

JetGuardPLUS-CBRNE.com



**Coverall designed
specifically for the CARA program**

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JETGUARDPLUS® SPECIFICATIONS

1



We have taken our JetGuardPLUS® coveralls and altered them to fit the needs of the US Army CARA program. New part numbers have been assigned to this new coverall.

Size	Part Number
Small/Medium	53320502
Large/XL	53320504
2X/3X	53320506
4X/5X	53320508
6X/7X	53320510

Description: JetGuardPLUS® coverall with attached hood, elastic around the face piece, respirator storm flap with Velcro® (or hook and loop) closure, Double zipper storm flap with Velcro® (or hook and loop) closure, boot flaps, elastic finger loops, and Taped seams.

The name of the material is: Tessaform® material.

The color of the material is: Gray

Each coverall will be individually vacuum packaged with size, part number and expiration date prominently displayed on the coverall and the outer box.

Each coverall will have a 10 year shelf life from date of purchase order.

The Tessaform® material has passed all tests required by NFPA 1994, Class 3 – 2001 edition and NFPA 1994, Class 3 – 2007 edition.***

This material has been tested and passed **Chemical Warfare Agent Permeation testing:**

Warfare agent	Required Holdout Time	Results
Mustard (HD)	> 3 hours	Passed
Soman (GD)	> 24 hours	Passed
VX	> 24 hours	Passed
Sarin (GB)	> 24 hours	Passed
Tabun (GA)	> 24 hours	Passed
Lewisite (L)	> 3 hour	Passed

This material has pass a **Flame Test:** (EN 13274-4) Resistance to ignition. When placed under a flame, this is a self-extinguishing material. No Post-combustion, No Post-incandescence, No Droplets, No Holes. ***

This material has passed a **Cold Temperature Performance Test.** ASTM D 747, *Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.* The testing temperature was -25°C (-13° F). The bending moment <0.057 Nm at an angular deflection of 60°.

This material has passed a **Flex Cracking Resistance Test** of >15,000 cycles (Test method EN-ISO 7854/99 (B))***

This material has passed **ASTM F 1671,** *Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi-X-174 Bacteriophage as a Test System.* The results must show no penetration of the Phi-X-174 bacteriophage for at least 1 hour.***

This material has passed a **Bursting Strength Test** ASTM D 751, *Standard Test Methods for Testing Coated Fabrics.* The results must be greater than 135 N (30 lbf). ***

This material has passed a **Puncture Propagation Tear Resistance Test** ASTM D 2582, *Standard Test Method for Puncture Propagation Test Resistance of Plastic Film and Thin Sheeting.* The results must be great than 25 N (5 3/5 lbf) ***

This material has a **Total Heat Loss Value (THL) of 200 Watts / Meter²** or greater (ASTM F 1868 Test Method)***

This material has is **Anti Static** on the **inside and outside** of the material.***

Using ASTM F739, *Standard Test Method for Resistance of Protective Clothing Materials to Permeation of Liquids or Gases Under Conditions of Continuous Contact,* the following testing was conducted with an air testing temperature at 90°F (32°C). ***

Chemical	CAS No.	Results
Mustard (HD)	505-60-2	PASS
Soman (GD)	96-64-0	PASS
Acrolein	107-02-8	PASS
Acrylonitrile	107-13-1	PASS
Dimethyl sulfate	77-78-1	PASS
Ammonia (gas)	7664-41-7	PASS
Chlorine (gas)	7782-50-5	PASS

In addition to the chemical listed above, over 100 different chemicals were tested on our Tessaform[®] material. A table of the lab results and breakthrough times can be found in the Chemical Resistant Table section of this report.

In addition to these tests, Indutex often runs internal tests on our garments. One test in particular is when we place our garment in an oven for 24 hours at 158°F (70°C). Once the garment is removed from the oven, we run extensive testing on the garment. We have found that the seams and the garment material still held up to it's original form and function.

Respiratory Protection:

This coverall was designed for and can be worn while wearing any manufacturers respirator sold in the today. In addition, this coverall can be worn while wearing an SCBA (Self-Contained Breathing Apparatus), a PAPR (Powered Air Purifying Respirator), a gas mask, a full face respirator, a half face respirator, or an N95 respirator. It is the user's responsibility to decide what type of respiratory protection is required for each project.

*** Important Note: All testing was done by an independent third party accredited testing facility. All lab results available upon request.

TECHNICAL DATA

2



INDUTEX

Garments Lines made with fabric

Tessaform®

JetGuard® PLUS

- Garments made with welded over taped seams (**TOPGUARD®** Technology)
 - cat. 3 type 3-B, (also Type 4, 5 and 6)
 - for NBC (nuclear, biological and chemical) protection
 - with antistatic properties
- Accessories with welded over taped seams (**TOPGUARD®** Technology)
 - cat. 3 type PB [3]-B
 - with antistatic properties



NUCLEAR PROTECTION
(EN 1073-2) non ventilated suits



BIOLOGICAL PROTECTION
(EN 14126)



CHEMICAL PROTECTION
(EN 14605 type 3-B)
(EN 14605 type 4)
(EN ISO 13982-1 type 5)
(EN 13034 type 6)



ANTISTATIC PROPERTIES
(EN 1149)

Jetguard® PLUS and garments have good electrical characteristics and does not generate electrostatic charges. The time taken to decline for the potential residue is neither too fast or too slow.

CWA (CHEMICAL WARFARE AGENTS) PERMEATION RESISTANCE (NATO Test)

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Tessaform[®]

Data sheet

PHYSICAL PROPERTIES

Property		Norm/Method	U.M.	Value	Class
Weight		ISO 4591	gr/m ²	160	n.a.*
Abrasion resistance		EN 530/96	cycles	>2.000	6
Flex cracking resistance		EN-ISO 7854/99 (B)	cycles	>5.000	3
Trapezoidal tear resistance	MD	EN-ISO 9073-4/99	N	25,7	2
	XD	EN-ISO 9073-4/99	N	46,1	3
Traction resistance	MD	EN-ISO 13934-1/00	N	150	3
	XD	EN-ISO 13934-1/00	N	150	3
Puncture resistance		EN 863/95	N	32,2	2
Burst resistance		EN-ISO 13938-2/01	KPa	360	4
Stability of heat	ext/ext	ISO 5978/90	-	Slight adhesion	n.a.*
	ext/int.	ISO 5978/90	-	No adhesion	n.a.*
	int./int.	ISO 5978/90	-	No adhesion	n.a.*
Surface resistivity		EN 1149-1/97	Ω	Conform	n.a.*
Hydrostatic head	EN ISO 20811/93		cm H ₂ O	646	n.a.*
			Pa	63.340	n.a.*
Ignition resistance		prEN 13274-4/98 (3)	-	Self extinguishing**	n.a.*
Over taped seam strength resistance		EN ISO 13935-2/01	N	250	4

* n.a. : not applicable.

** Self extinguishing. On both sides no auto combustion is pronounced but the formation of hole is observed without dripping.

