THE NEW ISO RPD-STANDARDS- ASPECTS TO CONSIDER

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24th June 2021

THE NEW ISO RPD-STANDARDS- ASPECTS TO CONSIDER

main aspect: the wearer

is the focus of the ISO Standardization of Respiratory Protective Devices

ISO 17420 series

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The new RPD Standard-aspects
General Philosophy

ISO RPD is wearer focused

The **WEARER** is in the focus and shall be protected against all hazards of the working environment

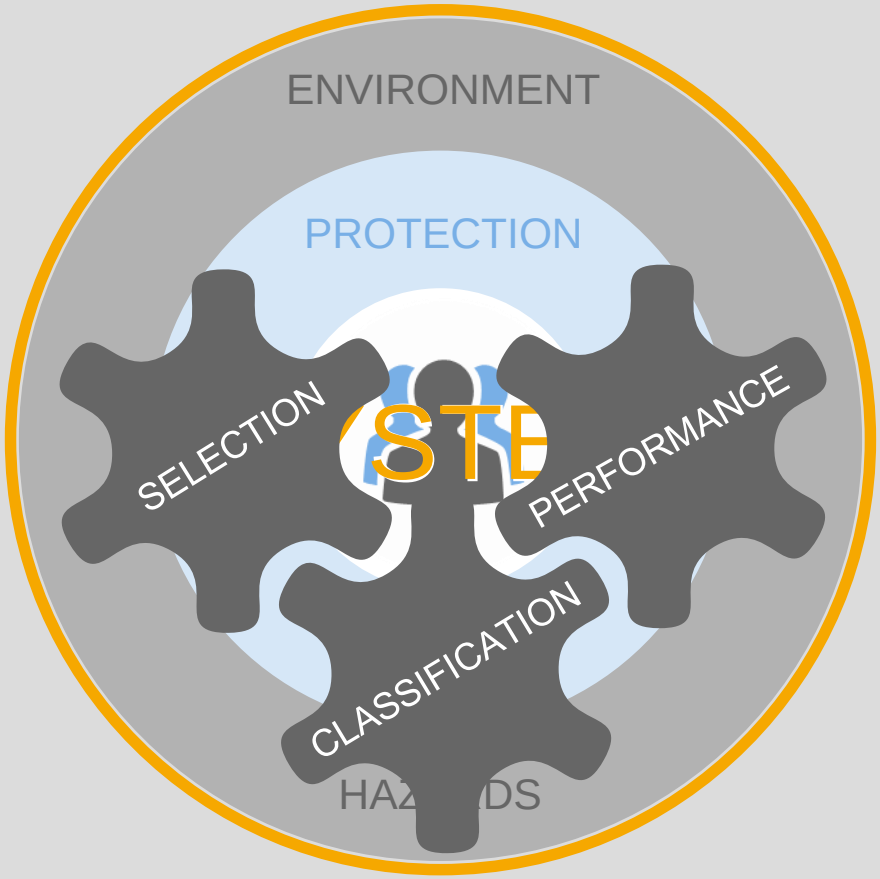
The new RPD Standard-aspects
General Philosophy

ISO RPD is wearer focused

- ISO RPD always describes a respiratory SYSTEM

The new RPD Standard-aspects
General Philosophy Scope

ISO RPD . . .

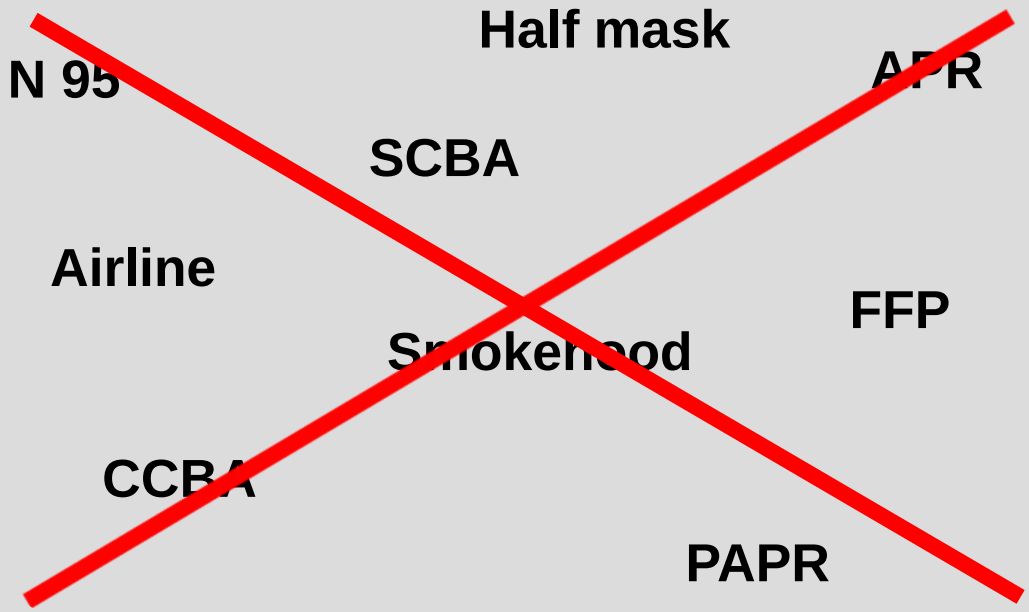


- …specifies **performance** of RPD based on human factors
- … defines **one classification** for all RPD
- ...presents a guideline procedure to **select** the adequate and suitable RPD for the wearer to conduct the task

