Mine Safety Appliances Company · P. O. Box 426 · Pittsburgh, PA 15230

Telephone: (412) 967-3000 Writer's Direct Dial

November 13, 2002

NIOSH Docket Office
Reference Docket – 002
Robert A. Taft Laboratories
M/S C:34
4676 Columbia Parkway
Cincinnati, OH 45226

Reference: CBRN APR Standard

MSA offers the following comments to the proposed NIOSH Certification Standard for Full Facepiece APR CBRN (September 16, 2002 Draft) per Federal Register Notice September 27, 2002 (Vol. 67, Number 188, page 61108).

Logistics

Based on the duration needed to complete all of the proposed certification tests, there could be several months between approvals for applications received on the same day under the current certification process. *To avoid confusion, we recommend that NIOSH release all approvals at the same time for submittals made within a specified period. Additionally, we recommend that NIOSH notify the applicant immediately in the event of the request for approval being denied.* This will help to speed product development. A similar process is used by SEI in granting approvals to NFPA standards.

4.3.1 and 4.3.2 Thread and Gasket Specifications

The proposed standard (September 16, 2002 Draft) establishes an international specification EN 148-1 for the internal and external thread. However, the proposed standard also specifies Sealing Gasket parameters that differ from those listed in EN 148-1. The result is that we will have a specification for a combination of components, which has no practical field experience. In addition, NIOSH has no way of addressing any changes that could be made by the European Community to the thread specification, yet includes it in their standard.

The internal facepiece thread, external filter thread and sealing gasket specified per the MCU-2A/P Prime Item Specification 55799-MS-200 is a proven, lab and field tested, interface system. Millions of military masks, made with thread forms in accordance with 55799-MS-200 or similar specifications, have been successfully deployed over several decades. With the requirements in the proposed standard (September 16, 2002 Draft), those facepieces could not be used with a CBRN Canister even in an emergency. 55799-

rec'd 11/14/02 pm

MS-200 and EN 148-1 specify the same rolled thread form Rd40 x 1/7, but different thread length, and gasket.

The shorter thread depth of the military specification was designed to provide a lower profile mask, minimize the possibility of cross-threading a canister in an emergency situation, and reduce potential exposure if the canister would need to be changed in a contaminated environment. The thread and gasket configuration per 55799-MS-200 is compatible with filters that have an external thread per EN 148-1 in addition to military threaded filters such as the C2A1 canister.

We recommend that NIOSH not reference independent military or international documents in the CBRN Full Facepiece APR standard for the thread and gasket. Instead, we recommend that NIOSH provide detailed designs of the allowable connection configurations, thread and gasket specifications, in the CBRN Full Facepiece APR standard. This will assure compatibility of connections in the field.

We recommend that NIOSH maintain the proven thread and gasket systems and allow alternate connection configurations for the facepiece based on (a) Military Specification 55799-MS-200 and (b) EN 148.1 for the facepiece. We further recommend that NIOSH not allow unproven internal thread and gasket designs. Specifying a wider tolerance for the internal thread length of the connector is not recommended because the gasket dimensions need to be adjusted to permit sufficient thread engagement. Information similar to that shown in attachment A should be included in the standard to further clarify the allowable thread and gasket configuration. In addition to the thread and gasket detail, specifications for go and no-go thread and plug gages should be identified to minimize variations between these components.

MSA recommends that NIOSH avoid allowing alternate gasket material based only on permeation and penetration characteristics. Additional material properties such as permanent set, modulus, and tear strength must be considered. MSA recommends that the gasket material be EPDM as currently used in gas masks and called out in the concept draft.

MSA also recommends that NIOSH consider maintaining the requirement of a single, mask-mounted filter and not allow the use of multiple (dual) filters. The use of multiple filters would increase the time required for filter element change-out, increase the potential for exposure during the change-out procedure, and potentially cause confusion with industrial products in an emergency situation. This will help to eliminate confusion and simplify the logistics and training at a CBRN response. There is a safety concern for the user, because if a 15-minute and a 30-minute canister were assembled on the same mask, the respirator may not meet a minimum 15-minute service life.

Dual canisters would also necessitate additional testing. Our experience has shown significant differences in many of the tests between use of a single filter verses multiple filters including gas life testing, LRPL fit testing, and the systems permeation testing.

4.3.3 Breathing Resistance, Facepiece

We are concerned about the maximum allowable facepiece inhalation resistance of 10 mmH_2O @ 85 lpm as specified in Section 4.3.3. We suspect that the facepiece resistance

requirement of 10 mmH_2O @ 85 lpm was proposed from military mask specifications and/or International Standard EN 136, Respiratory Protective Devices-Full Face Masks-Requirements, Testing, Marking.

