



A Pocket Guide to **Air-Line Systems**

Introduction



Type-C supplied-air respirators, more commonly referred to as air-line respirators, are designed to provide long-duration respiratory protection.

These respirators generally consist of a full-facepiece or half-mask facepiece connected by air-supply hose to an air source (either a compressor or bank of large air cylinders). When connected to the air source, the respirator delivers a supply of respirable air to the user.

Accessory equipment, such as pressure regulators, pressure relief valves, carbon monoxide monitors, and filters for air compressors, may be necessary to ensure that air is at the proper pressure and quality for breathing. Air quality must be Quality Verification Level Grade D or better as defined in ANSI Standard Z-86.1-1973 (Compressed Gas Association Specification G-7.1 Commodity Specification for Air).

Current air-line systems fall into two categories: pressure-demand and constant flow. The difference between the two is how air is supplied.

Pressure-demand systems deliver air only when the user necessitates it. Thus, pressure-demand devices afford greater air supply efficiency.

In contrast, with a constant flow device, air flow to the respirator is continuous. However, because air flow is continuous, constant flow air-line systems are generally used with a compressor for a virtually unlimited air supply.

Type-C supplied-air respirators are approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) for use in atmospheres not immediately dangerous to life and health or from which the wearer can escape without wearing the respirator.

Type C supplied-air respirators equipped with an auxiliary escape cylinder are approved for use in IDLH atmospheres.

“Immediately dangerous to life and health” means any hazardous atmosphere that may produce physical discomfort immediately, chronic poisoning after repeated exposure or acute adverse physiological symptoms after prolonged exposure. (42 CFR, Part 84 subpart A, 84.2(x)).

This limitation is necessary because the air-line respirator depends entirely upon an air supply not carried by the wearer. Therefore, if the air hose were severed or crimped, or the air compressor failed, the air supply to the wearer would be shut off. The wearer would be without respiratory protection and might not be able to safely escape from an IDLH atmosphere.

Another limitation of air-line respirators is that air-supply hose limits the wearer to a fixed distance from the air source.

As an air-line respirator user, it is your responsibility to supply the respirator with breathable air — Type 1-Grade D or better. The following pages show complete hookups of various air-line systems, both pressure-demand and constant flow, from air source to respirator, to aid you in assembling your own air-line system.

Product user manuals must be reviewed prior to use of equipment. This document is not intended to be the sole source of guidance for determining appropriate supplied-air setup and configuration.

Pressure-Demand **Air-Line Respirators**



Pressure-demand air-line respirators are designed to maintain slight positive air pressure inside the facepiece whether the wearer is inhaling or exhaling. This design helps to prevent contaminants from seeping in around the facepiece, even if there should be small breaks in the face-to-facepiece seal.

Pressure-demand air-line respirators are designed specifically for non-IDLH toxic atmospheres. The exception is if the respirator is equipped with an egress air cylinder for use during escape.

Pressure-demand air-line units require an air supply from an uncontaminated compressed-air source as stipulated in General Industry Safety and Health Regulations, Part 1910.134 (OSHA) with delivered air conforming to at least Type 1-Grade D of ANSI Standard Z86.1.

A common air source for pressure-demand systems is a single air cylinder that can be set up in remote sites that might otherwise be impossible to reach with a large stationary compressor.

Another air source option for pressure-demand respirators is a cylinder cascade system. A cascade system consists of several air cylinders joined together in a bank by means of coupler tees. Generally, banks consist of 3 cylinders of either 244 cubic-feet or 330 cubic-feet-capacity. One or more workers can breathe from a cascade system.

Average consumption of air is approximately 1.5 cubic feet of air per person, per minute. At a normal rate of consumption, a 3-cylinder bank used with a pressure-demand unit provides between 8 to 12 man-hours of air, depending upon cylinder capacity.

If using a compressor system, each respirator requires 1.5 cfm per person and needs to maintain inlet (working) pressure specified in the respirator instruction manual.

