Expanding Noise Compliance to Environmental Noise

Overview of environmental noise measurements of activities such as fracking, pump stations or wind farms.

Who Am I?

Ken Cox

- Larson Davis BDM
- 35+ years experience at LD
  - Developer, engineering manager, product manager
- Member IEC TC29 for 10+ years

FAQS

- **Agenda**
  - 25 minute presentation
  - 5 minutes for Q/A
- **Is presentation available?**
  - Yes

Agenda

- Why measure outdoor noise?
- When to measure?
- What equipment to use?
- What should I measure?
- Class 1 vs Class 2
- Environmental effects

Why Measure Outdoor Noise?

- Compliance
  - Municipal noise regulations
  - Required as part of construction permit or permit to operate
  - Legal settlement
- Good neighbor
  - Effort to prevent complaints and/or litigation
- Determine impact of potential change
  - Normally done by consultants

When to Measure?

- Only when activity occurs?
  - Acceptable for compliance
- Other considerations
  - Noise levels when activity not present
    - Difference in noise levels affects perception
  - Other noise sources

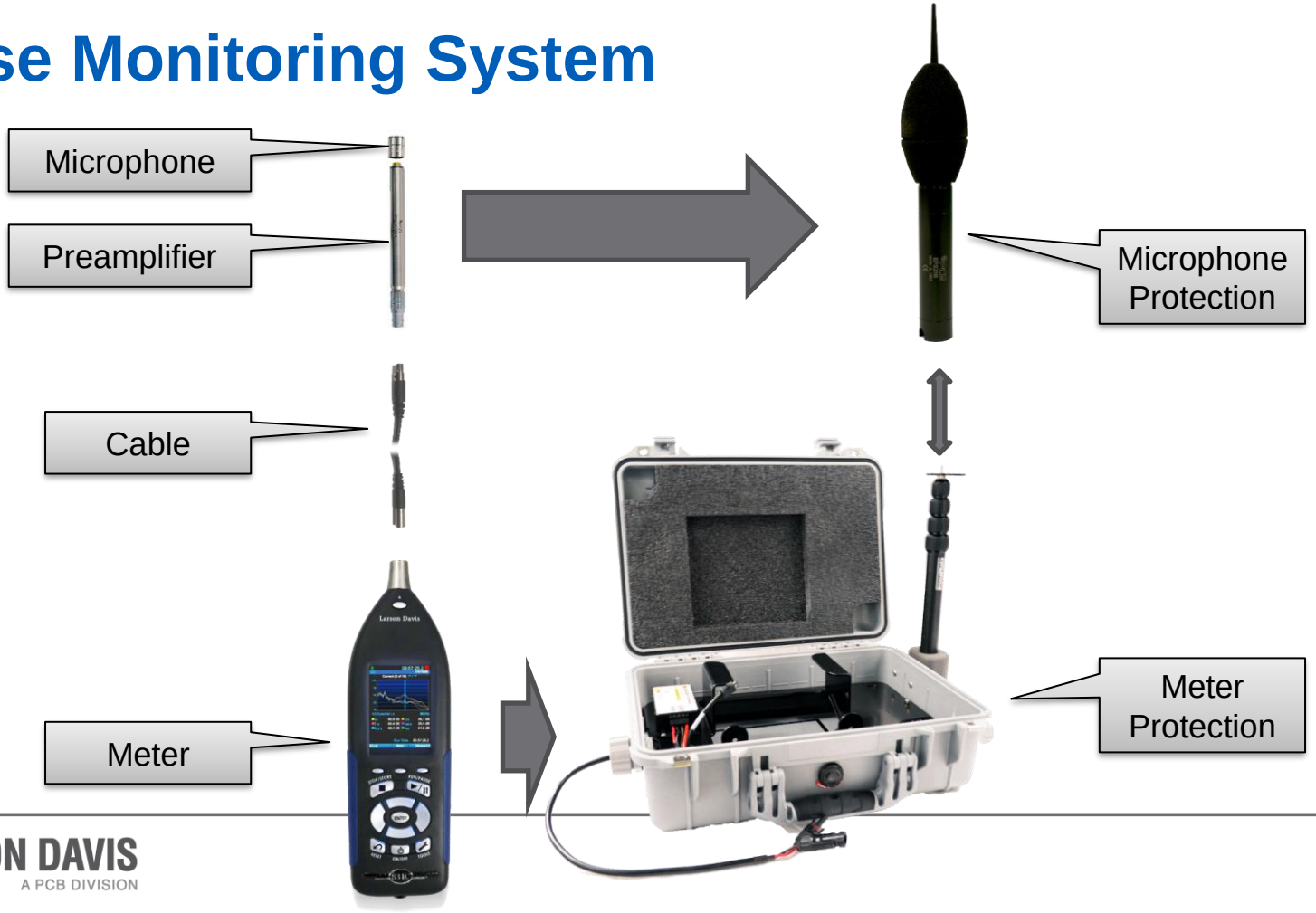
What Equipment to Use?

