



September 30, 2008

NIOSH Docket Officer  
RE: NIOSH DOCKET –NIOSH – 083A  
Robert A. Taft Laboratories, M/S C34  
4676 Columbia Parkway  
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[NIOCINDOCKET@CDC.GOV](mailto:NIOCINDOCKET@CDC.GOV).

**RE: Draft Concept of Subpart J: Supplied-Air Respirators Technical Performance Standard NIOSH Docket Number # - 83A**

Dear Docket Officer:

3M Company (3M), through its Occupational Health and Environmental Safety (OH&ES) Division, is a major manufacturer and supplier of respiratory protective devices throughout the world. 3M has invented, developed, manufactured and sold approved respirators since 1972. 3M employs experienced engineers and technical professionals for the development of respirators, including supplied-air respirators. Our sales people have trained and fit tested hundreds of thousands of respirator wearers throughout the world. Our technical staff has performed basic research on the performance of respirators and their uses, presented and published these data in numerous forums and assisted customers with the development and administration of effective respirator programs. In sum, we have substantial experience in all phases and applications of respiratory protection. We are pleased to provide the National Institute for Occupational Health and Safety (NIOSH) with our comments on the Draft Concept of Subpart J: Supplied-Air Respirators Technical Performance Standard, dated July 1, 2008

3M appreciates the opportunity to add our comments and knowledge to docket 83A. If NIOSH has any questions on these comments or wishes to further explore this position, we welcome the opportunity for further dialog.

Sincerely,

Robert A. Weber, CIH  
Manager of Technical Service and Regulatory Affairs  
3M Occupational Health & Environmental Safety Division

MLR:CEC/11b  
Enclosures

### **3M Comments on the Draft Concept of Subpart J: Supplied-Air Respirators Technical Performance Standard**

**July 1, 2008**

The following comments are in response to the above mentioned draft and comments from the public meeting of August 20, 2008 regarding the supplied-air respirators (SAR) technical performance standard.

#### **I. General Comments**

We believe the new proposed category of 'airsource respirator' is not appropriate and should be removed. This device appears to describe respirators that operate at very low pressures produced by 'air pumps'. Historically, and in this proposal for other SAR, the National Institute for Occupational Safety and Health (NIOSH) does not include the breathing air source in devices' approvals. It should not start now, for a number of reasons:

- It will limit users' respirator options. Choices would be limited to those manufacturers who "make" both an air pump and respirators.
- It will force respirator manufacturers to sell air pumps or stop making respirators that operate at air pump pressures. Under the current policies of NIOSH the respirator manufacturer would be required to exercise quality control over these devices. This can be done in two ways. If they were to be direct shipped from the "air pump" manufacturer, the respirator manufacturer would be required to develop a contract supplier relationship with all of the "pump" manufacturers (see NIOSH policy for "subcontractor" relationship). In order to offer versatility to consumers, respirator manufacturers will need to design their respirators to be compatible with most of the "pumps" on the market. This will require respirator manufacturers to exercise some control over the "pump" manufacturers' quality control program and this would be virtually impossible. The second way to exercise quality control over the pumps is where they are treated as an outsourced part or subassembly and as the pumps are received by the respirator manufacturer they undergo incoming inspections which would be extremely costly and burdensome requiring double shipping of these heavy devices. This most likely will lead to the demise of this respirator class.
- Defining these devices based on weight and what can be carried is arbitrary and results in a design standard rather than performance standard. It is arbitrary in that the problems NIOSH believes they have identified with these devices are not necessarily unique to these "smaller" compressors
- A few failed fit tests could cause major problems for employers who use these systems. For those vendors selling only tight-fitting facepieces with their air pumps, all employees must fit into the same brand of respirator. If they do not, the option to provide another brand of respirator to achieve fit is very unattractive, since an entire system would need to be purchased. This could result in the employer using the "wrong" respirator to do the job.

- There are proposed design requirements for CO monitors, filters, size of the system and the number of workers a system is allowed to support. These design requirements apply to all breathing air systems from pumps to very large non-portable compressors. These requirements are not within NIOSH's purview and if adopted could suppress development of innovative products.
- Inclusion of pumps in the NIOSH approval could mislead users into believing the air produced will always be respirable quality. NIOSH has no control or jurisdiction over how pumps are placed, maintained, or used.

