Miller, Diane M.

From: Dmitri Kazakov [dima11@optushome.com.au]
Sent: Thursday, December 22, 2005 4:20 PM
To: NIOSH Docket Office
Subject: SEA CBRN and Industrial PAPR standard reccomendations, based on NIOSH PAPR spec draft 4 Nov 2005

Attachments: Analysis of latest draft NIOSH CBRN specs 22 Dec 05.pdf; Analysis of latest draft NIOSH CBRN specs 22 Dec 05.doc


Analysis of latest draft NIOSH...


Analysis of latest draft NIOSH...

Dear Sirs

The S.E.A. team would like to present the attached document (MS Word and PDF versions) for your attention.
We believe it may help you further in the PAPR standard development.

Dmitri Kazakov
M. Eng, Grad IEEE
Engineering Manager
Safety Equipment Australia Pty. Ltd.
35/1 Jubilee Ave., Warriewood,
Sydney, NSW, 2102, Australia
Tel: [+61] (02) 9910 7505
Fax: [+61] (02) 9979 5364
mail: Dmitri.Kazakov@seasafe.com.au
http://www.sea.com.au

Analysis of latest draft NIOSH CBRN specs

CBRN PAPR draft 4th November 2005

Requirement to first meet 42CFR84 compliance and then apply for CBRN Approval. How is this to be done with the CBRN filters? There is no rating for these filters in 42CFR84 and yet some tests for the PAPR require the system to be tested with filters. Does NIOSH expect manufacturers to submit CBRN filters for a dummy industrial rating, say OV? If NIOSH allows initial 42CFR84 approval with any industrial filters then system tests must be redone as CBRN filters may affect the 42CFR84 performance if the CBRN filters have for example higher pressure drop than the industrial filters used for the 42CFR84 testing.

This standard requires a section providing guidance to users of the level of work that maybe undertaken with these CBRN-PAPRs and the possibility of out breathing them and other limitations..

1.0 MPC

First page states that durability conditioning applies, but section 1.0 Durability conditioning refers specifically to tight-fitting facepieces. Does it or does it not apply to loose-fitting also? (I suspect it does)

3.0 LRPL

Both power on and power off testing is proposed. Does NIOSH propose that CBRN_PAPRs maybe used in both power on and power modes without restrictions?

4.0 Gas Capacity

Why are hoods tested with gas challenges half that of the tight fitting facepieces and no limitations on the application of the equipment?

5.2 Upgrade

Why is retro-fit work to tight-fitting PAPR specified as being done by manufacturer trained and authorized technicians and no mention of requirement for loose fitting?

NIOSH should confirm that no retro fit approval is required where existing equipment or existing equipment using alternative required components gain CBRN-PAPR approval.

Industrial PAPR concept

84.301 (a) Definitions; 84.302 (a) Description

The definition that all PAPRs maintain positive pressure during operation and testing *at all times* cannot be justified without qualifying the limitations of use (ie: workload). No respirator can satisfy this definition if its maximum breathing rate is exceeded.
We would propose adding a clause which defines the workload limitations of each performance category.

84.304 (d) each tight-fitting PAPR shall be designed unpurified air from entering the system if the blower function stops
Does it mean that all PAPR must have silent mode? Otherwise how can we prevent the unpurified air access to the respirator? Blocking air path is not the solution...

84.310 and 84.311 Inhalation and Exhalation valves (...shall be)
Does it mean they must be fitted to all PAPRs?
There are quite strict requirements for these valves which do not make sense for PAPR, especially if it was not claimed as Silent-mode PAPR. Does this requirement apply to the loose fitting PAPR? In this case the loose fitting leak makes no sense for such tough valve leak requirements.

84.313 Positive pressure
The requirement that, for High flow rating, the breathing rate is increased from 86 to 103 l/m for the last 5 minutes of the rated operational time, needs to be investigated because it may cause problems.
Firstly, the ramping between speeds is not defined. Even if defined, ramping up can easily induce negative mask pressures, which would result in failing the test. Also, pressure shocks may be induced when ramping, which may also induce negative mask pressures. The safest way would be to discount any negative mask pressure events during the ramping phases; in this way the ramps don't need to be defined.
Secondly, the change in speeds may upset the low battery warning durations. Usually low battery warning predicts the remaining operating time assuming that the breathing rate current at the time of the warning is maintained. If the breathing rate changes after the first warning, the remaining battery time will also change. This is a problem only if the breathing rate increases after the first warning, in which case the remaining battery time will be reduced.
All demand-responsive PAPRs must use this principle because breathing rates cannot be predicted.

84.314 Air flow determination; 84.321 CO_2 machine test
By my reading, the intent of NIOSH here is very good, but it is not clearly defined and there are problems.

Clause (b) refers to "average constant air flow" – we assume this refers to flow through the filters. Also, the word "constant" should be removed as it is not applicable to demand responsive PAPRs.

Our understanding of this section is that the manufacturer specifies maximum and mimimum average flow rates through the filters. NIOSH will test six respirators (3 with minimum and 3 with maximum filter resistance configurations) and the average flow of each should fall within the specified limits. The tests would be done, for high flow rating, at 86 l/m (and 103 l/m for 5 minutes) for the whole specified operating time.
The specified maximum flow rate will be used for cartridge/canister/filter testing.

One problem, which may just be an interpretation, is that the measurement of average flow over such a long time (specified operating time) is a very long time in which to log flows. Much better to be done at a reduced cycle, or a single continuous breathing rate.

The CO_2 requirements, however, don't make much sense. 84.314 (f) states that the specified minimum flow rate (as described above) should be used for CO_2 testing. This is a very high flow rate for CO_2 testing – the breathing rate is about 86 l/m.

84.321 CO_2 machine test requirement is unclear: para (b) says the CO_2 test is done with the blower operating at the specified minimum flow rate, but para (d) requires the test to be done on a breathing machine at 10.5 l/m. Theses two requirements are contradictory, and are probably due to "constant flow PAPR thinking". If a demand responsive PAPR is tested on a breathing machine at 10.5 l/m, the flow through the filters will be far less than the specified minimum flow (based on 86/103 l/m breathing machine test).
The solution is for clauses 84.314 (f) and 84.321 (b) not to apply to demand responsive PAPRs. NIOSH needs to clarify this.

84.316 Gas testing

There appears to be a typo in Table 2: test concentration for HS is 5,000, should be 1,000 (as per latest draft CBRN spec).

84.317 LRPL
NIOSH must make the exercises identical so the test results for industrial can be used for CBRN also.

84.321 Low pressure indicator
Clause (a) states that it should indicate when mask pressure falls ***to*** ambient – preferably this should read ***below*** ambient.

84.325 Battery life
Clause (b) needs clarification : "with no filtering elements" probably refers to the headform (?) but it may be read as referring to the PAPR.
Clause (e) – once again it refers to mask pressure falling ***to*** ambient; we would recommend ***below*** ambient.