

Vortex Tube Respirator

INSTRUCTIONS

WARNING

This manual, including the warnings and cautions inside, must be carefully read and followed by all persons who use or maintain this product, including those who have any responsibility involving its selection, application, service or repair. This respirator will perform as designed only if used and maintained according to the instructions. Otherwise, it could fail to perform as designed and persons who rely on this product 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 read and observe the WARNINGS and CAUTIONS inside. We encourage our customers to write or call for a demonstration of this equipment prior to use or for any additional information relative to use or repairs. Call 1-800-MSA-2222 during regular working hours, or 1-800-MSA-5555 after working hours or during emergencies.

For More Information, call 1-800-MSA-2222 or Visit Our Website at www.MSAnet.com



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

DESCRIPTION

TABLE OF CONTENTS

Important Notice	2	Facepiece Fit Check	9
Description	2	Donning the Half Facepiece.....	10
Respirator Fitting Test	3	Air-Tightness Test.....	10
Respirator Use Limitations.....	3	Final Hook-Up	11
Preparing the Air Source.....	5	Using the Respirator	11
Assembling the Respirator.....	7	Maintaining the Respirator.....	13
Donning the Respirator	9	Accessories.....	13
Donning the Facepiece	9	Parts List and Accessories	14
Donning the Apparatus	9	Approvals	15

IMPORTANT NOTICE FOR RESPIRATOR PROTECTION PROGRAM ADMINISTRATORS

WARNING

1. An adequate respiratory program must include knowledge of hazards, hazard assessment, selection of proper respiratory protective equipment, instruction and training in the use of equipment, inspection and maintenance of equipment, and medical surveillance. (See OSHA regulations, Title 29 CFR, Part 1910.134, Subpart I, Par. 1910.134 (b) (1).)
2. This respirator will perform as designed only if used and maintained according to the instructions. The respiratory protection Program Administrator and the users must read and understand these instructions before trying to use or service this product.
3. This respirator shall be used only after proper instruction and training in its use as specified in OSHA regulations (Title 29 CFR, Part 1910.134, Subpart I, Par. 1910.134 (b) (3)).
4. This respirator must not be worn in an atmosphere which is immediately dangerous to life or health or from which the wearer cannot escape without the aid of a respirator. Under no circumstances should the respirator be used as an underwater device.
5. Use only with an air supply that meets ANSI (Compressed Gas Association) specifications. Air pressure and flow rates must be within the approved ranges for the device.
6. Users must wear suitable protective clothing and precautions must be taken so that the respirator is not worn in atmospheres that may be harmful to the device.
7. Do not alter, modify, or substitute any components without the approval of MSA. Such alterations will void the NIOSH/MSHA approval.
8. Inspect the respirator regularly and maintain it according to the instructions. Repairs must be made only by properly trained personnel.
9. If the air supply pressure is greater than 60 psig

(Vortex tube), be sure to use a pressure regulator between the air supply and air supply hose. Adjust the regulator to deliver air at the pressures specified by the vortex tube you are using. Failure to follow precautions may result in serious personal injury, death, or property damage.

10. This respirator may not provide a satisfactory seal with certain facial characteristics, such as beards or large sideburns that prevent direct contact between the skin and sealing surface of the facepiece. Do not use this facepiece if such conditions exist. An improper facial seal may allow non-respirable air to leak into the facepiece, reducing or eliminating respirator protection.

Failure to follow the above warnings may result in serious personal injury or death.

DESCRIPTION

Vortex-tube respirators are Type C, supplied-air respirators 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 or health:

“Not immediately dangerous to life or health” means any hazardous atmosphere which may produce physical discomfort immediately, chronic poisoning after repeated exposure, or acute adverse physiological symptoms after prolonged exposure (Title 42 CFR, Part 82, Subpart A, Par. 84.2 (z)).

The respirator may be used with the Ultravue® full facepiece; or the Comfo® II or Comfo Elite® half facepieces. All facepieces are available in small, medium, or large sizes, as well as in either Hycar rubber or silicone material.

