Kevlar® N636 Honeycomb

Typical Mechanical Properties

Cell size, inch	Density, pcf	DuPont Paper Designation	Compress Strength, PSI	L - Shear Strength, PSI	L - Shear Modulus, KSI	W - Shear Strength, PSI	W - Shear Modulus, KSI
1/8"	2.5	1.4 N636	250 164/154/107	205 181/144	15 17.7/16.0	115 94.3/82.7	8 9.12/8.02
1/8"	3	1.8 N636	350 267/223	265 236	20 19.8/16.4	150 115	11 8.60/8.135
1/8"	4	1.8 N636	600	365	21	200	12
1/8"	4	2.8 N636	480	405	26	240	15
1/8"	4.5	1.8 N636	725	420	21	230	12
1/8"	4.5	2.8 N636	650	475	27	275	15
1/8"	5	1.8 N636	850	470	22	260	13
1/8"	5	2.8 N636	825	545	29	320	16
1/8"	6	1.8 N636	1100	575	22	315	14
1/8"	6	2.8 N636	1150	680	32	400	17

This chart was produced using preliminary technical data supplied by EURO-COMPOSITES®, HEXCEL® and SCHÜTZ®. It is subject to revision as additional knowledge and experience are gained. DuPont makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information.

RT DRY B-BASIS/70°C WET B-/180°C DRY
(MEAN FOR MODULUS) (160°F) (355°F)

Kevlar® N636 Honeycomb

Typical Mechanical Properties

Cell size, inch	Density, pcf	DuPont Paper Designation	Compress Strength, PSI	L - Shear Strength, PSI	L - Shear Modulus, KSI	W - Shear Strength, PSI	W - Shear Modulus, KSI
5/32"	2.5	1.8 N636	300	220	18	140	10
5/32"	4.5	1.8 N636	970	370	21	250	14
5/32"	4.5	2.8 N636	730	450	26	275	15
5/32"	5	2.8 N636	980	550	28	335	16
5/32"	6	2.8 N636	1200	640	30	395	18
5/32"	6	3.9 N636	1100	730	29	355	14

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Nomex® Honeycomb

Typical Mechanical Properties

	Compressive Stabilized		Plate Shear			
			"L" Direction		"W" Direction	
Cell-Density	Str.psi	Mod.ksi	Str. Psi	Mod. Ksi	Str.psi	Mod.ksi
1/8" – 1.8	115	8	90	3.8	50	1.5
1/8" – 3.0	325	20	175	6.5	100	3.5
1/8" – 5.0	770	37	325	10.2	175	5.4
1/8" – 6.0	1125	60	385	13.0	200	6.5
3/16" – 2.0	150	11	95	4.3	55	2.1
3/16" – 6.0	1020	60	420	13.0	225	6.5
1/4" – 1.5	90	6	70	3.0	35	1.3

Korex® Honeycomb

Typical Mechanical Properties

	Compressive Stabilized		Plate Shear			
			"L" Direction		"W" Direction	
Cell-Density	Str.psi	Mod.ksi	Str. Psi	Mod. Ksi	Str.psi	Mod.ksi
1/8" – 3.0	375	40	250	19	145	9
1/8" – 4.5	750	75	490	38	260	15
1/8" – 6.0	1200	100	530	43	310	18
5/32" – 2.4	290	NA	190	13	110	7
1/4" – 1.5	118	NA	96	8	46	2
3/16" – 2.0	160	25	125	12	70	5
3/16" – 3.0	NA	NA	228	22	138	9
3/16" – 4.5	738	NA	411	35	244	13
OX – 3/8" – 1.5	NA	NA	70	4	50	5
OX – 3/16" – 3.0	390	34	105	6	130	14

