

DuPont™ Vespel® CP-0600 Series

Composite Parts

Laminate Series

Vespel® CP-0644, CP-0648 and CP-0650 composite parts consist of woven, carbon- fiber fabrics laminated in polyimide resin for strong, light, and durable components. CP parts are used as bushings and washers in high temperatures and oxidative environments.

CP-0644

Mechanical Property	Temperature	Test Method	Units	Typical Values
Ultimate Tensile Strength	23 °C (73 °F) 260 °C (500 °F)	ASTM D-638	MPa (ksi)	125 (18) 97 (14)
Tensile Modulus	23 °C (73 °F) 260 °C (500 °F)	ASTM D-638	MPa (ksi)	23,000 (3,400) 16,000 (2,300)
Ultimate Flexural Strength	23 °C (73 °F) 260 °C (500 °F)	ASTM D-790	MPa (ksi)	220 (32) 165 (24)
Flexural Modulus	23 °C (73 °F) 260 °C (500 °F)	ASTM D-790	MPa (ksi)	21,000 (3,000) 17,000 (2,400)
Ultimate Compressive Strength ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-3410	MPa (ksi)	140 (20) 100 (15)
Compressive Modulus ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-3410	MPa (ksi)	19,000 (2,700) 14,000 (2,100)
Short-Beam Shear Strength ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-2344	MPa (ksi)	33 (4.8) 24 (3.5)
Notched Izod	—	ASTM D-256	J/m (ft·lb/in)	171 (3.2)
Hardness, Rockwell 15-T	—	ASTM D-2240	—	79
Thermal Property				
Glass Transition Temperature, T _g	—	Thermal Mechanical Analysis	°C (°F)	360 (680)
Thermal Expansion Coefficient ^a	21 to 316 °C (70 to 600 °F)	ASTM E-228-85	m/m/°C (in/in/°F)	43.2 x 10 ⁻⁶ (24 x 10 ⁻⁶)
Thermal Expansion Coefficient	21 to 316 °C (70 to 600 °F)	ASTM D-696	m/m/°C (in/in/°F)	2.3 x 10 ⁻⁶ (1.3 x 10 ⁻⁶)
Other Properties				
Water Absorption, 180 hr	23 °C (73 °F)	ASTM D-570	% weight gain	2.1
Specific Gravity	—	ASTM D-792	—	1.51

Note: All values listed are for compression-molded samples and are measured in the plane perpendicular to the direction of molding pressure unless otherwise indicated.

^a Measured in the plane parallel to the direction of molding pressure.

CP-0644 may be processed using a variety of lay-up techniques with single or multiple debulking steps to optimize process capability for each part configuration. These design considerations can cause variation from the typical values listed above. Listed properties are based upon technical data that DuPont believes to be reliable. DuPont makes no warranties, expressed or implied, and assumes no liability in connection with use of this information.



The miracles of science™

CP-0648

Mechanical Property	Temperature	Test Method	Units	Typical Values
Ultimate Tensile Strength	23 °C (73 °F)	ASTM D-638	MPa (ksi)	150 (22)
	260 °C (500 °F)			130 (19)
Tensile Modulus	23 °C (73 °F)	ASTM D-638	MPa (ksi)	21,000 (3,100)
	260 °C (500 °F)			19,000 (2,700)
Ultimate Flexural Strength	23 °C (73 °F)	ASTM D-790	MPa (ksi)	250 (36)
	260 °C (500 °F)			195 (28)
Flexural Modulus	23 °C (73 °F)	ASTM D-790	MPa (ksi)	19,000 (2,800)
	260 °C (500 °F)			16,000 (2,300)
Ultimate Compressive Strength ^a	23 °C (73 °F)	ASTM D-3410	MPa (ksi)	170 (25)
	260 °C (500 °F)			140 (20)
Compressive Modulus ^a	23 °C (73 °F)	ASTM D-3410	MPa (ksi)	23,000 (3,400)
	260 °C (500 °F)			20,000 (2,900)
Short-Beam Shear Strength ^a	23 °C (73 °F)	ASTM D-2344	MPa (ksi)	37 (5.3)
	260 °C (500 °F)			28 (4.0)
Notched Izod	—	ASTM D-256	J/m (ft·lb/in)	123 (2.3)
Hardness, Rockwell 15-T	—	ASTM D-2240	—	79
Thermal Property				
Glass Transition Temperature, T _g	—	Thermal Mechanical Analysis	°C (°F)	330 (626)
Thermal Expansion Coefficient ^a	21 to 316 °C (70 to 600 °F)	ASTM E-228-85	m/m/°C (in/in/°F)	34.6 x 10 ⁻⁶ (19.2 x 10 ⁻⁶)
Thermal Expansion Coefficient	21 to 316 °C (70 to 600 °F)	ASTM D-696	m/m/°C (in/in/°F)	1.6 x 10 ⁻⁶ (0.9 x 10 ⁻⁶)
Other Properties				
Water Absorption, 180 hr	23 °C (73 °F)	ASTM D-570	% weight gain	2.6
Specific Gravity	—	ASTM D-792	—	1.48

Note: All values listed are for compression-molded samples and are measured in the plane perpendicular to the direction of molding pressure unless otherwise indicated.