DESCRIPTION

RESPIRATOR FITTING TESTS

A qualitative and quantitative respirator fitting test must be carried out for each wearer of an air-supplied and air-purifying type respirator. The test shall be performed in the air-purifying mode of operation and is necessary in order to determine the amount of protection the respirator will provide while being used in the air-purifying mode.

Qualitative Test — If the wearer of the respirator passes a qualitative fit test, the respirator can be worn in contaminant (particulate and/or organic vapor) concentrations up to the maximum use concentration listed below.

Quantitative Test — If the Wearer of the respirator performs a quantitative fit test, the respirator can be worn in contaminant (particulate and/or organic vapor) concentrations determined by the results of the test, but not exceed the maximum use concentration listed below:

Facepiece Type: Half-mask Facepiece
Maximum Use Concentration — 10 times the TLV for the contaminant

Facepiece Type: Full Facepiece
Maximum Use Concentration — 1000 times the TLV for the contaminant.

In addition to the above limitations, the wearer must not exceed the limitations listed in the applicable NIOSH/MSHA Approval or any maximum use concentration controlled by OSHA regulations.

WARNING

The user must perform a respirator fit test and follow all warnings and limitations specified. Failure to do so may result in serious personal injury or death.

Respirator fitting tests and protection factors are explained fully in ANSI Z88.2-1990, "Practices for Respirator Protection," published by the American National Standards Institute, 1430 Broadway, New York, NY 10018.

RESPIRATOR USE LIMITATIONS

The wearer must comply with the following MSA respirator use limitations:

- A. Maximum Use Concentration.
- B. The limitations outlined in the applicable NIOSH/MSHA approval.
- C. Any applicable limitation contained in a standard established by a regulatory agency (such as OSHA) with jurisdiction over the wearer.
material in the canister (for organic vapor respirators).

Do not exceed ANY of the applicable maximum use concentrations listed below:

Respirator Type Respirator Use	Respirators with Ultra-Filter® or Optifilter™ XL Filter Cartridges	
	Full Facepiece	Half Mask
Routine Use in Air-Supplied Mode Only-Including Entry, Continuous Use and Non-Emergency Egress	• 1,000 times Exposure Limit • IDLH	• 10 times Exposure Limit • IDLH

Unpacking and Inspection

Remove the respirator from the box. Inspect each component fully for shipping damage. Thoroughly inspect all components of the respirator before it is used. Read and follow all NIOSH/MSHA approval limitations as they apply to the respirator.

NOTES

PREPARING THE AIR SOURCE

PREPARING THE AIR SOURCE

Breathing air may contain no more than 10 parts per million (ppm) carbon monoxide (CO), not more than 1000 ppm carbon dioxide (CO₂), and not more than 5 milligrams per cubic meter of oil vapor or oil particulates. Some means of monitoring CO may be required. Contact MSA for more information on air-line CO monitors.

⚠ WARNING

The respirator does not remove carbon monoxide (CO). A continuous carbon monoxide monitor may be required of your installation (see 29 CFR Part 1910.134). Failure to follow this precautions may result in serious personal injury or death.

The air source must supply 60 - 95 (60 - 80)* psig pressure to the respirator at all times. Refer to the NIOSH/MSHA approvals.

There are numerous possible connection arrangements which are approved. Check Instruction Sheet P/N 995602 for approved fittings and possible air-supply hose assemblies which may be used to connect air-supply hoses and valves.

⚠ CAUTION

This system must be supplied with respirable air meeting the requirements of the Compressed Gas Association G-7.1 for quality verification level (grade) D air or equivalent.

The air source must provide at least 15cfm cool only, 25 cfm warm/cool to each respirator, and maintain the required inlet pressure range specified in this manual for the specific flow control device selected. If the air supply pressure is greater than 60 psig be sure to use a regulator between the air supply and air-supply hose. Adjust the regulator to deliver air the pressures specified. Failure to follow this warning may result in serious personal injury or death.

