AVON

PROTECTION

FUTURE ISO RPD STANDARDS including CBRN Special Applications

DR ANDY CAPON

Presentation Contents

- The ISO Philosophy
- The ISO Performance Standards
- ISO SC15 Committee Structure
- CBRN Special Applications
- Timelines

The ISO RPD Standards Philosophy

- **ISO: Performance, not Product.**

  Currently different EN standards describe difference products - e.g. EN 136 for Respirators, EN 137 for SCBA, EN 149 for Filtering Facepieces

  - **Under ISO different product types can get the same performance classification.....all in the same standard**

- **ISO: All about The Wearer**

  In EN standards wearer requirements are there, but are not always obvious

  - **Under ISO wearer requirements, linked to work rate, anthropometrics and ergonomics are at the forefront**

Just THREE ISO Standards Related to performance

(There are over 25 EN standards doing the same job)

- Supplied Breathable Gas Devices — ISO 17420-1
- Filtering Devices — ISO 17420-2
- Standard Connector — ISO 17420-3

The ISO Performance Standards are Supported by Numerous Test Method Standards

ISO 16900-1	Test Method -	Inward leakage
ISO 16900-2	Test Method -	Air rlow Resistance
ISO 16900-3	Test Method -	Filtration efficiency
ISO 16900-4	Test Method -	Gas filter capacity
ISO 16900-5	Test Method -	Breathing machine, metabolic simulator RPD headforms/torso, tools and transfer standards
ISO 16900-6	Test Method -	Mechanical strength
ISO 16900-7	Test Method -	Practical performance
ISO 16900-8	Test Method -	Interactive flow measurement
ISO 16900-9	Test Method -	CO_2 content of inspired air
ISO 16900-10	Test Method -	Heat and flame resistance
ISO 16900-11	Test Method -	Field of vision
ISO 16900-12	Test Method -	Work of breathing
ISO 16900-13	Test Method -	RPD using regenerated breathable gas and special application mining escape RPD
ISO 16900-14	Test Method -	Sound Level measurement
ISO 16900-15	Test Method -	Soot exposure

There are also supporting standards and documents

ISO 16972	Terms, Definitions, Graphical Symbols and Units of Measure
ISO TS 16973	Classification of RPD excluding RPD for Underwater Applications
ISO TS 16974	Marking and Information
ISO 16975	Requirements for Selection, Use and Maintenance (two parts)
ISO TS 16976-1	Human factors- Part 1: Metabolic rates and respiratory flow rates
ISO TS 16976-2	Human factors- Part 2: Anthropometrics
ISO TS 16976-3	Human factors- Part 3: An overview of oxygen and carbon dioxide in the breathing environment; physiological responses and limitations
ISO TS 16976-4	Human factors- Part 4: Work of breathing/Ventilation rate
ISO TS 16976-5	Human factors –Part 5: Thermal effects
ISO TS 16976-6	Human factors –Part 6: Psychological – physiological Effects
ISO TS 16976-7	Human factors – Part 7: Hearing & Communication
ISO TS 16976-8	Human factors – Part 8: Ergonomics

The ISO Performance Standards have two components:

- **Non-Respiratory Requirements, common to all RPD, e.g.**
  - **Strength**
  - **Visor properties**
  - **Resistance to flame**

- **Respiratory Requirements, e.g**
  - **Protection level**
  - **Filter Gas Capacity**
  - **Breathing Resistance**

The Classification Scheme differentiates between performance levels for Basic Devices

- System
  - Inward Leakage Requirements
  - Protection Levels
  - Application Work Rates
- Filtration
  - Particle Filter Efficiency
  - Gas Capacity Class/Type
- Breathable Gas Supply
  - Breathable Gas Capacity
  - Breathable Gas Supply

ISO RPD Classifications Table

Basic Performance Characteristics

A respiratory Interface and filter with standardized connector shall be marked with their classification and this symbol (⊙) for Standardized connector.

The addition of a + in the classification designation indicates that efficiency test or gas filter validation test is done at 180 l/min; no indication means testing at 110 l/min

Mode of Operation	TIL_{MAX} of Complete Device - lab test [%]	Safety factor (SF)	Protection Level (PL) $PL = \frac{1}{TIL_{MAX}} * 100 * \frac{1}{SF}$	Work Rate [l/min] min vol (Peak)	Application work rate
Filtration	5	2	PL2: 10	Moderate 35 (110)	W2: Very heavy
Breathable gas supply	20	1.25	PL1: 4	Light 20 (70)	W1: Moderate
	0.001	10	PL6: 10000	Extremely heavy 105 (270)	
	0.01	5	PL5: 2000	Very, very heavy 85 (225)	
	0.1	4	PL4: 250	Very heavy 65 (180)	
	1	3.33	PL3: 30	Heavy 50 (150)	W3: Maximal
				Maximal 135 (340)	

