Our Calibration Syringes, having a known calibrated volume as a standard, provide an easy and reliable method of calibrating and measuring the accuracy of respiratory volume measuring equipment in the field on a regular basis to satisfy your quality assurance program.

The 3 Liter size Syringe has been recommended as a minimum standard by the "Report of 1977 Snow Bird Workshop on Standardization of Spirometry", as the minimum volume to test spirometers. Our 7 liter size is the largest size Syringe, known to us, to be commercially available. This larger size is very useful in checking your Spirometer through a full 7 liters in a single uninterrupted complete volume stroke.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model Series</th>
<th>5520</th>
<th>5510</th>
<th>5550</th>
<th>5540</th>
<th>5530</th>
<th>5570</th>
<th>4900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Volume</td>
<td>10ml</td>
<td>100ml</td>
<td>1/2L</td>
<td>1L</td>
<td>3L</td>
<td>3L</td>
<td>7L</td>
</tr>
<tr>
<td>Smallest Graduation (ml)</td>
<td>2</td>
<td>20</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Volume Stroke (inch)</td>
<td>5</td>
<td>12.70</td>
<td>15.78</td>
<td>31.45</td>
<td>37.47</td>
<td>37.47</td>
<td>38.10</td>
</tr>
<tr>
<td>(cm)</td>
<td>7.62</td>
<td>12.70</td>
<td>15.78</td>
<td>31.45</td>
<td>37.47</td>
<td>37.47</td>
<td>38.10</td>
</tr>
<tr>
<td>Cylinder Bore (ID/inch)</td>
<td>1/2</td>
<td>1 1/4</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>(cm)</td>
<td>1.27</td>
<td>3.17</td>
<td>6.35</td>
<td>6.35</td>
<td>10.16</td>
<td>10.16</td>
<td>15.24</td>
</tr>
<tr>
<td>Weight (lbs.)</td>
<td>0.17</td>
<td>0.39</td>
<td>1.7</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>(grams)</td>
<td>75</td>
<td>175</td>
<td>771</td>
<td>907</td>
<td>2268</td>
<td>2411</td>
<td>4536</td>
</tr>
</tbody>
</table>

**ADJUSTABLE POSITIVE STOP FOR SETTING VOLUME**

These stops allow accurate repetitive duplication of your selected volume.

1/2, 1, 3 & 7 Liter Syringes -

- The volume stop is easily located on the graduated piston rod for the desired volume.
- A socket-hex wrench is supplied for tightening the volume-stop
- The volume stop can be set throughout the entire 1/2, 1, 3 & 7 Liter range.
- The 5570 Series 3 Liter Syringe is factory set to 3L and is not adjustable.

100cc and 10cc Miniature Syringes -

- The method of setting the volume stop is unlike the 1/2, 1, 3 & 7 Liter Syringes.
- Each volume graduation on the piston rod has a groove which engages with a spring loaded detent, in the volume stop, for locating the desired volume. A screw, in the volume stop, is then tightened with a socket-hex wrench to securely hold the stop.
- These volume stops can only be set at the following graduations:
  - 5510 Series - 20ml, 40ml, 60ml, 80ml, & 100ml
  - 5520 Series - 2ml, 4ml, 6ml, 8ml, & 10ml

**OUTLET PORT ADAPTERS**

- They thread into the end plate, making it convenient to use the various standards or custom OD / ID size connections. Some 5570 Series 3L Syringe and some 5530 Series Syringes have integrally molded outlet adapters and are not removable.
- The 1/2, 1, 3 & 7 liter sizes have the same thread and are therefore interchangeable.
- The Miniature 100ml and 10ml Model end plates have different size threads for the outlet port adapters, therefore these outlet port adapters can NOT be interchanged.

**QUALITY ASSURANCE**

- Traceable to the National Institute of Standards and Technology (NIST).
- The accuracy of each syringe is ± 1/2 of 1% full scale.
- Quality Assurance guidelines recommend that inspection and recalibration procedures of the syringe accuracy be performed three to four times a year, once a year at a minimum.

**CONSTRUCTION**

- 1/2, 1, 3 & 7 Liter cylinders are aluminum with hard anodize.
- 100 & 10 ml cylinders are acrylic plastic.
- Piston Seals are PTFE or nitrile rubber.
- Piston rods are aluminum (black anodize), stainless steel or polyamide thermoplastic.
- End plates, port adapters are POM, PET or PBT plastic.

