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MILLIMETERS, INCHES, AND NOMINAL SIZES

LET'S GET CLARITY

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Millimeters, inches, and nominal sizes: let's get clarity

Product types, countries, origins of items, application of standards...
it's easy to get confused in a plant between size conversions and between different specifications.

Standards organizations

Let's get clarity by starting with the standards organizations.
Standards organizations were formed in the post-war period to develop standards of global interest. Over time, they have evolved into technical committees that prescribe general and specific rules for the design, construction, and testing of equipment, machinery, and materials.
Today, certification bodies define processes and regulate services, quality, safety and the environment.

The most important international bodies at the level of issuing technical standards are:

ISO (**International Organization for Standardization**): founded in 1947 with headquarters in Geneva, ISO is the world's leading non-governmental organization for the development and establishment of technical standards.
ISO standards apply worldwide. Each country can choose to adopt ISO standards as its own.
A standard is UNI ISO when a particular ISO standard is implemented nationwide. A standard is UNI EN ISO when the ISO standard has also been implemented at the European level.
ISO uses the metric system of measurement and therefore its measurements are expressed in millimeters.

EN (**Comité Européen de Normalisation**): the abbreviation EN identifies standards that have been developed by the European Committee for Standardization (CEN).
EN standards must be mandatorily transposed by member countries of the European Union (in the case of Italy they become UNI EN).
When we see a UNI EN standard it is a transposition of the CEN standard.
It is not possible to have a UNI standard that contradicts those of CEN: these standards are intended to harmonize technical regulations throughout Europe, it goes without saying that the existence at the national level of standards that are not in harmony with their content is not allowed.
EN uses the metric system of measurement and therefore its measurements are expressed in millimeters.

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ASME (**American Society of Mechanical Engineers**): is a non-profit professional organization founded in 1880 based in the United States that deals with standards in the field of mechanical engineering: it promotes collaboration, knowledge sharing and development of techniques across all disciplines of engineering.
ASME uses the imperial system of measurement and therefore its measurements are expressed in inches.

Other bodies at the national level are:

ANSI (**American National Standards Institute**): a private, non-profit organization that sets industrial standards for the United States.

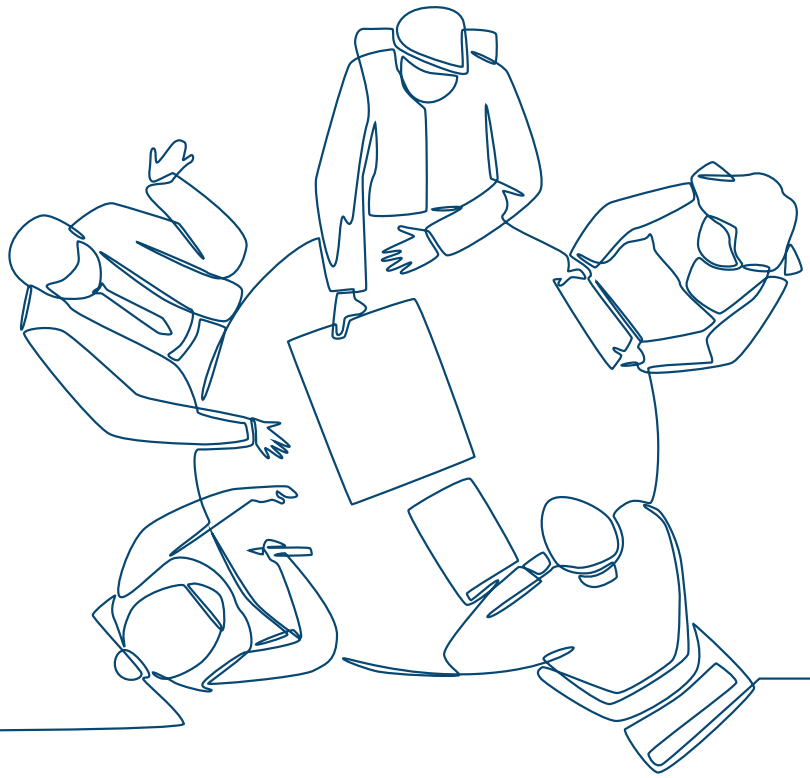
AFNOR (**Association Française de Normalisation**): French association for standardization.

DIN (**Deutsche Industrie Norm**): a German commission for industrial standardization.

UNI (**Ente nazionale italiano di unificazione**): a private association that develops and publishes technical standards for all industrial, commercial and service sectors.
It represents Italy at the European (CEN) and worldwide (ISO) standards organizations.

BS (**British Standard**): these are the standards produced by the BSI Group, established by Royal Charter and formally designated as the National Standards Body (NSB) for the United Kingdom.

Millimeters, inches and nominal dimensions are governed by the standards produced by these bodies.



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ISO or ASME, metric (mm, cm, ...) or imperial (inches, feet, ...)? Let's examine their proper use.

