

Tested Aluminized Materials

Material - Number	832.0	878.0	963.0	858.0	833.0	836.0	966.0	848.0	865.0
Tradename	PREATEX	ARATEX	BASOFIL	PREATEX	ARATEX	BARATEX	BASOFIL	GLAWIT	GLAWIT
Material description	70% carbon-/ 30% para-aramide	100% para-aramide	60% melamine resin 40% para-aramide	70% carbon/ 30% para-aramide	100% para-aramide	75% cotton / 25% para-aramide	60% melamine resin 40% para-aramide	100% fibreglass	100% fibreglass backside coated
	aluminized by transfer film, PUR - glue				aluminized PET film (double mirror), glued with silicone		PET-film	aluminized PET film (double mirror), glued with silicone	
Weight [g/m ²]	340	420	300	720	415	385	265	780	545
Application	convection, radiant heat, metal splashes								
Temperature range	<1.300° C								
Product packing	PE-bag, dark coloured								
Dispatch packing	cardboard box								
Storage	dustfree, protected from light								
Washing temperature	not washable								
Dry cleaning	not dry cleanable								
Waste removal	waste, depending of contamination by use								
Allergies	no skin irritation known							fibreglass may cause skin irritations	
Tensile strength EN 470 / ISO 5081	warp: 1.829 N weft: 1.358 N	4.000 N 3.000 N	3.000 N 1.800 N	2.000 N 1.000 N	618 N 601 N	551 N 321 N	2.463 N 2.090 N	650 N 550 N	1.100 N 850 N
Tear strength EN 470 / 4674	warp: 118 N weft: 98 N	260 N 250 N	400 N 400 N	290 N 215 N	74 N 50 N	70 N 51 N	156 N 138 N	120 N 110 N	70 N 60 N
Thermal Properties	Level / Rate	Level / Rate	Level / Rate	Level / Rate	Level / Rate	Level / Rate	Level / Rate	Level / Rate	Level / Rate
6.2 Burning behaviour EN 532	A	A	A	A	A	A	A	A	A
6.3 Convective heat EN 367	B1 5	B2 7	B1 6	B2 12	B2 11	B2 7	B1 6	B2 9	B2 7
6.4 Radiant heat EN 366	C2 50	C2 67	C2 78	C3 92	C4 207	C4 173	C4 >175	C2 80	C2 47
6.5 Molten metal (Al) EN 373	D2 220	D2 240	D3 358	D3 360	D3 351	D3 351	D2 202	D1 110	D1 140
6.6 Molten metal (Fe) EN 373	E2 140	E3 205	E3 210	E3 205	E3 201	E3 201	E1 63	E3 205	E2 145
7 Marking	 A B1 C2 D2 E2	 A B2 C2 D2 E3	 A B1 C2 D3 E3	 A B2 C3 D3 E3	 A B2 C4 D3 E3	 A B2 C4 D3 E3	 A B1 C4 D2 E1	 A B2 C2 D1 E3	 A B2 C2 D1 E2
Notified Body	BIA, Alte Heerstraße 111, D-53757 Sankt Augustin						STFI 09125 Chemnitz	BIA, Alte Heerstraße 111, D-53757 St. Augustin	
CE-type examination no.	9604017	9604021	199823583	9604019	2001 23637	2001 23637	Z 2732/06-3759/06	9604018	9604020
Certification no.	961153	961165	981149	961155				961154	961156

The *italic* printed requirements are not part of EN 531.

Personal Protective Equipment (PPE) made of aluminized textiles

Information for selection, use, care and maintenance (SUCAM)

ALWIT's experience in this field is based on the knowledge of manufacturing PPE from aluminized materials since 1954.

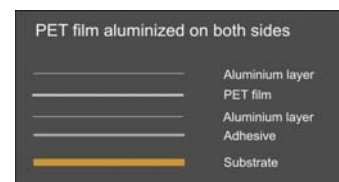
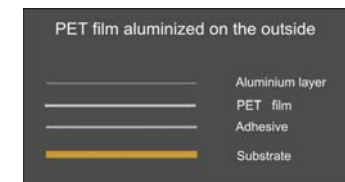
Selection

There are different techniques to aluminize textiles, to be seen at the table below, and which are decisive for the right selection. None of these techniques is defined in a standard, just the ready finished material has to meet the requirements of the test or performance standards, e.g. EN 531.

From that the type of glue that joints the aluminization together with the textile, gets a special importance. According to the type of adhesive it needs more or less flame retardancy agents (e.g. halogen) or solvents, of which the harmfulness for environment and health are wellknown.

