

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Setting the Standard for Safety and
Global Relevance:

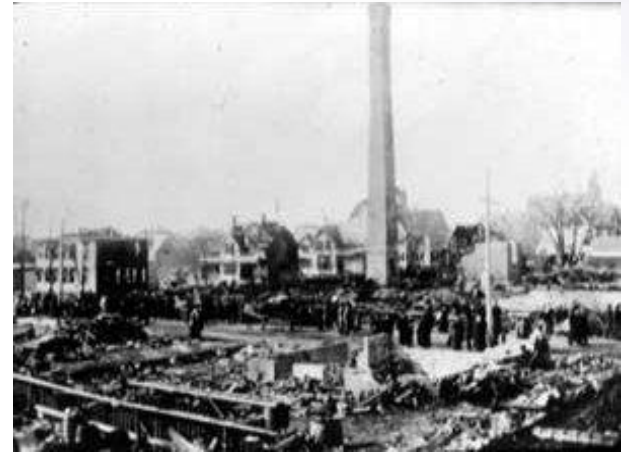
*An Overview of ASME Standardization and
A112 Plumbing Activities*

OUTLINE

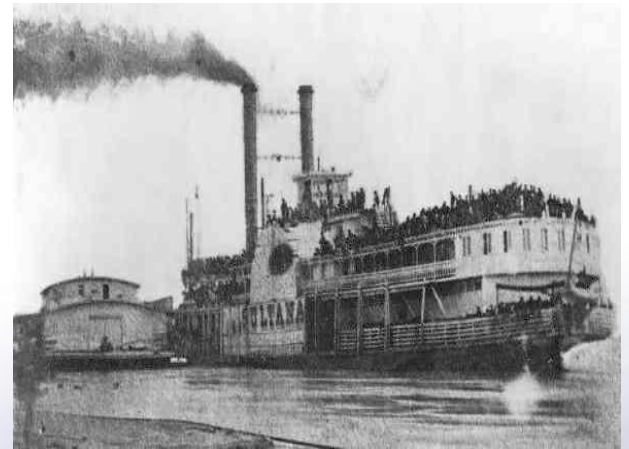
- ☐ History
- ☐ Vision, Mission, and Strategic Focus Areas
- ☐ Organization
- ☐ ASME Standardization Process and Scope of Activities
- ☐ ASME A112 Standards
- ☐ Effect on Engineers

ASME HISTORY

- Between 1898 and 1903 alone, over 1200 people were killed in the U.S. in 1900 separate boiler explosions
- Key problem: Lack of understanding, consistency, and safety features in boiler design and operation