Inches and millimeters are units of measurement used to express length.
By historical convention, **both the metric system and the imperial system**, typical of Anglo-Saxon countries, **are used in the fields of plumbing and mechanical fittings**.
The inch is a unit of length used in the imperial system of measurement, mainly in the United States and some other English-speaking countries. One inch corresponds to 25.4 millimeters.
Millimeters is a unit of length in the metric system, which is widely used throughout the world. One millimeter is equal to one thousandth of a meter.
Several measurements are expressed in millimeters or inches and are easy to identify.
Confusion often arises over nominal measurements: nominal diameter and nominal pressure.

The nominal diameter DN

Nominal diameter DN is a conventional value used to specify the dimensions of a pipeline and to provide a standardized reference for selecting related components, such as fittings, valves, and flanges.
It refers to the approximate measurement of the inside diameter of a pipe, valve, or flange and is a standardized value that facilitates the classification of piping components, for example: DN 50 indicates a nominal diameter of 50 mm, but the actual diameter may vary depending on the wall thickness of the pipe.
It is therefore an indicator used as a standardized reference for determining the size of mating elements in a pipe and is based on the inside diameter of the components.
Conventional DN values can be converted to millimeters (ISO) and inches (ASME) using the appropriate conversion tables.

The pressure rating PN

PN, pressure rating, is a conventional indication of the maximum internal working pressure for which a pipe, valve or flange is designed.
Nominal pressure is expressed in bar: a unit of pressure, covered by the International System (SI) for measuring fluid pressures, and helps determine the suitability of a component for a given application. For example, PN 16 indicates a pressure rating of 16 bar. This parameter defines the ability of piping, valves or flanges to withstand a given working pressure, under specific temperature conditions, and is used to ensure system safety and reliability.
Mechanical and dimensional characteristics are involved in the pressure rating PN, it is not a physical quantity, and corresponds to the working pressure of water at a temperature not exceeding 20° C.

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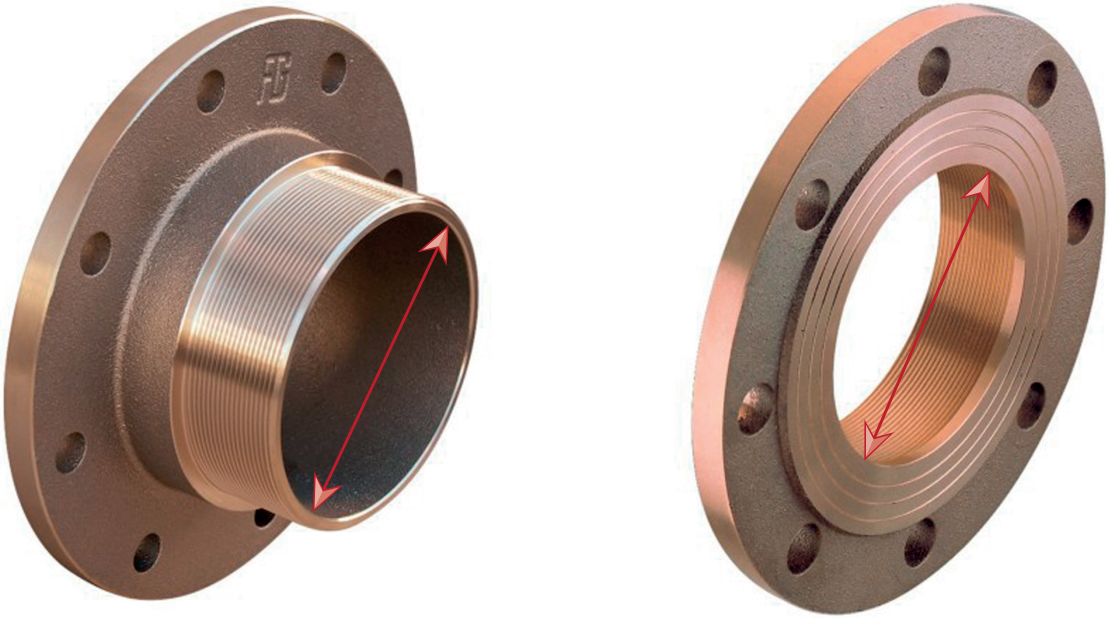
DN (nominal diameter) and PN (pressure rating) thus refer to two different characteristics of pipes or flanges.

In short, DN refers to the inside diameter of piping or flanges, while PN indicates the maximum working pressure for which a component is designed.
Both are important parameters to consider when designing and selecting piping system components, but remember that they refer to different characteristics.

Two elements must have the same nominal size (DN) and pressure rating (PN) to be directly mated.



Nominal diameter DN (mm / inch)

PN pressure rating (bar)

PN is the maximum pressure at which a component can operate. It is not a physical quantity like diameter.
PN affects component dimensions, such as thickness and number of holes, because materials and geometries must be designed to withstand certain pressures.

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Don’t forget to share your ideas with us!

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