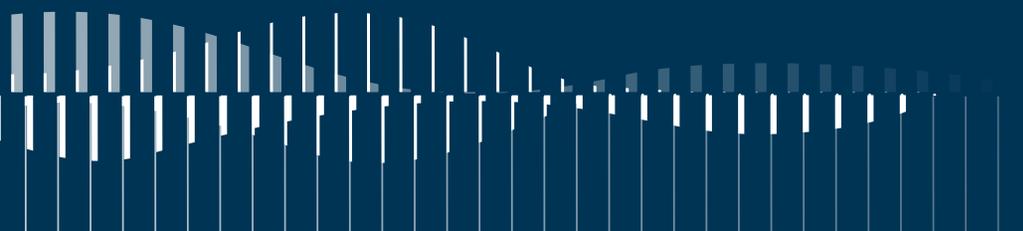


AUTOMOTIVE APPLICATION

Wind Noise Testing



**ACOUSTIC
SENSORS
FOR PREMIUM
NVH DATA**



| Wind Noise Testing



Wind noise is an aerodynamic noise related to the body design and turbulence from components such as side view mirrors, wipers, cavities, etc. It is most disturbing at speeds above 100 km/h (approx. 60 miles/h), but is becoming more and more important when powertrain and road noise is being reduced. Careful design minimizes the

problem, so early concept studies are important. Wind noise is, however, often an issue which is discovered late in the development process. It requires fast and efficient analysis since measures like extended seal systems or sound packages are expensive.

ACOUSTIC TEST TYPES WITHIN WIND NOISE TESTING

Wind tunnel tests with interior microphones measuring the contribution from a single system or component when all other possible disturbing sound sources are temporarily eliminated with tape, clay or similar.

CHALLENGES COMMON TO WIND NOISE TESTING

The variation in production for critical design areas must be low. The tolerance chains need to be investigated and, if necessary, compensated for with good seal systems.

- Testing time should be short since the access to prototypes is limited.
- Microphone positioning should be done fast and easy, and in a way to record repeatable results.
- The microphones should be placed so that they minimize structure-borne sound.

- Microphone holders and cables should not introduce any rattling noise.
- The installation should be safe for the test engineer to perform during vehicle testing.
- Calibration verification should be easy to perform.

The transducers are designed to withstand exposure to harsh environmental conditions such as strong vibrations, shock, drop, extreme temperatures and wet or dusty conditions without sacrificing performance or lifetime.

SELECTING THE RIGHT MICROPHONE

Intensity microphones or surface microphones are used for noise source investigations. Microphones used for wind noise testing must be very robust and able to withstand dust and humidity.

Surface microphones like the 40LA ½" CCP Precision Surface Microphone or the 40LS ¼" CCP Precision Surface Microphone are originally designed for in-situ boundary layer testing and can be mounted on the body of the car with non-invasive mounting. The total height of these microphones is 2,5 mm (approx. 1 inch) - including preamplifier and are, therefore, very suited for in-flow testing of the car in wind tunnels. The microphone is surrounded by a fairing to reduce self-generated turbulence.

Pistonphones like the 42AP Intelligent Pistonphone or the 42AA Pistonphone can be fitted with the OP0025 Kit for Sensitivity Calibration of ¼" Surface Microphones to perform a daily sensitivity verification of the 40LA/LS surface microphones.

RECOMMENDED MICROPHONES AND CALIBRATORS

Wind Noise Testing

| | | |
|-------------|------|--|
| Wind Tunnel | 40LA | ½" CCP Precision Surface Microphone, High Pressure |
| | 40LS | ¼" CCP Precision Surface Microphone |

Calibration

| | |
|--------|--|
| 42AP | Intelligent Pistonphone, Class 0 |
| 42AA | Pistonphone, Class 1 |
| OP0025 | Kit for Sensitivity Calibration of ¼ Surface Microphones |

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About GRAS Sound & Vibration

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones to industries where acoustic measuring accuracy and repeatability is of utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

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