MSA Pressure-Demand **Air-Line Units Include:**



- PremAire® Pressure-Demand Air-Line Respirator System:
 - with escape cylinder (for egress from IDLH atmospheres)
 - with vortex tube (for suit-cooling applications)
 - with dual-supply (to eliminate additional hose lengths)
- PremAire Cadet Supplied-Air Respirator (for use in non-IDLH environments)
- PremAire Cadet Escape Respirator/G1 PremAire Cadet Escape (for use in and escape from IDLH atmospheres)

To configure these products, please visit our air-line selection guide:
<http://webapps.msasafety.com/product-selection-guide/airline/#/index>

*PremAire Pressure Demand
Airline Respirator System*

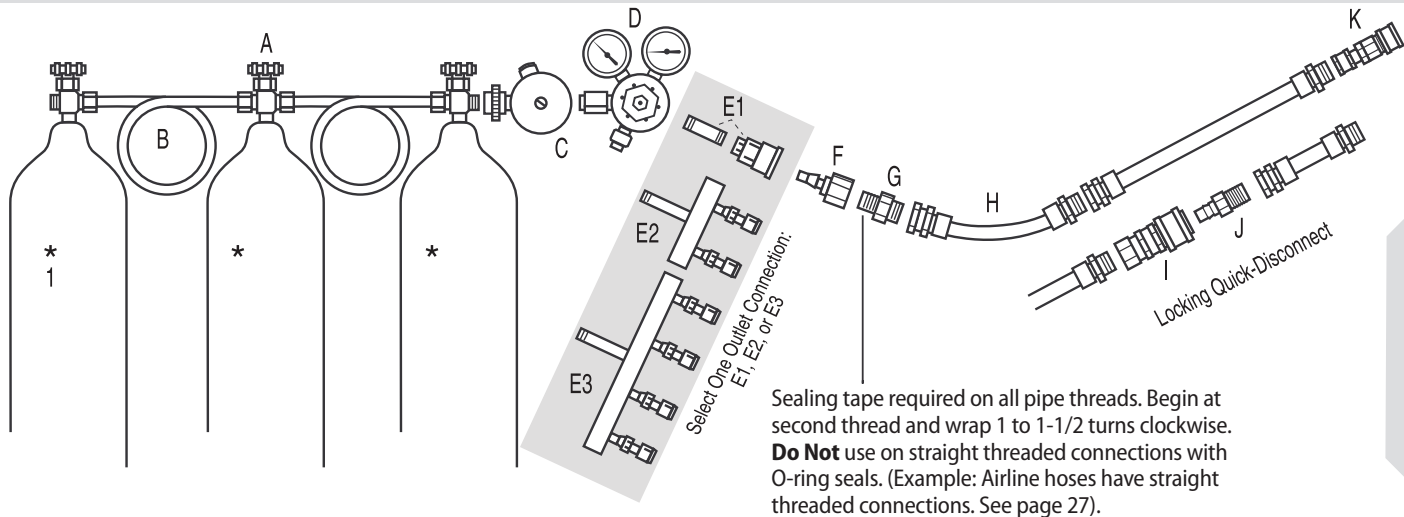


*PremAire Cadet Escape
Respirator*



*MSA G1 PremAire
Cadet Escape*

Cylinder and Cylinder Cascade Systems



Sealing tape required on all pipe threads. Begin at second thread and wrap 1 to 1-1/2 turns clockwise. **Do Not** use on straight threaded connections with O-ring seals. (Example: Airline hoses have straight threaded connections. See page 27).

Industry standards suggest tightening a pipe threaded connection so that 3-5 threads are exposed. (MSA has found that 8-12 ft-lbs. is suitable for our pipe thread applications).

1* Air cylinder – NOT SUPPLIED BY MSA

(A) Air tee block – *(see pg. 20)*

(B) Air pigtail – *(see pg. 20)*

(C) Audi-Larm™ Audible Alarm – *(see pg. 19)*

(D) Air cylinder pressure regulator – *(see pg. 19)*

Outlet Connections:

(E1) Female socket – P/N varies with type
(see pgs. 28 & 29 – col. 1)

Nipple – 1/4" x 1/4" NPT – (needed only w/female socket)

P/N 459867

(E2) 2-outlet manifold: *(see pg. 21)*

(E3) 4-outlet manifold: *(see pg. 21)*

(F) Male plug with female 1/4" NPT –
P/N varies with type *(see pgs. 28 & 29 – col. 2)*

(G) Union adapter – *(see pgs. 28 & 29 – col. 3)*

(H) MSA air-supply hose –
P/N varies with type *(see pg. 27)*

(I) Locking quick-disconnect female socket –
P/N varies with type *(see pgs. 23 & 24)*

