DEGREE OF SIMPLIFICATION OF DRAWING OF MACHINE PARTS

The degree of simplification is assumed depending on the scale and character of the drawing, namely:

- 1st degree simplifications (referred to in the standards as a simplified representation) are mainly used in the execution drawings of machine parts,
- second degree simplifications (referred to in the standards as a conventional representation) are used in assembly drawings, especially those made in a large reduction with a large number of small parts,
- schematic simplifications (so-called 3rd degree) are used in schematic drawings.

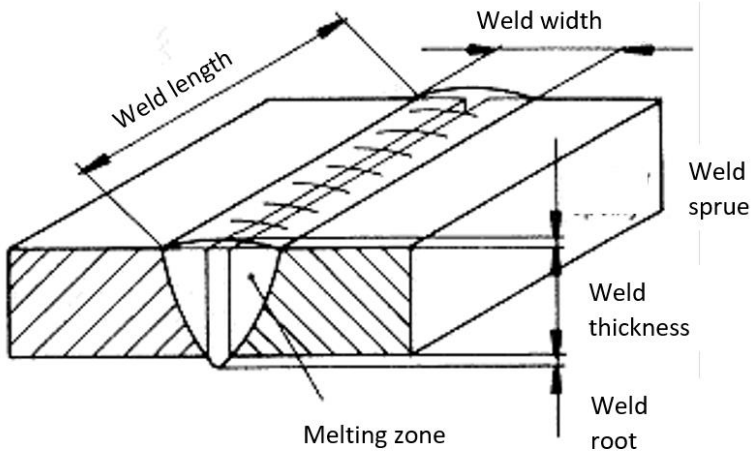
TYPES OF CONNECTIONS

CONNECTIONS

INSEPARABLE	SEPARABLE
• rivet	thread
• welded	pin
• molten	bolt
• soldered	splined
	multi-notched
• glued	tubular
• stitched	

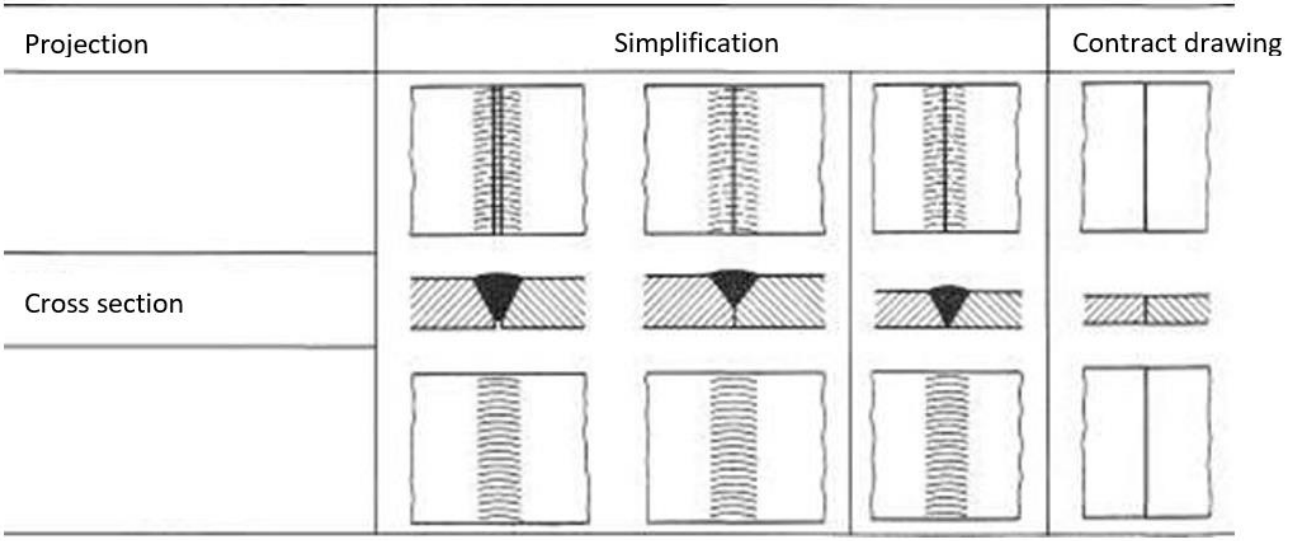
WELDED CONNECTIONS

In the technical drawing, welded joints can be represented in a simplified way, in accordance with general rules, or in a conventional way. Currently, only the contractual record is standardized (PN-EN 22553:1997, PN-ISO 2553:1997).



