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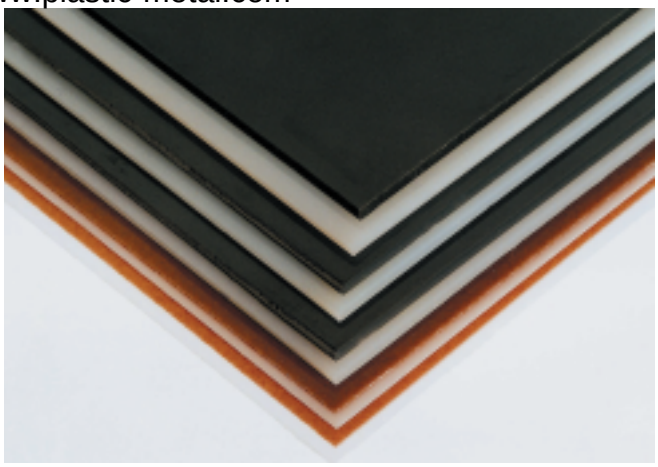
Thermoforming plastics from ENSINGER



ENSINGER has recently introduced a new range of thermoforming plastics now available in the UK. These materials include TECATRON PPS and TECAMID 6VF, all specifically designed for use in the process of thermoforming, a technique for which they have previously been unavailable.

TECASON P VF (PPSU)

Properties

- Very good creep resistance
- Extremely high impact resistance
- Excellent resistance to repeated sterilisation
- High frequency resistance
- Large range of colours (all RADEL® 5100/5500-colours are possible)
- Inherently flame-retardant
- Physiologically harmless

Preferred fields

Medical technology, electronics

Applications

Surgical trays, insulation components

Tray for sizing trials for hip implants

Surgical tray made from TECASON P VF

ENSINGER
ASK. THINK. SUCCEED.

TECATRON (PPS)
High performance under the severest of conditions

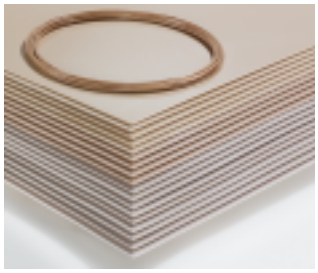
TECATRON PPS sheets and clad laminates were developed for chemical process technology, where there is a need for materials that provide good corrosion protection at high temperatures. They can successfully substitute fluoropolymers, and can reduce material costs for the producer. This high performance material also finds applications in demanding industries such as aerospace.

TECATRON LAM VF (PPS LAM)

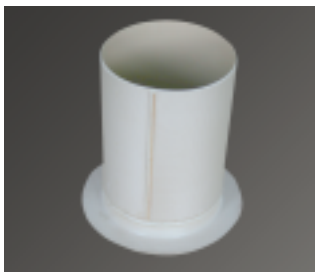
Properties

- High thermal resistance
- Inherently flame-retardant
- Excellent mechanical properties
- High chemical resistance
- Good machinability
- Very low permeation
- Reinforcement with glass fibres or modification to impact strength possible
- Low density

TECATRON PPS LAM can be hot gas welded with **TECATRON PPS**-welding wire.



Glass fibre reinforced **TECATRON PPS LAM** has very low permeation.



TECATRON VF (PPS GF)

Properties

- Semi-crystalline and hard with high strength and rigidity
- High thermal resistance up to 230°C
- Excellent chemical resistance also at high temperatures
- Outstanding dimensional stability and low water absorption
- Low toughness (tensile strength at break 1,9%)
- Inherently flame-retardant
- Very good creep resistance
- Very low permeation
- Available reinforced with glass fibres (15%, 30%, 40%)

Preferred fields

Aerospace, chemical processing, automotive, engineering technology

Applications

Strong coverings, containers and tubes, components for automotive technology, mechanical and thermally stressed components, supporting components

TECAMID 6 VF (Nylon 6)
Polyamide for deep-drawn moulding applications

Outstandingly suited to deep-drawing applications - an all-round engineering plastic now available for the first time to thermoformers.
Applications appear in the automotive industry, especially in mechanical engineering and in under the bonnet applications.

Properties

- High strength resulting from glass fibre reinforcement
- High toughness
- Permanent resistance to temperatures up to 140°C
- Resistance to oils, greases and solvents.