(J) Locking quick-disconnect male plug –
P/N varies with type *(see pgs. 23 & 24)*

(K) Female socket assembly –
P/N varies with type *(see pgs. 28 & 29 – col. 4)*

Industrial Air Cart

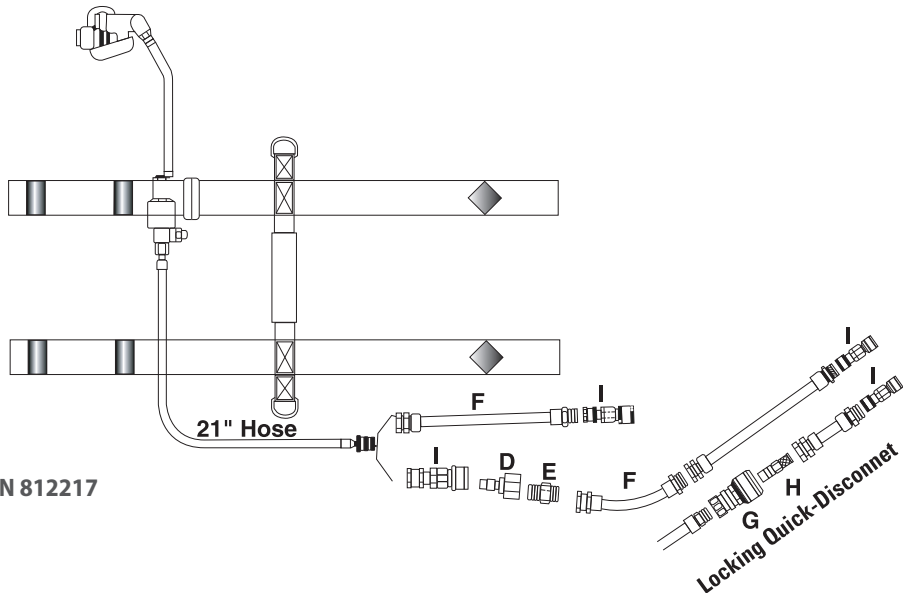
Industrial Air Cart permits as many as 4 NIOSH-approved air-line respirators to be connected to 2 1-hour 4,500 psig breathing apparatus cylinders (not included). See table below for cylinder ordering information. 60-minute cylinder provides maximum air supply.

INDUSTRIAL AIR CART	10107537	Industrial air cart equipped with union adapters
	10107779	Industrial air cart equipped with Snap-Tite aluminum quick-disconnects
	10107780	Industrial air cart equipped with Foster steel quick-disconnects
	10107811	Industrial air cart equipped with Hansen brass quick-disconnects



Provides air for up to four pressure-demand air-line respirators.

TransportAire™ Portable Air-Supply System



High pressure – P/N 812217

TransportAire Portable Air-Supply System consists of an impact-resistant handle with nylon straps that fit around a variety of MSA breathing apparatus cylinders (purchased separately). System is designed exclusively for use with MSA supplied-air respirators equipped with dual-supply option.

- 2 options
- Can connect air-line hose directly to fitting (**P/N 628232**) from 21" hose that is included with TransportAire System, or can use quick-disconnect fittings.

- (D) Male plug with female 1/4" NPT –
P/N varies with type (*see pgs. 28 & 29 – col. 2*)
- (E) Union adapter –
P/N 69542 (*see pgs. 28 & 29 – col 3.*)
- (F) MSA air-supply hose –
P/N varies with type (*see pg. 27*)
- (G) Locking quick-disconnect female socket –
P/N varies with type (*see pgs. 23 and 24*)
- (H) Locking quick-disconnect male plug –
P/N varies with type (*see pgs. 23 and 24*)
- (I) Female socket assembly –
P/N varies with type (*see pgs. 28 & 29 – col. 4*)

CYLINDERS	10127944-SP	H-30SL*, SuperLite, 30-minute NIOSH service life rating, 4500 psig, weight (empty): 6 lb. 9 oz.
	807570	H-45* Carbon-wrapped, 45-minute NIOSH service life rating, 4500 psig, weight (empty): 9 lb. 7 oz.
	10127945-SP	H-45SL, SuperLite, 45-minute NIOSH service life rating, 4500 psig, weight (empty): 8 lb. 8 oz.
	10127946-SP	H-60SL*, SuperLite, 60-minute NIOSH service life rating, 4500 psig, weight (empty): 10 lb. 12 oz.

