

# TIVAR® PRODUCT COMPARISON DATA

	Product Description	Units	Test Method ASTM	TIVAR® 1000 UHMW-PE	TIVAR® ECO UHMW-PE	TIVAR® UV UHMW-PE	ARMOR-X UHMW-PE	TIVAR® ESD UHMW-PE	TIVAR® EC UHMW-PE	
				Compression Molded/ Ram Extrusion	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	
MECHANICAL	1	Specific Gravity, 73°F	-	D792	0.93	0.93	0.94	1.0	0.94	0.94
	2	Tensile Strength, 73°F	psi	D638	5,800	4,000	5,800	3,200	5,800	5,800
	3	Tensile Modulus of Elasticity, 73°F	psi	D638	80,000	98,000	116,000	51,500	87,000	101,000
	4	Tensile Elongation (at break), 73°F	%	D638	300	200	300	100	300	300
	5	Flexural Strength, 73°F	psi	D790	3,500	2,000	3,800	2,200	3,700	3,200
	6	Flexural Modulus of Elasticity, 73°F	psi	D790	87,000	81,000	116,000	44,000	87,000	101,000
	7	Shear Strength, 73°F	psi	D732	4,800	-	-	-	-	-
	8	Compressive Strength, 10% Deformation, 73°F	psi	D695	3,000	2,800	3,300	3,900	3,300	3,300
	9	Compressive Modulus of Elasticity, 73°F	psi	D695	80,000	60,000	100,000	34,000	100,000	100,000
	10	Hardness, Rockwell, Scale as Noted, 73°F	-	D785	R56	N/A	N/A	N/A	N/A	N/A
	11	Hardness, Durometer, Shore "D" Scale, 73°F	-	D2240	66	67	66	50	66	66
	12	Izod Impact (notched), 73°F	ft. lb./in. of notch	D256 Type "A"	No Break	No Break	No Break	No Break	No Break	No Break
	13	Izod Impact (double notch), 73°F	ft. lb. / in. <sup>2</sup> of notch	D4020	47.6	38.1	47.6	-	46.2	28.6
	14	Coefficient of Friction (Dry vs. Steel) Dynamic	-	QTM 55007	0.12	0.14	0.12	0.20	0.12	0.12
	15	Limiting PV (with 4:1 safety factor applied)	ft. lbs./in. <sup>2</sup> min	QTM 55007	3,000	3,000	3,000	-	3,000	3,000
	16	Sand Slurry	1018 Steel=100	ASTM D4020	10	18	10	-	10	10
THERMAL	17	Coefficient of Linear Thermal Expansion (-40°F to 300°F)	in./in./°F	E-831 (TMA)	$1.1 \times 10^{-4}$	$1.1 \times 10^{-4}$	$1.1 \times 10^{-4}$	-	$1.1 \times 10^{-4}$	$1.1 \times 10^{-4}$
	18	Heat Deflection Temperature 264 psi	°F	D648	116	116	116	116	116	116
	19	Tg-Glass Transition (amorphous)	°F	D3418	N/A	N/A	N/A	N/A	N/A	N/A
	20	Melting Point (crystalline) Peak	°F	D3418	275	260	275	275	275	275
	21	Continuous Service Temperature in Air (Max.) (1)	°F	-	180	180	180	180	180	180
	22	Thermal Conductivity	BTU in./hr. ft. <sup>2</sup> °F	F433	2.84	N/A	N/A	N/A	N/A	N/A
ELECTRICAL	23	Dielectric Strength, Short Term	Volts/mil	D149	1,150	N/A	N/A	N/A	N/A	N/A
	24	Surface Resistivity	ohm/square	D257	$>10^{15}$	$<10^{15}$	$>10^{15}$ (UV Colors) $<10^{14}$ (UV Black)	$>10^{15}$	$10^5 - 10^9$	$<10^5$
	25	Dielectric Constant, 10 <sup>6</sup> Hz	-	D150	2.3	N/A	N/A	N/A	N/A	N/A
	26	Dissipation Factor, 10 <sup>6</sup> Hz	-	D150	$<0.5 \times 10^{-3}$	N/A	N/A	N/A	N/A	N/A
	27	Flammability @ 3.1 mm (1/8 in.) (5)		UL 94	HB	HB	HB	HB	HB	HB
CHEMICAL (3)	28	Water Absorption Immersion, 24 Hours	% by wt.	D570 (2)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	29	Water Absorption Immersion, Saturation	% by wt.	D570 (2)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30	Acids, Weak, acetic, dilute hydrochloric or sulfuric acid	@73°F		A	A	A	A	A	A
	31	Acids, Strong, conc. hydrochloric or sulfuric acid	@73°F		A	A	A	A	A	A
	32	Alkalies, Weak, dilute ammonia or sodium hydroxide	@73°F		A	A	A	A	A	A
	33	Alkalies, Strong, strong ammonia or sodium hydroxide	@73°F		A	A	A	A	A	A
	34	Hydrocarbons-Aromatic, benzene, toluene	@73°F		L	L	L	L	L	L
	35	Hydrocarbons-Aliphatic, gasoline, hexane, grease	@73°F		A	A	A	A	A	A
	36	Ketones, Esters, acetone, methyl ethyl ketone	@73°F		A	A	A	A	A	A
	37	Ethers, diethyl ether, tetrahydrofuran	@73°F		L	L	L	L	L	L
	38	Chlorinated Solvents, methylene chloride, chloroform	@73°F		L	L	L	L	L	L
	39	Alcohols, methanol, ethanol, anti-freeze	@73°F		A	A	A	A	A	A
	40	Continuous Sunlight	@73°F		L	L	A	A	A	A
OTHER	41	FDA Compliance			Y	N	N	N	N	N
	42	Relative Cost (4)			\$	\$	\$\$	\$\$	\$\$	\$\$
	43	Relative Machinability (1-10, 1=Easier to Machine)			2	3	3	3	3	3