PROTECTIVE PROPERTIES

Particle penetration

Total barrier against any particle dimension



Chemical Protection

Permeation resistance EN ISO 6529 (ex. EN 369)

Chemical n° CAS		Permeation EN ISO 6529		Permeation at 480 minutes (µg/min/cm ²)	Accuracy (µg/min/cm ²)
		min	Class		
Acetaldehyde	75-07-0	>480	6	0,011	0,001
Acetone	67-64-1	478	5	1,0	0,1
Acetonitrile	75-05-8	>480	6	<0,01	0,01
Acetic acid (glacial)	64-19-7	>480	6	<0,001	0,001
Acrolein	107-02-8	>480	6	<0,1	0,1
Acrylamide (50%)	79-06-1	>480	6	<0,001	0,001
Acrylonitrile	107-13-1	>480	6	<0,01	0,01

Tessaform[®]

Data sheet

Chemical n° CAS		Permeation EN ISO 6529		Permeation at 480 minutes ($\mu\text{g}/\text{min}/\text{cm}^2$)	Accuracy ($\mu\text{g}/\text{min}/\text{cm}^2$)
		min	Class		
Allyl alcohol	107-18-6	>480	6	<0,01	0,01
Allyl chloride	107-05-1	>480	6	<0,001	0,001
Amyl acetato n-	628-63-7	>480	6	<1	1
Ammonia	7664-41-7	>480	6	0,025	0,001
Ammonium hydroxide (30%)	1336-21-6	>480	6	0,017	0,001
Aniline	62-53-3	>480	6	<0,8	0,8
Antimony pentachloride	7647-18-9	>480	6	<1	1
Anthracene (sat'd in toluene)	120-12-7	>480	6	<1	1
Benzene	71-43-2	>480	6	<1	1
Benzonitrile	100-47-0	>480	6	0,1	0,1
Bromine	7726-95-6	150	4	6,3	0,05
Butyl ether n-	142-96-1	>480	6	<1	1
Carbon disulphide	75-15-0	>480	6	0,22	0,01
Carbon tetrachloride	56-23-5	>480	6	<1	1
Chlorine	7782-50-5	>480	6	<0,001	0,001
Chloroacetic acid	79-11-8	>480	6	0,015	0,001
Chlorobenzene	108-90-7	90	3	9,2	0,05
Chloroethanol 2-	107-07-3	>480	6	<0,001	0,001
Chloroform	67-66-3	360	5	1,5	0,05
Chloromethyl methyl ether	107-30-2	>480	6	<1	1
Chromic acid – saturated solution of chromium oxide VI in sulphuric acid at 96%	1333-82-0	>480	6	n.d.	0,1
Cresol -o	95-48-7	>480	6	<1	1
Creosote	8001-58-9	>480	6	<1	1
Cyclohexane	110-82-7	>480	6	<1	1
Di(2-ethylhexyl)	117-81-7	>480	6	<1	1
Dichloromethane	75-09-2	270	5	2,3	0,05
Diesel flue	70892-10-3	>480	6	<0,1	0,1
Diethylamine	109-89-7	>480	6	0,009	0,001
Dimethylacetamide N,N-	127-19-5	>480	6	<0,001	0,001
Dimethylformamide N,N-	68-12-2	>480	6	<0,001	0,001
Dimethyl nitrosamine	62-75-9	>480	6	<0,01	0,01
Dimethyl sulphide	75-18-3	>480	6	<0,01	0,01
Dioxane 1,4-	123-91-1	>480	6	<1	1
Epichlorhydrin	106-89-8	>480	6	<0,1	0,1
EPO 3 Harder and Epox AF bi component glue	-	>480	6	0,011	0,001
Ethanolamine	141-43-5	360	5	2,2	0,05
Ethyl acetate	141-78-6	>480	6	<1,0	1,0
Ethyl cellosolve® acetato	111-15-9	>480	6	<0,01	0,01
Ethylenediamine	107-15-3	>480	6	<0,01	0,01
Ethylene dibromide	106-93-4	>480	6	<1	1
Ethylene glycol	107-21-1	>480	6	<0,6	0,6
Formaldehyde (37%)	50-00-0	>480	6	<0,1	0,1
Formic acid (96%)	64-18-6	>480	6	0,03	0,03
Fluorobenzene	462-06-6	>480	6	<1	1
Furaldehyde 2-	98-01-1	398	5	1,46	0,01
Hexamethylene diisocyanate	822-06-0	>480	6	<1	1
Hexane n-	110-54-3	>480	6	<0,1	0,1
Hydrazine	302-01-2	>480	6	0,002	0,001
Hydrochloric acid (37%)	7647-01-0	>480	6	0,012	0,001

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Chemical n° CAS		Permeation EN ISO 6529		Permeation at 480 minutes ($\mu\text{g}/\text{min}/\text{cm}^2$)	Accuracy ($\mu\text{g}/\text{min}/\text{cm}^2$)
		min	Class		
Hydrofluoric acid (50%)	7664-39-3	>480	6	0,008	0,001
Hydrofluoric acid (70%)	7664-39-3	>480	6	0,0052	0,0001
Hydrogen peroxide (70%)	7722-84-1	90	3	9,2	0,1
Idrazine monohydrate	7803-57-8	>480	6	0,036	0,001
Isophthaloyldichloride (45°C)	99-63-8	>480	6	<0,1	0,1
Isopropyl alcohol	67-63-0	>480	6	0,016	0,001
Javel (50°C)	7681-52-9	330	5	2,4	0,01
Kerosene (Jet A fuel)	8008-20-8	>480	6	<0,1	0,1
Mercuric chloride (sat'd)	7487-94-7	>480	6	<0,03	0,03
Mercury	7439-97-6	270	5	2,8	0,02
Methanol	67-56-1	>480	6	0,43	0,1
Methyl-2-pentanone 4-	108-10-1	>480	6	0,6	0,1
Methylene bromide	74-95-3	312	5	24	1
Methylene chloride	75-09-2	>480	6	<1	1
Methyl ethyl ketone	78-93-3	>480	6	<0,01	0,01
Methyl isocyanate	624-83-9	>480	6	0,7	0,1
Methyl-t-butyl-ether	1634-04-4	>480	6	<0,1	0,1
Methyl vinyl ketone	78-94-4	>480	6	<0,01	0,01
Naphthalene	91-20-3	>480	6	<1	1
Nitric acid (70%)	7697-37-2	>480	6	<0,001	0,001
Nitric acid (> 90%, fuming)	7697-37-2	>480	6	<0,001	0,001
Nitrobenzene	98-95-3	>480	6	<0,1	0,1
Nitrogen dioxide	10102-44-0	>480	6	<0,001	0,001
Petrol, leaded	86290-81-5	>480	6	<0,1	0,1
Petrol, unleaded	8006-61-9	>480	6	<0,1	0,1
Phenol (85%)	108-95-2	>480	6	<0,5	0,5
Phosphoric acid (85%)	7664-38-2	>480	6	<0,001	0,001
Phosphorous oxytrichloride	10025-87-3	>480	6	<1	1
Phosphorous trochloride	7719-12-2	>480	6	<0,01	0,01
Polychlorinated biphenyl (PCB) in transformer oil	11097-69-1	>480	6	<0,1	0,1
Potassium carbonate	584-08-7	330	5	3,3	0,01
Potassium chloride	7447-40-7	360	5	1,5	0,005
Potassium chromate (sat'd)	7789-00-6	>480	6	<0,015	0,015
Potassium hydroxide (23%)	1310-58-3	270	5	2,6	0,01
Potassium hydroxide (50%)	1310-58-3	270	5	2,0	0,01
Propylene oxide 1,2-	75-56-9	>480	6	<0,01	0,01
Sodium cyanide (45%)	143-33-9	>480	6	<0,001	0,001
Sodium hydroxide (50%)	1310-73-2	>480	6	<0,001	0,001
Sodium hydroxide (conc.)	1310-73-2	>480	6	<0,001	0,001
Sodium hypochlorite (30% Chlorine)	7681-52-9	>480	6	<0,001	0,001
Sodium sulfide	1313-82-2	180	4	5,8	0,01
Styrene oxide	96-09-3	>480	6	<0,1	0,1
Sulphuric acid (93%)	7664-93-9	>480	6	<0,001	0,001
Sulphuric acid (95%)	7664-93-9	>480	6	<0,001	0,001
Sulphuric acid (96%)	7664-93-9	210	4	2,6	0,1
Sulphur anhydride	7446-09-5	>480	6	<0,001	0,001
Tetrachlorobiphenol 2,2',6,6'-	79-95-8	>480	6	<1	1
Tetrachloroethylene 1,1,2,2-	127-18-4	>480	6	<1	1

