

Washington Township Fire Department Standard Operating Procedure

Division 200: Emergency Operations
Section 203: Fire Suppression
Subject 203.03: Air 42 SCBA Cascade System
Supersedes: Training Bulletin 93-03-4



Approved By:

Date: March 31, 2005

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PURPOSE:

To establish a uniform and safe procedure for the operation and recharging of the Air 42 cascade system.

RESPONSIBILITY:

It shall be the responsibility of all members using this system to have been trained in its proper use. Further, this procedure shall be strictly adhered to whenever using the Air 42 cascade system.

PROCEDURES:

The Air 42 Cascade System consists of six, 6,000 psi Department of Transportation (DOT) "H" steel cascade cylinders, control panel, fragmentation tanks, booster pump, and associated high pressure piping and adapters.

SAFETY PROCEDURES

1. There will be No Smoking in, or within thirty feet, of the vehicle due to the oxygen cascade carried on the vehicle.
2. The booster pump auto shut down is set at 6,000 psi.
3. Always check to ensure that all cylinders are within the proper hydro test dates.
4. Make sure the regulator is set to the proper pressure for the cylinders being filled. The regulator should never be set higher than 4,700 psi.
5. Whenever using, filling or recharging any elements of this system, members shall use any and all necessary safety equipment to prevent any injury to themselves or others. This especially applies to the use of hearing protection when ambient noise levels exceed, or are expected to exceed, 90 decibels.

PERIODIC INSPECTIONS

A member trained in the proper use of the Cascade System will perform weekly and daily equipment checks of Air 42.

1. Check to see that the two bottle fill valves are shut on the control panel.
2. Slowly open all valves on the top of the six steel cascade cylinders.
3. Compare the pressures for each cascade cylinder on the control panel to the last entry in the log book. Update any discrepancy in the log book.
4. If cascade cylinders 4,5, or 6 are below 4,500 psi, the vehicle must be recharged (see Recharging Air 42 Cascade System).
5. If the regulator pressure is not set at zero, turn the valve counterclockwise to zero. (Do NOT tighten the regulator knob as this damages the valve seat.)
6. Turn off all six cascade cylinder valves.

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7. Check to see that cascade cylinders have a current hydrostatic test date for steel cylinders. (A hydrostatic test is in effect for five years.) If not current, immediately write an AVO or Speedy Reply to the Station 42 Career Lieutenant.
8. Write an AVO to the Station 42 Career Lieutenant to notify that person of any problems that you find. If the cascade system must be taken out of service, telephone the Fire Alarms Operator (for chief officer notification) and the Station 42 Career Lieutenant.
9. Assure that air is turned off at cascade cylinder valves. It is not necessary to bleed pressure from the lines.

FILLING AIR PACK CYLINDERS

The filling of air pack cylinders with the cascade on Air 42 will fall into two categories. The first is without utilizing the booster pump and the second is utilizing the booster pump. The function of the booster pump is to boost the pressure from the supply source to a higher pressure. For example, the cascade cylinders are at 300 psi, the booster pump will take this air and “boost” it to 4,500 psi (or whatever pressure the relief valve is set at, up to 6,000 psi.)

1. Separate the air pack cylinders to be filled into either the low pressure group (1800-2200 psi) or the high pressure group (4,500 psi).
2. The high pressure group of air pack cylinders should be filled first. To fill the low pressure air pack cylinders group, proceed to Step 17, Filling Air Pack Cylinders-Low Pressure.

When filling only a few air pack cylinders, it will not be necessary to utilize the booster pump. In this case, booster pump Valve 3 is opened and Valve 1 and Valve 2 are off. Proceed to Filling Air Pack Cylinders-High Pressure.

FILLING AIR PACK CYLINDERS-HIGH PRESSURE

3. Check the air pack cylinders for the most recent hydrostatic test date.

Aluminum	within 3 years of stamped date
Aluminum/fiberglass composite	within 3 years of stamped date
Carbon fiber	within 5 years of stamped date
Steel	within 5 years of stamped date

Place a red tag (Out of Hydro) on any air pack cylinder found out of test and NEVER fill any cylinders that are out of test.
4. Visually inspect the remaining air pack cylinders to be filled for cleanliness, dents, deep gouges, damaged valves, signs of obvious damage (including unraveling), problems with the pressure gauge, etc. Do NOT fill any air pack cylinder found with any type of damage, and place a Repair Tag on any air pack cylinder found with the above mentioned problems.
5. To set the regulator to 4,700 psi for filling, open a cascade cylinder that has 300 to 400 psi over the 4,500 psi reading, and turn the regulator knob CLOCKWISE until the regulator gauge shows 4,700 psi. Open all of the other cascade cylinders and proceed with filling the air pack cylinder(s).
6. Select two air pack cylinders to be filled that have pressure readings similar to each other. i.e., empty and 500, 2,000 and 3,000, 3,000 and 3,500, etc.
7. Place the air pack cylinder(s) in the fragmentation tank and connect the fill hose(s) to the air pack cylinder(s).
8. Check the bleed off valve(s) to see that they are in the CLOSED position.
9. Open the valve(s) on the air pack cylinder(s).

