

TEST REPORT

2021EP0503

DATE OF RECEPTION

10/11/2020

DATE TESTS

Starting: 10/11/2020
Ending: 10/02/2021

APPLICANT

MAE GİYİM SAN TİC LTD. ŞTİ
KAYABASI MAH. KAYASEHİR BULVARı PARK
MAVERA 2SITESI B2 BLOK
TR-34494 İstanbul

Att. Emel Konuklu

IDENTIFICATION AND DESCRIPTION OF SAMPLES

REFERENCES

D-Lab Bioclean Coverall: PS 3425

TESTS CARRIED OUT

- ERGONOMICS.
- SIZING.
- DETERMINATION OF PH VALUE.
- DETERMINATION OF FORBIDDEN AZO COLORANTS (CANCEROGENIC ARYLAMINES).
- SPECIFIC DESIGN REQUIREMENTS.
- SEAM STRENGTH RESISTANCE.
- DETERMINATION OF THE ABRASION RESISTANCE OF FABRICS.
- DETERMINATION OF TEAR RESISTANCE.
- DETERMINATION OF BREAKING STRENGTH AND ELONGATION.
- PUNCTURE RESISTANCE.
- DETERMINATION OF RESISTANCE TO PENETRATION BY SPRAY.
- DETERMINATION OF FLEX CRACKING AND CRACK GROWTH.
- THICKNESS.
- THICKNESS*.
- MASS PER UNIT AREA*.
- RESISTANCE TO PENETRATION BY LIQUIDS UNDER PRESSURE*.
- RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY SYNTHETIC BLOOD.
- RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY BLOOD-BORNE PATHOGENS USING PHI-X174.
- RESISTANCE TO WET BACTERIAL PENETRATION.
- TEST METHOD FOR RESISTANCE TO DRY BACTERIAL BARRIER PENETRATION.
- DETERMINATION OF INWARD LEAKAGE OF AEROSOLS OF FINE PARTICLES INTO SUITS.



SAMPLE DESCRIPTION

PHOTOGRAPHY

Numero de muestras analizadas
2



Reference⁽¹⁾

D-Lab Bioclean Coverall: PS 3425

///



RESULTS

ERGONOMICS

STANDARD

EN ISO 13688:2013

REFERENCE

D-Lab Bioclean Coverall : PS 3425

TEST DATE

01/12/2020

REMARK

The ergonomics verification has been performed by physical dimensions commensurate with the size found.

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RESULTS

SIZING

Standard

EN ISO 13688:2013 Apdo. 6

Test uncertainty

The test uncertainty is $\pm 1\%$ of the measurand's value, for a coverage value of $K=2$ (95%)

Size

XL

Reference	D-Lab Bioclean Coverall : PS 3425	
Bust girth (cm)	Arm height (cm)	Total height (cm)
142,0	64,0	165,0

Start and finish test date

02/12/2020 - 02/12/2020

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RESULTS

DETERMINATION OF PH VALUE

Standard

EN ISO 3071:2006

Determination date

20/11/2020

Extractor solutionA - H₂O**pH Extractor solution**

6,40

Temperature

20.5 °C

Reference	pH	Uncertainty
D-Lab Bioclean Coverall : PS 3425	7.40	± 5 %

REQUISITE

In accordance with Standard EN ISO 13688:2013, the pH value shall be greater than 3.5, and less than 9.5.

PASS

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RESULTS

DETERMINATION OF FORBIDDEN AZO COLORANTS (CANCEROGENIC ARYLAMINES)

Standard

UNE-EN 14362-1:2017

Test Methods

GC/MSD

Apparatus

Gas Chromatograph 7890A

Uncertainty

± 9 mg/Kg

Detectors

Mass Spectrometer 5975C

Reference	Results
D-Lab Bioclean Coverall : PS 3425 (WHITE FABRIC WITH COATING)	< 30* mg/Kg

*For all forbidden azo dyes listed below.

The textile products subject to control are according to the Standard EN ISO 13688:2013 on the use of Azo Colorants which release carcinogenic amines listed in the Standard Test

PASS

Forbidden Azo dyes

4-Aminodiphenyl, Benzidine, 4-Chlor-o-toluidine, 2-Naphthylamine, o-Aminoazotoluene, 2-Amino-4-nitrotoluene, p-Chloraniline, 2,4-Diaminoanisole, 4,4'-Diaminodiphenylmethane, 3,3'-Dichlorobenzidine, 3,3'-Dimethoxybenzidine, ,3,3'-Dimethylbenzidine, 3,3'-Dimethyl-4,4'-diaminodiphenylmethane, p-Cresidine, 4,4'-Methylene-bis-2-chloraniline, 4,4'-Oxydianiline, 4,4'-Thiodianiline, o-Toluidine, 2,4- Toluylenediamine, 2,4,5-Trimethylaniline, o-Anisidine, 4-Aminoazobenzene

REQUISITE

In accordance with standard EN ISO 13688:2013, by detecting Azo colorants the limited established is not detected by standard EN 14362-1

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RESULTS

SPECIFIC DESIGN REQUIREMENTS

REFERENCE

D-Lab Bioclean Coverall : PS 3425

STANDARD

EN 340:2003 and EN ISO 13688:2013

DESIGN REQUIREMENTS

The protection clothing design makes easy its correct placement and wearing staying with no movement during the use period intended.	PASS
The design of the protective clothing applies elements from other protective or equipment clothing, which are used to create a comprehensive protective outfit.	PASS
The clothing has no rough, sharp or hard surfaces or edges that could damage or irritate the user.	PASS
The clothing is not enough narrow for causing flow blood restriction.	PASS
The clothing is not enough loose and heavy for interfering the user's movement.	PASS

