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## Class Content

- Product Safety Introduction
- Product Safety Background
  - History
  - Organizations
- Product Safety Deep Dive (sort of)

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## Product Safety Introduction

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### Product Safety Introduction

- A product has many competing requirements to meet:
  - ❖ Performance
  - ❖ Quality
  - ❖ Cost
  - ❖ Manufacturability
  - ❖ Assembly
  - ❖ Product safety
- Codes are the minimum standard for safety. Products are expected to be safer than what codes require.
- **All products recalled or involved in a product liability case have been codes approved!**
- Government and the legal system have significantly increased public awareness of product safety.

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### Product Safety Introduction

- Most companies are aware of product liability risk, but don't fully understand what product safety actually encompasses, or, take a haphazard approach to meeting this requirement, which puts their products at risk of being unsafe even before the product is launched.
- The intent of this course:
  - Introduce the concept of product safety
  - Introduce common product safety terms
  - Identify potential safety hazards
  - Learn how to balance safety with business needs

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## Product Safety Introduction

### ➤ Product Safety Definition:

The process of ensuring a product is **reasonably safe** to install, service, and operate, under intended use **and** reasonable foreseeable misuse scenarios.

**Note:** reasonable foreseeable misuse does not include unforeseeable misuse or abuse

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## Product Safety Background

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## History

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# Product Safety for Consumer Products

05/04/2023

## History

### Non-government organizations formed in North America to address standards and safety:

- **1894**, Underwriters Laboratory (UL)
- **1896**, Nation Fire Prevention Association (NFPA)
- **1898**, American Society for Testing & Materials (ASTM)
- **1918**, American Gas Association (AGA)
- **1918**, American National Standards Institute (ANSI)
- **1919**, CSA Group (CSA)
- **1921**, National Safety Council (NSC)

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## History

### Government Involvement in Safety:

- **1966**, Department of Transportation (DOT)
- **1972**, Consumer Product Safety Commission (CPSC)

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## Companies & Agencies

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# Product Safety for Consumer Products

05/04/2023

## Product Codes Approval

- How do I know a product is codes approved?
- How do I know which organization approved the product for codes?
- Who can approve products for codes?
- Can a company approve its own products for codes?

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## Current Safety Companies & Agencies

- **Companies:**
  - ❖ National Safety Council (NSC)
  - ❖ Nation Fire Prevention Association (NFPA)
  - ❖ American Society for Testing & Materials (ASTM)
  - ❖ American National Standards Institute (ANSI)
  - ❖ Underwriters Laboratory (UL)
  - ❖ CSA Group (CSA)
  - ❖ Intertek (ETL)
- **Government Agencies:**
  - ❖ Department of Transportation (DOT)
  - ❖ Consumer Product Safety Commission (CPSC)

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## Product Codes Approval

### NAMEPLATE



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# Product Safety for Consumer Products

05/04/2023

## Product Codes Approval

### NAMEPLATE

manufacturer

product model #



product serial #  
and/or date code

Codes  
information

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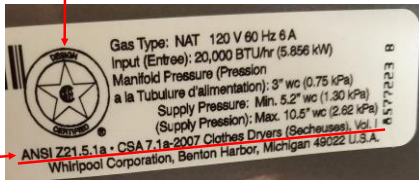
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## Product Codes Approval

### NAMEPLATE

codes agency which approved the product



codes standard used to approved the product

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## Underwriters Laboratory (UL)

### Marks:

product

component



Canada

United States



Canada

United States

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# Product Safety for Consumer Products

05/04/2023

## Underwriters Laboratory (UL)

Marks:

product mark



letter of conformance determines approved use.

approved for United States use only

approved for Canadian use only

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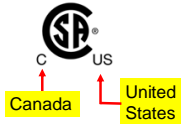
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## CSA Group (CSA)

Marks:

product



electrical, plumbing, and mechanical

gas fired components and products

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## Intertek (ETL)

Marks:



Intertek

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## Product Safety Deep Dive

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### Product Safety Deep Dive

#### Reasonably Safe:

The risk of all potential hazards, including both intended use and reasonably foreseeable misuse hazards, is small enough that the installer, user, or service person is **unlikely** to be injured when interacting with the product.

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### Product Safety Deep Dive

#### Defective Product:

A product with a manufacturing, design, or warning defect.

The defect(s) contributes substantially to an injury or a significant loss of property.

It is rare for a product to become hazardous from only (1) defect.

Keep in mind that the defect(s) must be linked to the injury or loss of property in question.

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## Product Safety Deep Dive

### Manufacturing defect:

A manufacturing defect is a defect in a product that was not intended and contributes substantially to an injury or a significant loss of property.

Due diligence was used in the design, testing, and marketing of the product, but the product has been made outside the specified design tolerances.

The manufacturing discrepancy could be related to component or assembly dimensional tolerances, material specifications, or any other engineering design requirement documented in a drawing or specification.