If quick-disconnect fittings are to be used, mating male plug and female socket fittings must be installed at the air source and on the ends of the air-supply hose(s). Although either male or female fittings may be installed at the air source, the installation shown in this manual starts with the female socket.

Inlet Pressure Monitoring:

1. An inlet pressure gauge assembly is available from MSA that monitors air pressure at the inlet of the MSA air-supply hose to ensure that air pressure is within the certified range. The gauge assembly is supplied with quick-disconnect fittings to accommodate the air-line system. Use P/N 476734 quick-disconnect with Snap-Tite fittings (AL).

2. The gauge assembly may be installed between the air source outlet and the air-supply hose inlet. Insert the inlet gauge quick-disconnect plug into the socket on the air source.
3. Pull on the plug to be sure the socket has snapped into place.

Preparing the Air-Supply Hose Connections (Without an Inlet Pressure Gauge Assembly):

Check for an O-ring in the hose connector.

1. Thread a P/N 69542 union adapter into the 3/8" hose female connector and tighten using wrenches. If a quick-disconnect will be used, a male plug must be selected that corresponds to the female socket on the air source. Use a plug which has female threads to match the tapered threads of the P/N 69542 union adapter. Apply pipe-sealing tape to the union adapter tapered-threads.
2. Thread the male plug on the union adapter and tighten using wrenches.
3. Use a female socket on the male end of the air-supply hose to mate with the respirator quick-disconnect.

Selecting and Joining Sections of Air-Supply Hose:

Virtually any combination of 3/8" id air-supply hose from MSA may be used. However, the following limitations apply — no more than 12 sections may be used; the total length of air-supply hose must not exceed 300 feet; and, no more than one 8 ft. or one 15 ft. length of air-supply hose may be used. Select air-supply hose from the table below.

Note: Also refer to Instruction Sheet P/N 995602 for possible air-supply hose assemblies which may be used to connect air-supply hoses and valves.

APPROVED AIR-SUPPLY HOSE ASSEMBLIES			
PART NO.	DESCRIPTION		MODEL NO.
481071	Neoprene	8 ft.	7-665-1
455020	Neoprene	15 ft.	7-665-1
455021	Neoprene	25 ft.	7-665-1
455022	Neoprene	50 ft.	7-665-1
481051	PVC	8 ft.	7-664-1
471511	PVC	15 ft.	7-664-1
471512	PVC	25 ft.	7-664-1
471513	PVC	50 ft.	7-664-1
484225	PVC	100 ft.	7-664-1
			7-664-2**
491513	Coiled Nylon	8 ft.	5-511-1
491514	Coiled Nylon	15 ft.	5-511-1
491515	Coiled Nylon	25 ft.	5-511-1
474043	Coiled Nylon	50 ft.	5-511-1

PREPARING THE AIR SOURCE

1. Insert the air-supply hose quick-disconnect plug into the socket on the air source. Pull on the air-supply hose to be sure the socket snapped into place.
2. If the respirator will not be donned immediately, install the dust plug in the female socket at the end of the air-supply hose.

Checking the Air-Supply Hose Valve Connection:

If quick-disconnects are not attached, install a male plug on the valve inlet fitting. Use only the approved fittings. Install a female socket on the end of the air-supply hose. Use only approved female sockets.

To check that the fittings match, push the air-supply hose female socket on the male plug at the bottom of the valve. Pull on the air-supply hose to make sure the socket has snapped in place. Turn the air source on so that air is flowing to the respirator. **Do not don the respirator until air source pressure is verified.**

Adjusting the Air Source Pressure:

Adjust the air source pressure at the inlet end of the 8 to 300 ft. air-supply hose. Follow the guidelines in the following chart.

Cold Vortex Tube

High pressure systems

Approved air-supply hose length
8-300 ft.

Approved inlet air pressure maintain 4 cfm to facepiece facepiece: 60-80 psig.

Warm/Cool Vortex Tube

High pressure systems

Approved air-supply hose length
8-300 ft.