Tessaform[®]

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Chemical n° CAS		Permeation EN ISO 6529		Permeation at 480 minutes ($\mu\text{g}/\text{min}/\text{cm}^2$)	Accuracy ($\mu\text{g}/\text{min}/\text{cm}^2$)
		min	Class		
Tetrahydrofuran	109-99-9	>480	6	<10	10
Tin chloride, Mono-n-butyl	1118-46-3	>480	6	0,002	0,001
Tin chloride, Tri-n-butyl	1461-22-9	>480	6	0,001	0,002
Titanium tetrachloride	7550-45-0	150	4	4,9	0,02
Toluene	108-88-3	360	5	3,3	0,01
Toluene-2,4-diisocyanate	584-84-9	>480	6	<0,001	0,001
Toluidine o-	95-53-4	>480	6	<0,05	0,05
Trichloroacetic acid	76-03-9	>480	6	0,002	0,001
Trichlorobenzene 1,2,4-	120-82-1	300	5	2	0,05
Trifluoroacetic acid	76-05-1	>480	6	<0,001	0,001
Trimethyl chinon	935-92-2	>480	6	<1	1
Vynil acetate	108-05-4	>480	6	<0,001	0,001

CWA (Chemical Warfare Agents) permeation resistance

Chemical	NATO Permeation Quantity after 4 h. $\mu\text{g}/\text{cm}^2$	Permeation FINABEL (h:min.)	Accuracy FINABEL $\mu\text{g}/\text{cm}^2$
Mustard (HD)	0,13	3:00	0,1
Soman (GD)	< 0,05	> 24:00	0,005
Sarin (GB)	not testable	> 24:00	0,005
Tabun (GA)	not testable	> 24:00	0,005
VX	< 0,05	> 24:00	0,005
Lewisite	not testable	3:15	0,005

Tessaform[®]

Data sheet



Biological Protection (EN 14126:2003)

Test	Value	Class
Synthetic blood under hydrostatic pressure	20 KPa	6 of 6
Blood born infective agents (Phi-X 174 bacteriophage)	20 KPa	6 of 6
Penetration of infecting agents by contact	> 75 min.	6 of 6
Biologically contaminated aerosols	∞ Log R	3 of 3
Biologically contaminated powders	0 Log u.f.c	3 of 3

NB To guarantee the biological protection all garments must be made with welded over taped seams.



Nuclear Protection (EN 1073-2)

Garments made with raw material *Tessaform*[®] passed all the tests included in EN 1073-2 norm (non ventilated suits) for the protection against nuclear contaminated particles.



Garments made with welded over taped seams (**TOPGUARD**® Technology) with NBC (nuclear, biological and chemical) protection made with raw material **Tessaform**® in grey colour (available in military green colour)



NUCLEAR PROTECTION
(EN 1073-2) non ventilated suits



BIOLOGICAL PROTECTION
(EN 14126)



CHEMICAL PROTECTION
(EN 14605 type 3-B)
(EN 14605 type 4)
(EN ISO 13982-1 type 5)
(EN 13034 type 6)



ANTISTATIC PROPERTIES
(EN 1149)

Garments have antistatic properties following these norms:

- Surface resistance and volume resistance – EN 1149-1 Par. 5-4-2 e 5-4-3 – EN 1149-2 Rv Par. 7
- Triboelectric compatibility – EN 1149-1 Par. 4.1-4.2 App. 1-2-3 – EN 1149.3 Par. 4.2-4.2.1 – EIA IS 5 A
- Time decay of charge – EN 1149-3 Par. 3.5-3.6 –pr EN 1149-5 – EIA IS 541 A STD Fed. TM N° 101 C Method 4046/1
- Electric safety ground resistance of model of the human body – CEI 64-8/4 Par. 6.12.5
- Time decay of the charge on a model of the human body – IEC 61340-4-1 TR/2

Jetguard® Plus garments have good electrical characteristics and does not generate electrostatic charges. The time taken to decline for the potential residue is neither too fast or too slow.

AVAILABLES MODELS

CATEGORY 3 TYPE 3-B (also 4, 5 and 6) - All the garments are in conformity with the following norms:



- EN 340 Protection Garments: General requirements
- EN 14605 Liquid jet tight chemical protective garments (Type 3)
- EN 14605 Liquid aerosols tight chemical protective garments (Type 4)
- EN ISO 13982 Particle tight chemical protective garments (Type 5)
- EN 13034 Liquid limited splash tight chemical protective garments (Type 6)

- OVERALL with hood
- OVERALL with hood and incorporated boots
- SPECIAL GARMENTS on customer need

CATEGORY 3 TYPE PB[3]-B - ACCESSORIES

- GOWN rear entry
- JACKET + TROUSER
- HOOD
- APRON
- SLEEVES
- BOOTS with pvc and antislid sole
- OTHER ACCESSORIES on customer need





MOST COMMON WORKING AREAS

- Emergency interventions after accidents with loss of chemicals
- Petrochemical companies
- Metal works
- Mining
- Production, treatment and shipment of chemicals
- Tank and reservoirs clean
- Army
- Waste treatment
- Water treatment
- Plating works
- PCB removal

CHEMICAL RESISTANT DATA

JETGUARDPLUS® VS. TYCHEM® F

3

Chemical Resistance Data

May 2016

			Breakthrough time (Normalized - in min.)	
CAS Number	Chemical Name / Synonym	Concentration [%]	Class 3 Ensemble ² JetGuardPLUS ² Mfg:Indutex	Tychem® F* Mfg:Dupont
127-18-4	1,1,2,2-TETRACHLOROETHYLENE	95+	>480	>480
120-82-1	1,2,4- Trichlorobenzene	95+	60	
79-95-8	2,2',6,6'- Tetrachlorobiphenol	95+	>480	
107-07-3	2-CHLOROETHANOL	95+	>480	>480
75-07-0	ACETALDEHYDE	95+	>480	109
64-19-7	ACETIC ACID	95+	>480	>480
67-64-1	ACETONE	95+	244	>480
75-05-8	ACETONITRILE	95+	>480	
107-02-8	ACROLEIN	95+	>480	63
79-06-1	ACRYLAMIDE	50% in water	>480	>480
107-13-1	ACRYLONITRILE	95+	>480	12
107-18-6	ALLYL ALCOHOL	95+	>480	>480
107-05-1	ALLYL CHLORIDE	95+	>480	imm.
7664-41-7	AMMONIA GAS	95+	>480	79
1336-21-6	AMMONIUM HYDROXIDE	28-30	>480	>480
628-63-7	Amyl acetate n-	95+	>480	
62-53-3	ANILINE	95+	>480	>480
120-12-7	Anthracene (sat'd. in toluene)	95+	>480	
7647-18-9	Antimony pentachloride	95+	>480	
71-43-2	Benzene	95+	>480	
100-47-0	BENZONITRILE	95+	455	>480
7726-95-6	BROMINE	95+	56	imm.
142-96-1	BUTYL ETHER N-	95+	>480	196
75-15-0	CARBON DISULFIDE	95+	77	>480
56-23-5	CARBON TETRACHLORIDE	95+	>480	11
7782-50-5	CHLORINE GAS	95+	>480	>480
79-11-8	CHLOROACETIC ACID	95+	>480	>480
108-90-7	CHLOROBENZENE	95+	4	70
107-07-3	Chloroethanol 2-	95+	>480	
67-66-3	CHLOROFORM	95+	>480	imm.
107-30-2	CHLOROMETHYL METHYL ETHER	95+	>480	46
8001-58-9	Creosote	95+	>480	
95-48-7	Cresol-o	95+	>480	
110-82-7	CYCLOHEXANE	95+	>480	>480
117-81-7	DI (2-ETHYLHEXYL) PHTHALATE	95+	>480	>480
75-09-2	DICHLOROMETHANE	95+	105	imm.
70892-10-3	Diesel fuel	95+	>480	
109-89-7	DIETHYLAMINE	95+	>480	>480
127-19-5	DIMETHYL ACETAMIDE N, N-	95+	>480	
62-75-9	Dimethyl nitrosamine	95+	>480	
75-18-3	Dimethyl sulphide	95+	>480	
68-12-2	DIMETHYLFORMAMIDE N,N-	95+	>480	>480
123-91-1	Dioxane 1,4-	95+	>480	
106-89-8	EPICHLOROHYDRIN	95+	>480	372
106-89-8	EPO 3 Harder and Epopox AF bi component glue	95+	>480	
141-43-5	ETHANOLAMINE	95+	>480	>480
141-78-6	ETHYL ACETATE	95+	>480	>480
111-15-9	ETHYL CELLOSOLVE(R) ACETATE	95+	>480	>480
107-15-3	ETHYLENE DIAMINE	99	>480	
106-93-4	ETHYLENE DIBROMIDE	95+	>480	288
107-21-1	Ethylene Glycol	95+	>480	
462-06-6	FLUOROBENZENE	95+	>480	
50-00-0	FORMALDEHYDE GAS	37	>480	>480
64-18-6	FORMIC ACID	95+	>480	260
98-01-1	FURFURAL	95+	137	>480
86290-81-5	GASOLINE, LEADED	95+	>480	30
822-06-0	Hexamethylene diisocyanate	95+	>480	