If NIOSH is nevertheless compelled to test pumps then NIOSH must propose a new subpart for "pumps" where pump manufacturers are required to submit pumps for approval to verify the quantity and the pressure of the air supplied. NIOSH can not certify they meet a certain air quality because there is no control by NIOSH or the manufacturers where the unit is placed in the work place.

### Specific Comments

In these comments, the specific section is listed first as we recommend it should be written or addressed. Red ink indicates words to be deleted and blue ink indicates additions to the section. The recommendation is then followed by our comment explaining why we request the change.

### 2. Definitions

The terms in this section should be alphabetized.

2.1 *Supplied-Air Respirator (SAR)* - ~~including all~~ completely assembled atmosphere supplying respirators designed for use as respiratory protection during entry into and escape from atmospheres not immediately dangerous to life or health (non-IDLH).

Comment:

'Including all' is unnecessary and poor syntax. Delete. The words "atmosphere supplying" need to be added to indicate that an air purifying respirator is not a supplied air respirator. If a definition for atmosphere supplying respirator is now required, the one from OSHA, 29 CFR 1910.134 (b) can be used: *Atmosphere-supplying respirator* a (or class of ) respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

As NIOSH revises all subparts of 42 CFR 84 this wording can be corrected.

2.3 *Supplied-Air Respirator/Self-contained breathing apparatus (SAR/SCBA)* - ~~including all~~ completely assembled atmosphere supplying respirators with an integrated SCBA cylinder designed for use as respiratory protection during entry

into and escape from hazardous atmospheres including atmospheres immediately dangerous to life or health (IDLH).

Comment:

While the following change is recommended, this definition should not be included in Subpart J Supplied Air Respirators because combination SAR/SCBA devices as described in this definition are approved under Subpart F as self-contained breathing apparatus.

All information related to these devices should also be removed. This includes the information in Sections 5 and 6 of this proposed concept.

~~2.5 *Airsource Respirator*—represents an approved respiratory protection system that encompasses a portable blower/air compressor supplying breathing air to the respiratory inlet covering.~~

~~2.6 *Portable blower/air compressor*—primary air supply for Airsource respirators and designed as such that it can be carried to the work location by no more than two persons (100 lb maximum including accessories) or rolled (manually or self-propelled) to the work location via a cart mounted system (300 lb maximum including accessories). This system may supply a maximum of three users simultaneously (plus a pneumatic tool connection per user if so equipped).~~

Comment:

2.5 and 2.6 should be deleted. As noted in our general comments, NIOSH should not be approving breathing air sources or specifying their design especially as part of the respirator configuration.

**2.8.2 *Helmet*** - a loose-fitting non-flexible respiratory inlet covering that is designed to offer impact and penetration protection of the head. It covers the head and neck, and may cover portions of the shoulders.

Comment:

The additional sentence is necessary to clarify that a helmet is different than a loose-fitting facepiece with head protection. This is particularly important in assigning appropriate protection factors.

**2.8.3 *Loose-fitting facepiece*** - a respiratory inlet covering which makes contact with but does not seal to the face. It may does not cover the neck, the back of the head or shoulders. It may or may not include head protection.

Comment:

These edits further clarify the difference between hoods, helmets, and loose-fitting facepieces.

~~2.8.4 Loose-fitting neck dam—a respiratory inlet covering which makes contact with but does not seal to the neck.~~

Comment:

This definition must be deleted. This definition is not necessary and is confusing. Both hoods and helmets meet this definition. Furthermore, the term “neck dam” is a term used in the respirator industry to indicate a tight fitting or tight sealing material around the neck, hence there is no such thing as a “loose fitting neck dam.” The definition that NIOSH has proposed is for either a collar or the shroud of a loose fitting helmet or hood.

**2.10 Respiratory inlet covering** - A half or full facepiece, hood, helmet or loose fitting facepiece or some combination of these that serves as a respiratory protective covering to the nose and mouth area.

Comment:

All examples of respiratory inlet coverings need to be listed as written, otherwise it excludes options. Another choice is that the ones listed need to be identified as examples only and not all inclusive of types of respiratory inlet coverings that could be certified.

