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Differences and comparison between ISO and ASME Standards

Millimetres, inches, nominal dimensions: the wide range of products, countries of origin and applications that may be found in industrial plants inevitably lead to a conversion issue among different specifications.

What is the meaning and the proper use of ISO and ASME Standards, metrical measures and the British Imperial System's measurements (like yards, inches, feet)?

In order to provide a thorough and comprehensive answer to this question, the history of the regulation bodies founded in the post war period must be considered. Norms and standards have changed and even experienced a considerable conceptual evolution over time, also resulting in broadened geographical horizons. Certification bodies do not only merely define processes anymore, but they also regulate services, quality, security and environmental protection.

The most relevant international bodies issuing technical standards are:

- **ISO** (*International Organization for Standardization*): an international non-governmental organization which develops and promotes worldwide technical specifications. It was founded in 1947 and it is headquartered in Geneva.
- **EN** (*Comité Européen de Normalisation*): it identifies the standards issued by the CEN. Their standards must be adopted by all the member states of the European Union.

There exist also national bodies issuing technical standards, which are listed below (in the industry jargon the following acronyms indicate the rules of standardization enforced in the country in which the body is headquartered):

- **ANSI** (*American National Standards Institute*): a private not-for-profit organization establishing industrial standards for the U.S.
- **AFNOR** (*Association Française de Normalisation*): a French organization for standardization
- **DIN** (*Deutsche Industrie Norm*): the standardisation committee of German industry
- **UNI** (*Ente nazionale italiano di unificazione – Italian National Unification*)
- **BS** (*British Standard*)

The most general and widespread unit of measurement is the nominal diameter (DN), a conventional value used to identify the diameter of mechanical components. The DN value does not coincide with the real value measured in millimetres, thus leading to a conversion issue underlying the previously asked question.

After having provided a brief overview of the main concepts related to this topic, it is now possible to illustrate the proper usage of different terms.

EN standards make use of millimetres. This kind of measurement is called “metrical”, and it is used for plastic and metallic pipes, ferrous and stainless steel and it determines joints' dimensions. The dimensions of welded fittings EN 10253 should rather be expressed in centimetres or meters (e.g. d. 168,3). Instead, the nominal diameter (DN) is usually used as reference for flanges EN 1092.

ANSI makes use of imperial units. In particular, ANSI's specifications concerning pipes' dimensions is called ASME (*American Society of Mechanical Engineers*).

ASME is a professional association that developed calculation standards for the sizing of pressure vessels, which are considered by supervisory authorities as reference standards. The dimensions of seamless fittings ASME B16.9 and flanges ANSI ASME B16.5 should be expressed in inches.

Below you can find a conversion table that enables you to express for each item their dimensions according to the reference standards.

Conversion table ISO / ASME		
DN	ISO / mm	ASME / inches (mm)
10	17,2	3/8" (17,15)
15	21,3	1/2" (21,34)
20	26,9	3/4" (26,7)
25	33,7	1" (33,4)
32	42,4	1 1/4" (42,16)
40	48,3	1 1/2" (48,26)
50	60,3	2" (60,3)
65	76,1	2 1/2" (73,03)
80	88,9	3" (88,9)
100	114,3	4" (114,3)
125	139,7	5" (141,3)
150	168,3	6" (168,3)
200	219,1	8" (219,1)
250	273	10" (273)
300	323,9	12" (323,9)
350	355,6	14" (355,6)
400	406,4	16" (406,4)
450	457,2	18" (457,2)
500	508	20" (508)
600	609,6	24" (609,6)
800	812,8	32" (812,8)
900	914,4	36" (914,4)
1000	1016,8	40" (1016,8)