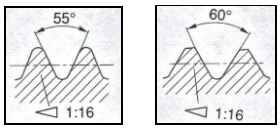
MEASURING TAPER THREADS R, Rc & NPT

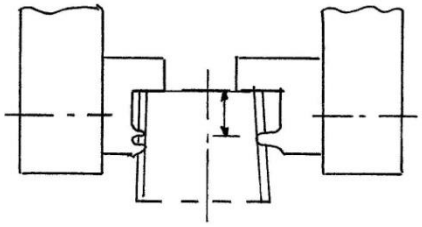
Nominal pitch diameter for taper threads is given at a specified distance from the end of the pipe and the larger the taper thread diameter (pipe diameter) the greater the distance.
e.g. for R & Rc ½" the distance is 8.2mm, 1" is 10.4mm and 2" is 15.9mm.
for NPT ½" the distance is 8.13mm, 1" is 10.16mm and 2" is 11.07mm.

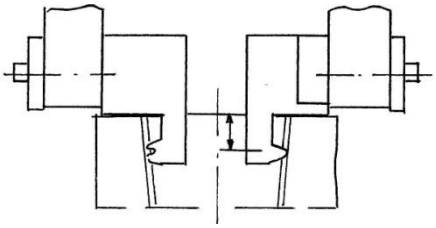
N.B. The diameter given for a pipe thread refers almost always to the hole diameter and not the pipe outside diameter.

Taper threads normally have a much larger pitch diameter tolerance than that of straight threads so when using FMS taper thread inserts pitch diameter tolerances have been recalculated from just one distance from the end i.e. 6mm. This means that by using one single FMS thread measuring insert it is possible to measure every taper thread from 1/4" and up.



Both thread types have the same taper but different flank angles.


Sketch showing the principle when measuring external taper thread pitch diameter.

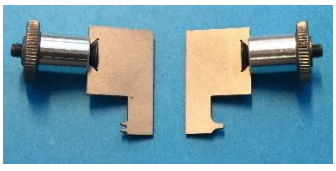

Sketch showing the principle when measuring internal taper thread pitch diameter.

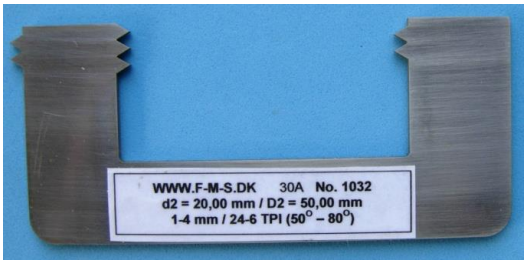
Page 2-2 shows the correct distances and nominal pitch diameters at those distances as well as showing the nominal pitch diameters at a single distance (6mm) from the pipe end.

Inspecting taper threads with thread plug and ring gauges requires one for each thread diameter and thus can be expensive if making several sizes. Using FMS taper thread inserts requires only one pair of inserts for either external or internal taper threads.

Pitch diameter measurement with FMS also has the advantage of having the correct pitch diameter if the thread is to be galvanized or similar afterwards as this will change the pitch diameter by 4 times the plating/coating.

FMS taper thread inserts also require a calibration plate (type 30A) for correct calibration and measurement.





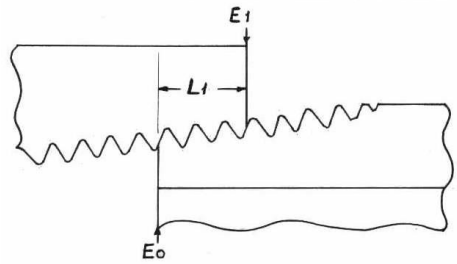
There are many other taper thread types than the three mentioned and FMS thread inserts can be made for all.

In the tables on page 2-2 mm can be converted to inches by dividing by 25.4.

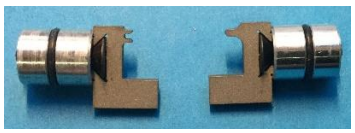
6mm / 25.4 = 0.236 ins.

TAPERED PIPE THREADS R, Rc & NPT – PITCH DIAMETER

Ref. ***DS/ISO 7-1*** *PIPE THREADS WHERE PRESSURE-TIGHT JOINTS ARE MADE ON THE THREADS (WHITWORTH)*
& ***ANSI/ASME B1.20.1*** *Pipe Threads, General Purpose*



E_0 is the internal measuring point and E_1 is the external measuring point



External thread inserts
FMS Type 24A

Internal thread inserts
FMS Type 25A

FMS thread inserts type 24A and 25A can measure pitches from 19 to 8 T.P.I.