Approved inlet air pressure to maintain 4 cfm to facepiece:

Hose Length	Inlet Pressure
8 - 100	60 - 75
100 - 200	75 - 90
200 - 300	80 - 95

⚠ CAUTION

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

Check the inlet pressure gauge reading periodically. Keep the reading in the correct range. If the reading changes, adjust the pressure until the pressure gauge reads within this range. Inspect the system for restrictions, such as a partially-closed valve or a clogged filter element.

ASSEMBLING THE RESPIRATOR

ASSEMBLING THE RESPIRATOR

Installing the Vortex Tube on the Support Belt:

1. Hold the sheath so that the pull-tab side faces you. Pass the support belt through the two slots in the back of the sheath so that the wide strip of sheath material is on the outside. Insert the sheath tab into the vortex-tube metal belt holder and close the snap.
2. Reconnect the quick-disconnect socket to the vortex tube. The vortex tube should be worn on your right side so that the air-supply hose will be behind you.
3. Turn the air supply on. Check for leaks with a commercial leak-test solution or soapy water. Tighten connections as required. Turn off the air supply.

Assembling the Filter Cartridge Holder:

A filter cartridge and holder assembly are approved for use with the vortex tube respirator. See page 0. When odors of vapors or gases become noticeable, or when breathing resistance becomes uncomfortable, the cartridge must be replaced. Check filter cartridge flow resistance using the Filter Resistance Tester.

Installing Filter Cartridges in the Cartridge Holder:

1. Unscrew the bezel ring. Separate the holder valves.
2. Screw the filter cartridge in until it is firmly seated on the gasket.
3. Place the holder halves together and tighten the bezel ring to ensure a good seal at the gasket.

Connecting the Cartridge Holder to the Respirator:

Connect the cartridge holder female fitting to the vortex tube. Connect the breathing tube coupling nut to the cartridge holder male fitting. Position the cartridge holder comfortably on your hip.

Connecting the Breathing Tube to the Full and Half Facepiece:

1. Check that there is a gasket in the facepiece coupling nut.
2. Check that there is a gasket in the breathing tube coupling nut.
3. Thread the breathing tube into the facepiece coupling nut and hand-tighten.

This image shows a full-page view of a blank sheet of lined paper. At the top, there is a solid gray horizontal band. Centered within this band is the word "NOTES" in a bold, black, sans-serif font. Below the gray band, the rest of the page is white and filled with evenly spaced, thin, dark gray horizontal lines, typical of notebook paper.

DONNING

DONNING THE FULL FACEPIECE

Note: If the respirator will be used in areas of high humidity or at temperatures below 32 deg F, the nosecup accessory should be used to inhibit fogging. Refer to page 0.

1. Don the facepiece.

WARNING

Do not wear eyeglasses under the facepiece. The temples or sidebars on eye glasses will prevent an airtight seal. If you must wear glasses, install the spectacle kit. Failure to follow this precaution may cause inhalation of contaminated air, resulting in serious respiratory injury or death.

- a. Attach the breathing tube to the facepiece coupling nut, hand-tighten.
- b. Loosen the harness head straps on the facepiece so the end-tabs are at the buckles.

- c. Hold the facepiece by the straps and put your chin in first.



- d. Then, pull the harness back over your head.



- e. Tighten the lower (neck) harness straps first, by pulling them straight back, not out. Tighten the temple straps the same way. Tuck in the ends of the straps so that they lay flat across the head.



- f. Push the headband pad towards the neck and repeat step. If necessary, tighten the front strap for best visibility and fit. Tuck in the ends of the straps so they lay flat across the head.
5. To Use the Speed-On Harness
 - a. Loosen the neck straps so the end-tabs are at the buckles.
 - b. Insert your chin into the facepiece.
 - c. Pull the harness "net" over the crown of your head.
 - d. Tighten the neck straps. There are no temple or front strap adjustments. Tuck in the straps so that they lay flat across the head.

FACEPIECE FIT CHECK

The Facepiece Fit Check must be performed each time the facepiece is donned. You must know the face-to-facepiece seal is good before you enter any hazardous area. To do this:

1. Block off the breathing tube with either the palm of your hand, or by placing your thumb over the opening inside the breathing tube coupling nut.