Description	Adhesive	Flame retardancy agent / solvents
Transfer – or take off film (erroneously also called „high vacuum“)	PUR	yes
PET-film, one side (outside) aluminized	PUR	yes
PET-Folie, both sides aluminized, so-called „double mirror“	PUR	yes
PET-Folie, both sides aluminized, so-called „double mirror“	NEOPRENE	yes (chlorine)
PET-Folie, both sides aluminized, so-called „double mirror“	SILICONE	no
Alu metal sheet	PUR	yes

Schematic representation



Film thickness in μ	Optical density ASTM D1003-77*	Stiffness	Application	
			IR - radiation	Metal splashes
No film	2.5	soft	good	fair
6	2.5	tough	good	good
6	2 x 2.5	tough	very good	good
6	2 x 2.5	very soft	very good	good
6	2 x 2.5	very soft	very good	very good
10		very tough	not appropriate for PPE; isolations	

* Since the aluminization is just a hint, the thickness cannot be measured in μ ; therefore the optical density is indicated in Å (Angström).

Selection of appropriate PPE and the right material of which PPE is manufactured is based on a risk assessment made by the user according to the European Directive 89/656 EC.

When tested against radiant heat according to ISO 6942 the different types of aluminization nearly do not differ from each other.

However, when the protective properties against metal splashes are tested according to EN 373, differences may occur by

- Type and thickness of basic material
- Type of aluminization
- Type of used adhesive.

Aluminized textiles are not water vapour permeable, and therefore not able to realize sufficiently the heat exchange between body core temperature and the atmosphere. Therefore PPE made from aluminized textiles may be worn for short time use only. For that reason it is recommended likely not to protect the whole body but just those parts which are exposed to the risk of radiant heat and / or metal splashes. In such cases the design of PPE is of great importance by improving comfort, e.g. by air ventilation openings, spacious design, low weight without disregard of protective properties.

Use

Aluminized PPE shall be worn over standard workwear or normal protective clothing.

While wearing aluminized PPE operation time shall be limited to the absolute necessary extent in order to avoid heat stress.

At first of all aluminized PPE are intended to protect against radiant heat, molten metal splashes and metalloenes.

Protective properties are at least reduced or partially gone lost when the effect of reflection is reduced. This may happen by soiling, abrasion or oxydation, and can be checked by visual inspection with nearly all types of aluminization.

Except however with aluminization by „double mirror“ film:

Even if the outer coat of aluminization has disappeared, the inside aluminization would still appear through the PET film as shiny reflecting. But this impression is deceptive; at this point the PET film is not more aluminized at the outside, and absorbes a lot of the striking radiation so the protective properties cannot be ensured in a full range. However the protection is not totally gone lost as in case of the other types of aluminization.

Care

Because aluminium oxydises faster under high humidity aluminized PPE may not be washed either cleaned.

In order to remove soot or soiling from the surface, it is recommended to clean it under low pressure by a slightly humid sponge or soft cloth.

Cleaning of the inside due to hygienic reasons is also not possible. Use of deodorant sprays is not recommended, just as aluminium spray to repair blind places, both for the same reason: The burning behaviour of the material could be influenced negatively.

If by hygienic aspects washing or cleaning is required, it might only be possible when detachable and washable linings are incorporated in the PPE.

Maintenance / Storage

When lost or partial lost of protection based on the ability to reflect radiant heat - by what influence as it may - is getting visible, PPE should be removed from service.

It is not possible to repair damaged aluminization. In fact aluminium sprays and silver bronze are also offered for such applications but they do not reach a considerable effect of reflection on textiles. Moreover, contents or propellants of those sprays may contain inflammable components that may deteriorate the flame spread properties of the material.

If, depending on the individual conditions of work, a limited and defined area of the PPE would be worn out earlier than the rest of PPE, that area could be repaired by the manufacturer applying a patch. Such especially exposed areas may be reinforced from the start by a patch that might also be detachable and exchangeable.

As already said, humidity accelerates the oxydation of aluminization, and therefore aluminized PPE should be stored under dry conditions.

As far as not used, aluminized PPE should be stored dustfree in their packaging.

Warranty

The general warranty of 2 years is also valid for aluminized PPE.

However, generally life span of PPE made from textiles is often much shorter. That is especially true for aluminized PPE as to be seen from the properties of aluminized textiles described above.

As most of personal protective equipments aluminized PPE are used as a preventative measure, and often not usable anymore when being exposed e.g. to high radiant, contact or convective heat or molten metal splashes.

Same is for aluminized PPE intended to protect people whilst fighting fire. Such PPE is not frequently used, and could be used more than 2 years if properly stored. But here also is in force that it should not be re-used after an action next to a fire with intense radiant heat or flames.

Because use of PPE for firefighting should be trained regularly, special attention should be paid to the inspection of PPE after the training and to proper storage.

