LANGUAGE
EN

HOW TO CHOOSE THE RIGHT PRE-PAINTED PRODUCT

PART OF MANNI GROUP

ISOPAN
INSULATING DESIGN

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HOW TO CHOOSE THE RIGHT PRE-PAINTED PRODUCT

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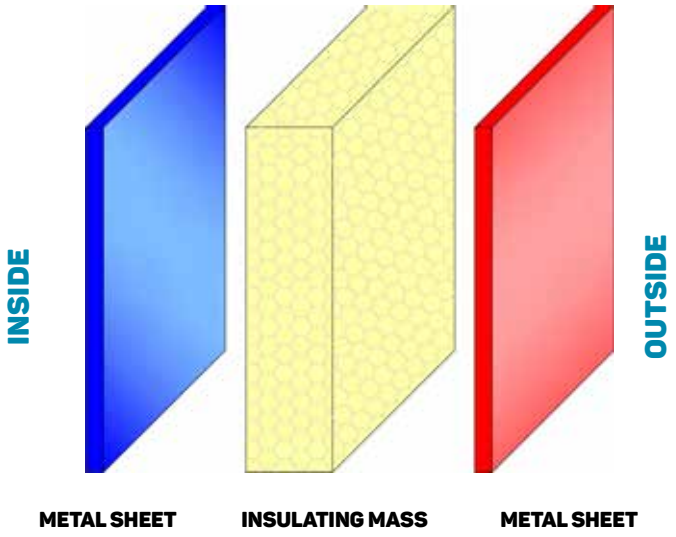
THE INSULATING PANEL AND THE PRE-PAINTED SHEETS: SOME NOTES

INTRODUCTION ON PRE-PAINTED SHEETS

This Isopan guide aims at giving clients and users advices on how to choose the right pre-painted sheet looking at the technical properties of the product.

ISOPAN PANELS

The ISOPAN Panel is assembled in a continuous process from an insulting mass in rigid polyurethane with high density closed cells or in composite mineral wool with two metal profiled sheets. The two sides of the panel are sometimes exposed to two completely different environments.



- **EXTERNAL SURFACE:** it is exposed to air pollution, wind, sun and UV, which raise the temperature of the metal surface and trigger a physic-chemical reaction on the organic coatings.
- **INTERNAL SURFACE:** it has a significantly lower temperature than the external surface thanks to the thermo insulation of the panel. It is exposed to the internal environment and its pollutants coming from production lines, condensations and contact with chemicals used in washing or coming from steams.

The user must take these aspects into account before making his choice about the panel model and above all about the type of metal sheet.

THE METAL OF THE TWO SURFACES

The metal must be chosen on the basis of considerations on the expected durability of the product, the environment to which it is exposed, its aesthetics and its price.

Isopan provides a wide range of metal sheets:

"BLANK" METALS

1. Aluminium, copper, stainless steel.

COATED METALS

2. Hot-dip galvanised steels with different ranges of zinc, aluminium-zinc steels (ALUZINC), pre-painted steels and pre-painted aluminium.

PRE-PAINTED SHEETS FOR PANELS

Pre-painted sheets can be provided on hot-dip galvanised steel substrate or on aluminium. Some of the following considerations about the layer of paint can be applied both to steel and to aluminium. Since there is a great demand of pre-painted products on galvanised steel we will handle these products first.

PRE-PAINTED PRODUCTS ON GALVANISED STEEL

The pre-painted steel sheets improve further the following properties:

- The structural properties of the panel, thanks to the quality of the used steels
- The expected life of the panel, since they protect the insulating mass and improve their appearance (such as the colour) as well as the aesthetics of the entire building.

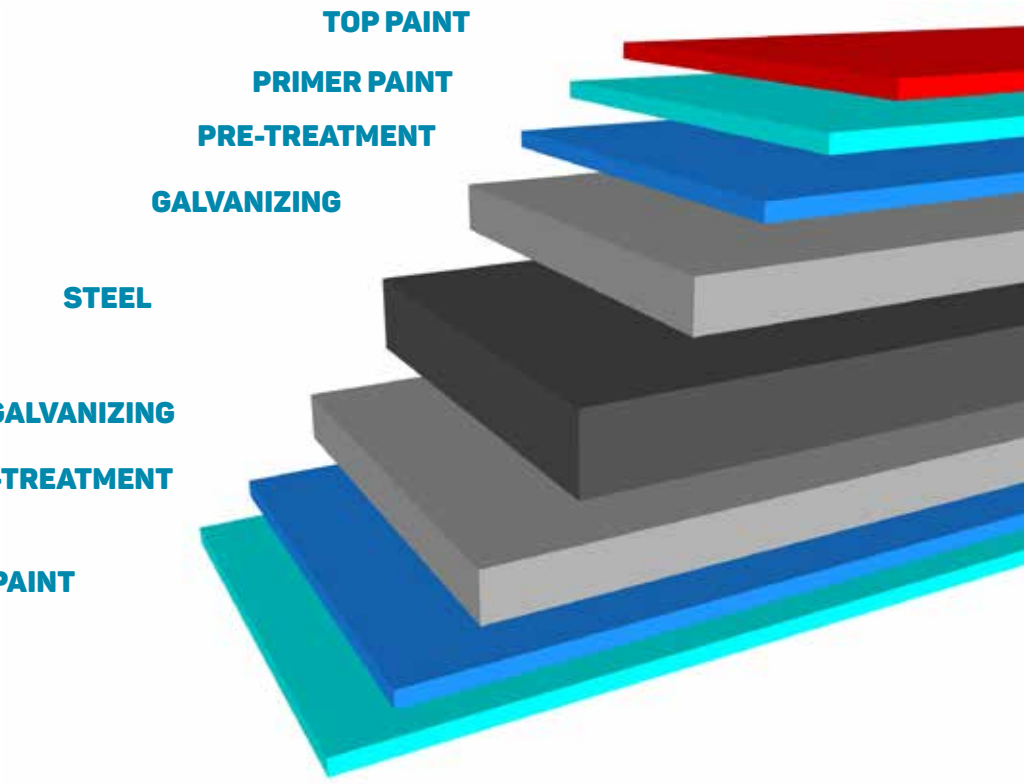
BRIEF INTRODUCTION ON THE PRODUCTION OF PRE-PAINTED PRODUCTS

The steel bands are pre-painted on a continuous process called coil coating. The metal sheet that has to be pre-painted is made of hot-dip galvanised bands (SENDZMIR) which are appropriately rubbed down on the surface and coated with a zinc layer of 100 g/m2 to 275 g/m2, depending on the purpose.