Military specifications allow a maximum facepiece inhalation resistance of 10 mmH_2O @ 85 lpm. The sampling probe on the military test apparatus is typically outside the nosecup area of the mask. However, the sampling probe on the test apparatus used by NIOSH is in the oral nasal cavity area. Measuring resistance inside the nosecup area can yield inconsistent resistance values. The nosecup of a full facepiece is designed to provide the wearer with a means to channel air directly to the exhalation valve, minimizing fogging and carbon dioxide content inside the mask. The nosecup is not designed to seal to the wearer in the same manner as the peripheral faceseal. If the test operator assembles the facepiece on the test apparatus such that the nosecup seals beyond its intended design, the measured inhalation resistance could be significantly greater when the measurement is taken inside the nosecup area. The measured inhalation resistance of the facepiece will vary depending on the sampling probe location and testmanship in assembling the facepiece onto the test apparatus.

Additionally, we do not understand the logic by which the 10mm maximum facepiece resistance was derived. The maximum allowable facepiece inhalation resistance per Section 7.19 of EN 136, Respiratory Protective Devices-Full Face Masks-Requirements, Testing, Marking is:

EN 136 Breathing Resistance Requirement for Class 1 Facepieces and Class 2 Facepieces with EN 148-1 Connections			
Inhalation Resistance, mmH_2O			Exhalation Resistance mmH_2O
30 lpm continuous flow	95 lpm continuous flow	160 lpm continuous flow or 50 lpm sinusoidal (25 cycles/min, 2.0 l/stroke)	160 lpm continuous flow or 50 lpm sinusoidal (25 cycles/min, 2.0 l/stroke)
5.1	15.3	25.49	30.59

Based on the EN 136 requirements, comparable maximum allowable facepiece inhalation resistances at 85 lpm are greater than 10 mmH_2O. This is demonstrated in the following table.

EN 136, Section 7.19	Comparable Resistance @ 85 lpm based on EN 136 (mmH_2O)
5.1 mmH_2O @ 30 lpm	14.41
15.3 mmH_2O @ 95 lpm	13.69
25.49 mmH_2O @ 160 lpm	13.54

Alternatively, we recommend that NIOSH replace the facepiece resistance requirement with an individual filter maximum allowable inhalation resistance of 50 mmH_2O @ 85 lpm. Resistance measurements on the filter component are very straightforward and can be accurately measured without issues of testmanship and test method, resulting in repeatable data.

We also recommend that NIOSH keep the requirement of a 20 mmH_2O exhalation resistance at 85 lpm instead of increasing it to 25 mm at 85 lpm. This would be consistent with current 42 CFR, Part 84 requirements and would not result in the relaxation of an existing requirement and the creation of a new class of respirator.

MSA recommends that NIOSH maintain the respirator breathing resistance requirements based on 42 CFR Part 84, as specified in Section 4.3.5. We recommend the following respirator resistance requirements measured at a continuous flow rate of 85 lpm:

Respirator Type	*Initial Maximum Inhalation Resistance mmH_2O*	*Final Maximum Inhalation Resistance mmH_2O*	*Maximum Exhalation Resistance mmH_2O*
Respirator w/ Facepiece Mounted Filter	*65*	*80*	*20*
Respirator w/ Non Facepiece Mounted Filter	*70*	*85*	*20*

4.3.6. Field of View

We recommend that NIOSH maintain the field of view requirement as specified in the September 16th, 2002 draft standard. Reduction in this requirement should be avoided because narrow field of view has been shown to reduce user performance on navigation, manipulation, spatial awareness, and visual search tasks. Eye-and-head movement coordination and perception of size and space are also affected by reduced field of view. Due to the expected use conditions of this facepiece and the expectations of the first responder community, it would be inappropriate to ease this requirement.

4.3.7 Haze (Lens Abrasion)

The intended purpose of this requirement is to address abrasion due to storage conditions. The NFPA test was developed to simulate the extremely hostile environments in which SCBAs are repeatedly used in the fire service. Therefore, the lens abrasion requirements in Section 4.3.7 of the proposed standard, are inappropriate for the intended purpose.

The lens abrasion test in the concept paper is meant to provide adequate visibility through the facepiece lens after extended storage, possibly in an environment such as the trunk of a vehicle. We believe that the NFPA Lens Abrasion requirement is not applicable to this class of device.

We recommend a more use-appropriate test method, such as the Abrasion Resistance of Transparent Plastics and Coatings, Oscillating Sand Method per the MCU-2A/P Prime Item Specification 55799-MS-200. This specification provides a better simulation of storage conditions representative of CBRN gas mask use and storage.