**2.11 Work rating**- A SAR air flow rating. The three ratings are low, moderate or high, as designated by the manufacturer.

Comment:

It needs to be clear that what NIOSH means by a “work rate” is the air flow rating of the respirator.

### 3 Descriptions

~~3.1 Supplied-air respirators (SAR) for use in industrial not immediately dangerous to life or health (non-IDLH) concentrations: SAR including all completely assembled respirators and accessories designed for use as respiratory protection during entry into non-IDLH atmospheres are described as follows:~~

Comment:

The deleted portions are not necessary. This restriction is already established in the definition of SAR in 2.1. So by definition, an SAR cannot be used in an IDLH environment.

**3.1.1 Supplied-air respirator (Airline):** A respirator equipped with a pressurized air supply hose which is used for entry into atmospheres not immediately dangerous to life or health. ~~which~~ It utilizes a source of respirable breathing air not carried by the user and consists of an ~~Airline~~ air supply hose, detachable coupling(s),

~~control valve, orifice, pressure demand valve; an arrangement for attaching the hose to the wearer, and a respiratory inlet covering usually consisting of a tight-fitting or loose-fitting facepiece, loose- a hood, or a helmet. Specific designs may require a control valve, orifice or pressure demand valve.~~

Comment:

The revisions clarify that the SAR is not an SCBA. The phrase "control valve, orifice, pressure demand valve" was moved because they are not all used on the same device, as the original definition implies.

~~3.1.2 **Supplied-air respirator-Airline-with Shield(Abrasive Blasting (AB)):** An Airline respirator equipped with additional accessories designed to protect the wearer's head and neck against impact and abrasion from rebounding abrasive particulate or toxic material, and with shielding material such as plastic, glass, woven wire, sheet metal, or other suitable resistant material to protect the lens(es) of respiratory inlet coverings. ~~which do not unduly interfere with the wearer's breathing zone or vision and while permitting easy access to the external surface of such lense(s) for cleaning.~~~~

Comment:

Shield does not adequately describe what the definition lists; abrasive blasting is clearer and more accurate. The deleted portions of the definition are not necessary since there are tests which will not be passed if the listed conditions are present.

~~3.1.3 **Supplied-air respirator-Airsource:** SAR, for entry into atmospheres not immediately dangerous to life or health, which requires a portable blower/air compressor, air hose, detachable coupling(s), an arrangement for attaching the hose to the wearer and respiratory inlet covering usually consisting of a facepiece, hood, or helmet. Systems capable of supplying respirable air to four or more users are considered "industrial plant or site-wide systems" and are not within the scope of this subpart.~~

~~3.1.4 **Supplied-air respirator-Airsource with Shield:** An Airsource SAR equipped with additional accessories designed to protect the wearer's head and neck against impact and abrasion from rebounding particulate and toxic material. Designed with shielding material such as plastic, glass, woven wire, sheet metal, or other suitable material to protect the lens of respiratory inlet coverings which do not unduly interfere with the wearer's breathing zone or vision while permitting easy access to the external surface of such lense(s) for cleaning.~~

Comment:

Delete both definitions for the reasons stated in our general comment.

**3.2 Atmosphere supplying respirator for concentrations immediately dangerous to life or health (IDLH):** SAR/SCBA designed for use as respiratory protective

devices during entry into and escape from IDLH atmospheres are described in Section 5.0 of this subpart.

- 3.3 Atmosphere supplying respirator for chemical, biological, radiological, and nuclear (CBRN) hazards: SAR/SCBA designed for use as respiratory protection during entry into and escape from IDLH atmospheres which may contain CBRN hazards are described in Section 6.0 of this subpart

Comment:

“SCBA” needs to be added because an SAR cannot be used in an IDLH atmosphere. This also makes the terminology consistent with the definitions in section 2 and the sections referred to in the above sections. By adding “SCBA” these definitions need to be removed to Subpart H because they are not approved as supplied air respirators.

