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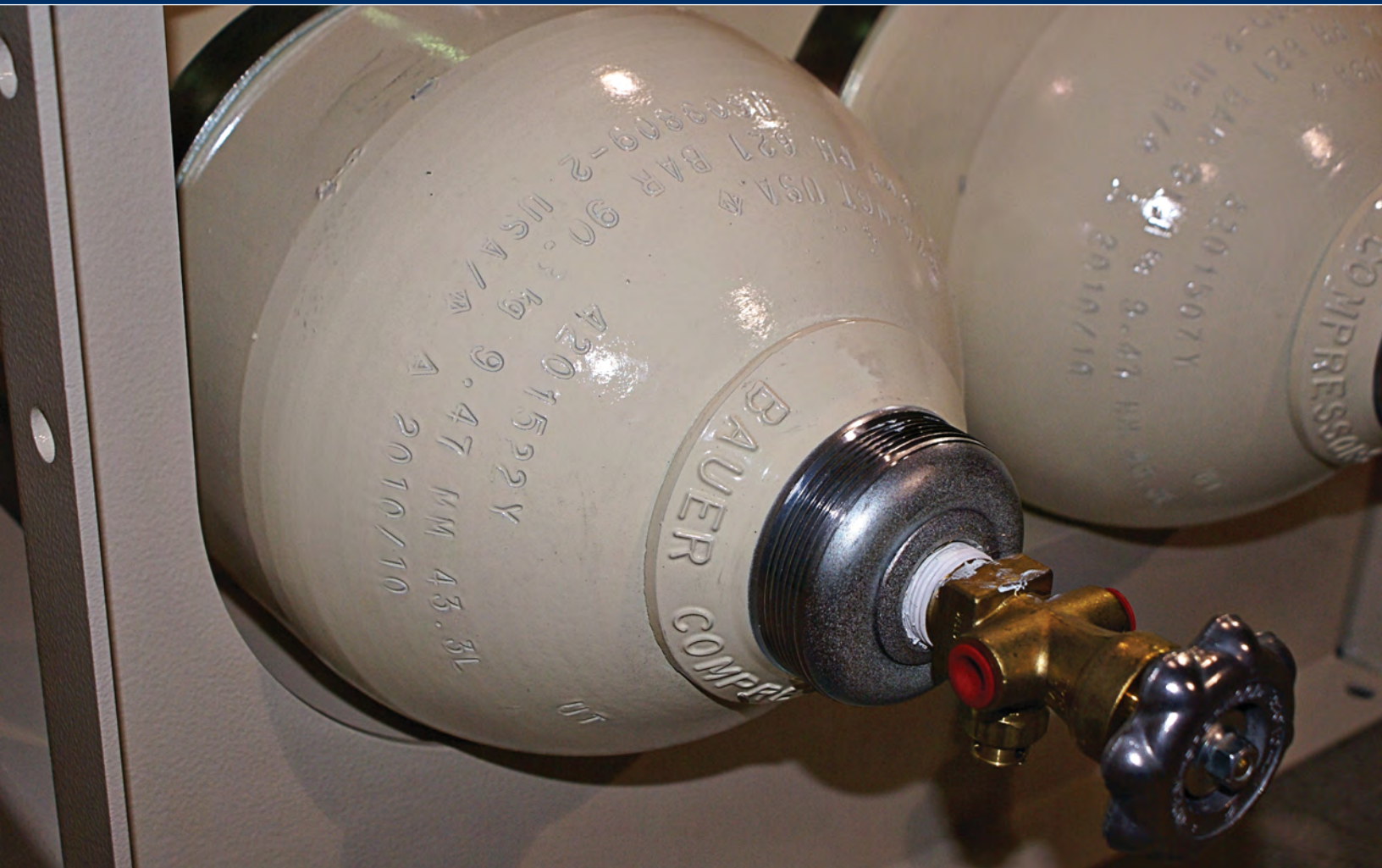
NITROGEN

HELIUM

ARGON

STORAGE SYSTEM SOLUTIONS

UN and ASME



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› Stored energy

MISSION STATEMENT

To be the global leader by supplying the best quality product while continuously improving through innovation.