- Permanent
  - Multi-year monitoring
  - Internet enabled
  - Consider calibration and maintenance
  - Solar or AC powered
  - Typical cost > $15k USD

What Equipment to Use?

- Semi-Permanent
  - 1 week to several years monitoring
  - Internet or sneaker net
  - Battery, solar or AC power
  - Typical $5k to $15k

Noise Monitoring System



What Equipment to Use?

- Portable
  - Up to a few weeks monitoring
  - Typically a SLM on a tripod
  - Sneaker net
  - Battery powered
  - Typical $2k to $6k

What Should I Measure?

- Can vary significantly
  - LAeq
  - LN
  - Lmax
  - Max time above
  - ???

Class 1 vs Class 2

- Class (formerly called Type)
  - ANSI S1.4 and IEC 61672
- Class 1
  - More accurate
  - Commonly better quality
- Class 2
  - Less accurate
  - Unregulated, poor quality

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Physikalisch-Technische Bundesanstalt
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Baumusterprüfbescheinigung
Type-examination Certificate

Ausgestellt für: *Issued to:*	PCB Piezotronics 1681 West 820 North 84601 Provo, Utah USA
gemäß: *In accordance with:*	Anlage 4 Modul B der Mess- und Eichverordnung vom 11.12.2014 (BGBl. I S. 2010) *Annex 4 Modul B of the Measures and Verification Ordinance dated 11.12.2014 (Federal Law Gazette I p. 2010)*
Geräteart: *Type of instrument:*	Schallpegelmesser *Sound level meter*
Typbezeichnung: *Type designation:*	LD 831C
Nr. der Bescheinigung: *Certificate No.:*	DE-17-M-PTB-0076
Gültig bis: *Valid until:*	12.05.2029
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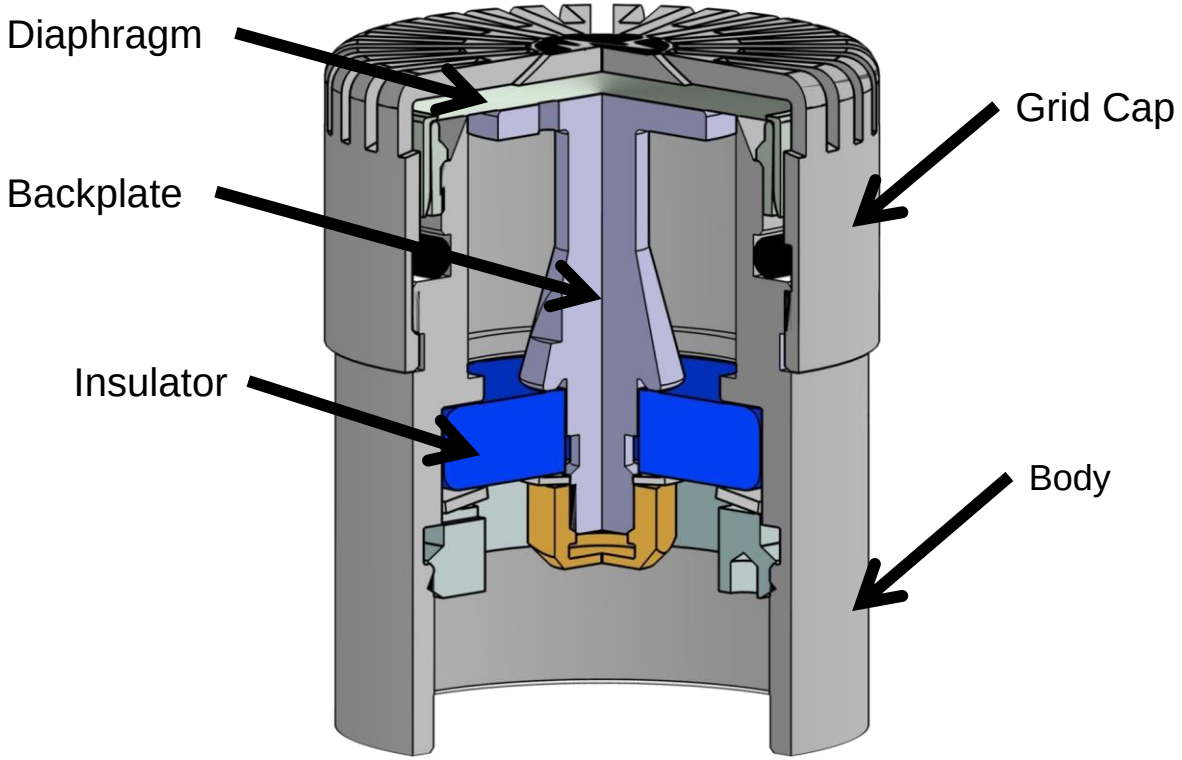
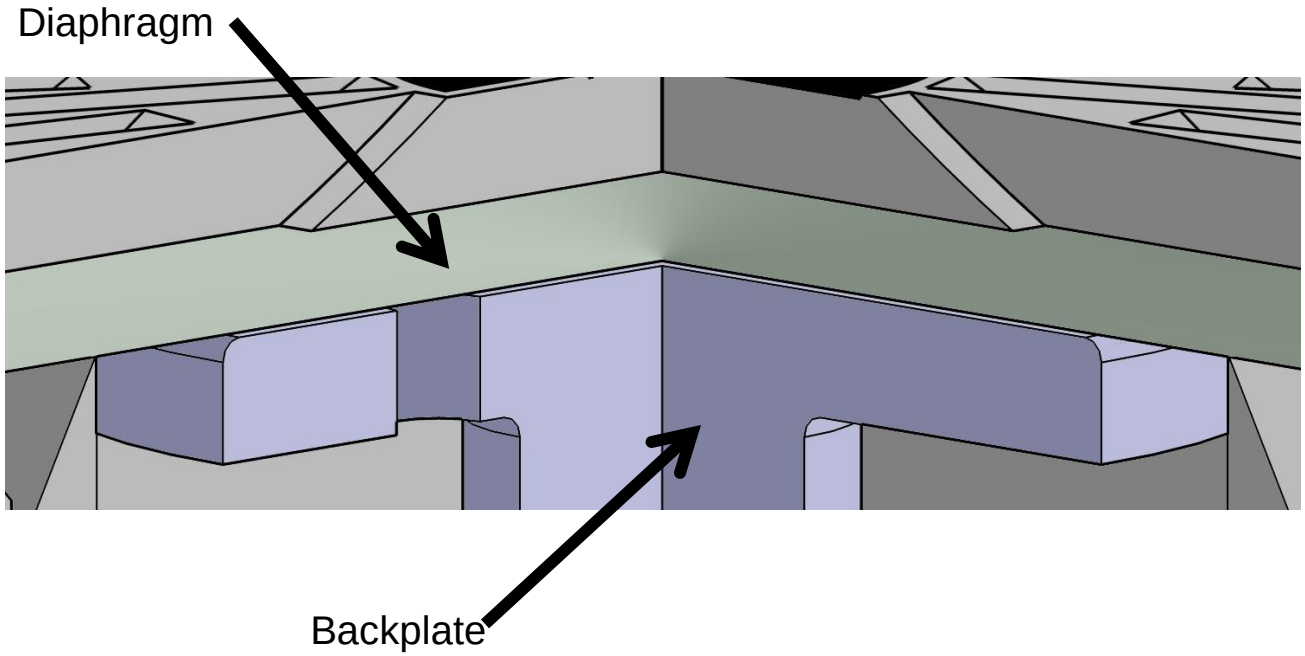
Pattern Approval

