

THERMASILENCE

Navy sailors must remain at peak performance when tasked with missions involving ever-increasing difficulty. Restful sleep is essential for success, yet noise generated within the close working quarters of ships and submarines can be detrimental to sleep cycles. Therefore, the use of innovative materials is desired to bolster natural sleep for more restorative rest. Noise control treatments can minimize mechanical and other noises onboard Navy platforms.

Texas Research Institute Austin, Inc. (TRI Austin), developed a noise control material (Figure 1) called ThermaSilence that possesses the required physical and environmental properties for internal shipboard applications. It meets the stringent fire, smoke, and toxicity (FST) requirements of MIL-STD-2031, entitled “Fire and Toxicity Test Methods and Qualification Procedure for Composite Materials Used In Hull, Machinery, and Structural Applications Inside Naval Submarines”, as shown in Table 1 below.

MIL-STD-2031 Fire and Toxicity Test Methods and Qualification Procedure for Composite Material Systems Used in Hull, Machinery, and Structural Applications Inside Naval Submarines			
Fire Test/Characteristic	Requirement	Test Method	Test Results for TRI075M25
Oxygen-temperature index	Minimum	ASTM D28632013	
% oxygen at 25°C	35	2013 Modified	61.39
% oxygen at 75°C	30		66.13
% oxygen at 300°C	21		71.69
Flame-spread index	20 (maximum)	ASTM E162	5
Ignitibility(s)	Minimum	ASTM E135416a	
100 kW/m ² irradiance	60		139
75 kW/m ² irradiance	90		144.3
50 kW/m ² irradiance	150		No Ignition
25 kW/m ² irradiance	300		No Ignition
Heat release rate (kW/m²)	Maximum	ASTM E135416a	
100 kW/m ² irradiance, peak	150		42.43
Average for 300 s	120		26.87
75 kW/m ² irradiance, peak	100		46.46
Average for 300 s	100		18.67
50 kW/m ² irradiance, peak	65		0
Average for 300 s	50		0
25 kW/m ² irradiance, peak	50		0
Average for 300 s	50		0
Smoke obscuration	Maximum	ASTM E662	
D _s during 300 s	100		0.3
D _{max}	200		1.6
Combustion gas generation (25 kW/m²)	CO=200 ppm CO ₂ = 40000 ppm HCN = 30 ppm HCl = 100 ppm	ASTM E1354	No Ignition No Ignition No Ignition No Ignition

ThermaSilence was tested for Sound Transmission Loss at ETS-Lindgren Acoustic Research Laboratory in Cedar Park, TX (a NVLAP-accredited laboratory, Scope of Accreditation under Lab Code 100286-0). At one inch thickness, the material achieved an excellent Sound Transmission Class (STC) of 35 (per ASTM E413) and Outdoor/Indoor Transmission Class (OITC) 32 (per ASTM E1332) in Sound Transmission Loss testing (per ASTM E90). Figures 2 and Figure 3 on the following page show the test results of the bare material.



ThermaSilence



Figure 1. ThermaSilence Sound Damping Material that meets MIL-STD-2031 “Fire and Toxicity Test Methods and Qualification Procedure for Composite Materials Used In Hull, Machinery, and Structural Applications Inside Naval Submarines”

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ETS-Lindgren Acoustic Research Laboratory Sound Transmission Loss (ASTM E90) Test Results Results Summary Table

Test Number:	TL8584		
Client:	TRI-Austin		
Specimen Description:	PSF 075M25 - Thickness 1" w/o Cladding		
One-third Octave Mid-band Freq. (Hz)	Transmission Loss (dB)	Uncertainty (+/- dB)	Octave Band TL (dB)
50	8		
63	15		12
80	25	4.7	
100	23	1.9	
125	26	2.1	24
160	25	1.4	
200	28	0.6	
250	30	0.4	29
315	31	0.4	
400	32	0.3	
500	34	0.3	33
630	34	0.2	
800	35	0.2	
1000	35	0.2	35
1250	35	0.2	
1600	35	0.2	
2000	35	0.2	36
2500	37	0.2	
3150	40	0.2	
4000	42	0.2	41
5000	43	0.2	
6300	43	0.3	
8000	45	0.3	45
10000	47	0.4	
STC	35		
OITC	32		
Rw	35		

Figure 2. Sound Transmission Loss
Test Results (ASTM E90)

ETS-LINDGREN ACOUSTIC RESEARCH LABORATORY SOUND TRANSMISSION LOSS (ASTM E90) TEST RESULTS RESULTS SUMMARY TABLE

ThermaSilence is easy to use and cost effective for sound isolation where FST resistance is required. This new material can be clad/co-cured in metal or composite skins. Low temperature cure (200 °F) enables ThermaSilence to be fabricated in place on a submarines and surface ships. Its low density of 0.03 lb/in³ (0.83 g/cm³) lends itself to weight-sensitive applications.

We are evaluating various commercial applications for ThermaSilence, wherein its stringent FST properties and effective sound isolation can be used to reduce sound where critical and mitigate fire risk. Applications include various commercial markets such as cruise ships, yachts, trains, and offshore oil rig habitability spaces.

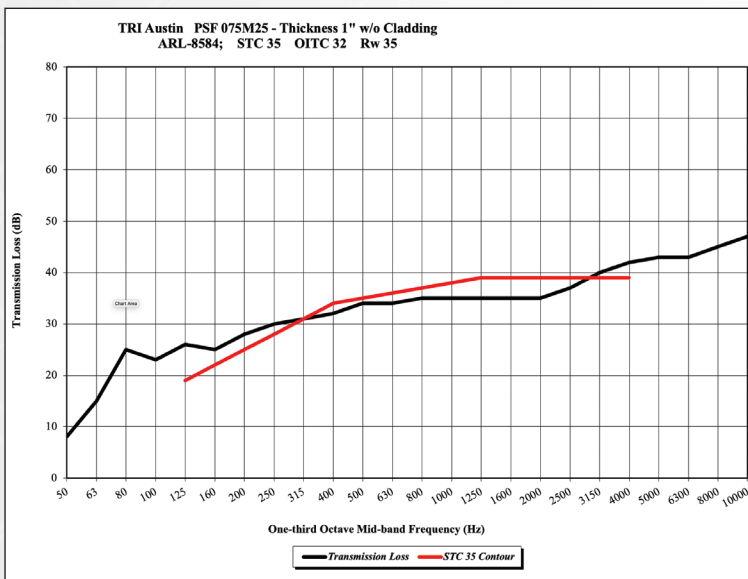


Figure 3. Sound
Transmission
Loss Test Results
(ASTM E90)



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TO LEARN IF THERMASILENCE
CAN HELP YOU WITH YOUR
APPLICATION, CONTACT:

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