

A vertical, close-up photograph of a metal thread, showing the ridges and valleys of the threads in detail. The lighting creates a strong sense of depth and texture, with highlights on the peaks and shadows in the valleys. The thread is positioned on the left side of the page, running vertically from top to bottom.

GUIDE TO CHOOSING THREAD TYPES



**HI-TECH
CONTROLS, INC.**

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Thread Selection for Your Application

WHY DOES THREAD TYPE MATTER?

When it comes to fittings and connectors, choosing the right thread type for the job makes all the difference. The success of your application relies on proper installation which is why choosing the correct thread is so important.

Consider these factors when selecting a thread type:

APPLICATION:

Wet or dry; indoor or outdoor
(Sun Exposure)



LOCATION:

Domestic or international



RATINGS & APPROVALS:

Requirements, certifications
(very important in hazardous applications)



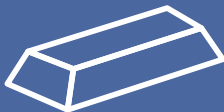
SPACING:

Footprint
(metal parts are smaller than nylon)



MATERIAL:

Nylon, nickel plated brass
or stainless steel



WALL THICKNESS:

If thick, Metric and PG
offer more options

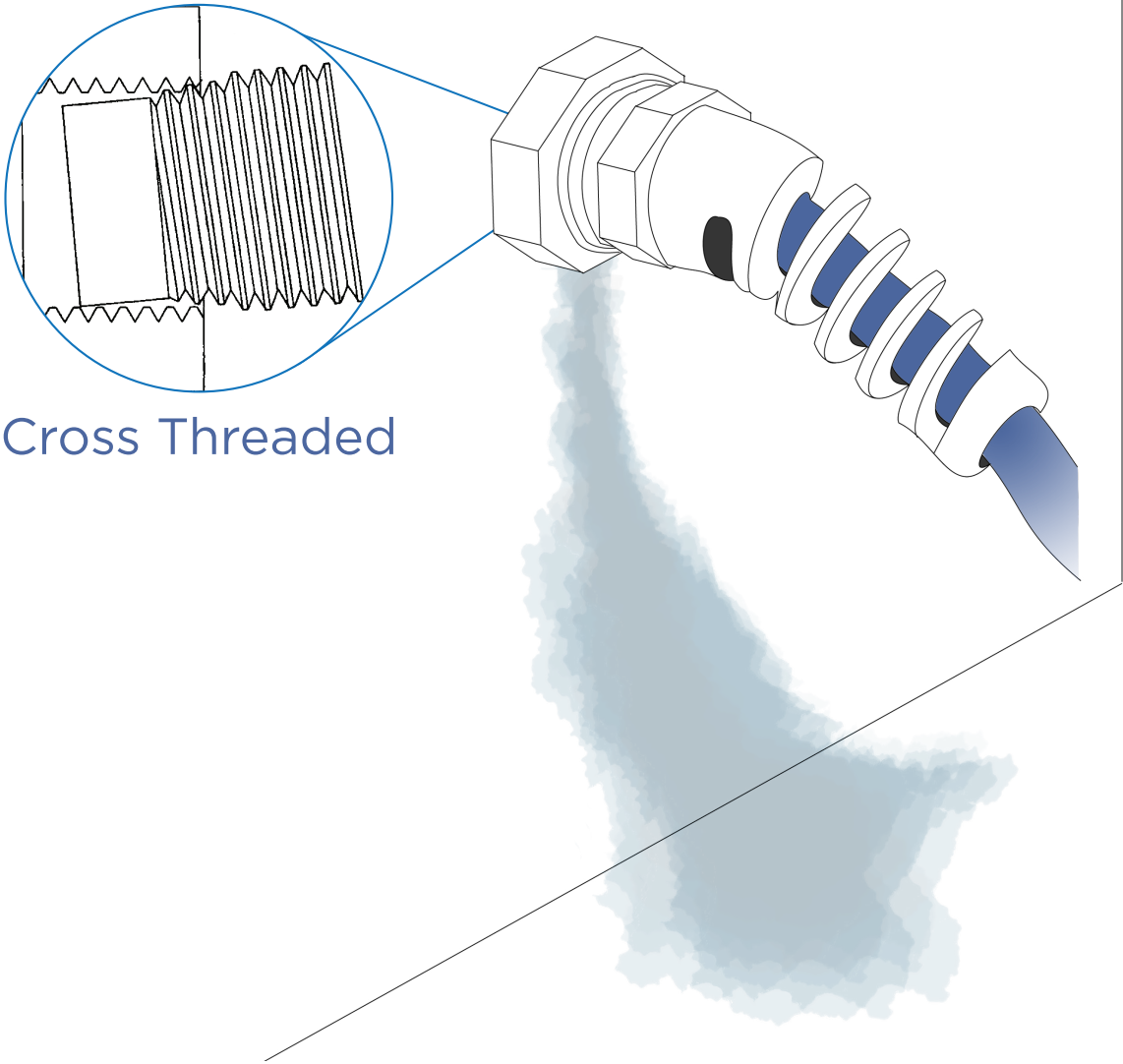


INDUSTRY:

Food and beverage, telecommunication, security, lighting, robotics,
packaging, marine, medical, renewable energy, automotive, military or
hazardous



Many problems can occur from improper thread selection including leakage, unconformity and instability. You also run the risk of cross-threading, or cutting of the thread, which could lead to permanent damage.

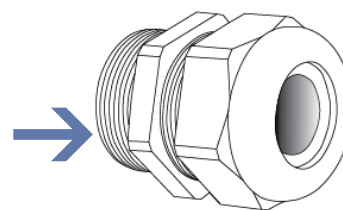


Choosing the right thread type for your application begins by understanding the basic characteristics of threads.

DEFINING THREAD TERMINOLOGY

In order to make a proper thread selection, it is important to understand the terminology used to describe the characteristics of the varying thread types.

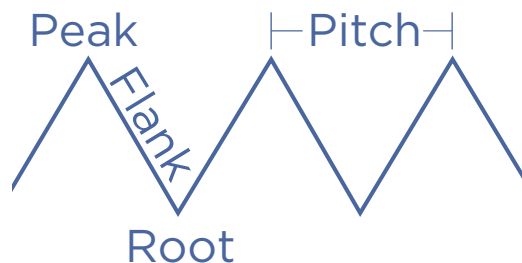
Thread – ridges wrapped around fitting in the form of a helix



Peak *also referred to as Crest* – highest point of thread

Root – lowest point of thread

Flank – thread portion connecting peak and root



Thread Pitch - distance between thread peaks along the length of the fitting

Thread Count *also referred to as TPI (Threads Per Inch)* - number of threads measured per inch along the length of the fitting

Thread Size - size of pipe or tubing with which the fitting connects

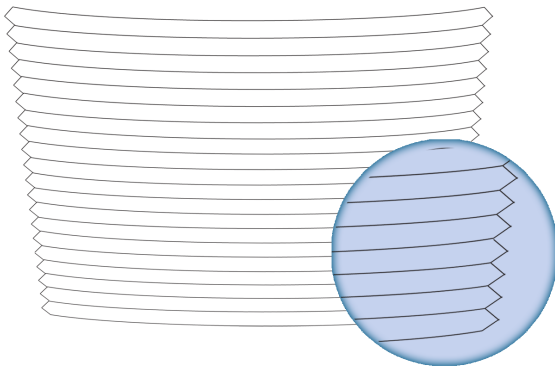
Parallel Thread *also referred to as Straight Thread* - runs straight, beginning at the shank and going to the end of the fitting

Taper Thread – runs diagonally, beginning at the shank and tapering in toward the end of the fitting

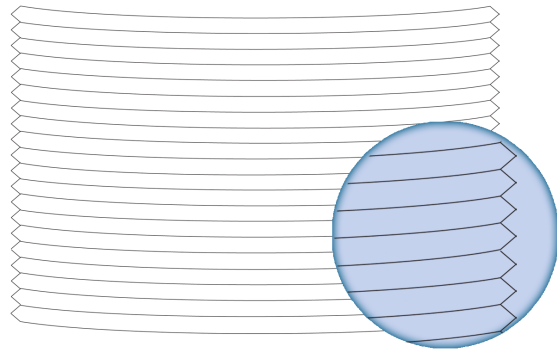
Self-Sealing Thread - seals pressure tight joints without a sealing compound

Sealant Thread - a sealant is needed to establish a liquid-tight seal

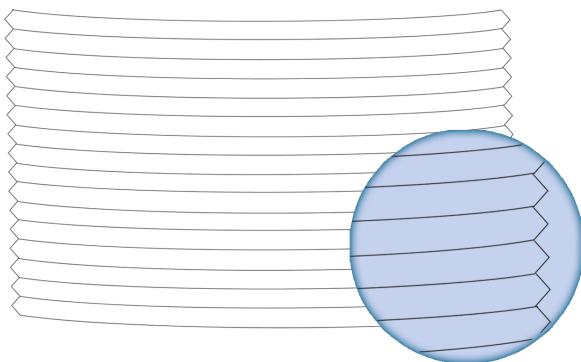
In this guide, we will discuss four basic thread types:



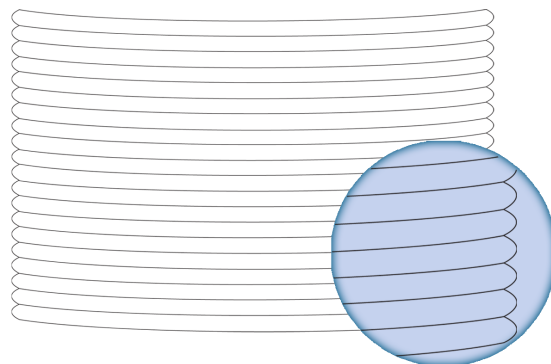
NPT THREADS
Tapered



METRIC THREADS
Straight



PG THREADS
Straight



BSPP(G) THREADS
Straight, rounded

NPT THREADS

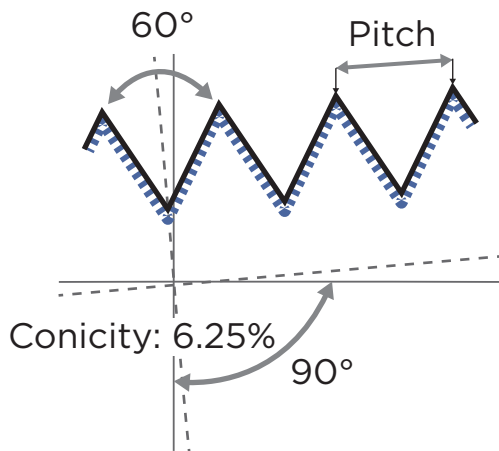
NPT stands for National Pipe Thread and is the US standard for tapered threads for connectors and fittings. NPT threads are usually longer than Metric or PG and taper toward the end. The taper rate for all NPT threads is 1/16.

NPT threads are designed to create a liquid-tight seal.. The flanks of the threads compress against each other which allow them to form a seal when torque is applied.

NPT threads are used in a wide range of materials to suit a variety of environments and conditions. You would want to use NPT threads in applications that require an effective seal from liquids, gases and steam.

NPT THREAD SPECIFICATIONS

Thread Size	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT
Major Dia. in Inches (mm)	.54 (13.72)	.67 (17.14)	.84 (21.34)	1.05 (26.67)	1.31 (33.40)	1.66 (42.16)	1.90 (48.26)	2.37 (60.32)
Pitch in Inches (mm)	.06 (1.41)	.06 (1.41)	.071 (1.81)	.07 (1.81)	.087 (2.21)	.087 (2.21)	.087 (2.21)	.087 (2.21)
Threads per Inch	18	18	14	14	11.5	11.5	11.5	11.5



- NPT Thread = National Pipe Thread
- Taper rate for all NPT threads is 1/16
- The taper on NPT threads allows them to form a seal when torqued as the flanks of the threads compress against each other

METRIC THREADS

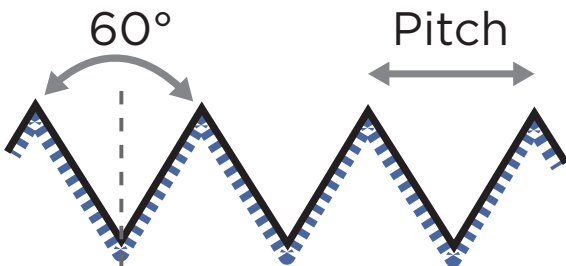
Even though Metric threads are European, they are the most common thread type used world-wide.

Metric threads are characterized by their major diameter and pitch, both expressed in millimeters. For example, an M20 x 1.5 fitting has a major diameter of 20mm and a pitch of 1.5mm.

You would want to use Metric threads in export equipment.

METRIC THREAD SPECIFICATIONS

Thread Size	M6	M8	M10	M12	M16	M20	M25	M32	M40	M50	M63
Major Dia. in Inches (mm)	.24 (6)	.31 (8)	.39 (10)	.47 (12)	.63 (16)	.79 (20)	.98 (25)	1.26 (32)	1.57 (40)	1.97 (50)	2.48 (63)
Pitch in Inches (mm)	.04 (1)	.05 (1.25)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)	.06 (1.5)
Thru Hole in Inches (mm)	.25 (6.4)	.33 (8.4)	.41 (10.5)	.49 (12.5)	.63 (16)	.79 (20)	.98 (25)	1.26 (32)	1.57 (40)	1.97 (50)	2.48 (63)



- Most commonly used type thread type world-wide
- Characterized by its major diameter and pitch
- Designated by the letter M followed by the value of the nominal diameter and the pitch, both expressed in millimeters and separated by the multiplication sign 'x' (i.e. M12 x 1.5)

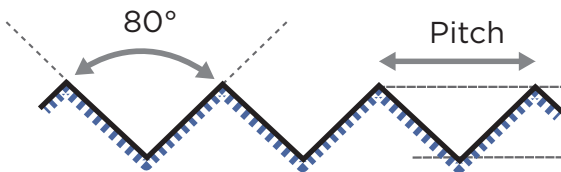
PG THREADS

PG stands for Panzer-Gewinde, and is an older German thread type.