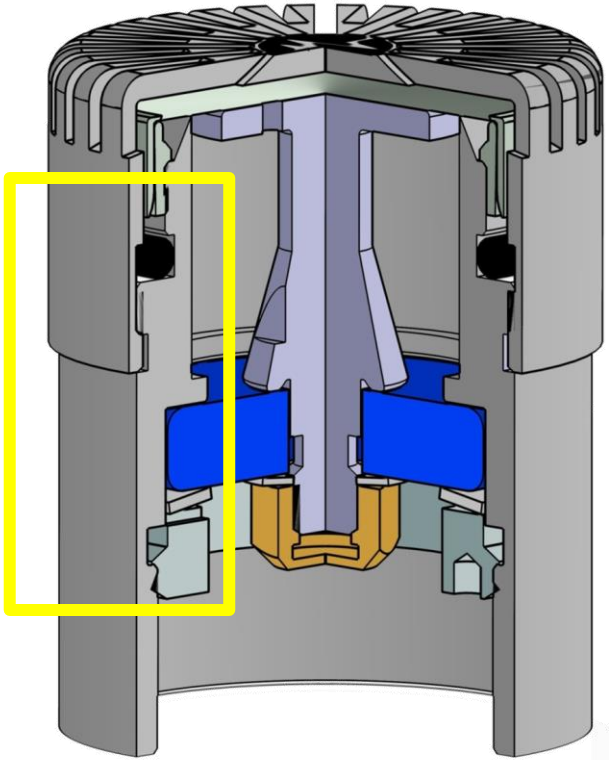
Microphone Elements



Microphone Gap



Microphone Venting



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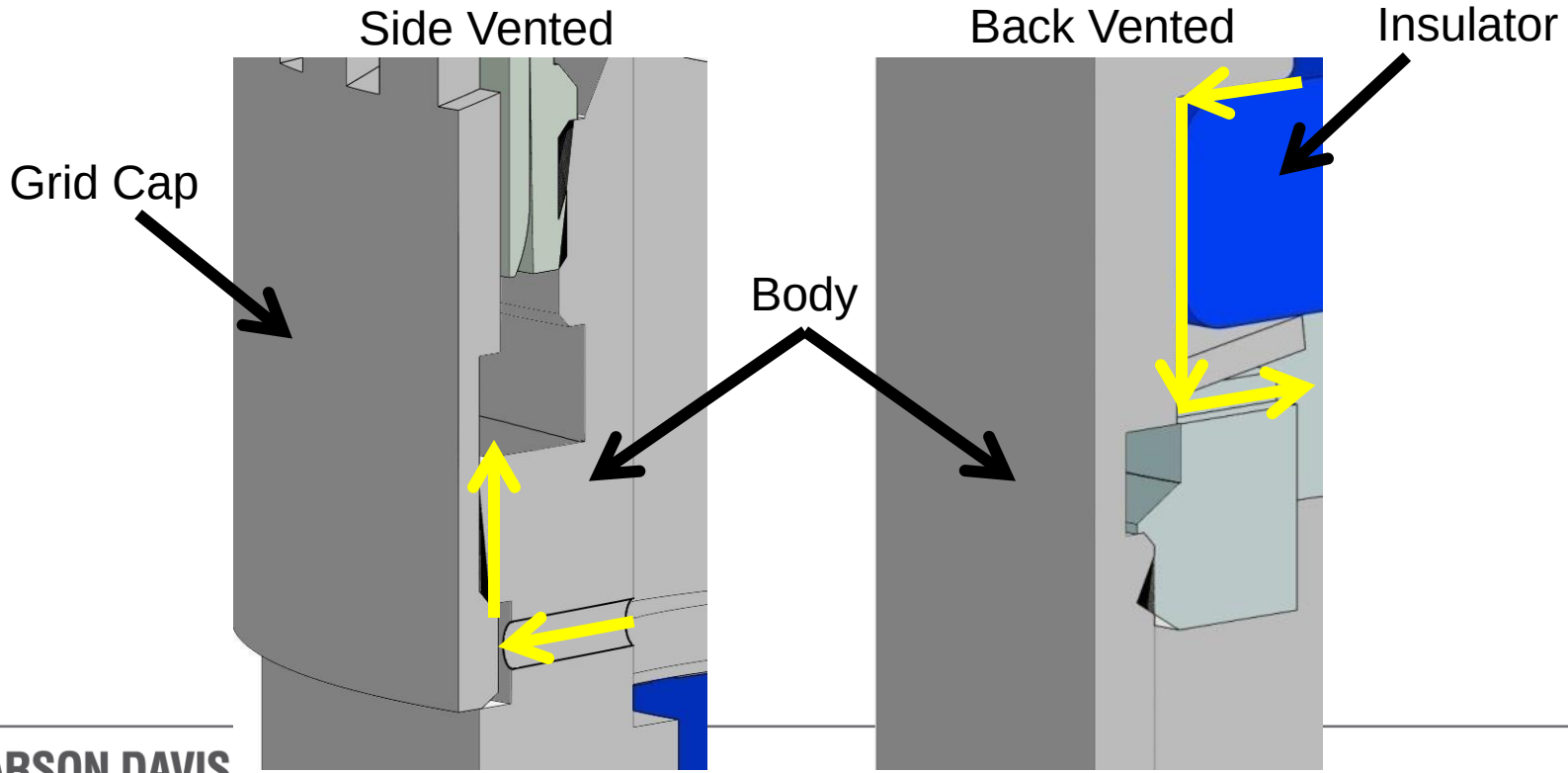
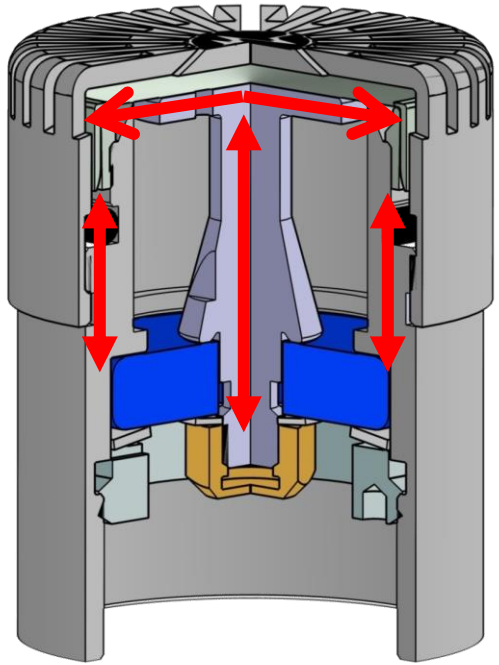


