

# SYNERGY<sup>®</sup>

B U B B L E H O O D



## with or without Vortex Tube instruction manual

### **WARNING**

THIS MANUAL MUST BE CAREFULLY READ AND FOLLOWED BY ALL PERSONS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING OR SERVICING THIS PRODUCT. This product will perform as designed only if used and serviced according to the instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED, AND PERSONS WHO RELY ON THE AIR MASK COULD SUSTAIN SERIOUS PERSONAL INJURY OR DEATH.

The warranties made by MSA with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following the instructions. Please read and observe the WARNINGS and CAUTIONS inside. For any additional information relative to use or repair, write or call 1-800-MSA-2222 during regular working hours.

See separate insert for NIOSH approval information P/N 10009932.



For More Information: Call (1-800-MSA-2222) or Visit Our Website at ([www.MSAnet.com](http://www.MSAnet.com))



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Choose MSA.

MINE SAFETY APPLIANCES COMPANY  
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

# DESCRIPTION

## NIOSH APPROVAL INFORMATION

### Cautions and Limitations

- B- Not for use in atmospheres immediately dangerous to life or health.
- D- Airline respirators can be used only when the respirators are supplied with respirable air meeting the requirements of CGA G-7.1 Grade D or higher quality.
- E- Use only the pressure ranges and hose lengths specified in the User's Instructions.
- J- Failure to properly use and maintain this product could result in injury or death.
- M- All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.
- N- Never substitute, modify, add, or omit parts. Use only exact replacement parts as specified by the manufacturer.
- O- Refer to User's Instructions, and/or maintenance manuals for information on use and maintenance of these respirators.
- S- Special or critical user's instructions and/or specific use limitations apply. Refer to User's Instructions before donning.

## SPECIAL USER'S INSTRUCTIONS

1. Inlet pressure vs hose length:

3/8" Hose Length	Inlet Pressure (w/o vortex)	Inlet Pressure w/vortex
8 feet	12 - 14 psig	75 - 90 psig
15 feet	13 - 15 psig	75 - 90 psig
25 feet	14 - 16 psig	75 - 90 psig
50 feet	17 - 21 psig	75 - 90 psig
50 - 75 ft.	19 - 22 psig	75 - 90 psig
75 - 100 ft.	23 - 26 psig	75 - 90 psig
100 - 125 ft.	25 - 30 psig	75 - 90 psig
125 - 150 ft.	28 - 33 psig	75 - 90 psig
150 - 175 ft.	30 - 36 psig	75 - 90 psig
175 - 200 ft.	32 - 38 psig	75 - 90 psig
200 - 225 ft.	34 - 41 psig	*
225 - 250 ft.	35 - 44 psig	*
250 - 275 ft.	37 - 46 psig	*
275 - 300 ft.	40 - 49 psig	*

\*Maximum hose length for Synergy Bubble Hood with Vortex Tube is 200 feet.

2. A maximum of 12 sections of air-supply hose may be used in making up the maximum working length of hose. The coiled hoses are considered to be the indicated length, although actual extended lengths can be less than indicated (maximum of one section of 8, 15, or 25 ft. coiled hose, or 6 sections of 50 ft. coiled hoses).

### WARNING

1. Turn the respirable air source on before donning the hood. Remove the hood immediately if the air flow stops.
2. Use only respirable air meeting the air quality standards of ANSI/ CGA G-7.1-1989 (Compressed Gas Association Specification G-7.1 for Quality Verification Level (Grade) D Gaseous Air).
3. Use only the air source pressure specified.
4. Do not use near open flame or hot sparks.
5. The hood may be contaminated during use. Use proper decontamination methods to prevent personnel exposure to hazardous substances when the respirator is removed.
6. Do not disconnect the air-supply hose in a contaminated atmosphere.