Remark

N/A: Not applicable

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RESULTS

SPECIFIC DESIGN REQUIREMENTS

REFERENCE

D-Lab Bioclean Coverall : PS 3425

STANDARD

EN 14126:2003/AC, point 4.3

DESIGN REQUIREMENTS

Protective clothing against infective agents meets the requirements that apply of the Standard ISO 13688:2013	PASS
Protective clothing against infective agents meets the requirements specified in the appropriate chemical protection Standard	PASS
The garment allows the user to move freely, in as much comfort as possible, in accordance with the protection the garment provides.	PASS

Remark

N/A: Not applicable

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RESULTS

SPECIFIC DESIGN REQUIREMENTS

REFERENCE

D-Lab Bioclean Coverall : PS 3425

STANDARD

EN ISO 13982-1:2004/A1:2010, point 4.3

DESIGN REQUIREMENTS

The type 5 chemical protection clothing meets the general requirements of the standard EN 340:2003	PASS
The clothing at least protects the torso, the arms and the legs, and is a one piece overall or a two piece suit.	PASS
The garment allows the user to move freely, in as much comfort as possible, in accordance with the protection the garment provides.	PASS

Remark

N/A: Not applicable

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RESULTS

SPECIFIC DESIGN REQUIREMENTS

REFERENCE:

D-Lab Bioclean Coverall : PS 3425

STANDARD

EN 13034:2005+A1:2009, point 5.1

DESIGN REQUIREMENTS

The type 6 chemical protection clothing meets the relevant requirements of the Standard EN 340:2003	PASS
The garment allows the user to move freely, in as much comfort as possible, in accordance with the protection the garment provides.	PASS
There are no special characteristics about the clothing where liquid chemical products can be collected and retained on the material surface (the pockets are protected)	PASS

Remark

N/A: Not applicable

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RESULTS

SEAM STRENGTH RESISTANCE

Standard

EN ISO 13935-2:2014

Apparatus

INSTRON Dynamometer

Conditioning date 03/12/2020 Test date 04/12/2020

Gauge length

100 mm

Atmosphere for conditioning testing

Temperature (20±2) °C Relative humidity (65±4) %

Number of specimens

Tested 5 Rejected 0

The break of the seam is produced for:

Torn fabric in clamps

Previous treatment

Null

Reference

D-Lab Bioclean Coverall : PS 3425

Average resistance (N)	C.V. (%)
45,78	
43,58	
43,38 44,35	2,77
43,42	
45,61	

Remarks

The relative expanded uncertainty of Seams resistance is ± 6% assay value of the measured, for a probability of coverage of 95%.

The test procedure described in the two versions of the Standard (EN ISO 13935-2:1999 and EN ISO 13935-2:2014) is the same.

REQUISITE ACCORDING TO STANDARD EN 14126:2003/AC:2004; EN 14605:2005+A1:2009; EN ISO 13982-1:2004/A1:2010; EN 13034:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>30N	> 50N	> 75N	> 125N	> 300N	> 500N

PERFORMANCE LEVEL 1

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RESULTS

DETERMINATION OF THE ABRASION RESISTANCE OF FABRICS

Standard

EN 530:2010 Method 2

Apparatus

Martindale Abrasion Tester

Conditioning date	23/11/2020	Test date	22/12/2020
Atmosphere for conditioning testing			
Temperature	(20±2) °C	Relative humidity	(65±4) %

Testing conditions

Rubbing against abradant paper 00

Testing pressure

9kPa

End point

Two thread broken

Technical characteristics of the sample

Not indicated by the client

Previous treatment

Null

Reference

D-Lab Bioclean Coverall : PS 3425

Specimens	Nº of cycles (n)
1	1500 < n < 2000
2	1500 < n < 2000
3	1500 < n < 2000
4	1500 < n < 2000

Remarks

The end test is performed by visual inspection.

The number of cycles corresponding to the rupture of the specimen.

The performance level is among the most unfavorable value of the pieces tested

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RESULTS

REQUISITE ACCORDING STANDARD EN 13034:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
> 10 cycles	> 100 cycles	> 500 cycles	> 1000 cycles	> 1500 cycles	> 2000 cycles

PERFORMANCE LEVEL 5

REQUISITE ACCORDING STANDARD EN 14605:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
> 10 cycles	> 100 cycles	> 500 cycles	> 1000 cycles	> 1500 cycles	> 2000 cycles

PERFORMANCE LEVEL 5

REQUISITE ACCORDING STANDARD EN 13982-1:2004/A1:2010

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
> 10 cycles	> 100 cycles	> 500 cycles	> 1000 cycles	> 1500 cycles	> 2000 cycles

PERFORMANCE LEVEL 5

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RESULTADOS / RESULTS

DETERMINATION OF TEAR RESISTANCE

Standard

EN ISO 9073-4:1997

Apparatus

INSTRON Dynamometer

Conditioning date

21/01/2021

Test date

27/01/2021

Atmosphere for conditioning testing

Temperature $(20 \pm 2)^\circ\text{C}$ Relative humidity $(65 \pm 2)\%$

Nº of specimens

Tested 5 for each direction

Rejected 0

The calculation of averages has been made

For electronic device

Reference

D-Lab Bioclean Coverall : PS 3425

Tear	Average load (N)	C.V. (%)
Lengthwise	50.42	4.62
	47.49	
	49.73	
	49.77	
	53.26	
Crosswise	47.95	
	19.98	
	20.19	
	23.42	
	23.65	
	24.89	17.01
	29.79	

REQUISITE ACCORDING TO STANDARD EN 14605:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>10N	> 20N	> 40N	> 60N	> 100N	> 150N

PERFORMANCE LEVEL 1

///



RESULTS

DETERMINATION OF BREAKING STRENGTH AND ELONGATION

Standard

EN ISO 13934-1:2013

Apparatus

INSTRON Dynamometer

Conditioning date	23/11/2020	Test date	04/01/2021
Atmosphere for conditioning testing			
Temperature	(20±2) °C	Relative humidity	(65±4) %
Gauge length			
Lengthwise	200 mm.	Crosswise	200 mm.
Test velocity			
Lengthwise	100 mm/min	Crosswise	100 mm/min
Pre-tension			
Lengthwise	2 N	Crosswise	2 N
Nº of specimens			
Tested	5 for each direction	Rejected	0
State of the specimens			
Conditioned			

Reference

D-Lab Bioclean Coverall : PS 3425

Direction	Maximum average load (N)	C.V. (%)	Average elongation (%)	C.V. (%)
Lengthwise	93	6	45	
	95		50	
	82 89		35 42	13.5
	86		39.5	
	88		42	
Crosswise	33	3	33	
	33		36	
	34 33		33.5 32.5	7.4
	32		30	
	34		31	

Remark

The relative expanded uncertainty of Tensile strength resistance is $\pm 5\%$ assay value of the measured, for a probability of coverage of 95%.