The steel band is unrolled on the continuous line and the paint is applied with coaters in the following steps:

1. Chemical treatment on the surface as conversion coating; this layer is essential to improve paint adhesion and reduce under skin corrosion. Both sides of the band undergo this treatment
2. Wet application of the anti-corrosion primer paint to one or both surface.
3. Baking primer paint in an oven by 240 °C
4. Wet application of finishing paint, enamel, top paint with the desired colour that will be visible only on one side or on both sides (for example in case of chequer plates both sides are visible) In case of panels only one side is visible because the other side is covered by the insulating mass. At the same time application of the back coat paint to the bottom side of the band or of the top paint in case both sides are visible.
5. Baking top paint in an oven.
6. Cooling and rolling.

The pre-painted band is ready for the production of panels or chequer plates without further manufacturing



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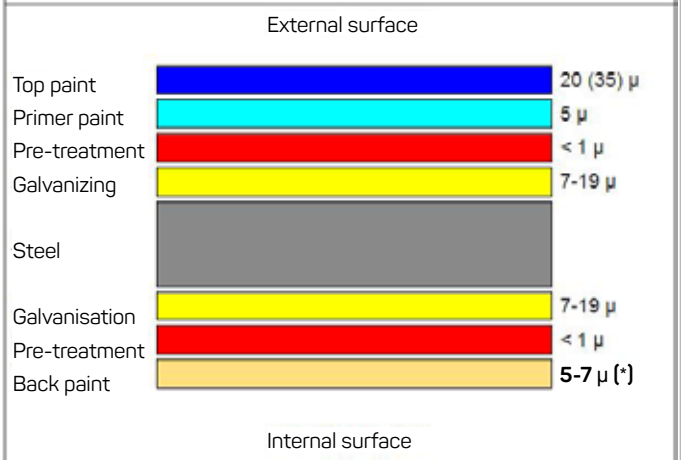
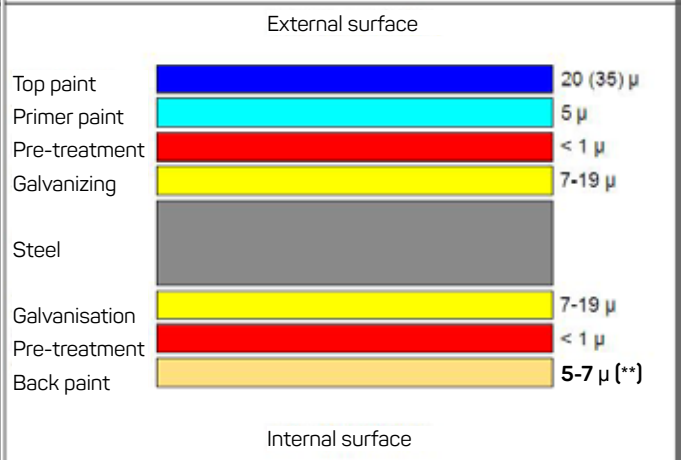
PAINT LAYERS CAN BE APPLIED WITH ONLY ONE CYCLE OF THE PAINTING LINE BY SIMPLY SETTING THE THICKNESS OF EVERY LAYER.

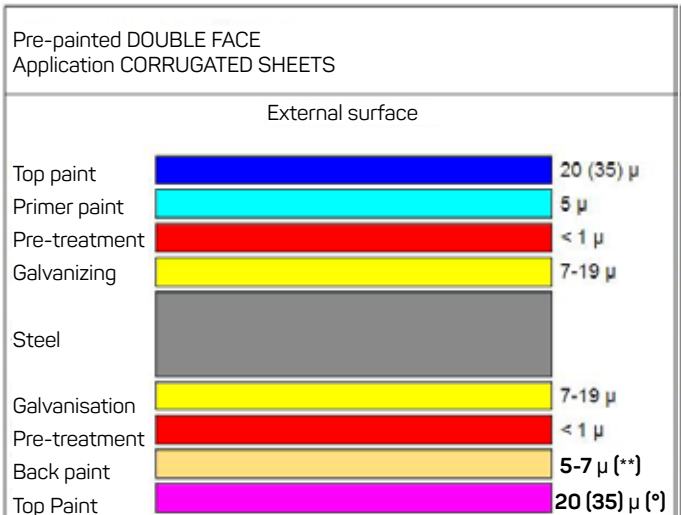
Pre-painted STANDARD
Application CORRUGATED SHEETS



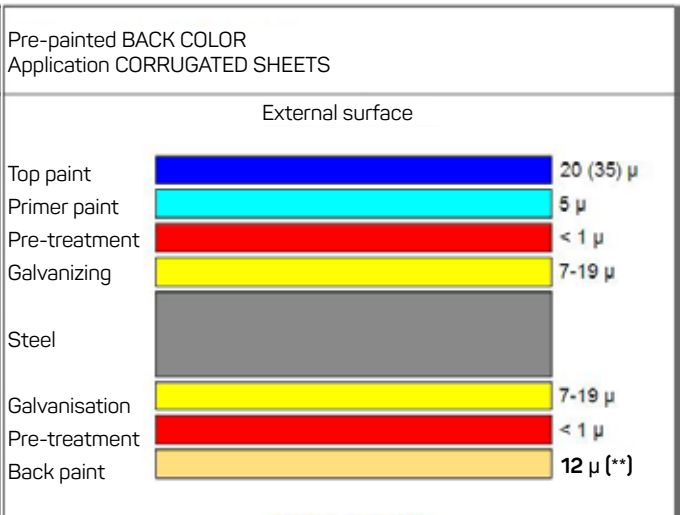
Pre-painted BACK FOAM
Application PANELS



Pre-painted DOUBLE FACE
Application CORRUGATED SHEETS



Pre-painted BACK COLOR
Application CORRUGATED SHEETS



(*) Back coat paint without guarantee
(**) Foaming paint with guaranteed adhesion to the insulating mass
(***) Back Paint with a similar colour to the external surface
(°) 35 microns as alternative to the 35 of the external surface

1 microns (µ) corresponds to 0,001 mm

PROPERTIES OF THE COIL COATING PAINTS

The used paints have been exclusively designed for the "coil coating" process and are made of polymer resins, which are fasteners, cross linkers such as melamine, several additives, solvents as well as colour pigments.