The new RPD Standard-aspects

Aspect: new designation of RPD

No design description , no product names…



The new RPD Standard-aspects

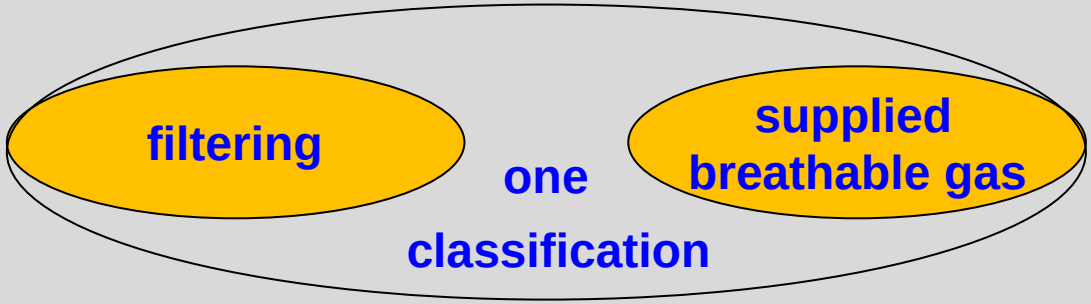
Aspect: new designation of RPD

No design description , no product names…

…but

two groups of

RPD

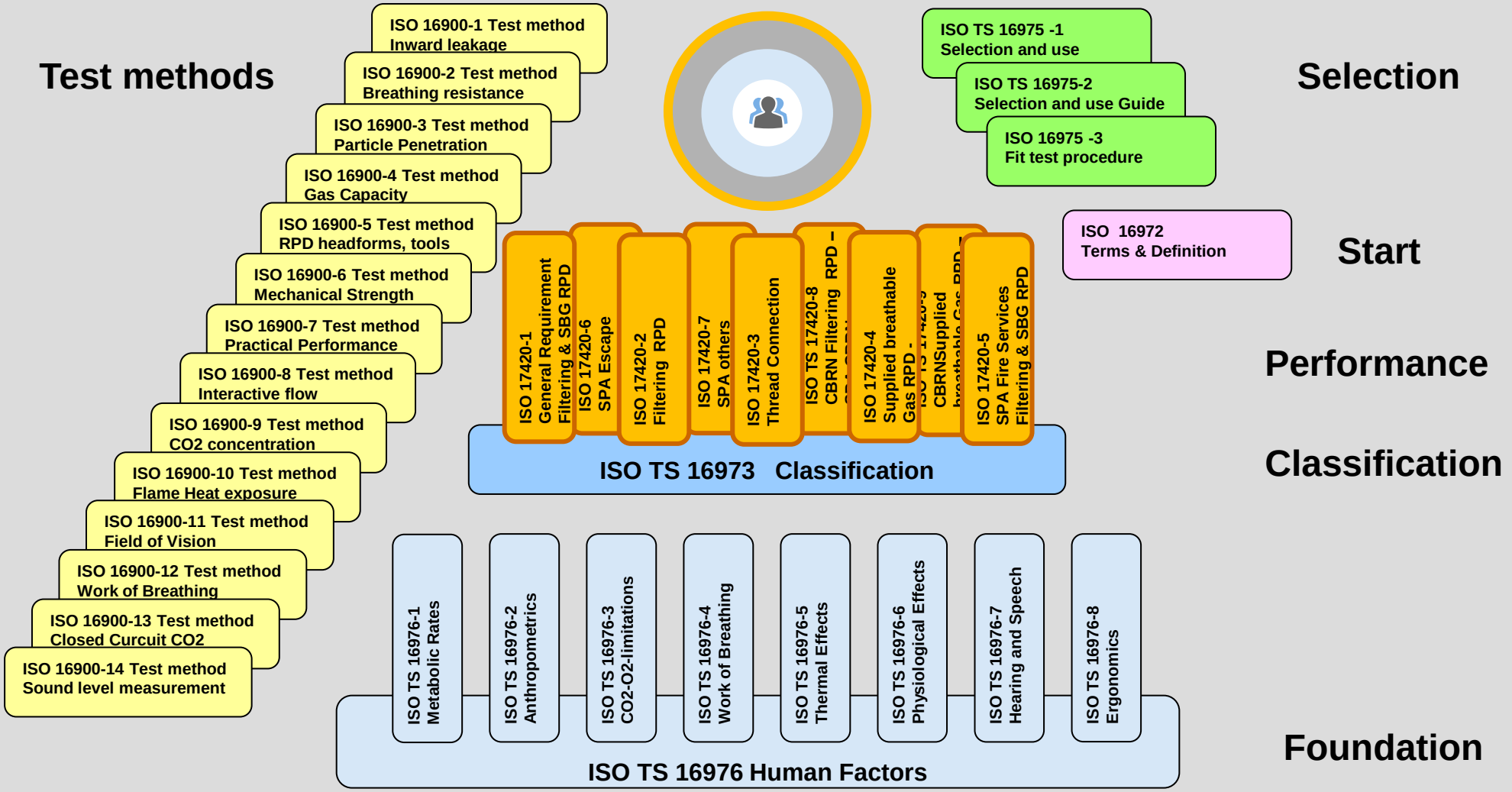


protecton ventilation interface particle and/or gas classes

respectively capacity of available breathable gas

The new RPD Standard-aspects

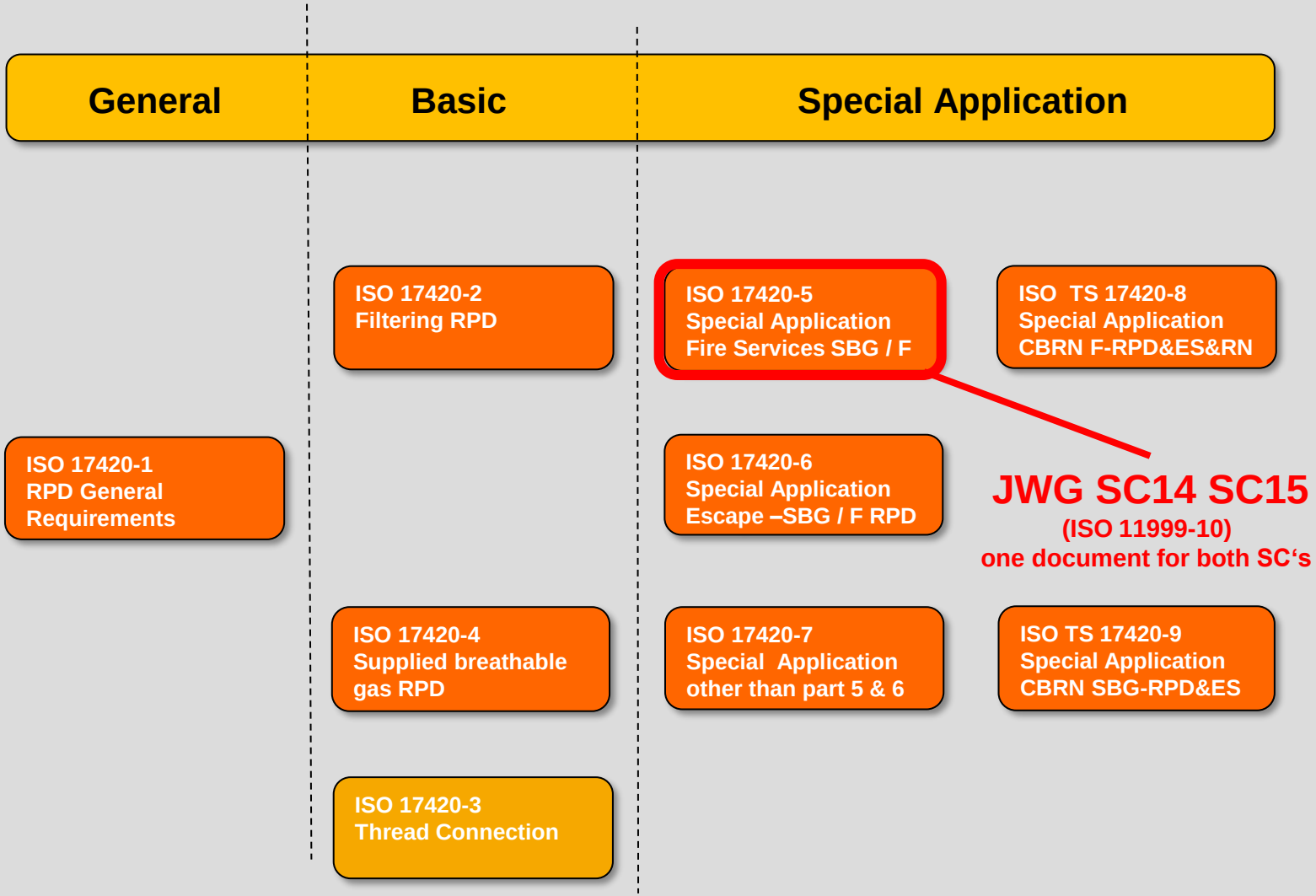
Flow of documents- history



34 documents are published by June 2021!