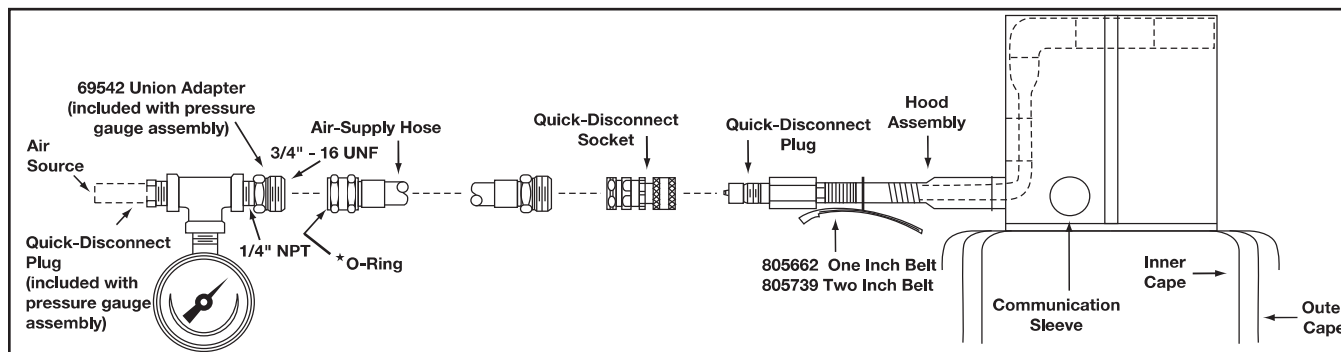
Failure to follow these warnings may cause serious personal injury or death.

## DESCRIPTION

The Synergy Bubble Hood from MSA is a Type C, supplied-air respirator approved by the National Institute for Occupational Safety and Health (NIOSH) for use in atmospheres not immediately dangerous to health (non-IDLH). This respirator is a constant-flow device which supplies a continuous flow of respirable air to the hood from an external air source.

The Synergy Bubble Hood is available in small, standard, and large, with either a blue or yellow cape. The hood is provided with an optional cold vortex tube. It also is available with or without a communications sleeve. An approved Synergy Bubble Hood respirator system consists of six major components:

1. Hood
2. Muffler assembly (consisting of muffler, braided hose, quick-disconnect socket, quick-disconnect plug, and



## DESCRIPTION

- check valve).
- 3. Breathing tube coupling.
- 4. Vortex tube assembly (optional) (which includes a quick-disconnect socket and plug assembly).
- 5. Support belt.
- 6. Approved air-supply hose.

### PRESSURE GAUGE ASSEMBLIES

PRESSURE-GAUGE ASSEMBLY Part No.	PLUG TYPE
476734	SNAP-TITE
476735	FOSTER or SCHRADER
476736	DUFF-NORTON
476737	HANSEN
476738	CEJN (locking type)
481377	SNAP-TITE (locking type)

### AIR SOURCE

The Synergy Bubble Hood requires a pressure-regulated source of clean, respirable compressed air. The purity of the air source is the responsibility of the user. The respirator is approved only when the air supplied to the respirator meets the requirements of the Compressed Gas Association Specification G-7.1-1989 for Quality Verification Level (Grade) D Breathable Air.

#### ⚠ CAUTION

**Inlet air must have a dew point of less than 0 degrees F and a temperature between 60 degrees F and 140 degrees F. Higher dew points, or air temperatures below 60 degrees F, may cause moisture to freeze in the vortex and reduce air flow. Air temperatures above 140 degrees F may damage the vortex.**

### AIR-SUPPLY HOSE

The Synergy Bubble Hood respirator can be used with a wide range of MSA air-supply hoses, which can be interconnected up to a maximum length of 300 feet.\* A maximum of 12 sections of air-supply hose may be used in making up the maximum working length of hose. The coiled hoses are considered to be the indicated length, although actual extended lengths can be less than indicated. (Maximum of one section of 8, 15, or 25 ft. of coiled hose or 6 sections of 50 ft. coiled hoses). MSA also offers an inlet pressure-gauge assembly that enables a user to check pressure at the inlet of the MSA air-supply hose, thus assuring that the air pressure is within the NIOSH approved range. The gauge is supplied with quick-disconnect fittings to accommodate your particular air-line system.

\*Maximum hose length for Synergy Bubble Hood with Vortex Tube is 200 feet.

**Note:** All air-supply hoses listed below are 3/8" in diameter (hose ID).

PART NUMBER	HOSE LENGTH (FT.)	MATERIAL
481071	8	NEOPRENE
455020	15	NEOPRENE
455021	25	NEOPRENE
455022	50	NEOPRENE
481051	8	POLYVINYL CHLORIDE
471511	15	POLYVINYL CHLORIDE
471512	25	POLYVINYL CHLORIDE
471513	50	POLYVINYL CHLORIDE
484225	100	POLYVINYL CHLORIDE
491513	8	COILED NYLON
491514	15	COILED NYLON
491515	25	COILED NYLON
474043	50	COILED NYLON

#### ⚠ CAUTION

**MSA air-supply hoses have various temperature limitations. Do not use when inlet-air temperatures exceed the limits specified for each hose material.**

HOSE MATERIAL	RECOMMENDED TEMP. LIMITS
Polyvinyl Chloride	30°F/120°F
Neoprene	-25°F/212°F
Nylon	0°F/160°F

### QUICK-DISCONNECTS FOR USE WITH SYNERGY HOODS

Quick-disconnect assemblies that can be used with the Synergy Hood are shown above. Quick-disconnects are required to connect air-supply hoses to the Synergy Hood and to the air source.