The test procedure described in the two versions of the Standard (EN ISO 13934-1:1999 and EN ISO 13934-1:2013) is the same.

REQUISITE ACCORDING TO STANDARD EN 14126:2003/AC:2004; EN 13034:2005+A1:2009; EN 14605:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>30N	> 60N	> 100N	> 250N	> 500N	> 1000N

PERFORMANCE LEVEL 1

///



RESULTS

PUNCTURE RESISTANCE

Standard

EN 863:1995

Apparatus

INSTRON Dynamometer

Conditioning date	19/11/2020	Test date	24/11/2020
Atmosphere for conditioning testing			
Temperature	(20±2) °C	Relative humidity	(65±5) %
Type of fabric			
Coated fabric			
Previous treatment			
Null			

Reference	Maximum force (N)	Average resistance (N)
	6,35	
	7,32	
D-Lab Bioclean Coverall : PS 3425	5,95	
	6,90	6,67
	6,85	

Remark

The relative expanded uncertainty of puncture resistance is ±11% assay value of the measured, for a probability of coverage of 95%.

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RESULTS

REQUISITE ACCORDING TO STANDARD EN 13034:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>5N	> 10N	> 50N	> 100N	> 150N	> 250N

PERFORMANCE LEVEL 1

REQUISITE ACCORDING TO STANDARD EN 14605:2005+A1:2009

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>5N	> 10N	> 50N	> 100N	> 150N	> 250N

PERFORMANCE LEVEL 1

REQUISITE ACCORDING TO STANDARD EN 13982-1:2004/A1:2010

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>5N	> 10N	> 50N	> 100N	> 150N	> 250N

PERFORMANCE LEVEL 1

REQUISITE ACCORDING TO STANDARD EN 14126:2003/AC:2004

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
>5N	> 10N	> 50N	> 100N	> 150N	> 250N

PERFORMANCE LEVEL 1

///



RESULTS

RESISTANCE OF MATERIALS TO PENETRATION BY LIQUID

Standard

EN ISO 6530:2005, EN 13034:2005+A1:2009

Atmosphere for conditioning and testing

Temperature (20±2) °C Relative Humidity (RH) (65±5) %

Flow

10 ml in 10 s

Mass per unit area approximate of the sample tested

Does not provided by the customer

Pre-treatment

As received

Reference

D-Lab Bioclean Coverall : PS 3425

Measurement uncertainty

Test liquid	Penetration index (%) ¹	Repellency index (%) ¹
Sulphuric Acid 30%	±0.3	±0.3
Sodium Hydroxide 10%	±1.1	±1.1
O-Xylene	±5.0	±7.8
1-Butanol	±5.8	±5.4

¹ On the measured value

Material tested

No-woven fabric, white colour

Test date

08/01/2021

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RESULTS

1. Test liquid Sulphuric Acid 30%

Trade name SCHARLAU (Ref: AC20791000)

Boiling point 336.85 °C

Evaporative losses prevision None

Direction	Specimen	Penetration index (%)	Repellency index (%)	Absorption index (%)
Warp	1	0.0	98.6	1.4
	2	0.0	99.0	98.6
	3	0.0	98.6	1.4
Weft	1	0.0	99.3	0.7
	2	0.0	98.8	98.7
	3	0.0	98.7	1.3

CLASSIFICATION ACCORDING TO EN 14325:2004

Class according to repellency index: **3**

Class according to penetration index: **3**

2. Test liquid Sodium Hydroxide 10 %

Trade name MERCK (Ref: 1055881000)

Boiling point 1390 °C

Evaporative losses prevision None

Direction	Specimen	Penetration index (%)	Repellency index (%)	Absorption index (%)
Warp	1	0.0	98.0	2.0
	2	0.0	98.7	98.0
	3	0.0	98.0	2.0
Weft	1	0.0	98.4	1.6
	2	0.0	98.7	98.3
	3	0.0	98.3	1.7

CLASSIFICATION ACCORDING TO EN 14325:2004

Class according to repellency index: **3**

Class according to penetration index: **3**

>>>



RESULTS

3. Test liquid	O-Xylene
Trade name	SCHARLAU (Ref: XI00252500)
Boiling point	139 °C
Evaporative losses prevision	None

Direction	Specimen	Penetration index (%)	Repellency index (%)	Absorption index (%)
Warp	1	0.0	96.9	3.1
	2	0.0	95.9	4.1
	3	0.0	95.8	4.2
Weft	1	0.0	96.2	3.8
	2	0.0	96.1	3.9
	3	0.0	95.1	4.9

CLASSIFICATION ACCORDING TO EN 14325:2004

Class according to repellency index: 3
 Class according to penetration index: 3

4. Test liquid	1-Butanol
Trade name	SCHARLAU (Ref: AL01732500)
Boiling point	117.88 °C
Evaporative losses prevision	None

Direction	Specimen	Penetration index (%)	Repellency index (%)	Absorption index (%)
Warp	1	0.0	96.9	3.1
	2	0.0	96.8	3.2
	3	0.0	96.4	3.6
Weft	1	0.0	96.9	3.1
	2	0.0	96.6	3.4
	3	0.0	96.7	3.3

CLASSIFICATION ACCORDING TO EN 14325:2004

Class according to repellency index: 3
 Class according to penetration index: 3

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RESULTS

Classification of the repellency to the liquids according to standard EN 14325:2004

Class	Repellency index
3	> 95 %
2	> 90 %
1	> 80 %

Classification to the penetration by liquids according to standard EN 14325:2004

Class	Penetration index
3	< 1 %
2	< 5 %
1	< 10 %

ACCORDING TO STANDARD EN 13034:2005+A1:2009

PASS

REQUISITES ACCORDING TO STANDARD EN 13034:2005+A1:2009

According to the Standard EN 13034:2005+A1:2009, for liquid repellency a performance level 3 shall be obtained for at least one of the chemicals referred to EN 14325:2004, and for resistance to penetration by liquids a performance level of at least 2 shall be obtained for at least one of the chemicals referred to EN 14325:2004.