The new RPD Standard-aspects

Structure of performance standards



How to use these standards?

1. note: all RPD have to fulfill the General Requirement (ISO 17420-1)

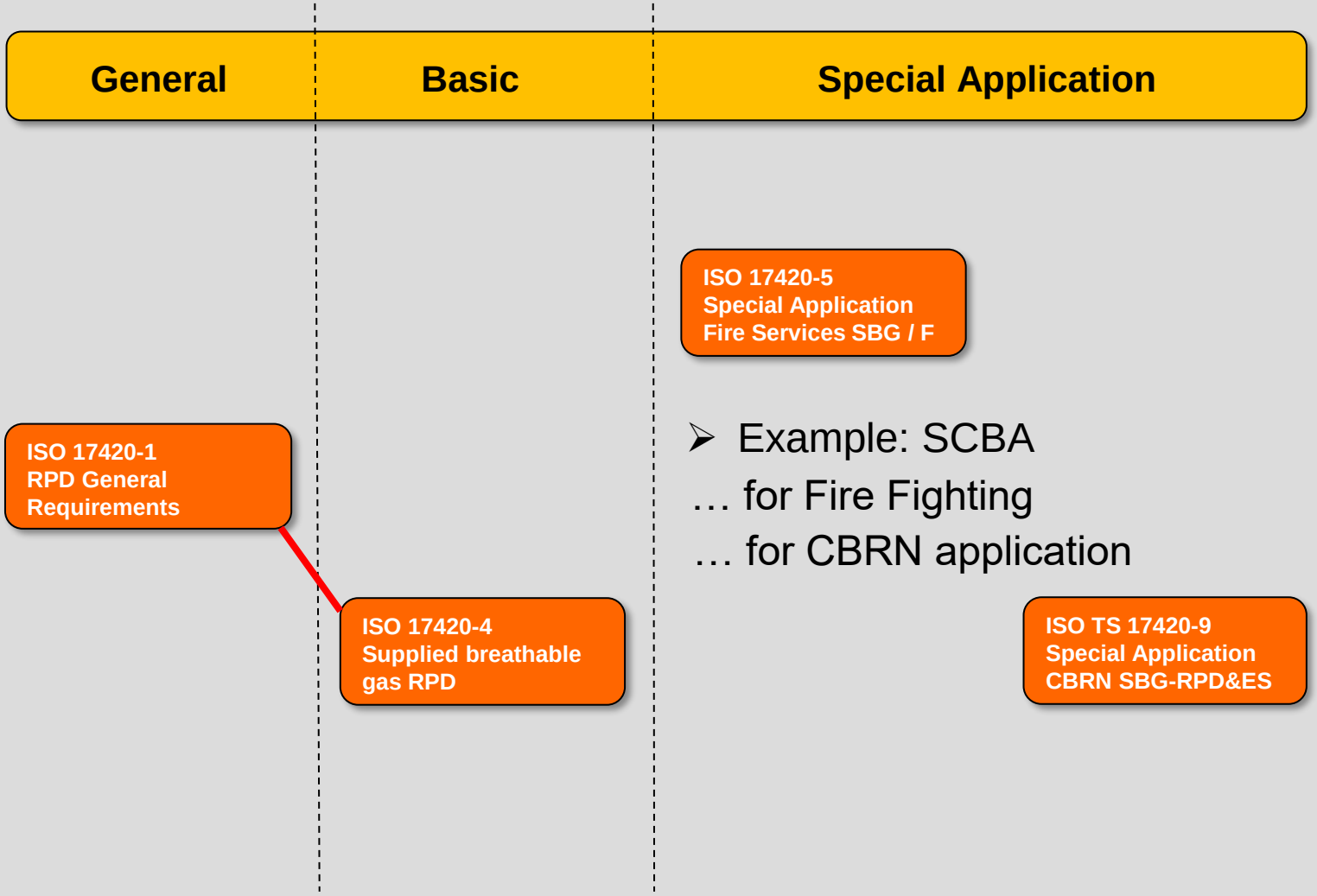
2. note: the application the RPD is used derives the setting of the course, eigther filtering inhaled gas or suppling breathable gas

3. note: further special applications specify specific requirements

4. note: the output of the risk assessment according to ISO TS 16975-1,-2 specifies the RPD class needed for the application/task