### INTERCONNECTING AIR-SUPPLY HOSES

MSA air-supply hoses can be interconnected up to a maximum length of 300 feet without voiding the NIOSH approval of the device. Locking quick-disconnects easily connect by pushing the plug and socket together. To separate, the plug and socket must first be pushed together and then the sleeve retracted from the plug. Up to 12 sections of hose can be used to make up a maximum working length of hose. MSA offers both threaded and locking-type quick-disconnects to interconnect hoses.

# DESCRIPTION

## Quick Disconnects Table Chart

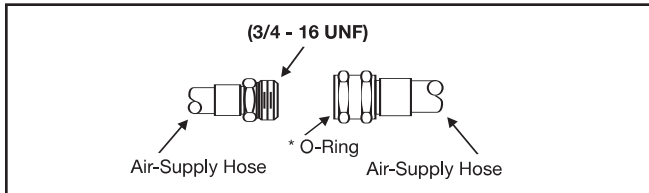
### LOCKING TYPES

<b>CEJN — Chrome (C)</b>	
479026 Plug For (C) Quick Disconnect Assembly	476956 (C) Socket
<b>SNAP-TITE — Aluminum (AL)</b>	
479027 Plug For (AL) Quick Disconnect Assembly	479032 (AL) Socket

### NON-LOCKING TYPES

<b>SNAP-TITE — Aluminum (AL) Brass (BR) Stainless Steel (SST)</b>					
			+		
68274 Plug For (AL) Quick Disconnect Assembly 630307 Plug For (BR) Quick Disconnect Assembly 629672 Plug For (SST) Quick Disconnect Assembly	455019 (AL) Socket Assembly 471777 (BR) Socket Assembly 471778 (SST) Socket Assembly	68272 (AL) Socket 630305 (BR) Socket 629673 (SST) Socket		69541 Air Supply Hose Connector	
<b>FOSTER — Steel (S) Stainless Steel (SST)</b>					
		=		+	
55716 Plug For (S) Quick Disconnect Assembly 636460 Plug For (SST) Quick Disconnect Assembly	467044 (S) Socket Assembly 801016 (SST) Socket Assembly		628770 (S) Socket 636459 (SST) Socket		69541 Air Supply Hose Connector
<b>HANSEN — Brass (BR)</b>					
		=		+	
630313 Plug For (BR) Quick Disconnect Assembly	471501 (BR) Socket Assembly		630311 (BR) Socket		69541 Air Supply Hose Connector
<b>DUFF-NORTON — Brass (BR)</b>					
		=		+	
630313 Plug For (BR) Quick Disconnect Assembly	471780 (BR) Socket Assembly		630308 (BR) Socket		69541 Air Supply Hose Connector
<b>NON-LOCKING TYPES — WITH CHECK VALVE IN PLUG</b>					
<b>FOSTER — Brass (BR)</b>					
		=		+	
62981 Plug For (BR) Quick Disconnect Assembly	470194 (BR) Socket Assembly		629980 (BR) Socket		69541 Air Supply Hose Connector
<b>HANSEN — Stainless Steel (SST)</b>					
		=		+	
628208 Plug For (SST) Quick Disconnect Assembly	471779 (SST) Socket Assembly		628768 (SST) Socket		69541 Air Supply Hose Connector

The following threaded connector assembly can be used to interconnect sections of approved air-supply hose.



### WARNING

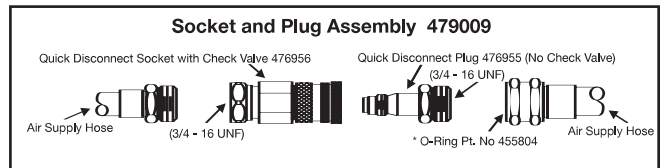
Check all hose connections to be sure fittings are secure. This must be done to ensure a continuous flow of air. Failure to follow this warning may result in serious personal injury or death.