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High pressure

ENERGY IN RESERVE

When an application requires storage, either in the form of a single cylinder or multiple cylinders, arranged either for bulk or in banks for cascading, a properly sized storage system offers many benefits to the compressed air/gas system. The main purpose of storage is to serve as a reservoir to handle constant, sudden or unusually high demands for air/gas that can exceed the capacity of the compressor. Storage protects the compressor from the direct demand of the system as well as serving to dampen or eliminate pressure pulsations to the system.

Each high pressure application must be carefully reviewed to determine the best type and size of storage to use. The cost of equipment as well as operational and maintenance costs can be reduced by properly matching the compressor to the storage system. BAUER recommends that the compressor does not start more than 4 times per hour to avoid short-cycling of the compressor. Short-cycling can be detrimental to the compressor, motor, compressor control system and to the high pressure system. This brochure will serve as a guide to selecting the best storage system solution for your application.

The volume of storage required for a specific application depends upon:

- Consumption rate of the system
- Capacity of the compressor/booster
- Deadband of the final pressure sensor

STORAGE SIZING

Bulk storage for limiting the number of compressor starts to 4 times per hour can be calculated by the following formula:

$$VR = 58 \times (QC / \Delta P)$$

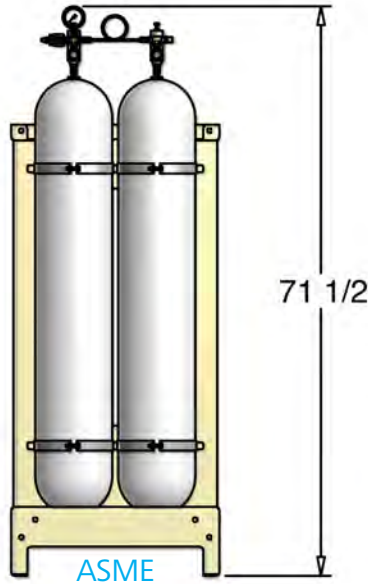
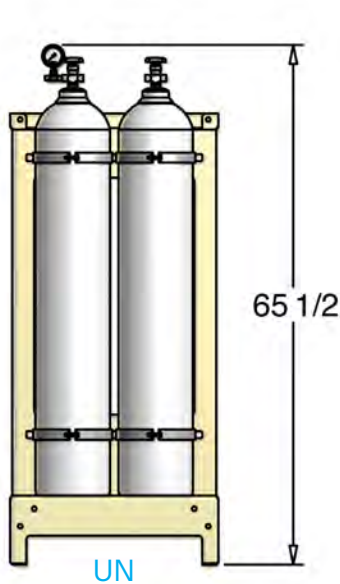
Where:

- **VR** = Volume of storage, cubic feet water volume
- **QC** = Capacity of compressor, standard cubic feet per minute (scfm)
- **Δ P** = Approximate deadband of final pressure sensor, pounds per square inch differential (psid).

Multiple cylinders and banks can be used for applications that require a large volume of storage. Contact BAUER for sizing storage with multiple banks for cascading.

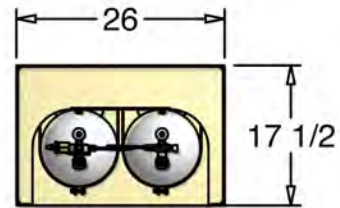


REFERENCE ASY-0759 FOR VERTICAL CONFIGURATIONS
AND ASY-0758 FOR HORIZONTAL CONFIGURATIONS



Model	Weight*	
	lbs	kg
UN 4500	455	206
UN 5000	475	215
UN 6000	525	238
ASME	935	424

*2-cylinder rack with bottles.



TECHNICAL DATA

BAUER is knowledgeable in the application of storage to medium and high pressure applications. We offer cylinders for storage to meet the code requirements of either the American Society of Mechanical Engineers (ASME) or the United Nations (UN) Model Regulations (ISO 9809-PART 2). The table below provides a summarization of technical data for cylinders offered by BAUER when storing air. Refer to the back page of this brochure for technical data when storing inert gases.