The new RPD Standard-aspects

How to use the standards - example A



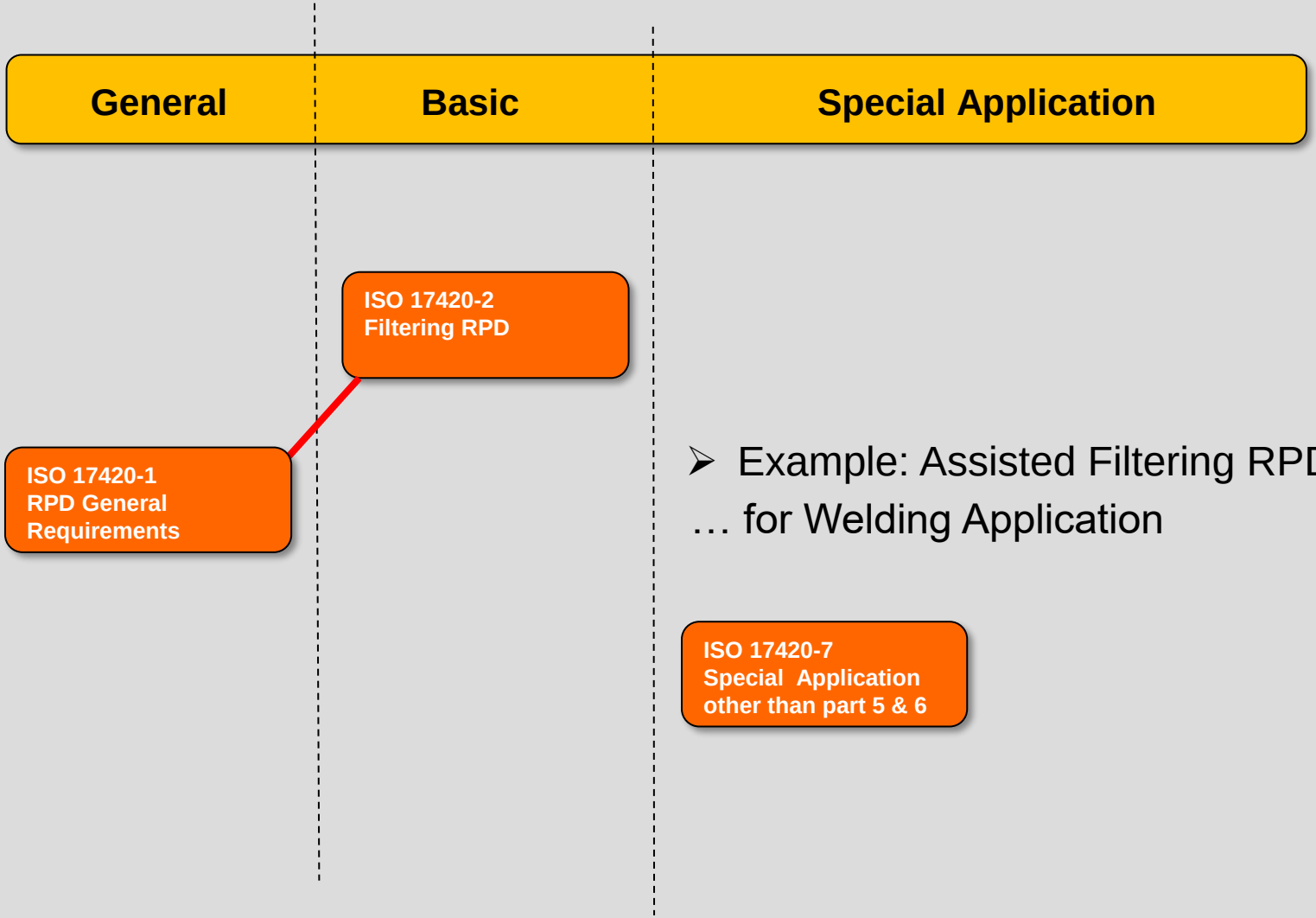
- Example: SCBA

… for Fire Fighting

… for CBRN application

The new RPD Standard-aspects

How to use the standards – example B

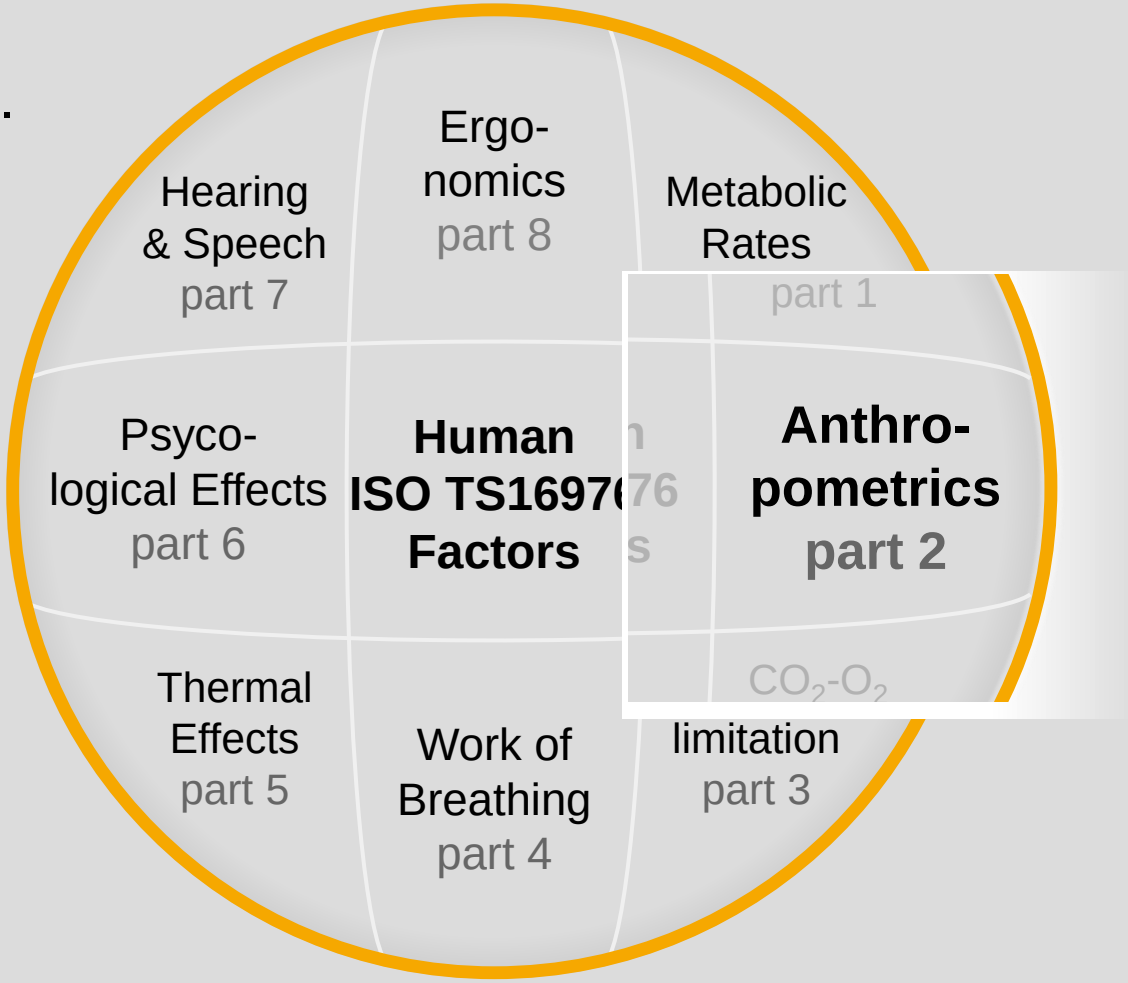


- Example: Assisted Filtering RPD (PAPR)

… for Welding Application

The new RPD Standard-aspects
Human Factors

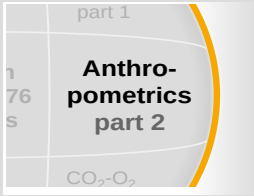
„Human Factors“….



….are the foundation of the RPD standards!