- ~~4.1.1.2 Each Airsource SAR described in Section 3.0 shall, where its design requires, contain the following component parts:~~

~~4.1.1.2.1 Respiratory inlet covering;~~

~~4.1.1.2.2 Air supply valve, or orifice;~~

~~4.1.1.2.3 Air supply hose;~~

~~4.1.1.2.4 Detachable couplings;~~

~~4.1.1.2.5 Flexible breathing tube;~~

~~4.1.1.2.6 Respirator harness; and~~

~~4.1.1.2.7 Portable blower or air compressor as a source of respirable breathing air.~~

Comment:

Delete this entire paragraph for the reasons stated in our general comment.

- 4.1.2.2 All connections and/or couplings for all supplied-air hoses shall be constructed so that at least 2 different disconnection motions are required for disconnection of connected fittings to prevent unintentional disconnection or provide visual evidence of inadequate connection.**

Comment:

The current language is unnecessarily specific. Requiring two motions could delay disconnection in an emergency egress situation, thereby delaying escape and increasing risk to the user.

#### **4.1.3.1 Body harnesses**

4.1.3.1.2 Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts, and where applicable, provide for holding a full facepiece in the ready position when not in use.

Comment:

This provision is an overly specific design requirement. There are other ways to accomplish this, e.g., a strap on the facepiece. This is also a feature that will be determined by the marketplace.

~~4.1.3.1.3 Protect the pressure reducer if so equipped.~~

Comment:

This provision is an overly specific design requirement. Manufacturers can decide if this is necessary and how to accomplish it.

~~4.1.3.1.4 Ergonomically Designed for multiple shapes and sizes of users.~~

Comment:

The term "ergonomically" is unnecessary and improperly used. Furthermore, there is no definition or test to indicate how one tells if a part is ergonomically designed.

~~4.1.3.2.1 Respiratory inlet coverings shall be equipped with adjustable and replaceable head harnesses which are designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire contact area.~~

Comment:

This is another overly specific design requirement. There are devices with hoods that do not require a head harness. There are disposable hoods and loose-fitting facepieces; it is not necessary to have a replaceable head harness.

~~4.1.3.3.2 Belts, rings, and attachments for life lines must withstand a pull of 227 kg. (500 pounds) for 30 minutes without failure. If the harness is designed to act as a safety/rescue harness it shall meet the American National Standards Institute (ANSI) Z359.1 Fall Arrest Standard.~~

Comment:

This is a respirator standard, not a fall protection standard. If a manufacturer chooses to design the harness for rescue purposes, it is the manufacturer's responsibility to design to an appropriate standard.

If NIOSH decides to retain this provision, a year must be specified for Z359.1.



**4.1.3.3.6 SAR** with a rigid head covering, a suitable harness shall be required to assist in holding this covering in place.

Comment:

It is not clear what this provision is saying. It appears to require a device to help hold a helmet or LFF with head protection on the user's head. If so, this is another specific design requirement that should be deleted. Manufacturers can determine if such a device is necessary and design accordingly.

**4.1.4.5 Hoods, helmets,** and loose-fitting facepieces shall be designed and constructed to fit persons with various head sizes, allow for the optional use of corrective eyewear, and ~~insure~~ensure against restriction of movement or vision by the wearer.

Comment:

Incorrect word.

~~**4.1.4.6 Helmets** shall meet the requirements of ANSI Z89.1-2003 Type I or Type II protective cap standards. Head gear not designed to provide head protection shall be prominently and permanently labeled to indicate that they are not impact and penetration resistant.~~

Comment:

This standard is for respiratory protection devices. NIOSH should not set requirements for head protection in a respiratory protection device standard. This requirement should be deleted in its entirety.

As written, this requirement means all helmets would be marked and would most likely have Z89.1 in the marking. This would be confusing as users may not take time to read the marking closely and may assume it indicates Z89.1 compliance. Markings would probably be either:

1. "Meets Z89.1 – 2003 ..." or
2. "Does not meet Z89.1 – 2003 ..."

It is current practice for users and OSHA compliance officers to just look for Z89.1. In addition, marking helmets that are not impact resistant would conflict with Z89.1, which requires marking to identify compliant head protection. NIOSH would be making manufacturers violate the ANSI standard just to get NIOSH approval. Cautionary language in the user instructions will tell users if the helmet does not offer head protection. Marking that the product complies indicates clearly that if it isn't marked, it does not comply.