2. Breathe in and hold your breath for 10 seconds. If the seal is good, the facepiece will collapse and remain collapsed against your face.



3. If the facepiece does not remain collapsed, or you notice any leakage, readjust the straps and test again. If this does not correct the leak, do not use the facepiece.

DONNING

4. Test the exhalation valve by exhaling. If the valve is stuck, you will feel a heavy rush of air around the facepiece. You may need a sharp exhalation at first to "crack" the valve. If this does not release the valve, do not use the facepiece.



⚠ WARNING

This device may not seal properly with your face if you have a beard, gross sideburns or similar physical characteristics. A facepiece that does not seal adequately may allow contaminated air to leak into the facepiece, reducing or eliminating respiratory protection. If such conditions exist the user assumes all risks of respiratory injury or death which may result. The face-to-facepiece seal must be tested before each use.

DONNING THE HALF FACEPIECE

Donning the Comfo® Facepiece with Cradle Headstraps:

Note: To install the Cradle Headband Conversion Kit (P/N 479875), follow the instructions supplied with the kit.

1. Slip the cradle headstrap over the crown of your head and rest the top of the facepiece on the bridge of your nose.
2. Swing the bottom of the facepiece under your chin. Pull the lower headstraps around your neck and attach the clip to the D-ring. Adjust the tension slides for a comfortable fit.

Donning the Comfo Facepiece with Elastic Headstraps:

1. Rest the top of the facepiece on the bridge of your nose. Swing the bottom of the facepiece under your chin.
2. Place the long headstraps over the crown of your head. Attach the clip to the D-ring.
3. Place the short headstraps around your neck. Attach the clip to the D-ring.
4. Adjust the tension slides for a comfortable fit. Perform the air-tightness test below.

AIR-TIGHTNESS TEST (Face-to-Facepiece Seal)

1. To test the facepiece for negative pressure leaks, block the end of the breathing tube and inhale so that the facepiece collapses against your face. Hold your breath for 10 seconds. The facepiece should remain collapsed. If the facepiece does not remain collapsed, readjust the headstraps and repeat step 1. If you cannot get a seal by adjusting the headstraps, check the facepiece for leaks. Locate the problem and correct it before using the respirator.



⚠ WARNING

This respirator may not provide a satisfactory seal with certain facial characteristics, such as beards or large sideburns that prevent direct contact between the skin and the sealing surface of the facepiece. Do not use this facepiece if such conditions exist. If the facepiece does not seal against your face, non-respirable air may leak into the facepiece, reducing or eliminating the protection. If such conditions exist, then YOU, the user, assume all risks of respiratory injury or death which may result. The face-to-facepiece seal must be tested before each use. Do not use a facepiece that does not seal.

2. To test the facepiece for positive pressure leaks, place the palm of your hand over the exhalation valve cover. Exhale gently. A slight positive pressure should build up inside the respirator. If any leakage is detected around the facial seal, readjust the headstraps and repeat steps 1 and 2. If you cannot maintain a seal by adjusting the headstraps, check the facepiece for leaks. Locate the problem and correct it before using the respirator.



FINAL HOOK-UP

Turn the air supply on. Attach the breathing tube to the cartridge holder and hand-tighten. You are now ready to use the respirator.

DONNING

Remove the respirator and return to fresh air immediately if air flow stops or breathing becomes difficult. Failure to follow this precaution may result in serious personal injury or death.

USING THE RESPIRATOR

⚠ WARNING

Do not use the respirator if air contaminants are unknown, immediately dangerous to life or health, or you cannot escape without respiratory equipment. The vortex tube respirator does not afford protection if the air source fails.

Do not use the respirator as an underwater device.

If exposed to contaminants which can be absorbed by the skin, wear clothing which will prevent the contaminant from contacting the skin.

Return to safe atmosphere and discard the respirator immediately if discoloration, crazing, blistering, cracking, or other deterioration of the respirator system are observed.

