

TEST REPORT

EN 1149-5 : 2018

Protective Clothing Electrostatic properties Material performance and design requirements

Client: YELKENCI HAZIR GIYIM SAN. VE TIC. A.S.

Address: Selimpasa Merkez Mah. 5001.Sk No:6 34570 Silivri-
Istanbul/TURKEY

Sample: PS 5657 Model (White coverall with hood, frontal zipper covered by flap and adhesive tape in full length, elasticated cuff, hood, ankle, Fabric: 100% PP laminated with PE in size S, M, L, XL, XXL, XXL


Sample received on: April 10, 2020

Report Number: NPT/20041012644/5

Elaborated by: Ashley Madison

Place and date of issue: Sheridan, WY April 25, 2020




Dr. Joseph Andrew, Ph.D.
Head of Testing Laboratory

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Test Standard: EN 1149-5:2018 / EN 1149-1:2006
Name of tests: Electric Surface Resistance
Sample condition: Min. 24hr, temperature of (23 ± 1) °C and a relative humidity of air of (25 ± 5) %.
Test equipment: Ohmmeter
Test condition: (23 ± 1) °C , (25 ± 5) %RH
Electrodes: Type A
Voltage: (100 ± 5) V

Test procedure:

The sample is placed on an insulating base plate, then placed the group of electrodes on the sample, apply a continuous stream and measure the resistance of the sample

Requirements: the surface resistivity must be less than $5 \times 10^{10} \Omega$

The inhomogeneous material must have a conductive yarn net and the maximum distance between the conductive threads must be of 10 mm.

Test results:

The test results obtained are given in the tables as follows

Electric Surface Resistance		
No. of sample	Surface Resistance (Ohm)	Surface Resistivity (Ohm)
1.sample	< 4×10^4	< 8×10^5
2.sample	< 4×10^4	< 8×10^5
3.sample	< 4×10^4	< 8×10^5
4.sample	< 4×10^4	< 8×10^5
5.sample	< 4×10^4	< 8×10^5
Average	< 4×10^4	< 8×10^5

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Test Standard: EN 1149-3:2004 Met.2 / EN 1149-5:2018
Name of tests: Charge Decay
Sample condition: Min. 24hr, temperature of $(23 \pm 1) ^\circ\text{C}$ and a relative humidity of air of $(25 \pm 5) \%$.
Test equipment: Electric Charge Meter
Test condition: $(23 \pm 1) ^\circ\text{C}$, $(25 \pm 5) \%$ RH

Test procedure:

The test methods are applicable to all materials, including homogeneous materials and heterogeneous forms of fiber materials with conducting surface and / or conductive fibers with conductive fiber core.

Charging by induction: The burden of the test sample is performed by inductive effect. Immediately below the test sample, which remains horizontal and no contact with it, an electrode is placed in the field. The field electrode is subjected to high voltage abruptly. If the sample is conductive or contain conductive elements is induced on it a charge opposite to the field electrode.

Electrode field incident on the conductive elements does not cross the sample and the resulting field is reduced in a manner that is characteristic of the material tested. This effect is measured and recorded by behind of the sample with a probe of appropriate action. The resulting field measured by the probe-mediated decreases the load induced on the sample size increases. This reduction of field is used to determine the time of semi-dissipation and protection coefficient.

Test results:

The test results obtained are given in the tables as follows

EN 1149-3:2004 Charge Decay					
Sample	Results			Requirements	
Tested Sample	Shielding factor (S)			Average	Shielding factor $\geq 0,2$ and/or
	0,25	0,28	0,28	0,270	
	Half decay time t50			Average	Half decay time $\leq 4\text{s}$
	0,90	1,10	1,50	1,167	

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NATIONAL PROTECTIVE TESTING LLC



Test Standard: EN 1149-5:2018, clause 5
Name of tests: Control of specific design requirements
Size: L

Test results:
The test results obtained are given in the tables as follows

Requirement	Result
Electrostatic dissipative protective clothing shall be able to permanently cover all non-complying materials during normal use (inclusive bending and movements)	Pass
Electrostatic dissipative protective clothing shall allow full body movement with closures fastened	Pass
Thin non-dissipative attachments, such as labels, reflective stripes, shall be permanently attached	Pass
Conductive parts (zippers, buttons etc.) are permitted provided they are fully covered by the outermost material when in use	Pass

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TEST REPORT

EN 13034:2005 + A1 : 2009

Protective clothing against liquid chemicals (Type 6)

Client: YELKENCI HAZIR GIYIM SAN. VE TIC. A.S.

Address: Selimpasa Merkez Mah. 5001.Sk No:6 34570 Silivri-Istanbul/TURKEY

Sample: PS 5657 Model (White coverall with hood, frontal zipper covered by flap and adhesive tape in full length, elasticated cuff, hood, ankle, Fabric: 100% PP laminated with PE in size S, M, L, XL, XXL, XXL)


Sample received on: April 10, 2020

Report Number: NPT/20041012644/3

Elaborated by: Ashley Madison

Place and date of issue: Sheridan, WY April 25, 2020




Dr. Joseph Andrew, Ph.D.
Head of Testing Laboratory

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Test Standard: EN 530:1996 Met.2 / EN 14325:2018-4.4.1 / EN 13034:2005+A1:2009-4.1
Name of tests: Abrasion Testing
Reference no: AT-001

Test Purpose:
 This test method is used to measure abrasion resistance of fabric used in protective clothings.