WELDED CONNECTIONS

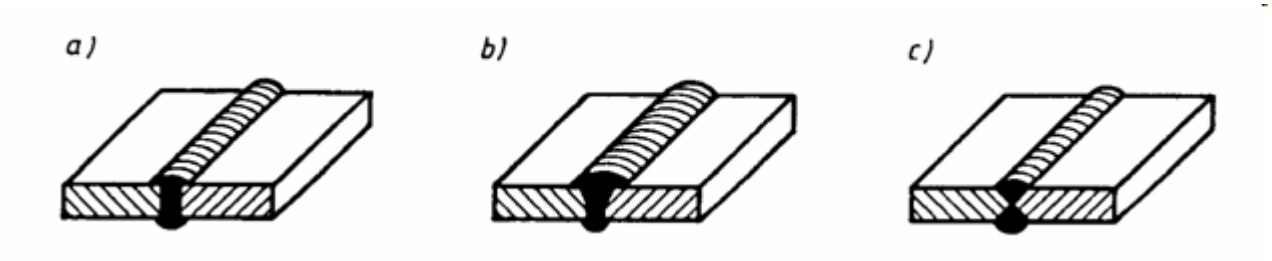
In simple terms, in the cross-section of a welded joint, the outline of the weld is drawn with a thick continuous line, and the outline of the joined parts undergoing remelting with a thin continuous line. The weld can be blackened. In the face view, the weld is represented by short thin arcs. In the view from the side of the ridge (opposite the face), the ridge is marked with a thick continuous line, and the invisible face with dashed arcs.



WELDED CONNECTIONS

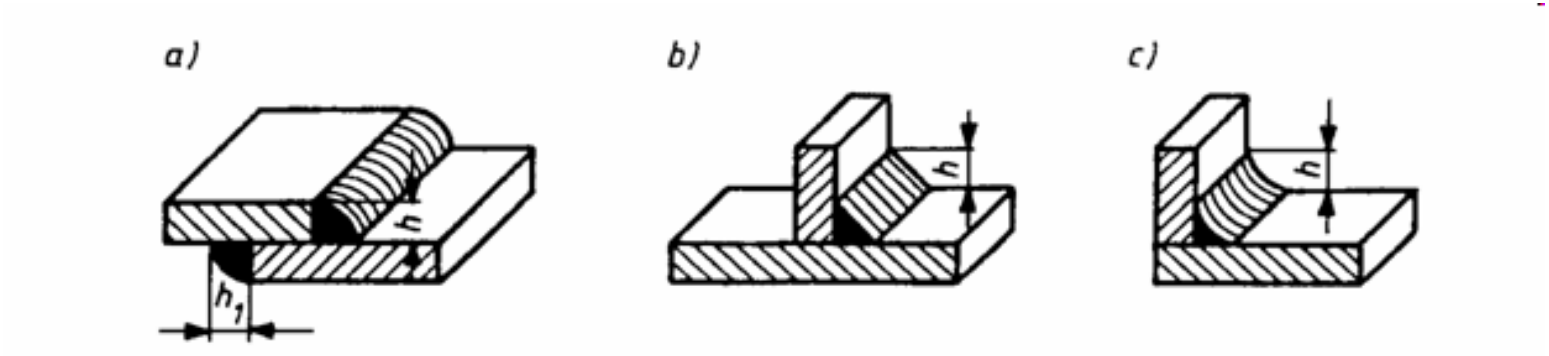
The weld designation consists of the weld mark and the basic dimensions in millimeters, which are: the thickness "a" of the weld, entered above the reference line on the left side of the weld mark, and the length "l" of the weld, entered on the right side of the mark.The thickness of the butt weld is:

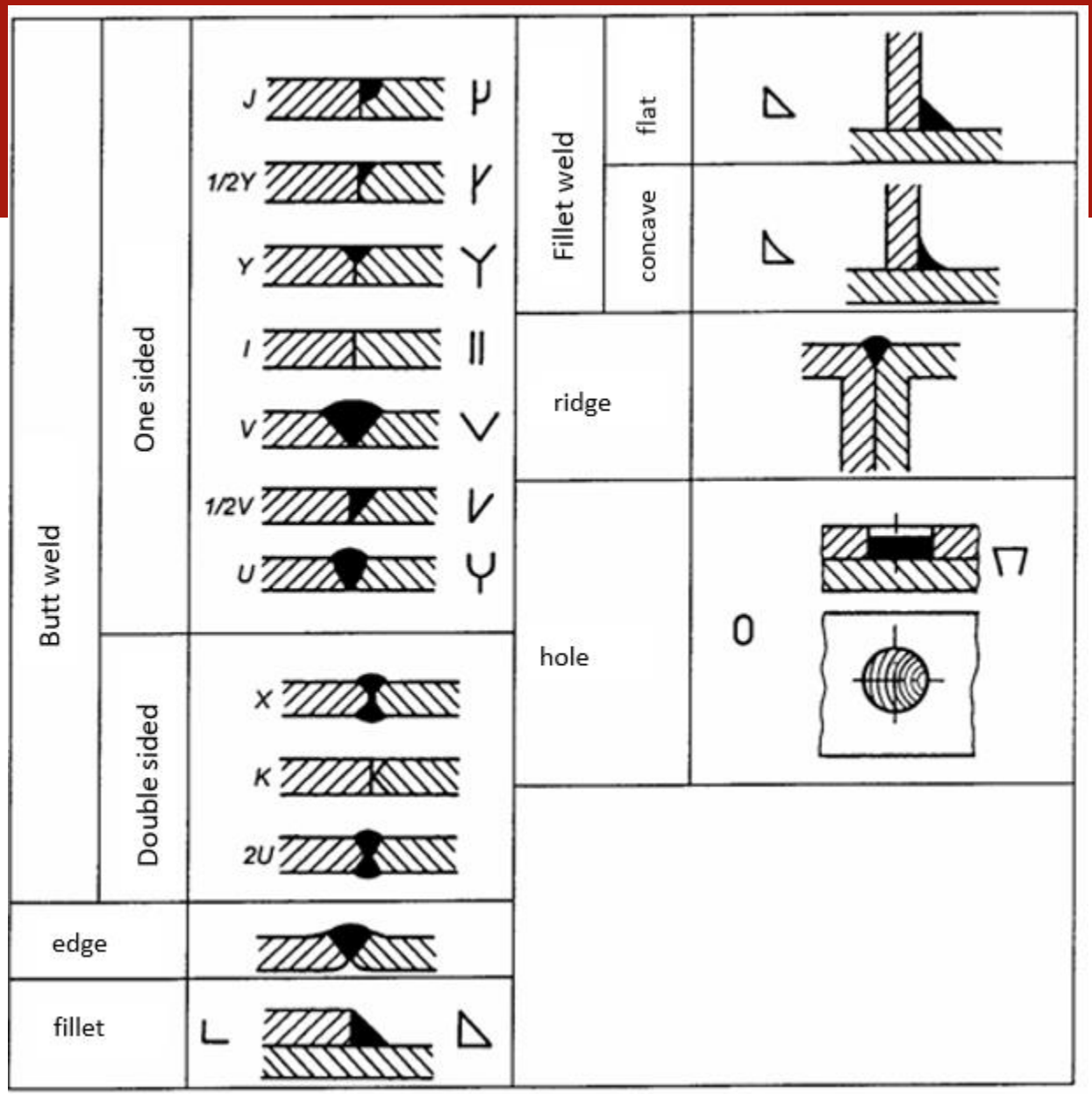
- the thickness of the joined parts
- the minimum distance from the weld face to the fusion border.



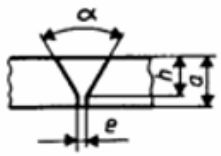
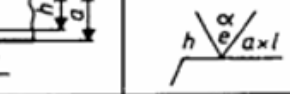
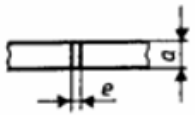
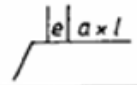
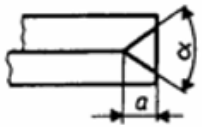
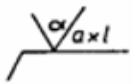
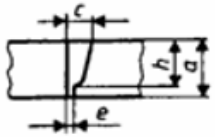
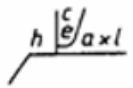
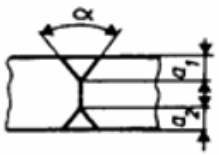
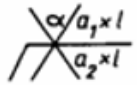
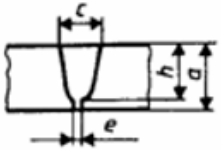
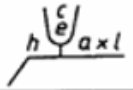
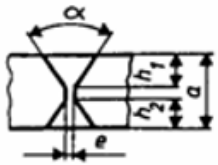
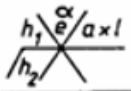
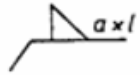
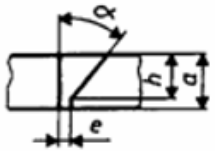
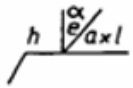
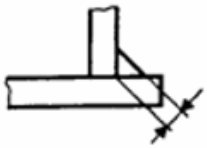
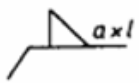
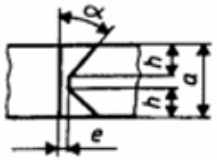
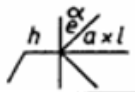
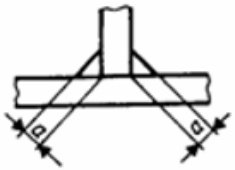
WELDED CONNECTIONS

The fillet weld thickness is the height of an isosceles triangle inscribed in the weld cross-section. This dimension can be replaced with the length of the side of the triangle.