Model	Spec	Cylinder valve	Pressure ratings		Water volume		Volume ¹⁾	Dimensions ²⁾ diameter-length		Weight ³⁾	
			working	test	in ³	ft ³		inches	mm	lbs	kg
CYL-0067	UN/ISO	DUAL-OUT 1/4 NPTF	4500	6750	2750	1.59	437	9.41-55	239-1397	155	70
CYL-0068	UN/ISO	CGA-347	5000	7500	2750	1.59	472	9.41-56	239-1422	170	77
CYL-0069	UN/ISO	DUAL-OUT 1/4 NPTF	6000	9000	2640	1.53	510	9.41-56	239-1422	195	88
CYL-0009	ASME	ISOLATION	5000	10500	2590	1.47	436	9.62-55	244-1397	400	181
CYL-0009	ASME	ISOLATION	6000	10500	2590	1.47	491	9.62-55	244-1397	400	181
CYL-0009	ASME	ISOLATION	7000	10500	2590	1.47	534	9.62-55	244-1397	400	181

1) Air capacity at working pressure and 70 °F 2) Dimension includes cylinder valve on UN cylinders. 3) Cylinder only.

ASME CYLINDERS - ASME Section VIII, Division 1 latest edition for non-corrosive service only.

MAWP = 5250 psi, Appendix 22 MAWP = 7000 psi.

Contact BAUER for assistance. Dimensions and weight are approximate and are subject to change.

SYSTEM

All UN cylinders are shipped with a protective cap for the cylinder valve. Valve caps are shipped installed on loose cylinders and shipped loose with racked assemblies. The mandatory retest period for these UN cylinders is every ten (10) years. Under no circumstances are these cylinders to be filled to a pressure exceeding the marked service pressure at 70 °F.

> UN



3/4-NGT USA
 PW-310 PH 465
 ISO9809-2 USA

Type / Pressure Rating	Description
UN BULK Storage Assemblies	
4500 psig	Specify required number of CYL-0067. Assembly includes 1/4" 37 DEG flare inlet fitting, Check Valve, Pressure Gauge, interconnecting pigtailed if necessary to connect multiple cylinders to one another, 1/4" 30 DEG swivel outlet fitting.
5000 psig	Specify required number of CYL-0068. Assembly includes 1/4" 37 DEG flare inlet fitting, Check Valve, Pressure Gauge, interconnecting pigtailed if necessary, 1/4" 30 DEG swivel outlet fitting.
6000 psig	Specify required number of CYL-0069. Assembly includes 1/4" 37 DEG flare inlet fitting, Check Valve, Pressure Gauge, interconnecting pigtailed if necessary, 1/4" 30 DEG swivel outlet fitting.