Sampling method:
 4 circular samples of fabric are cut with a diameter of 14cm used in this test.

Testing methods used:
 A test method for determining abrasion testing in accordance with standard EN 530:2011 Met.2 / EN 14325:2018-4.4.1 / EN 13034+A1:2011-4.1
 Type of felt used: Woven
 Pressure on sample: 9kPa
 Abradant: Abrasive paper 00

Test conditions:
 Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:
 Martindale uses for abrasion test.

Test Procedure:
 This test uses the Martindale Abrasion tester employed in the inverted mode, i.e. the test specimen is placed on the abradant table and the abradant is mounted in the test-piece holder. Testing is carried out on the outer surface of the test material.
 Four specimens are mounted over woven felt base-pads and abraded under a test head pressure of 9kPa, using grade 00 abrasive cloth for a pre-determined number of cycles or until failure occurs.
 If it is not possible to assess the performance of the fabric using the pressure pot, as required by EN14325 the end-point is determined using visual assessment as specified in EN 530: 2010.

Specimen breakdown in a coated material is when the coating surface has the first hole resulting from the wear, of a diameter at least equal to 0.5mm (hole does not have to be through material).
 The material is classified according to the number of abrasion cycles needed to destruct the barrier layer as follows taking the lowest single result from the 4 measurements.

Test results:
 The test results obtained are given in the tables as follows

No. of Sample	Unit	Results
1.sample	Cycles	650
2.sample	Cycles	650
3.sample	Cycles	650
4.sample	Cycles	650

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Test Standard: EN ISO 9073-4:1997 / EN 14325:2018-4.7 / EN 13034:2005+A1:2009-4.1
Name of tests: Tearing Strength Testing. Trapezoid Method.
Reference no: TST-001

Test Purpose:

This test method is used to measure determine the tear force of nonwoven textile fabrics used in protective clothing using the trapezoid method. These tests give an indication of how strong the fabric is in case a situation arose where the coverall needed to be freed from the machine. Coveralls can easily be torn if caught on sharp edges, for example, and so these are very real practical demonstrations of the strength of the fabric. The tests are very similar in that a sample of fabric is held in a clamp at the top and bottom, and the clamps are then pulled apart to see how much strength is required to pull the fabric apart.

Sampling method:

The five samples used in this test.
 Sample size: 75mm X 150mm

Testing methods used:

A test method for determining tear strength testing in accordance with standard EN ISO 9073-4:1999 / EN 14325:2018-4.7 / EN 13034+A1:2011-4.1
 Rate of extension: (100 ± 10) mm/min
 Length test: (25 ± 1) mm
 Useful length of tearing strength: (64 ± 1) mm
 Tearing strength: average of the significant peaks

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

Dynamometer uses for tearing strength test.

Test Procedure:

Five samples are prepared in each direction (MD and CD) and conditioned as described in the standard. A force is applied, to steadily extend a cut in the test specimen. The mean maximum tear resistance is given in Newtons. The performance of the material is classified using the mean result for the 5 results in each of the MD and CD of the material.

A rectangular specimen is marked and prepared so that it can be loaded in the grip faces at an angle, allowing a tear to propagate across the specimen.

Test results:

The test results obtained are given in the tables as follows

Tearing of the longitudinal direction	Unit	Results
1.sample	Newton	44,65
2.sample	Newton	41,54
3.sample	Newton	35,60
4.sample	Newton	38,40
5.sample	Newton	45,65
Average	Newton	41,17

Tearing of the transversal direction	Unit	Results
1.sample	Newton	22,85
2.sample	Newton	24,50
3.sample	Newton	27,95
4.sample	Newton	20,20
5.sample	Newton	20,50
Average	Newton	23,20

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Test Standard: EN ISO 13934-1:2013 / EN 14325:2018-4.9 / EN 13034:2005+A1:2009-4.1
Name of tests: Tensile Strength and Elongation Testing. Strip Method.
Reference no: TSE-001

Test Purpose:

This method specifies a procedure to determine the maximum force and the elongation at maximum force of textile fabrics using a strip method.

Sampling method:

The five samples used in this test.
 Width test: (50 ± 0.5) mm, Length test: (200 ± 1) mm

Testing methods used:

A test method for determining tensile strength and elongation testing with strip method in accordance with standard EN ISO 13934-1:2013 / EN 14325:2018-4.9 / EN 13034+A1:2011-4.1.
 Rate of extension: (100 ± 10) mm/min
 Pretension applied: 2N

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

Dynamometer uses for tearing strength test.

Test Procedure:

Five samples are prepared in each direction, each 50mm wide and long enough to enable a gauge length of 200mm to be used. The tests are made on a Testometric machine fitted with flat faced jaws operating at a rate of extension of 100 mm per minute. A pre-tension of 2 Newtons is employed. The performance of the material is classified using the mean result of the 5 readings measured in each of the MD and CD.