POLYESTER PAINTS

Paints made with oil free polyesters or amino resins must guarantee high product durability; by durability we mean no degradation and not absence of holes. What determine the product durability the most are water and its salts carried by the wind (in few words corrosion). UV action coming from the sun is also called photo degradation. In case of pre-paints photo degradation causes changes in the colour, gloss variations and sometimes destruction of the building polymers, which is also called chalking. These affect very much the aesthetics of the product because they spoil the colour, gloss and guarantee of durability decided during the planning.

DEVELOPMENT OF POLYESTERS

By changing some of the components of the polyesters, in the last 20 years the suppliers of coil coating paints have been improving considerably the standard polyester's performances and proposed new types:

HIGH DURABILITY POLYESTERS PS HD

These are Polyesters with more resistance to UV and chemical corrosion in comparison to standard polyesters.

POLYCARBONATE FLUORIDE PAINTS, PVF AND PVDF

As alternative the polyesters, new poly fluoride resins with more resistance to UV and chemicals have been introduced in the range of products.

THICKER PAINTS

Another way of resisting the chemical corrosion and the action of UV is by enhancing the barrier effect of the paint, in other words by increasing their 25-micron standard thickness. A thicker paint layer represents a bigger physical barrier against pollutants. A standard 35-micron thickness can be made by only one cycle of the production line.

With more cycles we can obtain a bigger layer of 55-60 microns, made of new generation resins.

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PAINTS WITH BARRIER EFFECT, PVC

This product is also called Plastisol and it is made by a dispersion of PVC, polyvinyl chloride. It can have thickness from 100 microns to above 200 microns, which represents an optimal barrier. Chemical resistance is however lower than by PVDF.

PLASTIC COATED SHEETS - SKIN PLATE

Skin plates are steels, which are not coated with paints but with PVC films. They are usually used for inside application. They are usually applied for internal surfaces of wall panels, which have to be washed very often because of their aesthetic value. They are also used very often for household appliances, sometimes for inside walls, which are washed very often with chemicals.

CONTROL TESTS ON PRE-PAINTED PRODUCTS

Together with pre-painted products, which can be used for many purposes, several control tests, sometimes already normed, have been introduced. These tests aim at controlling both the production process and the product performances.

Some tests simulate the environments, in which pre-painted products are installed, others test the end product.

TEST DI CONTROLLO DEL PROCESSO COIL COATING E DEL PRODOTTO FINITO CONTROL TESTS FOR COIL COATING AND END PRODUCT

- Resistance to solvents (MEK): it tests how complete the polymer net is.
- Paint adhesion, impact, erosion, grid test, fold: there must not be loss of paint after a adhesive tape has been applied.
- Colour difference with respect to the sample: By comparing the sample with the produced colour the value of the spectrophotometer cannot be higher than a fixed threshold of colour difference.
- Holes in the paint: by folding the sample several times with a grip, we control with a microscope if the paint has holes.
- Gloss control: The building industry usually uses semi gloss, with an instrument called gloss meter it is possible to control the sample's gloss.
- Hardness of the paint layer: the surface is scraped with pencils with increasing graphite hardness until scratched.

SIMULATION TESTS

- **Salty fog (NaCl - spray, water and salt)**
- **Acetic Salty fog (for aluminium sheets)**
- **Hygrostat**
- **QUV (resistance to UV)**

SPECIFIC TESTS DEPENDING ON THE PRODUCT APPLICATION

- **Taber test (resistance to abrasion)**
- **Release tests**
- **Stainability test**
- **Test for resistance to solvents**
- **Resistance to acids and bases**

THE ISOPAN RANGE OF PRE-PAINTED PRODUCTS

Designers can choose from a wide range of Isopan types of pre-painted steels, which are listed next with the official names assigned by the norm on pre-painted products.

RANGE OF ISOPAN PRE-PAINTED PRUDUCTS- NAME GIVEN BY THE NORM EN 10169-2

NAME	ABBREVATION	STANDARD THICKNESS µ
Standard polyester	**PS**	**25**
High durability polyesters PS HD	**P HD**	**25**
Polyvinylidene fluoride	**PVDF**	**25/35**
Thick resins PUR-PA	**PUR-PA**	**50/55**
Polyvinyl chloride	**PVC (P)**	**100/200**
Plastic coated polyvinyl chloride	**PVC (F)**	**100**

STANDARD POLYESTER - THICKNESS: 25 µ

Polyester pre-painted sheets have a 25-µ-thick paint layer made of 5-µ primer paint and a 20-µ enamel polyester. A wide choice of colour is available. Their pigment stability is ensured by tests of long outdoor exposure. All colours are available with zinc coating up to 200 g/m^2.

Standard polyester is recommended for mildly polluted rural and urban environments, RC2 resistance to corrosion and RUV2 resistance to UV (see: how to choose a pre-painted product).

HIGH DURABILITY POLYESTERS - THICKNESS: 25 µ

High durability polyester pre-painted sheets have a 25-µ-thick paint layer made of 5-µ primer paint and 20 nominal µ modified enamel polyester. Thanks to the chemical structure of its polymer binder, the high durability enamel is highly resistant to corrosion and UV.

They can be used in industrial environment and have a RC3 resistance to corrosion. They stand out for their high resistance to UV, which is clearly higher than that of standard polyesters. They are usually delivered with a RUV3 resistance to UV.

HD Polyesters are coated with a zinc layer of at least 200g/m^2.

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POLYVINYILDEN FLUORIDE PVDF - THICKNESS: 25 µ

PVDF poly fluorocarbon pre-painted sheets have a 25-µ-thick paint layer made of 5 µ primer paint and a 20 µ PVDF enamel.

