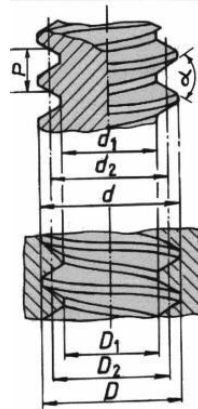


INSTRUCTION FOR MEASUREMENT OF A TYPICAL API THREAD

This instruction is written for measurement with FMS thread inserts, insert holders etc.. It is intended as a guide so any possible errors from incorrect use or calculations is at the user's own risk. To change from inches to mm multiply by 25.4.

Standard denominations for threads



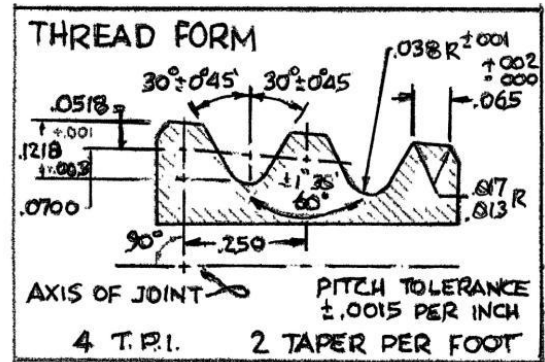
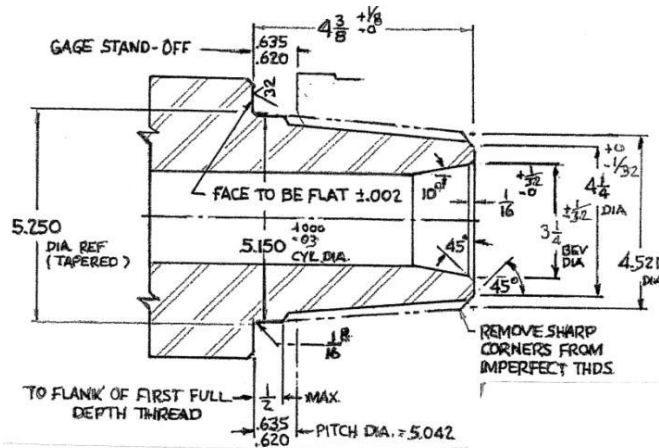
EXTERNAL THREAD
 d = Major diameter
d2 = Pitch diameter
 d1 = Minor diameter

INTERNAL THREADS
 D = Major diameter
D2 = Pitch diameter
 D1 = Minor or bore diameter

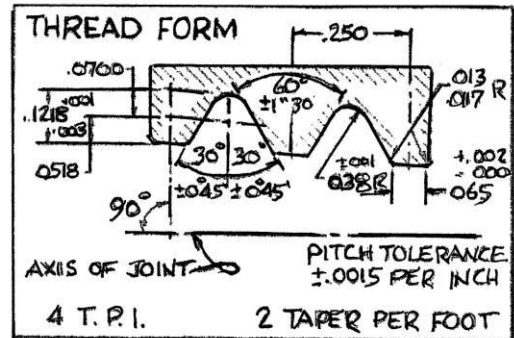
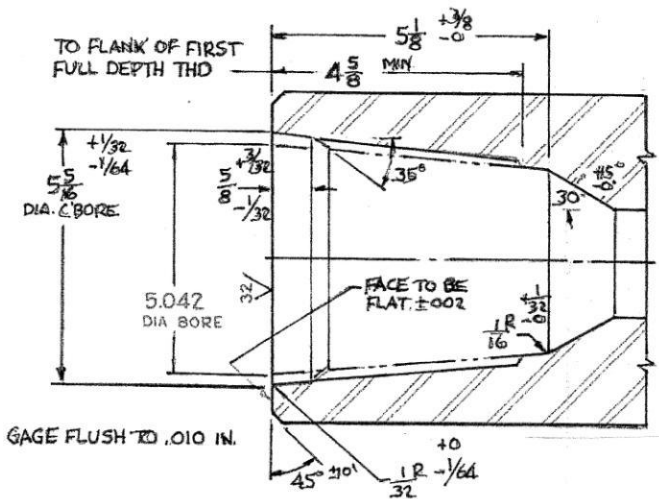
P = Pitch
α = Flank angle

The pictures below are typical API fittings and are only shown as examples.

A.P.I INTERNAL FLUSH PIN



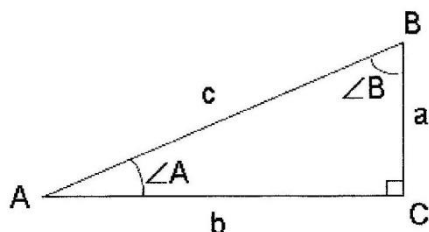
A.P.I INTERNAL FLUSH BOX



The theoretically correct distance for measuring pitch diameter is 5/8" (.635" to .620") from the shoulder of an external thread. To be certain that a full profile thread is measured FMS measure at a distance of 1" from the shoulder.

This requires a minor calculation to calculate what number should be added to or subtracted from the dimension (diameter) given in the relevant standard.