Grover Shoe Factory
Brockton, MA 1905



Steamship Sultana, 1865

ASME HISTORY

Timeline of Early ASME Standardization Milestones



1880

ASME founded to address issues with industrialization and mechanization



1884

Issues first standard, Code for the Conduct of Trials of Steam Boilers



1905

Standard for Proportions of Machine Screw Sizes



1914

First edition of the Boiler and Pressure Vessel Code



1916

Safety Code for Cranes



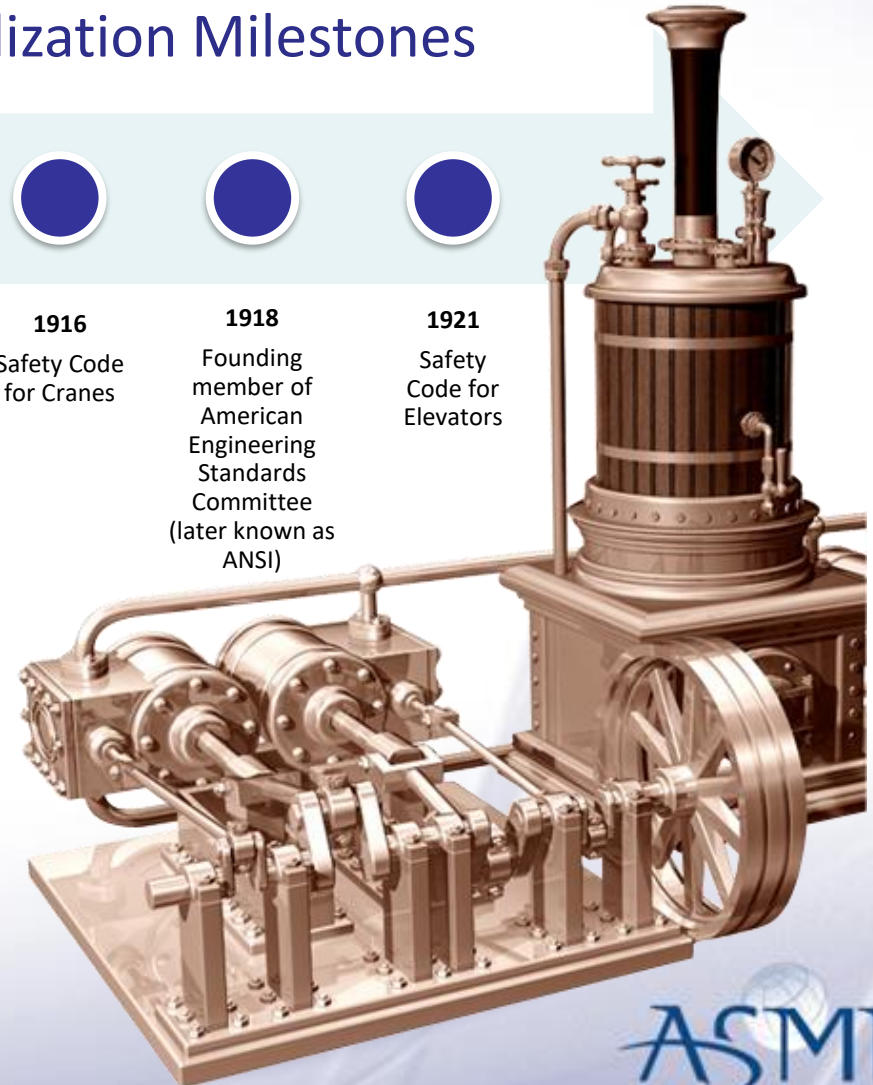
1918

Founding member of American Engineering Standards Committee (later known as ANSI)

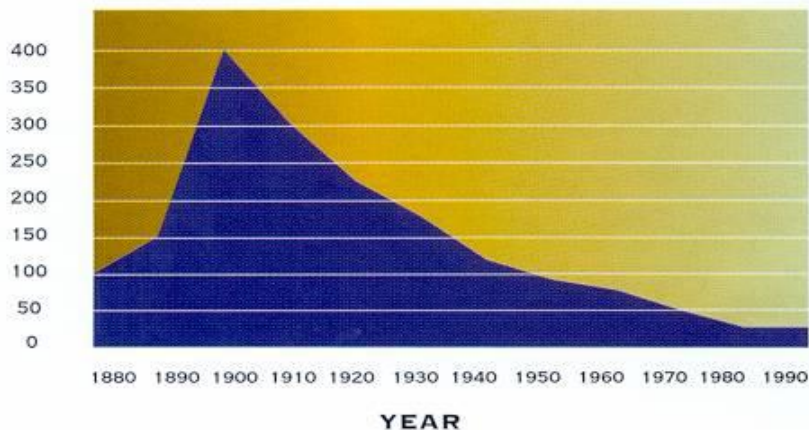


1921

Safety Code for Elevators



NUMBER OF EXPLOSIONS



ASME MISSION STATEMENT

To serve diverse global communities by advancing, disseminating and applying engineering knowledge for improving the quality of life; and communicating the excitement of engineering.

Standards and Certification (S&C) Mission Statement

To develop the best, most applicable codes, standards, conformity assessment programs, and related products and services in the world for the benefit of humanity



WHAT IS A STANDARD?

A set of technical definitions, instructions, rules, guidelines, or characteristics set forth to provide consistent and comparable results.

WHY ARE STANDARDS NEEDED?

