

# Solutions for Automotive Acoustic Comfort



**Rhodia**

*Engineering Plastics*



## EXPERTISE

- A research platform dedicated to acoustics
- An expertise in automotive industry requirements and materials' acoustic properties
- Specific methodologies for acoustic optimization of automotive systems

## SOLUTIONS

- A unique database of material fundamental acoustic properties
- Recommendation and assistance for material selection fitting acoustic and other functional requirements
- Design and validation support to optimize acoustic systems

## PARTNERSHIP

- Development of new material to answer customers' needs



# The answers

# 1

## A UNIQUE MATERIAL EXPERTISE

To support car manufacturers and Tier One suppliers in their quest toward more acoustic comfort in vehicles, and to help them answering the new 2004 noise reduction standards, Rhodia Engineering Plastics has developed a specific and unique expertise.

In its Acoustic Platform, the company has developed its own specific testing methods leading to a unique material database of acoustic properties. In this database, you can find visco-elastic and other fundamental acoustic properties for a large range of materials, including standard Technyl® and Technyl® Star polyamides.

Added to a real expertise in acoustic phenomena, this tool allows Rhodia Engineering Plastics' teams to recommend the best materials to fit specific acoustic requirements as well as to bring support in the applications development.

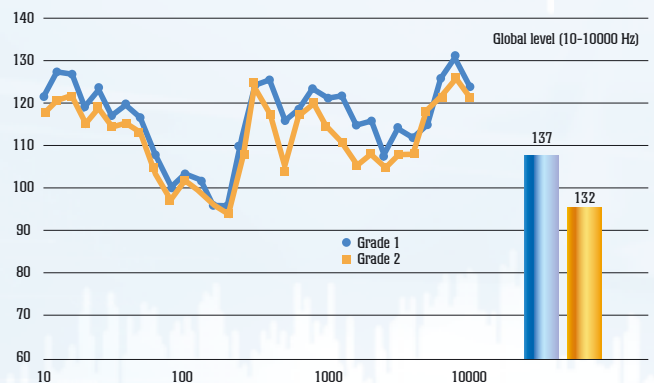
Materials acoustic properties measurement

A unique NVH Database

The method to characterize acoustic insulation developed by Rhodia Engineering Plastics uses sound reverberation chambers. The testing equipment and measuring conditions (acoustic rooms, test samples, sound source) have been specifically designed to ensure that the resulting database establishes reliable comparisons between different materials. The decision-making process and product choice is consequently facilitated, as significant variations may exist between two different polyamide formulations or more generally two different types of materials.

In addition, Rhodia Engineering Plastics has developed a method to characterize material structure-borne noise, by analyzing the acoustic radiation generated by vibrating samples.

Ex. material structure-borne noise



The significant variations of the overall noise levels observed in different polyamide formulations demonstrate the importance of selecting the right material, especially for components exposed to high vibration levels.

All the results from these measurements are stored in a proprietary NVH database to specifically meet the needs for acoustic comfort in the automotive market. The data can then be directly applied to programs to improve the acoustic performance of specific components.



Polymer Type	Acoustic Properties	Thermal Properties	Mechanical Properties	Chemical Properties	Processing	Performance	Rhodia
PA 6	120	150	100	100	100	100	ADW
PA 6.6	125	155	105	105	105	105	ADW66
PA 11	115	145	95	95	95	95	ADW11
PA 12	110	140	90	90	90	90	ADW12
PA 6.10	120	150	100	100	100	100	ADW610
PA 6.12	125	155	105	105	105	105	ADW612
PA 6.18	130	160	110	110	110	110	ADW618
PA 6.22	135	165	115	115	115	115	ADW622
PA 6.26	140	170	120	120	120	120	ADW626
PA 6.30	145	175	125	125	125	125	ADW630
PA 6.36	150	180	130	130	130	130	ADW636
PA 6.42	155	185	135	135	135	135	ADW642
PA 6.48	160	190	140	140	140	140	ADW648
PA 6.54	165	195	145	145	145	145	ADW654
PA 6.60	170	200	150	150	150	150	ADW660
PA 6.66	175	205	155	155	155	155	ADW666
PA 6.72	180	210	160	160	160	160	ADW672
PA 6.78	185	215	165	165	165	165	ADW678
PA 6.84	190	220	170	170	170	170	ADW684
PA 6.90	195	225	175	175	175	175	ADW690
PA 6.96	200	230	180	180	180	180	ADW696
PA 6.102	205	235	185	185	185	185	ADW702
PA 6.108	210	240	190	190	190	190	ADW708
PA 6.114	215	245	195	195	195	195	ADW714
PA 6.120	220	250	200	200	200	200	ADW720
PA 6.126	225	255	205	205	205	205	ADW726
PA 6.132	230	260	210	210	210	210	ADW732
PA 6.138	235	265	215	215	215	215	ADW738
PA 6.144	240	270	220	220	220	220	ADW744
PA 6.150	245	275	225	225	225	225	ADW750
PA 6.156	250	280	230	230	230	230	ADW756
PA 6.162	255	285	235	235	235	235	ADW762
PA 6.168	260	290	240	240	240	240	ADW768
PA 6.174	265	295	245	245	245	245	ADW774
PA 6.180	270	300	250	250	250	250	ADW780
PA 6.186	275	305	255	255	255	255	ADW786
PA 6.192	280	310	260	260	260	260	ADW792
PA 6.198	285	315	265	265	265	265	ADW798
PA 6.204	290	320	270	270	270	270	ADW804
PA 6.210	295	325	275	275	275	275	ADW810
PA 6.216	300	330	280	280	280	280	ADW816
PA 6.222	305	335	285	285	285	285	ADW822
PA 6.228	310	340	290	290	290	290	ADW828
PA 6.234	315	345	295	295	295	295	ADW834
PA 6.240	320	350	300	300	300	300	ADW840
PA 6.246	325	355	305	305	305	305	ADW846
PA 6.252	330	360	310	310	310	310	ADW852
PA 6.258	335	365	315	315	315	315	ADW858
PA 6.264	340	370	320	320	320	320	ADW864
PA 6.270	345	375	325	325	325	325	ADW870
PA 6.276	350	380	330	330	330	330	ADW876
PA 6.282	355	385	335	335	335	335	ADW882
PA 6.288	360	390	340	340	340	340	ADW888
PA 6.294	365	395	345	345	345	345	ADW894
PA 6.300	370	400	350	350	350	350	ADW900
PA 6.306	375	405	355	355	355	355	ADW906
PA 6.312	380	410	360	360	360	360	ADW912
PA 6.318	385	415	365	365	365	365	ADW918
PA 6.324	390	420	370	370	370	370	ADW924
PA 6.330	395	425	375	375	375	375	ADW930
PA 6.336	400	430	380	380	380	380	ADW936
PA 6.342	405	435	385	385	385	385	ADW942
PA 6.348	410	440	390	390	390	390	ADW948
PA 6.354	415	445	395	395	395	395	ADW954
PA 6.360	420	450	400	400	400	400	ADW960
PA 6.366	425	455	405	405	405	405	ADW966
PA 6.372	430	460	410	410	410	410	ADW972
PA 6.378	435	465	415	415	415	415	ADW978
PA 6.384	440	470	420	420	420	420	ADW984
PA 6.390	445	475	425	425	425	425	ADW990
PA 6.396	450	480	430	430	430	430	ADW996
PA 6.402	455	485	435	435	435	435	ADW1002