- (1) Data represents Quadrant's estimated maximum long term service temperature based on practical field experience.
- (2) Specimens 1/8" thick x 2" dia. or square.
- (3) Chemical resistance data are for little or no applied stress. Increased stress, especially localized, may result in more severe attack. Examples of common chemicals also included.
- (4) Relative cost of material profiled in this brochure (\$ = Least Expensive and \$\$\$\$\$\$ = Most Expensive)
- (5) **Estimated rating based on available data.** The UL 94 Test is a laboratory test and does not relate to actual fire hazard. Contact Quadrant for specific UL "Yellow Card" recognition number.

**Key:**  
 A = Acceptable Service  
 L = Limited Service  
 U = Unacceptable  
 QTM = Quadrant Test Method

**NOTE:** Property data shown are typical average values. A dash (-) indicates insufficient data available for publishing.

	TIVAR® DrySlide UHMW-PE	TIVAR® CleanStat UHMW-PE	TIVAR® Oil Filled UHMW-PE	TIVAR® Ceram P UHMW-PE	TIVAR® H.O.T. UHMW-PE	TIVAR® 88 UHMW-PE	TIVAR® 88 UHMW-PE w/BurnGuard	TIVAR® 88-2 UHMW-PE	TIVAR® 88 Esd UHMW-PE	TIVAR® 88-2 Esd UHMW-PE
	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded	Compression Molded
1	0.94	0.94	0.94	0.96	0.94	0.93	1	0.933	0.945	0.94
2	5,100	5,200	6,500	5,500	6,800	5,800	3,600	5,500	4,800	4,800
3	87,000	94,000	43,500	83,000	72,500	61,000	87,000	97,000	124,000	116,000
4	200	200	280	300	300	300	120	200	250	200
5	2,600	2,700	2,500	3,700	3,800	3,200	2,900	3,000	3,300	3,100
6	72,000	87,000	58,000	94,000	80,000	72,500	94,000	105,000	112,000	106,000
7	-	-	-	-	4,800	-	-	4,800	4,800	4,800
8	2,900	3,100	2,700	3,000	3,000	3,000	2,800	2,900	3,000	2,900
9	80,000	77,750	42,000	94,000	80,000	70,000	65,000	80,000	87,000	80,000
10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	64	66	64	68	68	69	64	64	67	64
12	No Break	No Break	No Break	No Break	No Break	No Break	No Break	No Break	No Break	No Break
13	33.3	28.6	36.2	50.0	28.6	34.3	41.9	45.2		
14	0.08	0.12	0.14	0.12	0.12	0.12	0.09	0.08	0.14	0.08
15	4,000	3,000	4,000	3,000	3,000	4,000	-	4,000	4,000	4,000
16	10	13	13	8.5	10	8	15	11	8	10
17	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	9.0 x 10 <sup>-5</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-4</sup>
18	116	116	116	116	116	116	116	116	116	116
19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	275	275	275	275	275	275	275	275	275	275
21	180	180	180	180	275	180	180	180	180	180
22	N/A	N/A	2.84	2.84	2.84	2.84	-	2.84	N/A	N/A
23	N/A	N/A	-	-	-	-	-	-	N/A	N/A
24	10 <sup>5</sup> - 10 <sup>9</sup>	10 <sup>7</sup> - 10 <sup>10</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>15</sup>	>10 <sup>12</sup>	>10 <sup>15</sup>	10 <sup>5</sup> - 10 <sup>9</sup>	10 <sup>5</sup> - 10 <sup>9</sup>
25	N/A	N/A	2.3	2.3	2.3	2.3	-	2.3	N/A	N/A
26	N/A	N/A	<0.5 x 10 <sup>3</sup>	<0.5 x 10 <sup>3</sup>	<0.5 x 10 <sup>3</sup>	<0.5 x 10 <sup>3</sup>	-	<0.5 x 10 <sup>3</sup>	N/A	N/A
27	HB	HB	HB	HB	HB	HB	V0	HB	HB	HB
28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
29	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	A	A	A	A	A	A	A	A	A	A
31	A	A	A	A	A	A	A	A	A	A
32	A	A	A	A	A	A	A	A	A	A
33	A	A	A	A	A	A	A	A	A	A
34	L	L	L	L	L	L	L	L	L	L
35	A	A	A	A	A	A	A	A	A	A
36	A	A	A	A	A	A	A	A	A	A
37	L	L	L	L	L	L	L	L	L	L
38	L	L	L	L	L	L	L	L	L	L
39	A	A	A	A	A	A	A	A	A	A
40	A	L	L	L	L	A	L	A	A	A
41	N	Y	Y	N	Y	N	N	N	N	N
42	\$\$\$	\$\$\$\$	\$\$	\$\$\$	\$\$\$	\$\$\$\$	\$\$\$\$	\$\$\$\$	\$\$\$\$	\$\$\$\$
43	3	3	2	3	2	3	4	2	3	3