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OSHA[®] BRIEF

Hazard Communication Standard: Safety Data Sheets

The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format. This brief provides guidance to help workers who handle hazardous chemicals to become familiar with the format and understand the contents of the SDSs.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English (although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., fire fighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies.

A description of all 16 sections of the SDS, along with their contents, is presented below:

Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g., flammable liquid, category¹).
- Signal word.
- Hazard statement(s).
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
- Precautionary statement(s).
- Description of any hazards not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service (CAS) number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
 - Present above their cut-off/concentration limits or
 - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
 - A trade secret claim is made,
 - There is batch-to-batch variation, or
 - The SDS is used for a group of substantially similar mixtures.

Chemicals where a trade secret is claimed

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

¹ Chemical, as defined in the HCS, is any substance, or mixture of substances.

Section 4: First-Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5: Fire-Fighting Measures

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6: Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up).

Section 7: Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements).

Section 8: Exposure Controls/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9: Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.);
- Odor;
- Odor threshold;
- pH;
- Melting point/freezing point;
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.

Section 10: Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.

Section 12: Ecological Information (non-mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment. The information may include:

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (K_{ow}) and the bioconcentration factor (BCF), where available.
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

Section 13: Disposal Considerations (non-mandatory)

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:

- Description of appropriate disposal containers to use.
- Recommendations of appropriate disposal methods to employ.
- Description of the physical and chemical properties that may affect disposal activities.
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities.

Section 14: Transport Information (non-mandatory)

This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea. The information may include:

- UN number (i.e., four-figure identification number of the substance)².
- UN proper shipping name².
- Transport hazard class(es)².
- Packing group number, if applicable, based on the degree of hazard².
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78³ and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code))).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

² Found in the most recent edition of the United Nations Recommendations on the Transport of Dangerous Goods.

³ MARPOL 73/78 means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

Section 15: Regulatory Information (non-mandatory)

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

Employer Responsibilities

Employers must ensure that the SDSs are readily accessible to employees for all hazardous chemicals in their workplace. This may be done in many ways. For example, employers may keep the SDSs in a binder or on computers as long as the employees have immediate access to the information without leaving their work area when needed and a back-up is available for rapid access to the SDS in the case of a power outage or other emergency. Furthermore, employers may want to designate a person(s) responsible for obtaining and maintaining the SDSs. If the employer does not have an SDS, the employer or designated person(s) should contact the manufacturer to obtain one.

References

OSHA, 29 CFR 1910.1200(g) and Appendix D.

United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS), third revised edition, United Nations, 2009.

These references and other information related to the revised Hazard Communication

Standard can be found on OSHA's Hazard Communication Safety and Health Topics page, located at:
<http://www.osha.gov/dsg/hazcom/index.html>.

Disclaimer: This brief provides a general overview of the safety data sheet requirements in the Hazard Communication Standard (see 29 CFR 1910.1200(g) and Appendix D of 29 CFR 1910.1200). It does not alter or determine compliance responsibilities in the standard or the Occupational Safety and Health Act of 1970. Since interpretations and enforcement policy may change over time, the reader should consult current OSHA interpretations and decisions by the Occupational Safety and Health Review Commission and the courts for additional guidance on OSHA compliance requirements. Please note that states with OSHA-approved state plans may have additional requirements for chemical safety data sheets, outside of those outlined above. For more information on those standards, please visit:
<http://www.osha.gov/dcsp/osp/statestandards.html>.

This is one in a series of informational briefs highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



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E-Commerce Companies

What is e-commerce?

E-commerce allows consumers to electronically exchange goods and services with no barriers of time or distance. Electronic commerce has expanded rapidly over the past five years and is predicted to continue at this rate, or even accelerate.

It covers a range of different types of businesses, from consumer-based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations.

Electronic commerce has also led to the development of electronic marketplaces where suppliers and potential customers are brought together to conduct mutually beneficial trade.

Logistics is being impacted by e-commerce, particularly by its business to consumer segment. The emergence of e-commerce has changed the relationship between customers and retailers (e-retailers). The consequences of e-commerce on logistics are little understood, but some trends can be identified. As e-commerce becomes more common, it is changing physical distribution systems.

What is E-Commerce?: A Comprehensive Introduction

Liz Masoner, Forbes

November 13, 2024

<https://www.forbes.com/advisor/business/what-is-ecommerce/>

Most of us have bought something online, but how far does e-commerce reach? E-commerce covers all transactions enabled by electronic communication. From individuals buying a treadmill on Facebook Marketplace to huge online stores such as Amazon, e-commerce is as diverse as the people behind it and has the power to level the playing field for businesses of all sizes.

We'll walk you through the details of what is e-commerce, e-commerce pros and cons, how e-commerce works, what selling platforms are available, types of e-commerce, what is sold with e-commerce and how products get to the customer after a purchase.

E-Commerce Definition

The simple answer is that e-commerce is buying and selling online. E-commerce is a short form of the phrase electronic commerce. There's more to it, though. From Amazon to your favorite local soap maker on Facebook to wholesale industrial parts manufacturers, e-commerce takes a lot of forms.

E-commerce takes place through brand websites, apps, email ordering, social media and marketplaces. Just like traditional on-site businesses where no one building type fits every business, no single e-commerce style works for all. The goal is to match your e-commerce outlet to the needs of your customers and company.

Unlike traditional on-site businesses, e-commerce removes many barriers to entry for small to medium businesses (SMBs), and even kitchen table entrepreneurs can reach global markets.

Pros and Cons of E-Commerce

There's no magical formula for selling. Traditional site-based sales, catalog sales and e-commerce all have good and bad points. That said, with the International Trade Administration projecting e-commerce to reach \$5.5 trillion by 2027, e-commerce isn't a sales avenue that can be ignored regardless of potential downsides.

When I'm asked by an existing business if e-commerce is worth it, I always point out that they are already competing with online sales whether they offer e-commerce or not. Every seller, even physical storefronts without an online presence, now has to compete with global online retailers. Customers will often visit physical stores to see products in person and then search for options online with better prices, home delivery or even just a different color.

E-Commerce Pros

- Lower cost of entry

- E-commerce stores can be opened more quickly than on-site stores

- Depending on location, fewer permits are needed for e-commerce

- Lower overhead than traditional on-site commerce since no physical storefront is required, although you may still need an office and inventory storage

- Scalability

- Wider audience reach—location, location, location is traded for SERPs, SERPs, SERPs

- Lower advertising costs and more DIY advertising options, thanks to social media ads, influencer marketing, email marketing, Google Ads and electronic self-serve billboards

- Open 24/7 without additional staffing

- Enhanced data and analytics gathering

- Personalized shopping suggestions for each customer

- It's easier for new and small businesses to become established and trustworthy on a budget

E-Commerce Cons

- Limited connection to customers

Customer service personnel are needed to help bridge the communications gap for online sales

Cybersecurity threats

Regulatory compliance can be difficult with data privacy, consumer protection and cybersecurity rules such as PCI-DSS payment security on top of business regulations

Sales tax is more complex, as you must track tax rates and rules for multiple locations

Inventory tracking and management to prevent overselling can be complex when selling through multiple channels

Extra tools that integrate inventory management with your online store become necessary (and with those tools come compatibility concerns and additional costs)

Shipping or delivery adds another layer of complexity to sales

Shipping, and other unexpected costs, are a top reason shoppers don't complete purchases

Return management increases costs, especially since returns are more frequent when customers can't physically examine products before purchasing and, when it comes to clothing or shoes, buy multiple sizes at a time

It's also important to note that returns are especially problematic for clothing sellers due to size bracketing. That is, ordering three or more sizes with the intention of returning all but the one that fits the best. I find that since customers usually don't have to interact with anyone when making e-commerce returns, they are less nervous about size bracketing instead of checking size charts before ordering.

How E-Commerce Works

E-commerce uses the internet to connect buyers and sellers, but that's where the similarities between online stores end.

Just like there are different types of brick-and-mortar stores, such as drive-throughs, wholesale distributors, large department stores and showrooms for custom-made products, there are different types of e-commerce stores.

Likewise, companies may sell to end users, wholesale to other companies or even to governments. There are also different product categories, so classifying e-commerce often winds up being a bit like ordering in a build-a-meal-style restaurant where you pick one from column A, column B and column C.

E-commerce businesses need to choose a sales channel, who to sell to, a product type and how to get orders to customers.

E-Commerce Channels

E-commerce channels are the actual methods used to connect the buyer and seller. These channels are where customers view the products available for sale and place orders.

Most businesses eventually wind up with a combination of channels, although I always advise starting with only one or two channels and slowly adding more channels later due to inventory complexity.

The most common e-commerce channels include marketplaces, e-commerce websites and apps, to name a few.