Chemical Resistance Data

May 2016

CAS Number	Chemical Name / Synonym	Concentration [%]	Breakthrough time (Normalized - in min.)	
			Class 3 Ensemble ² JetGuardPLUS ² Mfg:Indutex	Tychem® F* Mfg:DuPont
110-54-3	HEXANE, N-	95+	>480	>480
302-01-2	HYDRAZINE	95+	>480	283
7647-01-0	HYDROCHLORIC ACID	37	>480	>480
7664-39-3	HYDROFLUORIC ACID	70	>480	39
7664-39-3	HYDROFLUORIC ACID	50	>480	
7803-57-8	ldrazine Monohydrate	95+	>480	
99-63-8	Isophthaloyldichloride	95+	>480	
67-63-0	ISOPROPYL ALCOHOL	95+	>480	
8008-20-8	Kerosene (Jet A fuel)	95+	>480	
541-25-3	LEWISITE (L) CHEMICAL AGENT	95+	>1440	>360
7487-94-7	MERCURIC CHLORIDE	sat.	>480	>480
67-56-1	METHANOL	95+	361	77
78-93-3	METHYL ETHYL KETONE	95+	>480	71
108-10-1	METHYL ISOBUTYL KETONE	95+	11	>480
624-83-9	METHYL ISOCYANATE	95+	9	
78-94-4	Methyl vinyl ketone	95+	>480	
108-10-1	Methyl-2-pentanone 4-	95+	11	
74-95-3	Methylene bromide	95+	312	
75-09-2	Methylene chloride	95+	>480	
1634-04-4	Methyl-t-butyl-ether	95+	>480	
505-60-2	MUSTARD (HD) CHEMICAL AGENT	95+	>1440	>720
91-20-3	Naphthalene	95+	>480	
7697-37-2	NITRIC ACID, 70%	70	>480	
7697-37-2	NITRIC ACID, 90%	90	>480	
98-95-3	NITROBENZENE	95+	>480	
10102-44-0	Nitrogen dioxide	95+	>480	
86290-81-5	Petrol, leaded	95+	>480	
8006-61-9	Petrol, unleaded	95+	>480	
108-95-2	PHENOL	85+	>480	238
7664-38-2	PHOSPHORIC ACID	85	>480	>480
10025-87-3	PHOSPHOROUS OXYCHLORIDE	95+	>480	>480
7719-12-2	Phosphorous Trichloride	95+	>480	
11097-69-1	Polychlorinated biphenyl (PC)	95+	>480	
7789-00-6	POTASSIUM CHROMATE	sat. in water	>480	>480
75-56-9	PROPYLENE OXIDE 1,2-	95+	>480	14
107-44-8	SARIN (GB) CHEMICAL AGENT	95+	>1440	
143-33-9	SODIUM CYANIDE	95+	>480	
1310-73-2	SODIUM HYDROXIDE, 42-50%	50	>480	>480
1310-73-2	SODIUM HYDROXIDE	conc.	>480	
7681-52-9	Sodium hypochlorite (12-30% ch)	95+	>480	
96-64-0	SOMAN (GD) CHEMICAL AGENT	95+	>1440	>720
7446-09-5	SULFUR DIOXIDE	95+	>480	38
7446-09-5	Sulphur dioxide	95+	>480	
7446-93-9	Sulphuric acid	93	>480	
7446-93-9	Sulphuric acid	95+	>480	
96-09-3	Styrene Oxide	95+	>480	
77-81-6	TABUN (GA) CHEMICAL AGENT	95+	>1440	>720
109-99-9	TETRAHYDROFURAN	95+	>480	
1118-46-3	Tin chloride, Mono-n-butyl	95+	>480	
1464-22-9	Tin chloride, Tri-n-butyl	95+	>480	
584-84-9	TOLUENE-2,4-DIISOCYANATE	95+	>480	>480
95-53-4	TOLUIDINE O-	95+	>480	>480
76-03-9	Trichloroacetic acid	95+	>480	
120-82-1	TRICHLOROBENZENE 1,2,4-	95+	60	>480
76-05-1	Trifluoroacetic acid	95+	>480	
935-92-2	Trimethyl chinon	95+	>480	
108-05-4	VINYL ACETATE	95+	>480	imm.

imm. = Immediate Breakthrough

2 = Tessaform® materials is used to make the JetGuardPLUS®, Class 3 Ensemble®, and GasGuardT2® Garments

* Lab results published on www.DuPont.com

Tychem® F is a registered trademark of E.I. duPont de Nemours and Company.

Tessaform® is a registered trademark of Indutex S.p.A.

US MARINES CORPS FEEDBACK

4



US MARINES CORPS

gives feed back on

JetGuardPLUS® Level B Suits

Overview: The suit itself was better equipped to handle more stress than the current TYVEK F® suits that we currently have in stock. It had more protection on the boot and the gloves were already attached to the material which saves time due to taping and reduces the amount of chemical tape needed for the level B suit. I had some of my Marines use the suit in Canada and some here at CBIRF during training. The Marines in Canada were in the suit over 2 hours and during the training here at CBIRF they were in the Level B suit over an hour. This is what they reported back to me. To make it easier I developed some of the criteria that I thought would be important to note about the Level B suit.

Material (texture): The Marines commented on the material used on the suits. They said that it was thicker and was not as easy to have a blow out. It was easier to put on and was quicker to slide into the beta max boots due to the fabric used. The suit seemed to be more resistant to abrasions, cuts and tear because of the thicker JetGuardPLUS material.

Mobility: There was a lot more mobility in the suit and the sizes run bigger than normal. The suits might have to be ordered one size smaller to fit properly. There was no restriction of movement while wearing this suit which will benefit the Extraction Platoon more than the decontamination Platoon.

Heat: I had one who conducted training here at CBIRF, the training conducted was pulling a Marine on a sled and then walking around to simulate constant moving. The Marine said that it was cooler than the current level B suits that we are currently using. I had another Marine say that he could not tell the difference between the level of heat with what we are currently using and the level B suits that we were testing. The Marine who used this suit in Canada said it was slightly hotter and not enough to make a big impact on the work during decontamination operations. I also had a Marine say that it felt cooler when water was splashed in the suit and that the sweat displaced better in this Level B suit compared to the current ones that we are using. They also mentioned the suit absorbed the sweat better than the current suit that we are using.