Butt weld
One sided
Double sided
J
1/2Y
Y
I
V
1/2V
U
X
K
2U
edge
fillet
Fillet weld
flat
concave
ridge
hole

Dimensioning and marking of joints

No.	Joint drawing	Name Marking	No.	Joint drawing	Name Marking
1		Butt weld 	7		Butt weld I 
2		Butt weld V 	8		Butt weld J 
3		Butt weld 2V 	9		Butt weld U 
4		Butt weld X 	10		lap fillet weld L 
5		Butt weld 1/2V 	11		angle fillet weld L 
6		Butt weld K 	12		angle fillet weld 2L 

THREADED CONNECTIONS

- Threaded fasteners and threaded connections in the technical drawing are presented in a simplified form.

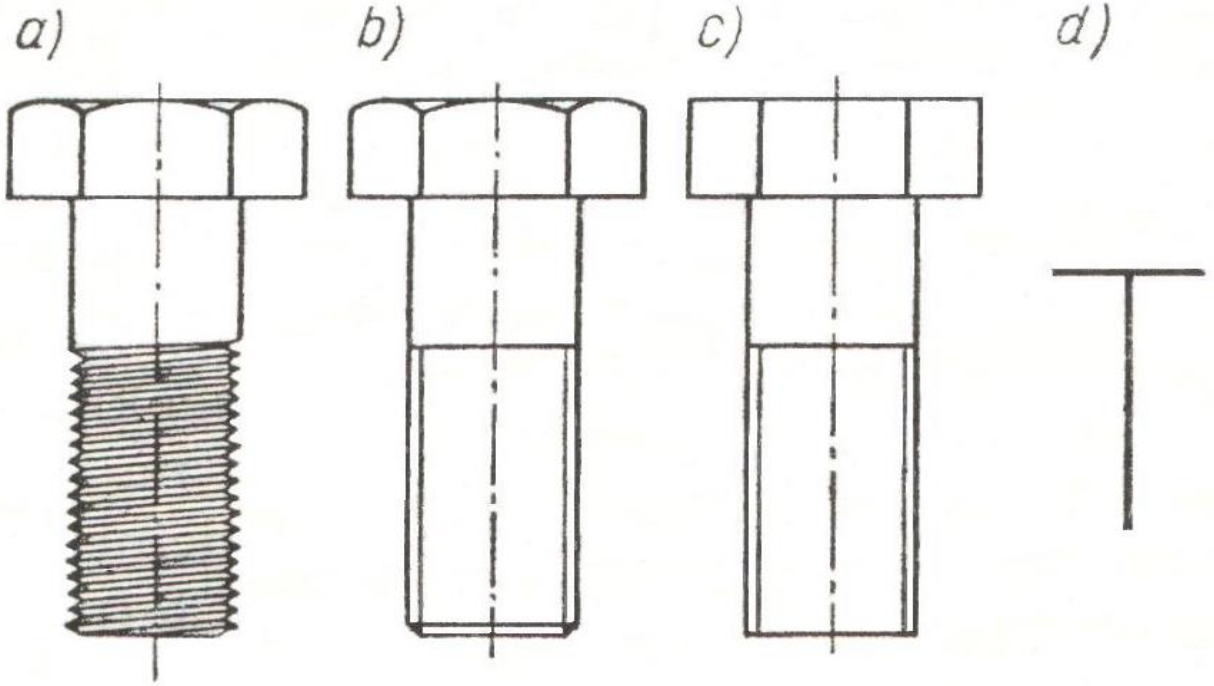
THREADED CONNECTIONS

- The presentation of the simplification consists in replacing the most complicated and difficult to draw lines of the outline of the object with lines that are easier to draw.
- Conventional representation consists in replacing the drawing of the entire object with a fixed, conventional graphic symbol.

THREADED CONNECTIONS

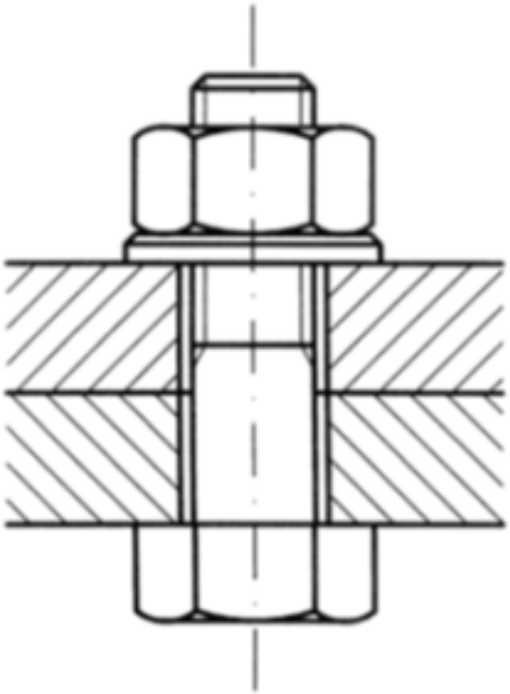
Hex head screw:

- real appearance
- first degree of simplification
- second degree of simplification
- third degree of simplification (conventional representation)