To improve resistance to corrosion in highly polluted environments, resistance to UV and paint layer flexibility, PVDF paint has been made completely different from polyester. Thank to its particular chemical structure, which has no organic functional group, which can be attacked, PVDFs are the most resistant pre-painted products. **Resistance to corrosion is classified as RC4, resistance to UV as RUV3.** A 200g/m^2 minimum Zinc coating is recommended.

POLYVINYILDEN FLUORIDE PVDF - THICKNESS: 35 µ

Polyvivnyliden fluorides are used where a high barrier effect (like in industrial environments with many chemical plants) is needed and solar radiation is particularly intense. We recommend a 35-µ-thick PVDF layer. They have a RC4 resistance to corrosion and a RUV4 resistance to UV, which is clearly higher than that of a 25-micron-thick paint.

A zinc coating of at least 275 g/m^2 is recommended.

THICK PAINTS PUR-PA - THICKNESS: 50/55 µ

Thick paints are made by urethane resins and amino resins, which are suitable for thick layers, during the coil coating process. They are sustained by a dedicated layer of primer of more than the standard 5 µ.

The have the highest resistance to corrosion in the scale provided by the norm as well as a very high resistance to UV. For aesthetic reasons the thick paint layers are delivered with an embossed profile. Pre-painted PUR-PA is used in difficult sea and industrial environments with specific chemical pollutants.

PLASTISOL PVC (P) - THICKNESS: 100/200 µ

Plastisol is a pre-painted sheet made of PVC, which is applied with a liquid emulsion during the coil coating process. The standard delivered thickness is 200 microns but it is also available with a 100-micron thickness. **Thanks to the barrier effect made by the thick layer, Plastisol can be used in highly polluted environments with chemicals. A low resistance to UV is the weakness of this product.** That's why it is also often applied together with a very thick pre-painted product or with 35-micron-thick PVDF. For aesthetic reasons the thick films are delivered with an embossed profile.

PLASTIC COATED POLYVINILCLORURE PVC (F) - THICKNESS: 100 µ

It is a pre-painted sheet made of a 100-micron-thick preconceived PVC film; it is not produced with the wet coil coating process. **It is highly recommended for indoor applications, especially for inner surfaces of panels exposed to condensations or washed often on their metal surface.**

The wide range of preconceived atoxic films is also highly recommended for the food industry, where they (of course only occasionally) have food contact.

HOW TO EXTEND THE DURABILITY OF A PRE-PAINTED PRODUCT

To choose a pre-painted product one must consider the environment where the building is placed, the possibility of corrosion and of course the geographical position, as well as the UV influence. Designers and users can have a look at the results of the simulation tests to evaluate the differences between the different products:

- For example the salty fog test, which helps to understand how much corrosion can build on the product after a few hours in the salty fog room.
- or the QUV test that evaluates the loss of colour and gloss caused by UV.

HOW TO CHOOSE A PRE-PAINTED PRODUCT ACCORDING TO THE RESISTANCE TO CORROSION, SALTY FOG

RC TABLE		
PRE-PAINTED	**MINIMUM TIME BEFORE WHITE RUST APPEARS h**	**CORROSION CATEGORY EN 10169**
Standard polyester 25	**360**	**RC3**
HD Polyester 25	**500**	**RC4**
PVDF 25	**500**	**RC4**
PVDF 35	**500**	**RC4**
PUR-PA 50/55	**700**	**RC5**
Plastisol 100/200	**1000**	**RC5**
Plastic coated	**500**	****

The table shows that PVDFs, Plastisol and thick pre-painted products have clearly better results in the salty fog tests and consequently rank in better categories according to the scale provided by the norm EN 10169.

Here are some explanations about the corrosion categories:

RC TABLE outdoor	
CATEGORY	**DESCRIPTION OF CORROSION CATEGORIES - OUTDOOR**
C1 - very low	
C2 - low	Low polluted environments. Rural areas.
C3 - middle	Industrial and urban environments, moderate sulphur dioxide pollution. Sea areas with low saltiness, from 10km to 20km from the sea.
C4 - high	Industrial and sea areas with moderate saltiness from 3km to 10km from the sea.
C5 I - very high	Industrial and sea areas with high humidity and aggressive pollution.
C5 M - very high	Sea areas with high salinity, from 1km to 3km from the sea *

* For the use on buildings in front of the sea, please contact the Technical Departement of Isopan, in order to study the best possible solution.

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VCorrosion categories apply also for indoor environments and are useful to choose the internal surface of panels or chequer plates. Sometimes indoor can be even more damaging than outdoor environments:

RC TABLE indoor	
CATEGORY	**DESCRIPTION OF CORROSION CATEGORIES - INDOOR**
C 1 - very low	Heated buildings with clean air such as offices, shops, schools, hotels
C2 - low	Not-heated buildings with condensations such as depots, sports halls.
C3 - middle	Production rooms with high humidity and moderate air pollution such as food production industry, wash-houses, beer factories, dairy factories.
C4 - high	Chemical plants, swimming pools, shipyards and coast plants.
C5 I - very high	Buildings or areas with permanent condensation and high pollution.
C5 M - very high	Buildings or areas with permanent condensation and high pollution.

HOW TO CHOOSE A PRE-PAINTED PRODUCT ACCORDING TO UV RESISTANCE, QUV TEST RESULTS

The table below shows the QUV test results. During the test UV effects are speeded up on pre-painted samples to evaluate paint's gloss retention. A low ΔE value means a small loss of colour and gloss

UV TABLE			
Pre-painted products and resistance to UV.		**Gloss retention**	**Colour loss**
Standard Polyester 25	RUV 2	gloss > 30%	dE < 5
Polyester HD 25	RUV 3	gloss > 60%	dE < 3
PVDF 35	RUV 4	gloss > 80%	dE < 2
PVDF 25	RUV 3	gloss > 80%	dE < 2
PUR-PA 50/55	RUV 4	gloss > 80%	dE < 1,2
Plastisol 100/200	RUV 2	gloss > 30%	dE < 5
Plastic Coated	\	\	\