Test results:

The test results obtained are given in the tables as follows;

Tearing of the longitudinal direction	Unit	Results
1.sample	Newton	74,65
2.sample	Newton	69,40
3.sample	Newton	76,50
4.sample	Newton	71,80
5.sample	Newton	82,65
Average	Newton	75,00

Tearing of the transversal direction	Unit	Results
1.sample	Newton	44,75
2.sample	Newton	39,65
3.sample	Newton	42,80
4.sample	Newton	44,25
5.sample	Newton	43,65
Average	Newton	43,02

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Test Standard: EN 863:1995 / EN 14325:2018-4.10 / EN 13034:2005+A1:2009-4.1
Name of tests: Puncture Resistance Testing
Reference no: PRT-001

Test Purpose:

This test method is used to measure Puncture strength tests are used to determine the puncture or rupture characteristics of a material. This is generally a compressive test where a material is compressed by a probe or other type of device until the material ruptures or until an elongation limit is achieved.

Sampling method:

The four samples used in this test.

Testing methods used:

A test method for determining puncture resistance test in accordance with standard EN 863:1997 / EN 14325:2018-4.10 / EN 13034+A1:2011-4.1

Rate of extension: 100 mm/min

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

Dynamometer uses for puncture resistance test.

Test Procedure:

Four material specimens are tested with the outer face of the fabric to the test probe. The maximum force required to push the spike through the specimen is recorded as puncture resistance. The mean value is rounded to the nearest whole number and the performance of the material is classified using the mean result of the 4 measurements, according to the performance levels described in standard.

Test results:

The test results obtained are given in the tables as follows

No of samples	Unit	Results
1.sample	Newton	16,45
2.sample	Newton	14,45
3.sample	Newton	13,55
4.sample	Newton	12,50
Average	Newton	14,24

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Test Standard: EN 13274-2:2001 Met. 3 / EN 13034:2005+A1:2009-4.1
Name of tests: Ignition and Flammability Testing
Reference no: IFT-001

Test Purpose:

This test method is used to clip the fabric vertically, flame burns at the bottom, then observe if fabric debris occurs and the flame is extinguished itself before fabric burned out. The test aims to evaluate whether the fabric/materials is combustible.

Sampling method:

The five samples used in this test.

Testing methods used:

A test method for determining puncture resistance test in accordance with standard EN 13274-2:2002 Met. 3 / EN 13034+A1:2011-4.1

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

Burner

Test Procedure:

Orientation of the burner: Vertical

Orientation of the samples: Horizontal

Ignition test focuses on if the flame is extinguished eventually, disregard how wide area burned before flaming off. But, flame-retardant treated protective coverall can offer non-flammable effect when it is removed heat source. There is no fabric debris and burned hole will not keep spread.

Test results:

The test results obtained are given in the tables as follows

No of samples	Result
1.sample	Pass
2.sample	Pass
3.sample	Pass
4.sample	Pass
5.sample	Pass

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Test Standard: EN ISO 6530:2005 / EN 14325:2018 / EN 13034:2005+A1:2009-4.1
Name of tests: Penetration by Liquids Testing
Reference no: PLT-001

Test Purpose:
This test method is used to measure penetration by with 4 different liquids.

Sampling method:
The three samples used in this test.

Testing methods used:
A test method for determining penetration by liquids test in accordance with standard EN ISO 6530:2005 / EN 14325:2018-4.10 / EN 13034+A1:2011-4.1
 Flow: (10 ± 0.5) (10 ± 1)

Test conditions:
Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:
Liquid Chamber.

Test Procedure:
For the test a transparent film and filter paper will be first be placed in the channel. Then, the sample fabric will be placed in a way that ensures that all surfaces are making contact and wrinkle-free. A beaker—which should be weighed beforehand—is placed at the end of the channel to gather the liquid the runs through the surface of the fabric. The test liquid will be allowed to run and, 60 seconds later, the fabric will be removed and the filter paper, the beaker and the transparent film will be weighed once more. The difference in weight (before and after the trial) will be calculated. The values result in the Penetration Index and the Repellency Index of each test tube and liquid given, in %.

Test results:
The test results obtained are given in the tables as follows

H₂SO₄ 30%

Direction	Warp			Weft			Media Average
	1	2	3	1	2	3	
Sample							
Penetration Index %	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Repellency Index %	95,10	94,80	96,30	95,30	98,40	96,70	96,10
Absorption Index %	4,90	5,20	3,70	4,70	1,60	3,30	3,90

NaOH 10%

Direction	Warp			Weft			Media Average
	1	2	3	1	2	3	
Sample							
Penetration Index %	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Repellency Index %	95,30	94,80	95,50	96,40	97,30	98,30	96,27
Absorption Index %	4,70	5,20	4,50	3,60	2,70	1,70	3,73

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o-xylene

Direction	Warp			Weft			Media Average
Sample	1	2	3	1	2	3	
Penetration Index %	4	4,3	4,4	4,2	5	4,3	4,37
Repellency Index %	91,3	90,5	90,3	90,8	89,5	91,3	90,62
Absorption Index %	4,7	5,2	5,3	5	5,5	4,4	5,02

1-butanol

Direction	Warp			Weft			Media Average
Sample	1	2	3	1	2	3	
Penetration Index %	3,9	4,1	3,7	4,9	4,4	4,7	4,28
Repellency Index %	90,3	90,8	91,2	88,9	90,3	90,4	90,32
Absorption Index %	5,8	5,1	5,1	6,2	5,3	4,9	5,40

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Test Standard: EN ISO 13935-2:2014 / EN 14325:2018 - 5.5 / EN 13034:2005+A1:2009-4.2.2
Name of tests: Seam tensile properties. Grab method
Reference no: PST-001

Test Purpose:

This test method is used to determinate of seam maximum force of sewn seams when the force is applied perpendicularly to the seam. This test describes the method known as the grab test.

