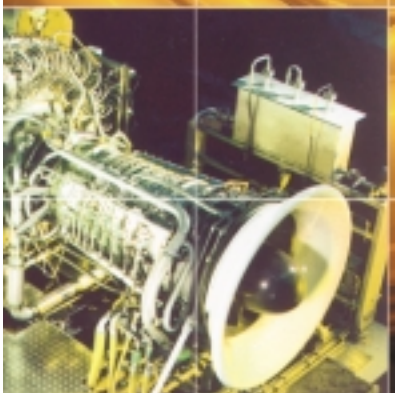
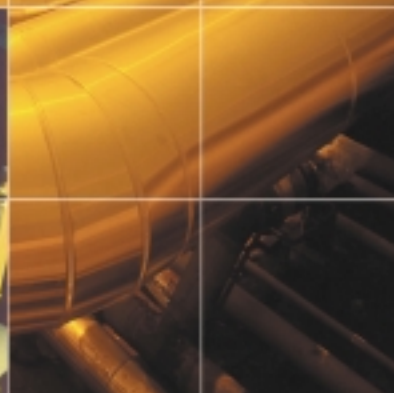
ASME International

INTRODUCTION TO

ASME CODES AND STANDARDS





ASME International

Dear Engineering Student:

The video you have just seen, "An Introduction to Codes and Standards", gave you a quick tour of the ASME involvement in Codes and Standards.* It ranged from the early impetus, given by the Sultana and Baltimore Hydrant disasters, to the present system of standard writing, conformity assessment and participation in ISO 9000.

This booklet expands on these issues so that you will become fully aware of the role codes and standards will play in your future professional life as a mechanical engineer.

Sincerely,

Task Group on Introduction to ASME Codes and Standards

Gerard G. Lowen, *Chairman*
Stuart Brown
Domenic A. Canonico
John H. Fernandes
Philip M. Gerhart
Halit M. Kosar
Richard A. Merz
Mark Pagano
Sam Zamrik

**For those who have not viewed the video please contact ASME Codes, Standards and Conformity Assessment.*
Telephone: 1-212-591-8500; Email: cs@asme.org

Introduction

From the very founding of the American Society of Mechanical Engineers (ASME International) in 1880, discussions were held on standards for shop drawing symbols, pulleys, and line shafting, machine screws, key seats, and drawing boards. With the ever-increasing industrialization, lack of interchangeability also became a problem. Engineers realized the need for standardization –the need to arrive at universal agreements on how, for example, a consumer could buy a bolt in California for a nut acquired in New Jersey, or how a worn boiler connection could be easily replaced by a new one that would fit into place securely and safely. In 1883, a committee on standards and gauges was created. During the annual meeting of the Society in the same year, a paper was presented on the need to adopt a set of rules for conducting boiler tests which would be generally accepted among engineers as a standard code of practice. The paper emphasized the prevailing lack of uniformity in that "every engineer who performs a boiler test makes a rule for himself, which may be varied from time to time to suit the convenience or interests of the party for whom the test is made." This resulted in the formation of a committee to study the subject of a uniform test code. Such a test code was published in 1884 and became ASME's first standard. Shortly thereafter, the Society decided that pipes and pipe threads should be standardized and that the standards committee should be composed of "men representative of pipe manufacturers and pipe users, with perhaps one representative of sprinkling systems and certainly one of the manufacturers of taps and dies." Such an approach to balance came to typify the makeup of future ASME standards committees.

Another serious problem facing engineers of that era was exploding boilers. Heating water to produce steam and converting that steam into energy to power machinery revolutionized production in the nineteenth century. To build up pressure, steam must be contained in some type of vessel and, uncontrolled, pressurized steam can burst even one made of steel. For want of reliably tested materials, secure fittings, and proper valves, boilers of every description on land and at sea were exploding with terrifying regularity. They would continue to do so into the twentieth century. With the boiler test code as a beginning, the establishment of universally accepted construction standards would take many years. Such standards are today found in the ASME Boiler and Pressure Vessel Code.

This Code, first published in 1915, is continually revised and updated to keep pace with new materials, new designs, and new applications in fossil and nuclear plants. It has been adopted as law in most states of the USA as well as in Canada. Since the development of this Code, boiler disasters have been reduced to almost none. After all, how many of you fall asleep at night worrying that your home heater may explode?

