

SEMI-FINISHED AND FINISHED PRODUCTS



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**DUPONT™ VESPEL®**

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**FLUORTEN®**  
PTFE & Technopolymers manufacturing



**FLUORITEN<sup>®</sup>**  
PTFE & Technopolymers manufacturing

## COMPONENTS IN DUPONT™ VESPEL<sup>®</sup>

The components in Dupont™ Vespel<sup>®</sup> combine the best characteristics of plastics, ceramics and metals; they are resistant to wear and sliding and in practice never melt: thanks to these properties they can be used in conditions of extreme operation.

### In short, the components in Dupont™ Vespel<sup>®</sup>:

- are exceptionally resistant to wear even in the absence of lubrication (PV limit value when dry: up to 12 MPa·m/s, which can be exceeded in the presence of lubrication),
- can operate continuously in a vast range of temperatures, from cryogenic ones up to 288°C and, for short periods, up to 482°C and above,
- can withstand loads at temperatures which are prohibitive for the majority of plastics,
- have a low thermal and electric conductivity,
- can be used to manufacture sealing gaskets thanks to their conformability and their capacity to resist permanent deformation. The sealing characteristics are generally greater than metal/metal ones for which much narrower tolerances are necessary,
- can easily be machined by tools without the need for special equipment or processes.

## MACHINING DUPONT™ VESPEL<sup>®</sup>

Fluoriten can provide finished components, machined with a machine tool or semi-finished in rods, tubes and sheets (see table) which can be finished by the customer with machine tools. The machining tolerances of the components in Dupont™ Vespel<sup>®</sup> are lower than those which can be obtained with other plastics and the parameters for machining are generally the same as those used for metals such as brass. Semi-finished goods in Dupont™ Vespel<sup>®</sup> are relatively easy to work mechanically thanks to the high characteristics of mechanical resistance, strength and dimensional stability of the material at the working temperatures.

Below please find a short guide to the choice of the various types of Dupont™ Vespel<sup>®</sup> depending on the applications and a table with the main characteristics.

## FIELDS OF APPLICATION

- transport, for the production of any kind of vehicle, military or civil;
- aerospace, to reduce the weight of the components used;
- in semiconductors, with a saving given by a longer duration than average;
- industrial in general, for compressors, valves, pumps, insulators;
- in office machinery, such as printers, photocopiers etc.
- in ball valves for oil & gas, to simplify the design of seals and housings, increase their life, avoid damage of the ball, reduce the operating torque and increase the temperature range of use: from cryogenic to 288°C in continuous and above 420°C for short periods.

## GUIDE TO THE CHOICE OF TYPES

APPLICATIONS	TYPE
Mechanical and electrical components at high temperatures, housings of valves, seals, electric insulators, connectors, nozzles for plasma torches, parts for the semiconductor sector.	SP - 1. Base resin not loaded. It has the highest mechanical resistance and elongation, the lowest flexural modulus and thermal conductivity and excellent electric properties.
Lubricated and non-lubricated applications, with requirements of low friction and resistance to wear. Housings of valves, seals, ball bearings, washers, sealing gaskets.	SP - 21. With 15% of graphite (in weight). Further improvement of its natural resistance to wear and long-term thermal stability.
Applications in which a low coefficient of thermal dilation is more important than mechanical resistance (which is slightly less). Ball bearings (bushings, washers, etc.) sweep-out fingers for hot glass bottles.	SP - 22. With 40% of graphite (in weight). Lowest coefficient of thermal dilation. Maximum resistance to creep.
Applications with requisites of low friction and resistance to wear, in moderate conditions of PV and temperature, Ball bearings (bushings, washers, etc.) housings of ball valves.	SP - 211. With 15% of graphite and 10% of fluorocarbon Teflon® (in weight). Minimum coefficient of static friction
Components with requisites of low friction and resistance to wear, which work in a vacuum or in the presence of inert gases. Ball bearings, rings for pistons and seals.	SP - 3. With 15% of MoS2 (in weight). Excellent behaviour in wear in anhydrous conditions.