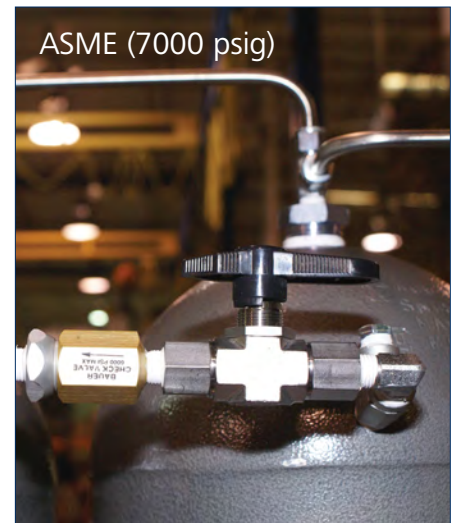
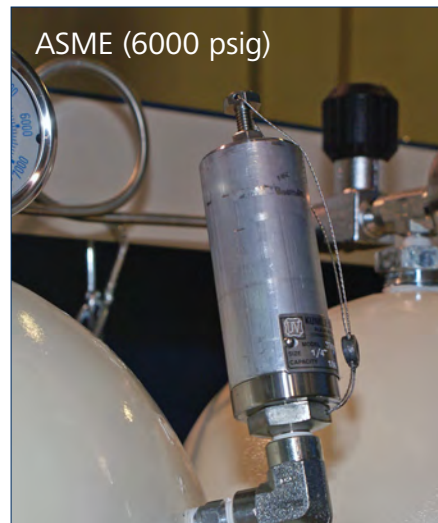
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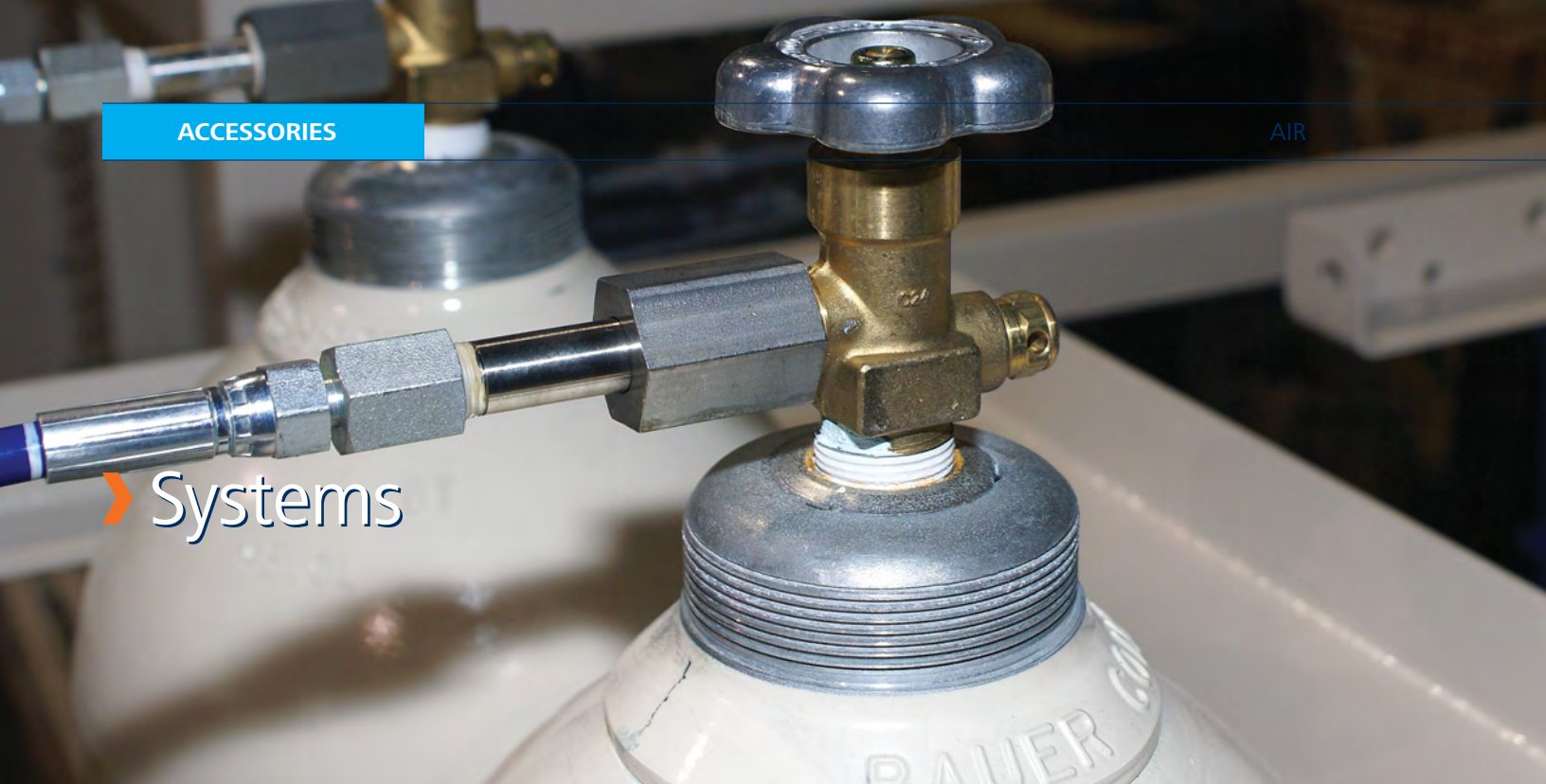
ARGON



Type / Pressure Rating	Description
ASME BULK Storage Assemblies	
5000 psig	Specify required number of CYL-0009 -each will be equipped with a Cylinder Valve. Each assembly includes at minimum a 1/4" 37 DEG flare inlet fitting, Check Valve, Cylinder Valve, Draining Valve, ASME Relief Valve, Pressure Gauge, interconnecting pigtails if necessary to connect multiple cylinders to one another, 1/4" 30 DEG swivel outlet fitting.
6000 psig	
7000 psig	



Systems

















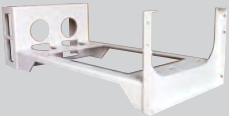



RELIABILITY

All panel mounted pressure regulators are supplied with pressure gauges for inlet and outlet pressures and a safety valve for overpressure protection of downstream components.