Figure 1
NUMBER OF EXPLOSIONS

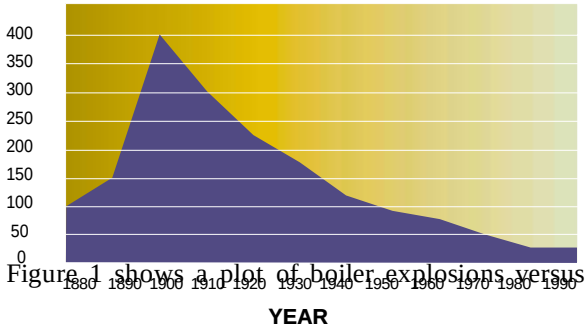


Figure 1 shows a plot of boiler explosions versus years since the Code was introduced – it speaks for itself.

It is because of codes and standards that chains and sprockets fit one another, plumbing fixtures are interchangeable, elevators do not fall, nuts and bolts have uniform dimensions, power generation equipment and industry in general operate safely and economically.

What is a standard?

A standard can be defined as a set of technical definitions and guidelines-"how to"instructions for designers and manufacturers. Standards, which can run from a few paragraphs to hundreds of pages, are written by experts.

Standards are considered voluntary because they serve as guidelines, not having the force of law. ASME publishes its standards; accredits users of standards to ensure that they are capable of manufacturing products that meet those standards; and provides stamps that accredited manufacturers place on their products, indicating that a product was manufactured according to a standard. ASME cannot, however, force any manufacturer, inspector, or installer to follow ASME standards. Their use is voluntary.

Why then are standards effective? Perhaps the 1991 Annual Report of the American Society for Testing and Materials (ASTM) said it best. "Standards are a vehicle of communication for producers and users. They serve as a common language, defining quality and establishing safety

criteria. Costs are lower if procedures are standardized; training is also simplified. And consumers accept products more readily when they can be judged on intrinsic merit."

What is a code?

A *code* is a standard that has been adopted by one or more governmental bodies and has the force of law, or when it has been incorporated into a business contract.

What is the involvement of ASME in codes and standards today?

Since the beginning of industrialization, ASME and many other standards developing organizations have worked to fulfill the growing need for standards in today's world. Through a voluntary, consensus process ASME standards are developed to protect the health and welfare of the public. In addition to developing these standards ASME provides conformity assessment processes which help to ensure that manufacturers live up to the relevant specifications and that certain personnel are properly trained.

The ASME Elevator Code encompasses design and installation of new equipment, maintenance, alteration, and inspection; all with respect to the safety of elevators, escalators, and related equipment. In addition, ASME accredits organizations that certify elevator inspectors.

Standards are also used to depict parts to be built and assembled, and to specify product drawings. By using a consistent system for drawing like the Y14.5 Standard on Geometric Dimensioning and Tolerancing, a manufacturer or fabricator is able to produce a part without misunderstanding. This contributes to the efficiency of modern manufacturing by allowing different components of a product to be built in different parts of the world.

ASME, the American Society of Testing and Materials (ASTM), and the Society of Automotive Engineers (SAE) are just some of the 200 plus volunteer organizations in the United States that adhere to procedures accredited by the American National Standards Institute (ANSI) for the development of standards. These procedures must reflect openness, transparency, balance of interest, and due process.

Committee meetings must be open to the public, and procedures are used to govern deliberations and voting. Committees must represent a balance of interested parties, and all comments on technical documents during the final approval process must be considered. Any individual may appeal any action or inaction of a committee relating to membership, or a code or standard promulgated by the committee.

ASME is one of the oldest and most respected standards developing organizations in the world. It produces approximately 600 codes and standards, covering a multitude of technical areas including boiler components, elevators, hand tools, fasteners, and machine tools. All of the items shown in the vertical sidebars of this booklet represent technical areas addressed by ASME codes and standards.