## SEMI-FINISHED PRODUCTS IN DUPONT™ VESPEL®

TUBE			RODS		SHEETS	
EXTERNAL DIAMETER	INTERNAL DIAMETER	RATED LENGTH	RATED DIAMETER	RATED LENGTH	THICKNESS	SIZE
180,00	142,00	838	3,1	965	12,7	127 x 127
170,00	142,00	838	6,30	965	25,4	127 x 127
162,00	142,00	838	9,50	965	38,1	127 x 127
170,00	119,00	838	11,10	965	50,8	127 x 127
149,00	119,00	838	12,70	965	6,3	127 x 254
142,00	119,00	838	15,80	965	38,1	127 x 254
165,00	109,00	838	19,00	965	50,8	127 x 254
154,00	109,00	838	25,40	965	1,6	254 x 254
144,00	109,00	838	31,70	965	3,2	254 x 254
137,00	109,00	838	38,10	965	4,8	254 x 254
137,00	86,30	838	50,80	965	6,3	254 x 254
124,00	86,30	838	63,50	965	12,7	254 x 254
109,00	86,30	838	82,50	685	25,4	254 x 254
129,00	66,00	838			38,1	254 x 254
119,00	66,00	838			50,8	254 x 254
101,00	66,00	838				
86,30	66,00	838				
124,00	48,20	838				
111,00	48,20	838				
94,00	48,20	838				
78,70	48,20	838				
43,10	35,50	330 (min. 3 PZ)				

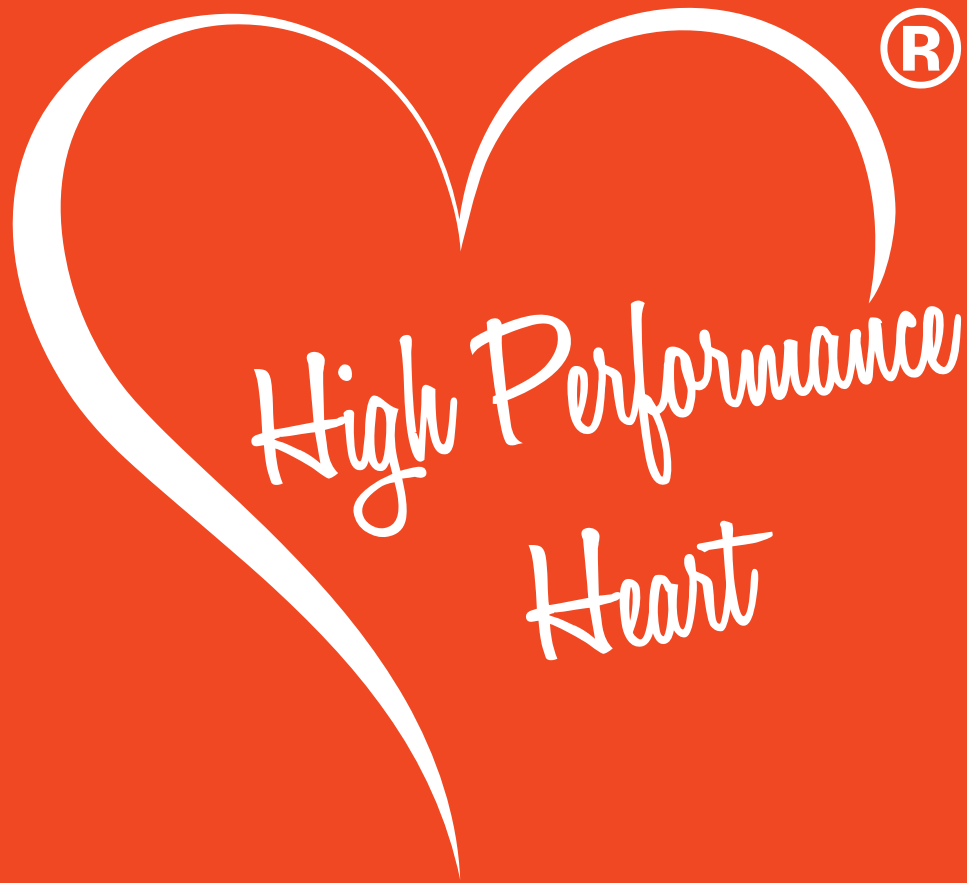
Tol. Diameter +0/+0.25

Measurements in mm  
 The dimensions are rated  
 Sizes and dimensions not available for all types.

