

1.0 PURPOSE

The following specification has the purpose of describing the chemical, physical and mechanical aspects of the twin wall sheet Polionda® produced by Ondaplast SpA.

2.0 APPLICATION

Before making any kind of manufacturing on the Polionda® twin wall sheet produced by Ondaplast SpA, you have to evaluate the main features and properties described in the following “Technical Sheet” and verify the compatibility to the uses to which it will be addressed all along its life. For any doubt, explanation, suggestion, clarification etc...please contact the technical office (TEC) in Ondaplast Spa.

3.0 DESCRIPTION AND SUGGESTIONS ON THE POSSIBLE RISKS

Type of risk	Description and suggestions
U.V. Resistant	Polypropylene doesn't have a good resistance to the U.V. rays because it is subjected to photo degradation process. For the outside uses it is necessary to add an "U.V. resistant additive" Please see par. 4.1.
Corona Treatment	Ondaplast products have a value of Corona treatment equal to 42 dyne. In this condition the sheet can be glued and printed.
Low temperature use	Polypropylene at temperature below 5°C becomes brittle. It is possible to stock it below this temperature, but anyway its use is recommended at room temperature (10 – 30°C). See table 4
High temperature use	Polypropylene at high temperatures reduces its mechanical features and loses its antistatic nature. In order to avoid the loss of these characteristics, Ondaplast recommends application at temperature below 35 °C. See table 4
Glueing	Polypropylene can be glued with specific substances. Make sure about the presence of a Corona treatment.
Welding	Polypropylene can be welded with ultrasounds devices or by hot air machineries in order to obtain localized and controlled micro fusions.
Printing	Polypropylene can be printed by flexographic, serigraphic printing or ink-jet techniques. Verify the presence of an adequate Corona treatment. See table 7
Presence of moulds and bacteria and anti – bacterial features	If stocked in aerated and dried places and in absence of any contamination, Ondaplast polypropylene products for pharmaceutical or food contact purpose doesn't permit moulds or bacteria colonies growth. Ondaplast process is

	<p>compliance with UNI EN 15593 regulation. It guarantees the hygiene of the food packaging (secondary) product. Polypropylene with anti-bacterial and anti mould agents is available upon request.</p>
Food Compatibility	<p>Virgin polypropylene with specific additives is compliant to come direct into contact with foodstuffs.</p>
RoHS Directive	<p>Ondaplast polypropylene is compliant with RoHS directives.</p>
Cutting of the sheets	<p>Polypropylene sheets can be cut through die cutting process or through the use of cutters that must be used with attention and in accordance with the security laws. See table 8</p>
Mechanical Characteristics	<p>The technical features depend on the relationship between thickness-weight . See tables 1-2-3.</p>
Chemical agents resistance	<p>Polypropylene is resistant to the most part of chemical agents. For particular substances it is better to make specific tests.</p>
Caloured products' stability and brightness	<p>Polypropylene can be extruded in a wide range of colours. The colour stability and its lifetime, depends on several factors and it is influenced by the exposition time to U.V. rays. If you need a specific request, please ask us for the colour fastness value according to ASTM D2565.</p>
Anti-static properties	<p>Polypropylene antistatic properties have a lifetime of 1-3 months. The lifetime decreases if the product is used and stocked in inappropriate condition or at high temperatures. See table 5.</p>
Gas permeability	<p>Mean value equal to 8 g/(m²*day) at 40°C and 90% H.R.</p>
Barrier effect	<p>The extruded polypropylene, especially in thin thickness doesn't have a particularly efficient barrier effect due to its chemical-physical characteristics. For all uses in which particular barrier effect are requested, please contact the Ondaplast technical office to verify its feasibility.</p>
Auto-extinguishing polypropylene	<p>For specific uses that require auto-extinguishing properties is available a range of products with flame retardant additives, in compliance with the main International relevant legislations (UL94 class V2, DIN 4102 class B1, NF P92-507, LPCB, etc.)</p>
Reuse and recycle simbol	<p>Ondaplast products are reusable several times and 100% recyclable. The recycle simbol is PP05 or PP5.</p>