- Promote safety, uniformity, consistency, reliability, productivity, efficiency and innovation
- Help communication between producers and users
- Considered a “common language”
- Promote interchangeability
- Allow for more flexibility for designers
- Standards satisfy safety, performance, and economic goals

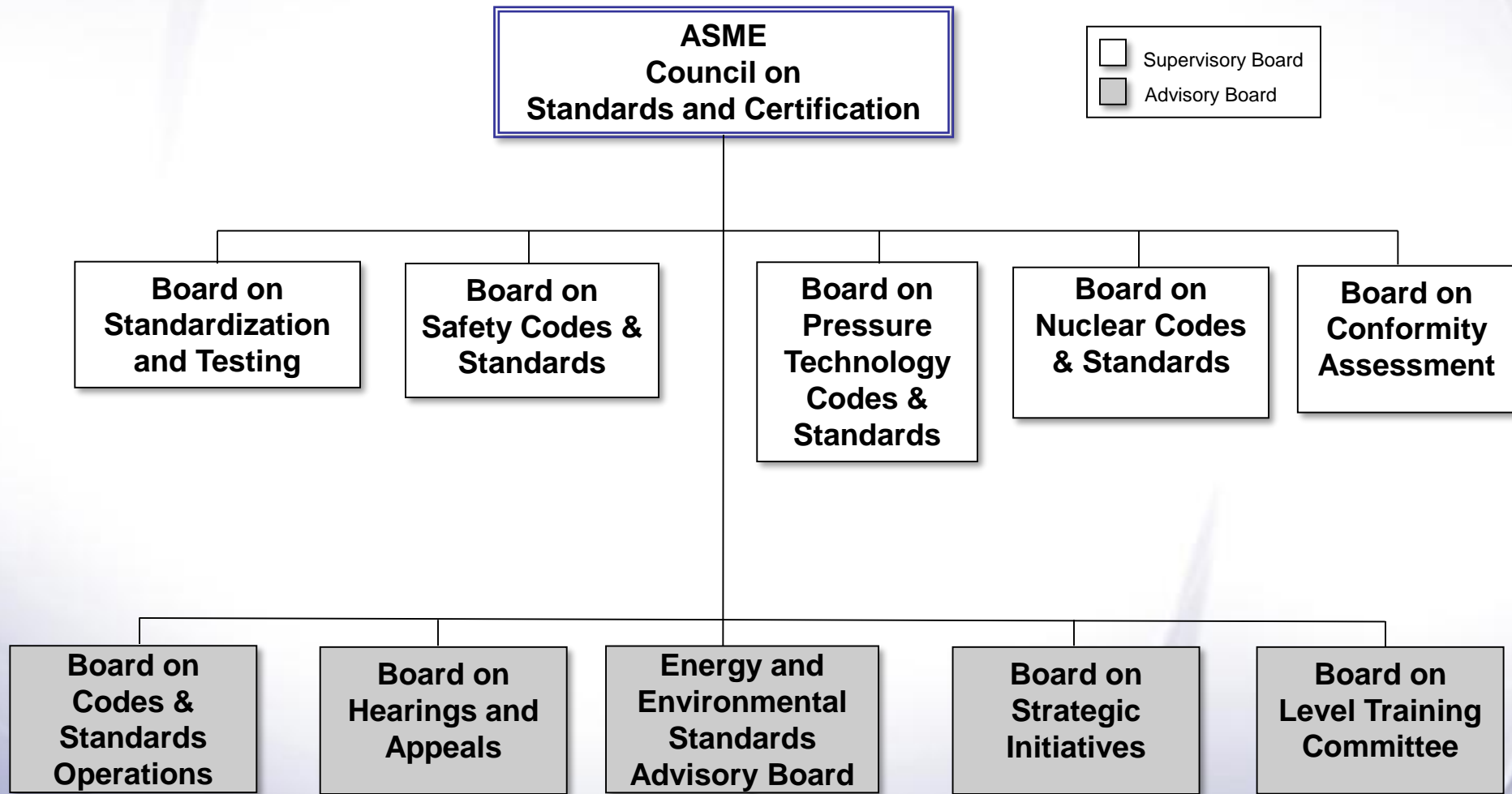
ASME STANDARDS TODAY

...by the numbers



- 600+ published standards (more recently, over 90 technical related non-standards publications)
- 700 boards, standards developing committees and supporting subgroups
- 130,000+ members worldwide, including **32,000+ student members**; 5,555 Standards and Certification Volunteers
- **720 student sections, and 31 local sections outside North America**
- **200 professional development courses (many of them standards-based)**
- 35 active memorandums of understanding with government, industry and professional organizations around the world

