

Thank You for Attending Today's Webinar:

Best Practices in Maintaining Gas Detection Systems



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Field Service

Calibration Best Practices

John Greivell and Jim Behnke

Consequences of NOT maintaining...

01. Unreliable alarms

False alarms or no alarms at all, leads to mistrust of alarm system.



02. Increased risk in plant

Without proper maintenance and calibration of the instruments the plant becomes an unsafe/unreliable workplace.



03. Worker safety

Gas detectors are meant to protect workers from unseen workplace gas hazards, need to keep in best working condition.



Agenda

01. Term definitions

02. How often you need to calibrate and how to assess this

03. Calibration gas: Which one to use for your system

04. Trusting your system

05. Recording your data

OSHA definitions



- **Bump testing/Function check:** A qualitative function check in which a challenge gas is passed over the sensor(s) at a concentration and exposure time sufficient to activate all alarm settings
- **Calibration check:** Verifies that the sensor(s) and alarms respond within the manufacturer's acceptable limits by exposing the instrument to a test gas

Alternative definitions



- **Bump testing:** the performance of a gas detector ensuring that the sensors are responding to their target gas
- **Function Check:** performing an alarm check to ensure everything happens that is supposed to: alarm goes off, doors lock, fire department shows up, etc.
- **Calibration:** the adjustment of the instrument's reading to coincide with a known concentration of test gas

How often to calibrate?



Honeywell Analytics recommends MPD sensor calibration at a maximum interval of 180 days (the XNX default value). This value can be reprogrammed in accordance with site procedures to assure the highest level of safety. Correct operation of each sensor should be confirmed before each use by calibration with a certified test gas of known concentration. In addition, the pellistors used in flammable gas sensors can suffer from a loss of sensitivity when in the presence of poisons or inhibitors, e.g., silicones, sulfides, chlorine, lead, or halogenated hydrocarbons.



- Vendor recommendations typically are based on the sensor being in the best conditions possible
- Compare this to the conditions your sensor will be in
- On Demand/As Needed

Risk and calibration

Risk Assessment Chart

Probability	Severity				
	Catastrophic	Significant	Serious	Minor	Insignificant
Often	Often	Often	Often	Often	Frequent
Likely	Often	Often	Often	Frequent	Frequent
Occasional	Often	Often	Frequent	Frequent	Frequent
Remote	Often	Frequent	Frequent	Frequent	Minimum
Unlikely	Frequent	Frequent	Frequent	Minimum	Minimum

Calibration depends on location



Calibration gas

- What kind of gas?
- What concentration of gas to use?
- What is the range of the sensor?
- What are the alarm levels?
- What is the capability of the sensor?



Combustible Gas Calibrations

No.	Gas	Star Rating
1	Acetone	4*
2	Ammonia	7*
3	Benzene	3*
4	Butanone	3*
5	Butane	4*
6	Butyl acetate	1*
7	Butyl acrylate	1*
8	Cyclohexane	3*
9	Cyclohexanone	<1*
10	Diethyl ether	4*
11	Ethane	6*
12	Ethanol	5*
13	Ethyl acetate	3*
14	Ethylene	5*

No.	Gas	Star Rating
15	Heptane	3*
16	Hexane	3*
17	Hydrogen	6*
18	Methane	6*
19	Methanol	5*
20	MIBK	3*
21	Octane	3*
22	Pentane	3*
23	Propane	5*
24	Propan-2-ol	4*
25	Styrene	2*
26	Tetra hydrofuran	4*
27	Toluene	3*
28	Triethylamine	3*
29	Xylene	2*

Calibration span settings

* Rating of calibration gas	* Rating of gas to be detected							
	8*	7*	6*	5*	4*	3*	2*	1*
8*	50	62	76	95	-	-	-	-
7*	40	50	61	76	96	-	-	-
6*	33	41	50	62	78	98	-	-
5*	26	33	40	50	63	79	100	-
4*	21	26	32	40	50	63	80	
3*	-	21	26	32	40	50	64	81
2*	-	-	-	25	31	39	50	64
1*	-	-	-	-	25	31	39	50

Calibration gas

- What kind of gas?
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Know and trust your system

01. Does your system include IR sensors?

Bump test

02. Does it include a flame detection system?

Response check

03. Function test your safety system

Gas alarm drills





Recording calibration data

01. What data to recorded?

- Date
- Sensor
- Lot number of gases used
- Person performing the work
- Plus
 - As found and as left
 - Any function checks performed
 - Observations