Remove the respirator and return to fresh air immediately if the flow of air stops. Failure to do so may result in serious personal injury or death.

Do not use the respirator if you cannot see through the lens.

Failure to follow these precautions can cause inhalation of the contaminant and result in serious personal injury or death.

Adjusting the Cold Vortex Tube Respirator:

For minimum cooling, turn the adjusting valve fully clockwise. Rotate the adjusting valve counter-clockwise until a comfortable temperature is reached.

For maximum cooling, turn the valve fully counter-clockwise (approximately 3-1/2 turns). The adjusting knob may vary air flow but cannot reduce flow below the required minimum 4 cfm rate when the proper pressure is used at the inlet of the air-supply hose.

Adjusting the Warm/Cold Vortex Tube Temperature:

Using the lever, rotate the temperature adjustment collar to provide a comfortable temperature. For maximum warmth, rotate the collar clockwise. For maximum cooling, rotate the collar counter-clockwise.

Removing the Full Facepiece Respirator:

1. To remove the Ultravue facepiece, return to fresh air and clean the outer surfaces of the respirator before removing the facepiece. To loosen the facepiece, insert your thumbs under each of the headband buckles and fully extend the headbands.



Grasp the speaking diaphragm housing, and pull the facepiece up and away from your face.



⚠ CAUTION

Do not pull by the exhalation valve. The facepiece rubber or the valve may be damaged.

Remove the support belt. Turn the air source off.

Removing the Half Facepiece Respirator:

To remove the Comfo facepiece, return to fresh air and clean the outer surfaces of the respirator before removing the facepiece. Unhook the snap from the lower D-ring, then grasp the facepiece by the yoke and pull outwards, then up over your head.

⚠ CAUTION

Do not pull by the exhalation valve. The facepiece rubber or the valve may be damaged.

Turn the air source off.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

MAINTAINING THE RESPIRATOR

MAINTAINING THE RESPIRATOR

NIOSH/MSHA approvals require a regular maintenance program. This program is necessary to assure proper protection, and must include cleaning and sanitizing, inspection of all parts of the respirator, and replacement of worn or damaged parts. See the parts list for correct replacement part numbers.

⚠ WARNING

Inspect the respirator after it has been cleaned and sanitized. Be careful that you do not breathe or touch the contaminant in handling the respirator or its parts. Use the equipment designed to protect you from the specific contaminant. Failure to follow this precaution may expose you to the contaminant, resulting in serious personal injury or death.

Cleaning and Sanitizing:

This respirator must be thoroughly cleaned after each use. Depending on the cleaning policy adopted, either a designated person or the user should clean the respirator. ANSI suggests that users should be trained in the cleaning procedure.

Remove excess contaminant from the respirator. Disconnect the breathing tube from the facepiece. Add Confidence Plus® Cleaning Solution (P/N 10009971) from MSA or a mild cleaning solution to a gallon of warm water (maximum temperature 120°F).

⚠ CAUTION

Alcohol should not be used as a germicide, because it may deteriorate the rubber.

Submerge the facepiece in the cleaning solution. Scrub gently until clean. A soft brush or sponge may be used. Rinse the facepiece thoroughly in clean water (maximum 120°F), then air-dry. If not rinsed thoroughly, Cleaner-Sanitizer II may irritate your skin.

⚠ CAUTION

Do not force-dry with heat. Temperatures above 120 F may distort or damage parts of this respirator. The Ultravue facepiece lens is plastic and may be scratched if rubbed with coarse dry cloth or paper towels.

Disconnect the breathing tube from the vortex tube. Remove the support belt from the clips. Disconnect the air-supply hose from the union (or quick-disconnect) fitting. Use a damp cloth or sponge saturated with Cleaner-Sanitizer II solution or a mild cleaning solution to wipe these parts clean.

Thoroughly wash the support belt and vortex-tube sheath in the cleaning solution. A soft brush or sponge may be used. Rinse thoroughly with plain water (maximum temperature 120 F), then air-dry. If not rinsed thoroughly, Cleaner-Sanitizer II solution may irritate your skin.

