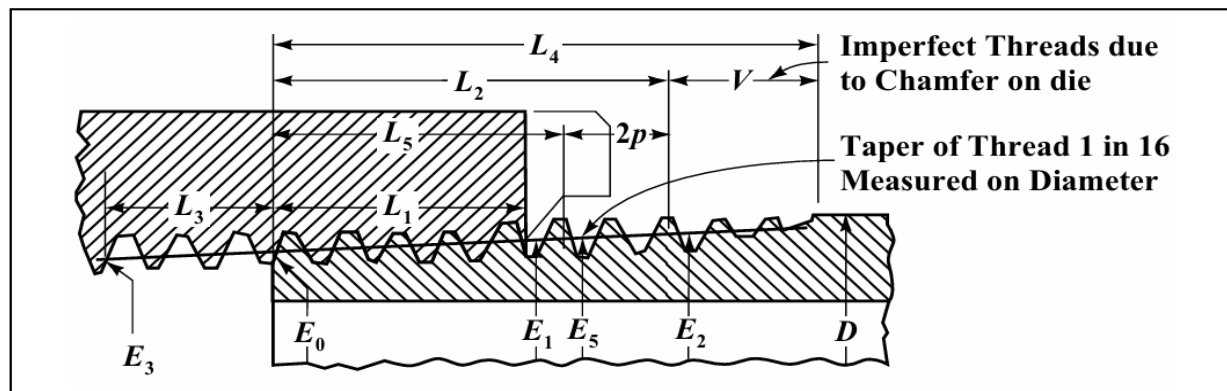


External NPT Machining Info and Guide

Here is a reference guide I put together with all the required information for turning an external NPT thread.

Table 4. Basic Dimensions, American National Standard Taper Pipe Threads, NPT
ANSI/ASME B1.20.1-1983 (R1992)



Some information on External NPT threads.

L_1 = hand tightening length

L_2 = Effective engagement length

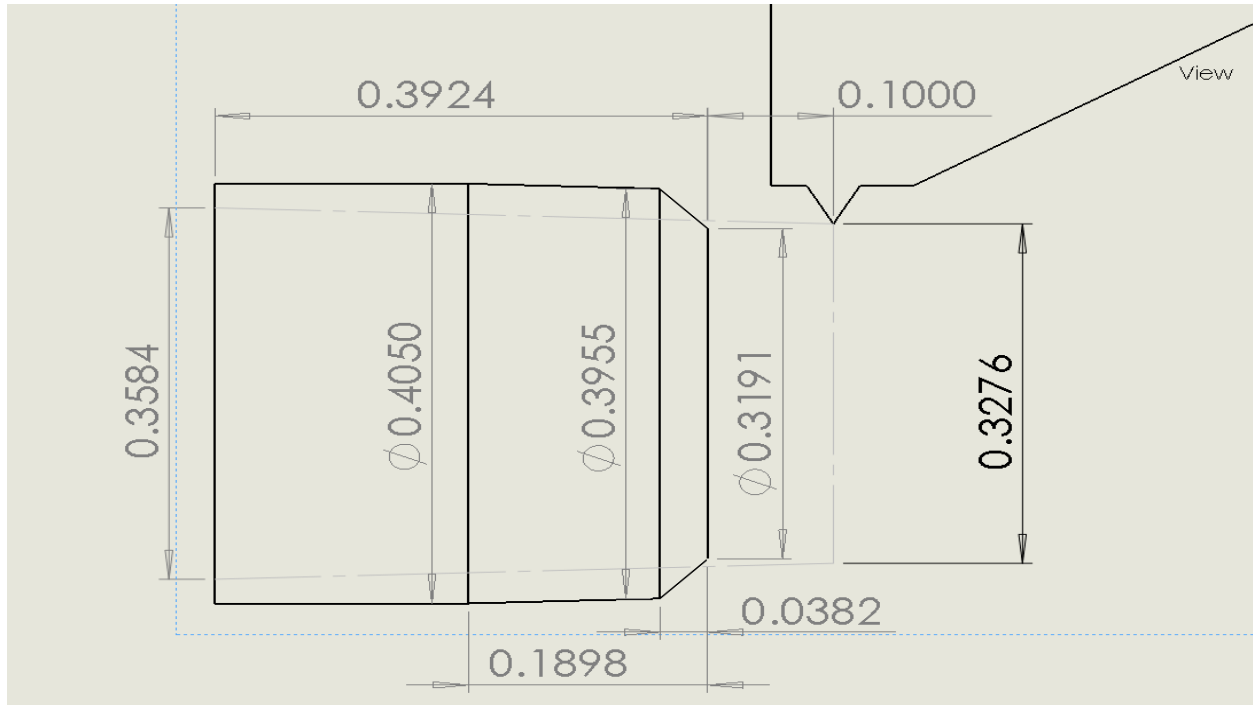
L_4 = Full length of thread

L_5 = Taper reaches pipe diameter, full thread form ends

E_0 = Pitch thread diameter at start (I have included major and minor diameters)

E_4 = Theoretical thread end diameter

A general rule is that it will take 3 to 5 turns before the thread is hand tight and then a further 1 to 3 turns to be "Air Tight". Air tight is between L_1 and L_2 , tightening the thread past L_2 is not in specification.



