NUDEC®



Glazing

Signals and signs

Machinery protection

Lighting

Dispensing and recreational machines

Displays and other publicity elements

Town furniture (anti-vandal)

Construction elements

NUDEC® PET

Polyethylenterephthalate sheets

- Excellent transparency and brightness
- High resistance to chemical products
- High impact strength and resistance to breakage
- Thermoformable, do not require any pre-drying
- Excellent fire performance. Low generation of non-toxic smoke
- Recyclable, respectful of the environment, completely combustible, without any emission of toxic substances that contaminate landfills.es that contaminate landfills

NUDEC® PET

Properties

Dimensional stability to heat

Articles manufactured with this product must not be continually exposed to temperatures above 60°C, depending on the application.

Ageing

The UV component of sunlight causes degradation to all plastics in general. This degradation depends on the exposure conditions, in other words, on the actual duration of exposure to sunlight, the sheet inclination to the sun's rays, temperature and humidity and on sunlight intensity (geographical coordinates). This degradation shows up as a progressive yellowing, a reduction in light transmission and loss of mechanical properties.

NUDEC®PET sheets are not protected against the effects of sunlight, however, the actual material itself possesses a certain resistance to outside weather so that it can be used in exterior applications in locations where sunlight is of low intensity and does not permanently fall on the sheets.

For exterior applications where the sheets are permanently exposed to ultraviolet light, a stabilised product, such as NUDEC®PETuv sheets, which are protected on both sides, are recommended. When used in exterior applications, the protective film must be removed immediately, since exposure to sunlight can cause permanent adhesion to the sheet.

Chemical resistance

In general, NUDEC®PET sheets are able to resist most acids, alcohols, and salts, together with plastifying agents.

They are also resistant to hydrocarbons, such as xylene, mineral oils and petroleum. However, resistance to aliphatic hydrocarbons is limited. Similarly, NUDEC®PET sheets also resist the chemical attack of acid rain, diesel engine exhaust fumes and air with a certain amount of salinity. Aromatic compounds can cause several reactions.

Contact with food and sanitary use

NUDEC®PET sheets (except the UV version) comply with the United States FDA (Food and Drug Administration) and the BGA (Bundes-gesundheitsamt, Germany) standards for contact with foodstuffs. PET is both odour and taste-free, making NUDEC®PET suitable for use applications where it comes into contact with food, and in medical usage.

NUDEC®PET sheets can be sterilised by gamma radiation or with ethylene oxide.

STANDARD SPECIFICATIONS FOR PET RESIN

	CODE	UNIT	VALUE
PHYSICAL			
Density	ISO 1183	g/cm^3	1.34
MECHANICAL			
Tensile strength @ yield	ISO 527	MPa	59
Tensile strength @ breakage	ISO 527	MPa	No breakage
Elongation @ breakage	ISO 527	%	No breakage
Elasticity modulus in traction	ISO 527	MPa	2,420
Resistance to flexion	ISO 178	MPa	86
Charpy impact test with notch	ISO 179	kJ/m^2	(*)
Charpy impact test	ISO 179	kJ/m^2	No breakage
Rockwell hardness, M / R scale			(*) / 111
Ball pressure hardness	ISO 2039	MPa	117
OPTICAL			
Light transmission	ASTM D-1003	%	89
Refractive index	ASTM D-542		1.576
THERMAL			
Maximum Service temperature		°C	60
VICAT Softening temperature (10 N)	ISO 306	°C	79
VICAT Softening temperature (50 N)	ISO 306	°C	75
Heat deflection temperature, HDT A (1.8 MPa)		°C	69
Heat deflection temperature HDT B (0.45 MPa)	ISO 75-2	°C	73
Coefficient of linear thermal expansion	ISO 75-2	$x10^{-5}/°C$	<6

These data correspond to raw material values.

(*) Non-applicable

CHEMICAL RESISTANCE

CHEMICAL PRODUCT	BEHAVIOUR		
	SATISFACTORY	REGULAR	UNSATISFACTORY
Mineral oil	X		
Vegetable oil	X		
Acetone			X
Acetic acid	X		
Water	X		
Turpentine	X		
Ammonia			X
Detergents	X		
Ethanol	X		
Petrol	X		
Glycerine	X		
Methanol		X	
Toluene	X		

REACTION TO FIRE

COUNTRY	CODE	CLASSIFICATION
GREAT BRITAIN	BS 476: Part 7	1Y
GERMANY	DIN 4102-1	B1
FRANCE	NFP 92-507	M2
ITALY	UNI 9177	Class 1
EU	DIN EN 13501-1	B - s2, d0
USA & CANADA	UL94	HB

A NUDEC®PET safety file is available for any additional type of query.

Specifications valid for clear panels.

Handling

Cleaning

The sheets should be cleaned with a solution of warm water with a little neutral soap and rinsed with water employing a very soft sponge or chamois leather.

Cutting

Sawing

The common types of saws employed in wood or metal carpentry provide good results when sawing NUDEC®PET sheets: disc, band, sabre, jigsaw, hewing, and handsaw. Disc or band saws produce the best edges and can perform almost all cutting operations.

Blade shape plays an important role in sawing plastics. It is recommended to employ a band saw with separated teeth because the empty space will facilitate the exit of the cut chips. The best results are obtained using teeth without any inclination and also somewhat jumped. To prevent the plastic from cracking or melting, the blade must be very sharp and the guide should very close to the cut to prevent vibration.

