

PPE CASE Notes

Personal Protective Equipment Conformity Assessment Studies and Evaluations Notes

The National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) monitors issues related to self-contained breathing apparatus (SCBA). The NIOSH FFFIPP has identified a potential hazard associated with rapid filling of compressed breathing air cylinders and the associated latent pressure/breathing time loss. Rapidly filling a breathing air cylinder, also known as “hot filling,” generates excessive heat and can result in a loss of pressure as the cylinder cools leaving the user with reduced breathing air. Fire departments should ensure that cylinders are stored fully charged to maximize use and capacity.

Hot Filling Hazards with SCBA Air Cylinders

ISSUES IDENTIFIED

- Many fire departments use higher pressure cylinders (i.e., 4500 and 5500 psi cylinders with 30, 45, 60, and 75-minute durations) that require slower fill rates for **routine** filling.
- Rapid fills, or “hot fills” of higher-pressure cylinders can result in **lower operating pressures** after the compressed air cools, **decreasing the amount of breathing air** for firefighters if not properly topped off.
- Higher pressure cylinders **may require** greater compressor and/or cascade system capacity to safely and completely fill cylinders to their full operating pressure.

BEST PRACTICE REMINDERS

- Ensure performance at the rated capacity by filling the cylinder to the proper operating pressure, at the proper fill rate, per the manufacturers’ guidelines. Remember that the rated **service time is based on a full cylinder**.
- Know the SCBA and compressor manufacturers’ guidelines regarding cautions and hazards of over pressuring a cylinder.
- Develop and implement standard operating guidelines for filling higher pressure cylinders to achieve full operating pressure and breathing air capacity, including topping off as needed.
- Consider upgrading the capacity of the breathing air fill systems in the department when upgrading to the higher-pressure cylinders. Verify with the SCBA and air fill system manufacturers that the system(s) can fill the expected number of cylinders to capacity.
- Ensure personnel who operate compressors and cascade systems to fill SCBA cylinders are trained per the manufacturers’ instructions and qualified as part of the department’s respiratory protection program.
- Refer to SCBA and compressor manufacturers’ guidelines providing direction on cylinder filling, as well as other important resources—for example, current editions of [NFPA 1989](#), [NFPA 1852](#), [NFPA 1500](#), and [NFPA 1901](#).



Photo courtesy of Suffolk Fire and Rescue

Bottom Line

All SCBA cylinders should be filled per the manufacturer’s guidelines. A hot filled cylinder will have less breathing air and must be topped off after it cools. Those responsible for filling cylinders should be trained on the proper techniques to achieve the correct cylinder operating pressure.

Get More Information

Find NIOSH products and get answers to workplace safety and health questions:
1-800-CDC-INFO (1-800-232-4636) | TTY: 1-888-232-6348
CDC/NIOSH INFO: cdc.gov/info | cdc.gov/niosh
Monthly NIOSH eNews: cdc.gov/niosh/eNews
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