* These cylinders are capable of custom options. Contact MSA Customer Service at 1-800-MSA-2222 for more information. All weights are approximate.

Constant Flow **Air-Line Respirators**



Constant flow air-line respirators also maintain slight positive air pressure inside the facepiece whether the wearer is inhaling or exhaling. This design helps to prevent contaminants from seeping in around the facepiece, even if there should be small breaks in the face-to-facepiece seal.

Constant flow air-line respirators maintain air flow at all times, rather than only on demand. Because of this design, constant flow units almost always use a compressor as their air source. A constant flow unit would quickly exhaust air from a cylinder or cascade system.

There are two types of constant flow air-line respirators: one uses a tight-fitting facepiece; the other, a loose-fitting hood or helmet. Inlet air pressure must be able to maintain at least 4 cfm for a tight-fitting facepiece and 6 cfm for a loose-fitting hood.

Inlet pressure for constant flow air-line respirators varies between 10-15 psig for low-pressure systems and 35-40 psig for high-pressure systems.

For constant flow air-line hoods, inlet pressure usually ranges between 10-15 psig and 85-100 psig, depending upon type. Also, depending upon inlet pressure, the length of approved air-supply hose for these systems is usually between 8-50 feet for low-pressure systems and 8-300 feet for high-pressure systems. Consult the instruction manual for your respirator to determine specific inlet pressure and hose length.

MSA Constant Flow Respirators

MSA Constant Flow respirators include:

- Duo-Twin respirators
- Abrasi-Blast supplied-Air respirator
- Constant Flow respirators with Advantage 4100, Ultra Elite, or Comfo facepieces

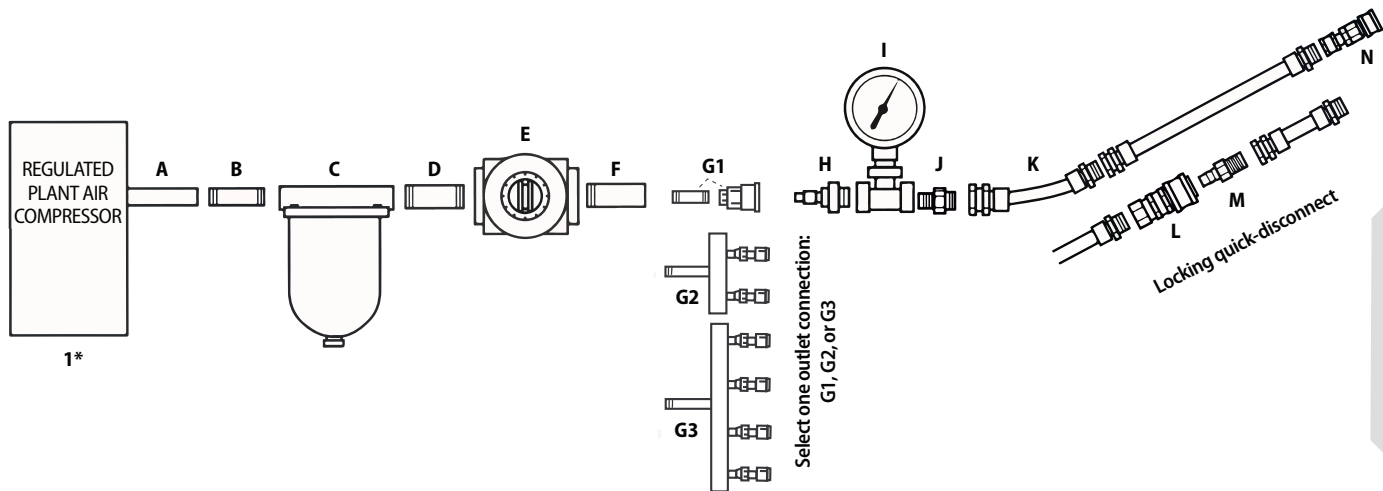


Duo-Twin Respirator with Advantage 4000 Facepiece



Abrasi-Blast Supplied-Air Respirator

Regulated Plant Compressor System



* Note: Inlet pressure gauge is required if there is a distance of 10-ft or more between the regulator and the manifold.