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10. Select the cascade cylinder with the next highest pressure than the air pack cylinder(s) and open the valve SLOWLY until you hear air entering the cylinder. The process should take approximately fifteen minutes (for 4,500 psi cylinders) when the air pack cylinder is completely empty; use your best judgment and ensure that the air pack cylinder(s) are filled slowly. Monitor the gauges and adjust the valve for the bank as necessary.
11. After the pressure in the cascade cylinder and the air pack cylinders being filled equalize, close the cascade cylinder knob and proceed to the next HIGHER pressure cascade cylinder and repeat Steps 8 & 9 until 4,700 psi is reached. (filling the 4,500 psi air pack cylinders to 4,700 psi will drop to approximately 4,500 psi after the air pack cylinder(s) cool.)
12. Shut the last cascade cylinder knob used, as well as the air pack cylinder.
13. Bleed off the air from the air fill lines by opening the bleed off valves on top of the fill lines.
14. Remove the air pack cylinder(s) from the fragmentation tank and return to Step 6 to continue filling additional air pack cylinders.
15. After all high pressure air pack cylinders have been filled, proceed to fill any low pressure air pack cylinders (Step 4).
16. Go to Shut Down Procedure (Step 19).

FILLING AIR PACK CYLINDERS-BOOSTER PUMP

When filling several air pack cylinders it will be more efficient to utilize the booster pump using the cascade air in bulk. To fill in bulk, open all six cascade valves and fill station valves to equalize the system pressure. Follow Steps 3-9 in Filling Air Pack Cylinders-High Pressure. Open the fill valves. Booster pump Valve 3 is open and Valve 2 is off. When cascade pressure falls below 4,700 psi, booster Valve 1 is opened SLOWLY and the air pack cylinder is then filled to the proper pressure. You will hear the booster pump operating (the greater the supply, the faster the pump will operate). After the air pack cylinders are filled, follow Steps 12 through 16.

FILLING AIR PACK CYLINDERS-LOW PRESSURE

- ~~17.~~ Set the pressure regulator for the low pressure air pack cylinder by obtaining the air pack cylinder pressure from one of the air pack cylinders to be filled (usually 2,215 psi). Open a cascade cylinder with 300 to 400 psi more than the 2,215 psi needed, and adjust the pressure regulator to 1,800 psi or 2,200 psi. Low pressure air pack cylinders can not be over filled unless the most recent hydro test date has a (+) next to it. If the (+) is present, the bottles can be filled 10% more than the DOT stamped pressure.
18. Obtain the low pressure adapter(s) from the SCBA Tool Box and attach them to the fill hose(s). Proceed to fill the air pack cylinder(s) as you would fill a high pressure air pack cylinder. (Steps 3-4 and 6-14.) Remember to check the hydrostatic test date table in Step 3 above for information.

SHUT DOWN PROCEDURE

19. If used, remove the low pressure adapter(s) and return them to the SCBA Tool Box.
20. Record all six cascade cylinder pressures on the log and shut off all six cascade cylinder valves.
21. If cascade cylinders 4, 5 or 6 are below 4,500 psi, proceed to the breathing air compressor to recharge the cascade system.

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RECHARGING AIR 42'S CASCADE SYSTEM

NOTE: Do not tighten down valves more than what is necessary otherwise damage can result.

1. Obtain the gray cascade recharge line located in the cascade room.
2. Prior to attaching the hose to the compressor you must ensure that the remote fill gauge located at the bottom right of the compressor is at zero. If it is not, first ensure that the remote fill control valve is closed by turning it completely clockwise. Then bleed the system off by turning the bleed valve (located below control remote fill valve) counterclockwise until gauge reads zero.
3. Locate the long male fitting on the recharge hose and connect it into the remote fill outlet.
4. Attach the opposite end to the Air 42 refill connection (located on the right side of the control panel.)
5. Open all the cascade cylinders on Air 42 that are to be filled.
6. Equalize the cascade cylinders that are to be filled by slowly opening each cascade cylinder valve located at the control panel of Air 42 until all open cascade cylinders have the same pressure.
7. Open the remote fill control valve on the compressor by turning it counterclockwise.
8. Air 42 now ready to be filled; this can be accomplished in two different ways. Either by using the compressor or by using the fixed cascade cylinders. If Air 42's cascade cylinders just need to be topped off or if you must fill the system and return to an emergency scene, using the fixed cascade cylinders is the preferred method due to the reduced time it takes to fill the system. If several cylinders are low or time is not an issue, using the cascade compressor is preferred.

Procedure for using cascade cylinders:

1. To begin filling start with the lowest bank that is higher than Air 42's cascade cylinders pressure. Slowly open the bank valve until you hear air moving through the system. Once air movement has stopped and the system has equalized, turn off the bank valve and proceed to the next highest bank following the same procedure using as many banks as it takes to fill the system. (Note: If several cascade cylinders on Air 42 are very low or empty, filling the system using the fixed cascade cylinders may not completely fill the system.)

Procedure for using compressor:

1. Before the compressor is used to fill Air 42's system, the oil level should be checked. The oil level sight glass is located behind the upper access panel on the left end of the unit.
2. Turn on the compressor with the green ON/OFF switch located next to the Emergency Stop Button. (Note: it is very important that the door to the cascade room remain open anytime the compressor is running.)
3. The compressor will automatically shut off when Air 42's cascade cylinders **and** the fixed cascade bottles are full (6000 psi). If several cascade cylinders are low, the filling process could take up to two hours. It is not necessary to remain at the station while the compressor is running, but arrangements need to be made to disconnect the fill hose and turn off the cascade cylinders to Air 42. Verbal contact with either the Shift Commander or Attack 41 crew should establish this responsibility.
9. Once the filling is complete, shut all valves at the fill station and the cascade cylinder valves on Air 42. Bleeding off the system on Air 42 is not recommended.

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10. Turn off the remote fill control valve on compressor and bleed off the fill hose until remote fill gauge reads zero.
11. Disconnect the fill hose at the compressor and Air 42. Roll the hose up and place back in Cascade Room.
12. Update Air 42's cascade cylinder logbook.

References