Each high pressure distribution system is carefully designed to include pressure indicating devices and safety, isolation, vent and drain valves as required. All panel mounted devices are clearly identified with labeling. More complex systems include a schematic diagram as part of the labeling for operator reference.

BAUER manufactures industry-leading distribution systems for several markets including SCBA cylinder refilling and gas-assist injection molding.

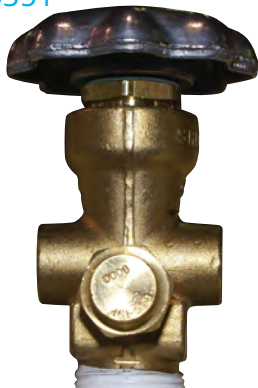
Model	Part number	Description
Valves (Line, Vent, Check)		
	VAL-0006	Line Valve, 1/4" NPT Female Inlet x 1/4" NPT Male Outlet
	VAL-0076	Panel mounted version of VAL-0006
	VAL-0316	Line Valve with Vent, 1/4" NPT Female. Vent Valve vents the downstream side of the valve.
	065126	Vent Valve, 1/4" NPT Female, 5000 psi
	VAL-0377	Vent Valve, 1/4" NPT Female x 1/4" NPT Male
	VAL-0140	Vent Valve, 1/4" NPT Male, 10,000 psi
	VAL-0007	Check Valve, 1/4" NPT Female Inlet x 1/4" NPT Male Outlet
	VAL-0176	Check Valve, 1/4" NPT Male Inlet x 1/4" NPT Female Outlet

Model	Part number	Description
Racks and rack accessories for UN and ASME Cylinders		
	ADP-0058	Adapter, CGA 347 Male x 1/4" NPT Female, Stainless steel.
	NUT-0043	Nut, CGA 347, Stainless steel. Use with NIP-0117.
	NIP-0117	Nipple, CGA 347 x 1/4" NPT Male, 3" length, Stainless steel with hard seat. Use with NUT-0043.
	VAL-0351*	Valve, dual outlet manifold valve for UN 4500 cylinders. Includes two (2) 1/4" NPTF ports and pressure relief device. Ports are 180° apart.
	VAL-0352*	Valve, dual outlet manifold valve for UN 6000 cylinders. Includes two (2) 1/4" NPTF ports and pressure relief device. Ports are 180° apart.
	VAL-0403*	Valve, CGA 347 for UN 5000 cylinders. Includes pressure relief device.
	RCK-0037	Universal two position steel rack. Designed for horizontal or vertical configuration and suitable for stationary or mobile applications. Multiple racks can be bolted together to form larger storage systems. Each rack includes four sets of cylinder clamps. (Your choice of CMP-0027 or CMP-0106.) Specify the type of cylinder and rack configuration at order placement. Reference drawings for available configuration schemes and dimensions. Mounting hardware for installation is not included.
	CMP-0027	Clamp set for ASME cylinders. Includes fastening hardware. (2 per cylinder is recommended.)
	CMP-0106	Clamp set for UN cylinders. Includes fastening hardware. (2 per cylinder is recommended.)
	UN-2**	Unistrut channel and two clamp sets, one for each UN cylinder. For use with UN cylinders only. Channel must be anchored to a vertical surface. Mounting hardware for installation of the rack is not included. See below for ordering racks for additional cylinder positions.

* Scope of supply may change based on availability from our suppliers.

** Additional mounting positions available. Change model name to reflect number of positions (i.e. UN-3, UN-4)

VAL-0351



VAL-0352



VAL-0403















➤ Piping

SAFETY

High pressure gas is used in a multitude of industrial applications. The design of a safe, efficient distribution system for a high pressure gas is critical to the successful use of that gas for a particular application. BAUER has over 60 years experience in the design and manufacture of distribution systems for high pressure. We have a reputation for providing safe, reliable, user-friendly distribution systems ranging from simple panels to complex systems controlled by a PLC and with touch-screen operator interface. Standard and custom designed systems are available.