Component Inspection:

Only trained personnel are to maintain the respirator. Use only genuine MSA parts. Do not make repairs or design modifications other than as recommended by MSA or the NIOSH/MSHA approval will be voided. Inspect the respirator after each use.

Perform the following inspection checks:

1. Check the facepiece for wear.
2. Be sure that you can see clearly through the lens. Look for scratches that may impair vision.
3. Be sure the facepiece headstraps are not damaged.
4. Be sure that there is a gasket in the facepiece coupling nut.
5. Inspect the facepiece exhalation valve. If the facepiece is equipped with a D/PD exhalation valve, be sure the valve is in the OUT position.
6. Be sure there is a gasket in the breathing tube coupling nut.
7. Inspect the vortex tube to be sure it is operating properly.
8. Check that the quick-disconnect snaps into place and releases properly.
9. Be sure that the support belt is in good condition.
10. Reassemble the respirator.
11. Inspect the air-supply hose for tears, cracks or other damage.

Storing the Respirator:

The vortex tube respirator should be stored in a clean, dry location within a temperature range of 32 - 80 F (long term) or -25 to ±120 F (short term, maximum 24 hours).

ACCESSORIES

The Constant Flow Air-Line Filter provides high-efficiency filtration of compressed-air lines. The filter removes a minimum of 99 percent of particulates measuring 0.3 micron or larger. These include dusts, mists, fumes, smokes, and petroleum vapors. A chemical cartridge removes organic vapors. The filter can be used at inlet pressure up to 125 psig. The pressure drop is 1 psig at a maximum rated air flow of 25 scfm. This accessory does not remove carbon monoxide (CO).

The Constant Flow Air-Line Pressure Regulator

reduces inlet pressure to the desired operating pressure. The pressure regulator maintains pressure on the outlet side until it is readjusted.

PARTS LIST AND ACCESSORIES

VORTEX TUBE RESPIRATOR

Complete Assemblies
(for use with air-supply hose)

Part Number	Description
494439	Respirator with Ultravue facepiece with Snap-Tite (AL) quick-disconnect and Cool vortex tube
494440	Respirator with Ultravue facepiece less quick-disconnect and with Cool vortex tube
495462	Respirator with Comfo facepiece with Snap-Tite (AL) quick-disconnect and Cool vortex tube
495463	Respirator with Comfo facepiece less quick-disconnect, with Cool vortex tube
495785	Respirator with Ultravue facepiece with Snap-Tite (AL) quick-disconnect and Warm/Cool vortex tube
495786	Respirator with Ultravue facepiece less quick-disconnect, with Warm/Cool vortex tube

PARTS AND ACCESSORIES

Part Number	Description
96680	Ultravue facepiece
480122	Comfo facepiece
463938	Vortex tube, Cool
495702	Vortex tube, Warm/Cool
9961	Support belt
457158	Breathing tube
469595	Cartridge holder assembly
455019	Socket assembly (Snap-Tite) for 3/8" hose
66273	Plug (Snap-Tite) for 3/8" hose
3532	Gasket (facepiece and breathing tube)
FILTER CARTRIDGES	
464031	GMA cartridge (P/N 459315), Pkg. of 10
3/8" NEOPRENE AIR-SUPPLY HOSE ASSEMBLIES	
481071	8 ft. length
455020	15 ft. length
455021	25 ft. length
455022	50 ft. length
3/8" PVC AIR-SUPPLY HOSE ASSEMBLIES	
481051	8 ft. length
471511	15 ft. length
471512	25 ft. length
471513	50 ft. length
484225	100 ft. length
ACCESSORIES	
81857	Air-line filter assembly
484923	Replacement filter group (for air-line filter)
476734	Pressure gauge assembly (Snap-Tite plug) for 3/8" hose
APPROVALS	
TC-19C-274	
TC-19C-277	

APPROVALS

PERMISSIBLE SUPPLIED-AIR RESPIRATOR, TYPE C, CONTINUOUS FLOW CLASS

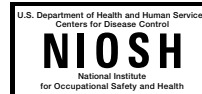
MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH



APPROVAL NO.
TC-19C-274

ISSUED TO

MINE SAFETY APPLIANCES COMPANY Pittsburgh, Pennsylvania, U.S.A.