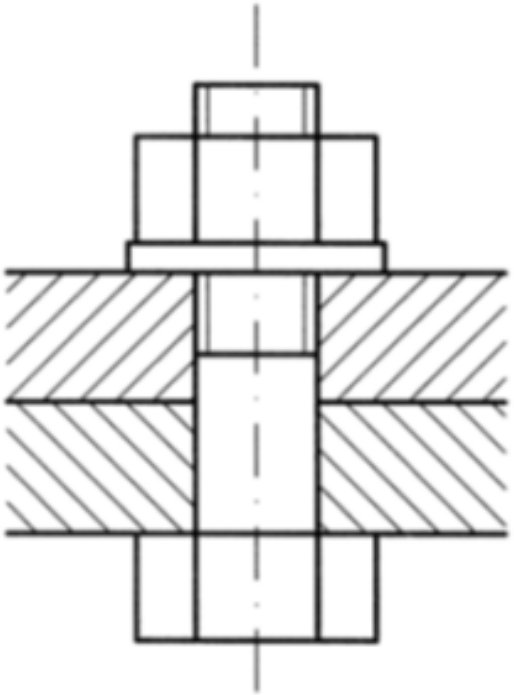


THREADED CONNECTIONS

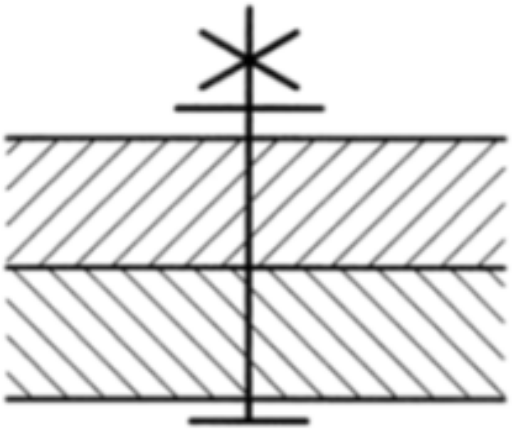
Accurate drawing



Simplified drawing



Symbolic drawing

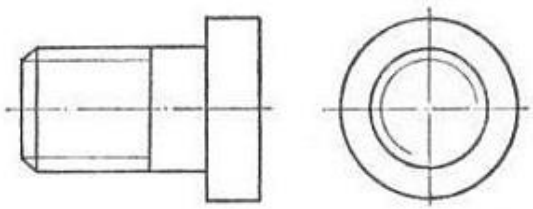


THREADED CONNECTIONS

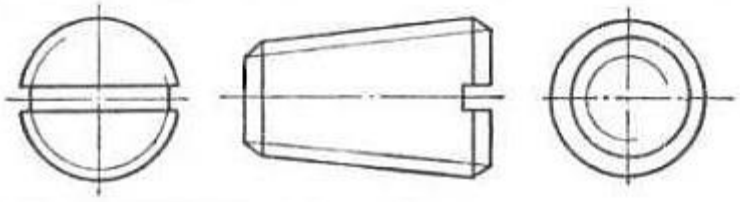
- The simplified way of drawing threads applies to all types of threads and consists in drawing the surface of the tops of the thread bosses with a thick line, and the surface of the bottoms of the grooves with a thin line. The distance between the thin line and the thick line should be equal to the thread pitch, but not less than 0.8 mm.
- In the projection on a plane perpendicular to the axis of the thread, a thin line is drawn along 3/4 of the circumference. This line should not start or end on the axes of the workpiece.
- The end of the thread length is drawn with a thick line led to the outer diameter of the thread.

THREADED CONNECTIONS

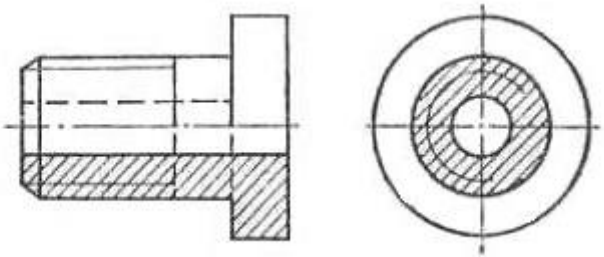
cylindrical external thread in view



external taper thread in view



external thread in half view and longitudinal half-section as well as in cross-section

