



Testing of diving suit material

Test item	Material and seam samples for Ursuit® Heavy Light Cordura
Type	Variable volume suit for diving
Customer	Ursuk Oy Teollisuuskatu 34 20520 TURKU Finland
Applied method	prEN 14225-2 (dated 2002-01-15)

Erkki Rajamäki
Research Engineer

Sanna Karkkula
Research Engineer

Tämän selosteen osittainen julkaiseminen on sallittu ainoastaan Työterveyslaitoksen kirjallisella luvalla. Testaustulokset pätevät ainoastaan testatuille näytteille. Tämän selosteen testit, joissa on merkintä: "Ei Mittatekniikan keskuksen FINAS-akkreditointia", eivät kuulu testauslaboratorion T013 akkreditoinnin piiriin.



T013 (EN 45001)

This report shall not be reproduced except in full without the written approval of the Finnish Institute of Occupational Health. The testing is valid only for the tested items. Tests marked "Not FINAS Accredited" in this report are not included in the FINAS Accreditation field for T013 testing laboratory.



Testing of diving suit material

1. Description and identification of test items

Description Heavy light Condura -material
Seam sample of Heavy light Condura
a double textured condura /polyester fabric with an interply of butyl rubber

Manufacturer Material: Ferguson Polycom limited
Seam: Ursuk Oy

2. Scope of testing

Testing dates: 2002-02-04 - 2002-02-22
The tests were performed at the Department of Physics at FIOH, Topeliuksenkatu 41 b, 00250 Helsinki, Finland.

The following tests were carried out:

Requirement		Test method
Hot and cold storage	prEN 14225-2:2002, 4.2.1	prEN 14225-2:2002, 5.2.2.1
Puncture-tear resistance	prEN 14225-2:2002, 4.3.1	EN ISO 13995:2001
Seam strength	prEN 14225-2:2002, 4.3.2	ISO 5082:1982, ISO 13934-2:1999

2.1 Sampling and conditioning

Receiving date: 2002-01-16 and 2002-01-30

Condition: Intact

Conditioning: Samples were conditioned at least 24 hours in an atmosphere having a temperature of $(20 \pm 2)^{\circ}\text{C}$ and a relative humidity of $(65 \pm 5) \%$ before testing.

Pre-treatment: Seam samples were tested as revived condition and after pre-treatment of hot and cold storage. Material samples were tested after pre-treatment of hot and cold storage.
Hot and cold storage: Cycle is 4 hours at $(+70 \pm 2)^{\circ}\text{C}$ and 4 hours at $(-20 \pm 2)^{\circ}\text{C}$.
The cycle was repeated four times.

3. Test results

3.1 Hot and cold storage

After hot and cold storage material and seam specimens were checked visually of damages. No signs of visible degradation, blocking, de-lamination or corrosion were found. Specimens were in good conditions.

3.2 Puncture-tear resistance

Velocity: 3,5 m/s Angle of the specimen: 45°

Pre-treated sample	Energy of impact 3,4 J (mass 500g)		Energy of impact 6,8 J (mass 1 000g)	
	Tear length* [mm]	Orientation	Tear length* [mm]	Orientation
1	22	along	51	along
2	19	along	45	along
3	18	cross	-	cross
4	16	cross	-	cross
5	14	bias 45°	-	bias 45°
6	12	bias 45°	-	bias 45°
Mean	17	PASS	48	FAIL

* Measured as in Compute -project; the length of the tear from the surface to the under edge of the blade.

3.3 Seam strength

3.3.1 As received samples

Apparatus: CRE, 500 N Jaws: Textile jaws, width 25 mm
 Test speed: 100 mm/min Gauge length: 75 mm
 Pretension: No Test specimen: Width 100 mm, length 150 mm

As received sample	Result [N]
1	378
2	410
3	357
4	451
5	392
Mean	398

3.3.2 Pre-treated samples

Apparatus: CRE, 500 N Jaws: Textile jaws, width 25 mm
 Test speed: 50 mm/min Gauge length: 100 mm
 Pretension: No Test specimen: Width 100 mm, length 180 mm

Pre treated sample	Result [N]
1	401
2	367
3	> 500*
4	> 500*
5	> 500*
Mean	> 453

*The value was higher than maximum force capacity of the jaws.

4. Summary of the test results

Test	Requirement	Result
Hot and cold storage	prEN 14225-2:2002, 4.2.1 No visible degradation, blocking, de-lamination or corrosion	No signs of visible degradation, blocking, de-lamination or corrosion were found. <i>The material samples fulfils the requirement</i>
Puncture-tear resistance	prEN 14225:2002, 4.3.1 Performance at least 1,7 J and mean tear < 40 mm Energy of impact J Level 1,7 1 3,4 2 6,8 3 13,6 4	Impact energy 3,4 mean tear: 17 mm <i>The material samples fulfils the requirement</i>
Seam strength	prEN 14225:2002, 4.3.2 Tensile load > 100 N	As received mean: 398 N After pre-treatment mean: >453 N <i>The seam samples fulfils the requirement</i>