used to help identify the bottle material.

This code has been molded into the base of all NALGENE injection- and extrusion-blow-molded bottles and containers greater than 500 ml, as well as all filter products.

CAUTION: Does not imply that the bottle may be recycled or disposed of in the general waste stream after use. Follow appropriate decontamination and disposal procedures when the bottle has been in contact with hazardous or infectious materials.

Reusing or Disposing of NALGENE PETG Media Bottles

PETG bottles can be reused after storing tissue culture media, buffers or other biologicals. To be sure that the container is made of PETG, check the bottom for one or both of these marks: the letters “PETG”; the recycling symbol:

(For more information on recycling codes, see “The Environmental Impact of NALGENE Products”.)

First, the bottles must be disinfected. UV light can be used, but imparts a slight yellow cast. Place uncapped (caps facing upward to expose inside surface) approximately 20 inches below a 30-watt Germicidal UV lamp for at least one hour. Ethylene oxide (EtO) gas is also acceptable. PETG bottles and their HDPE closures can also be sterilized using a concentration (1:1 in sterile water) or a 1:10 (in sterile water) dilution of sodium hypochlorite (bleach or Clorox*). Bottles should be exposed to the bleach for at least 5 minutes.

CAUTION: Do not use phenolic-based disinfectants such as Lysol** or O-Syl**. These will chemically attack the bottles.

For disposal, PETG bottles should first be disinfected. Autoclaving in a proper container or bag will melt the bottles for incineration. Properly burned, PETG produces only CO_2 and H_2O.

PETG bottles can also be recycled with consumer PET products, such as soft drink bottles. They should first be disinfected using chemicals or autoclaving.

*Registered trademark of Clorox Company

**Registered trademark of National Laboratories

Chemical Resistance

Interpretation of Chemical Resistance

The Chemical Resistance Chart and Chemical Resistance Summary Chart that follow are general guidelines only. Because so many factors can affect the chemical resistance of a given product, you should test under your own conditions. If any doubt exists about specific applications of NALGENE products, please contact Technical Service, Thermo Fisher Scientific, NALGENE and NUNC Products, 75 Panorama Creek Drive, Rochester, New York 14625-2385, or call (800) 625-4327, Fax (800) 625-4363. Email us at Technical.nalgene@thermofisher.com. International customers, contact our International Department at +1 (585) 899-7198, Fax +1 (585) 899-7195. Email us at intlmktg@thermofisher.com. In Europe, contact us at +44 (0) 1432 263933, Fax +44 (0) 1432 376567.

Additional Chemical Resistance Information

This chemical resistance chart is to be used only for NALGENE labware including containers up to 50L. For NALGENE centrifugeware please refer to those charts for use with NALGENE brand products only. The guidelines should not be applied to products from other manufacturers.

For chemical resistance of PETG (polyethylene terephthalate copolyester), see below.

For NALGENE fluorinated containers, including fluorinated high-density polyethylene (FLPE) and fluorinated polypropylene (FLPP), see inside back cover.

Effects of Chemicals on Plastics

Chemicals can affect the strength, flexibility, surface appearance, color, dimensions or weight of plastics. The basic modes of interaction which cause these changes are: (1) chemical attack on the polymer chain, with resultant reduction in physical properties, including oxidation; reaction of functional groups in or on the chain, and depolymerization; (2) physical change, including absorption of solvents, resulting in softening and swelling of the plastic; permeation of solvent through the plastic,and dissolution in a solvent, and (3) stress-cracking from the interaction of a "stress-cracking agent" with molded-in or external stresses. Also see "Chemical Resistance Classification".

The reactive combination of compounds of two or more classes may cause a synergistic or undesirable chemical effect. Other factors affecting chemical resistance include temperature, pressure and internal or external stresses (e.g., centrifugation), length of exposure and concentration of the chemical. As temperature increases, resistance to attack decreases.

Mixing and/or dilution of certain chemicals in NALGENE labware can be potentially dangerous. The reactive combination of different chemicals or compounds of two or more classes may cause an undesirable chemical effect or result in an increased temperature which can affect chemical resistance (as temperature increases, resistance to attack decreases). Other factors affecting chemical resistance include pressure and internal or external stresses (e.g., centrifugation), length of exposure and concentration of the chemical.

Environmental Stress-Cracking

Environmental stress-cracking is the failure of a plastic material in the presence of certain types of chemicals. This failure is not a result of chemical attack. Simultaneous presence of three factors causes stress-cracking: tensile strength, a stress-cracking agent and inherent susceptibility of the plastic to stress-cracking.

Common stress-cracking agents are detergents, surface active chemicals, lubricants, oils, ultra-pure 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 dilution of certain chemicals may result in reactions that produce heat and can cause product failure. Pre-test your specific usage and always 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 volumes of solvents which may legally be stored in an enclosed area.

Caution

Do not store strong oxidizing agents in plastic labware except that made of FEP or PFA. Prolonged exposure causes embrittlement and failure. While prolonged storage may not be intended at time of filling, a forgotten container will fail in time and result in leakage of contents. Do not place any plastic labware in a flame.

Visit
www.NALGENElabware.com
to access an extensive, online chemical compatibility database.

Resin Codes:

Code	Resin
ECTFE	Halar ECTFE* (ethylene-chlorotrifluoroethylene copolymer)
ETFE	Tefzel ETFE† (ethylene-tetrafluoroethylene)
FEP	Teflon FEP† (fluorinated ethylene propylene)
HDPE	high-density polyethylene
FLPE	fluorinated polyethylene
LDPE	low-density polyethylene
PC	polycarbonate
PEI	polyetherimide
PETG	polyethylene terephthalate copolymer
PFA	Teflon PFA† (polyfluoroalkoxy)
PMMA	polymethyl methacrylate (acrylic)
PMP	polymethylpentene
PP	polypropylene
PPCO††	polypropylene copolymer
PS	polystyrene
PSF	polysulfone
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
RESMER	RESMER manufacturing technology
SAN	styrene acrylonitrile
TFE	Teflon TFE† (tetrafluoroethylene)
TMX	Thermanox
PMX	Permanox
XLPE	cross-linked high-density polyethylene

*Halar is a registered trademark of Solvay Solexis
†Teflon and Tefzel are registered trademarks of DuPont.
††PPCO has replaced polyallomer (PA) in all products.

	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE	
CHEMICAL	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
1,4-Dioxane, pure	G	F	G	G	N	N	G	F	F	N	-	-	E	E	E	E	E	E	E	F	E	F
2,2,4-Trimethylpentane, pure	F	N	F	N	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	G	E	G
2,4,6-Trinitrophenol, pure	N	N	N	N	N	N	N	N	E	E	-	-	E	E	E	E	E	E	G	F	G	F
2-Methoxyethanol, pure	E	G	E	E	G	F	E	E	E	E	F	N	E	E	E	E	E	E	E	G	E	E
2-Propanol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E
Acetaldehyde, pure	G	N	G	F	G	N	G	N	G	N	-	-	E	E	E	E	E	E	G	F	E	E
Acetamide, saturated	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E
Acetic Acid, 5%	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	E	E	E	E	E	E	E

	PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
CHEMICAL	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
1,4-Dioxane, pure	N	N	N	N	N	N	N	N	N	N	E	E	F	N	N	N	N	N	-	-	F	N	N	N
2,2,4-Trimethylpentane, pure	N	N	N	N	N	N	G	F	N	N	G	F	G	F	-	-	-	-	-	-	-	-	E	E
2,4,6-Trinitrophenol, pure	N	N	N	N	N	N	N	N	G	F	N	N	G	F	-	-	E	E	-	-	G	N	G	N
2-Methoxyethanol, pure	N	N	F	N	F	N	N	N	N	N	E	E	G	F	-	-	N	N	-	-	-	-	E	E
2-Propanol, pure	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
Acetaldehyde, pure	N	N	N	N	N	N	N	N	N	N	G	F	G	G	N	N	N	N	N	N	N	N	N	N
Acetamide, saturated	N	N	N	N	N	N	N	N	E	E	G	G	E	E	-	-	E	E	E	-	E	E	G	N
Acetic Acid, 5%	E	G	E	F	E	G	E	E	E	G	E	E	E	E	E	F	E	E	E	E	E	E	E	E

E - No damage after 30 days of constant exposure. G - Little or no damage after 30 days of constant exposure. F - Some effect after 7 days of constant exposure. N - Immediate damage may occur. Not recommended for continuous use.

CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Acetic Acid, 50%	G	F	E	G	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	G	E	E	G	F	E	N	F	N	E	E	G	G	E	G	G	G	N	N	E	F	G	F	E	E	E	E
Acetic Acid, Glacial	G	N	G	G	E	G	E	G	G	G	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	N	N	N	E	E	F	N	G	G	F	N	N	N	N	N	N	N	F	N	E	G
Acetic Anhydride, pure	N	N	F	F	G	F	G	F	E	G	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	N	N	N	N	N	N
Acetone, pure	G	N	N	N	F	N	N	N	E	E	N	N	E	E	E	E	E	E	E	G	G	N	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	N	N	N	N	N
Acetonitrile, pure	E	E	E	E	E	G	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	E	E	F	N	N	N	N	N	-	-	N	N	G	G
Acetophenone, pure	N	N	F	F	F	N	F	N	G	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	G	G	F	N	N	N	N	N	-	-	-	-	N	N
Acrylonitrile, pure	E	E	E	E	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	E	E	F	N	-	-	-	-	-	-	E	E	G	N
Adipic Acid, pure	E	G	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	G	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Alanine, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	G	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	G	N
Allyl Alcohol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	G	E	N	G	N	G	F	G	F	E	E	E	E	N	N	N	N	-	-	E	E	E	G
Aluminum Chloride, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	G	G	E	E	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E
Aluminum Hydroxide, pure	E	G	E	E	E	G	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	G	G	G	G	G	E	E	E	E	-	-	G	G	-	-	E	E	E	E
Aluminum Salts, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	G	E	E	E	G	E	E	E	E	-	-	E	G	-	-	E	E	E	E
Amino Acids, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	G	N
Ammonia, 25%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	N	G	F	E	G	E	G	F	F	E	G	E	-	E	G	G	F	E	E	N	N
Ammonia, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	E	G	F	G	F	E	G	F	F	E	G	E	-	E	G	G	N	E	E	N	N
Ammonium Acetate, saturated	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	G	E	E	G	N	E	E	E	E	E	E	E	E	-	-	E	E	-	-	-	-	E	E
Ammonium Chloride, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	G	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E
Ammonium Glycolate, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	F	G	G	E	E	E	E	E	E	-	-	E	E	-	-	-	-	E	E
Ammonium Hydroxide, 5%	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	G	G	G	E	F	F	F	E	G	E	-	E	E	E	G	E	E	E	E
Ammonium Hydroxide, 30%	E	G	E	E	E	G	E	G	E	G	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	E	G	F	G	G	G	F	F	F	E	G	E	-	E	G	G	N	E	E	E	E
Ammonium Oxalate, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Ammonium Salts, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	G	E	E	E	G	E	E	G	G	E	E	E	E	-	-	E	G	-	-	E	E	E	E
Amyl Alcohol, pure	E	E	E	E	E	F	E	E	G	F	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	N	G	N	E	E	G	F	E	E	E	E	N	N	E	N	E	E	E	E	E	E
Amyl Chloride, pure	N	N	F	N	N	N	N	N	F	F	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	G	F	F	N	-	-	N	N	-	-	N	N	E	E
Aniline, pure	E	G	G	F	E	G	G	F	G	F	-	-	E	E	E	E	E	E	G	N	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	E	E	F	N	E	F
Aqua Regia, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	-	-	G	N	N	N	N	N	G	N
Arsenic Acid, pure	G	F	E	E	E	E	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	-	-	E	E	E	E	E	E	-	-	-	-	-	-	E	E	E	E
Benzaldehyde, pure	E	G	G	N	E	G	E	G	E	F	-	-	E	E	E	E	E	E	E	F	E	F	N	N	N	N	N	N	F	N	N	N	G	N	F	N	N	N	N	N	F	N	N	N	F	N
Benzenamine, pure	E	G	G	F	E	G	G	F	G	F	-	-	E	E	E	E	E	E	G	N	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	-	-	F	N	E	F
Benzene, pure	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	N	N	N	E	E
Benzoic Acid, saturated	E	E	E	E	E	G	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	G	F	F	G	G	E	E	G	G	E	E	E	E	-	-	N	N	E	E
Benzol, pure	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	N	N	N	E	E
Benzyl Acetate, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	G	E	G	F	N	N	N	N	N	N	N	N	N	E	E	F	N	-	-	N	N	-	-	-	-	-	-
Benzyl Alcohol, pure	N	N	F	N	G	G	N	N	G	G	N	N	E	E	E	E	E	E	E	E	E	E	N	N	G	F	F	N	N	N	N	N	G	G	F	N	N	N	G	N	-	-	-	-	E	E
Boric Acid, pure	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	-	-	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Bromine, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	F	N	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	N	G	G	N	N	E	E
Bromobenzene, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	N	E	F	N	N	N	N	N	N	N	N	N	N	F	F	F	N	-	-	N	N	-	-	-	-	E	E
Bromoform, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	F	E	F	N	N	N	N	N	N	N	N	N	N	F	F	F	N	-	-	N	N	N	N	-	-	E	E
Butadiene, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	F	N	N	N	N	N	N	N	G	F	G	F	-	-	N	N	-	-	-	-	E	E
Butyl Acetate, pure	G	F	G	F	F	N	G	F	F	F	-	-	E	E	E	E	E	E	E	G	E	G	N	N	E	N	N	N	N	N	N	N	E	G	-	-	N	N	N	N	G	N	F	N	F	N
Butyl Chloride, pure	N	N	N	N	N	N	N	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	F	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	-	-	E	E
Butyric Acid, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	N	N	N	G	G	N	N	F	N	N	N	N	N	N	N	-	-	N	N	E	E
Calcium Chloride, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E
Calcium Hydroxide, concentrated	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	G	G	G	G	G	F	F	E	G	F	N	E	E	N	N	E	E	E	E
Calcium Hypochlorite, saturated	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	F	N	E	E	E	G	F	F	E	G	E	-	E	E	E	G	G	G	E	E
Carbazole, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	E	E	E	E	E	E	-	-	E	E	-	-	-	-	-	-
Carbon Disulfide, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	F	E	G	N	N	N	N	N	N	N	N	N	N	N	N	-	-	N	N	N	N	-	-	N	N	G	N
Carbon Tetrachloride, pure	F	N	G	F	G	F	N	N	N	N	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	N	N	N	N	N	N	N	E	G	F	N	N	N	F	N	E	-	N	N	E	E

E - No damage after 30 days of constant exposure.

G - Little or no damage after 30 days of constant exposure.

F - Some effect after 7 days of constant exposure.

N - Immediate damage may occur. Not recommended for continuous use.

CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Caustic Potash, 30%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	E	G	N	E	G	G	G	F	F	E	G	E	-	E	E	G	F	E	E	E	G
Caustic Potash, 50%	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	F	E	G	F	F	E	G	E	N	E	G	G	F	E	E	N	N
Caustic Potash, concentrated	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	F	G	G	F	F	E	G	E	N	E	G	G	F	E	E	E	G
Caustic Soda, 1%	E	E	F	F	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	F	E	E	E	E	N	N	E	G	E	E	E	E	E	G	E	E	E	E
Caustic Soda, 50%	G	G	G	F	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	G	E	G	N	N	E	G	E	N	E	G	G	F	E	E	N	N
Caustic Soda, concentrated	G	G	G	F	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	G	E	G	N	N	E	G	E	N	E	G	G	F	E	E	N	N
Cedarwood Oil, pure	N	N	F	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	G	G	F	F	N	N	N	F	F	N	N	-	-	E	E	-	-	G	F	E	E	-	-	E	E
Cellosolve Acetate, pure	E	G	E	E	F	N	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	G	F	N	E	N	N	N	N	N	N	N	E	E	-	-	-	-	N	N	-	-	-	-	E	G
Chlorine, water solution	G	N	G	G	F	N	F	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	E	G	N	N	F	N	G	G	F	N	F	N	F	N	F	N	E	N	E	E
Chlorine, wet gas	G	N	G	F	F	N	F	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	G	F	N	N	F	N	N	N	N	N	G	F	-	-	F	N	N	N	F	N	F	N	E	E
Chlorine Wet Gas, 10%	G	N	G	F	F	N	F	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	G	F	N	N	F	N	N	N	N	N	G	F	-	-	F	N	G	G	G	F	G	F	E	E
Chlorine, Dry Gas, 10%	G	N	E	F	F	N	G	N	G	N	-	-	E	E	E	E	E	E	E	E	E	E	E	G	N	N	E	G	N	N	N	N	E	F	-	-	F	F	G	G	G	F	G	F	E	E
Chloroacetic Acid, pure	E	E	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	N	N	N	N	G	N	E	E	G	F	N	N	N	N	-	-	N	N	N	N
Chlorobenzene, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	F	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	N	N	E	E
Chloroform, pure	F	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	F	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	N	N	N	N	E	G
Chromic Acid, 10%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	G	E	N	E	G	E	G	E	E	E	G	F	N	E	G	E	G	E	E	E	E
Chromic Acid, 20%	E	E	E	E	G	G	G	F	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	N	N	G	N	N	N	G	G	E	E	G	G	N	N	E	G	F	N	E	E	E	E
Chromic Acid, 50%	E	E	E	E	G	F	G	F	G	G	-	-	E	E	E	E	E	E	E	E	E	E	F	N	N	N	G	N	N	N	F	N	E	E	F	N	N	N	F	F	N	N	E	G	E	G
Chromic Acid: Surfuric Acid Mixture, 96%	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	F	E	G
Cinnamon Oil, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	G	F	N	N	N	N	F	F	N	N	-	-	E	E	-	-	N	N	E	E	-	-	-	-
Citric Acid, 10%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E	E	E
Citric Acid, 1M	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E	E	E
Copper Sulfate, pure	E	E	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E
Cresol, pure	N	N	F	N	G	F	G	F	N	N	-	-	E	E	E	E	E	E	E	G	E	E	N	N	N	N	N	N	F	N	G	G	F	N	N	N	N	N	-	-	E	N	E	G	E	G
Cyclohexane, pure	F	N	F	N	G	N	F	N	N	N	G	N	E	E	E	E	E	E	E	G	E	E	F	N	N	N	N	N	N	N	G	F	G	F	G	-	F	N	E	E	N	N	E	E	N	E
Cyclohexanone, pure	N	N	F	N	F	N	F	N	G	F	N	N	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	-	-	N	N	G	N	E	E
Cyclopentane, pure	N	N	F	N	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	F	N	N	N	N	N	N	N	G	F	G	F	-	-	-	-	-	-	-	-	E	E
Decahydronaphthalene, pure	G	F	E	G	N	N	G	F	F	N	-	-	E	E	E	E	E	E	E	E	E	E	E	-	E	G	N	N	N	N	N	N	E	E	F	N	N	N	E	E	-	-	-	-	-	-
Decalin, pure	G	F	E	G	N	N	G	F	F	N	-	-	E	E	E	E	E	E	E	E	E	E	E	-	E	G	N	N	N	N	N	N	E	E	F	N	N	N	E	E	-	-	-	-	-	-
Diacetone, pure	N	N	N	N	G	F	G	F	F	F	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	-	-	-	-	N	N
Diacetone Alcohol, pure	F	N	E	E	G	F	E	F	E	E	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	E	F	E	E	E	G	N	N	N	N	-	-	-	-	F	N
Dibutyl Phthalate, pure	F	N	F	N	G	N	-	-	G	G	-	-	E	E	E	E	E	E	G	N	E	G	G	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	G	F	F	F	N	N
Diethyl Benzene, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	E	F	N	N	N	N	N	N	N	N	N	G	F	F	N	-	-	-	-	-	-	-	-	E	E
Diethyl Ether, pure	N	N	F	N	F	N	N	N	N	N	E	-	E	E	E	E	E	E	E	G	E	E	N	N	E	N	N	N	N	N	N	N	G	F	-	-	N	N	N	N	E	-	N	N	E	G
Diethyl Ketone, pure	N	N	N	N	G	G	G	G	G	F	-	-	E	E	E	E	E	E	G	F	G	F	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	-	-	F	N	N	N
Diethyl Malonate, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	F	N	G	N	N	N	F	F	N	N	E	E	-	-	-	-	N	N	-	-	-	-	N	N
Diethylamine, pure	N	N	F	N	G	N	G	N	F	F	-	-	E	E	E	E	E	E	E	N	E	G	N	N	N	N	N	N	G	F	G	G	N	N	E	G	-	-	-	-	E	-	-	-	G	N
Diethylene Dioxide, pure	G	F	G	G	N	N	G	F	F	N	-	-	E	E	E	E	E	E	E	F	E	F	N	N	N	N	N	N	N	N	N	N	E	E	F	N	N	N	N	N	-	-	F	N	N	N
Diethylene Glycol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	F	N	F	N	G	G	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E
Diethylene Glycol Monoethyl Ether, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	N	N	N	F	F	N	N	E	E	-	-	-	-	-	-	-	-	-	-	N	N
Dimethyl Acetamide, pure	F	N	E	E	E	E	E	E	F	G	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	G	-	-	-	-	-	-	E	-	-	-	N	N
Dimethyl Formamide, pure	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	G	G	G	G	N	N	N	N	N	N	N	N	N	N	G	G	-	-	N	N	N	N	E	N	-	-	N	N
Dimethylsulfoxide, pure	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	E	G	E	E	E	E	-	-	-	-	-	-	-	-	N	N
Dioxane, pure	G	F	G	G	N	N	G	F	F	N	-	-	E	E	E	E	E	E	E	F	E	F	N	N	N	N	N	N	N	N	E	E	F	N	N	N	N	N	-	-	F	N	N	N
Dipropylene Glycol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	F	F	N	G	G	E	E	E	E	E	-	-	-	E	E	E	E	E	E	N	N
DMSO, pure	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	E	G	E	E	E	E	-	-	-	-	-	-	-	-	N	N
Ethanol, 40%	E	G	E	E	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	F	E	G	E	G	E	E	E	E	N	N	E	E	E	E	E	E	E	E

E - No damage after 30 days of constant exposure.

G - Little or no damage after 30 days of constant exposure.

F - Some effect after 7 days of constant exposure.

N - Immediate damage may occur. Not recommended for continuous use.

CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Ether, pure	N	N	F	N	N	N	N	N	F	N	E	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	F	-	-	-	-	N	N	E	-	N	N	G	N
Ethyl Acetate, pure	E	E	E	E	G	N	G	F	F	N	N	N	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	E	E	-	-	N	N	N	N	G	N	F	N	N	N
Ethyl Alcohol, 40%	E	G	E	E	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	G	E	G	E	E	E	E	N	N	E	E	E	E	E	E	E	E
Ethyl Alcohol, 96%	E	G	E	G	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	F	N	E	G	E	G	E	E	E	E	N	N	N	N	E	G	E	E	E	E
Ethyl Alcohol, pure	E	G	E	E	E	E	E	G	E	G	G	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	F	N	E	G	E	G	E	E	E	E	N	N	N	N	E	G	E	E	E	E
Ethyl Benzene, pure	N	N	F	N	N	N	N	N	N	N	E	-	E	E	E	E	E	E	G	F	G	F	N	N	N	N	N	N	N	N	N	N	G	F	F	N	-	-	N	N	-	-	N	N	G	N
Ethyl Benzoate, pure	F	F	G	G	G	F	G	F	G	F	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	E	E	F	N	-	-	N	N	-	-	-	-	N	N
Ethyl Butyrate, pure	G	N	G	F	G	N	G	N	F	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	E	G	-	-	N	N	N	N	-	-	-	-	N	N
Ethyl Chloride, pure	F	N	N	N	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	N	N	N	N	E	E
Ethyl Cyanoacetate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	F	N	N	N	F	F	G	N	E	E	-	-	-	-	N	N	-	-	-	-	N	N
Ethyl Lactate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	F	N	N	N	F	F	F	N	E	E	-	-	-	-	N	N	-	-	-	-	N	N
Ethylene Chloride, pure	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	N	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	N	N	N	E	E
Ethylene Glycol, pure	E	G	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	F	N	E	E	E	E	E	E	E	E	G	F	E	E	E	G	E	E	E	E
Ethylene Glycol Monomethyl Ether, pure	E	G	E	E	G	F	E	E	E	E	F	N	E	E	E	E	E	E	E	G	E	E	N	N	F	N	F	N	N	N	N	N	E	E	-	-	-	-	N	N	-	-	-	-	E	E
Ethylene Oxide, 100%	F	F	G	F	F	N	F	F	F	N	G	F	E	E	E	E	E	E	E	E	E	E	F	N	N	N	G	N	E	E	N	N	E	G	F	N	E	E	F	F	-	-	N	N	E	E
Ethylene Oxide, gas	G	G	E	E	E	E	G	G	G	G	G	F	E	E	E	E	E	E	E	E	E	E	E	E	G	G	E	G	E	E	E	G	E	E	F	N	E	E	F	F	-	-	E	E	E	E
Ethylene Oxide, pure	F	F	G	F	F	N	F	F	F	N	G	F	E	E	E	E	E	E	E	E	E	E	F	N	N	N	G	N	E	E	N	N	E	G	F	N	F	N	N	N	-	-	N	N	E	E
EtO, gas	G	G	E	E	E	E	G	G	G	G	G	F	E	E	E	E	E	E	E	E	E	E	E	E	G	G	E	G	E	E	E	G	E	E	F	N	E	E	F	F	-	-	E	E	E	E
EtO, pure	F	F	G	F	F	N	F	F	F	N	G	F	E	E	E	E	E	E	E	E	E	E	F	N	N	N	G	N	E	E	N	N	E	G	F	N	F	N	N	N	-	-	N	N	E	E
Fatty Acids - saturated, pure	G	F	E	E	E	G	E	G	E	G	G	F	E	E	E	E	E	E	E	G	E	E	G	F	E	E	E	G	G	G	E	F	E	E	E	E	-	-	-	-	E	E	E	E	E	E
Fatty Acids - unsaturated, pure	G	F	E	E	E	G	E	G	E	G	G	F	E	E	E	E	E	E	E	G	E	E	G	F	E	E	E	G	G	G	E	F	E	E	E	E	-	-	-	-	E	E	E	E	E	E
Fluorides	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	G	E	E	E	E	-	-	-	-	-	-	-	-	E	E
Fluorine, gas	F	N	G	N	N	N	F	N	F	N	-	-	E	G	E	G	E	G	E	F	G	N	G	F	E	N	F	N	N	N	N	N	G	N	-	-	-	-	N	N	F	N	N	N	G	N
Formaldehyde, 10%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	G	E	E	G	G	E	G	E	G	E	G	G	N	E	E
Formaldehyde, 40%	E	G	E	G	E	E	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	N	G	F	G	G	E	G	G	G	E	F	F	N	F	N	G	N	E	E
Formalin, 10%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	N	E	E	G	G	E	G	G	G	E	G	E	G	E	G	G	N	E	E
Formalin, 40%	E	G	E	G	E	E	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	N	G	F	G	G	E	G	G	G	E	F	F	N	F	N	G	N	E	E
Formic Acid, 3%	E	G	E	E	E	E	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	N	E	G	E	E	E	E	E	-	E	G	E	E	E	E	E	E	E	E	E	E
Formic Acid, 50%	G	G	E	E	E	G	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	N	G	F	G	F	E	E	E	G	-	-	E	G	G	F	E	E	E	E	E	E
Formic Acid, 85%	G	G	E	E	E	G	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	N	F	N	G	F	G	F	E	E	E	G	-	-	G	F	G	F	E	E	E	E
Formic Acid, 100%	G	G	E	E	E	G	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	N	N	N	G	F	G	F	E	E	E	G	N	N	N	N	G	F	E	E	E	E
Formic Acid, pure	G	G	E	E	E	G	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	N	N	N	F	F	G	F	E	E	E	G	N	N	N	N	G	F	E	E	E	E
Freon TF, pure	E	G	E	G	E	G	E	G	F	N	-	-	E	E	E	E	E	E	E	G	E	G	G	N	G	F	N	N	G	F	F	N	E	E	F	N	-	-	F	N	E	-	-	-	E	E
Fuel Oil	F	N	G	F	E	F	E	G	G	F	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	N	N	E	G	F	N	E	G	G	F	-	-	E	G	E	-	G	N	E	E
Gasoline	N	N	F	N	F	N	N	N	G	F	G	-	E	E	E	E	E	E	E	E	E	E	F	N	G	N	N	N	F	F	N	N	G	F	F	N	N	N	F	N	G	G	G	N	E	E
Glutaraldehyde, pure	E	G	E	E	E	E	E	E	F	F	G	-	E	E	E	E	E	E	E	G	E	G	E	F	E	E	F	N	G	G	E	F	E	E	G	G	G	-	-	-	E	E	-	-	E	E
Glutaraldehyde Disinfectant	E	G	E	E	E	E	E	E	F	F	-	-	E	E	E	E	E	E	E	G	E	G	E	F	E	E	F	N	G	G	E	F	E	E	E	G	G	F	-	-	E	E	-	-	E	E
Glycerine, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	E	E	E	E	E	E	E	E	E	-	E	E	E	G	E	E	E	E
Glycerol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	E	E	E	E	E	E	E	E	E	-	E	E	E	G	E	E	E	E
Hexane, pure	N	N	G	F	G	F	F	N	F	N	G	-	E	E	E	E	E	E	E	G	E	E	F	N	E	N	N	N	E	G	N	N	E	G	G	F	E	-	E	E	E	F	G	N	E	E
Hydrazine, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	F	G	N	N	N	N	N	N	N	N	N	N	N	-	-	-	-	-	-	-	-	-	-	E	N	E	E
Hydrobromic Acid, 69%	E	E	E	G	E	G	-	-	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	N	E	G	F	F	E	G	-	-	N	N	G	G	G	F	E	E	E	E
Hydrochloric Acid, 5%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	F	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E
Hydrochloric Acid, 20%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	F	E	E	E	E	E	E	E	E	G	-	E	E	E	G	E	E	E	E
Hydrochloric Acid, 35%	E	E	E	E	E	G	E	G	E	G	G	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	F	N	E	E	E	E	E	E	E	E	N	N	E	G	G	F	E	E	E	E
Hydrofluoric Acid, 4%	E	E	E	E	E	E	E	G	E	E	F	N	E	E	E	E	E	E	E	E	E	E	G	G	E	E	G	F	G	F	G	F	E	E	G	F	G	-	-	-	G	F	E	E	E	E
Hydrofluoric Acid, 48%	E	E	E	E	E	G	E	E	E	G	N	N	E	E	E	E	E	E	E	E	E	E	F	N	G	F	F	N	F	N	N	N	E	E	N	N	N	N	E	G	G	F	E	E	E	E
Hydrogen Peroxide, 3%	E	E	E	E	E	G	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	E	E	G	E	E	E	G	E	-	E	E	G	F	E	E	E	E

E - No damage after 30 days of constant exposure.

G - Little or no damage after 30 days of constant exposure.

F - Some effect after 7 days of constant exposure.

N - Immediate damage may occur. Not recommended for continuous use.

CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Hydrogen Peroxide, 30%	E	G	E	E	E	F	E	G	E	G	G	-	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	G	E	E	E	G	F	N	E	E	N	N	E	E	E	E
Hydrogen Peroxide, 90%	E	N	E	E	E	F	E	G	E	G	G	-	E	E	E	E	E	E	E	E	E	F	E	E	E	G	N	N	E	E	E	G	E	E	E	G	N	N	E	E	N	N	F	F	G	N
Iodine Crystals, pure	N	N	N	N	E	E	F	N	G	N	-	-	E	E	E	E	E	E	E	E	E	G	G	N	N	N	N	N	N	N	G	F	N	N	E	G	-	-	N	N	F	N	N	N	E	E
Isobutanol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	F	G	N	E	G	G	G	E	E	E	E	N	N	G	N	-	-	E	E	E	E
iso-Butyl Alcohol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	F	G	N	E	G	G	G	E	E	E	E	N	N	G	N	-	-	E	E	E	E
Isopropanol, 100%	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
Isopropanol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
iso-Propanol, 100%	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
Isopropyl Acetate, pure	G	F	E	G	G	F	G	F	G	F	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	E	E	-	-	-	-	N	N	G	F	-	-	G	N
Isopropyl Alcohol, 100%	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
Isopropyl Alcohol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	N	G	F	E	G	E	E	E	E	N	N	E	F	E	E	E	E	E	E
Isopropyl Benzene, pure	F	N	F	N	F	N	F	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	-	-	N	N	-	-	-	-	-	-
Isopropyl Ether, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	F	-	-	-	-	-	-	-	-	-	-	E	G
Jet Fuel	F	N	F	N	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	G	N	E	G	N	N	G	F	G	F	G	F	G	F	-	-	-	-	E	-	-	-	E	E
Kerosene	F	N	F	N	F	N	N	N	G	F	G	-	E	E	E	E	E	E	E	E	G	F	E	-	E	E	N	N	G	F	N	N	G	F	G	F	E	F	-	-	G	F	F	N	E	E
Lacquer Thinner	N	N	F	N	F	N	F	N	F	F	N	N	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	G	F	G	F	N	N	-	-	-	-	-	-	E	E
Lactic Acid, 3%	E	G	E	E	E	E	E	G	E	G	F	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G
Lactic Acid, 85%	E	G	E	E	E	G	E	G	E	G	N	N	E	E	E	E	E	E	E	E	E	E	E	G	E	F	G	F	E	E	E	E	E	E	E	E	E	E	G	G	E	E	E	E	E	G
Lead Acetate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Magnesium Chloride, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E
MEK, pure	N	N	N	N	E	G	E	G	F	N	G	-	E	E	E	E	E	E	G	F	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	G	N	N	N	N	N
Mercuric Chloride, pure	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	N	N	-	-	G	G	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Methanol, 100%	E	G	E	E	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	F	N	E	G	G	F	E	E	E	G	N	N	N	N	E	G	E	E	E	E
Methoxyethyl Oleate, pure	E	G	E	E	E	G	E	G	E	G	G	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	N	N	N	N	N	N	E	E	-	-	-	-	-	-	-	-	-	-	-	-
Methyl Acetate, pure	F	N	F	F	G	F	G	F	E	E	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	G	-	-	-	-	-	-	G	F	-	-	E	N
Methyl Alcohol, 100%	E	G	E	E	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	F	N	E	G	G	F	E	E	E	G	N	N	N	N	E	G	E	E	E	E
Methyl Alcohol, pure	E	G	E	E	E	E	E	E	E	G	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	F	N	E	G	G	F	E	E	E	G	N	N	N	N	E	G	E	E	E	E
Methyl Ethyl Ketone, pure	N	N	N	N	E	G	E	G	F	N	G	-	E	E	E	E	E	E	G	F	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	G	N	N	N	N	N
Methyl Isobutyl Ketone, pure	N	N	N	N	G	F	G	F	F	F	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	-	-	N	N
Methyl Propyl Ketone, pure	N	N	F	N	G	F	G	F	F	F	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	-	-	N	N	-	-	-	-	N	N
Methylene Chloride, pure	N	N	F	N	F	N	F	N	F	N	N	N	E	E	E	E	E	E	F	N	G	N	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	N	N	N	N	E	G
Methyl-t-Butyl Ether, pure	N	N	F	N	F	N	F	N	E	E	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	G	F	-	-	-	-	-	-	-	-	-	-	E	E
MIBK, pure	N	N	N	N	G	F	G	F	F	F	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	-	-	N	N
Mineral Oil	G	N	E	E	E	F	E	E	E	G	G	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	E	E	E	E	E	E	N	E	E	E	G	G	N	E	E
Mineral Spirits	F	N	F	N	F	N	F	N	E	E	G	-	E	E	E	E	E	E	E	G	E	G	F	F	G	N	N	N	F	N	F	F	G	F	G	F	-	-	G	F	-	-	-	-	E	E
n-Amyl Acetate, pure	G	F	E	G	G	F	G	F	G	F	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	E	E	-	-	N	N	N	N	-	-	N	N	E	G
n-Butanol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	F	F	N	G	F	E	G	E	E	E	E	N	N	E	N	E	G	E	E	E	E
n-Butyl Acetate, pure	G	F	G	F	G	F	G	F	G	F	-	-	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	E	G	-	-	-	-	N	N	-	-	N	N	G	N
n-Butyl Alcohol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	F	F	N	G	F	E	G	E	E	E	E	N	N	E	N	E	G	E	E	E	E
n-Decane, pure	F	N	F	N	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	G	F	N	G	F	F	N	G	F	G	F	-	-	-	-	-	-	-	-	E	E
n-Heptane, pure	N	N	F	F	F	F	F	F	F	F	E	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	N	N	E	G	N	N	G	G	G	F	E	-	E	E	G	N	G	N	E	E
Nitric Acid, 10%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	F	F	N	G	N	E	E	G	N	E	-	G	G	E	N	E	E	E	E
Nitric Acid, 20%	E	E	G	G	F	F	G	F	E	E	G	-	E	E	E	E	E	E	E	E	E	E	E	G	E	E	G	N	F	N	G	N	G	G	G	N	E	-	G	G	G	N	E	E	E	G
Nitric Acid, 50%	G	F	F	N	F	N	F	N	F	N	G	-	E	E	E	E	E	E	E	E	E	E	G	F	G	F	F	N	F	N	F	N	F	N	F	N	F	N	N	N	N	N	N	N	E	G
Nitric Acid, 70%	F	N	F	N	N	N	N	N	F	N	N	N	E	E	E	E	E	E	E	E	E	G	G	N	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	N	N	N	N
Nitrobenzene, pure	N	N	N	N	N	N	N	N	F	N	N	N	E	E	E	E	E	E	E	G	E	G	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	N	N	G	N
Nitromethane, pure	N	N	F	N	F	N	F	N	E	F	N	N	E	E	E	E	E	E	E	F	E	G	F	N	N	N	N	N	N	N	N	N	F	N	E	E	-	-	-	-	E	-	-	-	E	G
n-Octane, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	-	-	N	N	G	F	N	N	E	E	G	F	-	-	N	N	E	-	E	E	E	E
o-Dichlorobenzene, pure	F	N	N	N	F	N	F	N	F	N	N	N	E	E	E	E	E	E	E	N	E	F	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	-	-	E	E

E - No damage after 30 days of constant exposure.

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CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Oil, Cedarwood	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	G	F	-	-	N	N	F	F	N	N	-	-	E	E	-	-	G	F	E	E	G	N	E	E
Oil, Cinnamon	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	G	G	F	N	N	N	N	F	F	N	N	-	-	E	E	-	-	N	N	E	E	G	N	-	-
Oil, Mineral	G	N	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	N	E	G	E	E	E	E	E	E	E	N	E	E	E	E	G	N	E	E
Oil, Pine	G	N	F	N	E	G	E	G	G	F	-	-	E	E	E	E	E	E	E	G	E	G	G	F	F	N	N	N	F	F	N	N	E	G	E	E	-	-	N	N	E	E	G	N	E	E
Orange Oil	F	N	G	F	G	F	G	F	F	F	-	-	E	E	E	E	E	E	E	E	E	E	F	F	F	N	N	N	F	F	N	N	E	G	F	N	-	-	G	F	-	-	-	-	E	E
Oxalic Acid, 10%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	G
Ozone, pure	G	N	G	N	F	N	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	G	G	F	E	E	F	F	G	N	F	F	E	-	G	G	G	G	N	N	E	E
p-Chloroacetophenone, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	N	N	N	N	N	N	N	N	N	E	E	F	N	-	-	-	-	-	-	-	-	N	N
p-Dichlorobenzene, pure	F	N	N	N	G	F	G	F	G	F	N	N	E	E	E	E	E	E	E	N	E	F	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	-	-	-	-	E	E
Perchloric Acid, 70%	G	N	G	N	G	N	G	N	G	N	-	-	E	E	G	F	E	E	E	G	E	G	N	N	G	N	N	N	N	N	G	F	G	N	G	F	E	E	G	G	F	F	N	N	E	G
Perchloric Acid, concentrated	G	N	G	N	G	N	G	N	G	N	-	-	G	F	G	F	G	F	G	F	G	F	N	N	G	N	N	N	N	N	G	F	G	N	G	F	E	E	G	G	F	F	N	N	E	G
Perchloric Acid, pure	G	N	G	N	G	N	G	N	G	N	-	-	G	F	G	F	G	F	G	F	G	F	N	N	G	N	N	N	N	N	G	F	G	N	G	F	E	E	G	G	F	F	N	N	E	G
Perchloroethylene, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	G	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	F	N	E	G	E	-	N	N	E	E
Petroleum	N	N	G	N	N	N	N	N	G	F	-	-	E	E	E	E	E	E	E	E	E	E	F	F	G	N	N	N	F	N	N	N	E	F	F	N	-	-	-	-	E	E	N	N	E	E
Phenol, 50%	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	E	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	F	N	N	N	E	G
Phenol, 100%	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	F	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	N	N	N	N	E	G
Phenol, Crystal	F	N	G	F	G	N	G	N	F	G	N	N	E	E	E	E	E	E	E	E	E	E	N	N	F	N	F	N	F	F	N	N	E	E	N	N	N	N	N	N	N	N	N	N	E	G
Phenol, liquid	N	N	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	G	E	F	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	N	N	N	N	N	E	G
Phosphoric Acid, 5%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E
Phosphoric Acid, 85%	E	N	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	F	E	E	E	G	E	G	F	N	E	E	G	F	E	E	E	E
Picric Acid, pure	N	N	N	N	N	N	N	N	E	E	-	-	E	E	E	E	E	E	G	F	G	F	N	N	N	N	N	N	N	N	G	F	N	N	G	F	-	-	E	E	-	-	G	N	G	N
Pine Oil, pure	G	N	F	N	E	G	E	G	G	F	-	-	E	E	E	E	E	E	E	E	E	E	G	F	F	N	N	N	F	F	N	N	F	N	E	E	-	-	N	N	E	E	-	-	E	E
Potassium Chloride, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E	E	E	-	-	E	E	E	G	E	E	E	E
Potassium Hydroxide, 1%	E	E	F	F	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	G	E	E	E	G	N	N	E	G	E	-	E	E	E	G	E	E	E	E
Potassium Hydroxide, 30%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	N	N	E	E	G	N	E	G	G	G	F	F	E	G	E	-	E	E	G	F	E	E	E	G
Potassium Hydroxide, concentrated	E	E	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	F	G	G	F	F	E	G	E	N	E	G	G	F	E	E	E	G
Potassium Permanganate, pure	E	E	E	E	E	G	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G	N	E	E	E	G	E	E	E	E	F	N	G	F	-	-	E	E	E	E
Propane, gas	N	N	E	E	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	F	N	E	G	F	N	F	F	N	N	E	E	G	F	-	-	E	E	-	-	-	-	E	E
Proprionic Acid, pure	F	N	E	F	E	G	E	G	E	F	-	-	E	E	E	E	E	E	E	F	E	G	N	N	G	N	F	N	G	G	G	N	E	F	E	G	-	-	-	-	E	E	-	-	E	E
Propylene Glycol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	F	N	G	N	G	G	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E
Propylene Oxide, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	N	N	E	F	G	F	F	N	F	N	G	G	N	N	E	E	F	N	-	-	N	N	-	-	-	-	N	N
Pyridine, pure	N	N	N	N	E	E	N	N	F	N	-	-	E	E	E	E	E	E	N	N	E	G	N	N	N	N	N	N	N	N	N	N	N	N	F	N	N	N	N	N	-	-	E	N	N	N
Resorcinol, 5%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	F	G	F	G	N	N	N	N	N	G	F	E	E	G	G	-	-	G	G	-	-	E	E	E	E
Resorcinol, saturated	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	F	F	N	N	N	N	N	G	F	E	E	G	G	-	-	G	N	-	-	E	E	E	E
Salicylaldehyde, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	N	E	G	G	F	F	N	N	N	F	F	N	N	E	E	F	N	-	-	N	N	-	-	-	-	E	G
Salicylic Acid, powder	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	F	G	F	E	E	E	E	E	E	E	E	-	-	E	G	-	-	E	E	E	E
Salicylic Acid, saturated	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	F	G	F	E	E	E	G	E	E	E	E	-	-	E	G	-	-	E	E	E	E
sec-Butanol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	N	E	G	G	G	E	E	E	E	-	-	G	N	-	-	E	E	E	E
sec-Butyl Alcohol, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	N	E	G	G	G	E	E	E	E	N	N	G	N	-	-	E	E	E	E
Silicone Oil, pure	E	G	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	E	E	E	F	E	E	E	G	E	E	E	E	E	E	F	N	E	E	E	E	-	-	E	E
Silver Acetate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	G	G	N	E	E	G	G	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Silver Nitrate, pure	E	G	E	E	E	E	E	G	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	G	E	E	E	E	E	E	E	E	-	-	E	G	-	-	E	E	E	E
Skydrol LD4 Aviation Hydraulic Fluid	G	F	E	G	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	E	G	F	N	-	-	-	-	F	N	-	-	E	F
Sodium Acetate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	F	G	N	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Sodium Carbonate, pure	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	G	N	E	G	E	G	F	F	E	G	G	N	E	E	-	-	E	E	E	E
Sodium Dichromate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	G	N	E	E	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Sodium Hydroxide, 1%	E	E	F	F	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	F	E	E	E	E	N	N	E	G	E	-	E	E	E	G	E	E	E	E

