AERFORM LHR

DECORATIVE LOW HEAT RELEASE THERMOPLASTIC FOR CABIN INTERIORS

AERFORM LHR, the only decorative low heat release thermoplastic, was introduced to the aviation market in June 1992.

Undergoing an extensive R&D effort spanning the past 18 months, the introduction of AERFORM LHR fulfills a cabin interior requirement that the industry has surely missed the past 4-5 years.

In 1986, the FAA issued a notice of proposed rule-making changing cabin interior materials used in transport category aircraft. The new regulations went into effect in two (2) stages -- the first in August 1988 and the second (more stringent values) in August 1990. As we all know, these regulations still remain in effect.

Since that time, thermoplastic materials meeting these regulations have been limited and a decorative thermoplastic to meet these regulations has been non-existent.

With the introduction of AERFORM LHR, the industry now has available a decorative low heat release thermoplastic which offers OEMs, airline operators and component manufacturers a cost manageable alternative to composite lay-up parts as well as an alternative material to the high temperature, high cost thermoplastics currently available.

A collaborative effort with B.F. GOODRICH resulted in the successful development of the base resin system. The low combustible resin system of B.F. GOODRICH, along with the low heat release technology, the decorative capabilities and the proprietary cap sheet technology of SCHNELLER has resulted in an exclusive partnership that brings AERFORM LHR to the fore-front of the industry.

As the development of AERFORM LHR continued, extensive R&D testing was conducted for OSU Heat Release, NBS Smoke, Impact, Colorfastness, Staining, etc.

The following slides provide the tests conducted, as well as the test data, to support the physical properties of AERFORM LHR.

Aerform LHR

APPLICATION AREAS

Specifically designed for self supporting parts

Sidewalls
Ceilings
P.S.U.
Lavs:
- Toilet Shrouds
- Toilet Roll Dispenser
- Close Out Panels
- Floor Pans

Seat Back Trays
Side Seat Panels
Window Reveals
Dado Panels
Door Liners
Window Shades

Aerform LHR

TESTING CONDUCTED BY R&D

- OSU
- NBS
- VERTICAL BURN
- IMPACT (GARDNER/NOTCHED IZOD)
- TABER ABRASION
- SHRINKAGE (MOLD)
- DIMENSIONAL STABILITY (FLAT)
- HEAT DISTORTION
- UV STABILITY
- FORMING TEMPERATURE RANGE
- DRYING CONDITIONS
- LONG TERM AGING
- SPECIFIC GRAVITY
- STAINING
- LIGHTFASTNESS

Aerform LHR

OSU Heat Relese & NBS Smoke Generation Data

HEAT RELEASE (HR) - OSU & NBS TEST RESULTS

GAUGE	TOTAL HR	PEAK HRR	NBS
.045	52	41	102
.065	46	44	91
.085	34	45	82
.105	31	47	71
.125	26	44	68

FLAMMABILITY RESULTS

GAUGE	AFTERFLAME	BURN LENGTH	DRIPPING
.045	0	4.0 in 102 mm	0
.065	0	3.5 in 89 mm	0
.085	0	3.4 in 86 mm	0
.105	0	3.3 in 84 mm	0
.125	0	2.6 in 66 mm	0

GAUGE vs WEIGHT

INCHES	OZ/FT2	MILLIMETERS	KILOS/M²
.045	5.85	1.14	1.967
.065	8.45	1.65	2.842
.085	11.05	2.16	3.716
.105	13.65	2.67	4.591
.125	16.25	3.17	5.465
.145	18.85	3.68	6.339

Representative Results. Results are the average of 60 coupons (20 sets)for each test. Actual test results available upon request.

