

Recovery of Pellistor LEL Sensor Response

LEL Sensor Deactivation

As described in TA Note 7, Pellistor-type LEL sensors suffer from possible deactivation when exposed to high levels of certain types of chemicals. Compounds like H₂S cause temporary inhibition, while silicones are notorious for causing irreversible sensitivity loss. Chlorinated compounds may also cause response loss, possibly due to the formation of corrosive HCl during the combustion process. However, reactivation is sometimes possible by exposing the sensor briefly to pure methane, which raises the pellistor temperature enough to burn off some deactivating deposits.



Pellistor LEL Sensor

Reactivation Procedure

- 1) Apply pure methane (>99% CH₄) to the sensor inlet for a short burst of 2-3 seconds
- 2) Wait a minute or two to allow oxygen to re-enter the LEL sensor
- 3) Repeat the above two steps 2 or 3 more times.

Only short bursts of methane are useful because a) oxygen is quickly consumed and b) most instruments are designed to turn off the LEL sensor above 100% LEL to avoid damage. Thus, longer methane exposures are unnecessary and do not improve reactivation. If methane is not available, propane may be tried, but methane is preferred because it has a higher combustion temperature.

Deactivation/Reactivation Test Results

Test results are shown in the tables below.

- 1) **Hydrogen sulfide (H₂S)** caused a moderate decrease in response that recovered after 24 hours when the sensor was allowed to run in ambient air, without the need for methane burst.
- 2) **Hexamethyldisiloxane** caused a severe decrease in response that did not recover after 48 hours running in ambient air. The methane burst reactivation gave a full recovery in response.
- 3) **Hydrogen chloride (HCl)** at 35 ppm caused no measureable sensitivity loss. Higher concentrations of chlorinated combustible VOCs in the LEL range need testing.

H₂S Poison/Recovery Test (exposed to 10 ppm H₂S* for 40 min, then left running in fresh air)

SN	Before poison test		After poison test		24 hrs later	
	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄
#610	0	50	0	46	0	49
#632	0	50	0	48	0	50
#639	0	50	0	46	0	49
#651	0	50	0	47	0	49

*Poison test included 2% LEL CH₄ in the H₂S gas mix in accordance with Chinese standard GB15322

Hexamethyldisiloxane Poison/Recovery Test (exposed to 10 ppm Hexamethyldisiloxane* for 40 min, then left running in fresh air for 48 hrs, then exposed to 99+% CH₄ 3 times for 2-3 seconds)

SN	Before poison test		After poison test		24 hrs later		48 hrs later		After CH ₄ reactivation	
	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄
#610	0	50	0	30	0	31	0	33	0	49
#632	0	50	0	14	0	15	0	16	0	52
#639	0	50	0	29	0	30	0	2	0	51
#651	0	50	0	4	0	4	0	5	0	52

*Poison test included 2% LEL CH₄ in the Hexamethyldisilazane gas mix in accordance with Chinese standard GB15322

Hydrogen Chloride (HCl) Poison Test:

(exposed to 35 ppm HCl / 2% LEL CH₄ for 4 hours)*

SN	Before poison test		After poison test	
	Fresh air	50% LEL CH ₄	Fresh air	50% LEL CH ₄
#610	0	49	0	49
#632	0	49	0	49

*2% LEL CH₄ included in accordance with Chinese standard GB15322