

# METROPOLITAN NY CHAPTER Refrigeration Service Engineers Society

*Continuing Education for the HVAC/R Industry*

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**September 2017**

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## Recovery Cylinder Capacities

Working with refrigerant recovery cylinders is a basic part of servicing refrigeration systems. Technicians need to work safely when handling these cylinders. A potential hazard can result from overfilling these cylinders. To prevent overfilling, recovery cylinders should not be filled to more than 80% of their internal volume.

Most technicians will accomplish this by placing their recovery cylinders on an electronic scale and monitoring the weight of the cylinder during the recovery process. When the recovery cylinder reaches a weight equal to 80% of its total capacity a technician will stop the recovery process and change cylinders, if needed. In order to use this method effectively a technician must know the cylinder's weight that would equal 80% of its maximum capacity. This maximum weight will vary slightly as different refrigerants are used in a recovery cylinder and different refrigerants have different liquid densities.

There are two basic ways to accurately determine the maximum weight of a recovery cylinder: 1) the recovery cylinder manufacturer can publish this data for various refrigerants, or 2) a technician can calculate this value.

To determine this value, use the following procedure:

First, calculate the internal volume of the recovery cylinder being used. This can be accomplished by dividing the water capacity of the cylinder by the density of water, which is 62.5 lb/ft<sup>3</sup>. The water capacity of a recovery cylinder will normally be stamped on the outside of the cylinder. For example, if a recovery cylinder has a water capacity of 47.17 lbs., then its internal volume will be 0.75 ft<sup>3</sup> (47.17 lbs ÷ 62.5 lb/ft<sup>3</sup> = 0.75ft<sup>3</sup>).



ft<sup>3</sup> = 0.75ft<sup>3</sup>).

Next, for the refrigerant to be recovered, determine its liquid density at a saturation temperature of 130°F. Refrigerant manufacturers publish the various saturation properties of their refrigerants which includes the liquid density at various saturation temperatures.

For example, if R-134a were the refrigerant to be recovered, its liquid density at a 130°F saturation temperature is 67.46 lb/ft<sup>3</sup>.

Next, determine the tare weight of the recovery cylinder, which is the weight of the cylinder if it were empty. This is also stamped on the outside of the recovery cylinder. For example, if using a nominal 50 lbs. recovery cylinder, the tare weight would be 24 lbs.

Next, use the following formula to determine the maximum cylinder weight:

Maximum Cylinder Weight = (Cylinder Volume x Liquid Density of the Refrigerant at 130°F x 0.80) + Tare Weight

For example, if the cylinder holding R-134a with a liquid density of 67.46 lb/ft<sup>3</sup> at 130°F saturation temperature had a water capacity of 47.17 lbs. and a tare weight of 24 lbs, the maximum cylinder weight would be:

Cylinder volume = water capacity (w.c.) ÷ density of water (62.5 lb/ft<sup>3</sup>)

Cylinder volume = 47.17 lbs ÷ 62.5 lb/ft<sup>3</sup> = 0.75ft<sup>3</sup>

Maximum Cylinder Weight = (0.75 ft<sup>3</sup> x 67.46 lb/ft<sup>3</sup> x 0.80) + 24 lbs = 64.48 lbs.

For safe operation a technician should not continue to fill this recovery cylinder once its weight has exceeded 64.48 lbs. Again, overfilling a recovering cylinder can lead very serious injury.

### Ladder Safety

Below are some safety conditions to observe when working with ladders:

- Do not hand carry loads on a ladder.
- Do not try reaching so far that you lose your balance; move the ladder instead.
- Do not stand on the ladder's top three rungs.
- Non-skid feet or spurs may prevent a ladder from slipping on a hard, smooth surface.
- Always inspect a ladder for damage before using.
- The base should be spaced 1 foot away for every 4 feet it reaches up.

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### ***PRESIDENT'S MESSAGE***

Welcome back from what I hope was a safe and profitable Summer. Stan Hollander CMS is working on setting up interesting and informative speakers. However, he can use your help. In the past we have focused on product information and knowledge. However, there are many other aspects of this business that may be of interest to you. With the heating season starting soon are there things you are weak in and could use a refresher on? When replacing a 80% efficient furnace with a 98% efficient is there anything else you need to consider? Please give this some thought. Our goal is to educate our members and what you want matters. Contact Stan Hollander CMS at [EducationalDirector@metronyrses.org](mailto:EducationalDirector@metronyrses.org) with your suggestions.

# **RSES MEMBERSHIP BENEFITS**

RSES member benefits go beyond training and education, however. Members qualify for special discounts on all of RSES training and educational materials, International Seminars and the RSES Annual Conference. They also receive:

A subscription to the **RSES Journal** the premiere industry monthly magazine.

Access to the entire contents of the **Service Application Manual** online.

Networking Opportunities Chapter meetings, State and Regional conferences provide members the opportunity to network with peers and build valuable personal and professional relationships within the HVACR industry.

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**RSES Technical Institute** is a comprehensive course of study designed to help members who desire to attain the highest levels of technical competency within the HVACR industry. Upon joining RSES, student members are inducted as Student (Student Technician) and individual members are inducted as a Level 1 (Technician). Individual members have the opportunity to advance levels through course participation or by passing required exams. On-line study courses are also available.

**Certificate Member, Certificate Member Specialist and Specialized Member** are classifications of RSES membership exclusive to RSES members (with the exception of student members). This status signifies to customers, employers and the entire HVACR industry your knowledge and commitment to excellence and improvement.

**RSES OnLine Career Center** – <http://jobs.rses.org> – A resume and job posting hub where employers with job openings can connect with technicians seeking new employment.

**RSES Partners in Education** - Entry into this members-only section of the RSES website features exclusive access to the section highlighting technical data from a number of original equipment manufacturers.

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**The MSAC Hotline**, Manufacturers Service Advisory Council, is an exclusive feature of RSES Journal. MSAC is comprised of longtime industry experts who answer technical questions submitted by readers. Members enjoy free access to this benefit in the magazine and online.

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