LIMITATIONS

Approved for respiratory protection in any atmosphere not immediately dangerous to life or health or from which the wearer can safely escape without the aid of the respirator. This approval applies only when the respirator is supplied with respirable air through 8 to 300 feet of air supply hose within the pressure range of 60 to 80 pounds per square in gauge as specified by the manufacturer. A maximum of 12 sections of air supply hose may be used in making up the maximum working length of hose. Each section of coiled hose is considered 50 feet in length (max.: 6 sections).

If using a 7-753-1, 7-753-2, or 7-753-3 facepiece, the D/DP Exhalation Valve must remain in the "OUT" position.

CAUTION

Follow the manufacturer's instructions for providing a supply of respirable air.

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained. This respirator shall be selected, fitted, used, and maintained in accordance with the Mine Safety and Health Administration, Occupational Safety and Health Administration, and other applicable regulations.

MSHA-NIOSH Approval TC-19C-274

Issued to Mine Safety Appliances Company — February 11, 1991

The approved assembly consists of the following MSA parts: 7-203-1, 7-203-2, 7-203-3, 7-753-1, 7-753-2, 7-753-3, 7-576-1, 7-476-2, or 7-476-3 facepiece; 457158 breathing tube; 469595 cartridge holder with 459322 or 459315 cartridge; 5-454-1 vortex tube; 7-977-1, 9961, 473902, or 487446 belt; 7-664-1, 7-664-2, 7-665-1, or 5-511-1 air supply hose; 69542, or 628232 union adapter; and 4-280-1 air supply hose connection (accessory).

PERMISSIBLE SUPPLIED-AIR RESPIRATOR, TYPE C, CONTINUOUS FLOW CLASS

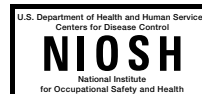
MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH



APPROVAL NO.
TC-19C-277

ISSUED TO

MINE SAFETY APPLIANCES COMPANY Pittsburgh, Pennsylvania, U.S.A.



LIMITATIONS

Approved for respiratory protection in any atmosphere not immediately dangerous to life or health or from which the wearer can safely escape without the aid of the respirator. This approval applies only when the respirator is supplied with respirable air through 8 to 300 feet of air supply hose within the specific pressure ranges according to the following hose lengths as specified by the manufacturer.

Hose Length	Hose Inlet Supply Pressure
8 - 100 ft.	60 - 75 psig
100 - 200 ft.	75 - 90 psig
200 - 300 ft.	80 - 95 psig

A maximum of 12 sections of air supply hose may be used in making up the maximum working length of hose. Each section of coiled hose is considered 50 feet in length (max.: 6 sections).

If using a 7-753-1, 7-753-2, or 7-753-3 facepiece, the D/DP Exhalation Valve must remain in the "OUT" position.

CAUTION

Follow the manufacturer's instructions for providing a supply of respirable air.

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained.

This respirator shall be selected, fitted, used, and maintained in accordance with the Mine Safety and Health Administration, Occupational Safety and Health Administration, and other applicable regulations.

MSHA-NIOSH Approval TC-19C-277

Issued to Mine Safety Appliances Company — February 11, 1991

The approved assembly consists of the following MSA parts: 7-203-1, 7-203-2, 7-203-3, 7-753-1, 7-753-2, 7-753-3, 7-576-1, 7-476-2, or 7-476-3 facepiece; 457158 breathing tube; 469595 cartridge holder with 459322 or 459315 cartridge; 5-454-1 vortex tube; 7-977-1, 9961, 473902, or 487446 belt; 7-664-1, 7-664-2, 7-665-1, or 5-511-1 air supply hose; 69542, or 628232 union adapter; and 4-280-1 air supply hose connection (accessory).



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



Be Sure.
Choose MSA.

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