1* Plant air compressor – NOT SUPPLIED BY MSA

(A) Outlet fitting for system – varies with system –
contact MSA for more information and guidelines

(B) Nipple (1/2 x 1/2 x 1 1/2 NPT) – **P/N 68833**

(C) Air-line filter–**P/N 81857** (see pg. 18)

(E) Pressure regulator – **P/N 66716** (see pg. 18)

(F) Bushing (1/2" M x 1/4" F) – **P/N 625528**

Outlet Connections:

(G1) Female socket – P/N varies with type (see pgs. 28 & 29 – col. 1)
Nipple – 1/4" x 1/4" NPT – (needed only w/female socket)
P/N 459867

(G2) 2-outlet manifold: (see pg. 21)

(G3) 4-outlet manifold: (see pg. 21)

(H) Male plug with male 1/4" NPT

(I) MSA inlet pressure gauge (see pg. 22)

(J) Union adapter (see pgs. 28 & 29 – col. 3)

(K) MSA air-supply hose –
P/N varies with type (see pg. 27)

(L) Locking quick-disconnect female socket –
P/N varies with type (see pgs. 23 & 24)

(M) Locking quick-disconnect male plug –
P/N varies with type (see pgs. 23 & 24)

(N) Female socket assembly –
P/N varies with type (see pgs. 28 & 29 – col. 4)

Breathing Air Distribution System **Filtration Box**



Breathing Air Distribution System filtration box is housed in a rugged polymer case. Unit is equipped with 3-stage filtration, pressure regulator, 4-outlet manifold, and continuous flow 115 VAC carbon monoxide monitor. Filtration box may be used in portable or stationary position. Two models of filtration box are available:

1– provides 50 cubic feet of air per minute;

2– provides 100 cubic feet of air per minute.

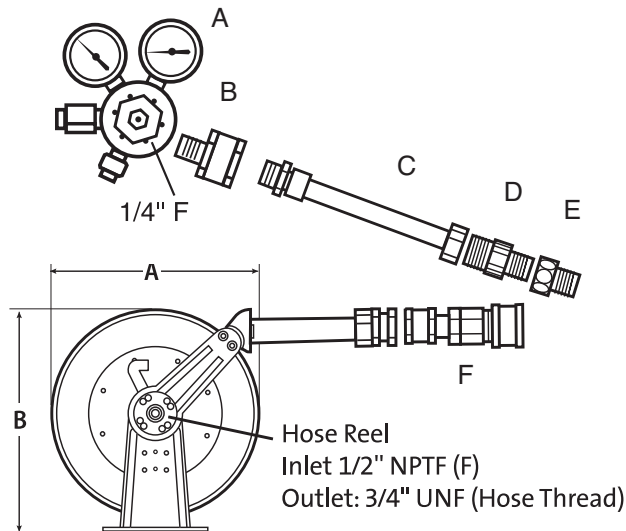
Portable Grade-D filtration system provides breathing air for up to 4 air-line respirators.

	For use in the United States (Carbon monoxide monitor set at 10 ppm)	For use in Canada (Carbon monoxide monitor set at 5 ppm)	Outlet Connections
FILTRATION BOXES <i>50 CFM</i>	10107538	10113347	Union adapters
	10107814	10113349	Snap-Tite aluminum quick-disconnects
	10107812	10113348	Foster steel quick-disconnects
	10107813	10113346	Hansen brass quick-disconnects
FILTRATION BOXES <i>100 CFM</i>	10107539	10113345	Union adapters
	10107816	10113343	Snap-Tite aluminum quick-disconnects
	10107817	10113342	Foster steel quick-disconnects
	10107815	10113344	Hansen brass quick-disconnects

Hose Reel Assembly

Includes 50-ft. 3/8" neoprene airline hose **P/N 455022.***
Automatically keeps hose at any desired length, controlling slack. **Hose reel assembly – P/N 72444**

- (A) Air-cylinder pressure regulator, dual gauge (see pg. 19)
- (B) Union adapter 1/4" NPT male x 3/4" UNF female – **P/N 69541**
- (C) * 8' neoprene hose – **P/N 481071** (see pg. 27)
- (D) 3/4" UNF male x 1/4" NPT male – **P/N 69542**
- (E) Pipe bushing 1/4" NPT female x 1/2" NPT male – **P/N 625528**
- (F) Female socket assembly – P/N varies with type
(see pgs. 28 & 29 – col. 4)



* 3/8" air-line hose has 3/4" UNF threads.