API threads are usually one of four different tapers. Either 1 1/4" per 12", 1 1/2" per 12", 2" per 12" or 3" per 12". *N.B. 12" written as one foot.*



The formula for half the taper angle is tangent A = a/b

On a taper of 1 1/4" per 12" half the angle is 2.975°

On a taper of 1 1/2" per 12" half the angle is 3.575°

On a taper of af 2" per 12" half the angle is 4.765°

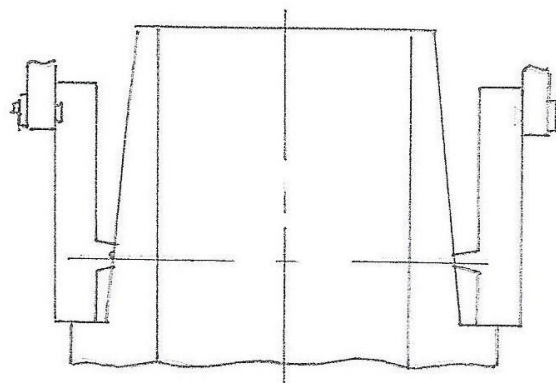
On a taper of 3" per 12" half the angle is 7.15°

In other words the diameter that is given at a distance of 5/8" should either be added to or subtracted from 2 times the difference from 1" to 5/8" i.e. 3/8".

On a taper of 2" per 12" this gives $\tan 4,765^\circ = a/0.375$.
 a is therefore $\tan 4.765 \times 0.375 = 0,0313$ ". This number must be multiplied by 2 and gives 0.0625".

External thread (d₂)

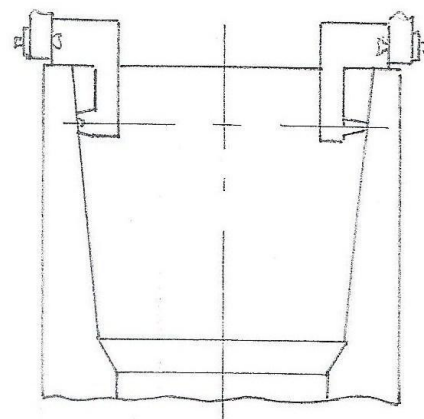
With the special FMS digital caliper or a standard digital caliper with mounted insert holders, push the inserts together and zero the caliper. Use of a FMS pressure device is recommended both when zeroing and measuring pitch diameter. Correct zeroing can be verified if the user has a calibration plate covering the relevant pitch.



Measure the pitch diameter when the bottom of the thread inserts are as close as possible to the shoulder as shown opposite. The measurement result shown on the digital caliper will be the factual pitch diameter when the result of the different depth (1" instead of 5/8") is added to the result.

Internal thread (D₂)

With the special FMS digital caliper or a standard digital caliper with mounted insert holders, push the inserts together and zero the caliper. Use of a FMS pressure device is recommended both when zeroing and measuring pitch diameter. Correct zeroing can be verified if the user has a calibration plate covering the relevant pitch.



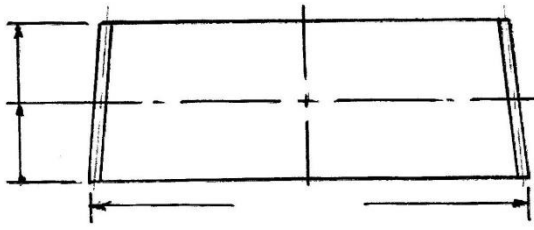
Measure the pitch diameter when the bottom of the thread inserts are as close as possible to the shoulder as shown opposite. The measurement result shown on the digital caliper will be the factual pitch diameter when the result of the different depth (1" instead of 5/8") is added to the result.

Important:

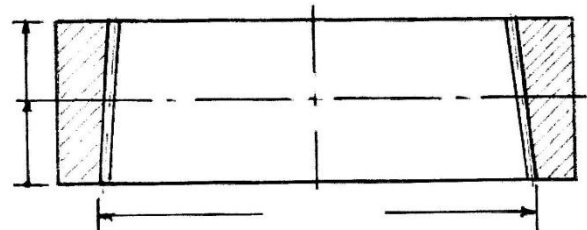
It is important that the same measurement pressure be used when bot calibrating and measuring. A reference thread plug or ring gage can be made to verify full thread profile and fit.

The drawings on the next page show possible thread gages.

THREAD PLUG GAGE



THREAD RING GAGE



For external pitch diameter



For internal pitch diameter



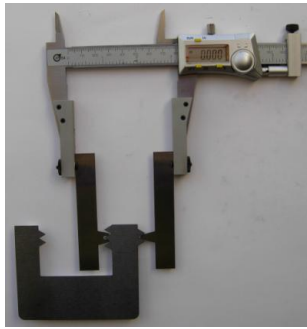
Angle master



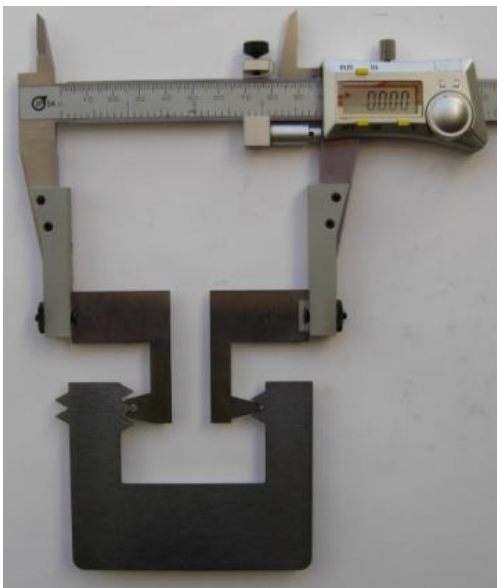
Calibration plate for 4 TPI



Zeroing for external pitch diameter measurement without the use of a calibration plate.



Checking/ calibrating external pitch diameter measurement with the use of a calibration plate.



Zeroing for internal pitch diameter measurement using a calibration plate.

N.B. The thread inserts and calibration plate shown are 4 TPI but can also be used for pitches from 3 TPI to 5 TPI.

When calibrating and/or measuring it's recommended that a FMS pressure device be used for the best results.