Sampling method:

The five samples used in this test.
 Sample size: 100x350mm

Testing methods used:

Rate of extension: (50 ± 10) mm/min
 Length test: (100 ± 1) mm
 Seams ready done

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

Instron, type CRE, class 0.5 – cell of 1kN

Test Procedure:

The tests were made following the EN ISO 17491-4:2008/A1 1:2016, method A (low-level spray) procedure. An aqueous spray, containing a fluorescent or visible dye tracer, is directed under controlled conditions at the chemical protective clothing worn by a human test subject. Inspection of the inside surface of the clothing and the outside surface of the absorbent overall worn under the test garment allows any points of inward leakage to be identified.

Test results:

The test results obtained are given in the tables as follows

No of samples	Unit	Results
1.sample	Newton	170
2.sample	Newton	185
3.sample	Newton	230
4.sample	Newton	180
5.sample	Newton	195
Average	Newton	192

Remarks:

- (1) fabric tear
- (2) fabric tear at the jaws
- (3) fabric tear at the seam
- (4) sewing threads breakage
- (5) threads pull-out
- (6) any combination of (1) up to (5)

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Test Standard: EN ISO 17491-4:2008/A1:2016 / EN 13034:2005+A1:2009 -5.2
Name of tests: Penetration by Spray
Reference no: PS-001

Test Purpose:
 This test method is used to determinate of resistance to penetration by liquids in the form of a light spray (mist test)

Sampling method:
 Undergarment: white with hood (Nonwoven)
 Stain sample: 1cm²
 Max. area of stains: 3x1cm²

Testing methods used:
 Method A used.
 And test method for determining penetration by spray test in accordance with standard EN ISO 17491-4:2008/AMD 1:2016 / EN 13034+A1:2011-5.2
 Test liquid: Aqueous solution with dye water soluble
 Spray pressure: 3 bar
 Flow: (0.47±0.05) l/min
 Preliminary test: Execution sequence of movements (7 step)

Test conditions:
 Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:
 Turn-table and system of hydraulic nozzles with angle spray at 75° which uses for penetration by spray test.
 Type of hydraulic nozzle: hollow cone.
 Additional protective accessories: latex gloves, mask, waterproof overalls, face shield

Test Procedure:
 The tests were made following the EN ISO 17491-4:2008/AMD 1:2016, method A (low-level spray) procedure. An aqueous spray, containing a fluorescent or visible dye tracer, is directed under controlled conditions at the chemical protective clothing worn by a human test subject. Inspection of the inside surface of the clothing and the outside surface of the absorbent overall worn under the test garment allows any points of inward leakage to be identified. Surface tension measurements of the test solution were recorded in the reservoir and at the nozzle before and after testing and these ranged from 50.0 to 51.5Nm⁻¹x10⁻³ and 50.6 to 51.3Nm⁻¹ x10⁻³ respectively.

Wearer	Height (cm)	Chest (cm)	Suit Size
AG	172	99	L

Test results:
 The test results obtained are given in the tables as follows

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TEST REPORT
EN ISO 13688 : 2013
Protective Clothing General Requirements

Client: YELKENCI HAZIR GIYIM SAN. VE TIC. A.S.

Address: Selimpasa Merkez Mah. 5001.Sk No:6 34570 Silivri-Istanbul/TURKEY

Sample: PS 5657 Model (White coverall with hood, frontal zipper covered by flap and adhesive tape in full length, elasticated cuff, hood, ankle, Fabric: 100% PP laminated with PE in size S, M, L, XL, XXL, XXL

Sample received on: April 10, 2020

Report Number: NPT/20041012644/1

Elaborated by: Ashley Madison

Place and date of issue: Sheridan, WY April 25, 2020




Dr. Joseph Andrew, Ph.D.
Head of Testing Laboratory

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Test Standard: EN ISO 13688:2013, clause 4
Name of tests: Control of Ergonomic requirements
Size L

Test results:
The test results obtained are given in the tables as follows

Test	Result
Ergonomic properties	Pass

* According to the inspection of the garment, this fulfills ergonomics requirement

Test Standard: EN ISO 13688:2013, clause 6
Name of tests: Sizing
Size L

Test results:
The test results obtained are given in the tables as follows

Analyse of size	Unit	Results XL
Total length	cm	190
Chest circumference	cm	135
Sleeves length	cm	81
Waist circumference	cm	127
Inside leg length	cm	83

*Average length of the sleeves measured from the neck to the bottom sleeve

Test Standard: EN ISO 13688:2013, clause 4.2 / EN ISO 3071:2020
Name of tests: pH of aqueous extract

Test results:
The test results obtained are given in the tables as follows

Test	Requirement	Result
pH value	3.3<pH<9.5	6,1, Pass

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Test Standard: EN ISO 13034+A1:2009, clause 5.1
Name of tests: Control of specific design requirements
Size L

Test results:
The test results obtained are given in the tables as follows

Requirement	Result
There are no features which may collect liquid chemicals and hold them onto the fabric surface, e.g. unprotected pockets etc.	Pass
The wearer has freedom of movement and shall be as comfortable as possible, consistent with the protection to be afforded by the garment	Pass