The new RPD Standard-aspects

Human Factors - deriving the RPD headforms



Distribution of the wearer population

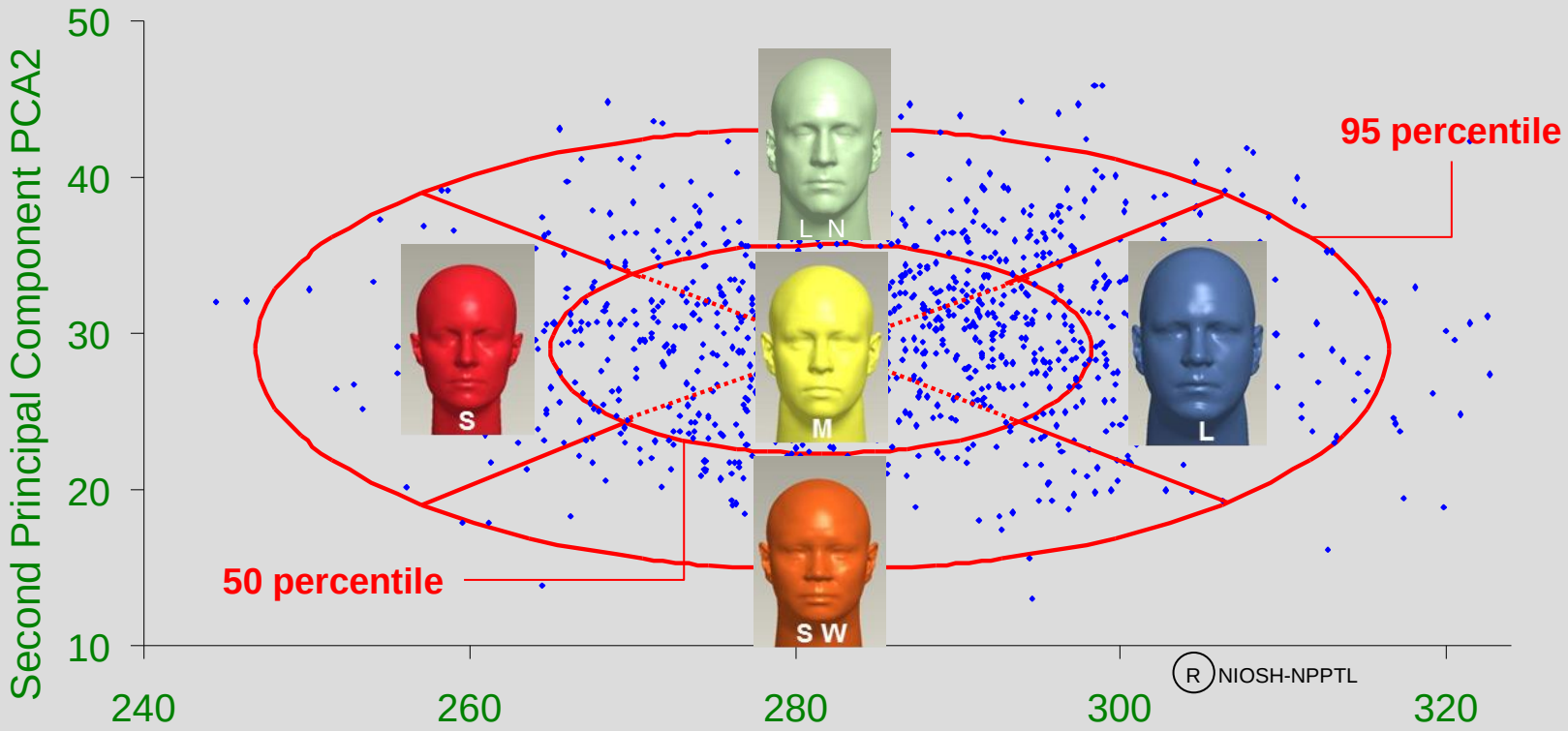
- > 3,000 head scans (3D) taken
- 5 head forms derived, representing 5% to 95% of all head forms
- distributed over a graph called Principal Component Analysis (PCA)

The new RPD Standard

Human Factors - deriving the RPD headforms

ISO TS 16976-2
Anthropometrics

Distribution of the wearer population



S = small; M = medium; L = large; SW = short/wide; LN = long/narrow

The new RPD Standard-aspects

Human Factors - deriving the RPD headforms

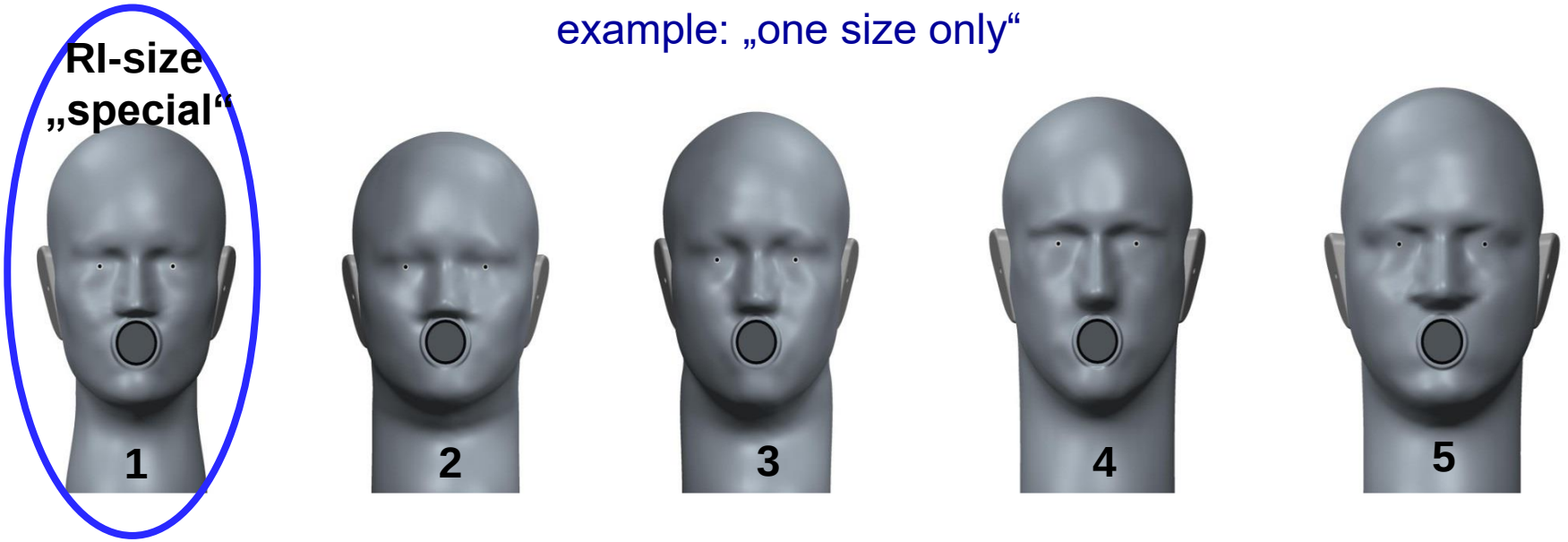
ISO 16900-5 Test method
RPD headforms , tools

Creating RPD headforms

- 5 RPD headforms for testing been created from 3D datasets

Sizes of Respiratory Interface (RI)