Marketplaces

Marketplaces are group selling portals where individuals and small businesses can list items for sale individually or set up small storefronts. Examples include Airbnb, eBay and third-party seller listings on Amazon and Walmart.

E-Commerce Websites

For most businesses, even if they sell through multiple channels, a stand-alone e-commerce website is the primary online store. Rather than programming stores from scratch, most businesses choose a ready-made e-commerce platform that already has built-in features including shopping carts, secure checkout, integrations with payment processors and templates for product catalogs.

Most of the top e-commerce platforms, such as Shopify, are all-in-one services that include hosting and a storefront maker. For brick-and-mortar stores expanding into online selling, e-commerce platforms, such as Square, that offer physical point of sale (POS) and online selling in one package are generally optimal.

Apps

More than just optimized for mobile, e-commerce apps are purely designed for mobile and are almost always distributed through the Google Play store and Apple's App Store. Although there are e-commerce app maker services available, their initial costs often start around \$500 and are outside the budget of many small businesses.

Email Ordering

While most e-commerce is completed through ordering portals, there is still a segment that often uses email ordering. Large wholesale orders, especially for industrial and construction supplies, are sometimes compiled on spreadsheets and emailed to order due to how unwieldy a shopping cart would become.

Social Media

Social media facilitates e-commerce in several ways. There are social media marketplaces, such as Facebook Marketplace, and individual account shops driving traffic to stand-alone e-commerce sites (often with affiliate codes in the links).

Many small businesses start out with individual account shops because their only online presence is on social media and there is little to no upfront cost involved in setting up an integrated e-commerce store this way.

3 Types of E-Commerce Business

Business to

Business to Business
B2B

Business to Consumer
B2C

Business to Government
B2G

Government to

Government to Business
G2B

Government to Consumer
G2C

Government to Government
G2G

Consumer to

Consumer to Business
C2B

Consumer to Consumer
C2C

Consumer to Government
C2G

Classified by who is selling to whom, e-commerce types can easily start to look like alphabet soup. However, there is a method to the madness, and each type is shortened to a three-character acronym.

“Business To” Categories

“Business to” types are where the primary e-commerce seller is a business.

B2B. Business-to-business e-commerce is where companies sell to other companies such as a building supply manufacturer selling roofing supplies to a distributor.

B2C. Business-to-consumer e-commerce is what most people think of when they hear e-commerce. Online retail sales for anything from original art to groceries fall into this type.

B2G. Business-to-government e-commerce is when private companies sell to government entities such as building contractors

“Consumer To” Categories

While often facilitated by businesses, “consumer to” e-commerce categories are when an individual is the seller or otherwise providing something of value to another entity.

C2B. Examples of consumer-to-business e-commerce include freelance web designers, consumers writing reviews, affiliate marketers and social media influencers promoting a product.

C2C. Consumer-to-consumer e-commerce mostly consists of facilitated transactions. That is, a business such as Airbnb acts as an intermediary for consumers to sell or rent something to another individual. Other examples include eBay, Poshmark and Facebook Marketplace.

C2G. Consumer-to-government (or citizen-to-government) e-commerce mostly involves citizens providing value to the government versus actually selling anything. Public input on upcoming policy changes or electronic voting could be considered C2G.

“Government To” Categories

“Government to” types are where the primary e-commerce seller is a local, state or federal government. While not a form your small business will take unless you’ve won the lottery and bought a sovereign island, this “government to” e-commerce is growing and it’s good to understand how it fits into the overall picture.

G2B. Government-to-business e-commerce includes government websites that allow businesses to apply for business permits, pay taxes and access public records.

G2C. Government-to-consumer (or government-to-citizen) e-commerce includes government portals where citizens can pay taxes and visitors can apply for visas.

G2G. Government-to-government e-commerce includes commerce between government agencies or different levels of government, such as one agency purchasing equipment from another, but is more often simply electronic information exchanges.

E-Commerce Product Types

The type of product sold can profoundly impact how e-commerce works. For example, while physical retail products simply need to be paid for and shipped, wholesale e-commerce

products mean sellers must also deal with site access controls, custom pricing and tracking wholesale tax certificates.

When you are researching the best e-commerce business ideas, it's important to keep the requirements of each product in mind.

Physical Products

Physical products make up the bulk of e-commerce. From cars to sublimated tumblers to landscape rock sold by the ton, there is a huge variety of items that fall into this product type, and they fall into one of two categories: retail and wholesale.

Retail covers items sold to anyone who wants to purchase, regardless of sales tax status. Wholesale products are generally sold B2B, where the buyer has a sales tax exemption and buys in larger quantities.

Private Labeling

Private-label products are usually physical products, but they are often broken out because they are a sort of hybrid between reselling something you bought and selling your own brand. Private-label products are made by another supplier but labeled with your branding.

Store-brand canned foods and Amazon Basics products are common examples of private labeling. The most common private-label e-commerce products from small businesses are coffee, cosmetics and clothing.

Digital Downloads

Digital downloads are products delivered in digital formats. Music and movie downloads, PDF sewing patterns, tutorials and e-books are digital download examples. Unlike physical products, digital downloads are susceptible to copying, sellers should invest in rights management or non-duplication security software.

However, even with that extra cost, digital downloads are often cost-effective, as there is no physical inventory to manage when selling digital products.

Streaming

Similar to digital downloads, streaming products are digital products consumed directly from the internet in real time instead of downloaded onto a personal device. Netflix and YouTube are two popular streaming service examples.

Services and Events

Selling services using e-commerce can sometimes become a hybrid between e-commerce and physical POS. Services such as home inspections, hair salon appointments and restaurant reservations are often set online, but payment is collected in person at the time of service.

This is a great entry into e-commerce for traditional companies, as it gives customers the convenience of seeing schedules and setting appointments without having to take time out of their day for a phone call.

Some services and events, such as photography sessions or workshops, may require payment or a deposit to be paid online. Still, other services such as online banking are conveniences that collect set fees automatically.

Rentals

Hotels, Airbnb and Vrbo are popular examples of rental e-commerce, but companies also rent cars, RVs, ice shacks and even puppies. Rental e-commerce is one of the more complex e-commerce products because of the sheer number of moving parts to set up the booking system.

Subscriptions

E-commerce subscriptions are automatically recurring purchases of any other category. For example, Hulu, Peloton or your weekly ready-to-make meal delivery. For small businesses,

popular subscription products include themed boxes such as snack samplers, coffee, tea and craft-of-the-month tutorials.

E-Commerce Order Fulfillment Models

After navigating all the setup and planning, I often see new e-commerce businesses caught unprepared for the work after the purchase. Unlike traditional commerce, where a customer has the product in hand at the time of purchase, e-commerce businesses have to figure out how to get the product to the customer's location.

Self-Fulfillment

If you are shipping or delivering items yourself after receiving an order, you're following the self-fulfillment model. In this type of order fulfillment, the seller carries inventory and packs and ships it once a customer places an order. You can store inventory in your own facility or rent storage space.

For digital products, there isn't a physical product to ship, but sellers will still need to have a download delivery system in place. Some simply email the file to customers and others use download management software. I often recommend new sellers look at marketplaces such as Etsy that have built-in download management.

In-Store Fulfillment

A subtype of self-fulfillment, in-store fulfillment allows traditional on-site retailers that already have multiple locations to expand their distribution networks without the cost of additional stand-alone distribution centers. In-store fulfillment routes orders to the closest existing location that has a product in stock, and the store ships it to the customer.

Buy Online, Pick Up In Store (BOPIS)

For businesses with a physical location, BOPIS allows customers to place orders and then pick up the packaged orders at a later time at their convenience. Additional staffing needs are minimal, and many retailers use existing staff to pull and prepare orders for pickup.

“Buy online, pick up in store” is the e-commerce equivalent of someone calling and asking if you can hold an item until they get off of work and getting paid for the item upfront.

Dropshipping

In dropshipping, the seller never touches the product and holds no inventory. When a customer places an order, the online store owner places an order with their supplier and has it shipped directly to the end customer. Print-on-demand products such as shirts are common in this e-commerce fulfillment model.

Fulfillment by Marketplace

While selling through a marketplace channel such as Amazon or Walmart helps you quickly gain credibility with customers, it can create concerns about shipping speed. If there are any delays with your notifications of sales or if the order is from a location you don't normally ship to, you may incur extra costs or the package might arrive late.

Fulfillment by marketplace takes advantage of programs such as Fulfillment by Amazon (FBA) from larger retailers that allow you to ship your products to a marketplace warehouse in bulk and then the marketplace ships items to customers as they are ordered.

Third-Party Logistics (3PL)

Rather than maintaining a warehouse facility or hiring staff to handle shipping, many e-commerce businesses opt to hire a third-party logistics company. These companies handle warehousing, shipping and receiving for you.