If NIOSH insists on retaining this requirement, the revised sentence should read:

**4.1.4.6 Helmets designed to provide head protection shall meet the requirements of ANSI Z89.1- 2003.**

~~4.1.4.7 SAR intended for use in abrasive particulate blasting operations shall be designed and constructed to provide protection against impact and abrasion from rebounding abrasive materials to the wearer's head and neck.~~

Comment:

See comment on 3.1.2. This provision is covered in the definition as revised in our comment.

~~4.1.5.2 All lenses of respiratory inlet coverings shall be designed and constructed to be impact and penetration resistant via the requirements of ANSI Z87.1-2003, American National Standard for Occupational and Educational Personal Eye and Face Protection Devices or the lenses shall be prominently and permanently labeled to indicate that they are not impact resistant.~~

Comment:

This requirement should be deleted for a number of reasons. It contradicts itself; it requires all lenses to meet Z87.1, and then says they must be labeled if they do not. In addition, this is a respiratory protection standard, not eye and face protection. This requirement means the manufacturer must mark all lenses and will most likely use Z87.1 in the marking. This will be confusing as users may not take time to read the marking closely and may assume it indicates Z87.1 compliance. Markings probably would be either:

1. "Meets Z87.1 – 2003" or
2. "Does not meet Z87.1 – 2003"

It is current practice for users and OSHA compliance officers to just look for Z87.1. In addition, marking lenses that are not impact resistant would conflict with Z87.1, which requires marking to identify compliant eye and face protection. NIOSH would be making manufacturers violate the ANSI standard just to get NIOSH approval. Cautionary language in the user instructions will tell users if the lens does not offer eye or face protection.

~~4.1.5.3 The lenses of abrasive particulate type Airline and Airsource SAR shall be shielded by plastic, glass, woven wire, sheet metal, or other suitable material which does not interfere with the vision or breathing zone of the wearer.~~

Comment:

See comment on 3.1.2. This provision is covered in the definition as revised in our comment.

~~4.1.5.4 Protective lenses shall be mounted and attached to the respiratory inlet covering to provide easy access to the external surface of the lens for cleaning and replacement.~~

Comment:

This paragraph is not clear. If it is intended to apply only to AB respirators, it is not needed because it is included in the revised definition in 3.1.2. If intended to apply to all SAR, it is not appropriate to require protective lenses. Manufacturers can decide if they want to offer this option. We recommend that this paragraph be deleted.

#### 4.2.3 Breathing air quality gas for Airline SAR; minimum requirements

4.2.3.1 Compressed breathing air shall meet the applicable minimum grade requirements for Type I-Grade D breathing air set forth in the Compressed Gas Association Commodity Specification for Air, G-7.1, 5<sup>th</sup> Edition, 2004 (Grade D or higher quality).

Comment:

These are supplied air respirators; other breathing gases are not used. Also, there is no Type I designation in G7.1-2004.

#### 4.2.4 Breathing gas for Airsource SAR; minimum requirements

~~4.2.4.1 Blowers/air compressors for Airsource SAR shall be equipped with a CO alarm to warn the user if the CO concentration in the air supply is  $\geq 10$  ppm of CO.~~

~~4.2.4.2 The temperature of the air produced by the blower/air compressor for all Airsource respirators shall not exceed 6 degrees Celsius above ambient as measured at the air entrance point of the respiratory inlet covering.~~

~~4.2.4.3 Must maintain positive pressure in the breathing zone of the respiratory inlet covering(s) at the manufacturer's specified work rate(s) as defined in Section 4.2.8.~~

~~4.2.4.4 Airsource SAR shall be equipped with a filter between the portable blower/air compressor and the respiratory inlet covering(s) to effectively remove 95% of the particles from the breathing air.~~

4.2.4.5 The filter between the blower/air compressor and the respiratory inlet covering shall be easily replaceable by the user. The manufacturer's filter change-out schedule should be followed (See: user instruction).

4.2.4.6 Compressors used to supply breathing air to respirators are constructed and situated to meet the requirements set forth in the 29 CFR 1910.134.i "Breathing air quality and use".

Comment:

Delete this entire paragraph for the reasons stated in our general comment.