NIOSH approves air-line respirators per 42 CFR Part 84, Subpart J. Approval is sought by respirator manufacturers for specific hose lengths and inlet pressures. An approved air-line respirator includes hose, fittings and respirator.

Most MSA pressure-demand air-line units are NIOSH-certified for operation at 65-85 psig with 25 to 300 feet of approved MSA air-supply hose.

However, respirators that are part of the PremAire System, including the PremAire Cadet Respirator, are NIOSH certified for operation at 60-100 psig with 8 to 300 feet of approved hose. (No more than 12 sections of hose may be used, or 6 sections when using coiled hose).

The MSA Constant Flow Air-line Respirator has high-pressure NIOSH certification of 35-40 psig with 8 to 300 feet of approved hose, and low-pressure certification of 10-15 psig with 8 to 50 feet of approved hose.

Inlet pressure and hose lengths may vary by MSA product. You must review the specific product user manual to understand appropriate operating pressure and approved hose lengths.



Caution: Always refer to the specific product user manual for exact pressure ranges.

Pressure Regulator

MSA pressure regulator reduces plant air system compressor pressure to desired operating pressure for respirators being used. Maintains pressure on outlet side until re-adjusted for use with inlet pressures of up to 125 psig.

PRESSURE REGULATOR	66716	Pressure regulator
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Air-Line Filter

MSA air-line filter provides high-efficiency filtration of air stream after it leaves the compressor. Minimum 99 percent removal of 0.3 micron and larger particulates including dusts, mists, fumes, smoke, and petroleum vapors. A chemical cartridge removes organic vapors. MSA air-line filter does not remove carbon monoxide, and can be used at inlet pressures of up to 125 psig. Pressure drop is 1 psig at maximum rated air flow of 25 cfm.



AIR-LINE FILTER	81857	Air-line filter - with 1/2" NPT female inlet and outlet
	488041	Air-line filter - with 3/4"-16 straight threads
	484923	Replacement filter kit

Audi-Larm® Warning Device

Air-supply cylinders can be equipped with the Audi-Larm Audible Alarm low-pressure warning device. This warning device uses a loud, clear bell to signal the user when cylinder air supply has been reduced to a limited service time. The bell rings when cylinder pressure reaches approximately 400 psig, and also rings briefly every time the cylinder is pressurized to check proper alarm operation.



AUDI-LARM AUDIBLE ALARM	85078	Audi-Larm Audible Alarm assembly (up to 3000 psig)
	492307	High-pressure Audi-Larm Audible Alarm assembly (up to 5500 psig)

Air-Cylinder Pressure Regulator

An air-cylinder pressure regulator is a required accessory when air-line respirators operate from a cylinder. Dual-gauge regulator receives varying outlet pressure from cylinder, reduces it and regulates it to a constant pressure of approximately 80 psig, the optimum pressure for regulator operation.



AIR-CYLINDER PRESSURE REGULATOR	68858	Air-cylinder pressure regulator, dual-gauge, 0-3000 psig
	633352	High-pressure air-cylinder regulator, dual-gauge, 0-5, 500 psig

TEE BLOCK AND PIGTAIL

Tee blocks and pigtails are used to connect a bank of cylinders together, thus, extending your air supply. The coupler tees, which makes a connection between the supply cylinder valve and the pigtail, and the outlet connection are constructed of brass. The pigtails joining the supply cylinders are made of tubular copper.



TEE BLOCK AND PIGTAIL	68850	Tee Block (up to 3000 psig)
	68851	Pigtail (up to 3000 psig)
	10081206	Tee Block (up to 5500 psig)
	10081205	Pigtail (up to 5500 psig)

Contact MSA or MSA Distributor for additional information

Manifolds

2- or 4-outlet manifolds can be used to supply air to 2 or 4 respirators from a single air source. Manifolds are supplied with quick-disconnect sockets that offer automatic air flow shutoff.