Third-Party Delivery

Third-party delivery is similar to 3PL, but those services don't handle warehousing or any inventory management for you. Third-party delivery services allow brick-and-mortar

businesses to sell online without handling the delivery part of the equation, or in some cases, the order picking and packing.

DoorDash, Shipt and Instacart are examples of third-party delivery. These services can work using direct order with the store or with a delivery app that acts as a go-between for the customer and the original business. These are most popular for food, grocery and convenience items from drugstores.

Bottom Line

E-commerce offers businesses and individuals a low-cost entry into a global market with the freedom to start small and scale easily as their resources and needs grow. Understanding what e-commerce is and the options available are the first step in creating a successful e-commerce strategy and starting your online store.

E-commerce Defined: Types, History, and Examples

By Andrew Bloomenthal, Investopedia

Updated September 24, 2024

<https://www.investopedia.com/terms/e/ecommerce.asp#:~:text=AdvantagesE-commerce>

What Is Electronic Commerce (E-commerce)?

Electronic commerce, or e-commerce, is the buying and selling of goods and services over the internet. E-commerce can be conducted on computers, tablets, smartphones, and other smart devices. Nearly every imaginable product and service is now available through e-commerce, and it has upended how many companies and entire industries do business.

Understanding E-commerce

As noted above, e-commerce is the process of buying and selling products and services online. But it involves more than simply a buyer and a seller, relying on a vast, often invisible, infrastructure to keep it running.

E-commerce has helped companies (especially those with a narrow reach, like small, local businesses) gain access to a wider market by providing cheaper and more efficient sales and distribution channels for their products or services.

While some businesses exist entirely online, others straddle the real and virtual worlds. Target (TGT), for example, is one of many giant retailers that has supplemented its brick-and-mortar presence with an online store that allows customers to purchase everything from clothes and coffeemakers to toothpaste and action figures without leaving their homes.

At the other end of the scale spectrum, individual sellers increasingly engage in e-commerce transactions via their own personal websites. And digital marketplaces like eBay and Etsy serve as exchanges where multitudes of buyers and sellers can come together and do business.

History of E-commerce

Most of us have shopped online for something at some point, which means we've taken part in e-commerce. So it goes without saying that e-commerce is everywhere. But very few people may know that e-commerce has a history that predates the internet.

E-commerce actually goes back to the 1960s, when companies used an electronic system called the Electronic Data Interchange to facilitate the transfer of documents. It wasn't until 1994 that the very first transaction took place. This involved the sale of a CD between friends through an online retail website called NetMarket.

The industry has evolved rapidly since then, with companies like Alibaba and Amazon becoming household names around the world. The introduction of free shipping, which, at least on the surface, reduces costs for consumers, has also helped increase the popularity of the e-commerce industry.

Advantages and Disadvantages of E-commerce

Advantages

E-commerce offers buyers and sellers a number of advantages:

- **Convenience:** E-commerce can happen 24 hours a day, seven days a week. Consumers can buy at their convenience, and business owners can make sales while they sleep.
- **Increased selection:** Many stores offer a wider array of products online than they could ever carry in their brick-and-mortar counterparts. And many stores that solely exist online offer consumers exclusive inventory that is unavailable elsewhere.
- **Potentially lower start-up costs:** E-commerce companies may require a warehouse or manufacturing site, but they usually don't need a physical storefront. The cost to operate digitally is often less expensive than needing to pay rent, insurance, building maintenance, and property taxes.
- **International sales:** As long as an e-commerce store can find a way to ship its products to its customers, it can sell to anyone in the world and isn't limited by physical geography.
- **Opportunity to collect valuable data:** Willingly or unknowingly, consumers share a lot of information on their interests and shopping habits when they buy or even just browse online. Site owners can monetize this data in a number of ways, using it themselves and selling it to others.

Disadvantages

There are also some drawbacks that come with e-commerce. Those can include:

- **Limited customer service:** If you shop online for a computer, you cannot simply ask an employee to demonstrate a particular model's features in person. And although some websites let you chat online with a staff member, that is not a typical practice. A disadvantage for shoppers, this can also be a money-saver for retailers.
- **Lack of instant gratification:** When you buy an item online, you must wait for it to be shipped to your home or office. However, e-tailers like Amazon now make the waiting game a little bit less painful by offering same-day delivery as a premium option for select products.
- **Inability to touch products:** Online images do not necessarily convey the whole story about an item, and e-commerce purchases can be disappointing when the items don't

live up to the buyer's expectations. Case in point: an item of clothing may be made from shoddier fabric than its online image indicates.

- **Dependence on technology:** If a website crashes or must be temporarily taken down for any reason, the business is effectively closed until things return to normal.
- **Greater competition:** Although the low cost of starting an e-commerce business can be an advantage, it also means competitors can just as easily enter the market.

Pros

- Convenient for consumers, often with greater selection
- Potentially low start-up costs for operators
- Broadens reach of businesses to anywhere they can ship their products.
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Cons

- Limited customer service or assistance
- Products can't be touched
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- Technological glitches can shut down the business
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B2C e-commerce companies sell directly to the product's end-user instead of distributing goods through an intermediary such as another retailer. This type of business model may be used to sell products (like your local sporting goods store's website) or services (such as a lawn care mobile app to reserve landscaping services). This is the most common business model and the concept most people likely think about when they hear the term e-commerce.

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Similar to B2C, an e-commerce business can sell goods to another company. B2B transactions often entail larger quantities, more detailed specifications, and longer lead times. The buyer can also arrange for recurring orders if the purchase is for ongoing manufacturing processes.

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dropshipper. This supplier manages inventory, oversees the warehousing of goods, packages the orders, and delivers the product to the purchaser.

White Labeling

In white-label e-commerce, the seller doesn't manufacture the product but buys an existing product from the manufacturer or another supplier and repackages it under its own brand for resale to the ultimate consumer.

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Similar to white labeling, private labeling involves selling a product made by another manufacturer. In private labeling however, the seller may have more control over the actual product, such as having it made to particular specifications. Store brands are an example of private labeling.

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Wholesalers serve the buyers of large numbers of a particular item or many smaller buyers of that item. A more capital-intensive approach to e-commerce, wholesaling can entail maintaining and warehousing significant quantities of inventory.

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E-commerce companies can also leverage repeat orders or loyal customers by implementing subscription services. The consumer places an order once and receives their goods at a fixed cadence, such as every month. Common subscription e-commerce products include meal prep services, pet food, fashion boxes, and health and grooming products.

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Dollar Shave Club offers customers personal grooming, health, and beauty products on a subscription basis. Customers can begin with an inexpensive starter kit and receive new shaver blades and other supplies each month.

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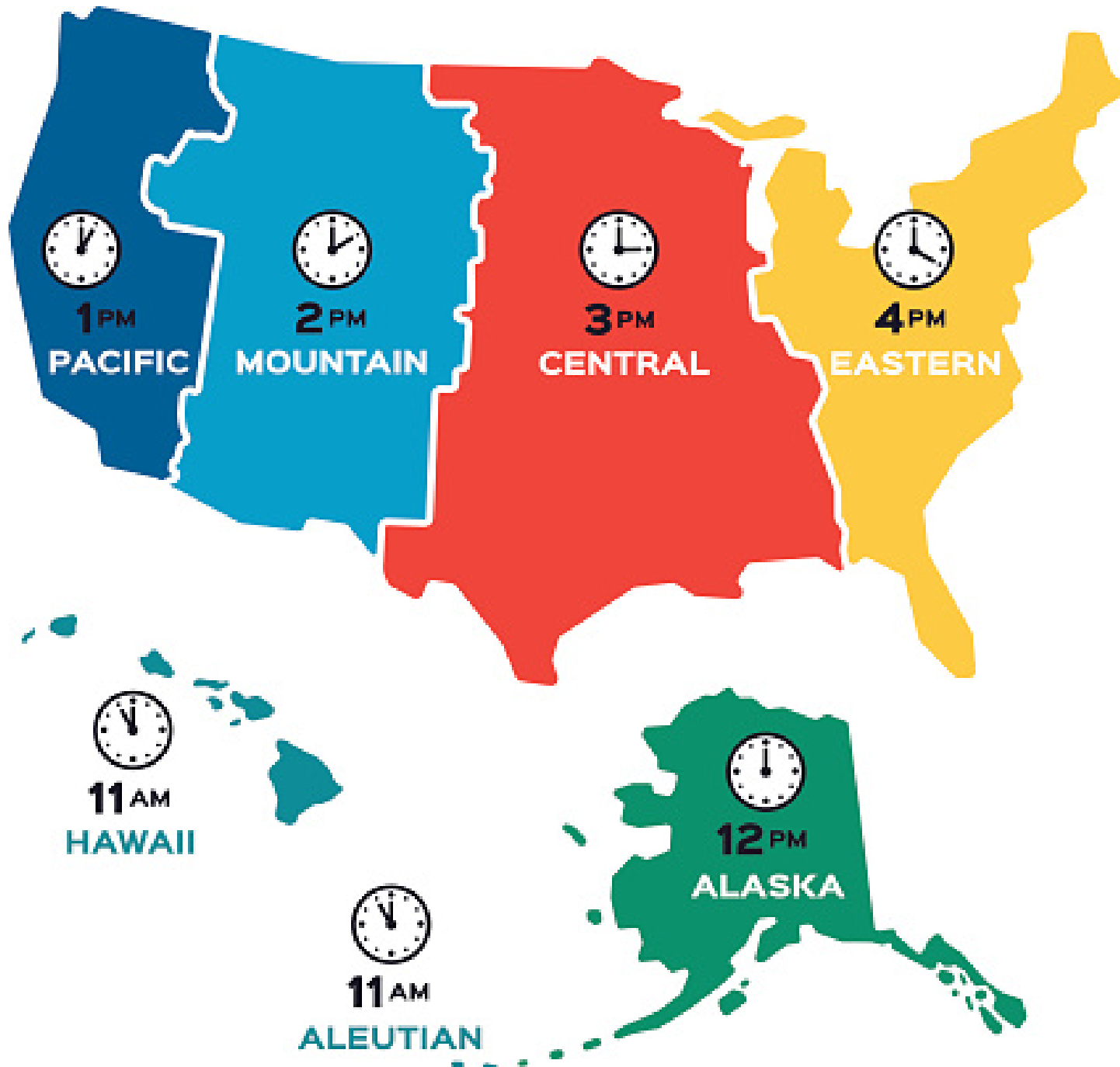
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Outcome #2 - Activity 2