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RESULTS

DETERMINATION OF RESISTANCE TO PENETRATION BY SPRAY

Standard

EN 13034:2005+A1:2009

Apparatus

Spray equipment according to EN ISO 17491-4:2008+A1:2016 Method A with modifications according to the point 5 of the Standard EN 13034:2005+A1:2009

Reference

D-Lab Bioclean Coverall : PS 3425

Description of the absorbent suit

One piece suit made with white absorbent fabric

Description of any additional equipment

Gumboots, gloves and hood

Surface tension measured of the water test and composition

Composition: Water, lactophenol blue and citric acid

Surface tension: 54.6 mN/m

Calibrated stain area

2.01 cm²

Spray nozzle

Disk DC-03, core CR-23

Pressure of the liquid source

Nozzle 1: 3 bar

Nozzle 2: 3 bar

Nozzle 3: 3 bar

Nozzle 4: 3 bar

Test date

12/01/2021

Temperature test

21.5 °C

Test uncertainty

1.3 cm

Conditioning

Temperature (20±2) °C

Relative humidity (65±5) %

Time At least 24 hours

Sizing of the garment

XL

Pre-treatment

As received

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RESULTS

Sequence of movements according to standard

	Mov. 1	Mov. 2	Mov. 3	Mov. 4	Mov. 5	Mov. 6	Mov. 7
Sample 1	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Sample 2	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Sample 3	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Results

Sample 1	Penetration Zone	Total number of penetration spots	Stain area in the penetration zone (cm ²)	Total stain area (cm ²)	Calibrated stain area (cm ²)	REQUIREMENT ACCORDING TO STANDARD EN 13034:2005+A1:2009
						≤ 6.03
	--	--	--	--	2.01	

Sample 2	Penetration Zone	Total number of penetration spots	Stain area in the penetration zone (cm ²)	Total stain area (cm ²)	Calibrated stain area (cm ²)	REQUIREMENT ACCORDING TO STANDARD EN 13034:2005+A1:2009
						≤ 6.03
	Crotch	2	1.40	5.20	2.01	
	Rear	4	3.80			

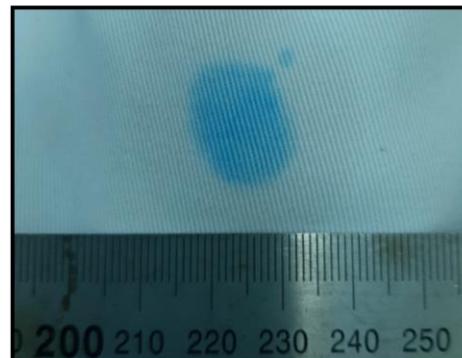
>>>



RESULTS

Sample 3	Penetration Zone	Total number of penetration spots	Stain area in the penetration zone (cm ²)	Total stain area (cm ²)	Calibrated stain area (cm ²)	REQUIREMENT ACCORDING TO STANDARD EN 13034:2005+A1:2009
	--	--	--	--	2.01	≤ 6.03

Picture of the additional garment



Calibrated stain

REQUIREMENT ACCORDING TO STANDARD EN 13034:2005+A1:2009

All chemical protective suits shall pass the test, i.e. there shall be no penetration of any suit. The total stain area on the undergarment shall be less than or equal to three times the total calibrated stain area.

ACCORDING TO STANDARD EN 13034:2005+A1:2009

PASS

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RESULTS

DETERMINATION OF FLEX CRACKING AND CRACK GROWTH

Standard

EN ISO 7854:1997 Method B

Used apparatus

Crumpleflex equipment.

Number of specimens

6

Test temperature

23,0 °C and 50,0 % RH

Reference	D-Lab Bioclean Coverall : PS 3425	
Specimen	Direction	Flex cycles
Specimen 1	Warp	>50000
Specimen 2	Warp	>50000
Specimen 3	Warp	>50000
Specimen 4	Weft	>50000
Specimen 5	Weft	>50000
Specimen 6	Weft	>50000

Remark:

According to EN 14126: 2003/AC: 2004, the mechanical requirements must be tested and classified according to EN 14325: 2018 point 4.5.2.1.

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14325:2018 LEVEL 6

Classification of resistance to flex cracking according to Standard EN 14325: 2018 point 4.5.2.1.

Performance levels	Cycles
6	> 50000
5	> 20000
4	> 8000
3	> 3000
2	> 1250
1	> 500

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RESULTS

Reference	D-Lab Bioclean Coverall : PS 3425	
Specimen	Direction	Flex cycles
Specimen 1	Warp	>100000
Specimen 2	Warp	>100000
Specimen 3	Warp	>100000
Specimen 4	Weft	>100000
Specimen 5	Weft	>100000
Specimen 6	Weft	>100000

Requirements according to Standard EN ISO 13982-1:2004+A1:2010

According the standard EN ISO 13982-1:2004+A1:2010 The materials of type 5 chemical protective clothing must be tested and classified in accordance with the provisions of EN 14325: 2004 pto. 4.5.

