

The tōn flux_{TM} products in the Lydall flux_{TM} product family are heat shields with marked acoustic properties that help reduce noise at the source. The acoustic performance is generated through the mixing of several materials and focuses on mid-range frequency noise absorption.

Composites

Single Layer - Micro Pierced or Perforated

- o Single layer of aluminum or thin gauge steel
- o Open area generally < 4%
- o Multiple options for piercing and perforating
- o Standard piercing patterns below

Holes / cm ²	Metal Thickness, mm
L16	< 0.50 mm
L24	< 0.40 mm
L45	< 0.15 mm

Multi Layer

- o Combines perforated or pierced metallic layers with an intermediate layer of fiber or air
- o The intermediate layer dictates the shield "Gap"
- o Examples below with high temperature fiber

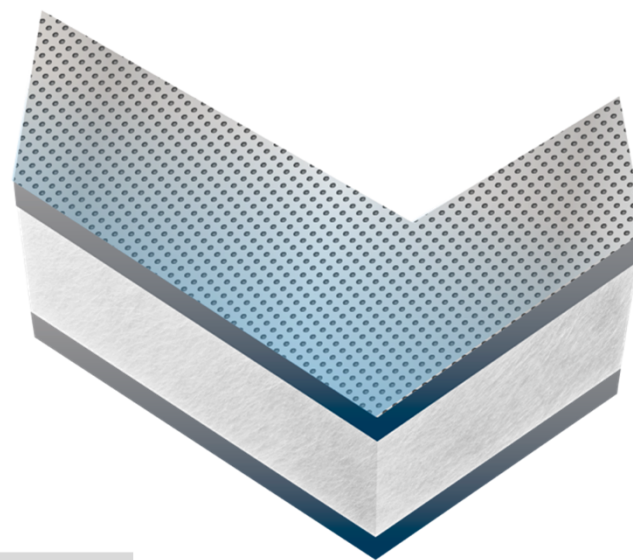
Open Area	Gap Thickness	Target Frequency
3%	4 mm	4400 Hz
1.5%	12 mm	2000 Hz
22%	10 mm	6300+ Hz

Acoustical Performance

- o Focus on noise absorption to reduce the overall sound pressure level of the vehicle - cabin and drive-by
- o Mix of all metal or metal and fiber materials; material selection is pinned to the application temperature and operating environment
- o Metallic layers are pierced or perforated to a pattern designed to absorb noise across a specific frequency range

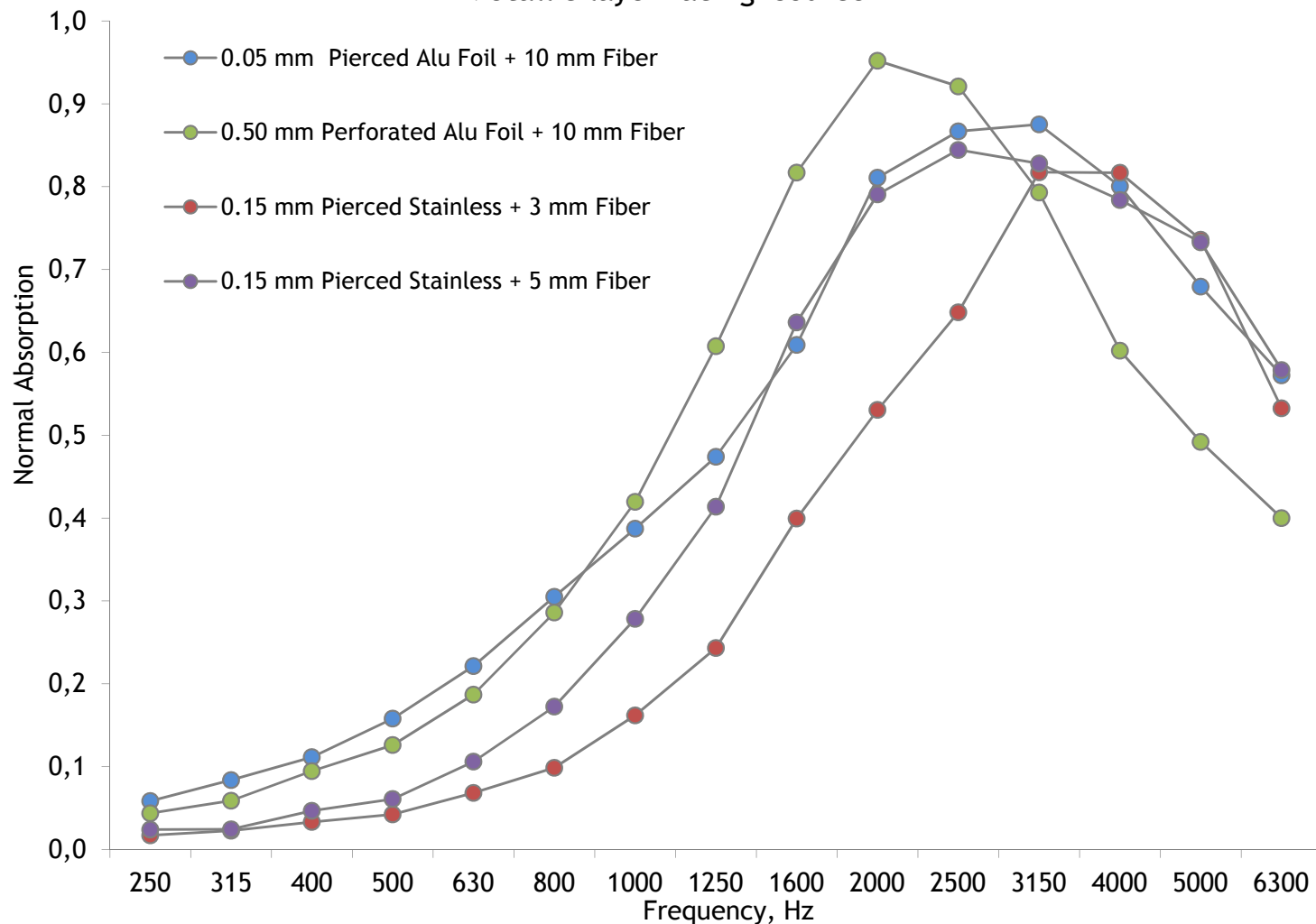
Mechanical Performance

- o Hemmed edges for handling safety and increased product robustness
- o Roll and plate embossment provides an increase in part rigidity
- o Wide array of approved and commonly used alloys available to exceed the requirements of harsh thermal and mechanical environments



Design Considerations & Tips

Normal absorption of various perforated and pierced composites
Metallic layer facing source



- o Favor noise absorption over transmission loss; the former contributes to a net noise reduction, the latter favors mass
- o The thicker the composite, the lower the peak noise absorption frequency
- o The thicker the metal gauge facing the noise source, the quicker the high frequency roll-off for tuned resonant absorbers
- o In general, aluminum solutions are suitable for underbody applications and stainless steel for exhaust mounted applications
- o Fiber backings help increase the composite's air flow resistance and absorption bandwidth
- o Absorber thickness, open - perforated - area, hole size and metal gauge, are all important noise absorption parameters and appear in the order of importance
- o The reduction in thermal performance caused by perforating or piercing is proportional to the open area as a percent and is generally negligible
- o Contact Lydall for applications support; we are quietly keeping it cool

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