KWL Chart

Name _____

What I K now:	What I W ant to Know: or What I W onder:	What I Have L earned:

Understanding Green Transportation and Its Significance

By [Rakesh Patel](#)

October 15, 2024

<https://www.upperinc.com/guides/green-transportation/>

As businesses digitize and expand their reach across geographies, logistics management has expanded its network to reach the last mile of the supply chain.

Transportation is the wheel that propels this machine.

However, according to the Environmental Protection Agency, road transport is the major contributor to global warming and accounts for about 28% of annual greenhouse gas emissions in the United States.

According to the CDP, companies will lose \$120 billion by 2026 due to supply chain disruptions caused by environmental risks.

So, if you want to compete in a changing market, sustainability is critical, and **green transportation** is one way to reduce environmental impact.

Green transportation can save you thousands of dollars as they work on renewable resources like electricity, which are way cheaper than gasoline.

In this article, we'll discuss in detail the different modes of green transportation and how you can use them in your business.

What is Green Transportation?

Green transportation encompasses all environmentally friendly modes of transportation.

Green transportation refers to a company's practices to ensure that its vehicles and other modes of transportation are environmentally friendly.

Amazon recently made a significant contribution to green transportation by implementing electric vehicles as part of its effort to achieve carbon neutrality. Another example of green transportation is reduced mileage between stops for drivers on multiple routes.

Green transportation may differ slightly from one business to the next. A floral business, for example, may scale its delivery operations to account for seasonal fluctuations, whereas a plumbing business may use schedule optimization to increase efficiency. However, at its core, green transportation assists businesses in becoming more sustainable.

The Significance of Green Transportation

Although initially expensive, businesses that invest in green transportation technologies will save money in the long run. Green vehicle conversion can save up to \$750 in fuel costs for every 15,000 miles driven.

Electric vehicle owners also benefit from lower maintenance costs. These long-term savings multiply exponentially for businesses that manage large fleets with high fuel and maintenance costs.

Businesses that go green will benefit financially from shareholder investments and investing in sustainable transportation technologies as sustainable investing becomes more popular.

Depending on your company's green transportation initiatives, tax credits such as the Alternative Fuel Vehicle Refueling Property Credit may be available.

Going green will increase the efficiency and productivity of your business. Route optimization and other green transportation strategies benefit the environment and your bottom line.

Modes of Green Transportation

The existing modes of transportation use fossil fuel, oil, and gas to power vehicles, leading to pollution and various human health problems.

Promising innovative technologies may be the ultimate solution, but we can play an important role by utilizing eco-friendly modes of transportation that are currently available. Let's look at some of the green transportation options available today.

For delivery industry

1. Bicycle



Bicycles may not be the best option for all products, but they may be ideal for delivering letters and newspapers across the neighborhood. There is no gas, no pollution, and the delivery person even gets a workout.

2. Electric bikes

Electric bikes are excellent green modes of transportation because they do not release harmful emissions like carbon dioxide and carbon monoxide. Only light peddling is required with an electric bike. However, the speed of electric bikes is strictly regulated by law. Electric bikes are a great option for delivering in downtown cities like New York.

3. Electric vehicles

Electric cars and trucks offer significant cost savings for businesses, particularly fleet vehicles that travel up to 100 miles per day on a regular basis. Although electric

vehicles are expensive to purchase, they have significantly lower operating costs than gasoline or diesel equivalents.

This makes widespread ownership more practical, reducing pollution, and saving you money.

4. Hybrid vehicles

Hybrid vehicles draw power using an internal combustion engine and one or more electric motors, which use energy stored in batteries. The hybrid car's battery cannot be charged by plugging it in. Instead, the internal combustion engine and regenerative braking charge the battery.

Greenhouse emissions from hybrid cars are extremely low; emissions can range from being 26% to 90% lower than emissions from standard vehicles. These vehicles provide a great mileage and can be beneficial for your business.

For personal use

1. Green trains



With most governments across the world now more committed than ever to supporting green transportation, trains are becoming more environmentally friendly, with hybrid locomotives and other innovative green technologies.

Modern electric trains use electrified third rail, overhead lines, or energy storage devices such as fuel cells and batteries. The advantage of these electric trains is that they can reach speeds of more than 200 mph while remaining incredibly safe.

2. Carpooling

If you and others are going to the same location, you can share the ride . It reduces the number of cars running on the road significantly, lowering harmful emissions and traffic. Some states, such as Arizona, have made this practice a part of their laws and regulations. There are special lanes designated for carpooling. Carshare apps like Uber are also adopting them.

3. Public transport

Generally, public transportation follows the same model as carpooling. Many countries are focusing on developing public transportation such as electric buses or metro in the cities to fight congestion and pollution.

The vast majority of people in urban areas prefer public transportation as the cities have fewer parking lots; on the other hand, the public commute can save time and money.

4. Walking



Walking contributes to zero emission of any greenhouse gas. You can save money by walking to your local destinations. It helps clear your mind and does not require any

planning. If you require additional support, purchase stable walking shoes and shoe inserts. Get your legs moving with family, friends, or solo stroll to help the environment.

Benefits of Sustainable Transportation

Green transportation and supply chain management requires a holistic approach characterized by environmentally friendly and socially responsible methods that address environmental, economic, and social issues. Not only will it benefit people and the environment, but it will also benefit your company.

1. Promotes health



Energy sources derived from fossil fuels such as natural gas, coal, and oil emit toxic gases leading to an increase in cancer and other cardiovascular diseases.

Sustainable transportation promotes community health by lowering emissions and air pollution. If more people used public transportation or green vehicles to commute, pollution levels would plummet, allowing people to breathe easier and live longer.

2. Contribution to sustainable economy

Investing in sustainable transportation plays a significant role in creating new jobs.

Building infrastructure to support public transportation, developing greener alternatives

to diesel-fueled vehicles, and staffing these new modes of transportation will generate more jobs in the transport sector.

3. Cost savings



Using green transportation modes such as bicycles, multiple-occupant cars, and electric motorcycles will save you a lot of money on out-of-pocket expenses associated with purchasing gas at the pump.

4. Customer loyalty

As customers are becoming more aware of global warming, there is an increase in customer demand for environmentally friendly products and services. Customers also expect corporations to actively work to reduce their carbon footprint due to the environmental impact of large businesses.

As a result, they prefer environmentally friendly businesses to those that do nothing to combat climate change.

5. Time savings

Route optimization software helps you become more environmentally conscious by streamlining your workflows and automatically identifying ways to reduce your

environmental impact. ESG-driven systems, for example, track your company's performance based on social and environmental factors to determine how green it is. Other tools, such as Upper Routing Planner, optimize the distance for you, saving time and fuel.

FAQs

What is NMT?

Non-motorized Transportation or NMT contains all forms of travel that do not rely on an engine or motor for movement. NMT includes bicycling, walking, and small-wheeled transport like skates, skateboards, push scooters, and hand carts.