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## 2

### A COMPLETE DEVELOPMENT PLATFORM

Computer aided engineering

Specific part testing methodologies

Rhodia Engineering Plastics has developed a complete platform to go further on part conception assistance with a full range of tools from the design to the test.

On one hand, a powerful simulation software analyses the performance of components like rocker covers and offers solutions to optimize part geometry. On the other hand, sound measurements techniques in acoustic chambers help to validate designs as soon as the prototype parts are available.

Numerous recent studies have demonstrated the efficiency of these tools to design components like engine covers, air ducts, intake manifolds, cylinder head covers and timing belt covers achieving high acoustic comfort while controlling product development lead times.

Further, by running vehicle on-board measurement, engineers at Rhodia Engineering Plastics can confirm their findings and recommendations regarding acoustics on real environment.





# Acoustic performance

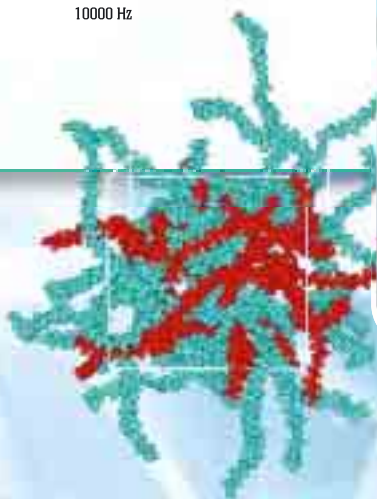
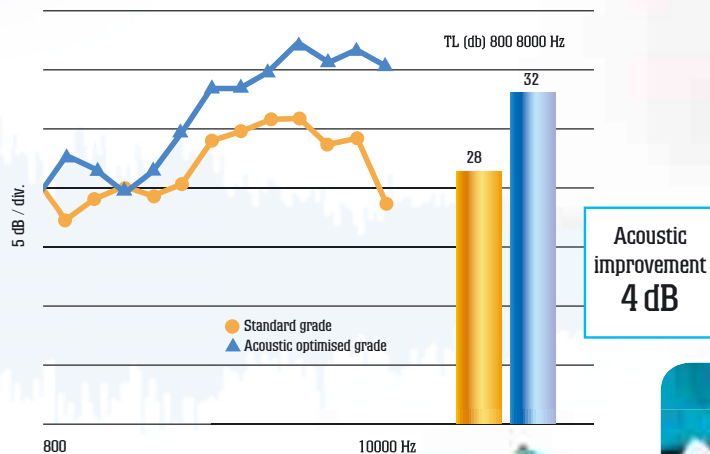
## 3

### NEW MATERIAL SOLUTIONS

Development of new grades in partnership with customers

Rhodia Engineering Plastics develops new material solutions along with preferred partners thanks to its specific know-how on key acoustic properties and unique cross fertilization techniques among several technologies of the Rhodia Group. This allows for creative new material solutions designed to reduce noise nuisances.

Acoustic transmission loss



# Solutions for Automotive Acoustic Comfort

Rhodia Engineering Plastics is the worldwide specialist in engineering plastics polyamide with industrial sites and technical development centers including strong acoustic capabilities.

Rhodia Engineering Plastics is the first thermoplastics material supplier to achieve the ISO/TS 16949 technical specification for its European plants.

TECHNYL® : The worldwide brand for polyamide solutions

- Polyamide PA 66      TECHNYL®
- Polyamide PA 6      TECHNYL®
- Polyamide Star      TECHNYL® STAR



**Rhodia**

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CHALLENGING BOUNDARIES