**4.2.8 Breathing rate verification of low, moderate, and/or high work air flow rates using a simple sinusoidal wave form**

4.2.8.1 The manufacturer shall specify the highest work air flow rate from Table 2 for the intended use of the SAR system. The SAR must maintain pressure above ambient in the face area and/or breathing zone of the respiratory inlet covering while properly mounted on a headform and operating at the manufacturer's minimum supply pressure and maximum hose resistance configuration at each of the rates desired for approval.

Table 2: NIOSH Approved Work-Air Flow Rates

Work Air Flow-Rate	Minute Volume	Tidal Volume and Respirations
Low	25 Lpm	1.30 liters @19.2 respirations per minute
Moderate	40 Lpm	1.67 liters @ 24 respirations per minute
High	57 Lpm	1.95 liters @ 29.1 respirations per minute

Comment:

The wording should be very specific in order to prevent confusion in using these devices. The respirator is not doing work so these can not be "work" rates. They are the "air flow" rates from the respirators. Furthermore, if NIOSH is wanting these devices to be selected based on work rate and hence the term "approved work rates" this will be impossible for NIOSH to enforce. NIOSH does not have an enforcement group for the workplace so these can not be approved. Thus "NIOSH approved" for describing work rates is inappropriate. It also implies these are the only work rates that are acceptable to work, which is also not true.

4.2.8.2 Pressure shall remain above ambient at all times during testing. ~~Static~~ Total pressure in the respiratory inlet covering relative to external pressure may not exceed 38 89 mm (4.5 3.5") of water column height for any SAR during testing.

Comment:

Because there are various definitions for static pressure, and because a breathing machine does not hold its breath, this provision could be easily misinterpreted. The suggested revisions are for clarity.

**4.2.9.8** The maximum allowable average CO<sub>2</sub> concentration is determined by subtracting the blank run average CO<sub>2</sub> level measured during the inhalation phase from the average CO<sub>2</sub> level measured during the inhalation phase with the respirator properly mounted on the headform, shall not exceed 1.0 % for one any of the three donnings.

Comment:

The revision is for clarity. As written the device is allowed to exceed 1% for two out of three donnings.

**4.2.10.3** Twelve human subjects (equally distributed for each respiratory inlet covering size) shall perform the test at the following work rates activities for 10 minutes each:

4.2.10.3.1 Standing.

4.2.10.3.2 Walking on a treadmill at 0° grade at 3.5 miles per hour.

~~4.2.10.3.3 Each exercise shall be performed for 10 minutes.~~

Comment:

The revisions are for clarity. Standing, walking and 10 minutes are not work rates. In addition it is not clear what is meant by “equally distributed for each respiratory inlet covering.” Is NIOSH meaning this when there are multiple sizes of a respiratory inlet covering? If so this needs to be stated, “...equally distributed for each respiratory inlet covering size when multiple sizes exist.”

**Table 3: LRPL Values**

Respiratory Inlet Covering	LRPL - Minimum Value(%)
<del>Loose-fitting respiratory inlet covering</del>	<del>2000</del>
Hood or helmet	10,000
Tight-fitting respiratory inlet covering except half mask	10,000
Tight-fitting half mask or loose-fitting facepiece	2,000

Comment:

LRPL is not a percent (%.) This is a unitless number representing the ratio of the test concentration outside the respiratory inlet covering compared to the concentration inside the respiratory inlet covering. Loose fitting respiratory inlet covering is too broad of a term to use in this table because there is a range in performance between SAR with various respiratory inlet coverings; i.e., from loose fitting facepieces to hoods and helmets. Therefore we have separated loose fitting facepieces from the hoods and helmets within the "loose fitting respiratory inlet covering" classification.

There appears to be no logic in setting the LRPL values. They may have been set based on the NIOSH APFs from the 2004 edition of the NIOSH Respirator Selection Logic but these numbers are out of date with what is being used in the field (see OSHA APFs). NIOSH needs to explain how it got its pass/fail LRPL values as it was unable to do so at the public meeting on this concept. The LRPL value for the tight fitting respiratory inlet covering appears to be 10 times the APF of 1000. The LRPL value appears to be 40 times the APF of 50 for SAR with a half mask and 80 times the APF of 25 for loose fitting facepieces (NIOSH also proposed the same value (80) for hoods or helmets). Perhaps this recommendation is based on the NIOSH APF of 25 but the NIOSH APF for loose fitting hoods and helmets is not correct nor current.