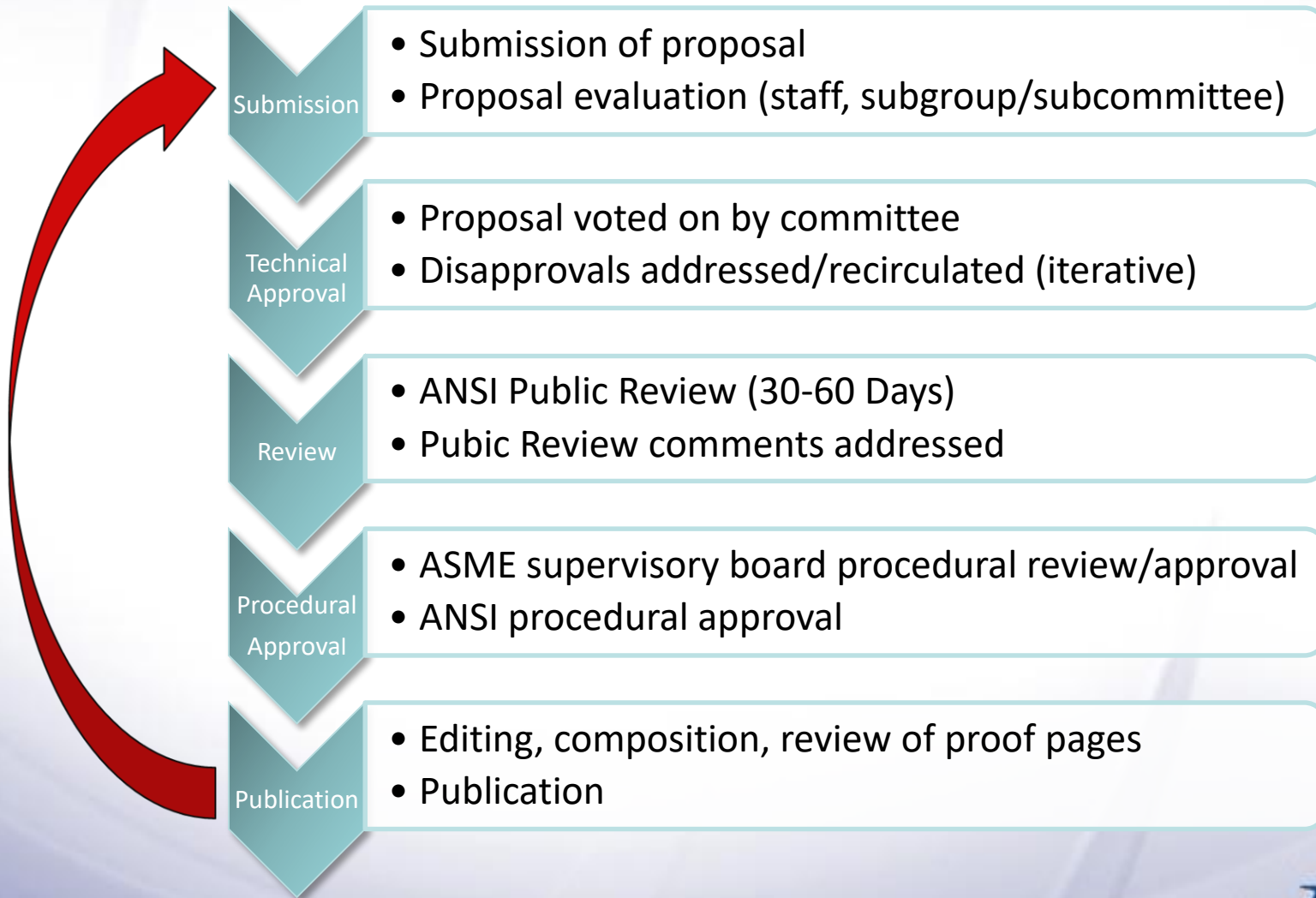
ASME S&C ORGANIZATION CHART



STANDARDS COMMITTEE WORK

- Any individual having the willingness and ability to participate in the committee's activity may apply for **committee membership**
- **No fees** for participation
- Multiple **types of membership**
- Web-enabled **electronic tools**
- All meetings **free and open** to the general public

ASME CONSENSUS PROCESS



ANSI ACCREDITATION



ANSI's *Essential Requirements* establish due process for standards development via:

- Openness
- Lack of dominance/Balance of interest
- Coordination and harmonization
- Consensus
- Consideration of views and objections
- Notification
- Written procedures
- Appeals

OTHER KEY ASPECTS

- ASME's standards are reviewed by the respective consensus committee at least every 5 years to **ensure continued relevance**
- Many standards (e.g. BPV codes) are under a **continuous state of review**
- **Interpretations** and **Code Cases** offered for most standards
- Not funded by industry or government
- Note: Standards are considered **voluntary** unless adopted into law by a regulatory authority

SCOPE OF ACTIVITIES

Pressure Technology

boilers, pressure vessels, piping, materials, welding, valves, flanges

Standardization/Performance Test Codes

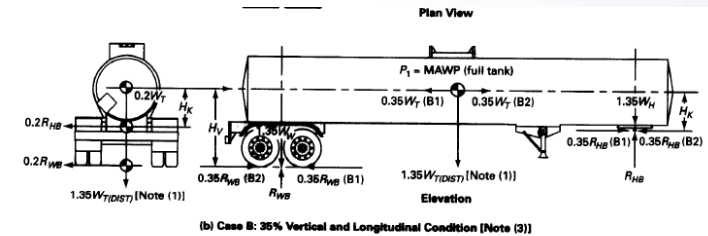
geometric dimensioning and tolerancing, dimensional metrology, plumbing, turbines and power plant equipment, fasteners, hand tools, energy assessment, additive manufacturing

Safety

elevators & escalators, cranes, automotive lifts, conveyors, rail transit

Nuclear

component design, containment, quality assurance, risk assessment, air and gas treatment, inspection



HISTORY OF PLUMBING IN THE USA

- Plumbing started outdoors