### CAUTION

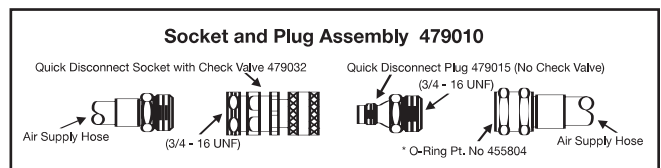
Hoses must be interconnected only with either the threaded connector (3/4-16 UNF) or the locking-type quick-disconnects listed. Do not use non-locking quick-disconnects to interconnect air-supply hoses.

Shown here are various locking quick-disconnect assemblies that can be used to interconnect air-supply hoses. To connect locking quick-disconnects, push the plug and socket together until they snap in place. To separate, first push the plug and socket together; then retract the sleeve from the plug.

### CEJN Chrome (C)



### SNAP-TITE Aluminum (AL)



# INSTALLATION

## INSTALLING THE MUFFLER ASSEMBLY

1. Unpack all parts. Shape the hood carefully. Open the hood and insert the quick-disconnect end through the air-line sleeve from the inside.



2. Place the muffler into the hood and secure it with loops or snaps.



3. Bend the muffler assembly into the rear corner. Pull the air-line sleeve down the air-line tubing until you feel resistance.



4. Seal the air-line sleeve around the inlet air tube with the vinyl tape supplied with the hood. Wrap at least 4 turns.



## PREPARING HOODS WITH THE OPTIONAL COMMUNICATIONS SLEEVE

1. Cut a V or an X into the sleeve opening.



2. Install the communications device through the sleeve and secure.



3. Use tape to seal the outside of the sleeve. Secure communications cables to the support belt.



## FILTER CARTRIDGE ASSEMBLY INSTRUCTIONS

The filter cartridge holder is approved for use with the Vortex tube respirator.

P100 cartridge approved for respiratory protection against dusts, mists, and fumes having a TWA less than 0.05 milligrams per cubic meter, and radionuclides. Available in packages of 10.

Filter cartridges are used to remove dusts, mists, and fumes that may be in the air supply.

When odors of vapors or gases become noticeable, or when breathing resistance becomes uncomfortable, the cartridge must be replaced. Filter cartridges should be

# INSTALLATION

checked for flow resistance using the Filter Resistance Tester.

## FILTER CARTRIDGE ASSEMBLY

Install filter cartridges in the cartridge holder as follows:

1. Unscrew the bezel ring.
2. Separate the holder halves.
3. Screw the filter cartridge in until it is firmly seated on the gasket.



4. Place the holder halves together and tighten the bezel ring to ensure a good seal at the gasket.



Connect the cartridge holder (with filter cartridge installed) to the respirator as follows:

1. Connect the cartridge holder female fitting to the vortex tube.
2. Connect the breathing tube coupling nut to the cartridge holder male fitting.
3. Turn the air source on. Check for leaks with a commercial leak-test solution or soapy water. Tighten connections as required, using wrenches or slip-joint pliers. Turn the air source off.



## DONNING THE SYNERGY BUBBLE HOOD

1. Connect the air-supply hose to the air source and the respirator.
2. Turn the air source ON and adjust the pressure regulator to the required pressure (see the hose lengths vs pressure range table).
3. Remove or loosen the user's outer garment.

4. Put the hood over the user's head so that the lower edge of hood rests on the user's shoulders.



5. Put the inner cape next to the body. Smooth out any folds. Tape the inner bibs together at the sides.



6. Fold the inner cape at the shoulders to keep material from hanging over the user's shoulders.



7. Don the outer garment and smooth out any folds in the outer cape against the outer garment.



# INSTALLATION

8. Tape the outer capes together at the sides (optional).



9. Position the vortex tube (optional) so that it is on the user's left side.



10. Tighten the support belt over the outer cape.



11. Be sure that the user's arms and neck can move freely. Adjust the hood as needed.



12. Check the inlet pressure periodically to be sure air flow is within the range specified on the approval.



**Note:** Approved air-supply hose: 3/8", length: 8 - 300 ft.\* Approved inlet air pressure required to maintain at least 6 cfm to each respirator: see the hose length vs pressure range table.

\*Maximum hose length for Synergy Bubble Hood with Vortex Tube is 200 feet.

13. To remove the hood, perform the steps above in reverse order.

## ADJUSTING THE TEMPERATURE ON THE COOL VORTEX TUBE

1. For minimum cooling, fully turn the adjusting valve clockwise.
2. Rotate the adjusting valve counterclockwise until a comfortable temperature is reached.
3. For maximum cooling, turn the valve fully counterclockwise (approximately 3-1/2

turns). The adjusting knob may vary air flow but cannot reduce flow below the required minimum 6 cfm rate when the proper pressure is used at the inlet of the MSA air-supply.





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