example: „one size only“



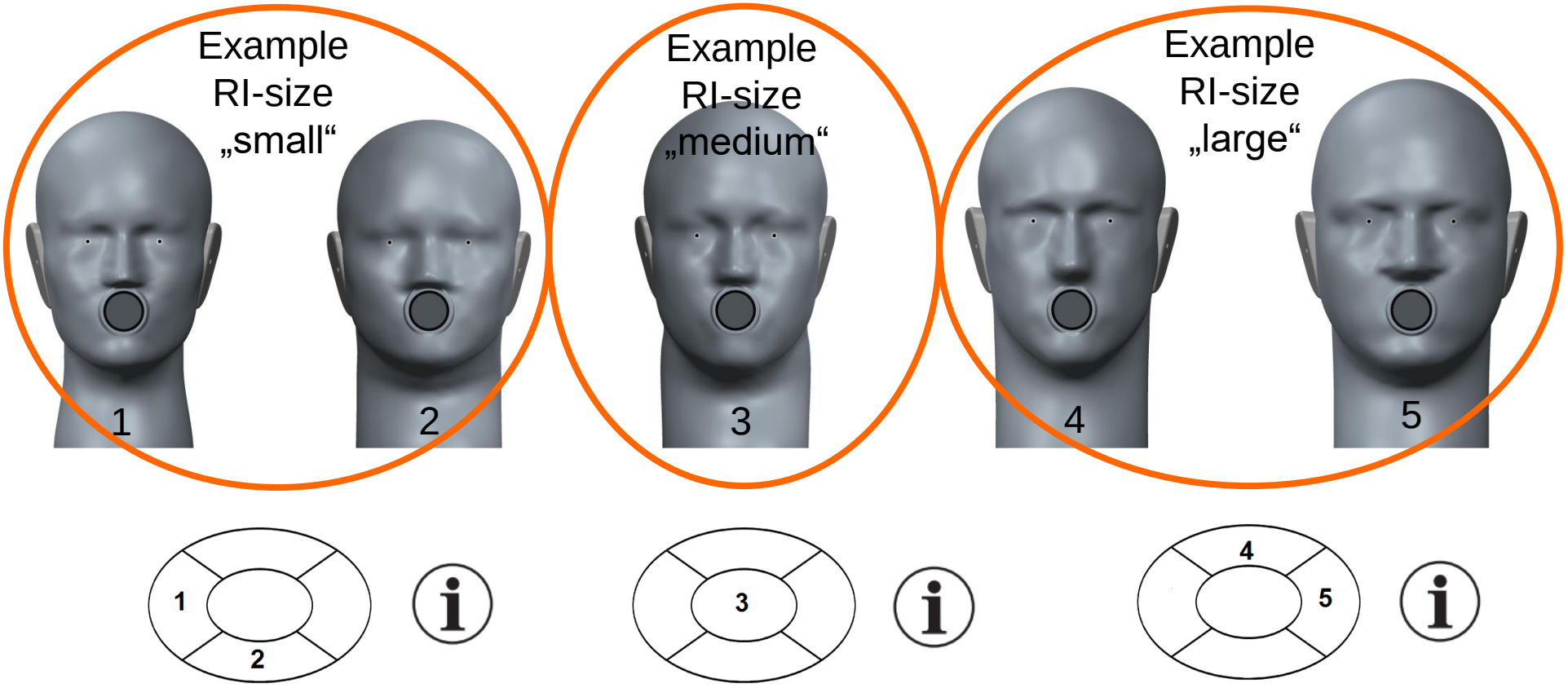
- **manufacturer has to define allocation between sizes of RI and sized of RPD headforms**
- **RI will be tested on these RPD headforms accordingly**

Designation of Respiratory Interfaces size

The new RPD Standard-aspects
Aspect: designation of RI-sizes

Sizes of Respiratory Interface (RI)

example: „three different sizes“

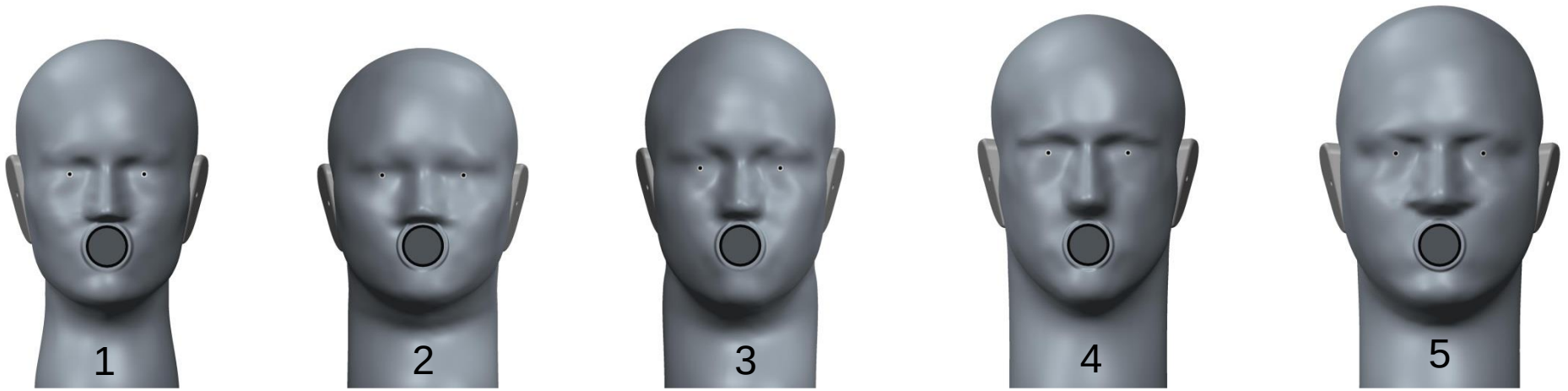


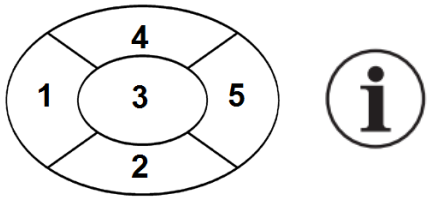
Designation of Respiratory Interfaces size

The new RPD Standard-aspects
Aspect: designation of RI-sizes

Sizes of Respiratory Interface (RI)

example: „one size fits all“





Designation of Respiratory Interfaces size

The new RPD Standard-aspects
Performance Characteristics

Definition of performance:

=

is the capability of a RPD to protect the wearer at the metabolic rate the wearer demands for the application/task(s)

performance characteristics:

- **Total –Inward Leakage**
- **Work Rate**
- **CO_2- O_2 level**
- **Breathable gas capacity**
- **Gas-Filter – Type/Capacity**
- **Particle-Filter – Efficiency**
- **Work of Breathing**
- **Breathing Resistance**

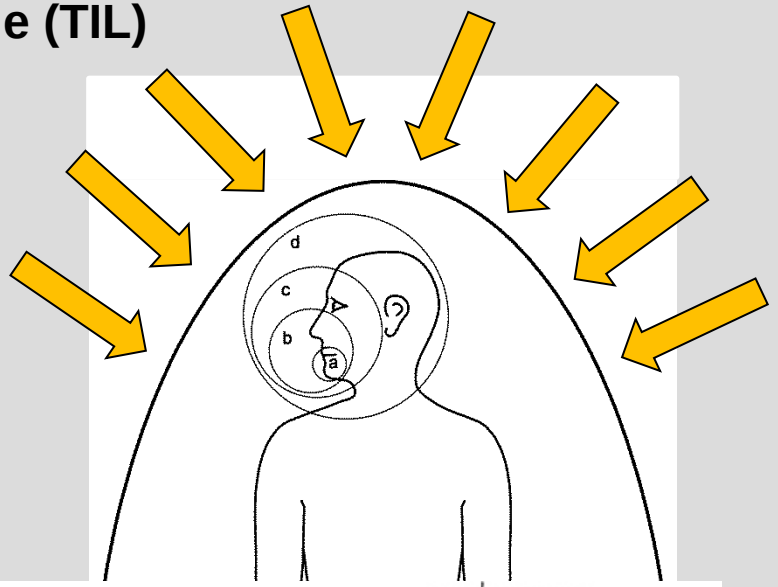
The new RPD Standard-aspects

Aspect: Respiratory Interfaces and Protection classes

CLASSIFICATION

Protection based on Total Inward Leackage (TIL)

mainly based on test results of the barrier lines of Respiratory Interfaces(RI)

