

REFERENCE DATA SHEET ON SAFETY DATA SHEETS

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REQUIRED AND POTENTIAL USES

^ [OSHA Hazard Communication Standard](#)

- ^ General Industry
- ^ Shipyard Employment
- ^ Marine Terminals
- ^ Construction
- ^ Agriculture
- ^ Federal Employees

^ [EPA](#) Regulations

- ^ Air Programs ²
- ^ Superfund, Emergency Planning, and Community Right-To-Know Programs ³⁻⁵
- ^ Toxic Substance Control Act ⁶
- ^ Solid Wastes ^{7, 8}
- ^ DOT - Emergency Response Information ⁹
- ^ Employee Training

The purpose of a safety data sheet (SDS), commonly referred to as a material safety data sheet (MSDS) before OSHA's 2012 revision of the Hazard Communication Standard, is to inform industrial purchasers and users of hazardous chemicals of the reasonably foreseeable physical and chemical hazards that may arise from the use of those chemicals. Most materials packaged for consumer use are exempt from the requirements of the Hazard Communication Standard (HCS). An SDS should include precautions for normal use, handling, storage, disposal, and spill cleanup. It should not include recommendations for protective measures that are more strict than needed. OSHA states in the inspection procedures for the HCS,¹⁰ "Information provided on MSDSs must be accurate. The safety and health precautions must be consistent with the hazards of the chemical. The standard allows any MSDS format as long as all of the required information is included."

HISTORY

In the 1940s the Manufacturing Chemists' Association, now known as the American Chemistry Council (ACC), began producing Chemical Safety Data Sheets containing "Properties and Essential Information for Safe Handling and Use" of some of the important hazardous chemicals used in commerce. Ultimately about 100 of these data sheets were produced. They were very detailed in their coverage of each chemical, to the point of almost being stand-alone books. The longest data sheet was 46 pages. Later, some chemical companies began to produce data sheets for some of their high-volume or hazardous chemicals. ACC no longer produces or supports Chemical Safety Data Sheets.

On November 25, 1983 OSHA published the Hazard Communication Standard as 29 CFR Part 1910, adding §1910.1200. This initial standard applied only to Standard Industrial Classification (SIC) Codes 20 through 39. The requirement that manufacturers and distributors provide SDSs to their customers became effective on November 25, 1985. The standard did not require a particular format for an SDS, but did specify what information it should include. Effective September 23, 1987, the requirements of the standard were extended to include "... all employers with employees exposed to hazardous chemicals in their workplaces."

As of the 1994 revision of its Hazard Communication Standard, OSHA had not required SDSs to meet specific format criteria. Hence the order in which information was presented in SDSs varied substantially. In an effort to improve the completeness, accuracy, and consistency of SDSs, in 1993 the American Chemistry Council (ACC) developed a voluntary standard for their preparation, ANSI Z400.1-1993, "American National Standard for Hazardous Industrial Chemicals -- Material Safety Data Sheets -- Preparation." This 179-page-long standard established an SDS format containing sixteen sections. The standard was revised in 1998, 2004, and 2010. Though the updates reordered sections and increased readability, the original 1993 SDS format criteria remains largely intact.

In its 2012 revision of the HCS, OSHA aligned the HCS with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), addressing concerns of consistency and quality of hazard warning information. This revision specifies a sixteen-section format for safety data sheets similar to that found in ANSI Z400.1/Z129.1-2010.

The U.S. Environmental Protection Agency (EPA) has also played a role in creating SDS regulations. In 1986 the EPA published the Emergency Planning and Community Right-To-Know Act of 1986, and in 1988 it published the Toxic Chemical Release Reporting: Community Right-To-Know regulation. The use and distribution of SDSs was an important part of these regulations. The Toxic Chemical Release Reporting regulations required that SDSs for chemicals requiring reporting by these regulations contain specific language notifying users that the chemicals were subject to these regulations. These and other EPA regulations have been promulgated under Title III C Emergency Planning and Community Right-To-Know Act of the Superfund Amendments and Reauthorization Act of 1986 (EPCRA).

OSHA's definition of hazardous chemicals is broad, and includes many materials that might otherwise be considered innocuous. Because of the potential for product liability suits, and consumers' demands for SDSs for almost all materials they purchase, manufacturers usually prepare SDSs even for relatively harmless materials.

IMPLICATIONS

OSHA requires manufacturers and importers of hazardous chemicals to distribute safety data sheets with information concerning reasonably foreseeable health and toxicity concerns arising from their use. Users of these chemicals are required to ensure that these SDSs are received with chemicals they purchase, and that the SDSs are readily available in the workplace.