**MAINTENANCE / SERVICE (RE-CALIBRATION)**

- Lubrication of seal should only be required once a year for the typical lab.
- For any re-conditioning, recalibration, replacing piston seals or replacing end cap o-rings, we encourage your returning syringe to us.
- The cost is nominal. We will Quote you a firm price after an evaluation of your Syringe. Contact Hans Rudolph, inc. for a Return Authorization Number (RAN).
- **A Rental Program** is available if your system must stay up and running. Contact Hans Rudolph, inc office for information.

**CAUTION:**

Use extreme caution when the Seal/Piston Assembly is removed from the cylinder for cleaning or repairs. This seal material is very soft and will not maintain a leak free condition if it is scratched or dented on the sealing edge.

ISO 9001 / ISO 13485

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ORDERING INFORMATION

P/N-Model No.
5520 Series 10ml Syringe - 1/2"(1.3cm) Diameter Cylinder. Has 2ml graduations with positive adjustable locking stop. Full volume stroke is 3" (7.6cm).

112380-5520A 10ml Syringe with 200271 Outlet 15mmOD/10.5mmID tapers
112381-5520B Replacement Outlet Port Adapters for 10 ml Syringes
200271 Outlet Adapter 15mm OD/10.5mmID tapers
200272 Outlet Adapter 22mmOD/15mmID tapers

5540 Series 10ml Syringe - 1 1/4"(3.2cm) diameter cylinder. Has 20ml graduations with positive adjustable locking stop. Full volume stroke is 5" (12.7cm).

112378-5510A 100ml Syringe with 200269 Outlet, 15mmOD/10.5mmID tapers
112379-5510B Replacement Outlet Port Adapters For 100ml Syringes
200269 Outlet Adapter 15mm OD/10.5mmID tapers
200270 Outlet Adapter 22mmOD/15mmID tapers

5550 Series 1/2L Syringe - 2 1/2"(6.35cm) diameter cylinder. Has 50 ml graduations with positive adjustable locking stop. Full volume stroke is 6 1/4"(15.78cm).

112742-5550 1/2 Liter Syringe with 200264 Outlet, 1 3/8"(35.5mm)OD/ 1 1/8"(28.6mm)ID
112743-5550A 1/2 Liter Syringe with 200265 Outlet, 1 3/4"(44.5mm)OD/ 1 1/8"(28.6mm)OD (Long OD tapered outlet)
112744-5550B 1/2 Liter Syringe with 200266 Outlet, 22mmOD/15mmID tapers
112745-5550C 1/2 Liter Syringe with 200267 Outlet, Fits over 2"(50.8mm)OD with 0-Ring slip fit
112746-5550D 1/2 Liter Syringe with 200268 Outlet, 1 1/8"(28.6mm)OD/22mmID taper

5570 Series 3L Syringe - 4"(10.2cm) diameter cylinder. Has 100 ml graduations with adjustable locking stop. Full volume stroke is 13 3/8" (34.5cm).

112028-5530 3 Liter Syringe with Integral Outlet 1 3/8"(35mm) OD/ 1 1/8"(28.6mm)ID
112231-5530A 3 Liter Syringe with 200265 Outlet 1 3/4"(44.5mm)OD/ 1 1/8" (28.6mm)ID (Long OD tapered outlet)
112232-5530B 3 Liter Syringe with 200266 Outlet 22mmOD/15mmID tapers
112233-5530C Replacement Outlet Port Adapters For 300ml Syringes
112234-5530D 3 Liter Syringe with 200267 Outlet Fits over 2"(50.8mm)OD with 0-Ring slip fit
112257-5530D 3 Liter Syringe with Integral Outlet 1 1/8"(28.6mm)OD/22mmID taper

5590 Series 5L Syringe - 4"(10.2cm) diameter cylinder. Factory set for 3000 Liter volume stroke displacement - Not adjustable.

113391-5570 5 Liter Syringe with Integral Outlet 1 3/8"(35mm) OD/ 1 1/8"(28.6mm)ID
113638-5570A 5 Liter Syringe with 200265 Outlet 1 3/4"(44.5mm)OD/ 1 1/8" (28.6mm)ID (Long OD tapered outlet)
113611-5570B 5 Liter Syringe with Integral Outlet 1 1/8"(28.6mm)OD/22mmID taper
113392-5570D 5 Liter Syringe with Integral Outlet 1 1/8"(28.6mm)OD/22mmID taper

4900 Series 7L Syringe - 6"(15.2cm) diameter cylinder. Has 100ml graduations with adjustable locking stop. Full volume stroke is 15" (38.1cm).