- Plumbing and sanitation was not important to early settlers
- The business was taken outside
- Outhouse were regulated based on distance to the house and the water supply

HISTORY OF PLUMBING IN THE USA

- The Civil War brought people together
- People from different states never communicated
- This was a new start to the country
- National organizations started following the war

HISTORY OF PLUMBING CODES AND STANDARDS

- The first U.S. standards originated during the civil war – Briggs Standard for wrought iron pipe
- Nominal pipe sized came into being for steel pipe (wrought iron pipe)

HISTORY OF PLUMBING CODES AND STANDARDS

- More soldiers died from poor sanitation than on the battlefield
- Sanitation was basically non-existent
- Soldier became some of the first plumbers
- Soldiers realized the need to control sanitation

HISTORY OF THE WATER PIPE SIZING IN THE PLUMBING CODES

- Most Plumbing Codes have relied on the supply fixture unit concept for sizing water piping systems.
- This method was originally developed by Dr. Roy Hunter at the National Bureau of Standards. Hunter wrote that the sizing method has many errors, therefore, engineering insight must be applied to every design.
- Recognizing the shortcomings of the sizing method, Codes has long recognized other methods for sizing water distribution systems, provided the system limitations are met.

EVOLUTION OF PLUMBING STANDARDS

- Plumbing products were first regulated by Commercial Standards.
- Commercial Standards were voluntary standards developed by the Federal Government through the National Bureau of Standards under the Department of Commerce.
- In 1955, ASME formed the A112 Committee to take over development of Plumbing Material Standards.