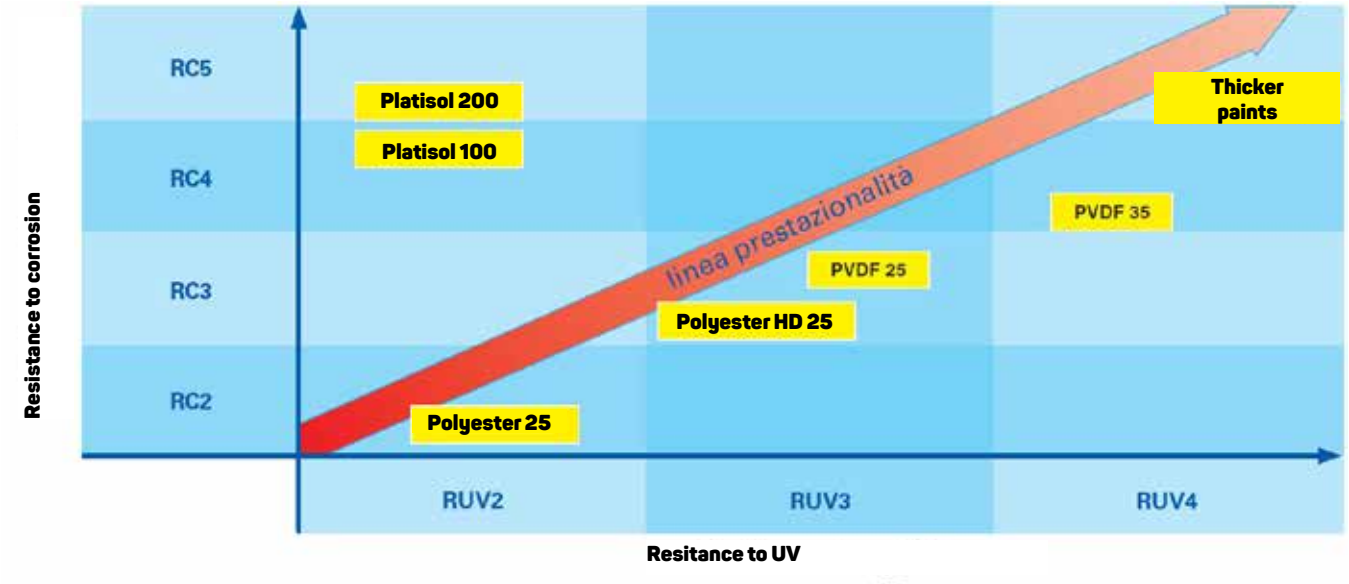
The table below shows the categories of resistance to UV according to UNI EN10169

CAT.	GEOGRAPHICAL POSITION
1	Coating of back surface of structural elements for buildings, which are near big lakes or sea. In these areas UV are more dangerous because they reflect on the water surface and become more intense.
2	Areas which are north of the 45° latitude and up to 900 m high
3	Areas which are south of the 45° latitude, north of the 37° latitude andup to 900 m high.
4	Areas which are south of the 37° latitude. All areas which are up to 900 m high

PERMORMANCE TABLE

Depending on the kind of outdoor and indoor environment as well as the geographical position the product is part of one of the classes of resistance to corrosion and UV described above.

In the following table you can see to which class the different pre-painted products belong.



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HOW TO CHOOSE THE RIGHT PRE-PAINTED PRODUCT

This guide aims at giving users some useful advices to how to choose the right type of products. A product matching the need of the user and project guarantees also more durability. This guide consists on different questions, which lead the designer and user in the final choice. A good choice can ensure the highest durability.

In order to make the most out of these guidelines the designer must have the following information before beginning:

- **Outdoor environment (pollution level)**
- **Indoor environment (humidity, chemicals)**
- **Distance from the sea**
- **Mean sea level**
- **Latitude**

Depending on the answers designers and users receive the following four codes:

- **RC outdoor (Resistance to corrosion outdoor)**
- **RC indoor (Resistance to corrosion indoor)**
- **RUV outdoor (Resistance to UV outdoor)**
- **RUV indoor (Resistance to UV indoor)**

1. HOW IS THE BUILDING, WHICH HAS BEEN PLANED?

It is necessary to know the properties of the building where the products will be installed. In particular: degree of importance, use of wall or roof panel and/or sheets, the building's intended use and eventually air conditioning or other emissions.

Equally important are the outdoor environment and the geographical position of the building.

For example: 20.000-m big industrial warehouse with insulating wall and roof panels. Air conditioning inside, no emissions. Intended use: textile and fabric depot. Rural environment outside, geographical position: Comune di Casalmaggiore (CR)

2. TO WHICH CODED OUTDOOR ENVIRONMENT BELONGS THE BUILDING?

RC TABLE outdoor	
CATEGORY	**DESCRIPTION OF CORROSION CATEGORIES - OUTDOOR**
C1 - very low	
C2 - low	Low polluted environments. Rural areas.
C3 - middle	Industrial and urban environments, moderate sulphur dioxide pollution. Sea areas with low saltiness, from 10km to 20km from the sea.
C4 - high	Industrial and sea areas with moderate saltiness from 3km to 10km from the sea.
C5 I - very high	Industrial and sea areas with high humidity and aggressive pollution.
C5 M - very high	Sea areas with high salinity, from 1km to 3km from the sea *

* For the use on buildings in front of the sea, please contact the Technical Departement of Isopan, in order to study the best possible solution.

To every coded environment characterised by a pollution level and distance from the sea, showed in the table, corresponds a level of resistance to corrosion outdoor.

For example: A building in a C2 environment must have a RC2 resistance.

3. TO WHICH CODED INDOOR ENVIRONMENT BELONGS THE BUILDING?

RC TABLE indoor	
CATEGORY	**DESCRIPTION OF CORROSION CATEGORIES - INDOOR**
C 1 - very low	Heated buildings with clean air such as offices, shops, schools, hotels
C2 - low	Not-heated buildings with condensations such as depots and sport halls.
C3 - middle	Production rooms with high humidity and moderate air pollution, such as food production industry, wash-houses, beer factories, dairy factories.
C4 - high	Chemical plants, swimming pools, shipyards and coast plants.
C5 I - very high	Buildings or areas with constant condensation and high pollution.
C5 M - Molto elevata	Buildings or areas with permanent condensation and high pollution.

To every coded environment characterised by a pollution level, air conditioning and condensations, showed in the table, corresponds a level of resistance to corrosion indoor.