02. Why record the calibration data?

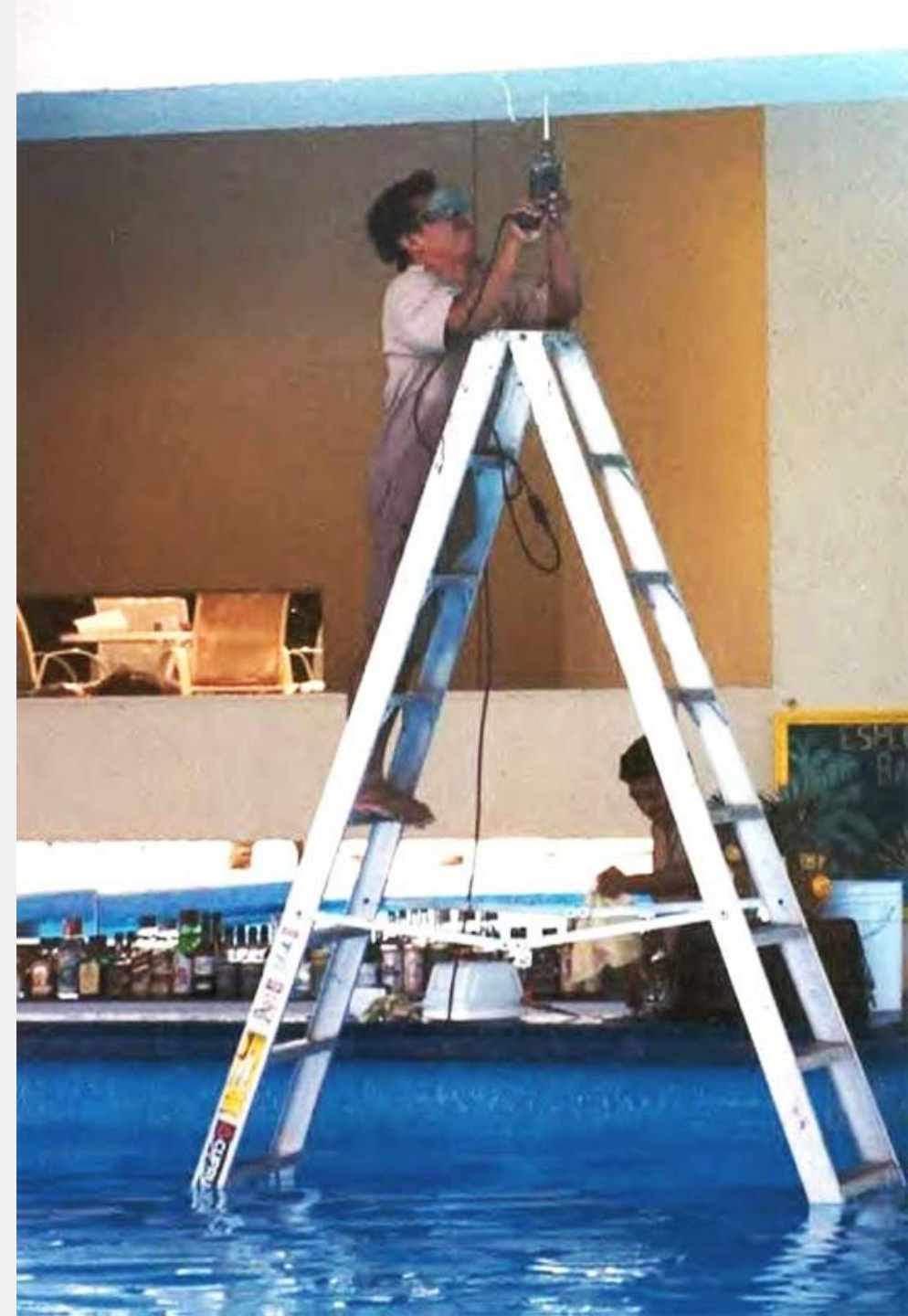
- At a glance anyone can identify an instrument and it's history: maintenance, repair records or if it's prone to erratic readings
- In case of an emergency: you have your records to see when your calibrations were last done, how the sensors preformed, and who last calibrated them

Data collection example:

Date	Sensor ID	Type	Zero Lot #	Zero as found	Zero as left	Span lot #	Span as found	Span as left	Initials
11/17/16	1 st floor west	IR LEL	LAO-110-7	0	0	KAL-50-100	49	50	JG
11/17/16	AIT-877	Cat Bead LEL	LAO-110-8	1	0	KAL-50-100	45	50	JB
11/17/16	Garage CO	CO	LAO-110-9	-1	0	PDQ-100-1.5	94	100	TD

Don't forget!

- Have you communicated to appropriate people that you will be performing the calibration?
- Have the alarm outputs been temporarily suspended?
- Is there a management system that automatically takes the system out of test mode? If not, is that step clearly listed?
- Do you have all of the necessary safety equipment? (standing on the top rung of a ladder to reach the sensor is not a good plan...)
- Have you found and looked at the sensors past records?
- **MAKE SURE YOU ARE NOT THAT PERSON!**





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