Test Standard: EN ISO 13982-1:2004/A1:2010
Name of tests: Control of specific design requirements
Size L

Test results:
The test results obtained are given in the tables as follows

Requirement	Result
Chemical protective clothing provides protection to at least covering trunk, arms and legs, such as one-piece coveralls or two piece suits (hood with visors and/or foot protection.	Pass

Test Standard: EN 1149-5:2018, clause 5
Name of tests: Control of specific design requirements
Size L

Test results:
The test results obtained are given in the tables as follows

Requirement	Result
Electrostatic dissipative protective clothing shall be able to permanently cover all non-complying materials during normal use (inclusive bending and movements)	Pass
Electrostatic dissipative protective clothing shall allow full body movement with closures fastened	Pass
Thin non-dissipative attachments, such as labels, reflective stripes, shall be permanently attached	Pass
Conductive parts (zippers, buttons etc.) are permitted provided they are fully covered by the outermost material when in use	Pass

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TEST REPORT

EN ISO 13982-1 : 2004 / A1 : 2010

Protective Clothing Against Solid Particulate (Type 5)

Client: YELKENCI HAZIR GIYIM SAN. VE TIC. A.S.

Address: Selimpasa Merkez Mah. 5001.Sk No:6 34570 Silivri-
Istanbul/TURKEY

Sample: PS 5657 Model (White coverall with hood, frontal zipper covered by flap and adhesive tape in full length, elasticated cuff, hood, ankle, Fabric: 100% PP laminated with PE in size S, M, L, XL, XXL, XXL)

Sample received on: April 10, 2020

Report Number: NPT/20041012644/4

Elaborated by: Ashley Madison

Place and date of issue: Sheridan, WY April 25, 2020


Dr. Joseph Andrew, Ph.D.
Head of Testing Laboratory

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Test Standard: EN ISO 13982-1:2004 / A1:2010-4.3.2
Name of tests: Aerosol Penetration
Reference no: AP-001

Test Purpose:

This test method is used to determine the barrier efficiency of chemical protective clothing against aerosols of dry, fine dusts.

Sampling method:

At least 5 test subjects are involved, each testing 2 suits. So at least 10 suits are tested. The device is a white material one piece hooded coverall incorporating elasticated ankles, waist, hood and wrists. There is a double action zip at the front of the suit which runs from the crotch to the neck and is covered during use by a flap which is sealed onto the suit material by means of double sided tape.

Testing methods used:

Test agent: Sodium Chloride aerosol

Test conditions:

Temperature and relative humidity measurements were recorded in the test chamber before and after each test and these ranged from 24.5 to 27.4°C and 47.1 to 59.6%, respectively

Test Equipment:

Aerosol Test Chamber.

Test Procedure:

This test is performed using "real people" and is designed to simulate everyday use. The garment is donned according to the manufacturers' instructions, including any protective equipment.

Prior to entering the test chamber the test subject (real person) is asked to repeat the following sequence of movements 3 times at what is termed "normal working speed";

- 1) Kneel on both knees, lean forward and place both hands on the floor 45cm in front of the knees. Crawl forward on hands and knees over a distance of 3m and crawl backwards again over the same distance
 - 2) Stand with feet shoulder width apart, arms at side. Raise arms until they are parallel to the floor in front of the body. Squat down as far as possible.
 - 3) Kneel on right knee, place left foot on floor with left knee bent 90°, left arm hanging loosely at side. Raise left arm fully overhead. Once they have completed these movements the suit is inspected visually for tears or rips in the fabric, seams, closures or connections to gloves, boots or mask (if any). Any damage is mentioned in the test report, but the test would be discontinued if the damage was significant or hindered the test subjects' movement.
- On entering the test chamber the test subject is asked to perform various test exercises in sequence. These are;
- 1) standing still
 - 2) walking at 5 km/h
 - 3) continuous squatting at a frequency of five squats per minute, between standing up straight and knees completely bent, while keeping both hands during all squats on a grip at a height of 1m (+/-0.05m) above the standing surface.
 - 4) A 3 min rest is allowed (standing still) between the walking and squatting exercises.
- Throughout the process various measurements are taken on the concentration of particulates inside and outside of the suit. A calculation is then used to ascertain the inward leakage during each test and the total inward leakage of particles into the suit.

The physical dimensions of the wearers are shown below;

Wearer	Height (cm)	Chest (cm)	Suit size
AG	172	99	L
MT	174	94	L
SR	170	104	L
YE	182	98	L
SK	178	96	L

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Test results:

The test results obtained are given in the tables as follows

Result-1) Aerosol Inward leakage (%) individual results

wearer	position	knee	waist	chest	average
AG	stand	0,93	1,053	3,16	1,714
	walk	1,059	1,165	2,174	1,466
	squat	7,156	17,954	36,796	20,635
	average	3,048	6,724	14,043	7,938
AG	stand	5,675	1,958	8,124	5,252
	walk	2,637	1,682	1,490	1,936
	squat	15,835	24,817	21,252	20,634
	average	8,049	9,486	10,289	9,274
MT	stand	2,375	1,269	2,33	1,99
	walk	2,045	1,592	2,581	2,07
	squat	23,612	12,59	19,419	18,54
	average	9,344	5,150	8,110	7,533
MT	stand	1,682	3,419	1,01	2,037
	walk	3,302	2,517	1,293	2,37
	squat	39,405	21,389	16,219	25,671
	average	14,796	9,108	6,174	10,026
SR	stand	0,923	1,101	3,417	1,813
	walk	3,091	2,138	2,128	2,452
	squat	10,002	22,47	15,829	16,1
	average	4,672	8,570	7,125	6,788
SR	stand	1,116	1,418	3,117	1,883
	walk	3,628	2,092	1,982	2,567
	squat	12,337	11,49	22,549	15,458
	average	5,694	5,000	9,216	6,636
YE	stand	2,026	1,101	3,417	2,181
	walk	3,284	2,138	1,73	2,384
	squat	26,58	20,291	13,692	20,187
	average	10,630	7,843	6,280	8,251
YE	stand	2,528	1,043	2,581	2,05
	walk	3,49	1,491	1,819	2,266
	squat	8,963	21,435	13,102	14,5
	average	4,994	7,990	5,834	6,272
SK	stand	1,92	1,474	2,004	1,799
	walk	3,401	3,82	2,529	3,25
	squat	21,587	32,591	36,117	30,098
	average	8,969	12,628	13,550	11,716
SK	stand	4,521	1,127	1,682	2,443
	walk	3,498	2,592	3,09	3,06
	squat	1,565	29,496	2,374	11,145
	average	3,195	11,072	2,382	5,549

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Result-2) Total Inward leakage (%) (overall average, all wearers)

position	knee	waist	chest	average
stand	2,370	1,496	3,084	2,316
walk	2,944	2,123	2,082	2,382
squat	16,704	21,452	19,735	19,297
average	7,339	8,357	8,300	7,998

Result-3) Total Inward leakage per test object

wearer	average
AG	8,606
MT	8,779
SR	6,712
YE	7,261
SK	8,632
average	7,998

Assessment of compliance:

EN ISO 13982-1 specifies the requirements and classes of type 5 suits as:

When tested in accordance with EN ISO 13982-2 the type 5 protective clothing shall be characterized by the following parameters:

Ljmn,82/90 : 90

LjmlL 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 positions, all suits); TILS8/10: 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

For this suit, all of the IL results are less than 30% and all of the TILS are less than 15%. The sample complies with the requirements of EN ISO 13982-1 (2004) for inward leakage of aerosol of solid.

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Test Standard: EN ISO 7854:1997 / EN 14325:2018-4.5 / EN ISO 13982-1:2004 / A1:2010-4.1

Name of tests: Resistance to damage by repeated flexing

Reference no: RRF-001

Test Equipment: Flexometer

Test condition: (20 ± 2) °C , (65 ± 5) %RH

Sample size: 105x50mm

No. of sample: 6

No. of cycles: 100000

Mobile disk frequency: (8.3 ± 0.4) Hz compression pulse per minute

Stroke length of mob.disk: (11.7 ± 0.35)mm

Test results:

The test results obtained are given in the tables as follows

Max direction longitudinal	result
Lowest value after 100.000 cycles	1-2 null
Max direction longitudinal	result
Lowest value after 100.000 cycles	1-2 null

0-any deterioration, 1-slight deterioration, 3-moderated deterioration, 4-severe deterioration

Depth of cracking:

- Null-no cracks,
- A-surface or finish crack, not exposing the cellular or middle layer
- B-cracking into but not right through the middle layer
- C-cracking through the base fabric
- D-cracking right the material

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TEST REPORT

EN 14126 : 2003/AC:2004

Protective Clothing Against Infective Agents

Client: YELKENCI HAZIR GIYIM SAN. VE TIC. A.S.

Address: Selimpasa Merkez Mah. 5001.Sk No:6 34570 Silivri-Istanbul/TURKEY


Sample: PS 5657 Model (White coverall with hood, frontal zipper covered by flap and adhesive tape in full length, elasticated cuff, hood, ankle, Fabric: 100% PP laminated with PE in size S, M, L, XL, XXL, XXL)

Sample received on: April 10, 2020

Report Number: NPT/20040712644/2

Elaborated by: Ashley Madison

Place and date of issue: Sheridan, WY April 25, 2020


Dr. Joseph Andrew, Ph.D.
Head of Testing Laboratory

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Test Standard: ISO 16603:2004 / EN 14126:2003/AC:2004 - 4.1.4.1
Name of tests: Penetration by blood and body fluids. Synthetic blood method
Reference no: SBM-001

Test Purpose:
 This test method is used to determinate of the resistance of protective clothing materials to penetration by blood and body fluids - test method using synthetic. This a test conducted using synthetic blood, which establishes at what pressure the liquid will pass through the test material.

Sampling method:
 3 samples used in this test. Sample size: 75x75mm

Testing methods used:
 Time and pressure control: Procedure D used. 5 minutes each samples pressure tested.

Test conditions:
 Min. 24hr, temperature of (21 ± 5) °C and a relative humidity of air of (60 ± 10) %.

Test Equipment:
 Penetration test cell.

Test Procedure:
 ISO 16603 uses synthetic blood in a simple visual penetration test to estimate the pressure at which strike through is likely to occur in ISO 16604. Testing to ISO 16604 can then proceed at this pressure as a starting point.