#### **~~4.3 Airsource SAR portable blowers/air compressor requirements~~**

~~4.3.1 Portable blowers/air compressors shall be designed and constructed to maintain positive pressure in the breathing zone of the respiratory inlet covering(s) at the manufacturer's specified work rate(s) as defined in Section 4.2.8.~~

~~4.3.2 Portable blowers/air compressors shall undergo a performance evaluation by operating them at their specified running parameters for 8 hours a day for a total of 15 days in the most demanding configuration for which the device is to be approved.~~

~~4.3.2.1 The portable blower/air compressor shall be located in the laboratory for this evaluation.~~

~~4.3.2.2 The portable blower/air compressor shall operate in the most demanding configuration with the maximum number respirators mounted on head forms. Each head form will be actuated by a breathing machine at the manufacturer's maximum approved work rate throughout the period without failure or evidence of wear such that any part of the respirator no longer meets the performance requirements.~~

~~4.3.2.3 The filter(s) shall not be changed during this evaluation.~~

4.3.3 Noise levels at the portable blowers/air compressors shall be  $\leq 85$  dBA at any point within a 92 centimeters (3 feet) diameter circle centered at the pump with the system operating in the most flow restrictive configuration.

4.3.4 Any system component exceeding 60 degrees Celsius shall be protected against incidental user contact.

4.3.5 Multiple user systems, whereby more than one user is supplied by a single portable blower/air compressor, may be approved, if each hose line is connected directly to a manifold (requires pressure gauge and regulator) at the blower/air compressor. The manifold can be remote from the portable blower/air compressor as long as a pressure gauge and regulator are integral to the manifold.

4.3.6 Multiple user systems shall be designed such that air shall not back flow from one line to another.

4.3.7 Multiple user systems shall be designed such that each line shall flow properly regardless of occurrences in other lines (such as total blockages or disconnected free flow).

Comment:

The entire section should be deleted for the reasons stated in our general comment.

#### **4.4 Air supply hose requirements**

4.4.1 *Airline supply hose; minimum requirements.* Total length of Airline hose(s): manufacturer specified, in multiples as desired.

Comment:

This is an editorial correction because only air is being supplied; not airlines.

##### **4.4.1.1 Air flow:**

4.4.1.1.1 The air supply hose with air regulating valve or orifice shall maintain positive pressure in the respiratory inlet covering at the manufacturer's specified work rate(s) as defined in Section 4.2.8 through the maximum length of hose and greatest number of connections for which approval is sought. This will be evaluated at the manufacturer's minimum specified air supply pressure.

4.4.1.1.2 The air supply hose, detachable coupling, and pressure demand valve of the pressure demand class for Airline SAR, shall be capable of delivering respirable air to maintain positive pressure in the respiratory inlet covering at the manufacturer's specified work rate(s) as defined in Section 4.2.8 with any combination of air supply pressure and length of hose within the applicant's specified range of pressure and hose length. The pressure demand valve is actuated 20 times per minute by a source of intermittent suction.

Comment:

These requirements should be incorporated into the 4.2.8 tests.

**4.4.1.2 Air-regulating valve:** If an air-regulating valve is provided, it shall be so designed that it shall remain at a specific adjustment, which shall not be affected by the ordinary movement of the wearer. ~~The valve must be so constructed that the air supply with the maximum length of hose and connections at the minimum specified air supply pressure while maintaining positive pressure in the respiratory inlet covering at the manufacturer's specified work rate(s) as defined in Section 4.2.8 for any adjustment of the valve.~~

4.4.x.x Pressure demand valve: If a pressure-demand valve replaces the air-regulating valve, it shall be connected to the air-supply at the maximum air pressure for which approval is sought by means of the minimum length of air-supply hose for which approval is sought. The outlet of the pressure-demand valve shall be connected to a source of intermittent suction so that the pressure-demand valve is actuated approximately 24 (Current rate used for SAR and SCBA) times per minute for a total of 100,000 inhalations. To expedite this test, the rate of actuation may be increased if mutually agreeable to the applicant and NIOSH. During this test the valve shall function without failure and the wear should not affect the valve's performance to the point where it no longer meets specifications. The pressure-demand valve shall not be damaged in any way when subjected at the outlet to a pressure or suction of 25 cm. (10 inches) of water gage for 2 minutes.