BAUER uses only quality components that are specifically designed for high pressure. All components are applied within their design parameters and include a safety factor of up to 4 to 1.

For permanent installations, BAUER recommends the use of seamless stainless steel tubing. All tube runs are supported to prevent the transmission of vibration through the tubing and to the rest of the system. High pressure hose is used for non-permanent installations or where flexibility is required.

Model	Part number	Description
Pipe fittings		
	CON-0017	1/4" NPT Nipple with Hex Wrench Surface
	CON-0018	1/4" NPT Coupling with Hex Wrench Surface
	CON-0042	1/4" NPT Cross, Female
	ELL-0017	1/4" NPT Elbow, Female
	ELL-0018	1/4" NPT Elbow, Female x Male
	ELL-0058	1/4" NPT Elbow, Male
	PLU-0004	1/4" NPT Plug
	TEE-0012	1/4" NPT Tee, Female with Male Run
	TEE-0013	1/4" NPT Tee, Female
	TEE-0014	1/4" NPT Tee, Female with Male Branch
	TEE-0036	1/4" NPT Tee, Male with Female Branch
	TEE-0040	1/4" NPT Tee, Male

Model	Part number	Description
Regulators		
	REG-0003	Adjustable Regulator, 6000 psi in, 5000 PSI Out. 1/4" NPT Ports for Inlet, Outlet and 2 Gauge Ports.
Hose fittings, hose and hose assemblies		
	ADP-0004	Adapter, 1/4" NPT Female Swivel x 1/4" Male
	CON-0039	Pipe to Hose Connector, 1/4" NPT Male x 37° Flare (JIC)
	ELL-0031	Pipe to Hose Elbow, 1/4" NPT Male x 37° Flare (JIC)
	HOS-0120	2-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0121	3-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0123	5-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0125	10-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0127	15-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0128	20-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	HOS-0129	25-ft Hose, 6000 psi, 1/4" NPT Male x 37° Flare (JIC) Female Swivel
	BFFD-347	5-ft Fill Hose Assembly, 1/4" NPT Male x BFFD-347 Connector. Includes Line Valve with Vent and Pressure Gauge.
Tube fittings and tubing		
	CON-0030	1/4" Tube x 1/4" NPT Male
	ELL-0028	1/4" Tube Elbow x 1/4" NPT Male
	ELL-0056	1/4" Tube Elbow x 1/4" NPT Female
	TEE-0037	1/4" Tube Tee x 1/4" NPT Male Branch
	TEE-0038	1/4" Tube Tee x 1/4" NPT Male Run
	TEE-0039	1/4" Tube Tee x 1/4" NPT Female Branch
	TUB-R-0011	Seamless Stainless Steel Tubing, 1/4" OD x 0.049" wall thickness. Rated to 7500 psig. Available only in 5-ft Lengths.
	TUB-0517	1/4" Tube Pigtail, Made from TUB-R-0011 Approximately 24" overall length. Use for interconnecting storage cylinders.
Pressure gauges		
	GAG-0009W	Pressure Gauge, 0-7500 psi, 2 1/2" Gauge Face, Liquid Filled. 1/4" Center Back Mount (male) with U-Clamp.
	GAG-0070W	Pressure Gauge, 0-7500 psi, 2 1/2" Gauge Face, Liquid Filled 1/4" Bottom Connection (male).
Relief Valves		
	VAL-0022	ASME Relief Valve, factory set at 5250 psi. ASME cylinder must be protected by an ASME relief valve. 1/4" NPT male connection.
	VAL-0154	ASME Relief Valve, factory set at 6500 psi. ASME cylinder must be protected by an ASME relief valve. 1/4" NPT male connection.
	VAL-0169	Relief Valve, adjustable to 6500 psi. This relief valve is not suitable for use on UN or ASME cylinders. It can be used downstream of a pressure regulator and in other locations for overpressure protection. 1/4" NPT Male Connection. Factory set at customer specified pressure.