The previous diagram is an example of the dimensions I would choose to first turn the part to, in the case of a 1/8-27" thread. I have included a chamfer the same size as the thread pitch on the front of the part. I have also included dimensions for where the threading tool should start and end. Please see the table below for dimensions on the turned profile.

External NPT						
Pipe Size	Pipe Dia	CH-Start-OD	CH-End-OD	CH-End-Z	L4-Full	Form End
1/16"	0.3125	0.2268	0.3032	0.0382	0.3896	0.1870
1/8"	0.405	0.3191	0.3955	0.0382	0.3924	0.1898
1/4"	0.54	0.4106	0.5254	0.0574	0.5946	0.2907
3/8"	0.675	0.5452	0.66	0.0574	0.6006	0.2967
1/2"	0.84	0.6728	0.8202	0.0737	0.7815	0.3908
3/4"	1.05	0.8821	1.0295	0.0737	0.7935	0.4028
1"	1.315	1.1319	1.3115	0.0898	0.9845	0.1462
1.25"	1.66	1.45273	1.63233	0.0898	1.0085	0.5329
1.5"	1.9	1.69169	1.87129	0.0898	1.0252	0.5495
2"	2.375	2.16462	2.34422	0.0898	1.0582	0.5826
2.5"	2.875	2.5695	2.8276	0.129	1.5712	0.8875
3"	3.5	3.19059	3.44869	0.129	1.6337	0.9501
3.5"	4	3.68747	3.94557	0.129	1.6837	1.0000
4"	4.5	4.18435	4.44245	0.129	1.7337	1.0499
5"	5.563	5.2407	5.4988	0.129	1.84	1.1563
6"	6.625	6.29606	6.55416	0.129	1.9462	1.2626

Lets say for example I want to make a 2-8 NPT external thread. I would turn the part with a start coordinate of Z0, X2.1646 and turn to Z-0.0898, X2.3442. Then turn back to the nominal pipe diameter of 2.375 at Z-0.5826, then turn to a final length of 1.0582 plus clearance for the threading insert. The form end dimension is the point at which the threading tool will stop forming the full outside profile of the thread.

Next is a start and end point for the threading insert itself. I have made a point of 0.1 inches away from the front of the part with a theoretical start point. This is to allow time for the machine to accelerate.

Next is a table for the threading data, so for a 2-8NPT thread we would start at Z0.1, X2.1932 and thread to Z-1.0582, X2.2656. These are the minor diameters of the thread as often the insert is set to the tip.

External NPT										
Pipe Size	Pipe Dia	L4-Full Length	TPI	Pitch	E0 Major	E0 Minor	E4 Major	E4 Minor	Z-OD Start	X-OD Start
1/16"	0.3125	0.3896	27	0.0370	0.3008	0.2416	0.3252	0.2659	0.1000	0.2353
1/8"	0.405	0.3924	27	0.0370	0.3931	0.3339	0.4177	0.3584	0.1000	0.3276
1/4"	0.54	0.5946	18	0.0556	0.5218	0.4329	0.5590	0.4701	0.1000	0.4267
3/8"	0.675	0.6006	18	0.0556	0.6565	0.5676	0.6940	0.6051	0.1000	0.5613
1/2"	0.84	0.7815	14	0.0714	0.8156	0.7013	0.8644	0.7501	0.1000	0.6950
3/4"	1.05	0.7935	14	0.0714	1.0248	0.9105	1.0744	0.9601	0.1000	0.9043
1"	1.315	0.9845	11.5	0.0870	1.3059	1.1667	1.3674	1.2283	0.1000	1.1605
1.25"	1.66	1.0085	11.5	0.0870	1.6267	1.4876	1.6897	1.5506	0.1000	1.4813
1.5"	1.9	1.0252	11.5	0.0870	1.8657	1.7265	1.9297	1.7906	0.1000	1.7203
2"	2.375	1.0582	11.5	0.0870	2.3386	2.1995	2.4047	2.2656	0.1000	2.1932
2.5"	2.875	1.5712	8	0.1250	2.8195	2.6195	2.9177	2.7177	0.1000	2.6133
3"	3.5	1.6337	8	0.1250	3.4406	3.2406	3.5427	3.3427	0.1000	3.2344
3.5"	4	1.6837	8	0.1250	3.9375	3.7375	4.0427	3.8427	0.1000	3.7313
4"	4.5	1.7337	8	0.1250	4.4344	4.2344	4.5427	4.3427	0.1000	4.2281
5"	5.563	1.84	8	0.1250	5.4907	5.2907	5.6057	5.4057	0.1000	5.2845
6"	6.625	1.9462	8	0.1250	6.5461	6.3461	6.6677	6.4677	0.1000	6.3398

Check out my other guides for general information.