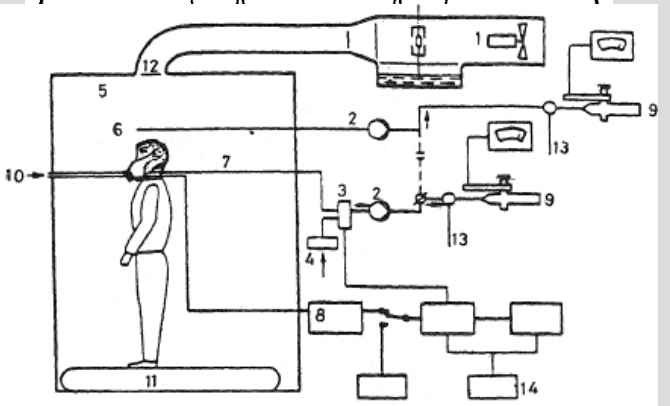


RI class based on barrier line /area of coverage

e	Body (Suit)
d	Head (Hood)
c	Face (Full Face mask / Visor)
b	Mouth and Nose (Half mask)
a	Mouth only (Mouthpiece (T))

T – tight fitting
L – loose fitting

TIL % (max)	Protection level derived by deviding 1/TIL by Safety Factors	Protection Class
0.001	10.000 (100.000)	PC 6 NEW
0.01	2.000 (10.000)	PC 5
0.1	250 (1000)	PC 4
1	30 (100)	PC 3
5	10 (20)	PC 2
20	4 (5)	PC 1



1. Atomizer
2. Pump
3. Change-over valve
4. Filter
5. Hood/chamber
6. Hood/chamber sample
7. Facepiece sample
8. Manometer
9. Photometer
10. Reference simulator fresh air
11. Treadmill
12. Ducting and baffle
13. Additional air
14. Pulsed sampling interface

Total Inward Leakage TIL-test method

The new RPD Standard-aspects

Aspect: work rate classes

CLASSIFICATION

ISO TS 16976-1
Metabolic Rates

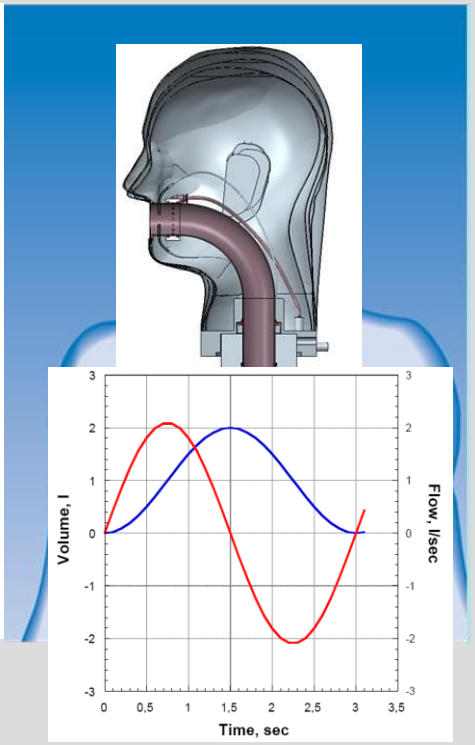
How much breathable gas does the wearer needs when performing the working task?

continous flow rate for calculation

max. flow rate/ time related

4 classes according to the work (M specified :

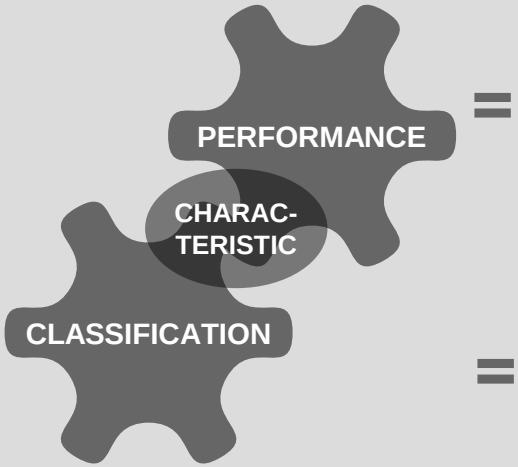
				(setting of breathing machine)
W4	maximal	NEW	65 l/min	(135 l/min) (45 x 1/min x 3 l) **for 2 to 5 min only**
W3	extremely heavy		50 l/min	(105 l/min) (42 x 1/min x 2,5 l)
W2	very heavy		40 l/min	(65 l/min) (32,5 x 1/min x 2 l)
W1	moderate		30 l/min	(35 l/min) (23,3 x 1/min x 1,5 l)



The new RPD Standard-aspects
Classification concept

ISO TS 16973 Classification

<u>One</u> classification for all RPD !



=

is the capability of a RPD to protect the wearer at the work rate the wearer demands for the application/task(s)

=

Basic-Performance

Protection Class	PC	Application Workrate Class	W	Respiratory Interface RI Class
6		4		e T/L
5		3		d T/L
4		2		c T/L
3		1		b T/L
2				a T/L
1				

\+ **filtering** **or** **suppling breathable gas** +

Special Application - Performance

Fire Fighting	CBRN	Mining	Marine	Abrasive Blasting	Welding	Escape
FF	CBRN	MN	MA	AB	WE	ES

The new RPD Standard-aspects

Aspect: classification and marking

CLASSIFICATION

Supplied Breathable Gas RPD

Basis-Performance

Protection Class (PC)	Application Workrate Class (W)	Respiratory Interface RI	Source	
6	4	e T/L	Source	S [liters]
5	3	d T/L		
4	2	c T/L		
3	1	b T/L		
2		a T/L		
1				

or S Y

Example for marking (SCBA) : PC5 W4 cT ⓘ S1500

Source

(Airline) : PC3 W3 dL ⓘ SY

CLASSIFICATION

Filtering RPD

Protection Class (PC)	Application Workrate Class (W)	Respiratory Interface RI	filtering eFficiency (F)	gas: type/ class	Abbre. + class
6	4	e T/L	5	4 9000	
5	3	d T/L	4	3 3000	
4	2	c T/L	3	2 1000	
3	1	b T/L	2	1 300	
2		a T/L	1		
1					

Example for marking (HalfMask+F) : ⊙ PC3 W2 bT ⓘ ⊙F2 AC3w2 ⊙ with standardized connector

(FullFaceMask + F) : PC4 W3 cT ⓘ F3 AC2BC1w3

	required minimum classes	
peak pressure inhalation > zero	≥PC5	W4
	≥PC5	≥W3
	≥PC5	≥W3
	≥PC4	≥W3
	≥PC3	≥W2

Special Application- Performance

FF5	Structural R2	Fire Fighting
FF4	Structural R1	
FF3	Hazardous	
FF2	Rescue	
FF1	Wildland	