4.4.1 Filter Canister Test Challenge, Breakthrough Concentrations, and Filter Efficiency

MSA recommends that NIOSH maintain the current conditions for "Filter Canister Test Challenge, Breakthrough Concentrations, and Filtration Efficiency" as outlined in the current CBRN Full Facepiece APR concept paper.

The current conditions listed in the draft standard provide for a canister that has a balanced performance for organic vapors, acid gases, and basic gases. Reducing the requirement in one of these areas would result in canisters that would provide longer service time in specific areas, but shorter service times in other areas. Reducing the requirements in all areas would result in smaller canister designs that would have a performance less than that of current multi-gas industrial cartridges approved to 42 CFR part 84. For the intended application it is expected that the use condition would be more severe than in a controlled industrial setting. NIOSH has demonstrated by their own testing, that canisters can be designed to meet these requirements. Additionally, maintaining current requirements will also expand the possible use of this canister to other markets, therefore, increasing the availability of filters during an emergency.

MSA also recommends that NIOSH establish nomenclature for each filter, and does not include reference to the filter duration. Referring to each filter based on its duration (15 minutes, 30 minutes, 45 minutes, etc.) could potentially confuse the user because the actual duration will be dependent on use conditions. A more appropriate description may be a letter or color designation.

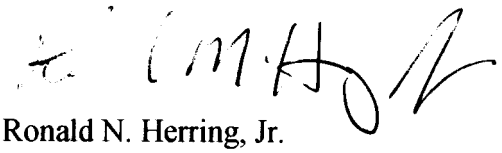
4.4.7 Chemical Agent Permeation and Penetration Resistance Against Distilled Mustard (HD) and Sarin (GB) Agent Requirements:

The concept paper requires HD and GB performance to be greater than the performance required of a CBRN SCBA. The minimum required service life for both HD and GB is twice that of an SCBA. We understand that the proposed minimum service life of 12 hours is based on estimated single shift duration. We are unaware of any work environment that requires a user to stay in the contaminated work area and wear a respirator for 12 hours. Considering the possible physical and psychological stresses that could be imposed on the wearer, a four hour work shift is more appropriate requiring the wearer to exit the contaminated work area and allowing scene command and control an opportunity to ascertain the physical and mental well being of the responder. A minimum service life requirement of 6 hours would be more realistic and account for the responsibility that we have to the responders. Furthermore, there are no defined decontamination procedures that would allow an exposed user to exit a contaminated area, decontaminate the facepiece, change the filter canisters and re-enter using the same facepiece.

Therefore, we recommend that chemical agent permeation and penetration testing be conducted at the proposed challenge concentrations, however, the minimum service life shall be set at 6 hours. This would set the minimum service life at a level that is more representative of actual use conditions.

NIOSH should also set the breakthrough concentrations for HD and GB at the same level as the current CBRN SCBA standard. This provides a level of consistency with other CBRN standards, such as the CBRN SCBA.

MSA appreciates the opportunity to comment and improve this important standard. We have supplied our military and first responders with products that protect their health and safety, against CBRN hazards, since prior to World War I. Please contact us, if you require any further expertise and recommendations.