Which are the best environmental transportation systems?

It should be no surprise that bicycles and walking are the most environmentally friendly modes of transportation. They not only produce zero emissions but are also enjoyable and healthy.

What role do green vehicles play in promoting sustainable transportation?

Green vehicles reduce environmental pollution and greenhouse emissions while contributing to energy independence by reducing oil imports as part of their contribution to an eco-friendly environment. They are energy efficient and do not have a negative impact on the environment.

What is the significance of promoting green transportation?

Green transportation is crucial for addressing air pollution and protecting our planet for future generations. It puts less pressure on reliance on finite fossil fuels, which contribute to global pollution.

What are greenhouse gases?

Greenhouse gases are atmospheric gases that affect the earth's energy balance. They are responsible for the so-called greenhouse effect. Carbon dioxide (CO₂), methane, and nitrous oxide, the most well-known greenhouse gases, are naturally present in low concentrations in the atmosphere. However, due to various man-made sources, the proportion has increased significantly since the turn of the century.

What are the positives and negatives of using green transportation?

Pros

Green transportation reduces carbon emissions and air pollution in businesses by reducing the use of fossil fuels. This not only makes your company more appealing to customers, but it can also reduce the overall cost of running a business by lowering fuel costs through reduced mileage, as well as tax breaks for using green technologies and other government incentives.

Cons

There may be some downsides depending on how you handle green transportation at your company. Green vehicles, for example, may have limited mileage. This may necessitate shortening your routes in order for your vehicles to return to base for recharging. Also, green technology is an expensive upfront investment and may not be a viable option for small businesses with limited budgets.

Conclusion

Eco-friendly methods will become an increasingly important topic as fuel prices rise and consumers emphasize combating global warming. Businesses can cut emissions by investing in all-electric vehicles, particularly road transportation, which accounts for a significant portion of global warming.

Although replacing an entire fleet requires significant investment, you can replace older vehicles with fuel-efficient ones and integrate route planning and route scheduling tools that will save fuel and greenhouse gas emissions from your vehicles.

Following Directions Activity

This quiz is to test your skill in reading and following directions. It should take you 2 minutes to complete.

Directions:

1. Read everything through carefully on this page before you do anything.
2. Print your name in the upper left-hand corner of this page.
3. Write the date below your name in the upper left-hand corner.
4. Circle the number "4" at the beginning of this sentence.
5. After the date written just below your name, write your birth date.
6. Draw a line through this sentence.
7. Put an "X" in the upper right-hand corner of this page.
8. Punch a hole with your pencil through the number "8" at the beginning of this sentence.
9. Draw a big smiley face in the middle of this paper.
10. Now that you have read everything through carefully, do only items 1 and 2.



U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

DOT CHART 15

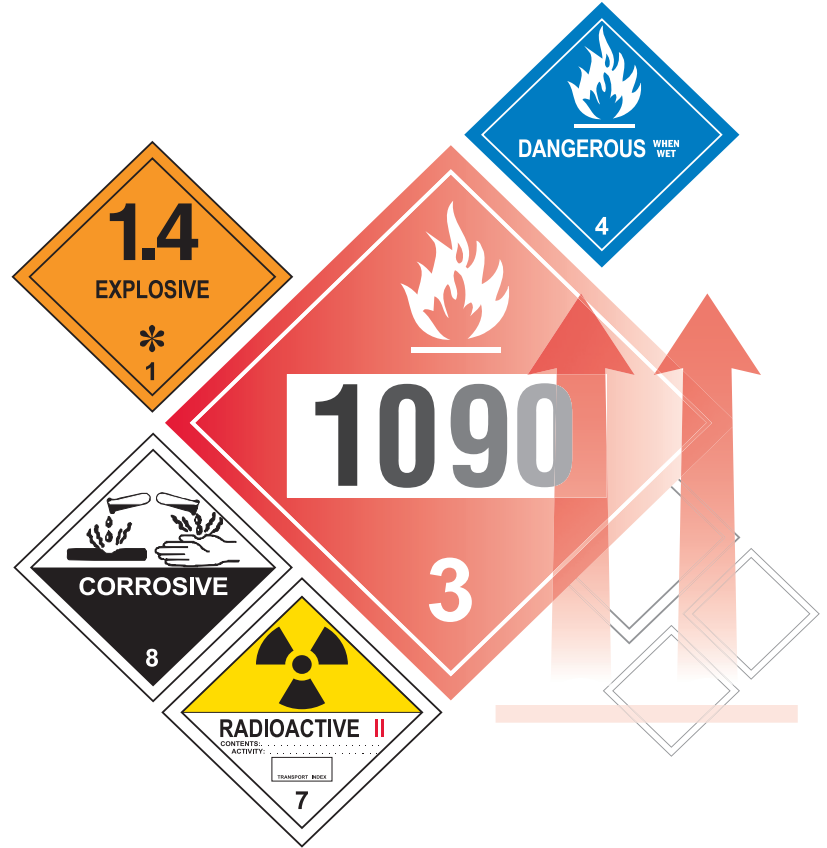
Hazardous Materials Markings, Labeling and Placarding Guide

Refer to 49 CFR, Part 172:

Marking - Subpart D







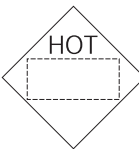
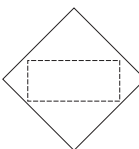

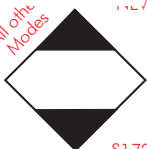






Labeling - Subpart E

Placarding - Subpart F



NOTE: This document is for general guidance only and should not be used to determine compliance with 49 CFR, Parts 100-185.

HAZARDOUS MATERIALS MARKINGS

<p>Package Orientation (Red or Black)</p>  <p>or</p>  <p>§172.312(a)</p>	<p>Keep Away from Heat</p>  <p>§172.317</p>	<p>OVERPACK</p>  <p>§173.25(a)(4)</p>	<p>Fumigant Marking (Red or Black)</p>  <p>§172.302(g) and §173.9</p>	<p>INHALATION HAZARD</p>  <p>§172.313(a)</p>	<p>HOT</p>  <p>§172.325</p>	<p>Marking of IBCs</p>  <p>§172.332(a)</p>	<p>Biological Substances, Category B</p>  <p>§173.199 (a)(5)</p>
<p>All other Modes</p>  <p>§172.315</p>	<p>Air Only</p>  <p>§172.316</p>	<p>ORM-D, Transition December 31, 2020</p>  <p>§172.316</p>	<p>UN1755</p>  <p>§172.316</p>	<p>Excepted Quantity</p>  <p>§173.4a(g)</p>	<p>Marking of IBCs</p>  <p>§178.703(b)(7)(i)</p>	<p>Marine Pollutant</p>  <p>§172.322</p>	

* The new limited quantity marking designates hazardous material packages prepared for air transport (Y) and packages not prepared for air transport (all other modes). The ORM-D classification and the use of packagings marked "Consumer commodity, ORM-D" is authorized until December 31, 2020, for domestic highway, rail, and vessel transportation. Transitional exception—Square-on-point with Identification Number: except for transportation by aircraft and until December 31, 2014, a package containing a limited quantity may be marked with identification number, preceded by the letters "UN" or "NA".

Hazardous Materials Warning Labels

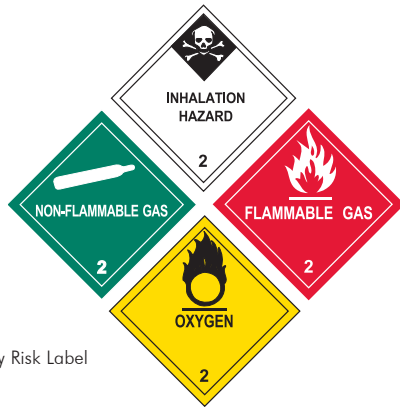
Actual label size: at least 100 mm (3.9 inches) on all sides

CLASS 1 Explosives: Divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



§172.411

CLASS 2 Gases: Divisions 2.1, 2.2, 2.3



§172.405(b), §172.415, §172.416, §172.417

CLASS 3 Flammable Liquid



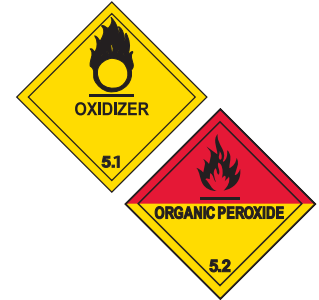
§172.419

CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet: Divisions 4.1, 4.2, 4.3



§172.420, §172.422, §172.423

CLASS 5 Oxidizer, Organic Peroxide: Divisions 5.1 and 5.2



§172.426, §172.427

* Include compatibility group letter.

