

GRAS 146AE ½" CCP FREE-FIELD MICROPHONE SET

# Versatile NVH Microphone



**ACOUSTIC  
SENSORS  
FOR PREMIUM  
NVH DATA**



# It's all about reliable data!

## GRAS 146AE CCP Free-field Microphone Set

**Automotive noise testing can be extremely demanding, so you need a robust solution to meet your expectations. This is why GRAS has developed the 146AE - a measurement microphone specially designed to perform under realistic test conditions.**

Setting up multichannel measurement systems many times a day exposes your microphones to shock and drop. It is important that your test systems are protected against vibrations, extreme temperatures, high humidity, dust and even oil mist.

To enable efficient testing you also have to trust that your microphones are ready and working when you roll a vehicle into the test chamber – and confident that your data is accurate when you roll it out again. Retesting or rescheduling is a costly option.

**Our answer is the 146AE** - the measurement microphone set that is so rugged and well protected that it can be trusted as your standard microphone for the broadest range of automotive noise, vibration and harshness (NVH) measurements – all without compromising measurement quality.





The **146AE** sets a new standard for automotive measurement microphones



- ✓ Brake Noise
- ✓ Engine Noise
- ✓ Powertrain Noise
- ✓ Buzz, Squeak and Rattle Noise
- ✓ Exhaust Noise
- ✓ Road and Tire Noise
- ✓ Vehicle Interior Noise
- ✓ Pass-by Noise

## The new standard microphone for all your acoustic NVH testing needs

The 146AE from GRAS sets a new standard for automotive measurement microphones. Now all your NVH test challenges can be solved with just one microphone which is flexible, precise and rugged.

### Flexible to meet your many measurement needs

Using different microphones for various measurement points can result in inconsistent data and complex test setups. With the 146AE you can use the same microphone at high temperatures, in high humidity or under dusty conditions (free-field as well as random-incidence). This optimizes efficiency and saves you time setting up and evaluating your entire test setup.

### High precision ensures valid data in challenging measurement positions

The consequences of inaccurate or incorrect data can be disastrous, especially, if identified late in your test sequence. The unmatched stability of the 146AE, the unique power-on feature as well as on-line calibration data mean that you can trust the accuracy of data from all your measurement positions.

### Rugged design makes it ideal for all NVH test conditions

The 146AE is designed for real-life use. This includes conditions where the microphone is exposed to high temperatures, water and dust as well as daily handling with the risk of vibrations, drops and other kinds of shocks.

The microphone is ideal for the test track as well as the dynamometer and is not affected by condensation or other typical problems related to testing in changing weather conditions or when moving vehicles between different facilities.

Whether your challenge is brake noise, powertrain noise, exhaust noise, buzz, squeak and rattle noise, vehicle interior noise, road and tire noise or pass-by noise, the 146AE is the solution.

### Low cost of ownership

Its extended lifetime ensures low cost of ownership and improves overall performance. The 146AE comes with a five year warranty.



# Explore the benefits

- the details that make all the difference...

## Rugged Design

The innovative design is prepared for daily use in rough testing conditions. The occasional drop or shock in the dynamometer, on proving grounds or on public roads does not affect the performance of the microphone, which always delivers reliable data.

## Waterproof

Can safely be used in wet and splashy conditions. The microphone preamplifier housing is certified watertight according to IP67.

## Extreme Temperature Performance

Optimized for extreme temperatures - from -40 to 125 °C (-40 to 257 °F) without impacting sensitivity. It is the most temperature-stable CCP microphone on the market.

## Random-incidence Corrector

With the RA0357 Random-incidence Corrector, it is possible to quickly change the response from free-field to random-incidence.



## Water, Oil and Dust-resistant Replaceable Grid

A grid with built-in filter allows for use in heavily contaminated environments and is easy to replace.

## Protected Venting

Dual, waterproof venting prevents moisture from blocking the venting and ruining your measurements.

## Power-on Indicator

Visual confirmation of status and transducer electronic data sheets (TEDS) reading during power-up ensures efficiency and readiness for data collection.

## Online Calibration Data

Calibration data for each specific microphone can be accessed at [gras.dk/e-data](http://gras.dk/e-data).

## Waterproof Connection

Waterproof connection and cabling ensure data integrity and surviveability during outdoor tests in all climate zones and weather conditions.

## REPLACEABLE GRID WITH BUILT-IN FILTER

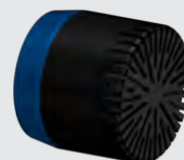
### WATER, OIL AND DUST-RESISTANT GRID

The grid has a built-in filter protecting the diaphragm from water, oil, dust and high-velocity particles.

This filter is made from an acoustically-transparent fabric that is water and oil repellent.

This, together with the vent control and connector design, makes it possible to measure in highly humid and dusty environments.