E - No damage after 30 days of constant exposure.

G - Little or no damage after 30 days of constant exposure.

F - Some effect after 7 days of constant exposure.

N - Immediate damage may occur. Not recommended for continuous use.

CHEMICAL	LDPE		HDPE		PP		PPCO		PMP		PETG		FEP		TFE		PFA		ECTFE		ETFE		PC		Rigid PVC		Flex. PVC		PSF		PS		FLPE		RESMER		PMMA		SAN		PEI		XLPE		PVDF	
	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°	20°	50°
Sodium Hydroxide, 10%	E	E	E	E	E	E	E	E	E	E	G	-	E	E	E	E	E	E	E	E	E	E	N	N	E	E	G	N	E	G	E	E	F	F	E	G	E	E	E	E	E	G	E	E	E	E
Sodium Hydroxide, 50%	G	G	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	G	E	G	F	F	E	G	E	N	E	G	G	F	E	E	N	N
Sodium Hydroxide, concentrated	G	G	E	E	E	E	E	E	E	E	N	N	E	E	E	E	E	E	E	E	E	E	N	N	E	G	F	N	E	G	E	G	F	F	E	G	E	N	E	G	G	F	E	E	N	N
Sodium Hypochlorite, 15%	E	F	E	G	F	N	G	N	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	E	F	N	E	E	E	G	F	F	E	G	E	E	E	E	E	G	E	E	E	E
Stearic Acid, pure	E	E	G	G	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	G	G	G	E	G	G	G	E	G	-	-	E	G	E	E	E	E	E	E
Sulfur Dioxide, dry gas	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	N	G	G	F	N	E	E	F	N	G	N	F	F	-	-	G	N	E	E
Sulfur Dioxide, liquid (46 psig)	N	N	F	N	E	E	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	G	G	N	F	N	N	N	G	G	N	N	F	N	F	N	N	N	F	F	-	-	F	N	E	E
Sulfur Dioxide, wet gas	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	G	N	G	G	F	N	E	E	F	N	N	N	F	F	-	-	G	N	E	E
Sulfur Dioxide, pure	N	N	F	N	E	E	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	G	G	N	F	N	N	N	G	G	N	N	F	N	F	N	N	N	F	F	-	-	F	N	E	E
Sulfur Salts, pure	F	N	G	F	F	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	G	F	N	N	N	G	N	G	G	N	N	G	F	-	-	-	-	N	N	-	-	-	-	F	N
Sulfuric Acid, 6%	E	E	E	E	E	E	E	E	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sulfuric Acid, 20%	E	E	E	E	E	E	E	G	E	E	E	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	F	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E
Sulfuric Acid, 30%	E	E	E	E	E	E	E	G	E	E	G	-	E	E	E	E	E	E	E	E	E	E	G	F	E	G	F	N	E	E	E	E	E	E	E	E	E	E	E	G	E	E	E	E	E	E
Sulfuric Acid, 60%	E	G	E	G	G	F	G	F	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	E	G	F	N	E	E	E	G	E	G	E	G	N	N	N	N	F	N	G	F	E	E
Sulfuric Acid, 96%	G	G	F	N	F	N	F	N	G	F	N	N	E	E	E	E	E	E	E	E	E	E	N	N	F	N	N	N	G	N	F	F	F	N	F	F	N	N	N	N	N	N	F	N	E	E
Sulfuric Acid, 98%	G	G	F	N	F	N	F	N	G	F	N	N	E	E	E	E	E	E	E	E	E	G	N	N	F	N	N	N	G	N	F	F	F	N	F	F	N	N	N	N	N	N	F	N	E	G
Sulfuric Acid, concentrated	G	G	F	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	E	E	G	N	N	G	N	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	N	N	N	N
Tartaric Acid, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	E	G	E	G	E	E	E	G	E	E	E	G	E	E	E	E	E	E	E	E	E	E
TCA, pure	F	N	F	N	G	F	F	N	E	E	-	-	E	E	E	E	E	E	E	F	E	G	F	N	F	N	F	N	G	G	F	N	F	N	F	N	-	-	N	N	-	-	E	G	E	G
tert-Butanol, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	G	F	N	G	F	G	G	E	E	E	E	-	-	E	E	-	-	-	-	E	E
tert-Butyl Alcohol, pure	E	G	E	E	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	G	F	N	G	F	G	G	E	E	E	E	-	-	E	E	-	-	-	-	E	E
Tetrahydrofuran, pure	F	N	F	N	G	F	G	F	F	F	-	-	E	E	E	E	E	E	N	N	G	F	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	-	-	N	N	N	N
THF, pure	F	N	F	N	G	F	G	F	F	F	-	-	E	E	E	E	E	E	N	N	G	F	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	-	-	N	N	N	N
Thionyl Chloride, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	N	N	-	-	-	-	-	-	-	-	N	N	N	N
Tincture of Iodine	E	G	G	F	E	E	G	N	N	N	-	-	E	E	E	E	E	E	E	E	E	E	G	N	N	N	G	F	-	-	G	F	G	F	E	G	N	N	-	-	E	F	N	N	E	G
Toluene, pure	F	N	N	N	N	N	N	N	F	F	N	N	E	E	E	E	E	E	E	G	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	F	N	N	N	E	E
Tributyl Citrate, pure	G	F	E	G	G	F	G	F	G	F	-	-	E	E	E	E	E	E	E	G	E	G	N	N	E	N	N	N	F	F	N	N	E	E	-	-	-	-	-	-	-	-	-	-	E	F
Trichloroacetic Acid, pure	F	N	F	N	G	F	F	N	E	E	-	-	E	E	E	E	E	E	E	F	E	G	F	N	F	N	F	N	G	G	F	N	F	N	F	N	-	-	N	N	-	-	E	G	E	G
Trichloroethane, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	E	E	G	N	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	N	N	-	-	E	E
Trichloroethylene, pure	N	N	N	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	N	N	E	E	N	N	N	N	N	N	N	N	N	N	F	F	F	N	N	N	N	N	N	N	N	N	E	E
Triethylene Glycol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	F	F	N	E	E	E	G	E	E	E	E	-	-	E	E	E	E	-	-	-	-
Tripropylene Glycol, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	G	G	F	F	N	E	E	E	E	E	E	E	E	-	-	-	-	E	E	-	-	-	-
Tris Buffer Solution, pH 11	E	G	E	G	E	G	E	G	E	G	F	N	E	E	E	E	E	E	E	E	E	E	F	N	E	E	E	G	G	F	G	N	E	G	E	E	E	E	E	E	E	E	E	E	E	E
Tris Buffer Solution, pH 7.0	E	G	E	G	E	G	E	G	E	G	G	G	E	E	E	E	E	E	E	E	E	E	G	F	E	E	E	G	G	F	G	N	E	G	E	E	E	E	E	E	E	E	E	E	E	E
Trisodium Phosphate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	G	N	E	E	G	N	G	F	E	E	F	F	E	G	G	N	E	E	-	-	E	E	E	E
Turpentine	F	N	F	N	F	N	N	N	F	N	G	-	E	E	E	E	E	E	E	E	E	E	F	N	G	F	F	N	N	N	N	N	G	F	N	N	G	N	G	N	N	N	N	N	E	E
Undecyl Alcohol, pure	E	F	E	G	E	G	E	G	E	G	-	-	E	E	E	E	E	E	E	G	E	G	G	F	E	F	G	F	F	F	G	G	E	E	E	E	-	-	E	E	-	-	-	-	E	E
Urea, pure	E	E	E	E	E	E	E	E	E	G	-	-	E	E	E	E	E	E	E	E	E	E	G	F	G	N	G	N	F	F	E	G	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Vinylidene Chloride, pure	N	N	F	N	N	N	N	N	N	N	-	-	E	E	E	E	E	E	G	F	G	F	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	-	-	-	-	E	E
Xylene, pure	N	N	F	N	N	N	F	N	F	N	-	-	E	E	E	E	E	E	E	E	E	G	N	N	N	N	N	N	N	N	N	N	G	F	F	N	N	N	N	N	F	N	N	N	E	E
Zinc Chloride, 10%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	N	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Zinc Stearate, pure	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	N	E	E	E	E	E	E	E	E	-	-	E	E	-	-	E	E	E	E
Zinc Sulfate, 10%	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	N	E	E	E	E	E	E	E	E	E	E	E	E	-	-	E	E	E	E