For example: A building in a C1 environment must have a RC1 resistance.

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4. TO WHICH CATEGORY OF SOLAR RADIATION BELONGS THE BUILDING?

1	Coating of back surface of structural elements for buildings, which are near big lakes or sea. In these areas UV are more dangerous because they reflect on the water surface and become more intense.
2	Areas which are north of the 45° latitude and up to 900 m high.
3	Areas which are south of the 45° latitude, north of the 37° latitude and up to 900 m high.
4	Areas which are south of the 37° latitude. All areas which are up to 900 m high.

As we have seen from the table, for a good evaluation it is necessary to know the exact geographical position of the building. Every category has a corresponding level of resistance to UV.

For example: A building in MIlan north of the 45° latitude and lower than 900 m (zone 2) must have a RUV2 resistance.

5. TO WHICH CATEGORY OF SOLAR RADIATION BELONGS THE BUILDING?

1	Coating of back surface of structural elements for buildings, which are near big lakes or sea. In these areas UV are more dangerous because they reflect on the water surface and become more intense.
2	Areas which are north of the 45° latitude and up to 900 m high
3	Areas which are south of the 45° latitude, north of the 37° latitude and up to 900 m high.
4	Areas which are south of the 37° latitude. All areas up to 900 m high .

Like before it is necessary to know the exact geographical position and distance from the sea or big lakes in order to choose the correct coating for the back surface of structural elements.

For example: A building in Milan, which belongs to zone 1 must have a RUV1 resistance.

SCREENING RESULTS

RC outdoor	RC 2
RC indoor	RC 1
RUV outdoor	RUV 2
RUV indoor	RUV 1

CHOICE DEPENDING ON SCREENING RESULTS: EXTERNAL SURFACE

EXTERNAL SURFACE		
Pre-painted	**RUV**	**RC**
Standard polyester 25	RUV1	RC1
Standard polyester 25	RUV2	RC2
HD Polyester 25	RUV3	RC3
PVDF 25	RUV4	RC4
PVDF 35	RUV4	RC4
PUR-PA 55	RUV4	RC5
Plastisol 100	RUV2	RC5
Plastic Coated	-	-

RC 2	STANDARD POLYESTER 25
RUV 2	

CHOICE DEPENDING ON SCREENING RESULTS: INTERNAL SURFACE

INTERNAL SURFACE		
Pre-painted	**RUV**	**RC**
Standard polyester 25	RUV1	RC1
Standard polyester 25	RUV2	RC2
HD Polyester 25	RUV3	RC3
PVDF 25	RUV4	RC4
PVDF 35	RUV4	RC4
PUR-PA 55	RUV4	RC5
Plastisol 100	RUV2	RC5
Plastic Coated	-	-

RC 2	STANDARD POLYESTER 25
RUV 2	

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HOW TO CHOOSE THE COLOUR OF A PRE-PAINTED PRODUCT

WHEN TO CHOOSE THE COLOUR?

Even if the designer has already an idea of the building's colour, we recommend reading carefully this guide, making the choice about the pre-painted product and only then choosing the colour.

WHICH COLOUR TO CHOOSE?

Some of the colours cannot be obtained with pre-painted cycles because the pigments are not compatible with the paint binders.

HOW TO CHOOSE

The choice can be made:

1. By looking at the colour table of the Isopan catalogues;

2. By sending a colour sample to Isopan

The paint producer will assemble the colour and send it to the client, who will accept it or not; the sent sample will be the only reference for the entire delivery.

By choosing you must take into account that strong colours fade quicker than pastel colours.

The designer will then have to consider the changes that the building's colour will undergo with the time, as well as the possible loss of colour and gloss; the following paragraphs give advices on these considerations.

COLOUR DIFFERENCE IN TIME

By choosing the colour it is in fact important to take into account that depending on the kind of pre-painted product colour changes (ΔE) in time vary considerably.

Note: The colour variations shown here are based on experience and do not represent a guarantee.

The following table shows the difference among hell, dark, middle, strong and metal colours and the corresponding spectrophotometer's values.

TABLE FOR CLASSIFICATION AND ASSIGNEMENT OF COLOURS

CLASSIFICATION DEPENDING ON TONE		
L > 80	C < 10	Class 1
	10 ≤ C ≤ 20	Class 2
	20 ≤ C ≤ 30	Class 3
	C > 30	Class 4
60 < L ≤ 80	C < 25 e -11 < a < +11 -5 < b < +25	Class 2 (Otherwise higher class)
	C < 25 e -15 < a < +15 5 < b < + 25	Class 3 (Otherwise higher class)
	C ≥ 30	Class 4
L ≤ 60	C < 29	Class 3
	C ≥ 29	Class 4

CLASSIFICATION DEPENDING ON CLASS	
Classe 1	HELL COLOURS
Classe 2	MIDDLE COLOURS
Classe 3	DARK COLOURS
Classe 4	SPECIAL COLOURS
Classe 5	METAL COLOURS

where:
C = (a2 + b2)1/2
a, b, C represent the spectrophotometer's values
L indicates the colour gloss

The following tables help to determine the colour variations in time (ΔE) depending on the geographical position and on the kind of colour.