Safety Features: The suit came with gloves attached to it and the majority of the Marines liked that due to the fact that there was no taping associated with the gloves. I did have a Marine who did not like the gloves on the suit, he did not feel safe. The JetGuardPLUS suit was made of a thicker material that provided better resistance to cuts, tears and abrasions. The boots of the suit had double protection which all the Marines liked. It fully encapsulated the feet and when you put on the beta max boot there was a flap that was over the portion that went into the boot. I think that is a very good idea and completely eliminates residue from leaking into the boot.

Recommendation: Invest in more of these suits and do a complete and thorough evaluation so we can get concrete information. The Marines had a good evaluation. One concern from one of the Marines was sweat displacement, and there was not much sweat that was formed from these JetGuardPLUS suits because of the nature of the op. There would have to be a 3 day trial to see if there is consistency with what was being said with the Marines.

USMC Reference Available Upon Request

September 2007

ABOUT INDUTEXUSA

5



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19352
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302-691-1464 fx
www.IndutexUSA.com

May 2016

RE: JetGuardPLUS® coveralls

To Whom It May Concern:

Thank you for reviewing a version of our JetGuardPLUS® coveralls.

We have been manufacturing and selling coveralls around the world for almost 40 years. We are ISO certified and have received some of the highest accolades for quality control. We have a three step quality control process that ensures that every single garment will be checked, at least one time, by an Indutex associate. Almost 25% of our workforce is in our quality control department.

We have a full line of patented materials and protective garments. Our chemical protective gear military-grade suits and clean room garments protect a wide variety of industries with a special focus on military, first-responders, chemical manufacturing and pharmaceuticals.

A version of our JetGuardPLUS coveralls have been certified to multiple NFPA 1994 certifications.

Worldwide, our customer list includes: the US Airforce, the US National Guard, Washington DC Metro Police, FDNY, NYPD, NJ State Police, Bristol-Myers Squibb, Novartis Pharmaceuticals, Pfizer, Schering-Plough, Pharmaceuticals and many more.

We offer an extensive line of protective garments in a wide variety of styles and configurations including coveralls, sleeves, booties, masks, beard covers, and headwear. In addition to our standard product line, our flexible manufacturing process allows us to customize our products to meet the specific needs of our customers.

We created a new part number: 5332050(x) for the JetGuardPLUS® coveralls that were modified to meet the exact needs of the US Army CARA workers.

If anyone would like alterations to this design, require additional samples and/or wish to discuss our capabilities I can be reached at: (302) 351-4079.

Thank you for your time and consideration and we look forward to working with you in the near future.

Sincerely,

A handwritten signature in blue ink, appearing to read "George Gianforcaro".

George Gianforcaro,
President
IndutexUSA

ISO CERTIFICATION

6

CERTIFICAZIONE DEL SISTEMA DI GESTIONE

Si attesta che / We certify that

INDUTEX S.p.A.

Via S. Francesco, 8/10 - 20011 Corbetta (MI)

E' conforme ai requisiti della norma / Is according to the standard

UNI EN ISO 9001: 2008

Per le seguenti attività / Concerning the following activities

Progettazione, produzione, vendita e commercializzazione
di indumenti di protezione della persona e dei processi

Design, manufacturing, sale and marketing of protective clothing for the person and for the processes

Certificato n. **SSG 6552 AQ 1783**
Certificate n.

Sett. EA **04-29**
EA Code

Prima emissione
First issue
31/05/1996

Emissione corrente
Current issue
30/06/2014

Data scadenza
Expiring on
13/07/2017

dr. ing. Giuseppe Leuci
(Responsabile Sistemi di Gestione)



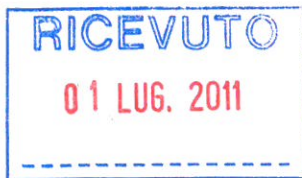
SGQ N° 036A
PRD N° 149B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

La validità del presente certificato è subordinata alla sorveglianza periodica annuale ed al riesame completo del Sistema di Gestione con periodicità triennale. Riferirsi al Manuale Qualità per i dettagli di eventuali esclusioni di requisiti della norma ISO 9001 e/o processi affidati in outsourcing. Per informazioni puntuali e aggiornate circa eventuali variazioni intervenute nello stato della certificazione di cui al presente certificato, si prega di contattare il n° telefonico o indirizzo e-mail riportati in calce al presente documento. Per le imprese del settore EA28 la certificazione è rilasciata secondo le prescrizioni del Regolamento Tecnico RT-05, la certificazione si intende riferita agli aspetti gestionali dell'impresa nel suo complesso ed è utilizzabile ai fini della qualificazione delle imprese di costruzione ai sensi dell'articolo 40 della legge 163 del 12 aprile 2006 e successive modificazioni e del DPR. 5 ottobre 2010 n. 207. Per le aziende del settore EA38 la certificazione è rilasciata in conformità al Regolamento Accredia RT-04

LAB RESULTS

7



Indutex S.p.A.
Attn. Mr. P.M. Rossin
Via S. Francesco 8/10
20011 Corbetta
Italy

Subject: Permeation tests CWA
Your reference: Signed quotation 4098
Contact person: R.J. van Eenennaam

Dear Mister Rossin,

At the request of Indutex S.p.A. (your reference Signed quotation 4098) ProQares performed permeation tests with mustard agent (HD), tabun (GA), sarin (GB) and soman (GD) on one protective material containing a seam. The details of the received sample are presented in Table 1 and all test results are presented in the Tables 2 and 3. The detailed description of the test procedures is presented in the Annex. Note that the test results are only applicable to the tested material, mentioned in Table 1.

Table 1: Received samples

Sample code ProQares	Description by customer
11PQ0964	Tessaform® hot taped seam

Table 2: Pressurized droplet, diffusive flow (0.2 kg/cm², <5%RH, 30°C, 4 hours, 30 mg drop)

Sample code	Agent	Amount of agent on sample (mg)			Penetrated amount (µg/cm ²)		
11PQ0964	HD	17.7	16.8	17.5	0.3	< 0.05	< 0.05
11PQ0964	GD	18.0	17.0	20.3	< 0.05	< 0.05	< 0.05
11PQ0964	VX	15.9	16.7	14.2	1.5	< 0.05	< 0.05

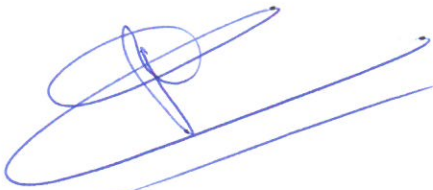
Table 3: Qualitative permeation tests, FINABEL method, (1 x 50 µl, 30°C, 24h)

Sample code	Agent	Thickness (mm)	Breakthrough time (hh:mm)
11PQ0964 A	HD	0.34	> 24:00 *
11PQ0964 B	HD	0.34	> 24:00 *
11PQ0964 C	HD	0.32	> 24:00 *
11PQ0964 A	GA	0.31	> 24:00
11PQ0964 B	GA	0.32	> 24:00
11PQ0964 C	GA	0.34	> 24:00
11PQ0964 A	GB	0.34	> 24:00
11PQ0964 B	GB	0.33	> 24:00
11PQ0964 C	GB	0.33	> 24:00
11PQ0964 A	GD	0.33	> 24:00
11PQ0964 B	GD	0.32	> 24:00
11PQ0964 C	GD	0.32	> 24:00

* Note that a slight breakthrough between 6 and 24 hours was observed next to the seam. An additional test on the flat material (without seam), showed that the material itself has a breakthrough time around 2 hours. The breakthrough observed in the seam test, was probably caused by the saturated vapor on top of the sample that permeates through the Tessaform material itself, next to the seam.

We trust all things are clear to you. In case of any questions, please do not hesitate to contact us.