Minimum Particle Filter Efficiency [%]	Group Gas Filter Type	Specific Gas Filter Type	Chemical symbol
F2: 95	BC: Basic 1 2 3 4	OZ: Ozone 1	HF: Hydrogen Flouride 1 2 3
F1: 80	OV: Organic Vapours 1 2 3 4	ND: Nitrogen Dioxide 1 2 3	AH: Arsine 1
F6: 99.999		HG: Mercury 1 2 3	PH: Phosphine 1 2 3
F5: 99.99	NOX: Nitrous oxides 1 2 3	FM: Formal-dehyde 1 2 3	ETO: Ethylene Oxide 1 2
F4: 99.9	OG: Organic Gases 1	MB: Methyl Bromide 1 2 3	CO: Carbon Monoxide 20 60 180
F3: 99	AC: Acidic 1 2 3 4	HCN: Hydrogen Cyanide 1 2 3 4	CD: Chlorine Dioxide 1
	Class	Class	Any Chemical: As specified

Note: XXXX equals the amount of usable air in Litres based on a specific validation test (t.b.d.) to the nearest 10 litres

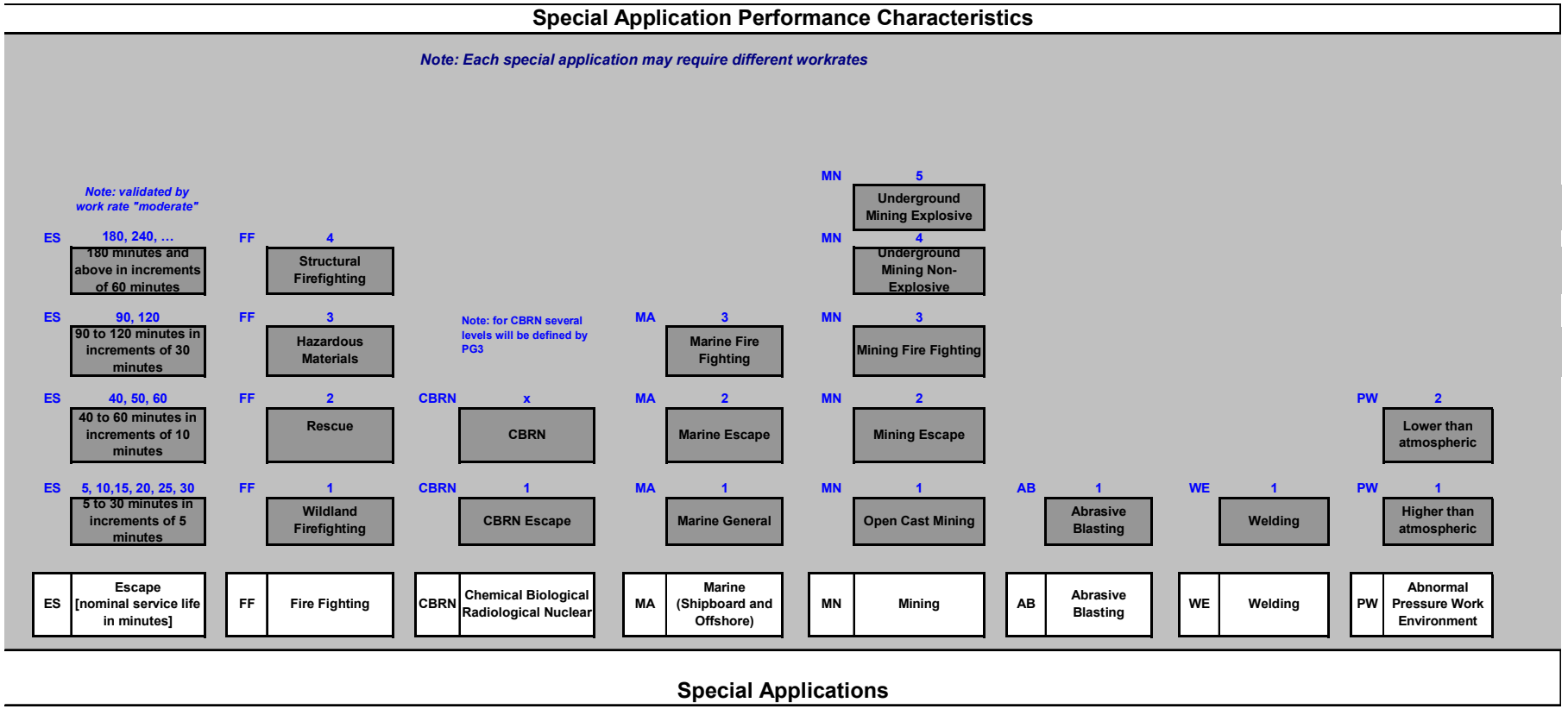
Supplied Breathable Gas Capacity
SXXXX: Breathable gas volume in XXXX litres
SY: Y = indication for air line devices

System | **Filtration** | **Breathable Gas Supply**

The Classification Scheme Separately highlights Product Types for Special Applications

- Escape
- Firefighting
- CBRN
- Marine
- Mining
- Abrasive Blasting
- Welding
- Abnormal Pressure Work Environment

