

Measuring Hydrogen Sulfide at the New TLV® Exposure Limit



In February 2010, the American Conference of Governmental Industrial Hygienists (ACGIH) adopted a new threshold limit value (TLV®) recommendation for H₂S, lowering the 8-hour TWA to 1.0 ppm, and the STEL to 5.0 ppm.

In the past, the most widely recognized occupational exposure limits for H₂S have referenced an 8-hour TWA of 10 ppm, and a 15-minute STEL of 15 ppm. The new TLV® has forced many companies to reconsider exposure limit guidelines and alarm settings. A major issue is whether the company's current instruments are capable of operation with alarms set to the new 1.0 ppm limit. Employers may need to verify whether or not this is possible with a particular instrument design.

What are TLVs®, and why do they matter?

OSHA uses the term Permissible Exposure Limit (PEL) to define the maximum concentration of a listed contaminant to which an unprotected worker may be exposed. Depending on the contaminant, the PEL may reference an eight-hour, time weighted average (TWA), a 15-minute short term exposure limit (STEL) or an instantaneous ceiling (C) concentration that cannot be exceeded for any period of time. Individual states either follow the Federal regulations, or follow their own, state-specific permissible exposure limits. States may not publish or follow exposure limits that are more permissive than Federal OSHA limits.

The ACGIH TLVs® are among the world's most widely used and respected guidelines for workplace exposure to toxic substances. TLVs® are developed and designed to function as recommendations for the control of health hazards, and to provide guidance intended for use in the practice of industrial hygiene.

ACGIH TLVs® are frequently incorporated by reference into state, federal, and many international regulations governing workplace exposure. They may also be cited or incorporated by reference in consensus standards of associations such as the National Fire Protection Association (NFPA), or American National Standards Institute (ANSI).

Given the potential for lawsuits, many employers have made the strategic decision to base their corporate health and safety programs on conservative applicable recognized standards. Since ACGIH recommendations are frequently more conservative than OSHA PELs, many programs, especially the programs of multinational or prominent corporations, use the ACGIH TLV®.

Do I really need to worry about the new lower H₂S exposure limits?

The alarm concentrations to use are determined by the regulatory standards that apply to the company's activities, and the employer's safety and toxic exposure limit policies. When in doubt, it is usually better to use a lower rather than higher alarm setting.



Figure 1: : GfG multi-sensor portable instruments use high-sensitivity hydrogen sulfide sensors capable of providing the stability and resolution needed for measurement and alarm settings at the new TLV®.



GfG Instrumentation

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How many H2S alarms does my instrument have?

Most H2S instruments have four user settable alarms for each toxic gas measured: Low, High, TWA and STEL. In GfG instruments the Low and High alarms are instantaneous “Ceiling” alarms. The alarms will sound immediately the moment the concentration exceeds the alarm setting. The STEL alarm is a time-history alarm based on the average concentration over the most recent 15-minute period. The TWA alarm is calculated for an 8-hour exposure period. When the exposure is less than 8-hours the TWA calculation is projected over a full 8-hour period.

Where should I set the alarms?

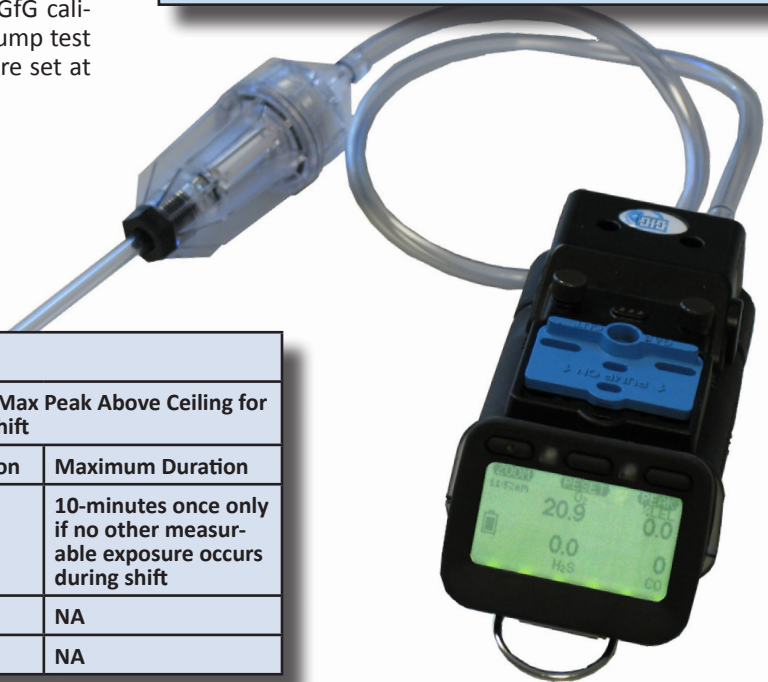
Until recently, most instrument users (and manufacturers) have set the Low and TWA alarms at 10 ppm, and the High and STEL alarms at 15 ppm. Instrument users who are required to conform to the new TLV will need to use much lower settings. It is possible to set the H2S alarms in GfG instruments as low as 0.5 ppm (one-half the TLV[®] exposure limit value). Many instrument users now set the Low and TWA alarms at 1.0 ppm, and the High and STEL alarms at 5.0 ppm.

Can I use the same gas I have been using to calibrate my instruments with the new alarms?

Yes. The signal of the H2S sensor is extremely linear over a very wide range. You can continue to use standard GfG calibration gas that includes 10 ppm or 20 ppm H2S to bump test or calibrate instruments even when the H2S alarms are set at 1.0 ppm.

TLVs[®] Incorporated by Reference in:

- NFPA 306 – Control of Gas Hazards on Vessels
- US Coast Guard regulations (OSHA PEL or TLV, whichever is lower)
- US Army (OSHA PEL or TLV, whichever is lower, or specific Army OEL)
- Some individual state health and safety plans (e.g. California)
- Many international standards and regulations (e.g. Canada)
- Many consensus standards (e.g. ANSI, NFPA)
- Many corporate health and safety plans
- Mine Safety and Health Administration (MSHA) regulations



H2S Exposure Limits					
	8-hr. TWA	STEL	Ceiling	Acceptable Max Peak Above Ceiling for an 8-Hour Shift	
				Concentration	Maximum Duration
Federal OSHA PEL	NA	NA	20 ppm	50 ppm	10-minutes once only if no other measurable exposure occurs during shift
NIOSH REL	10 ppm	15 ppm	NA	NA	NA
TLV (2010)	1.0 ppm	5.0 ppm	NA	NA	NA

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