CONTENT OF A SAFETY DATA SHEET

THE OSHA HAZARD COMMUNICATION STANDARD ¹

Paragraph (g) of the OSHA Hazard Communication Standard specifies the information that must be contained in safety data sheets. The manufacturer or importer of the chemical must prepare an SDS in English – though employers are free to possess copies in other languages – that contains, at a minimum, the section numbers and headings below:

Section 1: Identification

Section 2: Hazard(s) identification

Section 3: Composition/information on ingredients

Section 4: First-aid measures

Section 5: Fire-fighting measures

Section 6: Accidental release measures

Section 7: Handling and storage

Section 8: Exposure controls/personal protection

Section 9: Physical and chemical properties

Section 10: Stability and reactivity

Section 11: Toxicological information

Section 12: Ecological information

Section 13: Disposal considerations

Section 14: Transport information

Section 15: Regulatory information

Section 16: Other information, including date of preparation or last revision

IMPLICATIONS:

It is important to note that OSHA does not consider the information requirements contained in sections 12 to 15 to be under its jurisdiction; hence, OSHA will not enforce these requirements. However, OSHA emphasizes that in order to comply with the Globally Harmonized System of Classification and Labeling of Chemicals, an SDS must include sections 12 to 15 in the numerical order they appear above.

If the preparer of the SDS – be it the manufacturer of the chemical, its importer or the employer using the chemical – finds no relevant information to put under some subheading within any of the above sixteen sections, it must explicitly indicate that relevant information was not found to put under that subheading. If different mixtures of chemicals have similar chemical contents and hazards, OSHA allows for the preparer to create only one SDS to cover these different mixtures.

If the preparer of the SDS becomes aware of significant new hazard information pertaining to the chemical, it must add the information to the SDS within a period of three months; for chemicals not currently produced or imported, that information must be added before reintroduction of the chemical in the workplace.

Manufacturers and importers of chemicals should provide safety data sheets with the first shipment, and updated sheets must be sent with the initial shipment after an update; if these sheets are not provided for products marked as hazardous chemicals, the distributor of the product or the employer using it should obtain an SDS from the manufacturer or importer. OSHA also holds distributors responsible for providing safety data sheets.

While OSHA requires an extensive amount of specific information to be included, an SDS should not be a complete scientific work on the hazardous chemical. Employers may accept the content of an SDS from a supplier unless they know it is incorrect. However, the employer must ensure that an SDS is available for each hazardous chemical, and that it contains all of the required information; though this information may be presented so as to cover whole groups of hazardous chemicals in a particular work area, the information required for each of the hazardous chemicals must be provided. If an SDS is not received, the employer must contact the supplier to request one. If the information is still not received, OSHA should be contacted for assistance.

The quality and accuracy of SDSs varies widely. For example, a 2008 study that examined 24 peer-reviewed articles on MSDS accuracy states that these articles came to the following conclusions: SDSs failed to include health effects about half of the time while between 30% and 100% of materials analyzed contained chemicals that were not declared in the SDSs.¹¹ A safety data sheet is for the benefit of people who work with hazardous chemicals; if it is not in a reasonably accurate, useful, and understandable format, it will not achieve its purpose.

OSHA has compiled a summary of the phase-in schedule mandated by the 2012 revision of the HCS¹², which is presented below:

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015 December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors, and employers

ANSI Z400.1/Z129.1-2010 ¹³

This 2010 revision of the lengthy voluntary standard establishes an SDS format containing sixteen sections. A very brief description of the purpose and scope of each section is given below.

Section 1: Product and Company Identification Names the material and relates the SDS with the label and shipping documents. Must also present a mailing address and telephone number of the manufacturer, importer or other entity responsible for the SDS.

Section 2: Hazards Identification Contains an emergency overview that describes the material's properties (such as appearance and odor) and states the health, physical, and environmental hazards that may be of concern for emergency response personnel. Also indicates the material's OSHA regulatory status (such as non-hazardous or hazardous) with regards to the HCS to help determine whether training or other activities are required. Contains information on potential health effects/symptoms arising from exposure to the material in an easy-to-understand way. Also presents the material's environmental effects, focusing only on significant and relevant effects.

Section 3: Composition/Information on Ingredients Identifies the hazardous components of the material. If non-hazardous ingredients are listed, they should be listed separately. Chemical Abstract Service (CAS) numbers should be included, as should percentages or percentage ranges by volume or weight unless the percentages are claimed to be trade secrets. If the identity of any ingredient is claimed to be a trade secret, it should be so indicated in this section.

Section 4: First Aid Measures Includes emergency and first aid procedures. Should be in layman's language, easy to understand, and procedures for each potential route of exposure should be included. A "Note to Physicians" subsection should be included if such information is available.

Section 5: Fire Fighting Measures Describes fire and explosive properties of the material, extinguishing media to be used, and fire-fighting instructions. Applies to anyone who may be in the area of the fire.

Section 6: Accidental Release Measures Contains information needed to prevent or minimize adverse effects caused by leaks, spills or releases on people, property, as well as the environment. Should include personal and environmental precautions, methods for containment and cleanup, as well as spill or leak statements.

Section 7: Handling and Storage Provides guidelines for minimizing any potential hazards from storing and handling the material. Focuses on properties of material, not on general practices. Should include directions to minimize handling when appropriate, conditions such as temperature and inert atmosphere, and conditions to avoid.

Section 8: Exposure Controls/Personal Protection Contains three subsections: one listing exposure guidelines such as OSHA PELs, BEIs, ACGIH TLVs and company exposure regulations, another addressing personal protective equipment that should be used, and another subsection discussing the engineering controls that may be needed when handling the material.