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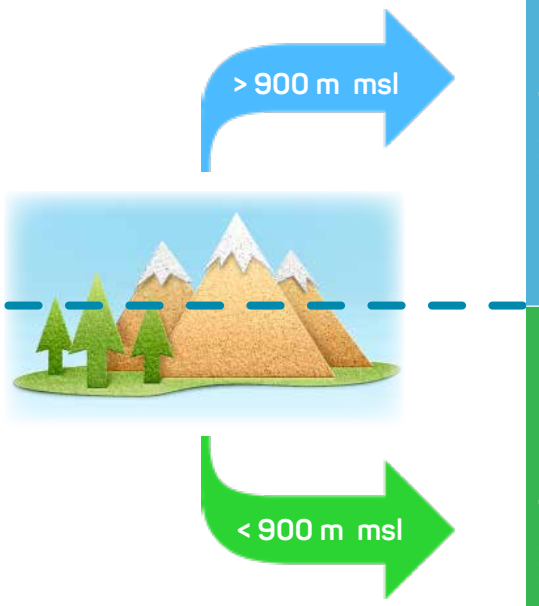
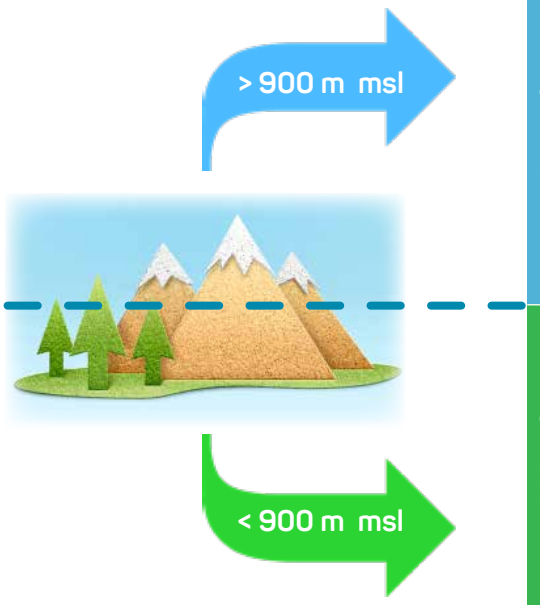


ΔE COLOUR = NORTH OF 42° LATITUDE				
> 900 msl	**LIGHT, MEDIUM AND DARK**			
	Polyester	-	2 YEARS	- 5 YEARS
	HD Polyester	≤ 3		-
	PVDF 25	≤ 3		≤ 3
	STRONG AND METALLIC			
	Polyester	-	2 YEARS	- 5 YEARS
	HD Polyester	≤ 3		-
	PVDF 25	≤ 3		-
< 900 msl	**LIGHT AND MEDIUM**			
	Polyester	≤ 5		5 YEARS
	HD Polyester	≤ 3		
	PVDF 25	≤ 3		
	DARK			
	Polyester	> 5		5 YEARS
	HD Polyester	≤ 3		
	PVDF 25	≤ 3		
	STRONG AND METALLIC			
	Polyester (metallic colour)	-		2 YEARS
	HD Polyester	≤ 3		
	PVDF 25	≤ 3		



ΔE COLOUR = SOUTH OF 42° LATITUDE			
> 900 msl	**LIGHT, MEDIUM AND DARK**		
	Polyester	-	5 YEARS
	HD Polyester	-	
	PVDF 25	≤ 3	
	STRONG AND METALLIC		
	Polyester	-	2 YEARS
	HD Polyester	-	
	PVDF 25	≤ 3	
< 900 msl	**LIGHT, MEDIUM AND DARK**		
	Polyester	-	5 YEARS
	HD Polyester	≤ 3	
	PVDF 25	≤ 3	
	STRONG AND METALLIC		
	Polyester	-	2 YEARS
	HD Polyester	≤ 3	
	PVDF 25	≤ 3	

EXAMPLE: for a building located in Reggio Emillia (North of 42° latitude), a PVDF pre-painted product with a metallic colour will have a value of ΔE not lower than 3, after 2 years of correct use.

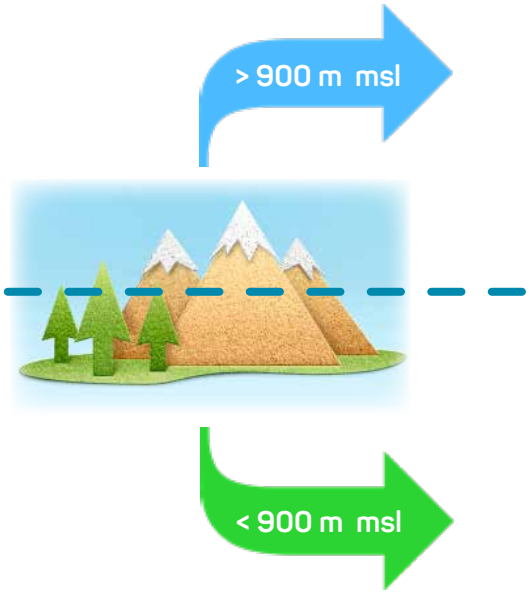
GLOSS RITENTION IN TIME

Pre-painted products are delivered with different ranges of gloss.

For outdoor surfaces the building industry usually uses semi-gloss products, which is a paint with a silk finish.

Standard values for gloss vary from 25 up to 35 gloss units with an angle of incidence of 60°. With time and depending on the kind of pre-painted products and geographical position, the gloss undergoes variation which are called gloss retention; a high value of gloss retention means a smaller aesthetic colour variation.

Here are the gloss retention values after years depending on the type of pre-painted product and geographical position, as we have seen for the colour.



GLOSS RETENTION = NORTH OF 42° LATITUDE					
> 900 msl	**LIGHT, MEDIUM AND DARK**				
	Polyester	-	2 YEARS	-	5 YEARS
	HD Polyester	≥ 50		-	
	PVDF 25	≥ 80		≥ 80	
	STRONG AND METALLIC				
	Polyester	-	2 YEARS	-	5 YEARS
	HD Polyester	-		-	
	PVDF 25	≥ 80		-	
< 900 mmsl	**LIGHT AND MEDIUM**				
	Polyester	≥ 30			5 YEARS
	HD Polyester	≥ 50			
	PVDF 25	≥ 80			
	DARK				
	Polyester	< 30			5 YEARS
	HD Polyester	≥ 50			
	PVDF 25	≥ 80			
	STRONG AND METALLIC				
	Polyester	-			5 YEARS
	HD Polyester	≥ 50			
	PVDF 25	≥ 80			