Environmental Effects Temperature

Temperature Coefficient:

In all microphones, sensitivity is proportional to temperature. A microphone should be allowed to acclimate itself for at least 15 minutes at ambient conditions to ensure correct operation.



Temperature Stability:

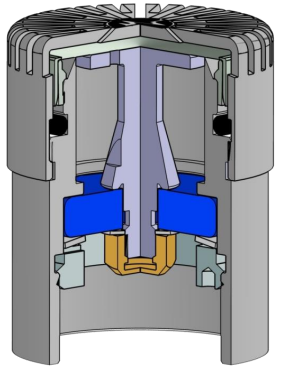
Long exposure to high temperature will cause the electret to discharge and the diaphragm to loosen. This will cause sensitivity to change ***permanently***.

Environmental Effects

Rain & Condensation:

Rain can load the diaphragm so it does not move freely in air.

Condensation can occur behind the diaphragm and change the mechanical impedance = changed sensitivity and frequency response

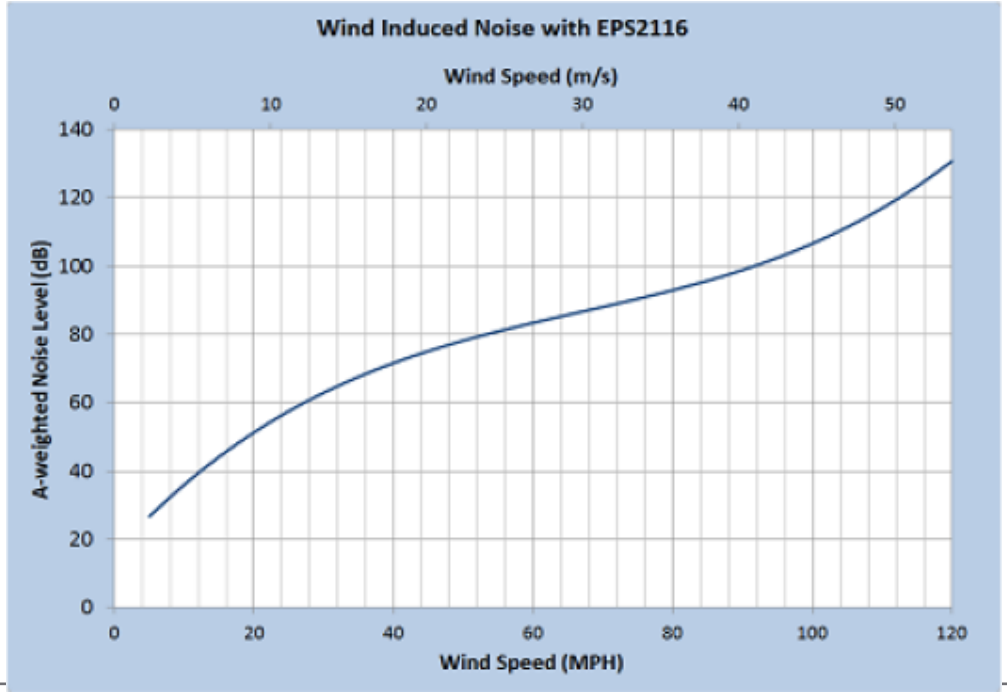


Environmental Effects

Wind:

Typical wind generated noise from an EPS2116

Note: products offering high wind noise rejection typically also affect sound



Noise Monitoring System - Security

Protection against

- Theft
- Vandalism
- Wildlife
- Flood
- Fire
- Power loss

Techniques

- Strong enclosures
- Chains and locks
- Camouflage
- Make look invaluable
- Good location selection

Contact Us

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Questions?