MANIFOLDS <i>4-outlet</i>	47370	Manifold, with Foster (S) quick-disconnect
	93931	Manifold, with Snap-Tite (AL) quick-disconnect
	488914	Manifold, less quick-disconnect <i>(see pg. 28 & 29 – col. 1 for sockets)</i>
MANIFOLDS <i>2-outlet</i>	84416	Manifold, with Foster (S) quick-disconnect
	486053	Manifold, with Snap-Tite (AL) quick-disconnect
	84418	Manifold, less quick-disconnect



Inlet Pressure Gauge

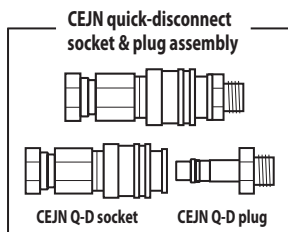
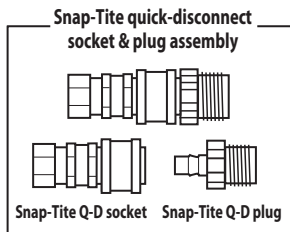
Inlet pressure gauge enables a user to check pressure at the inlet of MSA air-supply hose, thereby assuring that air pressure is within the certified range. Gauge is supplied with male plug for various quick-disconnect assemblies and union adapter for hose connection.



INLET PRESSURE GAUGE	476734	With male plug for Snap-Tite (AL) quick-disconnect assembly
	476735	With male plug for Foster (S) or Schrader quick-disconnect assembly
	476737	With male plug for Hansen (brass) quick-disconnect assembly
	476738	With male plug for CEJN (locking type)
	476739	With male plug for Foster (brass)
	476740	With male plug for Hansen (SST)
	481377	With male plug for Snap-Tite (locking type)
	492586	Less quick-disconnect plug and less union adapter

Locking Quick-Disconnects

Locking quick-disconnects are the only means to interconnect lengths of MSA air-supply hose (besides directly threading the air-supply hose together). For most systems, you can use up to 12 sections of hose to make up maximum length.



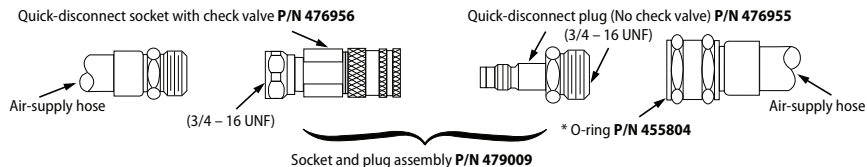
LOCKING QUICK-DISCONNECTS	479009	CEJN locking quick-disconnect assembly, socket and plug (chrome)
	476956	CEJN locking quick-disconnect female socket (chrome)
	476955	CEJN locking quick-disconnect male (w/male 3/4" NPT) plug (chrome)
	479010	Snap-Tite locking quick-disconnect assembly, socket and plug (aluminum)
	479032	Snap-Tite locking quick-disconnect female socket (aluminum)
	479015	Snap-Tite locking quick-disconnect male (w/male 3/4" NPT) plug (aluminum)

Note: Do not use non-locking quick disconnects to interconnect air supply hoses.

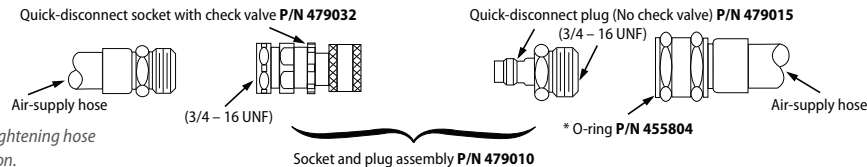
Coupling sections of approved air supply hose using locking quick-disconnects.

Locking quick-disconnects are easily connected by pushing the plug and socket together. To separate, the plug and socket must be pushed together and the sleeve on the socket retracted from the plug.

CEJN-chrome



Snap-Tite-aluminum



* Note: MSA recommends that no more than 8 - 12 ft.-lbs. when tightening hose or o-ring connections. Do not use sealing tape on this connection. Replacement o-rings are available in a package of 2, P/N 455804.

Approved Air-Supply Hose (3/8" ID)

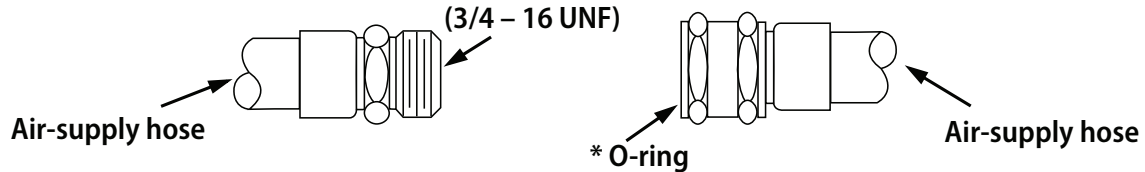
Available in smooth, reinforced, lightweight polyvinylchloride (PVC); chemical-resistant black neoprene; or smooth, coiled nylon. Must be used with MSA respirators to maintain NIOSH certifications. Quick-disconnects are sold separately.