Kind regards,



R.J. van Eenennaam
Author



Mr. J. van Hoof
Managing director

Direct dialling: +31 88 7766922
Direct fax: +31 88 7766999
Email: richard.vaneennaam@proqares.com

ANNEX 1 DESCRIPTION OF TEST METHODS

Qualitative Nerve agent (GA, GB, GD) test

Parameter	units	specification
Cell size	(cm ²)	8
Amount of droplets		1
Droplet size	(µl)	50
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Method of detection		visual, colour
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	24
Result reported	(hours)	Time until first appearance of colour change

Date 27-6-2011

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Ref.no.: 4098

Doc.no: 3793

The sample is placed in a cell. The material is contaminated with a 1 x 50 µl droplet of nerve agent by means of a dispenser. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the nerve agent. Underneath the cell an adsorption paper is placed. The whole is placed in a thermostated cupboard.

At different times after contamination, a check on the penetration of the test specimen is performed. To check the penetration of agent, the adsorption paper is removed, an amount of BuChE enzyme solution is sprayed on the paper and after about 10 seconds an amount of the substrate solution is sprayed on the paper. To check the performance of the enzyme- and substrate solution a blank is performed as well, using a fresh adsorption paper and the same detection procedure. The colour of the paper only changes from blank/slightly yellow to purple/blue when no nerve agent is present.

Qualitative mustard agent (HD) test, SD method

Parameter	units	specification
Cell size	(cm ²)	8
Amount of droplets		1
Droplet size	(µl)	10
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Method of detection		visual, colour change
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	24
Result reported	(hours)	Time until first appearance of colour change

The sample is placed in a cell and is contaminated with 1 droplet of 50 µl mustard agent by means of a micro syringe. The agent is placed on a small piece of filter paper. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the mustard agent. Underneath the cell a detection paper made out of Congo Red paper with tiny drops of chloroimide is placed. The whole is placed in a thermostated cupboard and the detection paper is inspected at regular intervals for the appearance of blue dots caused from the reaction between the chloroimide and mustard agent.

Laid droplet HD, GD and VX, 0.2 kg/cm², diffusive flow, 0.5 m/s

Parameter	units	specification
Cell size	(cm ²)	12.5
Amount of droplets		1
Droplet size	(mg)	30
Pressure	(kg/ cm ²)	0.2
Duration of pressure	(min)	15
Air flow over material	(m/s)	0.5
Air flow through material	(cm/s)	0
Air flow under material	(ml/min)	100
Method of detection		GC-FPD
Temperature	(°C)	30
Humidity	(%RH)	<5
Test duration, max	(hours)	4
Detection limit	(µg/cm ²)	0.05
Result reported	(µg/cm ²)	Penetrated amount after 4 hours

The sample is placed on a glass plate and contaminated with 1 droplet of 30 mg agent. A teflon plate (surface of 10 cm²) and a weight are placed onto the sample, making a pressure of 0.2 kg/cm². After 15 minutes the weight is removed and the sample is put in a glass test cell.

The remaining quantity of agent on the teflon plate is determined after the 15 minutes pressure and from this value, the actual contamination quantity present on the sample is calculated.

The cells containing the samples are placed into the test equipment. During the test thermostated air is drawn over the face of the samples at a speed of 0.5 m/s. The agent penetrating through the sample is collected in an organic liquid, Di Ethyl Succinate (DES). At the end of the test, the amount of agent present in the DES is determined by GC.

Indutex S.p.A.
Attn. Mr. P.M. Rossin
Via S. Francesco 8/10
20011 Corbetta
Italy



Subject: Initial L and VX tests
Your reference: Signed quotation 4095
Contact person: R.J. van Eenennaam

Dear Mister Rossin,

At the request of Indutex S.p.A. (your reference: signed quotation 4095) ProQares performed permeation tests with Lewisite (L) and VX on one seam material. The details of the received sample are presented in Table 1 and all test results are presented in the Tables 2 and 3. The detailed description of the test procedure is presented in the Annex. Note that the test results are only applicable to the tested material, mentioned in Table 1.

Table 1: Received sample

Sample code ProQares	Description by customer
11PQ0964	Tessaform® hot taped seam

Table 2: Qualitative permeation test Lewisite, FINABEL method, (1 x 50 µl, 30°C, 24h)

Sample code	Contamination on	Thickness (mm)	Breakthrough time (hh:mm)
11PQ0964 A	Seam	0.32	> 24:00
11PQ0964 B	Seam	0.35	> 24:00
11PQ0964 C	Seam	0.33	> 24:00

Table 3: Qualitative permeation test VX, FINABEL method, (1 x 50 µl, 30°C, 24h)

Sample code	Contamination on	Thickness (mm)	Breakthrough time (hh:mm)
11PQ0964 A	Seam	0.34	> 24:00
11PQ0964 B	Seam	0.31	> 24:00
11PQ0964 C	Seam	0.32	> 24:00

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info@proqares.com

Date 14-6-2011
Page 2 of 4

Ref.no.: 4095
Doc.no: 3599

We trust all things are clear to you. In case of any questions, please do not hesitate to contact us.

Kind regards,



R.J. van Eenennaam
Author

Direct dialling: +31 88 7766922
Direct fax: +31 88 7766999
Email: richard.vaneennaam@proqares.com



Mr. J. van Hoof
Managing director

ANNEX 1 DESCRIPTION OF TEST METHODS

Qualitative Lewisite (L) test

Parameter	units	specification
Cell size	(cm ²)	8
Amount of droplets		1
Droplet size	(µl)	50
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Method of detection		visual, colour change
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	24
Detection limit		Approx. 0.5 µg/cm ²
Result reported	(hours)	Time until first appearance of colour change
	(mm)	Thickness

The sample is placed in a cell and contaminated with a 1x50 µl droplet of Lewisite, laid by means of a micro-syringe. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the Lewisite. Underneath the cell a detection paper impregnated with ammonium-molybdate and zinc sulphate is placed. The whole is placed in a thermo stated cupboard and the detection paper is inspected at regular intervals to observe the change from greenish to blue caused from the reaction between the ammonium-molybdate and the arsenic of the penetrated Lewisite.

Qualitative Nerve agent (VX) test

Parameter	units	specification
Cell size	(cm ²)	8
Amount of droplets		1
Droplet size	(µl)	50
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Method of detection		visual, colour
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	1
Detection limit		Approx. 0.05 µg/cm ²
Result reported	(hours)	Time until first appearance of colour change
	(mm)	Thickness

The sample is placed in a cell. The material is contaminated with a 1 x 50 µl droplet of nerve agent by means of a dispenser. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the nerve agent. Underneath the cell an adsorption paper is placed. The whole is placed in a thermostated cupboard. At different times after contamination, a check on the penetration of the test specimen is performed. To check the penetration of agent, the adsorption paper is removed, an amount of BuChE enzyme solution is sprayed on the paper and after about 10 seconds an amount of the substrate solution is sprayed on the paper. To check the performance of the enzyme- and substrate solution a blank is performed as well, using a fresh adsorption paper and the same detection procedure. The colour of the paper only changes from blank/slightly yellow to purple/blue when no nerve agent (VX) is present.

