Recovery of Pellistor LEL Sensor Response

Technical Note 15

watchgas detection

LEL Sensor Deactivation

As described in TN Note 7, Pellistor-type LEL sensors suffer from possible deactivation when exposed to high levels of certain types of chemicals. Compounds like H_2S 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.

Reactivation Procedure

1. Apply pure methane (>99% CH_4) 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 unecessary 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 (H_2S) 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)*

	BEFORE POISON TEST		AFTER POISON TEST		24 HRS LATER	
SN	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 CH_4 in the H_2S 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+% CH_4 3 times for 2-3 seconds)

	BEFORE POISON TEST		AFTER POISON TEST		24 HRS LATER		48 HRS LATER		AFTER CH_4 REACTIVATION	
SN	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	33	0	33	0	49
#632	0	50	0	14	0	16	0	16	0	52
#639	0	50	0	29	0	2	0	2	0	51
#651	0	50	0	4	0	5	0	5	0	52

*Poison test included 2% LEL CH_4 in the Hexamethyldisilazane gas mix in accordance with Chinese standard GB15322

Hydrogen Chloride (HCl) Poison Test:
(exposed to 35 ppm HCl / 2% LEL CH_4 for 4 hours)*

	BEFORE POISON TEST		AFTER POISON TEST	
SN	Fresh air	50% LEL CH_4	Fresh air	50% LEL CH_4
#610	0	50	0	46
#632	0	50	0	48
#639	0	50	0	46
#651	0	50	0	47

*2% LEL CH_4 included in accordance with Chinese standard GB15322