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## Product Safety Deep Dive

### Design defect:

A design choice causing injuries by intended use or **reasonable foreseeable misuse** of the product and those injuries might have been avoided with an alternative design or a design safeguard that:

- a. Does not cause an **unreasonable** increase in the product **cost** or manufacture the product.
- b. Does not reduce the efficiency, benefits, or utility of the product.
- c. Was available at the time of manufacture.

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## Product Safety Deep Dive

### Warning defect:

A product's instructions or warnings cause injuries which could have been significantly reduced or avoided if properly instructed and warned.

A lack of product's instructions or warnings causes injuries which could have been significantly reduced or avoided if properly instructed and warned.

A product is not warning defective if additional instructions or warnings related to misuses detract from instructions and warnings intended to prevent more serious or likely hazards.

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## Product Safety Deep Dive

- Design defects and warning defects not caught in the development process will be included with every product sold, making these (2) defects more common than manufacturing defects.
- Manufacturing quality control and regulatory oversight at production facilities normally minimizes the number of products sold with a manufacturing defect.
- Proving a product has a manufacturing defect is often very difficult to demonstrate.
- Manufacturing defects are therefore relatively uncommon in product liability cases.

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## Product Safety Deep Dive

- **Product Safety Definition:**  
The process of ensuring a product is **reasonably safe** to install, service, and operate, under intended use **and** reasonable foreseeable misuse scenarios.

**Note:** reasonable foreseeable misuse does not include unforeseeable misuse or abuse

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## Product Safety Deep Dive

### Intended Use:

The function or functions the user is expected to benefit from through the use of the product.

The intended use is defined by industry standards, product specifications, product performance standards, codes requirements, user manuals, marketing materials, etc....

### Product misuse:

Using a product outside the product's intended use.

Misuse types:

1. Reasonable foreseeable misuse
2. Unforeseeable misuse
3. Abuse

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## Product Safety Deep Dive

### Reasonably foreseeable misuse:

An unintended use of a product but expected based on readily predictable human behaviors.

### Unforeseeable misuse:

A reasonably prudent person would not have used the product in the same or similar manner or circumstances. This misuse is not aligned with readily predictable human behaviors and therefore unreasonable in nature.

### Abuse:

A product intentionally modified. A product damaged due to forces or environmental exposure beyond reasonable foreseeable misuse.

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## Product Safety Deep Dive

### Reasonable Foreseeable Misuse:

1. Incorrect installation of the product.
2. Not following user manual operating instructions.
3. Not performing routine maintenance.
4. Overloading the product.
5. Dropping the product.
6. Spillage on the product.

There are many more potential reasonable foreseeable misuses and those misuses are highly dependent on the product of interest

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## Hazards

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## Product Safety Deep Dive

### Common Intended Use Hazards:

1. Electric shock
  2. Fire
  3. Mechanical
    - I. Lacerations
    - II. Flesh crushing injuries
    - III. Joint or skeletal injuries
    - IV. Broken bones
    - V. Amputations
  4. Thermal contact burns
- the big 4

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## Product Safety Deep Dive

### Common Intended Use Hazards: (continued)

5. Chemical exposure
  - I. Chemical burns (skin, eyes, nasal passages, lungs)
  - II. Toxicity (water contamination, mold, materials, etc.....)
  - III. Internal (inhalation, oral consumption)
  - IV. External contact (skin, eyes)
6. Asphyxiation
  - I. Insufficient oxygen (O<sub>2</sub>) (confined space)
  - II. Excess carbon dioxide (CO<sub>2</sub>) (confined space)
  - III. Airway blockage (choking, hanging, etc.....)
7. Radiation exposure

This is not an all inclusive hazard list and is highly dependent on the product of interest

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## Product Safety Deep Dive

- There are many tools available to support the product safety process.
- For the (7) hazards identified above, specific test procedures and success criteria have been established.
- Using an industry standard for a test procedure and success criteria minimizes a company's exposure to liability risk.
- There are several organizations which can be leveraged to help understand and determine reasonable misuse scenarios which can be expected to occur.

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## Balancing Safety with Business

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## Product Safety Deep Dive

### Reasonably Safe:

The risk of all potential hazards, including both intended use and reasonably foreseeable misuse hazards, is small enough that the installer, user, or service person is **unlikely** to be injured when interacting with the product.

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## Product Safety Deep Dive

### Product Safety Hazard Hierarchy

1. Design out the potential hazard.
2. Mitigate the potential hazard risk with a safeguard.
3. Mitigate the potential hazard risk using a manufacturing process, inspection process, etc....
4. Warn the user, service person, or installer about the potential hazard.