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Date 14-6-2011
Page 4 of 4

Ref.no.: 4095
Doc.no: 3599



Classification report

Manufacturer: INDUTEX S.p.A.
Via S. Francesco 8/10 20011 Corbetta MI

Item: TESSAFORM®

Performance of material			EN 14325:2004	
Test	Requirement		Result	Class/Conformity
Abrasion Resistance (EN 530 method 2)	Class 6	> 2000 cycles	> 2000 cycles	Class 6 Rdp 15RA08108
	Class 5	> 1500 cycles		
	Class 4	> 1000 cycles		
	Class 3	> 500 cycles		
	Class 2	> 100 cycles		
	Class 1	> 10 cycles		
Trapezoidal tear resistance (EN ISO 9073-4)	Class 6	> 150 N	50.8 N warp 31.5 N weft	Class 2 Rdp 15RA08108
	Class 5	> 100 N		
	Class 4	> 60 N		
	Class 3	> 40 N		
	Class 2	> 20 N		
	Class 1	> 10 N		
Tensile strength (EN ISO 13934-1)	Class 6	> 1000 N	190 N warp 130 N weft	Class 3 Rdp 15RA08108
	Class 5	> 500 N		
	Class 4	> 250 N		
	Class 3	> 100 N		
	Class 2	> 60 N		
	Class 1	> 30 N		
Puncture resistance (EN 863)	Class 6	> 250 N	15.5 N	Class 2 Rdp 15RA08108
	Class 5	> 150 N		
	Class 4	> 100 N		
	Class 3	> 50 N		
	Class 2	> 10 N		
	Class 1	> 5 N		
Flex cracking resistance (EN 7854)	Class 6	> 100 000 c.	> 15.000 cycles	Class 4 Rdp 15RA08108
	Class 5	> 40 000 c.		
	Class 4	> 15 000 c.		
	Class 3	> 5 000 c.		
	Class 2	> 2 500 c.		
	Class 1	> 1 000 c.		
Bursting resistance (EN 13938-1)	Class 6	> 850 kPa	141 kPa	Class 2 Rdp 15RA08109
	Class 5	> 640 kPa		
	Class 4	> 320 kPa		
	Class 3	> 160 kPa		
	Class 2	> 80 kPa		
	Class 1	> 40 kPa.		



Classification report

Test	Requirement	Result	Class/Conformity
Resistance to penetration to liquid (EN ISO 6530)	a performance level 2 shall be obtained for at least one of the chemicals referred Class 3: < 1% Class 2: < 5% Class 1: < 10%	H ₂ SO ₄ 0.0 %	Class 3
		NaOH 0.0 %	Class 3
		o-xylene 0.0 %	Class 3
		Butan-1-ol 0.0 %	Class 3
Repellency to liquid (EN ISO 6530)	a performance level 3 shall be obtained for at least one of the chemicals referred class 3: > 95% class 2: > 90% class 1: > 80%	H ₂ SO ₄ 95.5 %	Class 3
		NaOH 96.6 %	Class 3
		o-xylene 95.7 %	Class 3
		Butan-1-ol 95.1 %	Class 3 Rdp 15RA08108

Biological tests **EN 14126:2003**

Test	Requirement	Result	Class/Conformity
Resistance to penetration by contaminated liquids under hydrostatic pressure (ISO 16604)	Class	Test pressure	kPa 20 class 6 Rdp 15RA08109
	6	20 kPa	
	5	14 kPa	
	4	7 kPa	
	3	3,5 kPa	
	2	1,75 kPa	
Resistance to penetration by infective agents due to mechanical contact with substances containing contaminated liquids. (ISO 22610)	Class	Breakthrough	t >75 class 6 Rdp 15RA08109
	6	t > 75	
	5	60 < t ≤ 75	
	4	45 < t ≤ 60	
	3	30 < t ≤ 45	
	2	15 < t ≤ 30	
Resistance to penetration by contaminated liquid aerosols (ISO 22611)	Class	Penetration ratio	log > 5 class 3 Rdp 15RA08109
	3	log > 5	
	2	3 < log ≤ 5	
	1	1 < log ≤ 3	
Resistance to penetration by contaminated solid particles (ISO 22612)	Class	Penetration	Log ufc ≤ 1 class 3 Rdp 15RA08109
	3	≤ 1	
	2	1 < log ufc ≤ 2	
	1	2 < log ufc ≤ 3	

Additional tests **EN 1073:2003**

Test	Requirement	Result	Class/Conformity
Resistance to ignition (EN 13274-4)	self extinguishing" material	Post-combustion: NO Post-incandescence: NO Droplets : NO Holes : NO	PASS Rdp 15RA08108
Resistance to blocking (EN 25978)	Class 2	No blocking	Class 2 Rdp 15RA08108
	Class 1	blocking	

Uncertainty: an estimation of uncertainty of measurement has not been taken in account when making a classification or judgement to any pass/fail criteria

Date:

30.09.2015

PPE Testing and Certification Manager

Marco Colli

JetGuard® PLUS Class 3 Ensemble

NFPA 1994 Physical Performance Data

NFPA 1994 Class 3 Garment Ensemble Requirements

Test	Requirement	Lab Results	Pass/Fail
Overall Suit Ensemble Function and Integrity Test	<ul style="list-style-type: none"> • Completion of tasks within 15 minutes • No liquid penetration (outer gloves and outer boots shall not collect liquid) • Accommodation of head protection • 20/35 visual acuity or better 	Compliant	Pass

NFPA 1994 Class 3 Garment Element Requirements

Test	Requirement	Lab Results	Pass/Fail
Industrial Chemical Permeation Resistance	Average breakthrough time ≥ 60 min. (Garment & Garment Seam)	Garment: >180min. Seam: >180min.	Pass
Warfare Agent Permeation Resistance	$\leq 1.25 \mu\text{g}/\text{cm}^2$ avg. cumulative permeation in 1 hr. for Sarin (GB) and VX (Garment & Garment Seam)	<u>Sarin (GB)</u> Garment: $\leq 1.25 \mu\text{g}/\text{cm}^2$ Seam: ND (<0.000745) <u>VX</u> Garment: $\leq 1.25 \mu\text{g}/\text{cm}^2$ Seam: ND	Pass
Warfare Agent Permeation Resistance	$\leq 4.0 \mu\text{g}/\text{cm}^2$ avg. cumulative permeation in 1 hr. for Lewisite (L) and Distilled Mustard (HD) (Garment & Garment Seam)	<u>Lewisite (L)</u> Garment: $\leq 1.25 \mu\text{g}/\text{cm}^2$ Seam: $\leq 1.25 \mu\text{g}/\text{cm}^2$ <u>HD</u> Garment: $\leq 1.25 \mu\text{g}/\text{cm}^2$ Seam: $\leq 1.25 \mu\text{g}/\text{cm}^2$	Pass
Viral Penetration Resistance	No penetration of Phi-X-174 bacteriophage (Garment & Garment Seam)	Garment & Seam: No penetration	Pass
Burst Strength	Average bursting strength $\geq 134\text{N}$	268.9N	Pass
Puncture Propagation Tear Resistance	Average puncture propagation tear resistance $\geq 25 \text{ N}$	MD: 36.36N XD: 34.12N	Pass
Cold Temperature Performance	Bending moment $\leq 0.057 \text{ N}\cdot\text{m}$ at an angular deflection of 60° at -25°C	Pass	Pass
Breaking Strength	Breaking strength $\geq 1.31 \text{ kN}/\text{m}$ (Garment Seam and Closure Assembly)	Seam: 1.81kN/m Closure Assembly: 2.51kN/m	Pass



Return address: P.O.Box 45, 2280 AA Rijswijk, The Netherlands

Indutex S.p.A.
Attn. Mr. P.M. Rossin
Via San Francesco 8/10
20011 Corbetta (MI)
ITALY



Subject
Test report Tessa form

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Date
13 March 2003

Our reference
03D1/307/15122/brap

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Project number
15122

Your reference
Signed quotation 03D1f/186

At the request of Indutex S.p.A. (signed quotation 03D1f/186, dated 14-02-2003) TNO-PML performed permeation tests with several chemical warfare agents on Tessa form raw material. The material is archived in our quality system with code 03FB0806. Detailed descriptions of the tests are written in the Annex. Tests were performed in triplicate on the flat material. Test results are presented in Tables 1 and 2.

Note that quantitative pressure tests are based on the NATO standards and that the qualitative tests (colour reaction) are based on the FINABEL O.7.C convention.

The Standard Conditions for Research Instructions given to TNO, as filed at the Registry of the District Court and the Chamber of Commerce in The Hague shall apply to all instructions given to TNO.