KEVLAR® N636 Honeycomb
Typical Mechanical Properties

Cell size, inch	Density, pcf	DuPont Paper Designation	Compress Strength, PSI	L - Shear Strength, PSI	L - Shear Modulus, KSI	W - Shear Strength, PSI	W - Shear Modulus, KSI
3/16"	2	1.4 N636	210	145	10	85	5
3/16"	2	1.8 N636	165	145	12	90	8
3/16"	2.3	1.4 N636	255	175	11	100	6
3/16"	2.5	1.4 N636	330	200	12	120	7
3/16"	2.5	1.8 N636	250	200	14	120	8
3/16"	3	1.8 N636	390	250	15	160	10
3/16"	4	1.8 N636	655	340	20	240	14
3/16"	4	2.8 N636	640	385	23	235	13
3/16"	4.5	1.8 N636	790	385	23	275	15
3/16"	4.5	2.8 N636	810	440	25	275	14
3/16"	6	1.8 N636	1170	520	32	390	20
3/16"	6	2.8 N636	1310	600	28	390	19
3/16" - OX	2	1.8 N636	170	100	9	100	10
3/16" - OX	3	1.8 N636	390	180	9	175	13
3/16" - OX	4	1.8 N636	610	260	10	260	16

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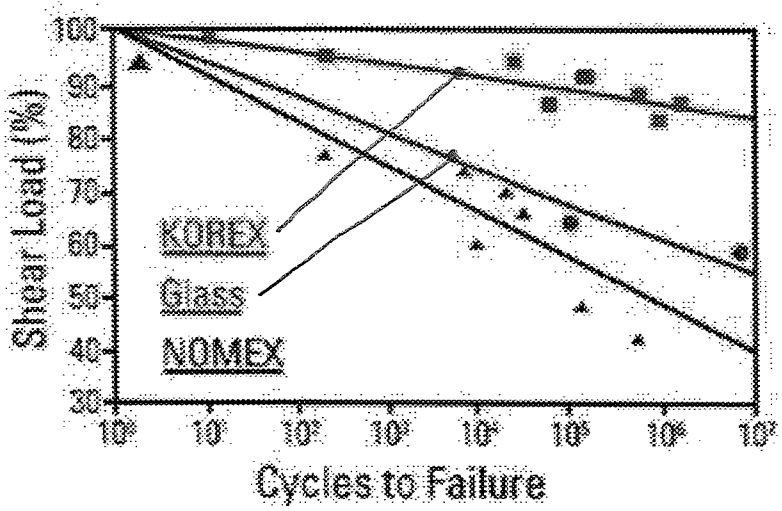
12/01

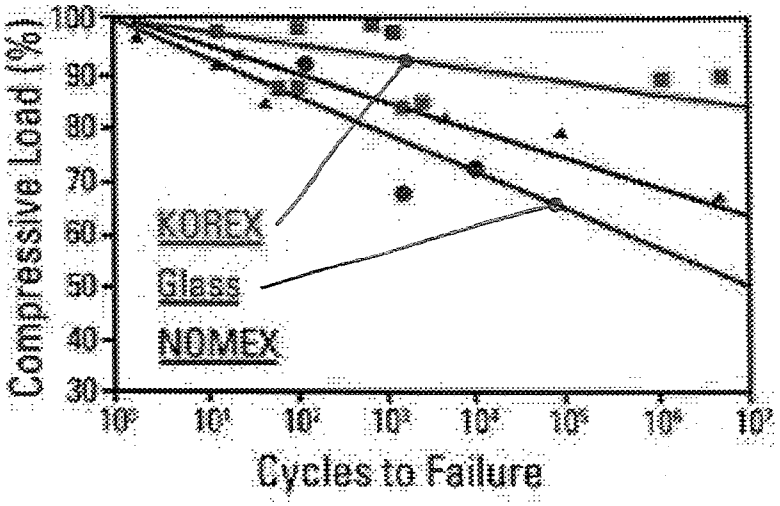
Fatigue comparison in shear and compression

Second generation aramid cores have superior fatigue resistance.

Short Beam Shear Fatigue



Compression Fatigue



All cores tested were 1/8-3.0.

The glass core was bias weave.

The second generation core was Korex®.