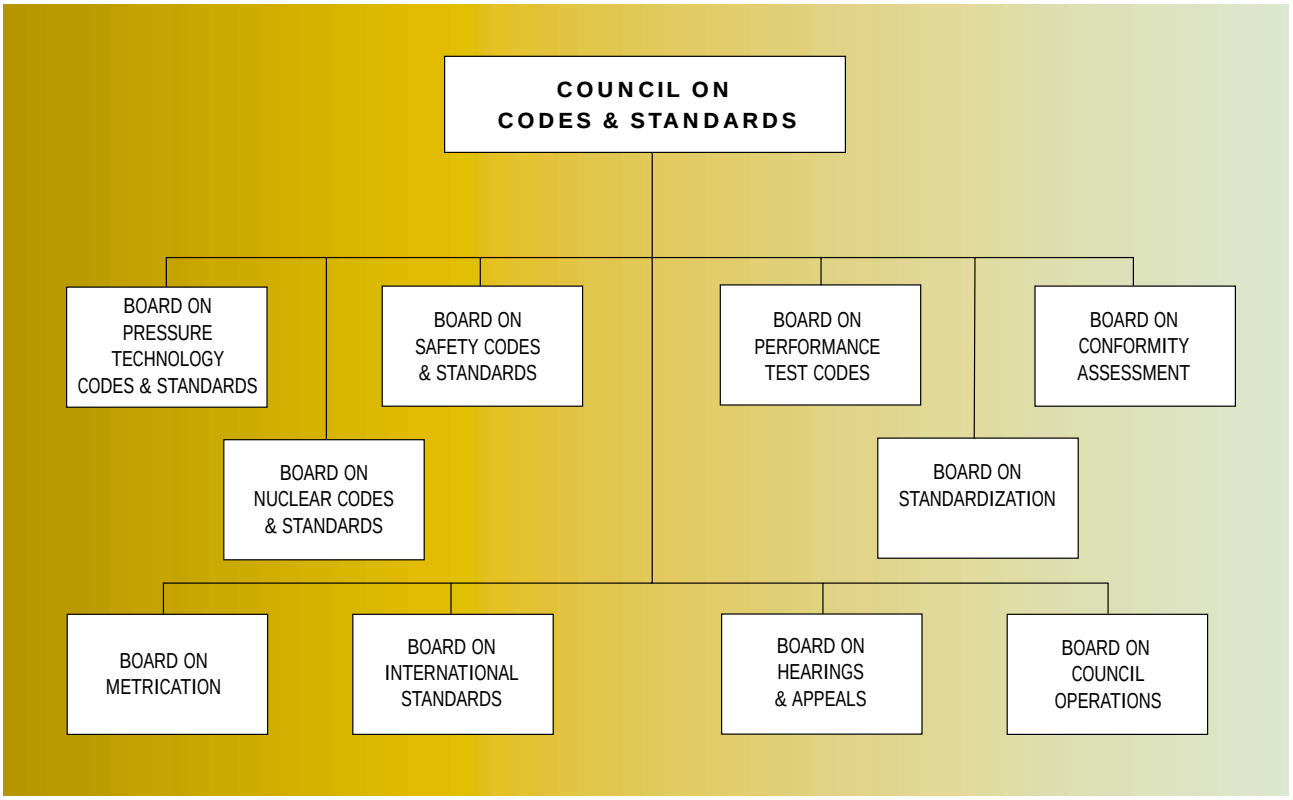


Figure 2

How is ASME organized to produce codes and standards?

Within ASME, the Council on Codes and Standards is one of five councils that report to the Board of Governors. Under this Council, as shown in Figure 2, there are six standards developing supervisory boards and four advisory boards that manage over 100 committees with 4000 volunteer members. The supervisory boards are responsible for pressure technology, nuclear installations, safety codes, performance test codes, conformity assessment and standardization. The advisory boards deal with metrication, international standards, hearings and appeals and council operations.

Codes and standards are living documents that are constantly revised to reflect new developments and technical advances. A request for a code or standard may come from individuals, committees, professional organizations, government agencies, industry groups, public interest groups, or from an ASME division or section. The request is first referred to the appropriate supervisory board for consideration. The board then assigns the request to an existing committee of knowledgeable volunteers or determines that a new standards committee must be formed. Once an appropriate committee has concluded that there is enough interest and need the standards developing process is initiated.

The standards committee is composed of engineers with knowledge and expertise in a particular field.

They represent users, manufacturers, consultants, universities, testing laboratories, and government regulatory agencies. The committee maintains a balance of members in various interest classifications so that no one group dominates. Volunteers must agree to adhere to the ASME Policy on Conflict of Interest and the Engineer's Code of Ethics.

Voting procedures for the standards committee are designed to ensure consensus as defined by ANSI. Balloting is conducted at meetings and votes are also sent by mail and email. Repeated voting may be necessary to resolve negative votes. If an individual member feels that due process was not observed, appeals may be made to the standards committee, supervisory board, and subsequently, to the Board on Hearings and Appeals.

Once consensus has been reached, the proposed standard is then subjected to a public review in Mechanical Engineering magazine, and on the ASME web site. Anyone may submit comments during the public review period, to which the committee must respond. The draft is also submitted for approval to the supervisory board and ANSI. When all considerations have been satisfied, the document is approved as an American National Standard and published by ASME.

How does one find out whether there is a standard for a product?