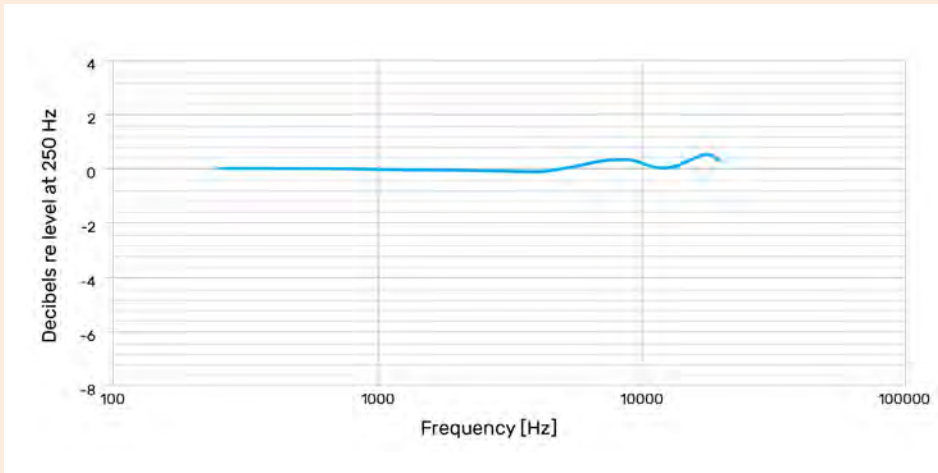
If the filter becomes clogged by dust or particles over time, the grid can easily be exchanged on the fly - reducing downtime and costs.



# Specifications

Frequency range and dynamic range as you know it from IEC compatible ½" free-field measurement microphones

## Typical Free-field Response



## MODEL SPECIFICATIONS

146AE ½" CCP Free-field Microphone Set

IEC 61094  
IEC 61672 class 1

**FREQUENCY RANGE:**  
3.15 Hz to 20 kHz

**DYNAMIC RANGE:**  
18 dB(A) to 133 dB

**SENSITIVITY:**  
50 mV/Pa

**TEMPERATURE:**  
-40 to 125 °C (-40 to 257 °F)

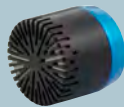
**HUMIDITY:**  
0 - 90% (Non-condensing)

Power-on Indicator

## ACCESSORIES

### > RA0340 Replaceable Grid

Protects the diaphragm from water, oil, dust and high-velocity particles.



### > RA0341 Calibration Adapter

For in-situ verification without changing the grid.



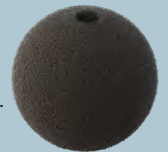
### > RA0357 Random-incidence Corrector

Transforms the 146AE's response to random incidence.



### > High-temperature Windscreen, Click-mount

Resists temperatures up to 125 °C (257 °F). AM0391-1 (1 pc), AM0391-2 (5 pcs).



### > RA0504 GoPro Adapter

A specially-designed adapter that ensures compatibility with GoPro mounting accessories.



### > AA0102 Waterproof Cable

IP67-rated cable, 3 m.



For full information about included and optional accessories, please refer to the 146AE product page at [www.grasacoustics.com](http://www.grasacoustics.com)

# GRAS Worldwide

Subsidiaries and distributors in more than 40 countries

**HEAD OFFICE, DENMARK**  
**GRAS SOUND & VIBRATION**  
Skovlytoften 33  
2840 Holte  
Denmark  
Tel: +45 4566 4046  
[www.grasacoustics.com](http://www.grasacoustics.com)  
[gras@grasacoustics.com](mailto:gras@grasacoustics.com)

**USA**  
**GRAS SOUND & VIBRATION**  
5750 S.W. Arctic Drive  
Beaverton, OR 97005  
Tel: 503-627-0832  
Toll Free: 800-231-7350  
[www.grasacoustics.com](http://www.grasacoustics.com)  
[sales-usa@grasacoustics.com](mailto:sales-usa@grasacoustics.com)

**UK**  
**GRAS SOUND & VIBRATION**  
Unit 115, Gibson House,  
Ermine Business Park, Huntingdon,  
Cambridgeshire, PE29 6XU  
Tel: +44 (0) 7762 584 202  
[www.grasacoustics.com](http://www.grasacoustics.com)  
[sales-uk@grasacoustics.com](mailto:sales-uk@grasacoustics.com)

**CHINA**  
**GRAS SOUND & VIBRATION**  
Room 303, Building T6  
Hongqiaohui, 990, Shenchang Road  
Minhang District, Shanghai  
China, 201106  
Tel: +86 21 64203370  
[www.grasacoustics.cn](http://www.grasacoustics.cn)  
[cnsales@grasacoustics.com](mailto:cnsales@grasacoustics.com)



## 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.

[grasacoustics.com](http://grasacoustics.com)

**GRAS** Sound & Vibration