Comment:

These are not air supply hose requirements as is now indicated. They should be moved into a new section titled 'Air regulating valves'.

**4.4.2 *Airsource supply hose; minimum requirements.*** Total length of air hose(s): manufacturer specified, in multiples as desired.

~~4.4.2.1 Air flow: Using the blower/air compressor shall maintain positive pressure in the respiratory inlet covering at the manufacturer's specified work rate(s) as defined in Section 4.2.8 through maximum length of hose and greatest number of connections for which approval is sought. This will be evaluated at the manufacturer's minimum specified air supply pressure.~~

Comment:

Delete for the reasons specified in our general comment.

**4.4.3 *Airline and Airsource supply hose; minimum requirements.***

~~4.4.3.1 Non-collapsibility: At the manufacturer's specified work rate and pressure the air supply hose shall maintain positive pressure in the respiratory inlet covering. *Next*, The hose shall not collapse or exhibit permanent deformation when a force of 90 kg (200 lbs) is applied for five minutes~~



between two planes 7.6 cm (3 inches) wide on opposite sides of the hose. This test will be conducted with the air supply hose operated at the manufacturer's specified work rate and pressure and shall maintain positive pressure in the respiratory inlet covering.

Comment:

The text was deleted because the hose alone does not maintain positive pressure in the inlet covering. It is a function of the entire system and is addressed in 4.2.8 testing.

**4.4.3.5** Hose permeation with gasoline (CAS# 8006-61-9):

**4.4.3.6** Hose permeation with kerosene (CAS# 8008-20-6):

**4.4.3.7** Hose permeation with toluene (CAS# 108-88-3):

Comment:

It should be made clear that a new hose section is used for each permeation test. The first sentence of each of the above test requirements should be clarified to read:

An unused hose shall be tested by immersing a 7.6 m. (25 feet) section of hose and one coupling (if applicable) shall be immersed in \_\_\_\_\_ for 2 hours with air flowing through the hose at the rate of 8 liters per minute.

**4.4.3.8 Detachable coupling:** A hand-operated detachable coupling by which the wearer can readily attach or detach the air supply hose shall be provided at a convenient location. This coupling shall be durable, remain connected under all conditions of normal respirator use, and meet the prescribed tests for strength and tightness of hose and couplings. All connections and/or couplings for all SAR intended for quick disconnection shall be constructed to prevent unintentional disconnection. ~~such as required at least two different motions for disconnection~~

Comment:

The deleted text is not necessary and may be hazardous. See comment in 4.1.2.2.

**6.3.2** The minimum packaging configuration is the protective packaging configuration that the end-user\* wearer shall normally store or maintain the SAR and the required components before and after it has been issued for immediate use. The user's instructions (UI) shall identify the minimum packaging configuration and shall direct the end user how to store or maintain the SAR/SCBA CBRN and the required components inside the manufacturer specified minimum packaging configuration while in the possession of the end user. The same minimum packaging configuration identified the UI shall encase the SAR/SCBA CBRN and the components when NIOSH performs the durability conditioning. The type of minimum packaging configuration, if any, is left to the discretion of the manufacturer. ~~Examples of common minimum packaging configurations are respirator carriers, clamshell containers, draw-string plastic bags, hermetically-sealed or nothing at all.~~

~~\*End user: The definition of the end user is the person who shall derive protection from the respirator by wearing it. It is understood that the end user shall store the respirator in a location where it shall be available for immediate access and use during an emergency.~~

Comment:

The examples listed are not necessary, nor are they appropriate for SAR. In addition, it is apparent that the definition for end user means the wearer so we suggest you use "wearer" and eliminate the "user" definition.

**6.4.3 Table 5:** Simultaneous liquid and vapor challenge of SAR/SCBA CBRN with sulfur mustard (HD)

Comment:

How/where is the liquid HD to be applied? Perhaps the locations will be identified in the STP. If so, this points out the importance of having the STPs for this subpart completed before the Concept is finalized.