110922-4900 7 Liter Syringe with 200264 Outlet 1 3/8"(35mm)OD/1 1/8" (28.6mm)ID
112234-4900A 7 Liter Syringe with 200265 Outlet 1 3/4"(44.5mm)OD/1 1/8" (28.6mm)OD (Long OD tapered outlet)
112235-4900B 7 Liter Syringe with 200266 Outlet 22mmOD/15mmID tapers
112236-4900C 7 Liter Syringe with 200267 Outlet Fits over 2"(50.8mm)OD with 0-Ring slip fit
112568-4900D 7 Liter Syringe with 200268 Outlet 1 1/8"(28.6mm)OD/22mmID taper

Recalibration of your Syringe, Contact Hans Rudolph, inc. for Return Authorization Number (RAN):
955004 Recalibration of 4900 Series 7 Liter Calibration Syringe
955052 Recalibration of 5570 Series 3 Liter Calibration Syringe
955035 Recalibration of 5530 Series 3 Liter Calibration Syringe
955036 Recalibration of 5540 Series 1 Liter Calibration Syringe
955037 Recalibration of 5550 Series 1/2 Liter Calibration Syringe
955038 Recalibration of 5510 Series 100 ml Calibration Syringe
955039 Recalibration of 5520 Series 10 ml Calibration Syringe
955051 Dead Space Measurement of New Syringe, (All Series)

IN-COMING CALIBRATION REPORT - on returned calibration syringe. This report must be requested at time of obtaining Return Authorization Number (RAN). 5-7 Data points will be checked with pass or fail indications.
955312 In-Coming Calibration on 4900 series 7 liter calibration Syringe
955315 In-Coming Calibration on 5570 series 3 liter calibration Syringe
955311 In-Coming Calibration on 5530 Series 3 liter Calibration Syringe
955310 In-Coming Calibration on 5540 Series 1 liter Calibration Syringe
955309 In-Coming Calibration on 5550 Series .5 liter Calibration Syringe
955308 In-Coming Calibration on 5510 Series 100 ml Calibration Syringe
955307 In-Coming Calibration on 5520 Series 10 ml Calibration Syringe

CERTIFICATE OF CALIBRATION - Provides National Institute of Technology (NIST) traceability to Hans Rudolph, inc. syringe test standards and actual volume calibration data (5-7 points) on your syringe with stated accuracy.
955306 Certificate of Calibration on 4900 series 7 liter calibration Syringe
955316 Certificate of Calibration on 5570 series 3 liter calibration Syringe
955305 Certificate of Calibration on 5530 Series 3 liter Calibration Syringe
955304 Certificate of Calibration on 5540 Series 1 liter Calibration Syringe
955303 Certificate of Calibration on 5550 Series .5 liter Calibration Syringe
955302 Certificate of Calibration on 5510 Series 100 ml Calibration Syringe
955301 Certificate of Calibration on 5520 Series 10 ml Calibration Syringe

NIST TRACEABILITY of your Rudolph Volume Calibration Syringe with 5 to 10 times greater accuracy than standard certificate of calibration. Hans Rudolph, inc. will certify the volume displacement of any specified reading(s) per your request. The price includes standard certificate of recalibration/calibration. The price is per graduation mark (contact HRI for special pricing on 5 or more points per syringe).
955046 Certificate of Traceability to NIST (Syringe Volume Setting).

CLEANING
This product requires special cleaning and care, which is described in our Cleaning, Disinfection, Sterilization and Maintenance Data Sheet 691203. Request this data sheet if not already in your possession. Make sure you fully comprehend this 691203 data sheet before proceeding with cleaning a Rudolph product.

APPLICABLE STANDARDS FOR MEDICAL TAPERED CONNECTIONS:
7.5mm, 10.5mm, 15mm, 22mm & 30mm

The 15mm, 22mm and 30mm tapered male and female diameter fitting connections are manufactured in accordance with the applicable standards as follows:

All 7.5mm and 10.5mm male and female diameters are also tapered.
Hans Rudolph, inc. has designed and manufactured these two sizes with parameters similar to the 15mm and 22mm standards. diameters other than the above five sizes are straight unless otherwise noted.

GENERAL INFORMATION
• Packaged: Individually polyethylene bagged and shipped clean, non-sterile.

REFERENCE