

What is the difference between a PEL, TLV and REL?

The permissible exposure limit (PEL) is a legal limit in the United States for exposure of an employee to a chemical substance or physical agent. PELs are established by the Occupational Safety and Health Administration (OSHA). In OSHA regulations, PELs are exposure limits to hazardous substances referenced in CFR 29 1910.1000 TABLE Z-1; Z-2 and Z-3 (Toxic and Hazardous Substances).

Threshold Limit Value (TLV) is a reserved term from the American Conference of Governmental Industrial Hygienists. Unless a state or the federal government adopts a hazardous chemical TLV, it is not a regulatory requirement but a recommended guideline. TLV is based on group consensus resulting in a recommendation of what the upper exposure limits should be for a hazardous substance.

Recommended Exposure Limit (REL) is a reserved term from National Institute for Occupational Safety and Health (NIOSH). REL is not a regulatory requirement, but a recommended guideline for upper exposure limits to hazardous substances. NIOSH recommends to OSHA to adopt into regulation the recommended REL as the “new” permissible exposure limit that will subtract, add or update an existing PEL. NIOSH is governed by the Center for Disease Control and Prevention whereas OSHA is an office within the Department of Labor.

1. Permissible Exposure Limit – PEL (Occupational Safety and Health Act - OSHA)

PEL is the maximum upper exposure legal limit to a hazardous substance exposure that an employee can be exposed to in an 8-hour period. Essentially, a PEL is basically the same as a TLV/REL except PELs are actual OSHA regulations whereas TLV/RELS are not (unless adopted by a state OSHA such as Minnesota). Incidentally, OSHA PELs adopted TLVs based on recommendations made by the ACGIH in 1968, meaning the existing PELs were once TLVs. The OSHA regulatory PELs are published in 29CFR 1910.1000 Table Z1, Z-2 and Z-3. PELs have pretty much remained the same. However, there have been PEL changes seen in lowering Silica PEL. Legislature approval is required to change a PEL. Many industrial hygienists feel that OSHA compliance limits are not sufficient to protect the worker since the toxicological basis for most limits have not been updated since the 1960s, even in light of updated information on many hazardous substances. OSHA has approximately 212 chemicals with PELs. Note OSHA website PEL links below:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9993

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9994

2. Threshold Limit Value - TLV (American Conference of Governmental Industrial Hygienists - ACGIH)

A chemical substance TLV is the “Workday Concentration” level to which a worker can be exposed to daily for his/her working lifetime without having adverse effects. Workday Concentration is the averaged exposure over a workday (usually 8 hours long). Another way to look at it is that TLVs are the maximum daily (8 hour shift) exposure to an airborne concentration of a hazardous material that healthy workers can be exposed to each workday (assuming a 40-hour workweek) without experiencing significant adverse occupational safety and health effects over a working lifetime. ACGIH has 677 chemicals with TLVs. TLVs are published annually in a booklet containing exposure guidelines for many commonly used substances. Note ACGIH website TLV links addresses below:

<http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations/overview>

3. Recommended Exposure Limit - REL (National Institute for Occupational Safety and Health- NIOSH)
REL is an occupational exposure limit recommended by NIOSH to OSHA to adopt as the “new” permissible exposure limit. The REL is a level that NIOSH believes would be protective of workplace safety and employee health over a working lifetime. Although not legally enforceable limits, NIOSH RELs are considered by OSHA during the promulgation of legally enforceable PELs. No REL has ever been adopted by OSHA. RELs are used as guides by some industry and advocacy organizations. NIOSH publishes RELs that OSHA takes into consideration when promulgating new regulatory exposure limits.

<https://www.cdc.gov/niosh/docs/2005-149/pdfs/2005-149.pdf>

4. Generally speaking, PEL/TLV/REL have three subcategories: time weighted average (TWA), ceiling value, and short term exposure limit (STEL).

The time weighted average is measured in a workplace by sampling a worker's breathing zone for the whole workday (a filter media cartridge/ battery attached to the employee). Then, add up all the exposure and divide by 8 hours if it was a full 8-hour test. The result is the average exposure – the TWA.

Ceiling value is the concentration an airborne toxic substance should not exceed at any time during the workday.

STEL is the TWA concentration taken over a 15 minute time period (not 8 hours). For proper safety in the workplace, the set exposure level cannot be exceeded during that 15 minute test period. If a test shows that a STEL has occurred; this means that the employee has been exposed to a heavy dose exposure of that hazardous substance during that 15 minute test period (which is not good). You can have a recorded STEL within an 8-hour workday and still be within the TLV. Your hazardous substance test TWA can be within the parameters. However, if a STEL occurs within that 8 hour test period, the company will need to review the production process to see if additional controls can be put in place to decrease the STEL. If a hazardous chemical does not have a STEL (many don't), then you rely on the TWA (8 hours).

PEL/TLV/REL TWA Example of Differences: the (OSHA) PEL of carbon monoxide is 50ppm with no STEL; (ACGIH) TLV 50ppm TWA with STEL of 400ppm: (NIOSH) REL 35ppm TWA with a ceiling of 200ppm.

5. Summary

The PEL, TLV and REL are measurements that identify the upper exposure limits of a hazardous substance based on 8 hours of exposure. The PEL is enforceable by OSHA, whereas the TLV and REL are not. When an employee's workplace hazardous substance exposure is analyzed, it takes into account all three terms: PEL, TLV, and REL. Understanding how everything works together to obtain a clear picture of an employee's exposure is the key to workplace safety in this regard. As you can see, each agency evaluation is different.

What does it all mean? OECS's experienced industrial hygienists will evaluate and incorporate PEL, TLV, and REL into a comprehensive health and safety assessment. An element of OECS's regular ongoing client program is to provide an understanding on how all the variables interrelate within the analysis, which is typically at "no charge" to regular clients – a great cost savings.