There are several different ways that engineers can find out whether there is an existing standard for a specific topic. They can look in the ASME Publications Catalog, the ANSI Catalog of American National Standards, the US government's OSHA General Industry Standards, or contact a standards organization directly. The internet may also be used as a resource for finding ASME standards. The ASME online catalog at http://www.asme.org/catalog can be searched by keyword, standard designation or the International Standard Book Number (ISBN).

How do manufacturers and the public get involved?

The first edition of the ASME Boiler and Pressure Vessel Code, published in 1915, provided for a stamp to be affixed to every product constructed in accordance with the Code.

Today, the various boiler and pressure vessel stamps are recognized by most states and many foreign countries as indicative of products manufactured in compliance with the Code and under a quality program acceptable to the Society.

A manufacturer obtains permission to use one of the stamps through the ASME conformity assessment process. The manufacturer's quality control system is reviewed by an ASME team. If it meets ASME requirements and the manufacturer successfully demonstrates implementation of the program, the manufacturer is accredited by ASME. The manufacturer then may certify the product as meeting ASME standards and apply the stamp to the product.

A stamp consists of a modified cloverleaf (derived from the shape of the ASME logo) with one or more letters in the center. The letters refer to the type of equipment and the applicable code. See Figure 3.

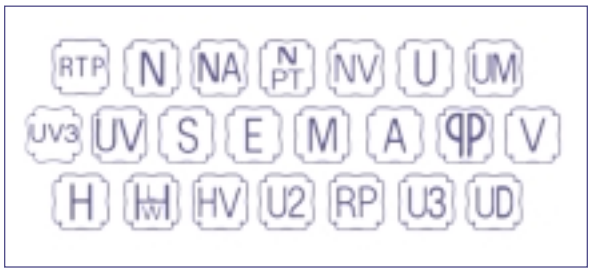


Figure 3

ASME has accreditation programs for nuclear power plant materials, fasteners and, as stated earlier, organizations that certify elevator inspectors. ASME also is accredited to certify a company's quality management system to ISO 9000 standards.

Since 1992, ASME has certified individuals to recognize that they have met the qualification criteria specified in ASME standards. Current programs include certification of operators of resource recovery facilities (municipal waste combusters), fossil fuel fired plants, medical waste incinerators, and hazardous waste incinerators; and certification of geometric dimensioning and tolerancing professionals. These programs include passing of written or oral tests.

ASME stamps issued are:

A	–	FIELD ASSEMBLY OF POWER BOILERS
E	–	ELECTRIC BOILERS
H	–	HEATING BOILERS, STEEL PLATE OR CAST IRON SECTIONAL
HV	–	HEATING BOILER SAFETY VALVES
HLW	–	LINED POTABLE WATER HEATERS
M	–	MINIATURE BOILERS
N	–	NUCLEAR POWER PLANT COMPONENTS
NPT	–	NUCLEAR POWER PLANT COMPONENT PARTIALS
NA	–	NUCLEAR POWER PLANT INSTALLATION/ ASSEMBLY
NV	–	NUCLEAR POWER PLANT SAFETY VALVES
PP	–	PRESSURE PIPING
RP	–	REINFORCED PLASTIC PRESSURE VESSELS
RTP	–	REINFORCED THERMOSET PLASTIC CORROSION RESISTANT EQUIPMENT
S	–	POWER BOILERS
U, U2, U3	–	PRESSURE VESSELS
UD	–	RUPTURE DISC DEVICES
UM	–	MINIATURE PRESSURE VESSELS
UV	–	PRESSURE VESSEL SAFETY VALVES
UV3	–	HIGH PRESSURE VESSEL SAFETY VALVES
V	–	BOILER SAFETY VALVES

• WASTE FACILITY OPERATORS • WATERHAMMER ARRESTERS • WEIGHING SCALES • WELDED ALUMINUM-ALLOY STORAGE TANKS • WHEEL DOLLIES • WHIRLPOOL BATHTUB APPLIANCES • WIND TURBINES • WRENCHES •

Conclusion

ASME is one of a number of professional and technical organizations which, together, work to secure the fabric of the modern world. The fact that the general public is unaware of their work is the best tribute to their achievement.

The system of voluntary codes and standards has brought stability to the necessities of modern living.

When you go to a movie, the projector in use is designed with standardized parts that fit together and are easily replaced. Your radio, television set, VCR, telephone, computer, hand tools, and sports equipment–virtually all modern devices for personal improvement and amusement–involve one or more engineering standards.

Invariably, those standards are scrupulously written and codified. And they are being rewritten and improved by engineers and fellow professionals all the time.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990