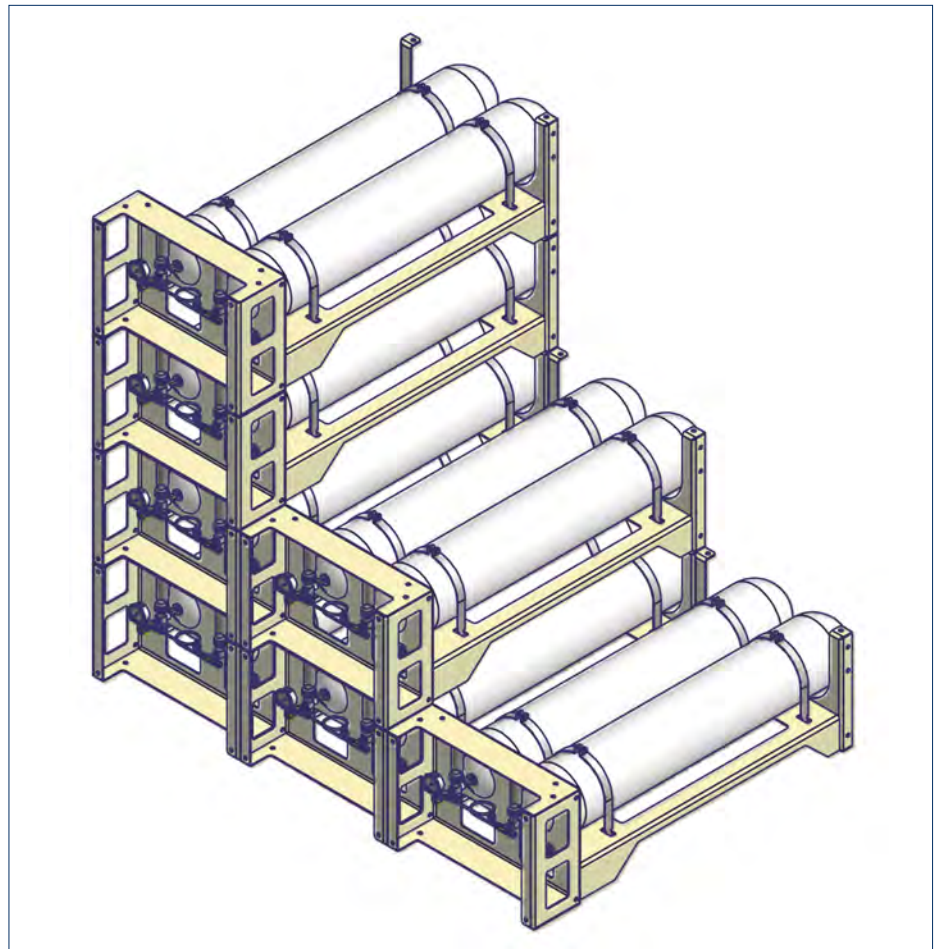
High pressure air and inert gases

STORAGE

For standard storage assemblies, Bauer utilizes a universal welded steel rack (RCK-0037) of our own design that safely and securely accommodates two storage cylinders whether of the ASME or the UN variety. For storage system requirements of a greater capacity, multiple rack assemblies can be bolted and tubed together. These storage rack assemblies are available in either vertical or horizontal configurations.

All storage rack assemblies up to 2 modules deep and 2 modules wide can be shipped completely interpiped, bolted together, and placed horizontally on a single shipping pallet. For larger orders, a tubing and hardware kit for connecting the modules will be shipped loose for on-site assembly.

In addition to the standard storage rack assemblies as described above, we are capable of providing engineered solutions to accommodate customer specified storage and racking requirements.



TECHNICAL DATA FOR GASES AT PRESSURE

The table below lists the volume of different gases that can be compressed into one (1) cubic foot water volume at the given pressure. The information is based on 70 °F and accounts for the compressibility of the gas. The table can be used to calculate the volume of air or gas that can be stored in a cylinder of known water volume. Likewise, the water volume of a cylinder can be calculated if the capacity of air or gas stored in the cylinder is known.