ASME A112 STANDARDS ON PLUMBING

ASME publishes about 43 Standards on plumbing. These Standards are under the purview of the ASME A112 Standards Committee. The Charter for the committee is:

The recommendation of suitable standards, or the development of standards where none exist, for performance requirements, composition, dimensions, and/or mechanical and physical properties of materials, fixtures, devices, and equipment used or installed in plumbing or mechanical systems.

ASME A112 STANDARDS ON PLUMBING

- A112 Standards are developed under the consensus process.
- Plumbing manufacturers promoted the development of standards.
- A112 Standards are used to regulate plumbing products

ASME A112 STANDARDS COMMITTEE COMPOSITION

The ASME A112 Standards Committee is currently comprised by the following membership:

General Interest (AF) – 8 Members

Educators, individuals from a technical society or other society and public interest persons

Laboratory (AI) – 4 Members

A national laboratory or an organization whose primary function is to perform research and development, or an organization furnishing testing and examination services

Producer/Manufacturer (AS) – 11 Members

Those directly concerned with the production of the

Regulatory/Government (AT) – 1 Member

Government employee using the standard but not

Consultant (AU) – 8 Members

Consultants using the standard to provide a service

APPLICATION OF STANDARDS

- Standards regulate all of the material used within a plumbing system.

The Plumbing Codes place a great emphasis in the referencing of consensus standards.

Plumbing fixtures are regulated by ASME A112 Standards

Pipe and fittings are regulated by ASTM Standards

Backflow preventers are regulated by ASSE standards

Many other standards promulgators.

ASME A112 STANDARDS ON PLUMBING

The most important ASME A112 Standards would be the fixture and fitting Standards:

- A112.18.1/CSA B125.1 on Plumbing Supply Fittings
- A112.18.2/CSA B125.2 on Plumbing Waste Fittings
- A112.19.1/CSA B45.2 on Enameled Cast Iron and Enameled Steel Plumbing Fixtures
- A112.19.2/CSA B45.1 on Ceramic Plumbing Fixtures

Note that these Standards are harmonized with the Canadian Standards Association (CSA)

ASME/CSA JOINT HARMONIZED STANDARDS

- Following the acceptance of NAFTA, Canada and the United States began developing joint harmonized standard.
- ASME and CSA signed an agreement to develop harmonized plumbing material standards.

A112.18.1/CSA B125.1 ON PLUMBING SUPPLY FITTINGS

This Standard covers plumbing supply fittings and accessories located between the supply stop and the terminal fitting, inclusive, as follows:

- (a) automatic compensating valves for individual wall-mounted showering systems;
- (b) bath and shower supply fittings;
- (c) bidet supply fittings;
- (d) clothes washer supply fittings;
- (e) drinking fountain supply fittings;
- (f) humidifier supply stops;
- (g) kitchen, sink, and lavatory supply fittings;
- (h) laundry tub supply fittings;
- (i) lawn and sediment faucets;
- (j) metering and self-closing supply fittings;
- (k) shower heads, hand-held showers, and body sprays; and
- (l) supply stops.

A112.18.2/CSA B125.2 ON PLUMBING WASTE FITTINGS

This Standard covers plumbing waste fittings of sizes NPS-2 and smaller.

This Standard does not cover

(a) plumbing supply fittings, which are covered by ASME A112.18.1/CSA B125.1;

(b) other devices (e.g., temperature-actuated in-line mixing valves), which are covered by CSA B125.3 or other plumbing product standards; and

(c) flexible water connectors under continuous pressure, which are covered by ASME A112.18.6/ CSA B125.6.

A112.19.1/CSA B45.2 ON ENAMELED CAST IRON AND ENAMELED STEEL PLUMBING FIXTURES

This Standard covers enamelled cast iron and enamelled steel plumbing fixtures and specifies requirements for materials, construction, performance, testing, and markings.