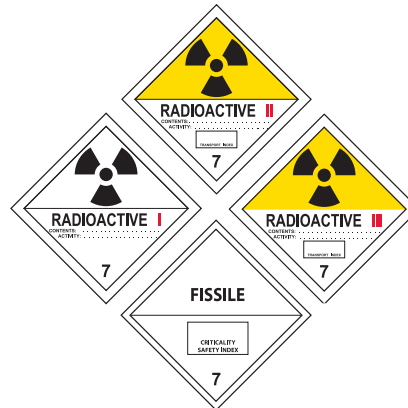
** Include division number and compatibility group letter.

CLASS 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance: Divisions 6.1 and 6.2



§172.323, §172.405(c), §172.429, §172.430, §172.432

CLASS 7 Radioactive



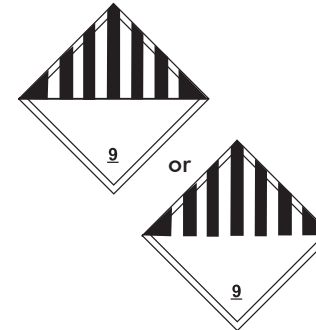
§172.436, §172.438, §172.440, §172.441

CLASS 8 Corrosive



§172.442

CLASS 9 Miscellaneous Hazardous Material



§172.446

Cargo Aircraft Only



§172.448

Empty Label



§172.450

For Regulated Medical Waste (RMW), an Infectious Substance label is not required on an outer packaging if the OSHA Biohazard marking is used as prescribed in 29 CFR 1910.1030(g). A bulk package of RMW must display a BIOHAZARD marking.

Hazardous Materials Warning Placards

Actual placard size: at least 250 mm (9.84 inches) on all sides

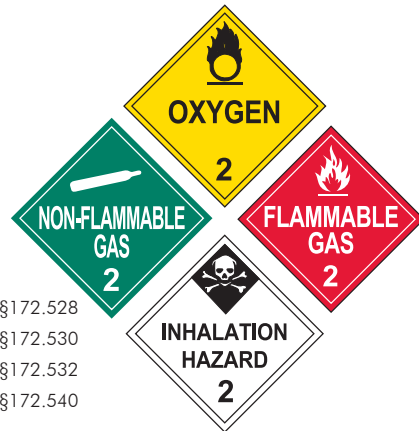
CLASS 1 Explosives



§172.522
§172.523
§172.524
§172.525

* For Divisions 1.1, 1.2, or 1.3, enter division number and compatibility group letter, when required; placard any quantity. For Divisions 1.4, 1.5, and 1.6, enter compatibility group letter, when required; placard 454 kg (1,001 lbs) or more.

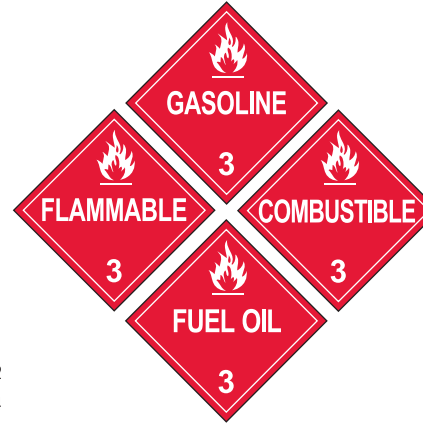
CLASS 2 Gases



§172.528
§172.530
§172.532
§172.540

For NON-FLAMMABLE GAS, OXYGEN (compressed gas or refrigerated liquid), and FLAMMABLE GAS, placard 454 kg (1,001 lbs) or more gross weight. For POISON GAS (Division 2.3), placard any quantity.

CLASS 3 Flammable Liquid and Combustible Liquid



§172.542
§172.544

For FLAMMABLE, placard 454 kg (1,001 lbs) or more. GASOLINE may be used in place of FLAMMABLE placard displayed on a cargo tank or portable tank transporting gasoline by highway. Placard combustible liquid transported in bulk. See §172.504(f)(2) for use of FLAMMABLE placard in place of COMBUSTIBLE. FUEL OIL may be used in place of COMBUSTIBLE on a cargo or portable tank transporting fuel oil not classed as a flammable liquid by highway.

CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet



§172.546, §172.547, §172.548

For FLAMMABLE SOLID and SPONTANEOUSLY COMBUSTIBLE, placard 454 kg (1,001 lbs) or more. For DANGEROUS WHEN WET (Division 4.3), placard any quantity.

CLASS 5 Oxidizer & Organic Peroxide



Organic Peroxide, Transition-2011 (rail, vessel, and aircraft) 2014 (highway)

§172.550, §172.552

For OXIDIZER and ORGANIC PEROXIDE (other than TYPE B, temperature controlled), placard 454 kg (1,001 lbs) or more. For ORGANIC PEROXIDE (Division 5.2), Type B, temperature controlled, placard any quantity.

CLASS 6 Poison (Toxic) and Poison Inhalation Hazard



§172.504(f)(10), §172.554, §172.555

For POISON (PGI) or PGII, (other than inhalation hazard) and POISON (PGIII), placard 454 kg (1,001 lbs) or more. For POISON-INHALATION HAZARD (Division 6.1), inhalation hazard only, placard any quantity.

CLASS 7 Radioactive



§172.556

Placard any quantity - packages bearing RADIOACTIVE YELLOW-III labels only. Certain low specific activity radioactive materials in "exclusive use" will not bear the label, but the radioactive placard is required for exclusive use shipments of low specific activity material and surface contaminated objects transported in accordance with §172.504(e) Table 1 and §173.427(a)(6).

CLASS 8 Corrosive



§172.558

For CORROSIVE, placard 454 kg (1,001 lbs) or more.

CLASS 9 Miscellaneous



§172.560

Not required for domestic transportation. A bulk packaging containing a Class 9 material must be marked with the appropriate ID number displayed on a Class 9 placard, an orange panel, or a white square-on-point display.

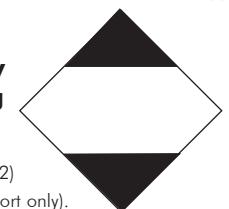
Dangerous



§172.521

A freight container, unit load device, transport vehicle, or rail car which contains non-bulk packages with two or more categories of hazardous materials that require different placards specified in Table 2 §172.504(e) may be placarded with DANGEROUS placards instead of the specific placards required for each of the materials in Table 2. However, when 1,000 kg (2,205 lbs) or more of one category of material is loaded at one loading facility, the placard specified in Table 2 must be applied.

Limited Quantity Marking



§172.315(a)(2)
(Vessel transport only).

Safety begins with communication!

General Guidelines on Use of Warning Labels and Placards

LABELS

See 49 CFR, Part 172, Subpart E, for complete labeling regulations.

- The Hazardous Materials Table [§172.101, Col. 6] identifies the proper label(s) for the hazardous material listed.
- Any person who offers a hazardous material for transportation MUST label the package, if required [§172.400(a)].
- Labels may be affixed to packages when not required by regulations, provided each label represents a hazard of the material contained in the package [§172.401].
- For labeling mixed or consolidated packages, see §172.404.
- The appropriate hazard class or division number must be displayed in the lower corner of a primary and subsidiary hazard label [§172.402(b)].
- For classes 1,2,3,4,5,6, and 8, text indicating a hazard (e.g., "CORROSIVE") is NOT required on a primary or subsidiary label. The label must otherwise conform to Subpart E of Part 172 [§172.405].
- Labels must be printed on or affixed to the surface of the package near the proper shipping name marking [§172.406(a)].
- When primary and subsidiary labels are required, they must be displayed next to each other [§172.406(c)].
- For a package containing a Division 6.1, PG III material, the POISON label specified in §172.430 may be modified to display the text PG III instead of POISON or TOXIC. Also see §172.405(c).
- The ORGANIC PEROXIDE label [§172.427] indicates that organic peroxides are highly flammable. Use of the ORGANIC PEROXIDE label eliminates the need for a flammable liquid subsidiary label. The color of the border must be black and the color of the flame may be black or white.

PLACARDS

See 49 CFR, Part 172, Subpart F, for complete placarding regulations.

