

## Thread types commonly used in refrigeration technology

### Flared tube fittings for soft copper tubes

The American UNF thread has also been included for the German refrigeration industry in the DIN 8904 standardisation. American flared tube fittings hence also fit on German products and vice versa. They are standard here as well. Whereas we describe flared tube fittings by the thread diameter, e.g.  $\frac{7}{16}$ " UNF, in the USA the same fitting is commonly described as  $\frac{1}{4}$ " SAE, i.e. the outer diameter of the copper tube to be connected is used as the nominal size. The following overview shows the respective comparison.

tube outer- Ø		Associated thread UNF	US- description SAE	Outer-Ø (max. dimension) [mm]	Core-Ø *) (min. dimension) [mm]	Number of threads per 1 inch	Pitch [mm]
Metric	Inch						
6	$\frac{1}{4}$ "	$\frac{7}{16}$ "-20 UNF	$\frac{1}{4}$ " SAE	11,079	9,738	20	1,270
-	-	$\frac{1}{2}$ "-20 UNF	$\frac{5}{16}$ " SAE	12,667	11,328	20	1,270
8	$\frac{5}{16}$ "	$\frac{5}{8}$ "-18 UNF	$\frac{3}{8}$ " SAE	15,839	14,348	18	1,411
10	$\frac{3}{8}$ "	$\frac{5}{8}$ "-18 UNF	$\frac{3}{8}$ " SAE	15,839	14,348	18	1,411
12	$\frac{1}{2}$ "	$\frac{3}{4}$ "-16 UNF	$\frac{1}{2}$ " SAE	19,012	17,330	16	1,588
15	$\frac{5}{8}$ "	$\frac{7}{8}$ "-14 UNF	-	22,184	20,262	14	1,814
16	$\frac{5}{8}$ "	$\frac{7}{8}$ "-14 UNF	$\frac{5}{8}$ " SAE	22,184	20,262	14	1,814
18	$\frac{3}{4}$ "	1"-14 UNS	$\frac{3}{4}$ " SAE	25,357	23,437	14	1,814
18	$\frac{3}{4}$ "	1 $\frac{1}{16}$ "-14 UNS	-	26,947	25,024	14	1,814
20	$\frac{7}{8}$ "	1 $\frac{1}{8}$ "-12 UNF	-	28,529	26,284	12	2,117
22	$\frac{7}{8}$ "	1 $\frac{1}{4}$ "-12 UNF	$\frac{7}{8}$ " SAE	31,704	29,459	12	2,117
22	$\frac{7}{8}$ "	1 $\frac{3}{8}$ "-12 UNF	-	34,877	32,634	12	2,117
25	1"	1 $\frac{1}{2}$ "-12 UNF	1" SAE	38,052	35,809	12	2,117

\*) The indicated core diameter refers to the female thread.

### Taper NPT-thread (USASB 2.1-1968)

US tapered pipe thread in compliance with National Taper Pipe Thread, according to ASA standard B 2.1. „NPT“ indicates the outer thread, „FPT“ indicates the same thread as inner thread (female pipe thread). Taper 1:16, flank angle 60°.

Outer thread NPT	Inner thread FPT	thread-Ø (max. dimension) [mm]	Flank-Ø [mm] at the beginning of the outer thread	Number of threads per 1 inch	Pitch [mm]	Thread length [mm]
$\frac{1}{8}$ " NPT	$\frac{1}{8}$ " FPT	10,271	9,233	27	0,941	10
$\frac{1}{4}$ " NPT	$\frac{1}{4}$ " FPT	13,572	12,126	18	1,411	14
$\frac{3}{8}$ " NPT	$\frac{3}{8}$ " FPT	17,055	15,545	18	1,411	16
$\frac{1}{2}$ " NPT	$\frac{1}{2}$ " FPT	21,223	19,264	14	1,814	20
$\frac{3}{4}$ " NPT	$\frac{3}{4}$ " FPT	26,569	24,579	14	1,814	26
1" NPT	1" FPT	33,401	30,826	11 $\frac{1}{2}$	2,209	32
1 $\frac{1}{4}$ " NPT	1 $\frac{1}{4}$ " FPT	42,164	39,551	11 $\frac{1}{2}$	2,209	42
1 $\frac{1}{2}$ " NPT	1 $\frac{1}{2}$ " FPT	48,260	45,621	11 $\frac{1}{2}$	2,209	47
2" NPT	2" FPT	60,325	57,633	11 $\frac{1}{2}$	2,209	59

### Whitworth pipe thread, cylindrical and tapered

Pipe thread in accordance with ISO 228. The thread diameter stated below is also the thread diameter measured at distance "a" for taper threads. Flank angle 55°, for taper thread taper 1:16.

Cylindrical thread	Taper thread	thread-Ø [mm]	Core-Ø [mm]	Number of threads per 1 inch	Pitch [mm]	Thread length [mm]
G $\frac{1}{8}$	G $\frac{1}{8}$ k	9,728	8,566	28	0,907	10
G $\frac{1}{4}$	G $\frac{1}{4}$ k	13,157	11,445	19	1,337	13
G $\frac{3}{8}$	G $\frac{3}{8}$ k	16,662	14,950	19	1,337	13
G $\frac{1}{2}$	G $\frac{1}{2}$ k	20,955	18,631	14	1,814	16
G $\frac{5}{8}$	G $\frac{5}{8}$ k	22,911	20,587	14	1,814	16
G $\frac{3}{4}$	G $\frac{3}{4}$ k	26,441	24,177	14	1,814	18
G $\frac{7}{8}$	G $\frac{7}{8}$ k	30,201	27,877	14	1,814	18
G 1	G 1 k	33,249	30,291	11	2,309	20
G 1 $\frac{1}{4}$	G 1 $\frac{1}{4}$ k	40,900	38,952	11	2,309	21
G 1 $\frac{1}{2}$	G 1 $\frac{1}{2}$ k	47,802	44,845	11	2,309	21
G 2	G 2 k	59,614	56,656	11	2,309	24
G 2 $\frac{1}{2}$	G 2 $\frac{1}{2}$ k	75,184	72,226	11	2,309	
G 3	G 3 k	87,884	84,926	11	2,309	
G 3 $\frac{1}{2}$	G 3 $\frac{1}{2}$ k	100,330	97,372	11	2,309	
G 4	G 4 k	113,030	110,072	11	2,309	