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GAS and NPT threads

In the previous article introducing the very concept of threading it was highlighted that in the hydraulic sector two specific kinds of threads are used: GAS threads and NPT threads.

GAS threading originated from the Whitworth thread – which was devised in 1833 and which is still used in the mechanical field – with a very subtle pitch. It is used for pipes' coupling and fluids conveyance and it is therefore common in stainless steel fittings.

The designation of GAS threading is conventional and it refers to the theoretical minor diameter of a pipe. Usually, the dimensions of threaded fittings are expressed in inches. Yet, conversion tables enable people to easily convert the width of a pipe's diameter in millimetres.

GAS threads are divided into **Conical GAS** and **Cylindrical GAS** threads.

The joints between the screws and nuts of conical threads are hermetically closed. This may be done by means of the coupling between conical screws with conical or cylindrical nuts.

Instead, the joints between screws and nuts of cylindrical threads are not perfectly hermetic. Cylindrical threads are defined parallel and the screwing stops before the outer part of the thread. Tightness is guaranteed by the presence and use of gaskets.

Therefore, they can be classified into two categories:

- Threads for those pipes that are not watertight on the thread (UNI EN ISO 228)
- Threads for pipes that are watertight on the thread (UNI EN ISO 226, that substituted UNI EN ISO 7).

It must be noted that UNI EN ISO 226 is divided into UNI EN ISO 226-1 for conical screw – cylindrical nut; UNI EN ISO 226-2 for conical screw – conical nut.

The designation of threads for watertight pipes is done starting from letter R (external conical thread). For differentiating them on the basis of internal threading, letters p and c are added as follows:

- Rp followed by the DN dimension expressed in inches for internal cylindrical threads (cylindrical nut)
- Rc followed by the DN dimension expressed in inches for internal conical threads (conical nut)

Instead, UNI EN ISO 228 only concerns cylindrical screws and cylindrical nuts with parallel threads and it is designated by letter G, followed by the DN dimension expressed in inches and tolerance class A (more restricted) or B (wider) for the dimensions limit of the major diameter, medium diameter and minor diameter (only for external threading).

NPT threading (National Pipe Thread) is the American standard compliant with ANSI B 1.20.1 standard.

NPT standards define the kind of thread and endurance obtained by contact and compression of the threaded flank with the female cone.

The most common dimensions are expressed in inches (see *Differences and comparison between ISO and ASME Standards*) and they range between 1/8" and 2".

NPT threading, usually used for carbon steel and stainless steel, can be used also for other materials such as brass, cast iron castings and plastic materials.

The standard norm has a variant – ANSI B1.20.3 – that defines the *National Pipe Taper Fuel* (NPTF), used in the petrochemical industry.

The NPT male thread can be referred to by using the acronyms MPT (Male Pipe Thread), MNPT or NPT(M). Instead, the female one can be referred to by the acronyms FPT (Female Pipe Thread), FNPT or NPT(F).

To follow, threading tables featuring size, threads' diameter, the number of threads for inches and the pitch are displayed:

BSP – British Standard Pipe			
Inch	Threading diameter (mm)	Threads x inch	Thread pitch (mm)
1/16"	7,723	28	0,907
1/8"	9,728	28	0,907
1/4"	13,157	19	1,337
3/8"	16,662	19	1,337
1/2"	20,955	14	1,814
3/4"	26,441	14	1,814
1"	33,249	11	2,309
1 1/4"	41,910	11	2,309
1 1/2"	47,803	11	2,309
2"	59,614	11	2,309
2 1/2"	75,184	11	2,309
3"	87,884	11	2,309
4"	113,030	11	1,337

NPT – National Pipe Thread			
<i>Inch</i>	<i>Threading diameter (mm)</i>	<i>Threads x inch</i>	<i>Thread pitch (mm)</i>
1/16"	7,938	27	0,941
1/8"	9,233	27	0,941
1/4"	13,716	18	1,411
3/8"	17,145	18	1,411
1/2"	21,336	14	1,814
3/4"	26,670	14	1,814
1"	33,401	11 1/2	2,209
1 1/4"	42,164	11 1/2	2,209
1 1/2"	48,260	11 1/2	2,209
2"	60,325	11 1/2	2,209
2 1/2"	73,025	8	3,175
3"	88,900	8	3,175
4"	114,300	8	3,175