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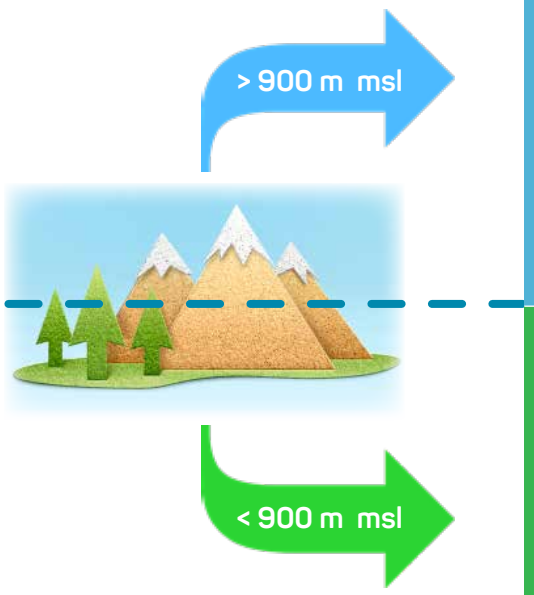
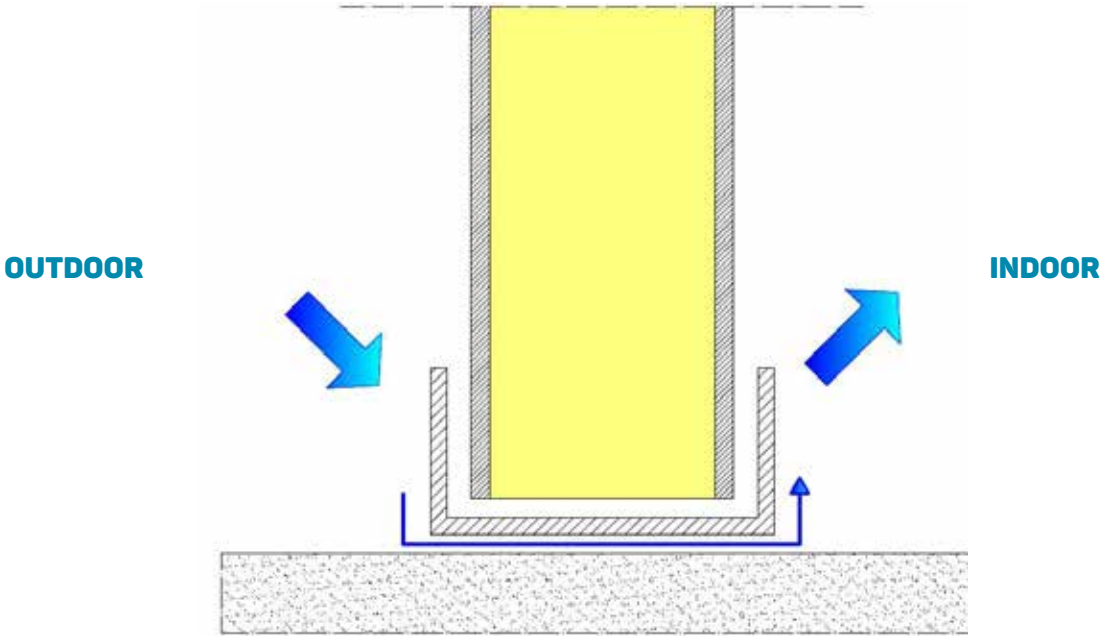


RITENZIONE GLOSS - SUD DEL 42° PARALLELO			
> 900 msl	LIGHT, MEDIUM AND DARK		
	Polyester	-	5 YEARS
	HD Polyester	-	
	PVDF 25	≥ 80	
	STRONG AND METALLIC		
	Polyester	-	5 YEARS
	HD Polyester	-	
	PVDF 25	≥ 80	
< 900 msl	LIGHT, MEDIUM AND DARK		
	Polyester	-	5 YEARS
	HD Polyester	≥ 50	
	PVDF 25	≥ 80	
	STRONG AND METALLIC		
	Polyester	-	2 YEARS
	HD Polyester	≥ 50	
	PVDF 25	≥ 80	

EXAMPLE: for a building located in Reggio Emilia (North of the 42° latitude and with 58 m msl) a PVDF pre-painted product with a metallic colour will have a gloss retention value of at least 80 after 5 years of life.

For the classification of colour (light, medium, dark and metallic) see the "Table for classification and assignment of colours" at page 19.

FLASHING ELEMENTS



In case of flashing elements the two parts (external and internal surfaces) will have about the same temperature. The internal surface will have a high temperature during the day and a very low temperature at night.

Of course condensations on the internal surface play a major role because they can contain pollutants coming from inside of the building.

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THE IMPORTANCE OF ZINC COAT FOR PRE-PAINTED PRODUCTS

The paint layer on the plane surface degrades very slow in time and corrosion of the zinc coating can appear after ten years; that's why a small zinc coat would be sufficient to ensure durability, which means no holes on the product even in highly polluted environments.

Anyway the following can happen:

- A wrong paint layer can degrade more quickly and pollutants can corrode even the zinc coat, which would start to oxidise (oxidation);
- Inappropriate transportation or depot of the product and water stagnation can cause holes in the paint (blistering);
- Holes in the pleats of the profile

Example of blistering

Example of oxidation after blistering

It is clear that the zinc coating plays an important role depending on the environment: if you choose a pre-painted product, which is resistant to pollution, you need an appropriate and valid zinc coat.

For this reason Isopan suggests a zinc coat for every paint type.

PRE-PAINTED	Zinc coating (addition of the two surfaces)		Zinc coating (the same thickness for the two surfaces)	
	g/m²	microns	g/m²	microns
Standard polyester 25	100/150 (*)	14/21	50/75	7/11
HD Polyester 25	100/150 (*)	14/21	50/75	7/11
PVDF 25	200	28	100	14
PVDF 35	200	28	100	14
PHD e PVDF PUR-PA 55	275	38	137	19
Plastisol 100	200	28	100	14
Plastic Coated	100/150	14/21	50/75	7/11

(*) to update

PRE-PAINTED PRODUCTS AND FOOD CONTACT

Metal pre-painting is made with paints that contain polymer resins, cross-linkers, colour pigments, solvents and additives.

Many organic components are removed or permanently transformed in oven during the coil coating process; others remain in the net structure of the dry paint.

Some components can cause food poisoning in case of food contact (for example pigments).

That's why some rules must be followed when panels are used in the food industry:

RULE N° 1

Food contact must occur occasionally and not permanently; liquid or solid food must not remain constantly in contact with the pre-painted surface if then eaten.

RULE N° 2

In case a pre-painted surface is installed where food contact may occur, like some fridge cells and slaughter rooms, the designer must be ensure that the product does not release any component and have passed the release-tests.

Moreover the designer must explicitly require from the producer a certificate that the product does not contain toxic elements.

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