Preferred fields

Automotive (especially technical components), engineering technology

Applications

Enclosures, components for sound insulation, under-coating, containers for transport

Reference data for thermoforming processes

	Drying temperature	Drying time in hours/mm wall thickness	Thermoforming temperature in °C on the surface of the sheet		Factor of material (1 = Polystyrene)		Temperature of tool in °C	Shrinkage during processing in %
			Pressure	Vacuum	Heating time	Cooling time		
TECAMID 6 VF (PA 6 GF)	110	4	230-240	240-250			90	0,2-1,6
TECASON P VF (PPSU)	–	4	230-270	270-285			150	0,8-1,0
TECATRON VF (PPS GF)	–	–	260-270	260-275	3,5	0,9	140	0,7
TECATRON LAM VF (PPS)	–	–	260-270	260-275	3,5	0,9	140	0,7

Sizes

	Thickness mm	Width mm	Length mm
TECASON P VF (PPSU)	on request	610	1220
TECAMID 6 VF (PA 6 GF)	0,25-6,35	610-1250	1220 2440
TECATRON VF (PPS GF)	0,25-6,35	610-1250	1220 2440
TECATRON LAM VF (PPS)	3	610-1250	1220 2440

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Standard values

	Unit	TECASON P VF	TECATRON LAM VF	TECATRON GF 15 VF	TECATRON GF 30 VF	TECATRON GF 40 VF	TECAMID 6 VF
DIN-abbreviation		PPSU	PPS	PPS	PPS	PPS	PA 6
Density (ASTM D 792, DIN 53 479)	ρ g/cm³	1,29	1,35	1,44	1,58	1,65	1,20
Tensile strength at yield (ASTM D 638, DIN EN ISO 527)	σ_S MPa	70	90				105/ 60*
Tensile strength at break (ASTM D 638, DIN EN ISO 527, ASTM D 1708 (a))	σ_R MPa			120	160	185	105/ 55*
Elongation at break (ASTM D 638, DIN EN ISO 527, ASTM D 1708 (a))	ε_R %	>50	8	2	2	1,9	5/ 19*
Modulus of elasticity, after tensile test (ASTM D 638, DIN EN ISO 527)	E_Z MPa	2350	1900	7700	11000	14000	5400/ 2500
Modulus of elasticity after flexural test (ASTM D 790, DIN EN ISO 178)	E_B MPa	2600		7500	10400	14000	4200/ 210
Hardness (ball indentation: ISO 2039/1, Shore D: ASTM D 2240, DIN 53 505 (d), Rockwell: ASTM D 785 , ISO 2039/2 (r), Others: ASTM D 785 (a), DIN 43 456 (s))	H_K MPa					320	140
Impact resistance (DIN EN ISO 179, Izod: ASTM D 256, DIN EN ISO 180 (i), Charpy: DIN EN ISO 179 21, notch impact strength: DIN 53 456 (k))	a_n kJ/m²	31 (k)		32	9,5 (i)	45	70/ 105*
Melting point (DIN 53 736)	Tm °C		280	280	280	280	222
Glass transition temperature (DIN 53 736)	T_g °C	220	87	90	90	90	
Heat distortion temperature after ISO-R 75 method A, (DIN 53 461)	HDT/A °C	207	110	220	255	260	170
Heat distortion temperature after ISO-R 75 method B, (DIN 53 461)	HDT/B °C	214		115			205
Maximum service temperature short term long term	°C	190 170	260 230	230	230	260 230	140
Thermal conductivity (23 °C)	λ W/(K•m)	0,35	0,25			0,25	
Specific heat (23 °C)	c J/(g•k)					1,18	
Coefficient of linear thermal expansion (23 °C, ASTM D 696, DIN 53 752, ASTM E 831)	α 10^{-5} 1/K	5,6	5			ca. 3	4
Dielectric constant (10^6 Hz, ASTM D 150, DIN 53 483, IEC-250)	ε_r	3,45				4	
Dielectric loss factor (10^6 Hz, ASTM D 150, DIN 53 483, IEC-250)	tan δ					0,004	
Volume resistance (ASTM D 257, EC 93, DIN IEC 60093)	R_D Ω · cm	10^{15}	10^{13}		10^{15}	10^{13}	
Surface resistance (ASTM D 257, EC 93, DIN IEC 60093)	R_o Ω	10^{13}	10^{15}	10^{15}	10^{15}	10^{15}	
Dielectric strength (ASTM D 149, IEC-243, VDE 0303 part 2)	E_d k V/mm	15				20	
Resistance to tracking (DIN 53 480, VDE 0303 part 1)	Stufe					KC 175	
Moisture absorption to equilibrium 23 °C/50% rel. humidity (DIN EN ISO 62)	W(H_2O) %	0,37	0,01	0,02	0,02	0,02	
Flammability acc. to nach UL-Standard 94		V0	V0	V0	V0	V0	HB

* humid, after storage in standard atmosphere 23°C 50 RH (DIN 50 014) until saturation.

Information concerning the exclusion of liability and Terms and Conditions of Delivery can be found in our Semi-finished products catalogue or at www.ensinger-online.com.

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