CBRN PAPR

Human Factor Requirements

- Field of View (FOV)
- Fogging
- Communications
- Haze, Luminous Transmittance and Abrasion Resistance
Field of View (FOV)

Requirement:
- Visual Field Score (VFS) ≥ 90
- 1 Respirator that anatomically best fits the Head Form of the Apertometer of EN 136:1998 or equivalent; VFS = Average Score of 3 Fittings

Derived From: AMA Guides; Functional Impact of VFS ≥ 90 Translates to Normal Vision
Fogging Resistance Requirement

- Requirement: Each Subject's Average VAS ≥ 75 points.
- Number of Tests: 2 Human Test Subjects
- Three (3) Visual Acuity Scores (VAS) will be Taken:
  - (1) Post Chamber Don;
  - (2) After 5 min. of Exercise;
  - (3) After another 5 min. of Exercise
Fogging Test Conditions and Equipment

- **Environmental Test Condition:**
  - Low Temp Chamber -21.0°C (-6.0°F)
  - 2 PAPRs of each Size Cold Soaked for 4 Hours prior to test

- **Two (2) Human Test Subjects Required w/ Vision ≥ 20/40**

- **Test Equipment:**
  - Environmental Chamber
  - Treadmill
  - Snellen Logarithmic Low Acuity Chart 2000 @ 40cm with 2.5% Contrast
Communication Requirement (Speech Intelligibility)

- Requirement:
  - Overall Performance Rating (PR) ≥ 70%

- PAPR Motor Blower shall be operating
Communication Methodology

- Modified Rhyme Test (MRT)
- Background Noise = 60 dBA ± 2 dBA consisting of a broadband “pink” noise
- Distance = 10' (3.1m)
- 10 MRT Trials, Yielding:
  - 15 MRT Scores with Respirator and 15 without Respirator; (3 Listeners, and 5 Speakers; 1 Female required in each group)
Primary Lens: Haze, Luminous Transmittance and Abrasion Resistance

- Requirement:
  - Initial Haze Requirement: $\leq 3.0\%$
  - Initial Luminous Transmittance ($LT$) $\geq 88.0\%$

- Abrasion Resistance:
  - Haze Not to Increase $> 4.0\%$
  - LT Not to Decrease $> 4.0\%$
Test Equipment

Haze-Gard Hazemeter, BYK-Gardner, Model HB-4727 or Equivalent; ASTM D 1003-00

Taber Abrasive Machine or Equivalent; ASTM D 1044-99
Methodology

Specimens Required of Lens Material:
- Three (3) flat 4 in² (102 mm²) Abraded
- Three (3) flat 4 in² (102 mm²) Un-Abraded
- Same protective coating process as production
- Same nominal thickness as dominant viewing area
- After Abrasion, Cleaned IAW ASTM D 1044 or PAPR Manufacturer’s User Instructions.

Test Methods Used:
- ASTM D 1003-00: Haze and LT
- ASTM D 1044-99: Surface Abrasion
- Abrasion Wheel: CS-10F (Taber)
- Load: Under a 500 gram weight
- 70 Cycles (Revolutions)
Human Factor Requirements
Issues, Testing & Timelines

- **Issues:** None Perceived

- **Testing:**
  - Bench Mark Testing: 3 to 4 PAPRs / *Mfgr
  - Verification Test (VT): PAPR use same STP(s) as APR so Bench Marking will suffice for VT

- **Timelines:**
  - Complete VT by Sept 2004

* Minimum of 3 Manufacturers
Field of View (FOV) Requirement: VFS ≥ 90 Points

Fogging Requirement: Each Subject’s Avg VAS ≥ 75 Points

Communications Requirement: PR(%) ≥ 70%

Haze, Luminous Transmittance and Abrasion Resistance:
- Haze Requirement: ≤ 3.0%
- Luminous Transmittance Requirement: LT not to Increase > 4.0%
- Abrasion Resistance Requirement: LT not to Decrease > 4.0%

Human Factor Requirements and Standard Test Procedures Same as NIOSH CBRN Full Facepiece Gas Mask