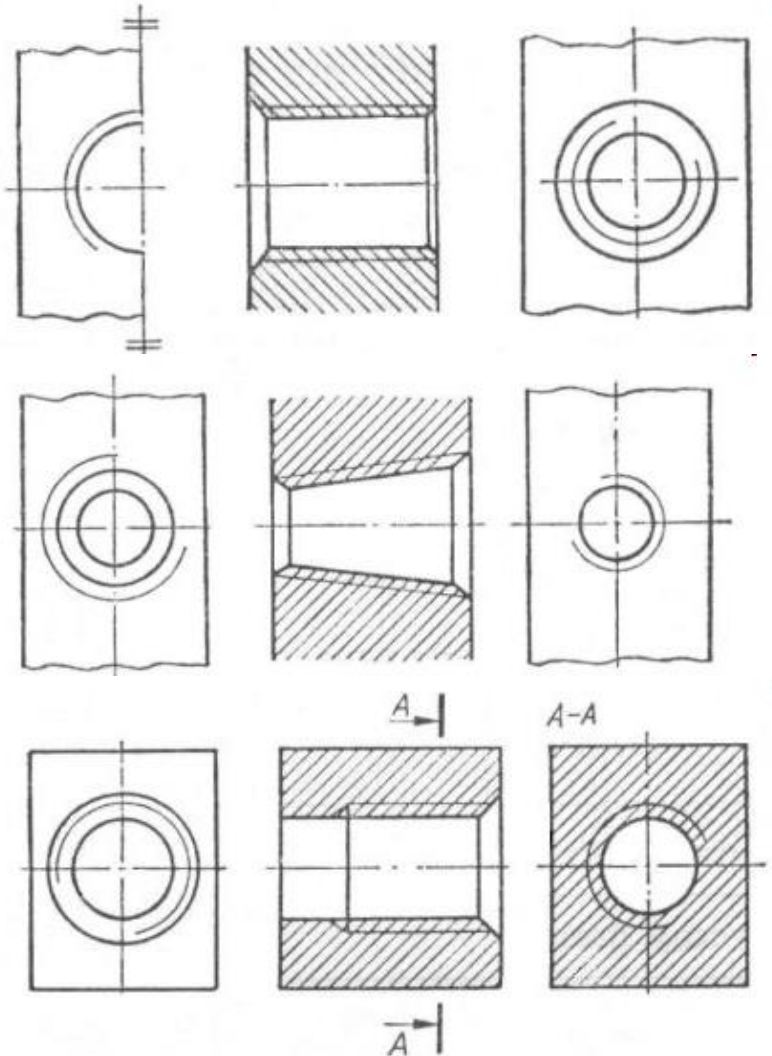


THREADED CONNECTIONS

cylindrical internal thread through

internal taper thread

internal blind thread

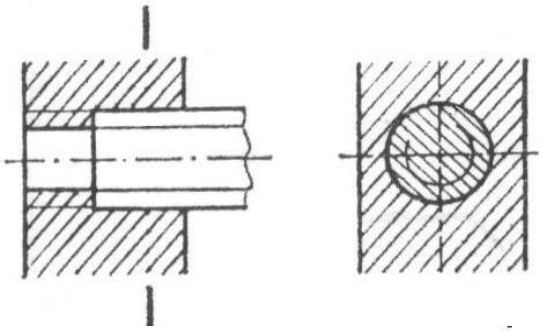


THREADED CONNECTIONS

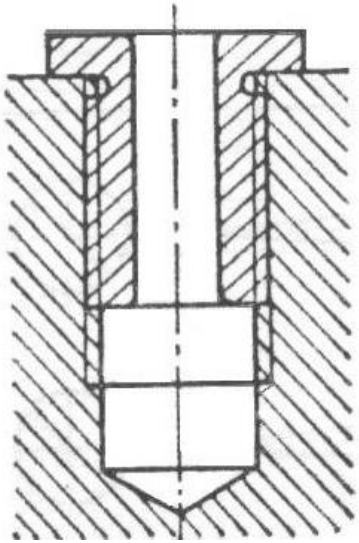
- A threaded connection is obtained by screwing an element with an external thread made on the shaft (screw, bolt) with an element with an internal thread made in the hole (nut).
- When drawing threaded connections, the advantage of an external thread (bolt) over an internal thread (nut) is assumed as a rule.