R & Rc (WHITWORTH PIPE THREAD) BSPT					
Nominal pipe diam,	T.P.I.	P mm	Pitch diam. E_0	Pitch diam. E_1	Measurement point L_1
1/4	19	1.337	11.93	12.30	6.0
3/8	19	1.337	15.41	15.81	6.4
1/2	14	1.814	19.28	19.79	8.2
3/4	14	1.814	24.69	25.28	9.5
1	11	2.309	31.12	31.77	10.4
1 1/4	11	2.309	39.64	40.43	12.7
1 1/2	11	2.309	45.53	46.32	12.7
2	11	2.309	57.15	58.14	15.9
2 1/2	11	2.309	72.62	73.71	17.5
3	11	2.309	85.12	86.41	20.5
4	11	2.309	109.96	111.55	25.4
5	11	2.309	135.16	136.95	28.6
6	11	2.309	160.56	162.35	28.6

NPT (AMERICAN PIPE THREAD)					
Nominal pipe diam.	T.P.I.	P mm	Pitch diam. E_0	Pitch diam. E_1	Measurement point L_1
1/4	18	1.411	12.13	12.49	5.79
3/8	18	1.411	15.55	15.93	6.10
1/2	14	1.814	19.26	19.77	8.13
3/4	14	1.814	24.58	25.12	8.61
1	11½	2.209	30.83	31.46	10.16
1 1/4	11½	2.209	39.55	40.22	10.67
1 1/2	11½	2.209	45.62	46.29	10.67
2	11½	2.209	57.63	58.33	11.07
2 1/2	8	3.175	69.08	70.16	17.32
3	8	3.175	84.85	86.07	19.46
3 1/2	8	3.175	97.47	98.78	20.85
4	8	3.175	110.09	111.43	21.44
5	8	3.175	136.92	138.41	23.80
6	8	3.175	163.73	165.25	24.33

R & Rc (WHITWORTH PIPE THREAD) (BSPT)				
Nominal pipe diameter	T.P.I.	P	Pitch diameter at 6 mm depth	
			External	Internal
1/4	19	1.337	12.30	11.93
3/8	19	1.337	15.78	15.44
1/2	14	1.814	19.65	19.42
3/4	14	1.814	25.06	24.91
1	11	2.309	31.49	31.40
1 1/4	11	2.309	40.01	40.06
1 1/2	11	2.309	45.90	45.95
2	11	2.309	57.52	57.77
2 1/2	11	2.309	72.99	73.34
3	11	2.309	85.49	86.10
4	11	2.309	110.33	111.18
5	11	2.309	135.53	136.58
6	11	2.309	160.93	161.98

Pitch diameter tolerances tolerances on external threads

19 T.P.I. ± 0.08
14 T.P.I. ± 0.11
[1] 11T.P.I. ± 0.14
[2] 11T.P.I. ± 0.21

Pitch diameter on internal threads

19 T.P.I. ± 0.10
14 T.P.I. ± 0.14
[1] 11 T.P.I. ± 0.18
[2] 11 T.P.I. ± 0.21

[1] up to and including R 2 and Rc 2
[2] above R 2 and Rc 2

NPT (AMERICAN PIPE THREAD)				
Nominal pipe diameter	T.P.I.	P	Pitch diameter at 6 mm depth	
			External	Internal
1/4	18	1.411	12.50	12.12
3/8	18	1.411	15.92	15.56
1/2	14	1.814	19.63	19.40
3/4	14	1.814	24.95	24.75
1	11½	2.209	31.20	31.09
1 1/4	11½	2.209	39.92	39.85
1 1/2	11½	2.209	45.99	45.92
2	11½	2.209	58.00	57.96
2 1/2	8	3.175	69.45	69.79
3	8	3.175	85.22	85.70
3 1/2	8	3.175	97.84	98.41
4	8	3.175	110.46	111.06
5	8	3.175	137.29	138.04
6	8	3.175	164.10	164.88

Pitch diameter tolerances on external threads

18 T.P.I. ± 0.09
14 T.P.I. ± 0.11
11½ T.P.I. ± 0.14
8 T.P.I. ± 0.20

Pitch diameter tolerances on internal threads

18 T.P.I. ± 0.09
14 T.P.I. ± 0.11
11½ T.P.I. ± 0.14
8 T.P.I. ± 0.20