

During the evaluation of the 5500 psi Air-Pak SCBA and cylinder technology, the effects of the higher pressure in relation to the current charging systems is often asked. There are two different methods for filling cylinders. The first is using a compressor system with storage cylinders. The other method is to use a cascade system or bank of cylinders. The purpose of this white paper is to provide accurate information for users about the filling of 5.5 cylinders by conducting tests using actual 5.5 cylinders.

The first test was conducted to compare a compressor’s ability to fill 5.5 cylinders and an equivalent duration 4.5 cylinder.

### Principle of Testing:

- The first test cycle conducted was the baseline and determined the number of 4500 psi cylinders that could be filled in an hour.
- The second test cycle determined the equivalent duration 5500 psi cylinders that could be filled in an hour.
- The testing used the same compressor system for both sets of tests.
- Each cylinder was completely drained prior to filling (no residual air in the cylinders).
- The same individual was used to fill both sets of cylinders to eliminate individual performance variance from the testing.

30 Minute Cylinders		45 Minute Cylinders	
Compressor:	Scott Liberty I Mobile Air System with 20 hp Ingersoll-Rand compressor	Compressor:	Scott Liberty I Mobile Air System with 20 hp, 6000 psi Ingersoll Rand compressor
Storage:	Four (4) ASME cylinders plumbed as bulk	Storage:	Four (4) ASME cylinders plumbed as bulk
Charge Station:	Scott RevolveAir Charge Station	Charge Station:	Scott RevolveAir Charge Station
Cylinders Tested:	Scott 4.5 30’ Cylinder (45 cubic feet capacity) Scott 5.5 30’ Cylinder (45 cubic feet capacity)	Cylinders Tested:	Scott 4.5 45’ Cylinder (65 cubic feet capacity) Scott 5.5 45’ Cylinder (65 cubic feet capacity)
<b>Results:</b>		<b>Results:</b>	
Number of 4.5 Cylinders Filled:	43	Number of 4.5 Cylinders Filled:	33
Number of 5.5 Cylinders Filled:	43	Number of 5.5 Cylinders Filled:	30

The above testing demonstrates that the use of 5500 psi cylinders will not have an adverse affect on the filling capabilities of a compressor system. This will enable a department to enjoy the benefits of the 5.5 cylinder technology without having to incur additional infrastructure costs.

The second test conducted at Scott Safety was to compare the output of a cascade system for both 4.5 and 5.5 cylinders.

## Principle of Testing:

- The first test cycle conducted was the baseline and determined the number of 4500 psi cylinders that could be filled with a cascade system.
- The second test cycle determined the number of equivalent duration 5500 psi cylinders that could be filled with a cascade system.
- The testing used the same cascade system for both sets of tests.
- Each cylinder was completely drained prior to filling (no residual air in cylinders).
- The same individual was used to fill both sets of cylinders to eliminate individual performance from the testing.

30 Minute Cylinders	
Cascade Storage:	Four (4) 6000 psi ASME cylinders plumbed as bulk with SmartFill Auto Cascade
Charge Station:	Scott RevolveAir Charge Station
Cylinders Tested:	Scott 4.5 30' Cylinder (45 cubic feet capacity) Scott 5.5 30' Cylinder (45 cubic feet capacity)
<b>Results:</b>	
Number of 4.5 Cylinders Filled:	20
Number of 5.5 Cylinders Filled:	13

45 Minute Cylinders	
Cascade Storage:	Four (4) 6000 psi ASME cylinders plumbed as bulk with SmartFill Auto Cascade
Charge Station:	Scott RevolveAir Charge Station
Cylinders Tested:	Scott 4.5 45' Cylinder (65 cubic feet capacity) Scott 5.5 45' Cylinder (65 cubic feet capacity)
<b>Results:</b>	
Number of 4.5 Cylinders Filled:	13
Number of 5.5 Cylinders Filled:	8

The above testing demonstrates that a true cascade system can provide filling capabilities for the 5500 psi cylinders albeit at a decreased yield due to the smaller pressure difference between the cascade cylinders and the SCBA cylinders.

Regardless of your air-filling system, the 5500 psi cylinders can still be easily filled with either a cascade filling system or a compressor filling system.

Sincerely,



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Scott Safety