Gauge pressure		Air		Nitrogen		Argon		Helium	
psig	bar	scf	m ³	scf	m ³	scf	m ³	scf	m ³
1000	69	70.29	1.99	69.30	1.96	71.79	2.03	66.37	1.88
1500	103.4	104.77	2.97	102.74	2.91	108.50	3.07	98.12	2.78
2000	137.9	137.77	3.9	134.90	3.82	145.30	4.11	128.55	3.64
2500	172.4	169.11	4.79	165.39	4.68	181.50	5.14	158.08	4.48
3000	206.9	198.96	5.63	193.82	5.49	216.30	6.13	186.78	5.29
3500	241.4	226.14	6.4	220.26	6.24	249.20	7.06	214.66	6.08
4000	275.9	251.34	7.12	244.39	6.92	279.90	7.93	241.79	6.85
4500	310.3	274.85	7.78	266.60	7.55	308.30	8.73	268.19	7.6
5000	344.8	296.57	8.4	286.67	8.12	334.40	9.47	293.90	8.32
5500	379.3	316.03	8.95	305.80	8.66	358.40	10.15	318.95	9.03
6000	413.8	334.06	9.46	322.77	9.14	380.30	10.77	343.37	9.72

Example 1: Find the volume of air a UN 6000 cylinder will hold at 5000 psig.

UN 6000 = 1.53 cf water volume at 5000 psig, 296.57 scf air / scf water volume

$$1.53 \times 296.57 = 453 \text{ scf}$$

Example 2: If a cylinder is known to hold 200 scf of Argon at 2000 psig, what is its water volume?

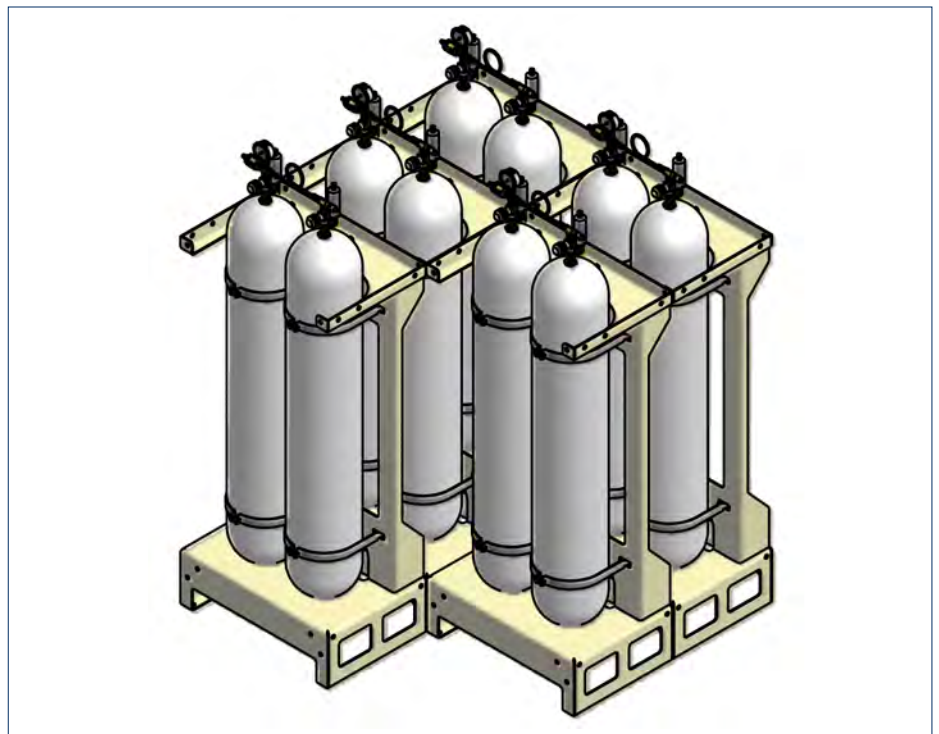
At 2000 psig, 145.3 scf Argon / scf water volume

$$200 \text{ scf} / 145.30 \text{ scf/scf} = 1.38 \text{ scf (water volume)}$$

Example 3: How many 45 scf (air volume) tanks can be filled from 0 to 4500 psig from two UN 6000 cylinders arranged for bulk storage?

UN 6000 = 1.53 cf water volume, 510 scf each, 1028 scf for 2. At 4500 psig, each UN 6000 cylinder will hold 1.53 scf x 274.85 scf/scf = 420 scf

Available volume from each cylinder, 510 scf - 420 scf = 90 scf, 180 scf from 2. Number of fills, [(180 scf / 45 scf) = 4 tank fills.



› Custom systems



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