- Each person who offers for transportation or transports any hazardous material subject to the Hazardous Materials Regulations must comply with all applicable requirements of Subpart F [§172.500].
- Placards may be displayed for a hazardous material, even when not required, if the placarding otherwise conforms to the requirements of Subpart F of Part 172 [§172.502(c)].
- For other than Class 7 or the DANGEROUS placard, text indicating a hazard (e.g., "FLAMMABLE") is not required. Text may be omitted from the OXYGEN placard only if the specific ID number is displayed on the placard [§172.519(b)(3)].
- For a placard corresponding to the primary or subsidiary hazard class of a material, the hazard class or division number must be displayed in the lower corner of the placard [§172.519(b)(4)].
- Except as otherwise provided, any bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of material listed in Table 1 must be placarded [§172.504].
- When the aggregate gross weight of all hazardous materials in non-bulk packages covered in Table 2 is less than 454 kg (1,001 lbs), no placard is required on a transport vehicle or freight container when transported by highway or rail [§172.504(c)].
- Notes: See §172.504(f)(10) for placarding Division 6.1, PG III materials.
- Placarded loads require registration with USDOT. See §107.601 for registration regulations.
- The new ORGANIC PEROXIDE placard became mandatory 1 January 2011 for transportation by rail, vessel, or aircraft and becomes mandatory 1 January 2014 for transportation by highway. The placard will enable transport workers to readily distinguish peroxides from oxidizers [§172.552].

PLACARDING TABLES

[§172.504(e)]

TABLE 1

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.1.....	EXPLOSIVES 1.1.....
1.2.....	EXPLOSIVES 1.2.....
1.3.....	EXPLOSIVES 1.3.....
2.3.....	POISON GAS.....
4.3.....	DANGEROUS WHEN WET.....
5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE.....
6.1 (Materials poisonous by inhalation (see §171.8)).....	POISON INHALATION HAZARD.....
7 (Radioactive Yellow III label only).....	RADIOACTIVE ¹

¹RADIOACTIVE placard also required for exclusive use shipments of low specific activity material and surface contaminated objects transported in accordance with §173.427(b)(4) and (5) or (c) of the subchapter.

TABLE 2

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.4.....	EXPLOSIVES 1.4.....
1.5.....	EXPLOSIVES 1.5.....
1.6.....	EXPLOSIVES 1.6.....
2.1.....	FLAMMABLE GAS.....
2.2.....	NON-FLAMMABLE GAS.....
3.....	FLAMMABLE.....
Combustible Liquid.....	COMBUSTIBLE.....
4.1.....	FLAMMABLE SOLID.....
4.2.....	SPONTANEOUSLY COMBUSTIBLE.....
5.1.....	OXIDIZER.....
5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE.....
6.1 (Other than materials poisonous by inhalation).....	POISON.....
6.2.....	(None).....
8.....	CORROSIVE.....
9.....	Class 9 (See §172.504(f)(9)).....
ORM-D.....	(None).....

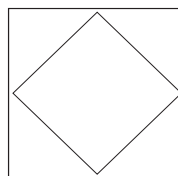
IDENTIFICATION NUMBER DISPLAYS



§172.332

Appropriate placard must be used with orange panel.

IDENTIFICATION NUMBER MARKINGS ON ORANGE PANELS OR APPROPRIATE PLACARDS MUST BE DISPLAYED ON: (1) Tank Cars, Cargo Tanks, Portable Tanks, and other Bulk Packagings; (2) Transport vehicles or freight containers containing 4,000 kg (8,820 lbs) in non-bulk packages of only a single hazardous material having the same proper shipping name and identification number loaded at one facility and transport vehicle contains no other material, hazardous or otherwise; and (3) transport vehicles or freight containers containing 1,000 kg (2,205 lbs) of non-bulk packages of materials poisonous by inhalation in Hazard Zone A or B. See §§172.301(a)(3), 172.313(c), 172.326, 172.328, 172.330, and 172.331.



§172.527

Square white background required for placard for highway route controlled quantity radioactive material and for rail shipment of certain explosives and poisons, and for flammable gas in a DOT 113 tank car [§172.507 and §172.510].

This Chart is available online at the following link: <http://phmsa.dot.gov/hazmat>



U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

USDOT/PHMSA/OHMIT/PHH-50
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Washington, D.C. 20590
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Email: training@dot.gov

PHH50-0138-0413

Cargo theft reaching record levels, prompting calls for congressional action

Alejandra Carranza, March 7, 2025

<https://www.truckingdive.com/news/cargo-theft-rising-enforcement-needed-hearing/741459/>



Will Johnson, chief special agent at BNSF Railway Police Department speaks at a subcommittee hearing titled “Grand Theft Cargo: Examining the Costly Threat to Consumers and the U.S. Supply Chain” on Feb. 27. Retrieved from [U.S. Senate Committee on Commerce, Science and Transportation](#) on February 28, 2025

Trucking, railroad and shipper representatives raised the alarm about the rise of cargo theft affecting U.S. supply chains during a congressional hearing last week.

Leaders from BNSF, the Owner-Operator Independent Drivers Association, Tanager Logistics and Academy Sports and Outdoors urged lawmakers to step up enforcement during a Senate subcommittee hearing on Feb. 27.

Broker fraud, shipment interception and other forms of cargo theft are costing supply chains up to \$35 billion annually, multiple speakers said, citing data from the federal Homeland Security Investigations agency.

Those crimes are contributing to higher consumer costs — and threatening some carriers' livelihoods.

“Since I began my testimony, a small business trucker has likely fallen prey to fraud that could jeopardize their entire business,” OOIDA EVP Lewie Pugh said. “That’s how commonplace freight fraud is becoming in trucking.”

Much of the crime is committed by repeat offenders, and only one in 10 results in an arrest, Sen. Todd Young said, citing the American Trucking Associations.

Cargo theft rises and gets creative

The rise in cargo theft is hurting truckers, logistics companies, shippers and if it continues can also begin to hurt consumers' pockets.

“In my 25 years in the supply chain, I’ve never seen cargo theft this prevalent,” Robert Howell, chief supply chain officer at Academy Sports and Outdoors said during the hearing.

Howell said the types of thefts include load interception, identity theft, double brokering and cyber fraud. Crime in this area has advanced from stealing a truckload or duplicating a Department of Transportation motor carrier number to cyber theft of online credentials and systems.

“Recently, we had a shipment we call private label swimwear. It was intercepted on its way from Nevada to our Texas distribution center. As you can imagine, this is critical this

time of year for the season. Unfortunately, we had to react when that load was stolen and repurpose and reposition product throughout our network,” Howell said.

The event resulted in additional costs to the company as well as shipment delays, and ultimately an impact to the consumer, Howell added. It also impacted third-party service providers, brokers and carriers.

Another logistics provider, Tanager Logistics and Double Diamond Transport, got its email spoofed and its identity stolen in a separate case, CEO Adam Blanchard testified.

“Posing as Tanager Logistics, the criminals brokered loads to unsuspecting motor carriers who delivered the cargo, while the scammers pocketed the money,” Blanchard said. “In just one example, they diverted a full truckload of energy drinks with a retail value well over six figures, over 1,000 miles from Texas to California.”

Emboldened by the lack of investigations and prosecutions, cargo thieves are growing the size and sophistication of their operations, Blanchard warned.

“At this very moment, two Tanager Logistics are listed on the FMCSA official website: my company and an imposter,” he said. “We provided this evidence to FMCSA, but they refused to take it down.”

Congress needs to take action

While stakeholders shared how cargo theft has impacted their individual company and industry, all of them advised congress on measures that need to be taken to start controlling the theft that is happening.

An estimated 65,000 thefts occurred in 2024, which was about a 40% increase over the prior year, Will Johnson, chief special agent at BNSF Railway Police Department said during the hearing, citing the Association of American Railroads.

The rise could be attributed to the lack of coordination and jurisdictional guidance.

“Cargo theft cases often cross multiple state lines, making jurisdictional coordination, prosecution and data collection extremely difficult,” Johnson said. A lack of a coordinated federal cargo theft enforcement effort also hinders effective prosecution, he added.

Johnson urged congress to consider multiple action items as a starting point to find effective solutions. Johnson’s suggestions include:

1. Support the establishment of a Federal Supply Chain Crime Coordination Center and Supply Chain Fraud and Theft Task Force to address cargo theft in all aspects of the supply chain.
2. Direct funding to dedicated federal prosecutors to tackle cargo theft cases.
3. Modernize the Federal Motor Carrier Safety Administration vetting process to include stronger authentication methods, real time carrier verification, and implement controls around the sale or transfer of DOT and MC numbers.
4. Increase criminal penalties for cargo theft cases.
5. Allow all victims aggregated harm to be considered in these offenses.
6. Encourage public private partnerships between corporate security teams, carrier monitoring services, load boards, insurers and law enforcement through data sharing initiatives.
7. Allow the prosecution venue to be established at the place of offense, and also at the victims U.S. corporate place of residence.
8. Ease the burden on crime victims by allowing CBP the authority to waive regulatory fines when cases are proven that theft had occurred.

Pugh, the OOIDA EVP, advised congress to pass the Household Goods Shipping Consumer Protection Act. This bill would provide FMCSA the necessary tools to protect consumers from fraud by scammers in the interstate transportation of household goods.

Pugh said the bill would also require brokers to register with a physical address, which is something carriers have done for years and it's a minor change with a major impact on protecting motor carriers.

