Displays, showcases and other publicity material at sales points

Machinery protection

Moulds

Dispensing and recreational machines

Notices and signs

Protective shields

Security glazing

Construction components

Town furniture (anti-vandal)

Walls and ceilings

Covering panels

Warehouse panels

Caravan bodywork panels

Any industrial application that required thermoforming

NUDEC® PC

Polycarbonate sheets

- Excellent transparency and surface brightness
- High heat resistance
- They are available with UV protection
- Elevated hardness
- Excellent impact strength
- Thermoformable
- Intermediate chemical resistance
- Fire-resistant
- Reduced noise transmission
- Recyclable

NUDEC® PC

Properties

Dimensional stability to heat

NUDEC®PC sheets can withstand temperatures up to 120°C depending on the application.

Transformation

They can be sawn, edged and drilled without any burring. Crack-free holes can be easily made. They can be milled with conventional milling machines. A good clamping system is required. Laser cutting is not recommended.

Weathering

NUDEC®PC sheets are not protected against 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®PCuv 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.

PVC Profile Seals

PVC additives used in the manufacture of Seals. Plastifying agents derived from pthalic acids that are used to provide the PVC with ductility; this plastifying agent migrates to the surface and attacks the PC resulting in stress cracking general deterioration of the sheet properties.

Specifications valid for clear panels.

STANDARD SPECIFICATIONS FOR PC RESIN			
	CODE	UNIT	VALUE
PHYSICAL			
Density	ISO 1183	g/cm^3	1.2
MECHANICAL			
Tensile strength to deformation	ISO 527	MPa	60
Tensile strength to breakage	ISO 527	MPa	72
Elongation to breakage	ISO 527	%	150
Elasticity modulus in traction	ISO 527	MPa	2,300
Resistance to flexion	ISO 178	MPa	97
Charpy impact strength notched (23ºC)	ISO 180	kJ/m^2	55
Izod Unnotched (23ºC)	ISO 180	J/m	No breakage
Izod Notched (23 ºC)	ISO 180	J/m	950
Rockwell hardness, M / R scale	ASTM D-785		72/118
OPTICAL			
Light transmission	ASTM D-1003	%	87-91
Refractive index	ASTM D-542		1,586
THERMAL			
Maximum Service temperature		°C	120
VICAT Softening temperature (50 N)	ISO 306 B	°C	151
Heat deflection temperature, HDT A (1.8 MPa)	ISO 75-2	°C	143
Heat deflection temperature HDT B (0.45 MPa)	ISO 75-2	°C	146
Coefficient of linear thermal expansion	ASTM D-696	10^5/mK	6.8

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
GERMANY	DIN 4102-1	B1
FRANCE	NFP 92-507	M2

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

Informatiile detaliate in prezenta fisa tehnica sunt, in masura tuturor cunostintelor detinute de TUPLEX, corecte si adevarate la data la care au fost emise.

Inaintea aplicarii produsului, utilizatorul va efectua teste pentru a se asigura ca produsul este adecvat pentru aplicatia respectiva.

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®PC 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.

Polishing

The sheet edges can be buffed using buffing paste, first with a rigid fabric disc and then with a soft cloth to produce the final finish.

Drilling

NUDEC®PC sheets can be drilled quite easily with a normal stand drill or even with a hand-drill using clean, sharp drill bits. Drill bits designed for use with plastics are recommended. It is occasionally possible to use ordinary drill bits, but they should be sharpened to reduce the depth or cutting angle. During the drilling operation, the sheet must be firmly held, but avoiding excessive pressure at the same time. The hole must be larger than the screw to allow for thermal dilation and contraction.

There must be a separation between the edge and the hole of at least twice the hold diameter. Speeds of up to 1,750 rpm are preferred for small drill holes and for larger holes, whereas speeds as low as 350 rpm are advised. The use of compressed air is recommended to prevent overheating, especially in cases where sheet thicknesses exceed 5 mm.

Gluing

Gluing with adhesives

Among the recommended adhesives are those based on solvents, hot melt, silicone, two-component polyurethane based, two-component epoxy based and adhesive tapes.

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

- Chemical compatibility with the PC 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 / useful lifetime
- Adhesive strength (adherence to the plastic)
- Final usage requirements

The surfaces to be glued should be cleaned with a soft cloth and alcohol to eliminate all dirt and grease.

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.

Some adhesives can contract on 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

There are various thermoforming techniques that can be applied to NUDEC®PC sheets in order to obtain the desired shape once heated, using mechanical force, compressed air or a vacuum. Moulds can be made of plaster, water-cooled steel, cast aluminium or other materials, such as wood or epoxy.

Pre-drying is necessary in a forced air circulation oven at 120°C because moisture can produce bubbles or other problems in surface appearance. Drying time depends on sheet thickness.

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 pre-drying, thermoforming or hot-bending.

Vacuum moulding

The thermoforming temperature must be between 185 and 205°C, depending on sheet thickness.

Drop-moulding

Temperature between 145 and 160°C.

Bending

Hot-bending

Using two electric element heaters on both sides, (top and bottom), it becomes possible to bend at more precise angles. When the sheet reaches the correct temperature (above 155°C) a slight resistance will be noted to folding, this is when the sheet is easily bent.

If it is attempted to bend the sheet before it has been sufficiently heated, cracks will appear that could lead to breakage. If, on the other hand, the sheet is over-heated, bubbles might appear along the section that is to be bent.

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 pre-drying, thermoforming or hot-bending.

Cold bending

The maximum recommended angle is 90° for sheets having a thickness of less than 6 mm. This angle becomes 135° for sheets with a thickness greater than 135°. It is often necessary to bend in excess in order to achieve the desired angle.

Decoration

Printing

NUDEC®PC sheets can be printed using most printing methods. NUDEC has a list of inks suitable for silk-screening NUDEC®PC.

Painting

NUDEC®PC can be painted without surface treatment. *The print film should be removed just prior to printing to prevent the surface from damage.*

NUDEC® PC

Polycarbonate sheets

Properties

Specifications

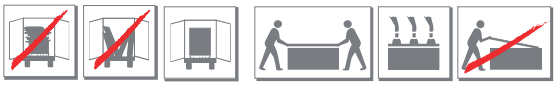
Handling

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®PC 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.

09/2014