E - No damage after 30 days of constant exposure.

G - Little or no damage after 30 days of constant exposure.

F - Some effect after 7 days of constant exposure.

N - Immediate damage may occur. Not recommended for continuous use.

Resin	Max. Use Temp. (°C)[2]	HDT[1] Temp. (°C)	Brittle-ness Temp. (°C)[13]	Transparency	Microwav-ability	Auto-claving[4]	Sterilization[4]				Specific Gravity	Flexibility	Permeability (cc.-mil/100in^2-24 hr.-atm)		
							Gas	Dry Heat	Radi-ation	Disin-fectants			N_2	O_2	CO_2

1. Heat Deflection Temperature is the temperature at which a bar deflects 0.01" at 66 psig (ASTM D648). Materials may be used above Heat Deflection temperatures in non-stress applications; see Max. Use Temp.
2. Ratings based on 5-minute tests using 600 watts of power on exposed, empty labware. CAUTION: Do not exceed Max. Use Temp., or expose labware to chemicals which heating cause to attack the plastic or be rapidly absorbed.
3. Plastic will absorb heat.
4. STERILIZATION
   - Autoclaving (121°C, 15 psig for 20 minutes)—Clean and rinse items with distilled water before autoclaving. (**Always completely disengage thread before autoclaving.**) Certain chemicals which have no appreciable effect on resins at room temperature may cause deterioration at autoclaving temperatures unless removed with distilled water beforehand.
   - Gas—Ethylene Oxide, formaldehyde, hydrogen peroxide.
   - Dry Heat (160°C, 120 minutes)
   - Disinfectants—Benzalkonium chloride, formalin/formaldehyde, ethanol, etc.
   - Radiation—gamma irradiation at 25 kGy (2.5 MRad) with unstabilized plastic.
5. Sterilizing reduces mechanical strength. Do not use PC vessels for vacuum applications if they have been autoclaved. Refer to Use and Care Guidelines for NALGENE Labware, for detailed information on sterilizing.
6. "Yes" indicates the resin has been determined to be non-cytotoxic, based on USP and ASTM biocompatibility testing standards utilizing an MEM elution technique on a WI38 human diploid lung cell line.
7. Resins meet requirements of CFR21 section of Food Additives Amendment of the Federal Food and Drug Act. End users are responsible for validation of compliance for specific containers used in conjunction with their particular packaging applications.
8. Acceptable for aqueous foods only, at temperatures up to 121°C/250°F. Not sanctioned for use with alcoholic or fatty foods at any temperature.
9. Acceptable for:
   - Nonacid, aqueous products; may contain salt, sugar or both (pH above 5.0).
   - Dairy products and modifications; oil-in-water emulsions, high or low fat.
   - Moist bakery products with surface containing no free fat or oil.
   - Dry solids with the surfaces containing no free fat or oil (no end-test required) and under all conditions as described in Table 2 of FDA Regulation 177.1520 except condition A—high temperature sterilization (e.g. over 100°C/212°F).
10. Acceptable for:
    - Alcoholic foods containing not more than 15% (by volume) alcohol; fill and storage temperature not to exceed 49°C (120°F).
    - Non-alcoholic foods of hot fill to not exceed 82°C (180°F) and 49°C (120°F) in storage.
    - Not suitable for carbonated beverages or beer or packaging food requiring thermal processing.
11. Straight-sided jars, beakers and graduated cylinders only.
12. Acceptable for aqueous, oil, dairy, acidic, and alcoholic foods up to 71° C/160° F.
13. The brittleness temperature is the temperature at which an item made from the resin may break or cracked if dropped. This is not the lowest use temperature if care is exercised in use and handling.
14. The tubing will become opaque from absorbed water, see the current NALGENE® Labware catalog for details.
15. WVTR = Water Vapor Transmission rate in g-mm/m^2 - 24 hr. - 1 BAR at 37°C and 90% Relative Humidity.

Plastic Resin Information

Resin	Permeability (cc.-mm/m²-24 hr.-Bar) N_2	O_2	CO_2	Water Vapor Transmission Rate (g-mm/m²-24 hr.-Bar at 38°C, 90% RH)[15]	Water Absorption (%)	Non-Cytotoxicity[6]	Suitability for Food and Bev. Use[7]	Reg. Part 21 CFR	Refractive Index	Melting Point Range (°C)	Glass Transition Temperature Range (°C)
LDPE	69.94	154.28	1,049.09	15.5-23.3	<0.01	Yes	Yes[9]	177.1520	1.5400	85 to 125	-25
HDPE	16.32	71.88	225.36	4.6-6.2	<0.01	Yes	Yes[9]	177.1520	1.5100	125 to 138	-25
PP	18.65	93.25	310.84	3.9	<0.02	Yes	Yes	177.1520	1.4735	160 to 176	-20 to -5
PPCO	17.48	77.71	252.56	4.40	<0.02	Yes	Yes	177.1520	1.4735-1.5100	150 to 175	-20
PMP	3,108.42	12,433.68	44,683.32	775	0.01	Yes	Yes[11]	177.1520	1.4630	235	N/A
FLPE	16.32	71.88	225.36	4.6	<0.01	Yes	Yes[9]	177.1615	1.5100	125 to 138	-25
ECTFE	3.89	9.71	42.74	3.15	<0.1	Yes	Yes	177.1380	1.4200	242	85
ETFE	11.66	38.86	97.14	1.65	0.03	Yes	Yes	177.1550	1.3580	265	N/A
FEP	124.34	291.41	854.82	6.20	<0.01	Yes	Yes	177.1550	1.341 to 1.347	275	N/A
PFA	113.07	342.31	878.13	2.00	<0.02	Yes	Yes	177.1550	1.3580	302 to 310	50 to -80
PTFE/TFE	-	119.48	-	4.0	<0.01	Yes	Yes	177.1550	1.3500	320 to 330	120 to 130
PETG	3.89	9.71	48.57	18.13	0.13	Yes	Yes[10]	177.1315	1.57	265	81
PC	19.43	116.57	417.69	115	0.35	Yes	Yes	177.1580	1.5860	N/A	154
PSF	21.37	116.57	271.99	-	0.3	Yes	Yes	177.1655	1.6330	N/A	185 to 195
PS	7.77–9.71	16.57-155.42	88.55-582.83	1.220.47–6,102.35	0.05	Yes	Yes	177.1640	1.5894	N/A	74 to 110
PVC (rigid)	0.78–7.77	1.55	1.55	14-79	0.15-0.75	Yes	Yes[12]	176.180/175.300	1.5390	N/A	75 to 105
PVC (tubing)	3.22-12.94	2.60-38.89	64.81-226.84	15-80	0.15-0.75	Yes	Yes[12]	176.180/175.300	1.5390	N/A	75 to 105
ResMer™	-	-	-	-	0.01	-	-	-	-	200 to 270	90 to 110
PEI	7.23	14.38	66.56	5.80	0.25	-	Yes	177.1595	1.4600	N/A	215
PMMA	1.08	4.80	26.40	55.20	0.35	Yes	Yes	177.1010	1.4893	85 to 105	N/A
PUR	15.93-46.24	29.14-127.06	74.85-641.11	-	0.03	Yes	No	-	-	75 to 160	-30 to -0
PVDF	3.50	5.44	196.22	29.76	0.05	Yes	Yes	177.2510	1.4200	141 to 178	-60 to -20
XLPE	16.32	71.88	225.36	4.6-6.2	<0.01	Yes	No	-	1.5400	N/A	N/A
TPE	12.05-56.34	33.03-251	349.70-3,354.76	-	0.05-0.1	Yes	Yes	177.2600	-	N/A	N/A
EPR	9.71-58.29	29.14-252.57	310.84-3,108.43	-	0.05	-	Yes[9]	177.2600	-	N/A	-54
SAN	-	-	-	-	0.2	-	Yes	177.1040	1.5700	108	N/A
Silicone	-	-	-	-	0.1	-	Yes[9]	177.2600	-	N/A	-130 to -120