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14325:2004	LEVEL 6
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Requirements according to Standard EN 14605:2005+A1:2019

By the method of cell pressure examine the tightness of the specimens. Should obtain, at least, the level of benefit 1 in the classification according to EN 14605:2005+A1:2009.

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14605:2005+A1:2009	PASS
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Classification of resistance to flex cracking according to Standard EN 14325:2004

Performance levels	Cycles
6	> 100000
5	> 40000
4	> 15000
3	> 5000
2	> 2500
1	> 1000

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RESULTS

DETERMINATION OF FLEX CRACKING AND CRACK GROWTH

Standard

EN ISO 7854:1997 Method B

Used apparatus

Crumpleflex equipment.

Number of specimens

6

Test temperature

-30 °C

Reference	D-Lab Bioclean Coverall : PS 3425	
Specimen	Direction	Flex cycles
Specimen 1	Warp	>4000
Specimen 2	Warp	>4000
Specimen 3	Warp	>4000
Specimen 4	Weft	>4000
Specimen 5	Weft	>4000
Specimen 6	Weft	>4000

Remark:

According to EN 14126: 2003/AC: 2004, the mechanical requirements must be tested and classified according to EN 14325: 2018 point 4.6

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14325:2018 LEVEL 6
Classification of resistance to flex cracking according to Standard EN 14325: 2018 point 4.6

Performance levels	Cycles
6	> 4000
5	> 2000
4	> 1000
3	> 500
2	> 200
1	> 100

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RESULTS

Reference	D-Lab Bioclean Coverall : PS 3425	
Specimen	Direction	Flex cycles
Specimen 1	Warp	>4000
Specimen 2	Warp	>4000
Specimen 3	Warp	>4000
Specimen 4	Weft	>4000
Specimen 5	Weft	>4000
Specimen 6	Weft	>4000

Requirements according to Standard EN ISO 13982-1:2004+A1:2010

According the standard EN ISO 13982-1:2004+A1:2010 The materials of type 5 chemical protective clothing must be tested and classified in accordance with the provisions of EN 14325: 2004 pto. 4.6

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14325:2004	LEVEL 6
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Requirements according to Standard EN 14605:2005+A1:2019

By the method of cell pressure examine the tightness of the specimens. Should obtain, at least, the level of benefit 1 in the classification according to EN 14605:2005+A1:2009.

PERFORMANCE LEVEL ACCORDING TO STANDARD EN 14605:2005+A1:2009	PASS
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Classification of resistance to flex cracking according to Standard EN 14325:2004 pto. 4.6

Performance levels	Cycles
6	> 4000
5	> 2000
4	> 1000
3	> 500
2	> 200
1	> 100

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RESULTS

THICKNESS

Standard

EN ISO 2286-3:2017

Apparatus

Thickness meter MESDAN LAB

Conditioning date	03/12/2020	Test date	04/12/2020
Atmosphere for conditioning testing			
Temperature	(20±2) °C	Relative humidity	(65±5) %
Test pressure			
2 kpa ± 0.2 KPa			
Type of fabric			
Coated fabric			
Pressure foot			
(50.5 ± 0.2) mm			
Nº of specimens			
5			
Reference			
D-Lab Bioclean Coverall : PS 3425			

Minimal thickness (mm)	Average thickness (mm)	Maximum thickness (mm)
0,88	0,97	1,10

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RESULTS

THICKNESS*

Standard

EN ISO 9073-2:1996. Method A

Apparatus

Thickness meter

Conditioning date	23/11/2020	Test date	25/11/2020
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Atmosphere for conditioning testing

Temperature	(20±2) °C	Relative humidity	(65±5) %
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Test pressure

0.5 kPa

Reference

D-Lab Bioclean Coverall : PS 3425 (SEAMS)

Average thickness	CV (%)
1,25	8,15

///



RESULTS

MASS PER UNIT AREA*

Standard

ISO 3801:1977, Method 5

Conditioning date

03/12/2020

Test date

04/12/2020

Atmosphere for conditioning testing

Temperature (20±2) °C

Relative humidity

(65±2) %

Type of fabric

Coated fabric

State of the specimens

Original

Reference

D-Lab Bioclean Coverall : PS 3425

Mass per unit area (g/m ²)	CV (%)
73,16	3,24

///



RESULTS

MASS PER UNIT AREA*

Standard

ISO 3801:1977, Method 5

Conditioning date	25/11/2020	Test date	26/11/2020
Atmosphere for conditioning testing			
Temperature	(20±2) °C	Relative humidity	(65±2) %
Type of fabric			
Coated fabric			
State of the specimens			
Original			
Reference			
D-Lab Bioclean Coverall : PS 3425 (Seams)			

Mass per unit area (g/m ²)	CV (%)
73,3	2,78

///



RESULTS

RESISTANCE TO PENETRATION BY LIQUIDS UNDER PRESSURE*

Standard: ISO 13994:2005

Method: A

- 0 kPa for 5 min
- 13.8 kPa for 10 min

Test liquid: Distilled water

Temperature: 22 °C ± 2 °C

Test date : 17/12/2020

Reference	Resistance to Penetration
D-LAB BIOCLEAN COVERALL : PS 3425	PASS
	PASS
	PASS



RESULTS

DETERMINATION OF THE ABRASION RESISTANCE OF FABRICS

Standard

EN ISO 12947-2:2016

Apparatus

Martindale Abrasion Tester

Conditioning date 19/11/2020 **Test date** 04/01/2020

Atmosphere for conditioning and testing according accordance EN ISO 139:2005/A1:2011

Temperature (20±2) °C **Relative humidity** (65±4) %

Testing conditions

Abrasive paper Trizact Grit A65

Technical characteristics of the sample

Not indicated by the client

Testing pressure

9 kPa

End point

Specimen breakdown

Reference

D-Lab Bioclean Coverall : PS 3425

Specimens		No. of cycles in the inspection interval before the end of the test is reached
1		400 < n < 1000
2		400 < n < 1000
3		400 < n < 1000
4		400 < n < 1000
Lowest individual result		400 < n < 1000

Remarks

The end test is performed by hydrostatic head end-point determination, according standard EN 14325:2018, point 4.4.2.3.