This Standard covers the following plumbing fixtures:

- (a) bathtubs;
- (b) drinking fountains and water coolers;
- (c) lavatories;
- (d) shower bases; and
- (e) sinks:
 - (i) kitchen and bar sinks;
 - (ii) laundry sinks;
 - (iii) service sinks; and
 - (iv) utility sinks.

A112.19.2/CSA B45.1 ON CERAMIC PLUMBING FIXTURES

This Standard covers vitreous and non-vitreous china plumbing fixtures and specifies requirements for materials, construction, performance, testing, and markings. This Standard's performance requirements and test procedures apply to all types of water closets and urinals that discharge into gravity drainage systems in permanent buildings and structures, independent of occupancy.

This Standard covers the following plumbing fixtures:

(a) bathtubs; (b) bidets; (c) drinking fountains; (d) fixtures for institutional applications; (e) lavatories; (f) shower bases; (g) sinks; (h) urinals

ADDITIONAL ASME A112 PLUMBING PRODUCT STANDARDS

ASME A112.4.2 Water Closet Personal Hygiene Devices

ASME A112.4.3 Plastic Fittings for Connecting Water Closets to the
Sanitary Drainage System

ASME A112.6.2 Supports for Off-The-Floor Water Closets

ASME A112.19.10 Dual Flush Devices

ASME A112.19.14 Six Liter Water Closets w/ Dual Flushing Device

ASME A112.19.15 Bathtubs with Pressure Sealed Doors

ASME A112.19.19 Vitreous China Non-Water Consuming Urinals

ASME/CSA STANDARD ACCEPTANCE

- Standards are used by various countries, either in its entirety or some portions.
- Examples are: Mexico, China, Philippines, Saudi Arabia, UAE, Indonesia, etc.

ASME STANDARDS ACCEPTANCE BY PLUMBING CODES

- ASME Standards are widely accepted by the different Plumbing Codes in the USA and Canada.
- ASME A112 Standards Committee works closely with the ICC International Plumbing Code and the IAPMO Uniform Plumbing Code to make sure that all relevant ASME A112 Standards are referenced in the appropriate Codes.

BENEFITS OF STANDARDIZED PLUMBING

- **Manufacturers:** Facilitates international exchange of goods and services, decrease manufacturer cost, improve the management and design, uniform terminology is created, sizes and dimensions are coordinated and adapted, exportation and marketing of products, simplifies purchasing management.
- **Consumer:** Establishes quality and safety levels for the service and products, makes easier the comparison between the different products.
- **Public Service:** Establishes quality, environmental and safety policies, helps with economical development, facilitates business, improvement of universal technical communication and mutual understanding.

BENEFITS OF STANDARDIZED PLUMBING

- Variety reduction are well known and can mostly be assessed in terms of hard cash, taking due account of the additional cost reduction effects on associated parts and operations
- Interchangeability as a result of standardization leads to higher productivity and lower manufacturing costs. These benefits are relayed to the users as a result of increased competition. Interchangeability is also very important to erection, installation, maintenance, and repairs
- Availability implies that an adequate number of varieties are always in stock. This means shorter lead times and less capital tied up on the user side.

BENEFITS OF STANDARDIZED PLUMBING

- In the United States, in the 1920, there were about 8,000 deaths per year related to poor water quality and sanitation
- Today, there are virtually none. That is due to Codes and Standards on Plumbing.
- Today, the drinking water in the United States is the safest in the world. Canada is a close second.
- For example, in Ghana, more than 4,000 children under the age of 5 die from poor water quality and sanitation each year.

HOW DOES THE ASME STANDARD AFFECT AN ENGINEER?

- Material Selection
- Design Requirements
- Fabrication Requirements
- Examination and Testing Requirements
- Quality Assurance
- Personnel Certification

SUMMARY

- Engineering Standards were developed to improve public safety, allow for uniform consistency of products, and help ensure fair and free commerce and trade
- ASME develops standards using an ANSI accredited voluntary consensus approach
- Standards help engineers by providing requirements for design, fabrication, materials, testing, and other areas



QUESTIONS?