ISO RPD Classifications



An Expert Group will oversee ISO CBRN requirements development:

Joint Task Group (JTG) of CBRN Specialists drawn from government and Industry. Leader: Dr Simon Smith

- **Joint Task Group Mandate:**
  - **''Review and adapt the ISO RPD standards for the special application CBRN''**
  - **Work in parallel with completion of the main standards, but do not delay their publication.**
- **First meeting in Delft 2012**

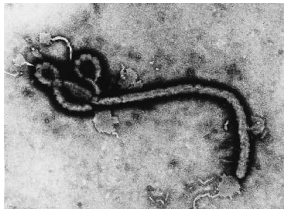
CBRN Special Application Development: Task Group Scope

- **The Task Group scope is mandated by ISO SC15**
  - **Joint Task Group scope:**
    - Consider requirements for filtering and supplied breathable gas devices
    - Consider integration with other PPE (eg clothing: a real challenge!)
    - Consider Selection and Use
- **What's out of scope?**
  - Military users
  - Children and young people
  - Infirm or injured persons
  - Non-humans (animals)
  - Methods of equipment decontamination
  - Equipment disposal after use

CBRN and its Consenquences

Chemical Agents
- Industrial
- Military

→ Generally localized
Detection reasonably available
PPE is a Challenge
Remediation straightforward



Biological Agents
- Bacteria
- Viruses
- Rickettsiae
- Toxins

Potentially Widespread
Detection Challenge
PPE Straightforward
Remediation complex + economic impact

Radiological agents
- Radioactive material enhanced explosives
- Nuclear power accidents

Potentially Widespread
Detection straightforward
PPE Straightforward
Remediation complex + economic impact

Nuclear devices
- Explosion
- Fire hazard
- Secondary hazards

Key CBRN issues

- High levels of toxicity
- Multiple threats (gases, vapours, particulates and liquids)
- Persistent agents
- Unknown and variable threat concentrations
- Large, complex incidents – inter-operability and field change-out issues
- Filtering devices may need to be used in IDLH conditions
- Penetration and permeation resistance of materials is critical
- Existing protection factors may not be adequate
- Interaction with other PPE

Who will use ISO CBRN Special Application Devices ?

Diverse groups with different tasks will use CBRN RPD -

- Official first responders
  - Police
  - Fire services
  - Emergency Medical Workers
  - Sampling and detection teams

- First Receivers
  - Primary health care
  - Casualty nest workers

- Critical Continuity Workers
  - Utilities
  - Transportation

- Others may need to use CBRN equipment depending on the scale and nature of an incident.

Sources to assist ISO CBRN std development:

National standards alredy in place:

- **USA NIOSH CBRN Standards (SCBA, APR, PAPR and APER)**
- **UK BS8468 Series**
- **Canadian Z1610-11 Standard**
- **National codes of practice and guidance notes**

These are not necessarily performance standards, but they will provide much good input into the ISO framework

Timelines for ISO CBRN standard development

- Aiming for first draft recommendations in June 2013 on key elements
  - Breathable gas systems – additional testing for CBRN
  - Interfaces and test methods – especially standard connectors
  - Filters – performance requirements and test methods
  - Escape devices – special requirements
- Work on selection and used has been deferred unit this first draft of the performance requirements is complete

NOTE: If there are any CBRN experts in the audience, there's still time to join and your input would be most welcome!!

REMEMBER!

ISO RPD Standards are just
ISO Standards

They have to be accepted into Europe as

harmonised EN ISO standards

before they become mandatory in Europe

Timelines for ISO into EN

- **The process for adopting ISO as EN ISO standards will be protracted:**
  - **Everyone wants time to adapt**
  - **Some SME organisations in EU have concerns**

CEN TC79 (The European equivalent of ISO) is trying to work out a compromise:

- **The three-phase approach:**

Adopting ISO into Europe

Phase 1: Pre-Evolution period:

Before the ISO standards are published (Circa 2015)

CEN TC 79 will:

- Check ISO against the PPE Directive 89/686/EEC
- Identify gaps in current ENs not covered by ISO
- Prepare for an impact assessment study (Italy)
- Hold Frequent CEN meetings to monitor ISO progress

Adopting ISO into Europe

Phase 2: Evolution period:

After the ISO standards are published CEN TC79 will :

- Formally review ISO standards & seek improvements
- Conduct EU Impact Assessment of adopting ISO
- Ensure European Test Houses are prepared
- Formalise gap analysis between Ens and ISO

At the end of the evolution period (six years) CEN TC 79 will formally vote on adoption:

CEN TC79 will campaign for yes vote

Adopting ISO into Europe

Phase 3: Transition period:

(Assumes positive vote and ISO standards are published as ISO EN standards)

During the proposed 5-year transition period the ISO ENs and ENs run in parallel, meaning:

- Manufacturers choose either ISO EN or EN for certification
- There is time for recertification of current products
- Test houses can iron out testing problems
- Manufactures have time for new designs

QUESTIONS?