PG threads are straight threads designed with a smaller thread depth and larger flank angle. The 80° angle of the PG thread gives a shorter profile than the more common 60° angle found in Metric threads.

PG THREAD SPECIFICATIONS

Thread Size	PG 7	PG 9	PG 11	PG 13/13.5	PG 16	PG 21	PG 29	PG 36	PG 42	PG 48
Major Dia. in Inches (mm)	.49 (12.5)	.60 (15.2)	.73 (18.6)	.80 (20.4)	.89 (22.5)	1.11 (28.3)	1.46 (37)	1.85 (47)	2.13 (54)	2.39 (59.3)
Pitch in Inches (mm)	.05 (1.27)	.06 (1.41)	.06 (1.41)	.06 (1.41)	.06 (1.41)	.06 (1.59)	.06 (1.59)	.06 (1.59)	.06 (1.59)	.06 (1.59)
Thru Hole in Inches (mm)	.50 (12.7)	.61 (15.4)	.74 (18.8)	.81 (20.7)	.90 (22.8)	1.12 (28.6)	1.47 (37.4)	1.87 (47.5)	2.14 (54.5)	2.35 (59.8)



- PG Thread = Panzer-Gewinde (also Panzer-Rohr-Gewinde)
- German thread type
- Depth of thread is smaller than NPT and Metric, but flank angle is larger
- Straight thread

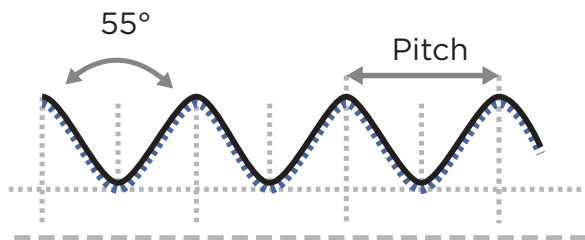
BSPP(G) THREADS

BSPP stands for British Standard Pipe Parallel, and the “G” denotes constant diameter of the thread.

BSPP(G) threads are the international standard for interconnecting and sealing with fittings.

BSPP(G) THREAD SPECIFICATIONS

Thread Size	G 2-1/2"	G 3"	G 4"
Major Dia. in Inches (mm)	2.96 (75.18)	3.46 (87.89)	4.45 (113.03)
Pitch in Inches (mm)	.09 (2.31)	.09 (2.31)	.09 (2.31)
Threads per Inch (mm)	2.98 (75.7)	3.34 (84.93)	4.33 (110.07)



- BSPP Thread = British Standard Pipe Parallel Thread
- Parallel (straight) thread with a constant diameter, denoted by the letter G
- Symmetrical V-thread in which the angle between flanks is 55° (measured in an axial plane)
- One-sixth of this sharp V is truncated at the top and the bottom
- Threads are rounded equally at crests and roots by circular arcs ending tangentially with the flanks
- The theoretical depth of the thread is therefore 0.64 times the nominal pitch

THREAD SELECTION FOR YOUR APPLICATION

If you are unable to determine the thread type you need, follow these steps:

1. Determine if the thread is straight or tapered:
 - Straight Threads - Measure the outside diameter of the male (ODM) or the inside diameter of the female (IDF) from thread peak to thread peak.
 - Tapered Threads- Measure the outside diameter of the male (ODM) at the large end and the small end or the inside diameter of the female (IDF) at the large end and the small end from thread peak to thread peak. Then measure the outside diameter (OD) of the unthreaded pipe.
2. Calculate the number of threads per inch:

Measure the distance from thread peak to thread peak, across the largest number of whole threads. Then divide the number of threads by the measurement to find the threads per inch (TPI).

We hope this guide has helped you understand the importance of selecting the proper thread for your applications. Remember to always think about the application, location, ratings & approvals, spacing, wall thickness, material and industry when choosing your thread. Should an installation require a longer thread, we offer elongated threads.

Please contact us with additional questions.



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