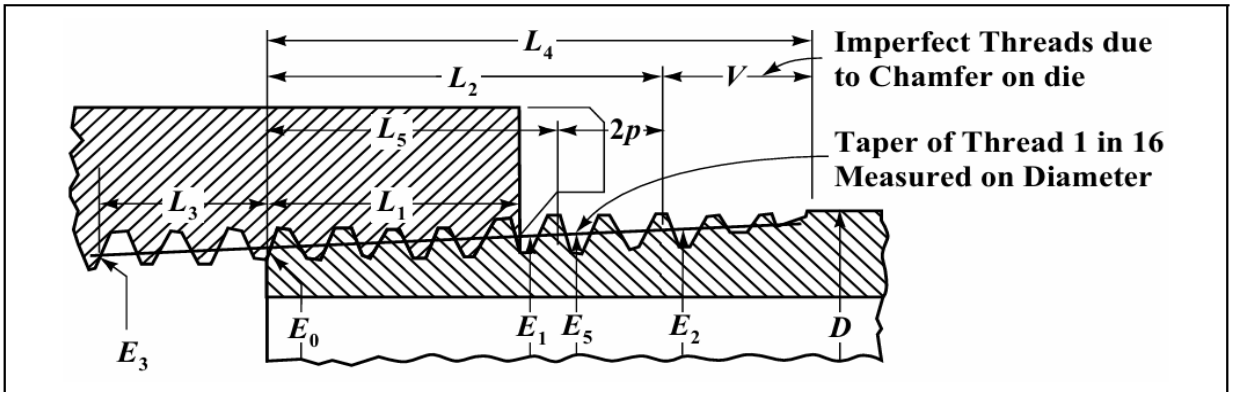
Internal NPT Machining Info and Guide

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

L1 = hand tightening length

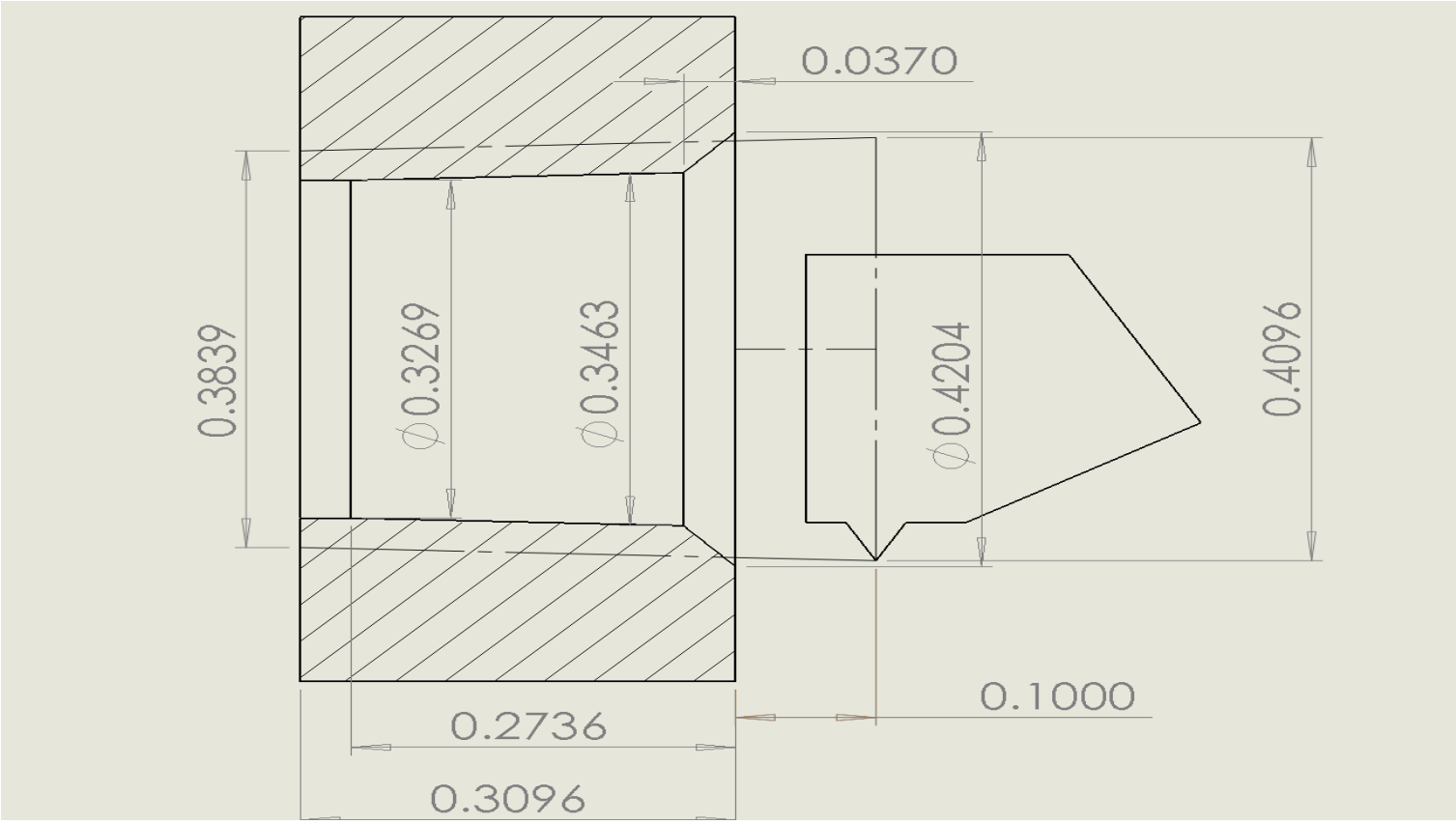
L3 = Effective engagement length

L1+L3 = Full length of thread

E1 = Pitch thread diameter at start (I have included major and minor diameters)

E3 = 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 L1 and L3, tightening the thread past L3 is not in specification.



Internal NPT									
Nominal Pipe Size	Pipe Dia	E1 Minor	E3 Minor	L1+L3	End Depth	CH-Start-ID	CH-End-ID	CH-End-Z	Form End
1/16"	0.3125	0.2516	0.2346	0.2711	0.3081	0.3256	0.2492	0.0383	0.2711
1/8"	0.405	0.3440	0.3269	0.2726	0.3096	0.4180	0.3416	0.0383	0.2726
1/4"	0.54	0.4472	0.4225	0.3945	0.4501	0.5583	0.4436	0.0574	0.3945
3/8"	0.675	0.5826	0.5571	0.4067	0.4623	0.6937	0.5790	0.0574	0.4067
1/2"	0.84	0.7213	0.6879	0.5343	0.6057	0.8641	0.7167	0.0738	0.5343
3/4"	1.05	0.9317	0.8971	0.5533	0.6247	1.0746	0.9271	0.0738	0.5533
1"	1.315	1.1917	1.1504	0.6609	0.7479	1.3656	1.1861	0.0898	0.6609
1.25"	1.66	1.5138	1.4713	0.6809	0.7679	1.6877	1.5082	0.0898	0.6809
1.5"	1.9	1.7528	1.7102	0.6809	0.7679	1.9267	1.7472	0.0898	0.6809
2"	2.375	2.2267	2.1831	0.6969	0.7839	2.4006	2.2211	0.0898	0.6969