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## Product Safety Deep Dive

LEAST

RISK

MOST

### Product Safety Hazard Hierarchy

1. Design out the potential hazard.
2. Mitigate the potential hazard with a safeguard.
3. Mitigate the potential hazard using a manufacturing process, inspection process, etc....
4. Warn the user, service person, or installer about the potential hazard.

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## Product Safety Deep Dive

### Safeguard:

A component, feature, or function which is intended to prevent a potential hazard from propagating to an unsafe level.

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## Product Safety Deep Dive

### Noise Factor:

A factor which cannot be controlled by the product manufacturer but potentially influences both functional and safety related product performance results:

- Unknown to or out of the product user's control
- Reasonable foreseeable misuse

Noises can be variable or step(on/off)

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## Product Safety Deep Dive

### Noises unknown to or out of the user's control

- Electrical supply:
  - ❖ Voltage potential
  - ❖ Reverse polarity
  - ❖ L1/ground miswire
  - ❖ Outlet type (ground/no ground)
  - ❖ Outlet to floor height
  - ❖ Location of outlet
- Gas supply:
  - ❖ Supply pressure
  - ❖ Available flow
  - ❖ Gas BTU content
  - ❖ Gas type/composition
  - ❖ Location of tap
  - ❖ Shut-off valve present
  - ❖ Pressure tap present
- Floor type
- Floor levelness
- Room use type
- Ambient humidity
- Ambient temperature

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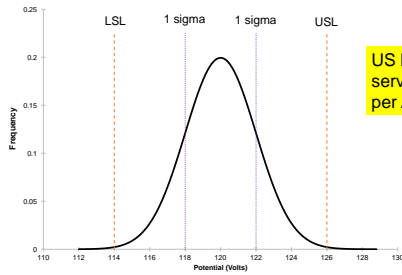
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## Product Safety Deep Dive



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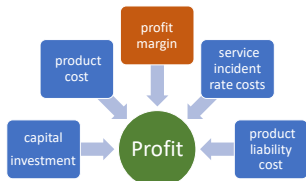
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## Product Safety Deep Dive

- Companies produce and sell products for profit.
- A business has (5) product attributes that must be managed correctly in order to stay in business.



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## Product Safety Deep Dive

Reasonably safe products **do not**:

1. Result in an unreasonable increase in the product cost or manufacturing the product.
2. Reduce the efficiency, benefits, or utility of the product.

A balance between the (5) product attributes driven by risk management ensures a reasonably safe product which is affordable to the consumer and makes a profit for the company.

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## Warning Labels

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## Product Safety Deep Dive

### Product Safety Labels

- A warning is the last line of defense in the product safety hierarchy but is often required.
- Using a warning label to prevent adding the cost of a safeguard to the product is a risky business strategy.
- A warning label has to communicate the following elements to be considered acceptable:
  - ❖ The hazard type
  - ❖ The hazard severity
  - ❖ How to prevent the hazard from occurring
  - ❖ Resulting injuries by not following the instructions

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## Product Safety Deep Dive

### Hazard Level Definitions:

#### Caution:

The least severe warning indicating minor or moderate injury could occur if the instructions are not followed.

#### Warning:

Death or serious injury could occur if the instructions are not followed.

#### Danger:

The most severe warning indicating death or serious injury could occur if the instructions are not followed ***immediately.***

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## Product Safety Deep Dive

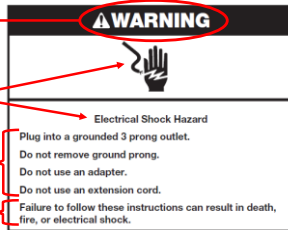
### Product Safety Labels

hazard severity level

hazard type identified

Instructions on how to prevent the hazard from occurring

Health risk if instructions aren't followed



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**Course  
Summary**

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# Product Safety for Consumer Products

05/04/2023

## Summary

- Product safety was implemented long ago and continues to evolve to this day.
- There are both industry initiated organizations as well as government formed agencies which focus on product safety.
- US government product safety organizations did not appear until the 1960/1970 time frame.
- Product safety organizations offer a vast amount of information and services to support the implementation of safe products.
- Most states require consumer products be codes certified in order from them to be sold legally.
- Each codes agency has it's own unique identification mark to show a product has been certified

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## Summary

- A product can be defective either by design, manufacture, or due to a failure to warn.
- The product has to prevent injury from reasonable foreseeable misuse but not unreasonable misuse or abuse.
- No one could afford a product which is 100% safe under all conditions. Risk management is therefore required to make a reasonably safe product.
- A reasonably safe product benefits both the user and the company selling the product by balancing product safety with the business's need to make a profit.

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## Summary

- Use the product safety hierarchy to manage safety risk.
- When a new test or performance success criteria is needed, always look for an industry standard to follow.
- Reasonable noises must be identified and incorporated into safety testing.
- Using warning labels in place of a safeguard is not appropriate.
- Over warning is a poor strategy because it detracts from the warnings which address the most serious hazards to the user.

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