Table 1 Test results permeation tests (pressure test, quantitative)

Agent	Amount of CWA on the sample (mg)			Penetrated amount ($\mu\text{g}/\text{cm}^2$)		
Mustard agent (HD)	12.8	11.3	9.9	0.2	< 0.05	0.2
Soman (GD)	16.8	14.6	16.4	< 0.05	< 0.05	< 0.05
VX	14.8	10.0	12.4	< 0.05	< 0.05	< 0.05

Contaminated surface is 10 cm².

Table 2 Test results permeation tests (qualitative colour reaction)

Agent	Thickness of sample (mm)			Breakthrough time (h:min)		
Mustard agent (HD)	0.22	0.22	0.22	3:00	3:00	3:00
Soman (GD)	0.22	0.21	0.22	> 24:00	> 24:00	> 24:00
Sarin (GB)	0.20	0.22	0.22	> 24:00	> 24:00	> 24:00
Tabun (GA)	0.23	0.21	0.22	> 24:00	> 24:00	> 24:00
VX	0.22	0.21	0.21	> 24:00	> 24:00	> 24:00

The colour change of the detection papers is visually checked at different times after starting the test.



Date
13 March 2003

Our reference
03D1/307/15122/brap

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We hope all things are clear to you. In case of any questions or problems, please do not hesitate to contact us.

Kind regards,

A handwritten signature in blue ink, appearing to be 'R.J. van Eenennaam', is located on the left side of the page.

R.J. van Eenennaam, BSc.
Project manager

A handwritten signature in blue ink, appearing to be 'H.F.A. Trimbos', is located on the right side of the page.

H.F.A. Trimbos, M.Sc.
Manager Research Group
Physical Protection



Date
13 March 2003

Our reference
03D1/307/15122/brap

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ANNEX TEST METHODS

Laid droplet HD, GD or VX

Parameter	units	specification
Cell size	(cm ²)	12.5
Contamination	(g/m ²)	--
Amount of droplets		1
Droplet size	(μl)	30 mg
Surface of pressure foot	(cm ²)	10
Pressure	(kg/ cm ²)	0.2
Duration of pressure	(min)	15
Air flow over material	(m/s)	0.5
Air flow through material	(cm/s)	0
Air flow under material	(ml/min)	100
Method of detection		GC
Temperature	(°C)	30
Humidity	(%RH)	<5
Test duration, max	(hours)	4
Detection limit		0.05 μg CWA / cm ²
Result reported	μg/cm ²	Penetrated amount

The NBC material is placed on a glass plate and contaminated with 1 droplet of 30 mg agent. A teflon plate (surface of 10 cm²) and a weight are placed onto the sample, making a pressure of 0.2 kg/cm². After 15 minutes the weight is removed and the sample is put in a glass test cell.

The remaining amount of CWA on the teflon plate is determined by weighing. From this value the actual contamination amount on the sample is calculated (this is the difference between the placed 30 mg and the found amount on the teflon plate) and is reported.

The cells containing the samples are placed into the test equipment. During the test thermostated air is drawn over the face of the samples at a speed of 0.5 m/s. The CWA penetrating through the NBC material is collected in an organic liquid, Di Ethyl Succinate (DES). At the end of the test, the amount of agent present in the DES is determined by GC.



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13 March 2003

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Qualitative Mustard agent test

Parameter	units	specification
Cell size	(cm ²)	12.6
Contamination	(g/m ²)	
Amount of droplets		1
Droplet size	(μl)	50
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Air flow under material	(ml/min)	0
Method of detection		visual, colour change
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	24
Detection limit		0.1 μg/cm ² (pinpoint breakthrough) or 4 μg/cm ² (continuous and homogeneous breakthrough)
Result reported	(hours)	Time until first appearance of colour change
	(mm)	Thickness

The sample is placed in a cell. A 1.5 cm² piece of filter paper is placed on to the sample and is contaminated with 50 μl mustard agent by means of a dispenser. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the mustard agent. Underneath the cell a detection paper made out of Congo Red paper with tiny drops of chloroimide is placed. The whole is placed in a thermostated cupboard and the detection paper is inspected at regular intervals for the appearance of blue dots caused from the reaction between the chloroimide and mustard agent.



Date
13 March 2003

Our reference
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Qualitative Nerve agent (GA/GB/GD/VX) test

Parameter	units	specification
Cell size	(cm ²)	12.6
Contamination	(g/m ²)	
Amount of droplets		1
Droplet size	(μl)	50
Air flow over material	(m/s)	0
Air flow through material	(cm/s)	0
Air flow under material	(ml/min)	0
Method of detection		visual, colour
Temperature	(°C)	30
Humidity	(%RH)	--
Test duration, max	(hours)	24
Detection limit		Approx. 0.05 μg/cm ²
Result reported	(hours)	Time until first appearance of colour change
	(mm)	Thickness

The sample is placed in a cell. A 1.5 cm² piece of filter paper is placed on to the sample and is contaminated with 50 μl nerve agent by means of a dispenser. An inverted petri dish sealed with wax on top of the cell prevents evaporation of the nerve agent. Underneath the cell an adsorption paper is placed. The whole is placed in a thermostated cupboard.

At different times after contamination, a check on the penetration of the test specimen is performed. To check the penetration of agent, the adsorption paper is removed, an amount of BuChE enzyme solution is sprayed on the paper and after about 10 seconds an amount of the substrate solution is sprayed on the paper. To check the performance of the enzyme- and substrate solution a blank is performed as well, using a fresh adsorption paper and the same detection procedure. The colour of the paper only changes from blank/slightly yellow to purple/blue when no nerve agent (GA, GB, GD or VX) is present.

TNO Prins Maurits Laboratory

Fax message

Nederlandse Organisatie voor
toegepaste natuurwetenschappelijk
onderzoek / Netherlands Organisation
for Applied Scientific Research



To
Indutex S.p.A.
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Subject
Report Tessaform

Date
12 February 2003

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03D17/171/15122/brap

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Your reference
Signed quotation 03D17/145

Number of pages
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If you have not received all pages,
please call us.

Dear Mr. Rossin

At the request of Indutex S.p.A. (signed quotation 03D17/145, dated 05-02-2003) TNO-PML performed permeation tests with Lewisite on Tessaform raw material. The material is archived in our quality system with code 03FB0806. A complete description of the test is written in the Annex. Test was performed in triplicate. Test results are presented in Table 1.

Table 1 Test results

TNO sample ID	Thickness of sample (mm)	Breakthrough time (h:min)
03FB0806	0.26	4:00
03FB0806	0.25	2:45
03FB0806	0.25	2:45

The colour change of the detection papers is visually checked at different times after starting the test.

We hope all things are clear to you. In case of any questions or problems, please do not hesitate to contact us.

Kind regards,

R.J. van Eenennaam, BSc.
Projectmanager

H.F.A. Trimbos, M.Sc.
Manager Research Group
Physical Protection

PHOTOS OF CARA COVERALLS

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JetGuardPLUS® coveralls designed specifically for the CARA Program



Figure 1- JetGuardPLUS coveralls

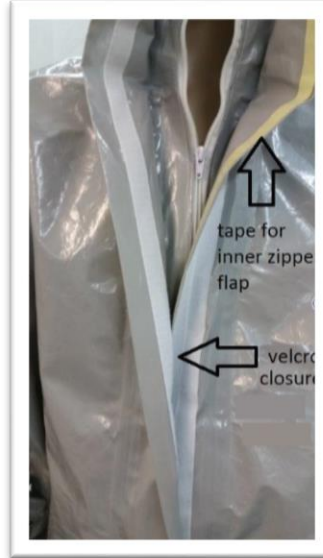


Figure 2- Velcro Closure on Zipper Flap



Figure 3- Straight back



Figure 4- elastic wrists



Figure 5- Respirator Flap with Velcro Closure



Figure 6 - Straight Leg