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15. WVTR = Water Vapor Transmission rate in g-mm/m² - 24 hr. - 1 BAR at 37°C and 90% Relative Humidity.

Chemical Resistance Classification

E 30 days of constant exposure causes no damage. Plastic may even tolerate for years.

G Little or no damage after 30 days of constant exposure to the reagent.

F Some effect after 7 days of constant exposure to the reagent. Depending on the plastic, the effect may be crazing, cracking, loss of strength or discoloration. Solvents may cause softening, swelling and permeation losses with LDPE, HDPE, PP, PPCO and PMP. The solvent effects on these five resins are normally reversible; the part will usually return to its normal condition after evaporation.

N Not recommended for continuous use. Immediate damage may occur. Depending on the plastic, the effect will be a more severe crazing, cracking, loss of strength, discoloration, deformation, dissolution or permeation loss.

This information is only a summary. To access our chemical resistance database, go to: www.NALGENElabware.com/techdata/chemical/index.asp

Resin Codes

ECTFE	Halar* ECTFE (ethylene-chlorotrifluoroethylene copolymer)
ETFE	Tefzel† ETFE (ethylene-tetrafluoroethylene)
FEP	Teflon† FEP (fluorinated ethylene propylene)
FLPE	fluorinated high-density polyethylene
HDPE	high-density polyethylene
LDPE	low-density polyethylene
PC	polycarbonate
PETG	polyethylene terephthalate copolyester
PFA	Teflon† PFA (perfluoroalkoxy)
PMMA	polymethyl methacrylate (acrylic)
PMP	polymethylpentene ("TPX")
PP	polypropylene
PPCO	polypropylene copolymer
PPO	polyphenylene oxide
PS	polystyrene
PSF	polysulfone
PUR	polyurethane
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
ResMer	ResMer™ Manufacturing Technology
SAN	styrene acrylonitrile
TFE	Teflon† TFE (tetrafluoroethylene)
TPE	thermoplastic elastomer
XLPE	cross-linked high-density polyethylene

* Halar is a registered trademark of Solvay Solexis.

† Or equivalent.

Tefzel and Teflon are registered trademarks of DuPont.

For more technical information and the latest product news visit: www.NALGENElabware.com

	ECTFE/ETFE	FEP/TFE/PFA	FLPE	HDPE	LDPE	PC	PETG	PMMA	PMP	PP/PPCO	PS	PSF	PUR	PVC (BOTTLE)	FLEXIBLE PVC TUBING	PVDF	ResMer™	TPE***
Acids, dilute or weak	E	E	E	E	E	E	G	G	E	E	E	E	F	E	G	E	E	G
Acids,** strong and concentrated	E	E	G	G	G	N	N	N	E	G	F	G	N	G	F	E	G	F
Alcohols, aliphatic	E	E	E	E	E	G	G	N	E	E	G	G	N	G	F	E	E	E
Aldehydes	E	E	G	G	G	F	G	F	G	G	F	F	N	G	N	G	G	G
Bases/Alkali	E	E	F	E	E	N	N	F	E	E	E	E	F	E	F	G	E	F
Esters	G	E	G	G	G	N	F	N	E	G	N	N	N	N	N	G	F	N
Hydrocarbons, aliphatic	E	E	E	G	F	G	G	G	G	G	F	G	G	G	F	E	G	E
Hydrocarbons, aromatic	G	E	E	N	N	N	N	N	N	N	N	N	N	N	N	E	F	N
Hydrocarbons, halogenated	G	E	G	N	N	N	N	N	N	N	N	N	N	N	N	F	F	F
Ketones, aromatic	G	E	G	N	N	N	N	N	F	N	N	N	N	F	N	F	F	N
Oxidizing Agents, strong	E	E	F	F	F	F	F	N	G	F	G	G	N	G	F	G	G	N

* For tubing chemical resistance, other than PVC, see tubing section.

** Except for oxidizing acids: for oxidizing acids, see "Oxidizing Agents, strong."

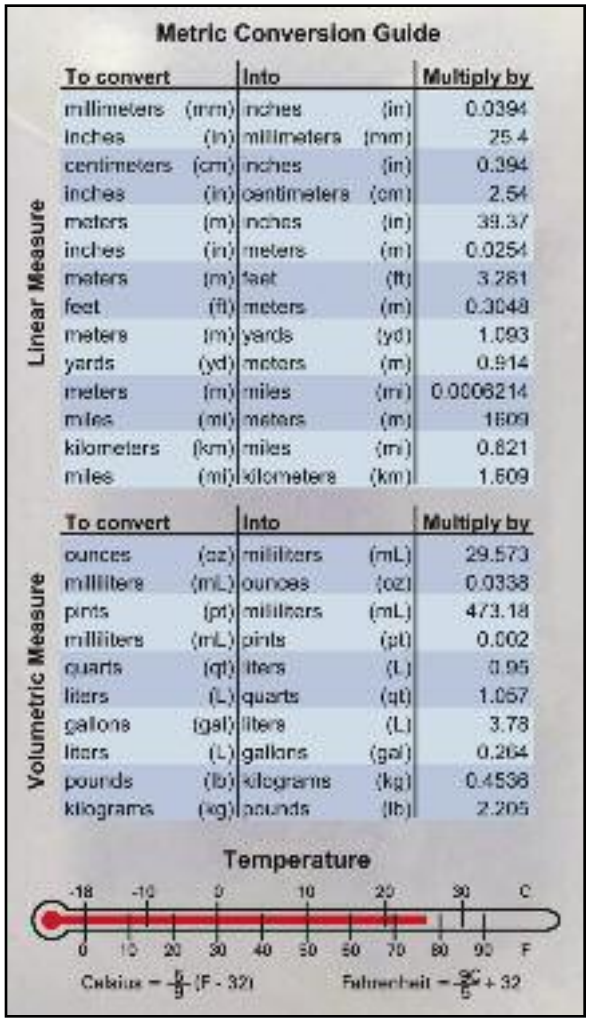
*** TPE gaskets.

Notes

Resin Quick Reference Chart

	Polypropylene (PP)	Polypropylene Copolymer (PPCO)	Low Density Polyethylene (LDPE)	High Density Polyethylene (HDPE)	Polycarbonate (PC)	Polymethylpentene (PMP)	Polystyrene (PS)
High Temperature	135°C	121°C	80°C	120°C	135°C	145°C	90°C
Low Temperature	0°C	-40°C	-100°C	-100°C	-135°C	20°C	20°C
Autoclavable	Y	Y	N	N	Y	Y	N
Microwavable	Y	Marginal	Y	N	Y	Y	N
Dry Heat (Oven)	N	N	N	N	Y	Y	N
Freeze	N	Y	Y	Y	Y	N	N
Flexibility	Rigid	Moderate	Excellent	Rigid	Rigid	Rigid	Rigid
Clarity	Translucent	Translucent	Translucent	Translucent	Clear	Clear	Clear
Recycling Symbol	5 PP	5 PP	4 LDPE	2 HDPE	7 OTHER	7 OTHER	6 PS

Y= Yes N= No



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