Section 9: Physical and Chemical Properties Lists properties that should be included to assist users in determining proper handling and storage procedures. Appearance, odor, odor threshold, physical state (e.g. liquid, solid or gas), pH, vapor pressure and density, melting and freezing points, solubility, initial boiling point, boiling range, evaporation rate, flash point, flammability (solid, gas), flammability/explosive limits, vapor density, vapor pressure, specific gravity/relative density, solubility, auto-ignition temperature, partial coefficient: n-octanol/water, and decomposition temperature must be included. Additional properties may be included if they are useful.

Section 10: Stability and Reactivity Describes hazards pertaining to stability/reactivity of the material under specific conditions. Should include chemical stability, incompatible materials, hazardous products of decomposition, conditions to avoid, and should address the potential of hazardous reactions.

Section 11: Toxicological Information Includes information used to determine human health hazards or negative health effects of material gained from animal testing, human testing, structure activity relationships, and in vitro testing. May also include information on the material's potential for causing cancer, the effects of acute, subchronic, and chronic exposure to the material, as well as the material's corrosive, irritation, sensitization, neurological, reproductive, target-organ, developmental, and mutagenic effects.

Section 12: Ecological Information Lists information useful in determining material's impact on the environment if it is released into the environment. May address issues of persistence/degradability, toxicity, mobility in environment and accumulation/bioaccumulation, among others.

Section 13: Disposal Considerations Provides information helpful in determining proper recycling, reclamation or disposal methods for the material or the material's container.

Section 14: Transport Information Presents information for shipping classification to aid personnel in preparing the material for shipping. Though not intended to detail all transportation regulations for the material, this section should present a simple shipping description containing an identification number, packing group, proper shipping name, and hazard class; additional information may also be included.

Section 15: Regulatory Information Provides information on the material's regulatory status that may be useful for safety, health, and environmental regulation compliance. Specific organization and content depends on where material is made, the places it is marketed and the intended use. While the section is not meant to list all applicable regulations, it may list the following US Federal statutes/regulations/agencies: TSCA, OSHA, CERCLA, FIFRA, SARA Title III, CWA, CAA, SDWA, FHSA, FDA/USDA, and DEA. It may also list some international as well as US state regulations.

Section 16: Other Information Includes any other pertinent information such as hazard ratings, label information, a key to abbreviations, and preparation/revision information.

IMPLICATIONS

The sixteen-section SDS format requirements adopted by OSHA in its 2012 revision of the HCS are extremely similar to the above sixteen-section format requirements set forth in the ANSI Z400.1/Z129.1-2010. However, unlike ANSI, OSHA does not provide a detailed description of the type of information to be included in each section, simply requiring an SDS to adequately cover each section.

REFERENCES

1. "Hazard Communication," 29 CFR 1910.1200. Washington, Occupational Safety and Health Administration 77 FR 17785, March 26, 2012
2. "National Emission Standards for Hazardous Air Pollutants for Source Categories," 40 CFR Part 63. Washington, Environmental Protection Agency, 58 FR 61970, Dec. 29, 1993.
3. "Emergency Planning and Notification," 40 CFR Part 355. Washington, Environmental Protection Agency, 52 FR 13395, Apr. 22, 1987.
4. "Hazardous Chemical Reporting: Community Right-To-Know," 40 CFR Part 370. Washington, Environmental Protection Agency, 52 FR 38364, Oct. 15, 1987.
5. "Toxic Chemical Release Reporting: Community Right-To-Know," 40 CFR Part 372. Washington, Environmental Protection Agency, 53 FR 4525, Feb. 16, 1988.
6. "Significant New Uses of Chemical Substances." 40 CFR Part 371. Washington, Environmental Protection Agency, 53 FR 28358, July 27, 1988.
7. "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," 40 CFR Part 266. Washington, Environmental Protection Agency, 50 FR 666, Jan. 4, 1985.
8. "Land Disposal Restrictions," 40 CFR Part 266. Washington, Environmental Protection Agency, 51 FR 40638, Nov. 7, 1986.
9. "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications Requirements and Emergency Response Information Requirements," 49 CFR Part 172. Washington, Department of Transportation, 41 FR 15996, Apr. 15, 1976.
10. "Inspection Procedures for the Hazard Communication Standard, 29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, and 1928.21," OSHA Instruction CPL 02-02-038, Appendix A (g)(2). Washington, Occupational Safety and Health Administration, October 22, 1990.
11. Chu, W, et al., "Accuracy, Comprehensibility, and Use of Material Safety Data Sheets: A Review," *American Journal of Industrial Medicine* 51(11):861-876 (2008).
12. "Hazard Communication: Effective Dates," *Occupational Safety and Health Administration*. Web. Accessed December 28, 2012. <<http://www.osha.gov/dsg/hazcom/effectivedates.html>>.

13. *American National Standard for Hazardous Workplace Chemicals –Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation*, ANSI Z400.1/Z129.1-2010. New York, American National Standards Institute, 2010.

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