Aerform LHR

Beet Juice
Mustard (French 's Yellow)
Lipstick (Mabelline Red)
Ketchup (Hunts)
Coffee (Black)
Tea (Plain)
Pepsi
Crayon (Crayola Blue)
Ball Point Pen (Bic Blue)
Felt Pen (Sanford Black)
Cigarette (Smoke Test BMS 8-62)
Skydrol (Monsanto 500/A)
Shoe Polish (Kiwi Black)
Machine Oil
Dark Oak Stain (Enrich)
Light Oak Stain (Enrich)
Salad Dressing (Miracle Whip)
Chapstick (LipbalmPink)
Magic Marker (Sanford Black)
Whiskey (Seagrams V.O.)
French Dressing (Kraft)
Italian Dressing (Wishbone)
Wet Newspaper
Kerosene
Methyl Ethyl Ketone
Baby Oil (Johnsons)
Butter (Land-O-Lakes)
Hot Chocolate (Hershey's)
Eye Mascara (Maybelline Black)
Nail Polish (Cutex Red)
Contact Cement (3M 1357)
Saltwater
Tobasco Sauce (McIlhenny Co.)
Beer (Busch)
Red Wine (Richards)
VM&P Naptha
Xylene
Chocolate Bar (Hersheys)
Food Dye (McCormick Red)
Kool Aid (Cherry)
Bleach (Clorox)
Rust Water
Orange Juice (Minute Maid)
Milk (Fresh Whole)
Nail Polish Remover (Cutex Non-Oily)
Liquid Soap (Joy)
Ammonia (Bo-Peep)
Vegetable Oil (Wesson)
Vinegar (Distilled)
Merthiolate
Acetone

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STAINING RESULTS

	158° F 7 Days C	R	120°F 7 Days C	R	Room Temp. 7 Days C	R
Mustard (French 's Yellow)	A-B	1				
Ketchup (Hunts)	A-F	3	A-F	1		
Coffee (Black)	A	1				
Pepsi	A-F	2	A	1		
Ball Point Pen (Bic Blue)	A-F	3	A-F	1		
Whiskey (Seagrams V.O.)	A	1				
Beer (Busch)	A	1				
Red Wine (Richards)	A-F	2	A-B	1		
Chocolate Bar (Hersheys)	A-B	1				
Orange Juice (Minute Maid)					A	1

CLEANERS:

A - Water w/cloth
B - 409 w/cloth
C - 409 w/soft brush
D - Isopropyl Alcohol w/cloth
E - Oil-Flo* Safety Solvent w/cloth
F - Oil-Flo* Safety Solvent w/soft brush

RESULTS:

1 - No stain, no visible change
2 - Slight, shadow of stain remains
3 - Moderate, visible stain 6" away
4 - Severe, full stain
5 - Damaged surface

*Manufactured by Titan Chemical, Inc., Sunnyvale, CA

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PHYSICAL PROPERTIES

PROPERTY	*TEST METHOD*	*RESULT*
Specific Gravity	ASTM-D792	1.55
Heat Distortion	ASTM-D648	185° F (85° C) @ 264 psi
Forming Temperature		300-350° F (150-175° C)
Mold/Part Shrinkage	After Forming	.004in/1in .1mm/25.4mm
U. V. Stability QUV 340A bulb	ASTM-G53 ΔE color change	300 hours no change 500 hours ΔE < 1.0
U. V. Stability per DMS 2291	Fed. Std. No. 191 Method 5660	PASS
Abrasion Resistance CS 17 wheel 250 grm	ASTM-D1044 Taber Abrasion	7mg/1000 revolutions
Flexural Modulus	ASTM-D790	4.2 x 10^5 psi
Dimensional Stability	ASTM-D1204 @ 200° F	Machine Dir -0.35% X-Machine -0.15%
Impact	ASTM-D2974 Gardner Impact	Gauge U.S. Metric .045in 136in-lb 15j .065in 168in-lb 19j .085in 200in-lb 22j .125in 264in-lb 30j .145in 320in-lb 36j
	ASTM-D256 Notched IZOD	.125in 6ft lbs/in 320j/m

In summary, AERFORM LHR provides the industry with not only a cost manageable method to improve the aesthetics of the cabin interior, but more importantly, a cost manageable method to improve the safety of the aircraft.

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