^a Measured in the plane parallel to the direction of molding pressure.

CP-0648 may be processed using a variety of lay-up techniques with single or multiple debulking steps to optimize process capability for each part configuration. These design considerations can cause variation from the typical values listed above. Listed properties are based upon technical data that DuPont believes to be reliable. DuPont makes no warranties, expressed or implied, and assumes no liability in connection with use of this information.

CP-0650

Mechanical Property	Temperature	Test Method	Units	Typical Values
Ultimate Tensile Strength	23 °C (73 °F) 260 °C (500 °F)	ASTM D-638	MPa (ksi)	130 (19) 110 (16)
Tensile Modulus	23 °C (73 °F) 260 °C (500 °F)	ASTM D-638	MPa (ksi)	23,000 (3,300) 19,000 (2,800)
Ultimate Flexural Strength	23 °C (73 °F) 260 °C (500 °F)	ASTM D-790	MPa (ksi)	210 (30) 165 (24)
Flexural Modulus	23 °C (73 °F) 260 °C (500 °F)	ASTM D-790	MPa (ksi)	18,000 (2,600) 15,000 (2,200)
Ultimate Compressive Strength ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-3410	MPa (ksi)	145 (21) 120 (17)
Compressive Modulus ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-3410	MPa (ksi)	23,000 (3,400) 22,000 (3,200)
Short-Beam Shear Strength ^a	23 °C (73 °F) 260 °C (500 °F)	ASTM D-2344	MPa (ksi)	34 (5.0) 25 (3.6)
Notched Izod	—	ASTM D-256	J/m (ft-lb/in)	144 (2.7)
Hardness, Rockwell 15-T	—	ASTM D-2240	—	80
Thermal Property				
Glass Transition Temperature, T _g	—	Thermal Mechanical Analysis	°C (°F)	330 (626)
Thermal Expansion Coefficient ^a	21 to 316 °C (70 to 600 °F)	ASTM E-228-85	m/m/°C (in/in/°F)	30.2 x 10 ⁻⁶ (16.8 x 10 ⁻⁶)
Thermal Expansion Coefficient	21 to 316 °C (70 to 600 °F)	ASTM D-696	m/m/°C (in/in/°F)	4.0 x 10 ⁻⁶ (2.2 x 10 ⁻⁶)
Other Properties				
Water Absorption, 180 hr	23 °C (73 °F)	ASTM D-570	% weight gain	2.3
Specific Gravity	—	ASTM D-792	—	1.49

Note: All values listed are for compression-molded samples and are measured in the plane perpendicular to the direction of molding pressure unless otherwise indicated.

^a Measured in the plane parallel to the direction of molding pressure.

CP-0650 may be processed using a variety of lay-up techniques with single or multiple debulking steps to optimize process capability for each part configuration. These design considerations can cause variation from the typical values listed above. Listed properties are based upon technical data that DuPont believes to be reliable. DuPont makes no warranties, expressed or implied, and assumes no liability in connection with use of this information.

Visit us at kalrez.dupont.com or vespel.dupont.com

Contact DuPont at the following regional locations:

North America
800-222-8377

Latin America
+0800 17 17 15

Europe, Middle East, Africa
+41 22 717 51 11

Greater China
+86-400-8851-888

ASEAN
+65-6586-3688

Japan
+81-3-5521-8484

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable and falls within the normal range of properties. It is intended for use by persons having technical skill, at their own discretion and risk. This data should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.

Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, discuss with your DuPont customer service representative and read Medical Caution Statement H-50103-3.

Copyright © 2013 DuPont. The DuPont Oval Logo, DuPont™, The miracles of science™, Kalrez®, Vespel®, Teflon® and Nomex® are trademarks or registered trademarks of E.I. du Pont de Nemours and Company or its affiliates. All rights reserved.

(04/13) Reference No. VPE-A11079-00-A0413 (Previously VCPI0600-053003)



The miracles of science™