4.0 CHARACTERISTICS

Table 1

<i>PP physical properties</i>			
Property	Method	Measurement Unit	Value
Specific weight	ISO 1183	g/cm ³	0,907
Water absorbtion	ISO 62	%	0,02

Table 2

<i>PP mechanical properties</i>			
Property	Method	Measurement Unit	Value
Tensile strength (50 mm/min)	ISO 527	MPa	30
Breaking extension (50 mm/min)	ISO 527	%	750
Flexion modulus	ISO 178	MPa	1100
Impact resistance IZOD (23°C)	ISO 180	kJ/m ²	50
D Shore Hardness	ISO 868	-	66

Table 3

<i>Sheet' mechanical properties</i>				
Property	Method	Measurement Unit	Value	
Maximum compression effort	2,0 mm/350 gr	Internal	N/cm ²	min. 25
	2,0 mm/400 gr	Internal	N/cm ²	min. 35
	3,0 mm/450 gr	Internal	N/cm ²	min. 20
	3,0 mm/650 gr	Internal	N/cm ²	min. 55
	3,0 mm/800 gr	Internal	N/cm ²	min. 65

Table 4

<i>Sheets'heat properties</i>			
Property	Method	Measurement Unit	Value
Expansion Coefficient	ASTM D 696	°C ⁻¹	0,18

The polypropylene has excellent mechanical properties, shock and breaking resistance at 23° C. These properties

are strictly compromised at low temperatures, near or below 0° C . For specific use at low temperatures, please contact us

Table 5

Sheets' electrical properties			
Property	Method	Measurement Unit	Value
Standard surface resistivity	ASTM D 257	Ω	ca. 10 ¹³
Antistatic surface resistivity	ASTM D 257	Ω	ca. 10 ¹¹
Conductive surface resistivity	ASTM D 257	Ω	ca. 10 ⁶

Table 6

Chemical resistance
<p>Polypropylene guarantees resistance to oil, fat, saline solutions; acids, bases at temperature lower than 60°C. PP is not resistant to substances with high oxidizing effect. Polypropylene is a polymer which will swell if exposed to certain solvents</p>

Table 7

Printing
<p>Corona treatment is on both sides is guaranteed for 3 months from the date of manufacture, marked on each packed. Ondaplast also recommended that special inks for polypropylene are used.</p>

Table 8

Cutting and creasing
<p>It is recommended to store the material at temperatures around 20° C. Cutting and creasing are possible on automatic and manual systems.</p>

Table 9

Further information
<p>Twin wall sheets need between 48 to 72 hours after delivery to acclimatize at room temperature (around 20° C). Do not stack the pallets. Remove the banding from the pallets on receipts.</p>

4.1 Polionda® UV resistant

Polionda® UV resistant is protected against UV-ray. The protection covers the polypropylene chemical structure and allows the external use of the products.

TECHNICAL FEATURES

The product is designed to withstand at least 450kLy.

The intensity of light radiation varies in geographical areas and can be different from year to year, so the average annual intensities are evaluated to calculate the duration over the years.

The table shows the duration value in years corresponding to the corresponding average intensity / year:

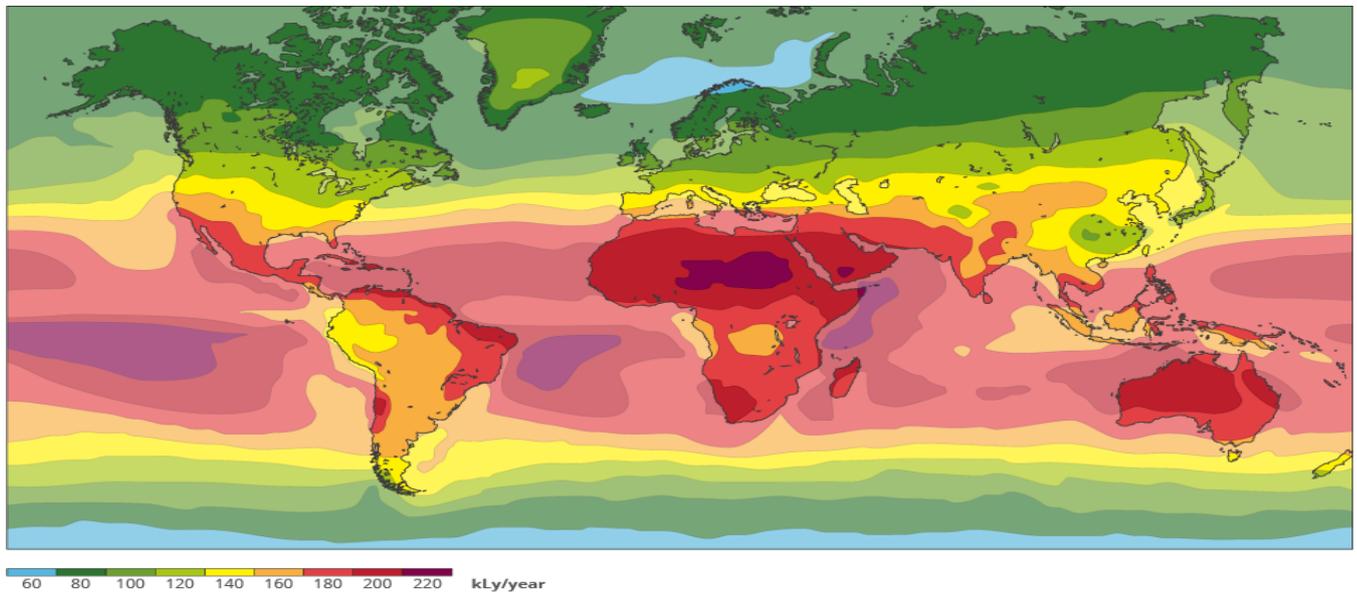
kLy/year	Duration years
80	5,5
90	5,0
100	4,5
115	4,0
130	3,5
150	3,0

The durability values refer to the half-life of the initial mechanical properties

WARNING:

acid, sulphur, copper, metals, oxidizing agents and high temperatures (peaks) can drastically reduce the above parameters.

Global geographical representation of kLy



4.2 Polionda® G-Ray resistant

Polionda® G-Ray resistant product is protected against GAMMA-RAY radiation. The protection covers the polypropylene chemical structure and allows the use of the product for application which need gamma ray sterilization.

TECHNICAL FEATURES

The product is designed to withstand gamma-ray sterilization for packaging applications used by pharmaceutical industry.

It has been approved in the radiation test with a dose of 35 kGy.

5.0 RELEVANT REGULATIONS

Food regulation: comply with Regulation (UE) n° 10/2011 and subsequent amendments and changes to Reg. No (EU) 2017/752 relating to plastic materials and articles intended to come into contact with foodstuffs and according with FDA, CFR 21.

Coneg Regulation (USA) and directive 94/62/EC: heavy metals (cadmium, lead, mercury, and chromium (VI)) content below 100ppm

D.Lgs n° 54 of 11/04/2011 (Directive 2009/48/CE concerning games safety): comply with the Decree except the flammability part that should be expressively requested. It is a customer obligation to provide for the complete certification.

NRoHS 2002/95/EC directive (European Parliament and Council of 27 January 2003): comply with requirements on the restriction of use of certain hazardous substances in electrical and electronic equipment.

BRE LPS 1207 (on a specific request): in compliance with the regulation concerning the auto-extinguishing materials (test of small flame, test of big flame, test of gas emission, test of toxic gas emission, test on the oxygen index). Please stock the product far from heat source and at room temperature.

The test results are based upon raw materials according to our current knowledge
The technical data concerning Table 3 are not binding and are given for guidance only.