“Congress must also use its oversight to ensure existing programs that help prevent fraud are better prioritized. This includes improving FMCSA’s national consumer complaint database, or NCCDB, which OOIDA has advocated for for years,” he said.

Outcome #9 Jigsaw – Trellborg Sealing Solutions Streamwood Handbook

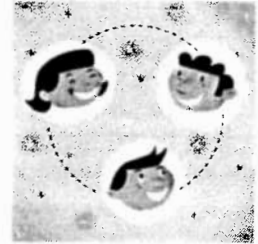
Group Recorder	Group Spokesperson	Letter/Page of Handbook

Section	Main Idea	Vocabulary to Define

rate for hours worked in excess of 8 hours in a workday. This classification contains two categories – Salaried Non-Exempt and Hourly.

EMPLOYMENT OF RELATIVES

TSSS will consider the hiring of employee relatives when the individual candidates meet the requirements of an open position. In those situations where a relative of an existing employee has applied for, or is being considered for, a position with the Company, the employee will not be involved in any aspect of the selection or hiring processes. In the same regard, related employees should not be placed in a supervisor/subordinate relationship.



INTERNAL JOB OPPORTUNITY

The Company has established a job-posting program to give employees an opportunity to apply for positions for which they are interested and qualified. Vacancies, excluding senior management level positions, are normally posted on designated bulletin boards.

Full-time employees with at least six months of continuous service in the current job, and who have a satisfactory performance and attendance record, as well as no employee corrective actions, are eligible to apply for posted openings. Job openings will be posted in the breakrooms for a duration of up to one week (open and close dates are indicated on the actual job posting).

Qualified and eligible employees should obtain and complete an Internal Job Opportunity Form from Human Resources while also notifying their immediate supervisor of their interest in the open position. Once the form is completed, return it to Human Resources by the closing date specified on the job posting for screening.

Human Resources will review each applicant's qualification. This may include a discussion with the employee's supervisor and a review of the employee's personnel file. Human Resources in partnership with the hiring manager will interview candidates and discuss their qualifications and interest in the job. Any employee lacking the qualifications for the job in question will be notified during this phase of the job posting program.

The selected candidate will be notified of the transfer date by the hiring manager.

PERFORMANCE REVIEWS- NON-UNION EMPLOYEES

The Company maintains a system for evaluating employees' performance to maximize communication and increase contribution to Company objectives. It is our aim that this process will also help to enhance and recognize the employee's performance during a specific period of time.

During this process the Manager/Supervisor will have the opportunity to review the employee's salary and request a modification depending on the employee's performance.

Please contact and advise your supervisor or Human Resources, if more than a year has passed since receiving formal feedback.



PERFORMANCE REVIEWS- UNION EMPLOYEES

The Company maintains a system for evaluating employees' performance to maximize communication and increase contribution to Company objectives. It is our aim that this process will also help to enhance and recognize the employee's performance during a specific period of time.

Salary compensation for union employees is negotiated with the Union. During the performance review process, salary will not be reviewed only the performance level of the union employee.

Please contact and advise your supervisor or Human Resources, if more than a year has passed since receiving formal feedback.

EMPLOYEE BENEFITS

BENEFIT PROGRAM INFORMATION

Our company is proud to offer a very comprehensive benefit package, that we hope will provide you with additional support, to enhance the quality of your personal life and that of your family. Only full time employees are eligible to participate in the program.

If you have been hired as a full time non-union employee, the Human Resources Department will schedule your benefit orientation training, within the first 30 days of your employment. At that time you will be provided with all the information regarding each benefit.

If you have been hired as a full time union employee, the Human Resources Department will schedule your benefit orientation training within the probation period (90 days probation Molding & Orkot; 60 days probation Machining and Finishing).

Keep in mind that you will have a limited window of opportunity to enroll into the benefit program. You are encouraged to familiarize yourself with all the literature and to provide us with all the information required to ensure effective enrollment.

If you missed your initial benefit enrollment period, depending on the benefit, you may have additional opportunities to enroll within the year. The company will provide at least one full open enrollment period per calendar year, in which all employees will have the opportunity to re-enroll in all benefits.

The Company will incur the majority of the cost burden to provide you with this package. However, there are several benefits in which you will be required to share a small percentage of the cost in order to get and/or enhance the coverage provided.

Participation in the benefits of which you will be required to contribute is not mandatory. You will have the opportunity to waive coverage.

The following list provides you with a basic outline on most of the benefits that we offer for non-union employees.

- ↓ Health, Dental and Vision Insurance
- ↓ Short-term and Long-term disability protection
- ↓ Group Term Life Insurance
- ↓ Paid vacation and holidays
- ↓ Membership in the 401(k) Plan
- ↓ Educational Assistance Program
- ↓ Flexible Spending Accounts
- ↓ Work-life balance employee assistance program
- ↓ Worldwide emergency travel assistance services



The following list provides you with a basic outline on most of the benefit that we offer for union employees

- ↓ Health Insurance
- ↓ Short-term disability protection
- ↓ Group Term Life Insurance
- ↓ Paid vacation and holidays
- ↓ Union Pension Plan

For further information and detailed brochures describing coverage, please contact the Human Resources Department.

EDUCATIONAL ASSISTANCE PROGRAM

TSSS is committed to assisting employees in advancing their educational goals to acquire new skills and to enhance their capabilities. The Company offers educational assistance for most of the major costs of further education.

Vacation Year

The "Vacation Year" will begin on January 1st and end December 31st.

Benefit

The table below illustrates the allotments granted to newly hired employees based on their hire date for the current vacation year.

MONTH HIRED	VACATION HOURS (to be used by Dec 31st of their year of hire)	VACATION HOURS FOR THE FOLLOWING VACATION YEAR
January through March	80	80
April through July	40	80
August through December	0	80

The following table shows the vacation allotments based on years of service.

YEARS OF SERVICE	VACATION HOURS
More than 1 but less than 8	80
More than 8 but less than 18	120
More than 18	160

Vacation Allotments

The full vacation allotment must be used within the same vacation year. Vacation hours will not be accumulated and/or rolled over into the following vacation year.

Employees on Long-Term Disability will be prorated on their vacation allotment for the following year.

Salaried Exempt Employees – Vacation must be used within the same vacation year or the vacation days will be lost.

Hourly and Salaried Non-Exempt Employees - At the end of the vacation year the company will pay up to a maximum of forty (40) hours of the employee's remaining, but unused vacation. The employee will forfeit pay and time off on any remaining unused vacation hours over forty (40).

Vacation calculation and payment

Employees will be paid one time their regular hourly rate for all vacation hours used.

Employees that use all of their sick time and incur additional personal/sick absences will automatically apply this time towards any available vacation hours. When this occurs it will be labeled as "vacation substitution".

Payment of Vacation upon Termination

Employees that terminate their employment from the Company will receive payment for unused vacation.

VACATION UNION EMPLOYEES

The Company provides time off, with pay, to employees allowing them the opportunity for rest and relaxation away from the job.

The Company encourages each employee to take the full amount of vacation granted during the calendar year.

You are responsible for providing advance notice when requesting vacation and are highly encouraged to schedule your vacation time with as much anticipation as possible and to also consider alternative time off dates, since the requested dates may need to be switched to alternative dates. Each department head will determine the scheduling of vacations for his or her



Salaried Employees

To make sure you are properly paid, you are required to use the proper forms for documenting vacation, personal/sick days. All vacation personal/sick days must be approved by your manager.

PAYDAYS

Employees are paid biweekly on Thursday. If the regular payday occurs on a holiday, the payday is the last working day prior to the holiday.

On each payday, you receive a statement showing gross pay, deductions and net pay. Automatic deductions such as additional tax withholding, contributions to voluntary benefit plans and individual savings plans may be arranged through the Human Resources Department.

TSSS requires that paychecks be direct deposit. Your paycheck will be automatically deposited to your savings and/or checking account at your bank of choice. In addition, employees may enroll for paperless paystubs which are accessible from any personal computer.



OVERTIME COMPENSATION NON-UNION HOURLY EMPLOYEES

Occasionally, your supervisor may require you to work overtime. In these instances, you are given as much advance notice as practical.

Non-exempt employees are paid at the rate of one and one-half (1 ½) times their regular hourly rate for hours worked in excess of 40 during the established workweek. The established workweek begins on Monday at 12:00 AM and ends at 11:59 PM on the following Sunday.

Company recognized holidays and actual hours worked only will count towards hours worked when calculating overtime pay.

OVERTIME COMPENSATION UNION HOURLY EMPLOYEES

Occasionally, your supervisor may require you to work overtime. In these instances, you are given as much advance notice as practical (24 hour notice for Saturday).