THREADED CONNECTIONS

A pin screwed into a threaded hole

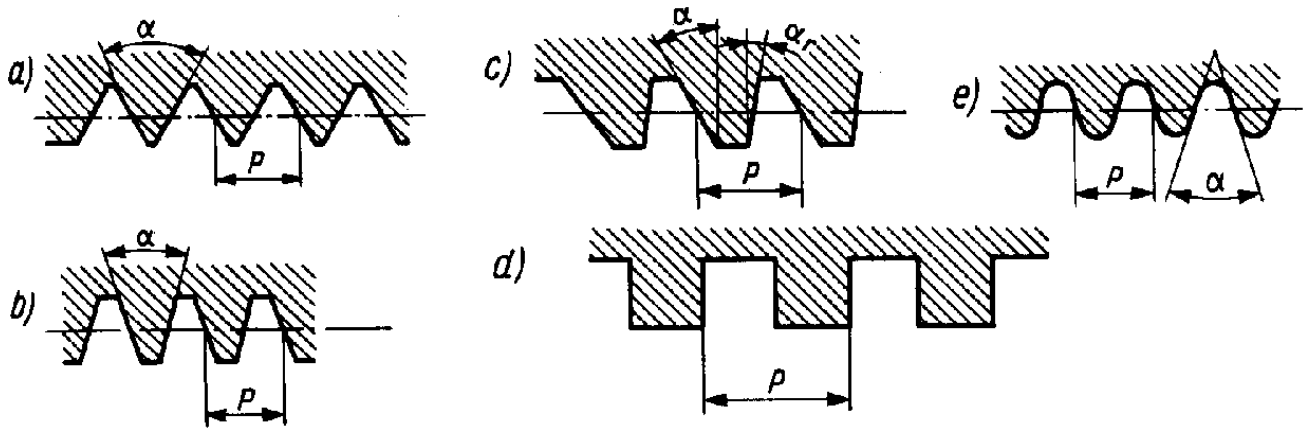


Sleeve screwed into threaded hole



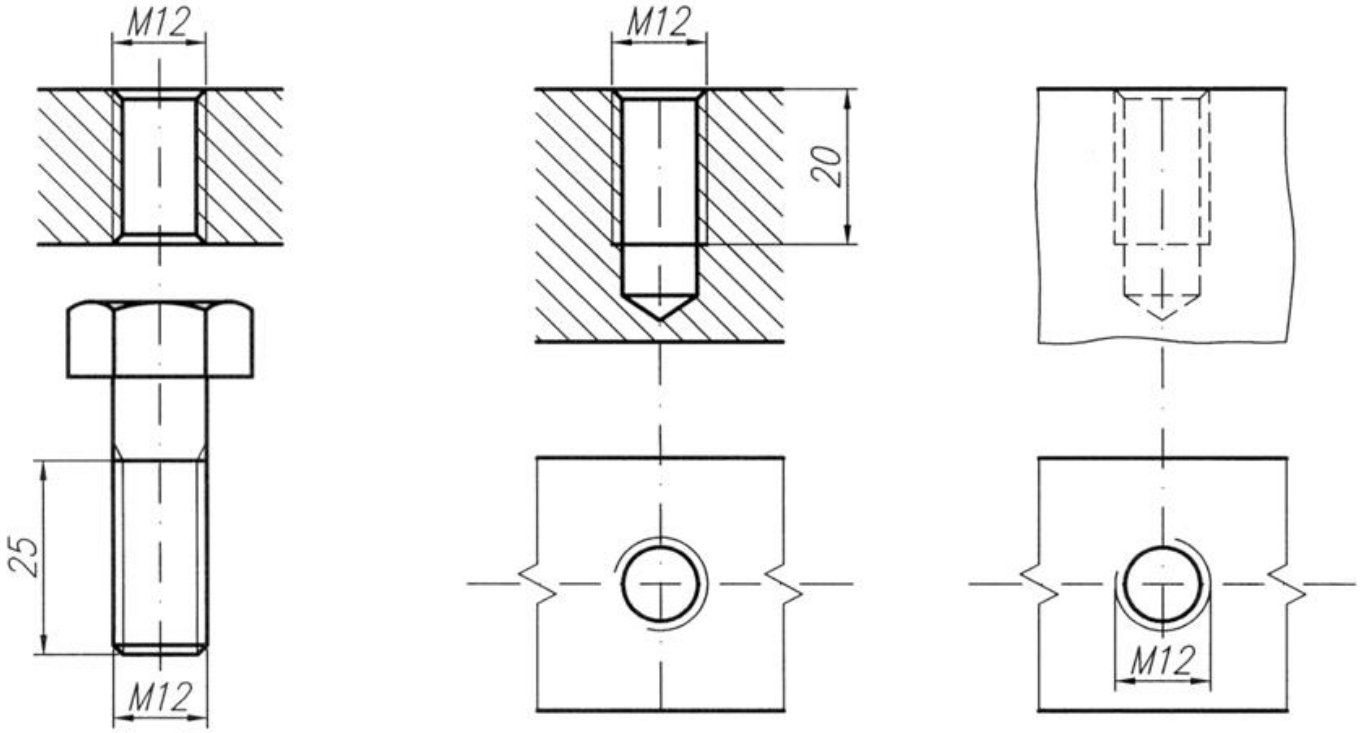
SELECTED TYPES OF THREADS AND THEIR DESIGNATIONS

- Metric thread, e.g.: M20
- Trapezoidal thread, e.g.: Tr24x5
- Cylindrical, e.g.: G ½
- Tapered tubular, e.g.: R1/2
- Round, e.g.: RD32X1/8"



THREAD DIMENSIONS

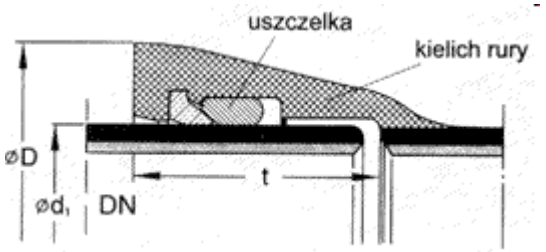
Threads are dimensioned by specifying the thread designation and its usable length.