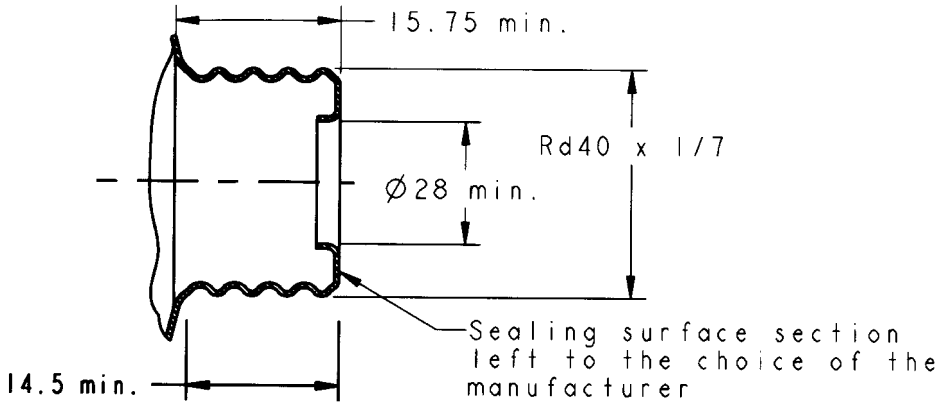


Ronald N. Herring, Jr.
Director of Marketing
MSA
Safety Products Division

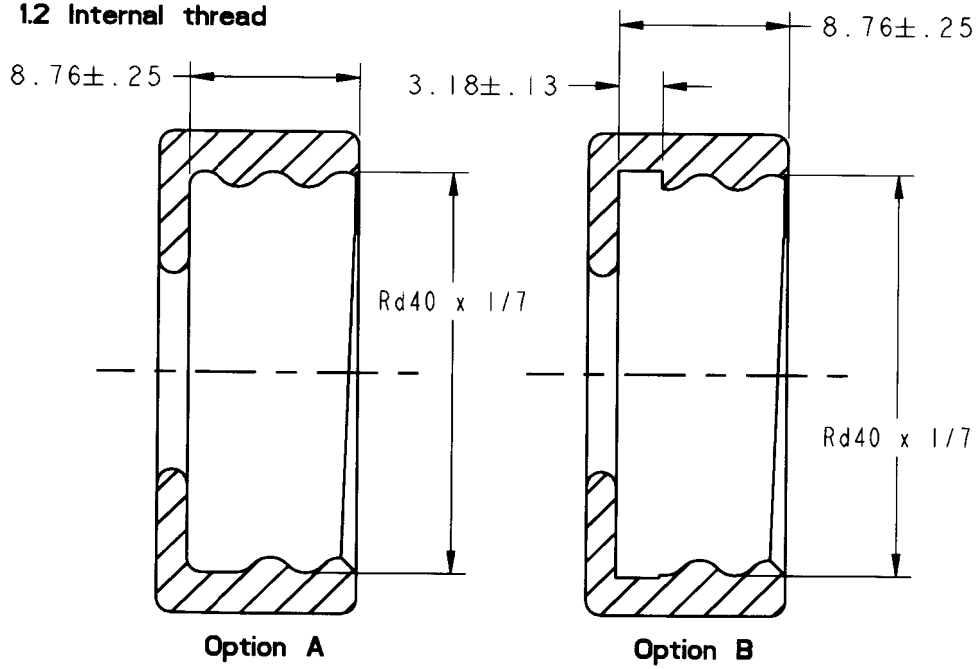
Dimensions in millimetres

1.0 Standard thread connector

1.1 External thread

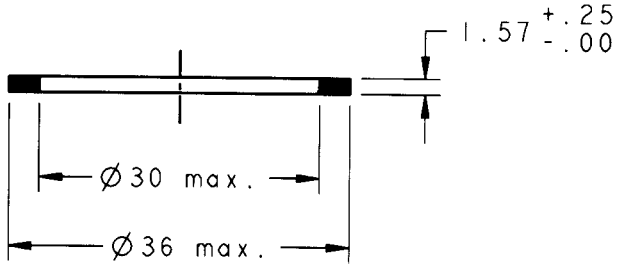


1.2 Internal thread

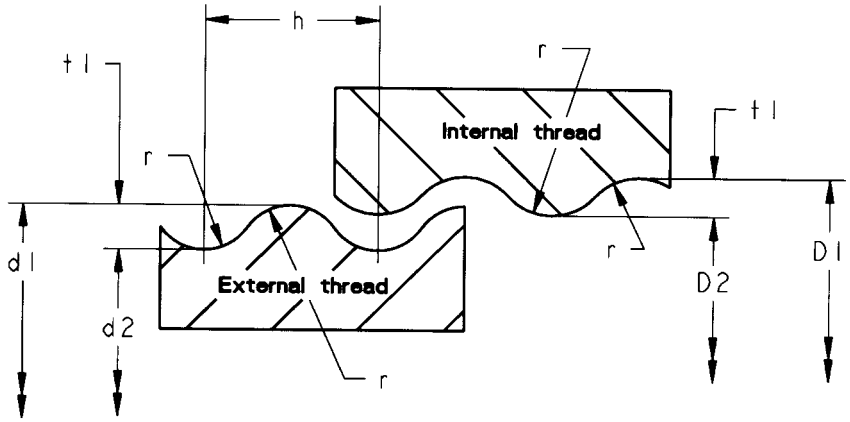


Dimensions in millimetres

1.3 Gasket



2.0 Dimensions of threads



Thread	Thread Limits						Pitch	Number of threads per 25.4	Thread height	Radius
	External thread			Interal thread						
	Major diameter d1		Minor diameter d2	Major diameter D1	Minor diameter D2					
	max.	min.	max.	min.	min.	max.	h	z	t1	r
Rd40 X 1/7	40.00	39.40	38.40	40.16	38.56	38.86	3.629	7	0.8	1.225