REQUISITE ACCORDING STANDARD EN 14126:2003

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
> 10 cycles	> 40 cycles	> 100 cycles	> 400 cycles	> 1000 cycles	> 2000 cycles

PERFORMANCE LEVEL 4

>>>



RESULTS

WATER PENETRATION RESISTANCE. TEST UNDER HYDROSTATIC PRESSURE

Standard

EN 20811:1992 (Obsolete)

Apparatus

Hydrostatic Head Tester

Atmosphere for conditioning and testing

Temperature	(20±2) °C	Relative humidity	(65±4) %
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Water temperature

20 °C

Rate of increase of water pressure

10 cm H₂O/min ((980±50)Pa/min)

Surface exposed

External side

After abrasion test

According to standard EN 14325:2018 pto. 4.4.

Reference	Specimen	Pressure (mm/H ₂ O)
D-Lab Bioclean Coverall : PS 3425	1	>200
	2	>200
	3	>200
	4	>200

Remark

The edition of the standard used, does not correspond to the latest version released.

///



RESULTS

RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY SYNTHETIC BLOOD

Standard: ISO 16603:2004 Procedure: C

Principle:

A specimen is subjected to a body fluid stimulant (synthetic blood) for a specified time and pressure sequence. A visual observation is made to determine when, or if, penetration occurs. Any evidence of synthetic blood penetration constitutes failure. Results are reported as PASS / FAIL.

In the method, the specimen is inserted in the penetration cell with the normal outside surface of the textile towards the cell reservoir which is further filled with synthetic blood. The other face is in contact with retaining screen (which ensures a good bearing of the textile during the pressure application).

The pressure application procedure is the following:

- 0 KPa for 5 min
- 1,75 KPa for 5 min
- 3,5 KPa for 5 min
- 7 KPa for 5 min
- 14 KPa for 5 min
- 20 KPa for 5 min

Test date: 17/12/2020

Environmental condition: 22 °C and 40 % H.R

Tested side: External side

Pretreatment: ---



RESULTS

RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY SYNTHETIC BLOOD

Results:

Reference of the sample	D-Lab Bioclean Coverall : PS 3425		
Results	Replicate 1	Replicate 2	Replicate 3
0 KPa for 5 min	PASS	PASS	PASS
1,75 KPa for 5 min	PASS	PASS	PASS
3,5 KPa for 5 min	PASS	PASS	PASS
7 KPa for 5 min	PASS	PASS	PASS
14 KPa for 5 min	PASS	PASS	PASS
20 KPa for 5 min	PASS	PASS	PASS
Retaining screen specifications	Not used		



RESULTS

RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY BLOOD-BORNE PATHOGENS USING Phi-X174

Standard: ISO 16604:2004.

Procedure: C.

Principle:

In the method, the material is placed in the test cell. The good side of the test material is directly in contact with a suspension of bacteriophage (phi-X174). After assembly, the cell is placed in the apparatus as defined in the standard and the corresponding pressure is applied:

- 5 minutes in contact without pressure application.
- 5 minutes at 20 kPa.

End of test, the sample surface that has not been in contact with the bacteriophage suspension is clarified. The rinsing liquid is then placed on an agar plate which has previously been inoculated with *Escherichia coli* (used as host bacteria of bacteriophage). The plates are incubated for 24 hours at 37 ° C, the presence of colonies on the agar surface means that the bacteriophage has passed through the sample.

Results are expressed in the form: PASS or FAIL test. The detection of only one plaque constitutes a failure of the textile.

Date test: 09/12/2020 – 10/12/2020

Dimension of the test specimens: 7,5 cm x 7,5 cm.

Bacteriophage: Bacteriophage Phi-X174 (ATCC 13706-B1).

Host bacteria of the used of bacteriophage: *Escherichia Coli* (ATCC 13706).

Retaining screen: not use.

Environmental condition: 22 °C y/and 39 % H.R

Bacteriophage concentration:

- Starting: $3,06 \cdot 10^8$ (PFU/ml)
- Ending: $2,16 \cdot 10^8$ (PFU/ml)

Compatibility ratio: 1,04

Pretreatment: ---



RESULTS

RESISTANCE OF MATERIALS USED IN PROTECTIVE CLOTHING TO PENETRATION BY BLOOD-BORNE PATHOGENS USING Phi-X174

Results:

Reference	Test 1	Test 2	Test 3
D-Lab Bioclean Coverall : PS 3425	PASS (-)	PASS (-)	PASS (-)
Negative Control	(-)	(-)	(-)
Positive Control	(+)	(+)	(+)

Remarks:

- Symbols used in the table of results meaning the following:

(+) = Penetration of bacteriophages.

(-) = No penetration of bacteriophages.

- In accordance with the standard EN 14126:2003 point 4.1.4.1, the product should be classify as **CLASS 6** according with the following table:

Table of classification of resistance to penetration of contaminated liquids under hydrostatic pressure.

Class	Hydrostatic pressure at which the material passes the test
6	20 kPa
5	14 kPa
4	7 kPa
3	3,5 kPa
2	1,75 kPa
1	0 kPa ^a

^a Means that the material is only exposed to the hydrostatic pressure of the liquid in the test cell.



RESULTS

RESISTANCE TO WET BACTERIAL PENETRATION

Standard

EN 14126:2003/AC:2004; EN ISO 22610:2006

Test date

11/12/2020 - 14/12/2020

Verifications of equipment operation performed

- Adjustment of the force of the finger to $3 \pm 0,02$ N according to point 8.3.
- Verification with carbon paper according to point 10.2.
- Verification with reference material according to point 10.3.