Test results:
 The test results obtained are given in the tables as follows

No. of Sample	Hydrostatic pressure	Result
1.sample	0 kPa	Pass
2.sample	0 kPa	Pass
3.sample	0 kPa	Pass
1.sample	1.75 kPa	Pass
2.sample	1.75 kPa	Pass
3.sample	1.75 kPa	Pass
1.sample	3.5 kPa	Fail
2.sample	3.5 kPa	Fail
3.sample	3.5 kPa	Fail
1.sample	7 kPa	Fail
2.sample	7 kPa	Fail
3.sample	7 kPa	Fail

*Pass: The sample resist to penetration and synthetic blood doesn't pass through the fabric
 *Fail: The sample doesn't resist to penetration and synthetic blood pass through the fabric

Note: The results given in this Test Report apply only to the sample tested by our laboratory!
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Test Standard: ISO 16604:2004 / EN 14126:2003/AC:2004 - 4.1.4.1
Name of tests: Penetration by blood and other body fluids-born pathogens. Phi-X174 bacteriophage method
Reference no: PXB-001

Test Purpose:
 This test method is used to determinate of the resistance of protective clothing materials to penetration by blood and body fluids - test method using synthetic. This a test conducted using synthetic blood, which establishes at what pressure the liquid will pass through the test material.

Sampling method:
 3 samples used in this test. Sample size: 75x75mm

Testing methods used:
 Time and pressure control: Procedure D used. 5 minutes each samples pressure tested.
 Penetration survey method is Plaque-forming units (PFU)
 Name of test microorganism: Bacteriophage Phi-X 174

Test conditions:
 Min. 24hr, temperature of (21 ± 5) °C and a relative humidity of air of (60 ± 10) %.

Test Equipment:
 Penetration test cell.

Test Procedure:
 It can be clearly seen that only the ISO 16604 test uses a contaminant – a bacteriophage (that is, a virus that parasitises a bacteria by infecting it, in this case Phi X174, selected, according to the standard, for its small size) – that is considerably smaller than the Coronavirus now filling the news. The other tests use bacteria considerably larger than Coronavirus. Thus, ISO 16604 is the only test providing a clear indication of effective resistance to penetration of that size of infectious agent.
 It also describes a laboratory test method used to measure the resistance of the materials used in protective clothing to penetration by blood-borne pathogens using a surrogate microbe with continuous liquid contact. Protective clothing either passes or fails depending on whether viral penetration at a specific hydrostatic pressure can be detected.

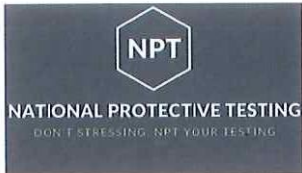
Test results:
 The test results obtained are given in the tables as follows

No. of Sample	Hydrostatic pressure	Result
1.sample	1.75 kPa	Pass
2.sample	1.75 kPa	Pass
3.sample	1.75 kPa	Pass
	Negative control(PE 10µm)	Pass
	Positive control	Fail

*Pass: The sample resist to penetration and synthetic blood doesn't pass through the fabric
 *Fail: The sample doesn't resist to penetration and synthetic blood pass through the fabric

Pre-test bacteriophage titer: 4.5E+008 PPU/ml
 Post-test bacteriophage titer: 4.5E+008 PPU/ml

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Test Standard: EN ISO 22610:2006 / EN 14126:2003/AC:2004 - 4.1.4.2
Name of tests: Wet Bacterial penetration
Reference no: WBP-001

Test Purpose:

This test method is designed to determine a material's resistance to penetration of bacteria in a liquid.

Sampling method:

Five pieces 25 cm x 25 cm or with a diameter of 25 cm shall be randomly cut under aseptic conditions from the material to be tested.

Testing methods used:

Testing time: 5 steps of 15 minutes

S. aureus strain, ATCC 29213, is cultured 18 to 24 h at (36 ± 1) °C on tryptic soy agar.

Culture medium: Nutrient agar

Donor material: Polyurethane membrane; 30 µm

Distance from agar surface to brim of petri dish: 3mm

Concentration of test suspension: 2.9×10^4 CFU/ml

Test conditions:

Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:

The turntable consists of three parts:

- the motor compartment;
- the agar plate holder;
- the finger holder arm.

Test Procedure:

The material to be tested is put on a lidless agar plate, on a rotating disk on top of the test specimen, a piece of donor material and a piece of approximately 10 µm thick HD polyethylene film of corresponding size is placed and materials are fixed using a double steel ring. An abrasion resistant finger is placed on top of the donor material to exert a specified force on the donor and test specimen to bring them into contact with the agar.

The finger is applied to the material by a pivoted lever moved by an excenter cam in such a way that it moves over the entire surface of the plate within 15 minutes. The assemblage of materials is stretched by the weight of the steel ring so that only a small area of the test specimen is brought into contact with the agar surface at a time. Due to the combined effect of rubbing and liquid migration bacteria may spread from the donor material through the test specimen down to the agar surface.

After 15 minutes of testing, the agar plate is replaced and the test repeated. Within five periods of 15 minutes each, tests are performed with the same pair of donor material and test specimen. In that way the test allows for an estimation of the penetration over time. Finally the bacterial contamination on the test specimen is estimated using the same technique. The agar plates are incubated to visualise the bacterial colonies, which are then enumerated. The results are processed in accumulated form to characterize the barrier capability and penetration kinetics of the material.