Die-stamping

NUDEC®PET sheets can be satisfactorily die-cut with steel blades (up to 2 mm). The blade has to be quite frequently replaced or sharpened.

The die-cutting press must be adjusted so that the run completely traverses the plastic sheet and stops before blade cause any nicks.

Polishing

Pre polishing is required to eliminate any marking caused by the cutting disc.

The following may be used:

- Rotating rigid fabric discs with buffing paste
- Rotating soft fabric discs with buffing paste for the final finish

Flame polishing the edge is also possible with a standard butane torch or a hot nitrogen welding torch, care should be taken of the exact distance between the sheet and the heat source and the passing speed. If the heat source is brought too close there is a danger of crystallising-whitening the surface or the material may becoming too fluid.

Adhesives

Because of the exceptional chemical resistance of NUDEC®PET sheets it is not possible to use adhesives with solvents. Among the recommended adhesives are the cyanacrylates, together with two-component polyurethanes and epoxies.

The following should be taken into consideration when selecting an adhesive:

- Chemical compatibility with the sheets
- Aesthetics of the finished joint
- Dilation and contraction with temperature changes
- Fragility, rigidity and flexibility
- Alterability with respect to outside weather, where applicable
- Duration and useful lifetime
- Adhesive strength (adherence to the plastic)
- Final usage requirements

For perfect gluing of the surfaces to be joined, they must fit together well (without exerting force and without leaving any cavities) and should also be smooth and unpolished.

Certain adhesives with volatile components may contract during drying. This effect can be compensated by cutting the joint at an angle, thus leaving space to be filled with a slight excess of adhesive.

Thermoforming

- Pre-drying, as required for polycarbonate, is not necessary.

Time and energy savings

- Thermoforming temperatures between 120 °C and 150 °C. Very high temperatures can reduce the impact strength of the material.
- Mould temperature must not exceed 60 °C.
- It is recommended that heating time is reduced to avoid crystallisation.

All NUDEC products use film to protect the surface from possible damage during production and transport. This protective film is not prepared to withstand high temperatures and must be removed prior to thermoforming or hot-bending.

Bending

Cold bending

NUDEC®PET sheets of less than 3 mm can be cold bent using standard equipment as employed for metal sheets, such as presses or bending machines. The surface protection film should be left in place during the bending process in order to protect it from scratches. It is best not to employ excessive speed for bending since too must stress can cause the surface to break up.

Bending with incandescent wire

Standard two-side, incandescent wire bending equipment can be satisfactorily employed. Excessive wire temperature or insufficient distance between the wire and the sheet can lead to slight crystallisation (fine white misting) of the sheet surface. If this occurs, then the wire power should be reduced or the distance between the wire and sheet increased. In extreme cases, the wire can be replaced for one with a larger diameter in order to reduce the resistance and consequently its temperature.

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Decoration

Certain printing inks can display some difficulty in adhering to the PET due to its high resistance to solvents. For a list of suitable printing inks please contact the NUDEC Technical department.

The print film should be removed just prior to printing to prevent the surface from damage.

NUDEC® PET

Polyethylenterephthalate sheets

Properties

Specifications

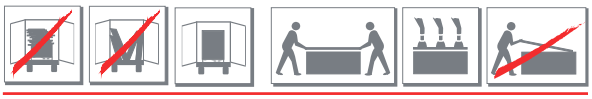
Handling

Transport

Storage

Responsibility clause

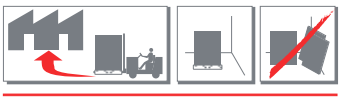
- NUDEC, S. A. supplies its products in accordance with the indications prepared by the purchaser with respect to the ordered material and quality. In this sense, NUDEC, S. A. provides its customers with all available professional and technical information deriving from its product analyses.
- Once the material has been delivered by NUDEC, S. A., the purchaser is fully responsible for all subsequent application, treatment, use and/or utilisation of this same material , whether by the actual purchaser or by third parties, with complete indemnity for NUDEC, S. A.
- The purchaser is wholly and soley responsible for carrying all tests or analyses, of any nature, which are required to verify that the product can be effectively applied for the purpose sought by the purchaser or by any third parties to whom the purchaser supplies the product or for whom its is installed.
- NUDEC, S. A. is exempt from any responsibility deriving from any inadequate or defective application of its products by the purchaser or subsequent third parties, and only accepts damages deriving directly from possible defects of its products at origin.



Transport

Dirt and sharp angles may damage the surface in the case of friction.

- During transport, stable, flat pallets should always be used and the sheets secured to prevent sliding.
- The sheets must not be allowed to slide over each other during loading and unloading operations.
- They should be lifted by hand without any dragging or by suction-cup lifting equipment.



Storage

An incorrect storage position can lead to permanent deformation.

- The sheets should be stored in closed premises that guarantee normal environmental conditions.
- The sheets should be stored one on top of the other on flat horizontal surfaces and fully supported over their total area.
- The topmost panel should be covered with a sheet of polyethylene or cardboard etc.
- NUDEC®PET sheets must not be stored in direct sunlight or under conditions of high humidity and/or temperature as this can have a negative effect of protective film adhesion.

NUDEC®

Pintor Vila Cinca, 24-28
E-08213 - Polinyà (Barcelona) - SPAIN
Tel. (+34) 93.713.27.00
Fax (+34) 93.713.19.36
nudec@nudec.es
www.nudec-plastic.com

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