Environmental conditions

- Temperature (°C): 21
- Relative humidity (%): 38

Distance from the agar surface to the edge of the Petri dish (mm):

3

Size specimens:

25 cm x 25 cm

Carrier material

Material de PU (Schuett-biotec GmbH)

Staphylococcus aureus suspension ATCC 29213 (CECT 794) (cfu/mL)

21,100

Nº tested specimens

5

Pre-treatment

----->>>



RESULTS

Sample reference

D-Lab Bioclean Coverall : PS 3425

Batch n°

Results

Replica	1	2	3	4	5
Test time	ufc	ufc	ufc	ufc	ufc
15 min	0	0	0	7	0
30 min	1	0	1	8	1
45 min	2	1	2	1	0
1 h	1	0	4	3	0
1h 15min	0	0	1	1	1
Test specimen upside down	288	260	289	234	205
cfu/plate maximum	2	1	4	8	1

Calculated barrier index I_B

Replica	1	2	3	4	5	Average ⁽²⁾
I_B	6,0	6,0	5,9	5,7	6,0	5,9 ± 0,2

Remarks

- ⁽²⁾Average value ($n = 5$) ± U (extended uncertainty) for a probability of coverage of 95%

>>>



RESULTS

Remarks

In accordance with the standard EN 14126:2003/AC:2004 point 4.1.4.2, the product should be classify as **CLASS 1** according with the following table:

Table. Classification of resistance to penetration of biological agents by mechanical contact with substances containing contaminated liquids.

Class	Penetration time (t min)
6	$t > 75$
5	$60 < t \leq 75$
4	$45 < t \leq 60$
3	$30 < t \leq 45$
2	$15 < t \leq 30$
1	$\leq 15 \text{ min}$

- ⁽¹⁾Data provided by the Customer.

///



RESULTS

TEST METHOD FOR RESISTANCE TO DRY BACTERIAL BARRIER PENETRATION

Standard

EN ISO 22612:2005

Test date

01/12/2020 - 02/12/2020

Principle

The test is carried out on test pieces fixed each in a container. In each container except one a portion of talc contaminated with *Bacillus subtilis* is poured on the test piece. One container is left uncontaminated as a control. A sedimentation plate is inserted at base of each container at a short distance below the test piece.

The apparatus supporting the containers is then brought into vibration by a pneumatic ball vibrator. The talc that penetrates is captured on the sedimentation plate. The sedimentation plates are removed and incubated; the numbers of colonies produced are counted.

Equipment

- 9 cm diameter Petri dishes containing TGE agar.
- 50 g of talc (95% < 15 μ).
- Purified spores of *Bacillus subtilis* in a concentration of $8,8 \cdot 10^8$ ufc/g talc.
- 12 test pieces 20x20 cm, of reference barrier material.

Pre-treatment

>>>



RESULTS

Sample reference

D-Lab Bioclean Coverall : PS 3425

Batch number⁽¹⁾

Results

Test pieces	log (ufc)
1	0,00
2	0,48
3	0,00
4	0,00
5	0,00
6	0,00
7	0,00
8	0,00
9	0,00
10	0,00
Average	0,05

CLASS 3

Remarks

In accordance with the standard EN 14126:2003/AC:2004 point 4.1.4.4, the product should be classify as **CLASS 3** according with the following table:

Table. Classification of the Contaminated solid particles penetration resistance:

Class	Penetration log (ufc)
3	≤ 1
2	$1 < \log(\text{ufc}) \leq 2$
1	$2 < \log(\text{ufc}) \leq 3$

- ⁽¹⁾Data provided by the Customer.

///



RESULTS

DETERMINATION OF INWARD LEAKAGE OF AEROSOLS OF FINE PARTICLES INTO SUITS

Standard

EN ISO 13982-2:2004

Test date

16/12/2020

Reference

D-Lab Bioclean Coverall : PS 3425

The physical dimensions of the wearers are shown below

Wearer	Height (m)	Chest (cm)	Size of the suit
JAM	1.75	102	XL
MAB	1.78	105	XL
NIC	1.79	98	XL
MAU	1.75	100	XL
CRI	1.76	96	XL

Pre-treatment

As received

Description of the suit

The suit is a white material one-piece hooded coverall incorporating elasticated wrists, waist, ankles and hood. There is a single action zip at the front of the suit, which runs from the crotch to the neck, which is covered during use by one flap with an adhesive.

Description of the undergarment

Wearer wore close fitting polyester/cotton long trousers and long sleeve T-shirts.

Description of any additional equipment

Half mask, wellington boots and nitrile disposable gloves.

Deviation of the standard

>>>



RESULTS

Ambient conditions test

Temperature= (20.2 – 22.6)°C

Relative Humidity= (49.6 – 53.2)%

The outcomes of the tests were as follows:

In response to the question "does the suit fit", test subject answered "Yes".

After testing in accordance with the movements defined in clause 4.3.2 of EN ISO 13982-2:2004, no damage to the suit was observed.

Sequence of movements according to standard

	Mov. 1	Mov. 2	Mov. 3
Suit 1	Pass	Pass	Pass
Suit 2	Pass	Pass	Pass
Suit 3	Pass	Pass	Pass
Suit 4	Pass	Pass	Pass
Suit 5	Pass	Pass	Pass
Suit 6	Pass	Pass	Pass
Suit 7	Pass	Pass	Pass
Suit 8	Pass	Pass	Pass
Suit 9	Pass	Pass	Pass
Suit 10	Pass	Pass	Pass

>>>



RESULTS

Measurement of concentrations

	Concentration				
	Before the test (%)			Inside the chamber after the stabilization (mg/m ³)	Inside the chamber at the end of all exercises of the test (mg/m ³)
	Knee	Waist	Chest		
Suit 1	0.002	0.001	0.001	5.12	4.78
Suit 2	0.001	0.001	0.001	5.06	4.86
Suit 3	0.002	0.002	0.002	5.01	4.70
Suit 4	0.001	0.002	0.002	5.32	5.36
Suit 5	0.002	0.001	0.002	4.74	4.78
Suit 6	0.004	0.001	0.001	5.13	4.92
Suit 7	0.003	0.002	0.002	5.32	5.74
Suit 8	0.003	0.003	0.003	5.24	5.33
Suit 9	0.006	0.006	0.006	5.99	6.48
Suit 10	0.005	0.0015	0.005	5.92	6.24