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Test results:

The test results obtained are given in the tables as follows

	Interval (Min)	n° colonies 1st sample	n° colonies 2nd sample	n° colonies 3rd sample	n° colonies 4th sample	n° colonies 5th sample	average
Petri dish 1 (X1)	0-15	17	14	18	11	17	15,4
Petri dish 2 (X2)	15-30	24	15	21	24	19	20,6
Petri dish 3 (X3)	30-45	35	22	17	24	20	23,6
Petri dish 4 (X4)	45-60	33	19	30	25	21	25,6
Petri dish 5 (X5)	60-75	42	51	48	43	37	44,2
Petri dish 6 (ref. Z)		125	150	168	165	155	152,6
T		276	271	302	292	269	282
b (EPP)		4,57	4,95	4,90	4,92	4,88	4,84

Legend

b (EPP) = Barrier index

$b (EPP) = 6 - (CUM1 + CUM2 + CUM3 + CUM4 + CUM5)$

where

$CUM1 = X1/T$

$CUM2 = (X2+X1) / T$

$CUM3 = (X3+X2+X1) / T$

$CUM4 = (X4+X3+X2+X1) / T$

$CUM5 = (X5+X4+X3+X2+X1) / T$

$T = Z + X1 + X2 + X3 + X4 + X5$

X1, X2, X3, X4, X5: number of colonies on the five plates from one of five samples

Z = number of colonies from the top side (plate nr. 6 reference)

Item	Unit	Result
Breakthrough time	min	$30 < t \leq 45$

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Test Standard: ISO/DIS 22611:2003 / EN 14126:2003/AC:2004 - 4.1.4.3
Name of tests: Penetration by biologically contaminated aerosols
Reference no: PBA-001

Test Purpose:
 This test method is designed to determine a material's resistance to penetration by biologically contaminated aerosols.

Sampling method:
 Four pieces diameter 25 mm material tested.

Testing methods used:
 S. aureus strain, ATCC 6538
 Culture medium: Nutrient agar

Test conditions:
 Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:
 Perspex box with collision atomizer

Test Procedure:
 The barrier effect of the test material, against biologically contaminated aerosols, is measured using a bacterium solution of Staphylococcus Aureus, which is suspended in an aerosol and sprayed onto both an unprotected cellulose-nitrate membrane and one covered with the test barrier material (the pore size of the membrane is approx. 0.45 µm). The test takes place within a sealed chamber.

Both membranes are subsequently analysed to establish their bacterial load by culturing on an agar plate. In order to classify the results, the penetration ratio (ratio of the load of the unprotected cellulose-nitrate membrane to the load of the membrane protected with the test material) is calculated and presented in log units.

Test results:
 The test results obtained are given in the tables as follows

Microorganisms extract to membrane Reference (Value A)		
No. of Sample	Unit	Result
1.sample	CFU	15700,0
2.sample	CFU	15900,0
3.sample	CFU	16550,0
4.sample	CFU	14800,0
Average	CFU	15737,5
Microorganisms extract to membrane sample (Value B)		
No. of Sample	Unit	Result
1.sample	CFU	9
2.sample	CFU	10
3.sample	CFU	7
4.sample	CFU	11
Average	CFU	9,25
Penetration ratio (A/B)	Log10 CFU	3,23

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Test Standard: ISO/DIS 22612:2005 / EN 14126:2003/AC:2004 - 4.1.4.4
Name of tests: Penetration by biologically contaminated powders
Reference no: PBP-001

Test Purpose:
 This test method is designed to determine a material's resistance to penetration by biologically contaminated powders.

Sampling method:
 Ten samples material tested.
 Sample size: 200x200mm

Testing methods used:
 Test time: 30 minutes
 Spores of Bacillus subtilis, ATCC 9372, Culture medium: TGE agar

Test conditions:
 Min. 24hr, temperature of (20 ± 2) °C and a relative humidity of air of (65 ± 5) %.

Test Equipment:
 Vibrating apparatus

Test Procedure:
 To measure the barrier against contaminated dust, the test materials is pre-sterilised and then fixed into the test apparatus and dosed with contaminated (Bacillus Subtilis) talcum powder. An agar culture plate is located underneath.

The test apparatus is agitated or shaken. The particles which penetrate the material are cultured and counted after incubation of the agar plate and a non-contaminated test specimen is run as a control. The results (mean values from 10 single results at a given time) are measured in penetration log units

Test results:
 The test results obtained are given in the tables as follows

No. of Sample	Unit	Result
1.sample	CFU	15,2
2.sample	CFU	9,1
3.sample	CFU	7,8
4.sample	CFU	11,8
5.sample	CFU	11,2
6.sample	CFU	11,0
7.sample	CFU	16,6
8.sample	CFU	9,3
9.sample	CFU	13,3
10.sample	CFU	14,2
Average	CFU	12,0
No. of Sample	Unit	Result
1.sample	Log10 CFU	1,2
2.sample	Log10 CFU	1,0
3.sample	Log10 CFU	0,9
4.sample	Log10 CFU	1,1
5.sample	Log10 CFU	0,9
6.sample	Log10 CFU	1,0
7.sample	Log10 CFU	1,2
8.sample	Log10 CFU	1,0
9.sample	Log10 CFU	1,1
10.sample	Log10 CFU	1,2
Average	Log10 CFU	1,1
Talcum Concentration	CFU/g	7.7E+007

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