TEST REPORT

EN 13034:2005+A1:2009

Protective clothing against liquid chemicals (Type 6)

Client:	ESTİLO MODA TEKSTİL TARIM HAYVANCILIK İNŞAAT İÇ DIŞ TİC. VE SAN. LTD. ŞTİ.
Address:	Gazi Osman Paşa Mah. Kolej Sok. No:2/A Turhal/TOKAT/TÜRKİYE
Sample:	ES6124 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 20, 2020
Report Number:	NPT/20042012659/3
Elaborated by:	Ashley Madison
Place and date of issue:	Sheridan, WY May 05, 2020

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

Note: The results given in this Test Report apply only to the sample tested by our 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 530:1996 Met.2 / EN 14325:2018-4.4.1 / EN 13034:2005+A1:2009-4.1
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	750
2.sample	Cycles	750
3.sample	Cycles	750
4.sample	Cycles	750

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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 9073-4:1997 / EN 14325:2018-4.7 / EN 13034:2005+A1:2009-4.1
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	32,00
2.sample	Newton	38,00
3.sample	Newton	42,00
4.sample	Newton	31,00
5.sample	Newton	36,00
Average	Newton	35,80

Tearing of the transversal direction	Unit	Results
1.sample	Newton	22,90
2.sample	Newton	25,70
3.sample	Newton	23,90
4.sample	Newton	22,70
5.sample	Newton	19,80
Average	Newton	23,00

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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 13034:2005+A1:2009-4.1.
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	85,20
2.sample	Newton	70,30
3.sample	Newton	69,80
4.sample	Newton	78,30
5.sample	Newton	84,60
Average	Newton	77,64

Tearing of the transversal direction	Unit	Results
1.sample	Newton	47,20
2.sample	Newton	42,30
3.sample	Newton	41,90
4.sample	Newton	45,70
5.sample	Newton	40,80
Average	Newton	43,58

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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 863:1995 / EN 14325:2018-4.10 / EN 13034:2005+A1:2009-4.1
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	16,90
2.sample	Newton	15,80
3.sample	Newton	19,40
4.sample	Newton	16,80
Average	Newton	17,23

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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 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 13274-2:2001 Met. 3 / EN 13034:2005+A1:2009-4.1

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
Oritentation of the samples: Horizantal
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 14325:2018–4,12, 4,13 / 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 13034:2005+A1:2009-4.1
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

H_2SO4 30%

Direction	Warp			Weft			Media Average
Sample	1	2	3	1	2	3	
Penetration Index %	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Repellency Index %	93,30	97,10	94,30	96,20	95,70	97,70	95,72
Absorption Index %	6,70	2,90	5,70	3,80	4,30	2,30	4,28

NaOH 10%

Direction	Warp			Weft			Media Average
Sample	1	2	3	1	2	3	
Penetration Index %	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Repellency Index %	95,20	96,70	93,90	94,80	95,70	95,10	95,23
Absorption Index %	4,80	3,30	6,10	5,20	4,30	4,90	4,77

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o-xylene

Direction	Warp			Weft			Media Average
Sample	4	2	3	1	2	3	
Penetration Index %	4,9	4,2	5,1	4,8	4	5	4,67
Repellency Index %	90,2	89,8	91,6	90,1	89,9	91,2	90,47
Absorption Index %	4,9	6	3,3	5,1	6,1	3,8	4,87

1-butanol

Direction	Warp			Weft			Media Average
Sample	1	2	3	1	2	3	
Penetration Index %	5,9	5,5	4,9	4,6	5	4,8	5,12
Repellency Index %	90,3	89,9	91,5	90,2	89,8	91,1	90,47
Absorption Index %	3,8	4,6	3,6	5,2	5,2	4,1	4,42

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Test Standard: EN ISO 13935-2:2014 / EN14325:2018 - 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/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.

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

No of samples	Unit	Results
1.sample	Newton	215
2.sample	Newton	190
3.sample	Newton	200
4.sample	Newton	220
5.sample	Newton	230
Average	Newton	211

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/A1:2016 / EN 13034:2005+A1:2009-5.2
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/A1:2016, 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
OC	173	107	L

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

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TEST-1

Test	Unit	Results
Total number of points penetration	-	0
Total number of points penetration	cm^2	0

*Total penetration area shoul be less than or equal to 3 times the area of stain sample

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TEST-2

Test	Unit	Results
Total number of points penetration	-	0
Total number of points penetration	cm^2	0

*Total penetration area shoul be less than or equal to 3 times the area of stain sample

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TEST-3

Test	Unit	Results
Total number of points penetration	-	0
Total number of points penetration	cm^2	0

*Total penetration area shoul be less than or equal to 3 times the area of stain sample

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