>>>



RESULTS

Inward leakage individual results are (%):

WEARER	POSITION	Knee	Waist	Chest	Average
JAM	Stand	2.430	5.380	13.200	7.003
	Walk	4.550	8.130	9.920	7.533
	Squat	16.110	17.160	18.910	17.393
	Average	7.697	10.223	14.010	10.643
JAM	Stand	7.040	8.850	12.830	9.573
	Walk	3.620	4.110	7.090	4.940
	Squat	8.120	16.860	24.010	16.330
	Average	6.260	9.940	14.643	10.281
MAB	Stand	5.380	7.430	13.090	8.633
	Walk	3.790	5.020	7.960	5.590
	Squat	26.030	22.990	22.150	23.723
	Average	11.733	11.813	14.400	12.649
MAB	Stand	6.570	8.350	14.900	9.940
	Walk	4.160	4.870	6.250	5.093
	Squat	22.240	20.550	21.490	21.427
	Average	10.990	11.257	14.213	12.153
NIC	Stand	1.530	3.460	10.320	5.103
	Walk	4.560	3.560	10.410	6.177
	Squat	17.250	15.110	19.030	17.130
	Average	7.780	7.377	13.253	9.470
NIC	Stand	3.860	5.270	7.360	5.497
	Walk	2.910	3.270	6.310	4.163
	Squat	14.200	15.150	15.290	14.880
	Average	6.990	7.897	9.653	8.180
MAU	Stand	4.970	11.920	12.040	9.643
	Walk	4.290	5.410	8.860	6.187
	Squat	17.380	17.090	16.500	16.990
	Average	8.880	11.473	12.467	10.940
MAU	Stand	4.370	4.420	7.040	5.277
	Walk	1.820	0.490	1.530	1.280
	Squat	13.580	9.180	9.980	10.913
	Average	6.590	4.697	6.183	5.823
CRI	Stand	1.830	4.410	8.080	4.773
	Walk	2.560	2.400	6.500	3.820
	Squat	10.480	11.200	10.820	10.833
	Average	4.957	6.003	8.467	6.476
CRI	Stand	3.400	4.320	6.380	4.700
	Walk	2.440	1.970	3.250	2.553
	Squat	8.050	5.820	4.950	6.273
	Average	4.630	4.037	4.860	4.509

>>>



RESULTS

Total inward leakage by wearer (%):

WEARER	Average
JAM	10.462
MAB	12.401
NIC	8.825
MAU	8.382
CRI	5.492
Average	9.112

Total inward leakage (%):

POSITION	Knee	Waist	Chest	Average
Stand	4.138	6.381	10.524	7.014
Walk	3.470	3.923	6.808	4.734
Squat	15.344	15.111	16.313	15.589
Average	7.651	8.472	11.215	9.112

">>>>



RESULTS

$IL_{82/90}$: the inward leakage value (in percent). equal to or superior to 82/90 (91.1%) of all IL values measured (all exercises. all sampling position. all suits):

Ordination	Value	Ordination	Value	Ordination	Value	Ordination	Value
1	0.490	24	4.370	47	7.430	69	13.580
2	1.530	25	4.410	48	7.960	70	14.200
3	1.530	26	4.420	49	8.050	71	14.900
4	1.820	27	4.550	50	8.080	72	15.110
5	1.830	28	4.560	51	8.120	73	15.150
6	1.970	29	4.870	52	8.130	74	15.290
7	2.400	30	4.950	53	8.350	75	16.110
8	2.430	31	4.970	54	8.850	76	16.500
9	2.440	32	5.020	55	8.860	77	16.860
10	2.560	33	5.270	56	9.180	78	17.090
11	2.910	34	5.380	57	9.920	79	17.160
12	3.250	35	5.380	58	9.980	80	17.250
13	3.270	36	5.410	59	10.320	81	17.380
14	3.400	37	5.820	60	10.410	82	18.910
15	3.460	38	6.250	61	10.480	83	19.030
16	3.560	39	6.310	62	10.820	84	20.550
17	3.620	40	6.380	63	11.200	85	21.490
18	3.790	41	6.500	64	11.920	86	22.150
19	3.860	42	6.570	65	12.040	87	22.240
20	4.110	43	7.040	66	12.830	88	22.990
21	4.160	44	7.040	67	13.090	89	24.010
22	4.290	45	7.090	68	13.200	90	26.030
23	4.320	46	7.360				

$TILS_{8/10}$: the “total inward leakage per suit” value. equal or superior to 80% of all TILS-values:

Suit	Average
1	4.509
2	5.823
3	6.476
4	8.180
5	9.470
6	10.281
7	10.643
8	10.940
9	12.153
10	12.649

>>>



RESULTS

REQUIREMENTS ACCORDING TO STANDARD EN ISO 13982-2:2004

When tested in accordance with EN ISO 13982-2:2004 the type 5 protective clothing shall be characterized by the following parameters according to EN ISO 13982-1:2004/A1:2010:

- $IL_{82/90}$: the inward leakage value (in percent), equal to or superior to 82/90 (91.1%) of all IL values measured (all exercises, all sampling position, all suits)
- $TILS_{8/10}$: the “total inward leakage per suit” value, equal or superior to 80% of all TILS-values.

Type 5 chemical protective clothing shall meet at least the following requirements:

- $IL_{82/90} \leq 30\%$ and
- $TILS_{8/10} \leq 15\%$

$IL_{82/90}$	18.910
$TILS_{8/10}$	10.940

ACCORDING TO STANDARD EN ISO 13982-1:2004/A1:2010 PASS

///



Lucia Martinez
Head of PPE and Ballistics department

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