# DUPONT™ VESPEL® FEATURES



PROPERTY / PROPRIETÀ	TEMP. °C	ASTM METHOD	UNITS	SP-1	SP-21	SP-22	SP-211	SP-3
Tensile Strength / Resistenza a trazione	23	D1708	Mpa	86,2	65,5	51,7	44,8	58,5
	260			41,4	37,9	23,4	24,1	-
Elongation, ultimate / Allungamento % a rottura	23	D1708	%	7,5	4,5	3	3,5	4
	260			6	3	2	3	-
Flexural strength, ultimate / Resistenza a flessione	23	D790	Mpa	110,3	110,3	89,6	68,9	75,8
	260			62,1	62	44,8	34,5	39,9
Flexural Modulus / Modulo a flessione	23	D790	Mpa	3102	3792	4826	3102	3275
	260			1724	2551	2758	1379	1862
<b>Compressive Stress / Resistenza a compressione</b>								
@ 1% strain	23	D695	Mpa	24,8	29	31,7	20,7	34,5
@ 10% strain				133,1	133,1	112,4	102	127,6
@ 0,1% strain				51	45,5	41,4	37,2	-
Compressive Modulus / Modulo a compressione				2413	2895	3275	2068	2413
<b>Axial fatigue, Endurance limit / Resistenza a fatica assiale</b>								
@ 10 <sup>3</sup> cycles	23	-	Mpa	55,8	46,2	-	-	-
	260			26,2	22,8	-	-	-
@ 10 <sup>7</sup> cycles	23	-	Mpa	42,1	32,4	-	-	-
	260			16,5	16,5	-	-	-
<b>Radial fatigue, Endurance limit / Resistenza a fatica radiale</b>								
at 10 <sup>3</sup> cycles / a 10 <sup>3</sup> cicli	23	-	Mpa	65,5	65,5	-	-	-
at 10 <sup>7</sup> cycles / a 10 <sup>7</sup> cicli	23	-		44,8	44,8	-	-	-
Shear Strength / Resistenza al taglio	23	D732	Mpa	89,6	77,2	-	-	-
Impact Strength, Izod Notched / Resistenza all'urto Izod con intaglio	23	D256	J/m	42,7	42,7	-	-	21,3
Impact Strength, Izod unnotched / Resistenza all'urto Izod senza intaglio	23	D256	J/m	747	320	-	-	112
Poisson's Ratio / Coefficiente di Poisson	23	-	-	0,41	0,41	-	-	-
Wear Rate (*) / Resistenza all'usura	-	-	m/sx10 <sup>-10</sup>	17-85	6,3	4,2	4,9	17-23
Coefficient of friction (*) / Coefficiente di attrito				(*)= Unlubricated in air / Non lubrificato, in aria				
PV = 0,875 Mpa.m/s	-	-	-	0,29	0,24	0,3	0,12	0,25
PV = 3,5 Mpa.m/s				-	0,12	0,09	0,08	0,17
In vacuum / sotto vuoto				-	-	-	-	0,83
Static in air / Statico in aria				0,35	0,3	0,27	0,2	-
Coefficient of linear thermal expansion / Coefficiente di dilatazione termica lineare	23 to 260	D696	µm/m/°C	54	49	38	54	52
Thermal conductivity / Conducibilità termica	40	-	W/m. °C	0,35	0,87	1,73	0,76	0,47
Specific heat / Calore specifico	-	-	J/Kg/°C	1130	-			
Deformation under 14 Mpa load / Deformazione sotto carico di 14 Mpa	50	D621	%	0,14	0,1	0,08	0,13	0,12
Deflection temperature at 2Mpa / Temperatura di deformazione a 2 Mpa	-	D648	°C	360	360	-	-	-
<b>Dielectric constant / Costante dielettrica</b>								
@ 102 Hz	23	D150	-	3,62	13,53	-	-	-
@ 104 Hz				3,64	13,28	-	-	-
@ 106 Hz				3,55	13,41	-	-	-
<b>Dissipation factor / Fattore di dissipazione</b>								
@ 102 Hz	23	D150	-	0,0018	0,0053	-	-	-
@ 104 Hz				0,0036	0,0067	-	-	-
@ 106 Hz				0,0034	0,0106	-	-	-
Dielectric strength - short time 2 mm thickness / Rigidità dielettrica - tempo corto 2 mm spessore	-	D149	MV/M	22	9,84	-	-	-
Volume resistivity / Resistività volumetrica	23	D257	Ω.m	10 <sup>14</sup> - 10 <sup>15</sup>	10 <sup>12</sup> - 10 <sup>13</sup>	-	-	-
Surface resistivity / Resistività superficiale	23	D257	Ω	10 <sup>15</sup> - 10 <sup>16</sup>	-	-	-	-
<b>Water absorption / Assorbimento d'acqua</b>								
24 h	23	D570	%	0,24	0,19	0,14	0,21	0,23
48 h	50			0,72	0,57	0,42	0,49	0,65
equilibrium, 50% RH / Equilibrio 50% RH	-			1,0-1,3	0,8-1,1	-	-	-
Specific gravity / Densità	23	D792	gr/cm <sup>3</sup>	1,43	1,51	1,65	1,55	1,6
Oxygen Index / Indice d'ossigeno	-	D2863	%	53	-	49	-	-



“Give your equipment  
a High Performance Heart  
through Fluorten srl  
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