Therefore guarantee cannot be taken on for following cases:

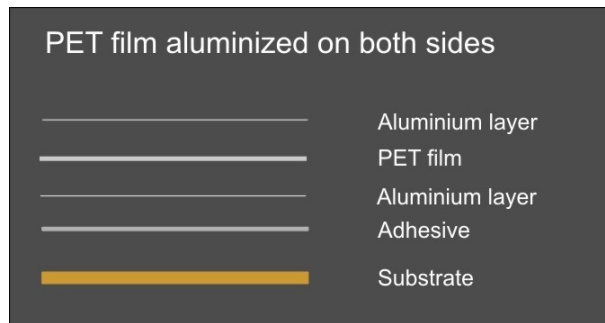
- Peeling of aluminization by oxydation, if caused by improper care or storage or environmental conditions unknown to the manufacturer
- Abrasion of the regular just 6 μ aluminium cover by mechanical influence
- Exposition of PPE to flames, heat or molten metal
- Improper use, e.g. of closure systems
- Improper care or repair

Guaranteed are therefore only

- The careful selection of raw material and accessories depending on the risk assessment of customer
- Good and faultless workmanship of PPE
- Proper packing

Why PPE made of ARATEX* 833.0 ?

ARATEX* 833.0 is aluminized in the so-called "double-mirror" process and was developed especially for PPE against heat radiation and metal droplets. The schematic illustrates the meaning of "double mirror": a PET film that is aluminized on **both** sides and bonded to the substrate. This offers the advantage that an inner reflective aluminum layer remains even after the external aluminum layer has worn off.



The process alone, however, is not the distinguishing feature. There are several other materials that are also produced in this process, and yet **ARATEX 833.0** differs in a number of significant aspects.

A closer look at the sequence of layers of **ARATEX 833.0** from the inside to the outside quickly shows that a lot of thought has gone into the development of this product that combines protection, wearing comfort and environmental compatibility like no other aluminized material.

1. Substrate

a) Pile

The uniform raising of the rear side of the material provides an excellent insulation thanks to a natural air cushion, which eliminates the need for an additional lining and thus avoids the otherwise inevitable weight increase.

b) Knitted fabrics

Knitted fabrics are softer and more flexible than woven fabrics which significantly contributes to the increased wearing comfort. Knitwear contains more insulating air and thus offers better protection. Knitwear made of **ARATEX** offers sufficient tensile strength and tear growth resistance even without a so-called rip stop weave, which would only limit the extensibility and flexibility of the product.

2. Silicone-based adhesive



A silicone-based adhesive offers unique properties:

- a) It is very **soft**.
- b) It is **environmentally sound**, as it does not require any hazardous additives to prevent the propagation of flames.
- c) It hardly develops any **flue gases** when it is decomposed by heat.
- d) It provides excellent protection against **metal droplets**.

3. "Double Mirror" PET film aluminized on both sides (see above)

* ARATEX is ALWIT's brandname for materials made of 100% para-aramid fibres as e.g. KEVLAR® or TWARON®

Material number	833.0
Trademark	ARATEX
Outershell	100% para-aramide, knitted material, inside raised, aluminised by PET film (double mirror) with silicone glue
Weight [g/m ²]	415
Lining (1) thermal lining	no
Lining (2) inner lining	no
Application	convection, radiant heat, metal splashes
Temperature range	<1.300° C
Packing unit	Depending on type of PPE
Product packing	PE-bag, dark coloured
Dispatch packing	cardboard box
Storage	dustfree, protected from light
Washing temperature	not washable, only to be cleaned by a moist sponge
Cleaning	not dry cleanable
Waste removal	waste, depending of contamination by use
Allergies	No skin irritation known

Material number		833.0
General requirements	Standard	
5.1 Sizes	EN 340	Depending on type of PPE
Length		Depending on type of PPE
5.2 Dimensional change	ISO 5077	Not washable
<i>El. Surface resistivity</i>	EN 1149/1	
<i>El. vertical resistance</i>	EN 1149/2	
<i>Tensile strength [N]</i>	ISO 5081 ISO 1421	warp: 618 N weft: 601 N
<i>Tear strength [N]</i>	ISO 4674	warp: 74 N weft: 50 N
Thermal requirements	Standard	Level / Rate
6.2 Burning behaviour	ISO 15025	A
6.3 Convective heat HTI ₂₄	EN 367	B2 11
6.4 Radiant heat t ₂ [s]	ISO 6942	C4 207
6.5 Molten metal	EN 373 (Al)	D3 351
6.5 Molten metal	EN 373 (Fe)	E3 201
7 Marking	EN 531 / 340	 A B2 C4 D3 E3
Notified Body		 BGIA, Alte Heerstraße 111, D-53757 Sankt Augustin
CE-type examination no.		2001 23637
Certification no.		

Italic printed requirements are not part of EN 531.