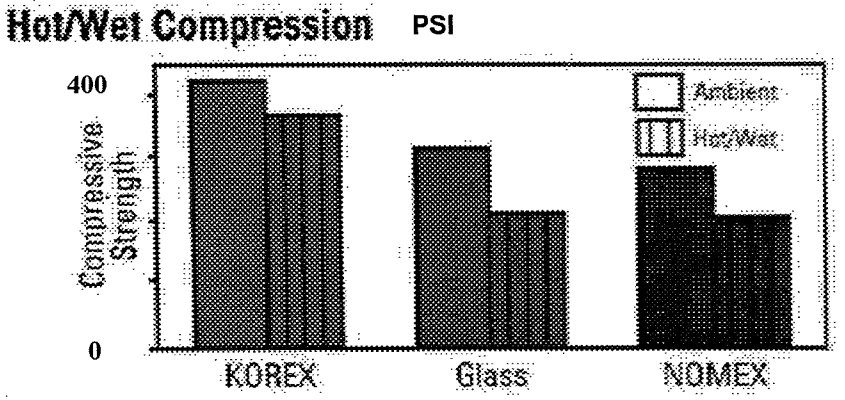
Comparison of Hot/Wet properties

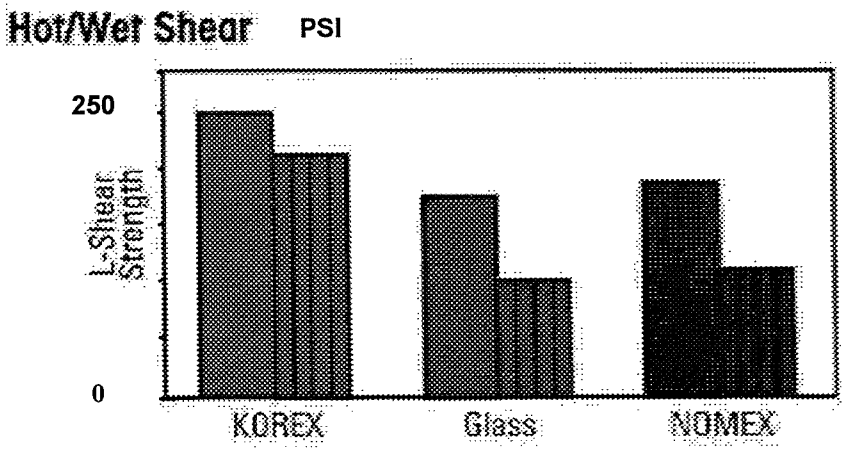
Second generation aramid cores have superior Hot/Wet properties.

All cores tested were 1/8-3.0.

The glass core was bias weave.

The second generation core was Korex®.





THERMAL CONDUCTIVITY OF CORE MATERIALS

- Nomex® = ~ 0.75 $\frac{\text{BTU in}}{\text{hr ft}^2\ ^\circ\text{F}}$

- Aluminum = 135 $\frac{\text{BTU in}}{\text{hr ft}^2\ ^\circ\text{F}}$

- Thermal conductivity of Kevlar® and Korex® honeycombs are expected to be similar to Nomex®.

Composite Honeycomb Summary Chart

CORE TYPE	NOMEX®	HRP® glass	Kevlar® N636	Korex®	HFT® glass
MKT PRICE (core)	$30 / lb	$45 / lb	**$55 / lb**	$75 / lb	$135 / lb
ADVANTAGES	Small Cell Size and Low Density, Tough, Easy to bond when dry, Durable in Shop, Easy to Form	Higher Modulus and Strength than Nomex®, Low Moisture P/U	Dimensional stability, 2X Modulus, Higher Strength, Better Hot Wets, Low Moisture Low CTE Tougher than glass	Advantages similar to Kevlar® N636	Between NOMEX® and KOREX® in properties
HONEYCOMB MANUFACTURERS	EURO-COMPOSITES® HEXCEL® M. C. Gill Schütz Showa	HEXCEL®	EURO-COMPOSITES® HEXCEL® M. C. Gill Schütz	HEXCEL®	HEXCEL®

VALUE ADDED The above prices apply to the basic honeycomb in block form and can vary considerably with cell size and density. Additional operations are needed to make the core ready to be bonded into a sandwich. These operations may include sawing the core into slices, forming it to shape, machining air foil sections, and other value added activities, that may be performed by the honeycomb producer or the sandwich manufacturer.

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