FF

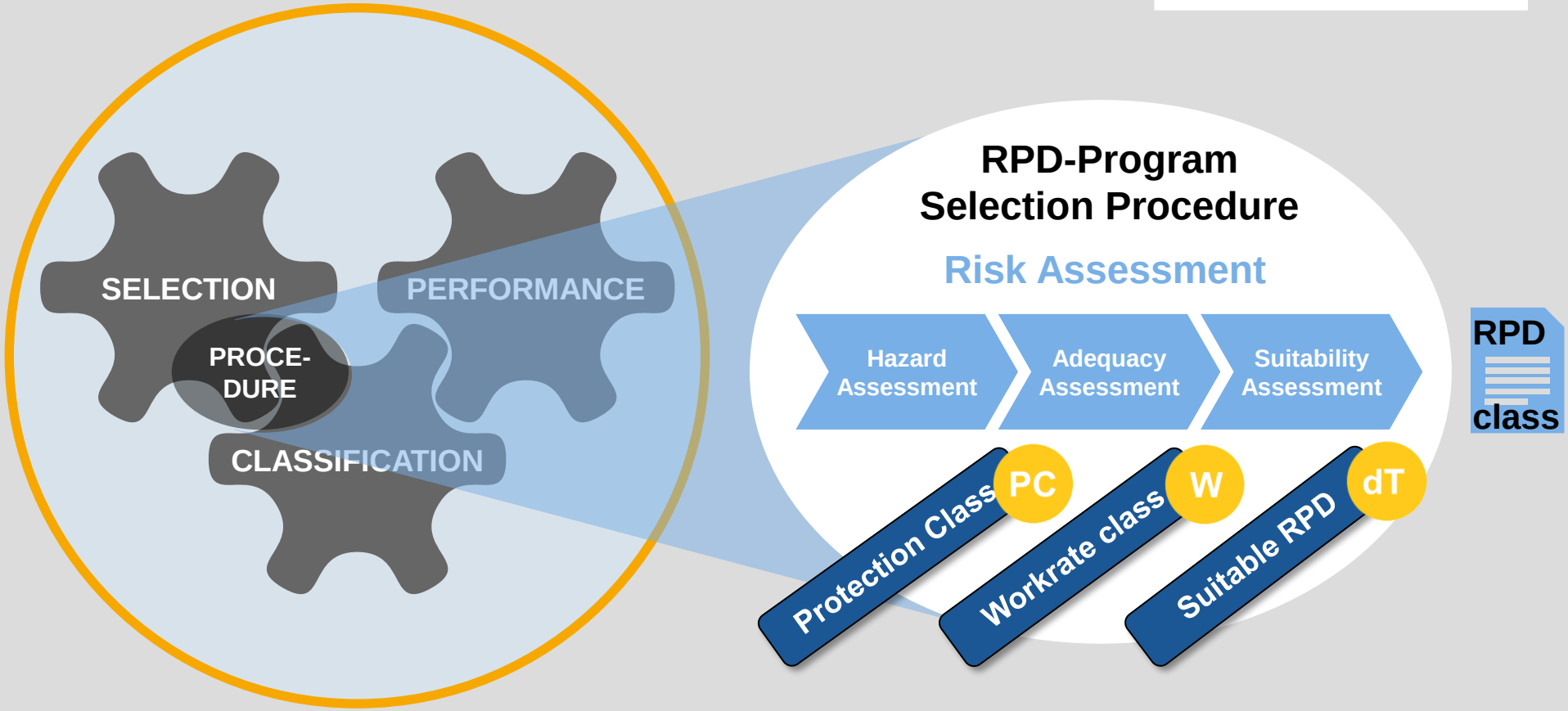
Example for marking

(SCBA structural firefighting R2) : PC5 W4 cT ⓘ S1500 FF5

The new RPD Standard-aspects
Aspect: selection procedure

How to select the adequate and suitable RPD for the wearer at work/task?

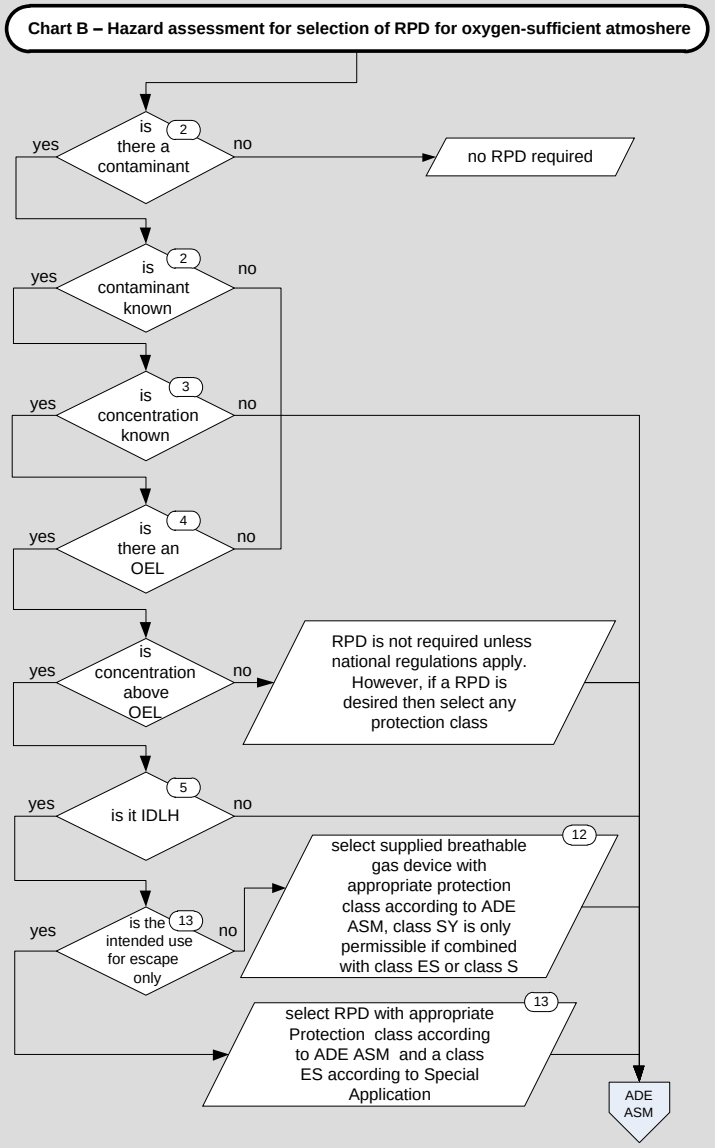
ISO TS 16975-1/-2
Respiratory Protective Devices-Selection, Use and Maintenance



The new RPD Standard-aspects
Aspect: selection procedure

SELECTION

selection flow charts



ISO TS 16975 -1
Selection and use

ADE ASM: Adequacy Assessment

Aspects to consider

- wearer orientation
- new designation of RPD
- use of performance standards
- designation of RI sizes
- RI and protection classes
- work rate classes
- classification and marking
- selection procedure

The new RPD Standard-aspects

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thank you for your attention !