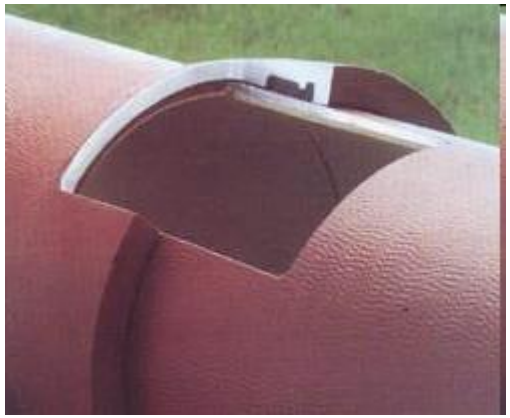


TUBULAR CONNECTIONS

We divide into:

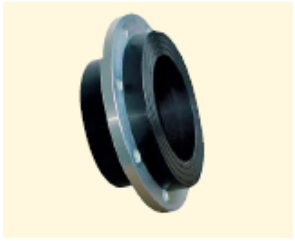
- bell-shaped - They are used on water and sewage pipes. They consist in inserting the end of one pipe (spigot) into another pipe (socket). Sealing is done with a rubber gasket.





TUBULAR CONNECTIONS

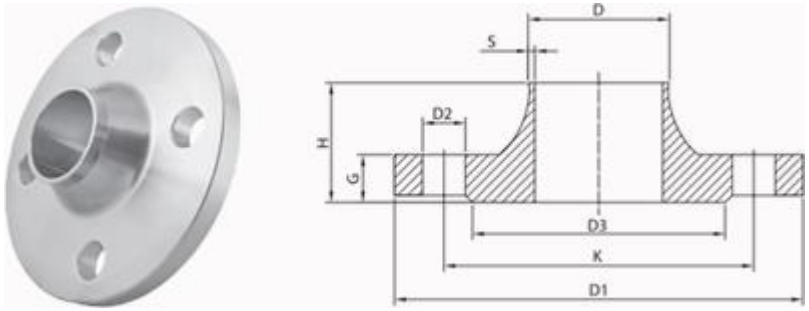
- flanged - They are used on water, steam and gas lines (at high pressures). Flanges can be fixed or loose, applied over the pipe mouth shoulder. The joint sealing material, depending on the type of liquid or gas being conducted, can be rubber, cardboard, fabrics, soft metals, plastics.

TUBULAR CONNECTIONS

Flat flange

Blind flange



Neck flange

TUBULAR CONNECTIONS

TUBULAR CONNECTIONS

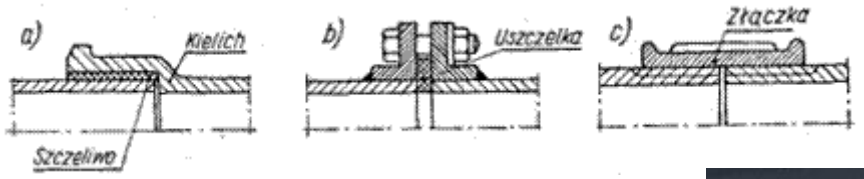
TUBULAR CONNECTIONS

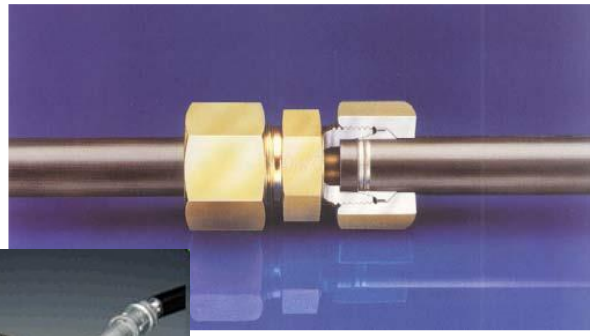
Flanged connections for PE pipes

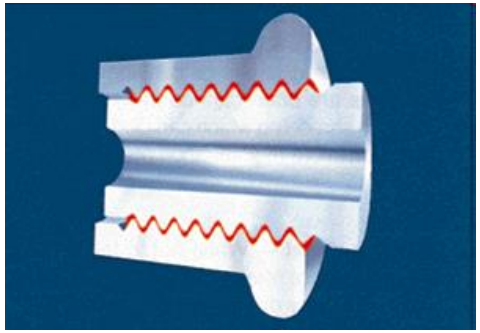
Flanged connections for cast iron pipes

TUBULAR CONNECTIONS

- **threaded** - Used in water, steam and gas lines. Their sealing consists of hemp wrapped on the thread and with varnish. Currently, special pastes are used. External threads can be cylindrical or tapered, bore threads only cylindrical.







TUBULAR CONNECTIONS

TUBULAR CONNECTIONS