AIR-SUPPLY HOSE TEMPERATURE RANGES

Neoprene	-25° to 212°F
PVC	32° to 120°F
Nylon	0° to 160°F

Coupling sections of approved air-supply hose using threaded connectors attached to hose.



** Note: MSA recommends no more than 8 -12 ft-lbs. when tightening hose or o-ring connections. Do not use sealing tape on this connection. Replacement o-rings are available in package of 2, P/N 455804.*





NEOPRENE AIR-SUPPLY HOSE	481071	8-ft. with brass hose coupling
	455020	15-ft. with brass hose coupling
	455021	25-ft. with brass hose coupling
	455022	50-ft. with brass hose coupling
	481077	8-ft. with stainless steel hose coupling
	481078	15-ft. with stainless steel hose coupling
	481079	25-ft. with stainless steel hose coupling
	481080	50-ft. with stainless steel hose coupling

COILED NYLON AIR-SUPPLY HOSE	491513*	8-ft. with brass hose coupling
	491514*	15-ft. with brass hose coupling
	491515*	25-ft. with brass hose coupling
	474043*	50-ft. with brass hose coupling

PVC AIR-SUPPLY HOSE	481051	8-ft. with brass hose coupling
	471511	15-ft. with brass hose coupling
	471512	25-ft. with brass hose coupling
	471513	50-ft. with brass hose coupling
	484225	8-ft. with stainless steel hose coupling
	481057	15-ft. with stainless steel hose coupling
	481058	25-ft. with stainless steel hose coupling
	481059	50-ft. with stainless steel hose coupling
	481060	100-ft. with stainless steel hose coupling

* Recommended usable length 4- to 25-ft.

Quick-Disconnects and Adapters





QUICK-DISCONNECT TYPE	Interchangeability †	1	2	3	4
		 Female Socket 1/4" NPT	 Male Plug w/Female 1/4" NPT	 Union Adapter 1/4" NPT x 3/4" UNF	 Female Socket Assembly* (used to connect air-supply hose to male plug on respirator)+
SNAP-TITE (AL)	C	66272	66274	69542	455019
SNAP-TITE (SST)	C	629673	629672	808358	471778
SNAP-TITE (BR)	C	630305	630307	69542	471777
HANSEN (SST)	A	628768	628208	808358	471779
HANSEN (BR)	D	630311	630313	69542	471501
FOSTER (S)	B	628770	55716	69542	467044
FOSTER (SST)	B	636459	636460	808358	801016
FOSTER (SST)	D	636473	637851	808358	800805
FOSTER (BR)	A	629980	629981	69542	470194
SCHRADER (S)	B	See Foster(S)	See Foster(S)	See Foster(S)	See Foster(S)

AL-aluminum; S-steel; SST-stainless steel; BR-brass

† Fittings with the same letter code are interchangeable.

* Socket assembly consists of socket from column 1 and brass union adapter P/N 69541 (3/4" female x 1/4" NPT male). Exception: All SST fittings have SST union P/N 808360.

Quick-Disconnects and Adapters

QUICK-DISCONNECT TYPE	Interchangeability †	1	2	3	4
		 Female Socket 1/4" NPT	 Male Plug w/Female 1/4" NPT	 Union Adapter 1/4" NPT x 3/4" UNF	 Female Socket Assembly* (used to connect air-supply hose to male plug on respirator)+
CEJN LOCKING (CHROME-PLATED—BR)	E	631870	479026	69542	479001
CEJN LOCKING (CHROME)	E	—	479026	69542	476956
SNAP-TITE LOCKING (AL)	F	—	479027	69542	479032
SNAP-TITE LOCKING (SST)	F	—	479028	808358	479033
SNAP-TITE LOCKING (BR)	F	—	479029	69542	479034

AL-aluminum; S-steel; SST-stainless steel; BR-brass

† Fittings with the same letter code are interchangeable.

* Socket assembly consists of socket from column 1 and brass union adapter P/N 69541 (3/4" female x 1/4" NPT male). Exception: All SST fittings have SST union P/N 808360.

Air-Line Systems **Notes**



Note: This Bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



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