2.5"	2.875	2.6622	2.6039	0.9320	1.0570	2.9122	2.6541	0.1291	0.9320
3"	3.5	3.2885	3.2250	1.0160	1.1410	3.5385	3.2804	0.1291	1.0160
3.5"	4	3.7888	3.7219	1.0710	1.1960	4.0388	3.7807	0.1291	1.0710
4"	4.5	4.2871	4.2188	1.0940	1.2190	4.5371	4.2791	0.1291	1.0940
5"	5.563	5.3493	5.2751	1.1870	1.3120	5.5993	5.3412	0.1291	1.1870
6"	6.625	6.4060	6.3305	1.2080	1.3330	6.6560	6.3982	0.1250	1.2080

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.

Lets say for example I want to make a 2-8 NPT internal thread. I would turn the part with a start coordinate of Z0, X2.4061 and turn to Z-0.087, X2.2321. Then turn back to E3 minor diameter of 2.1831 at Z-0.6969, then turn to a final length of 0.7839 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, X2.3721 and thread to Z-0.7839, X2.3168. These are the major diameters of the thread as often the insert is set to the tip.

Internal NPT														
Nominal Pipe Size	Pipe Dia	L1-Hand Tight	TPI	Pitch	E1 Major	E1 Minor	L3-Wrench	E3 Major	E3 Minor	L1+L3	End Depth	End Major	Z-ID Start	X-ID Start
1/16"	0.3125	0.16	27	0.0370	0.3108	0.2516	0.1111	0.2939	0.2346	0.2711	0.3081	0.2916	0.1	0.3171
1/8"	0.405	0.1615	27	0.0370	0.4032	0.3440	0.1111	0.3862	0.3269	0.2726	0.3096	0.3839	0.1	0.4095
1/4"	0.54	0.2278	18	0.0556	0.5361	0.4472	0.1667	0.5114	0.4225	0.3945	0.4501	0.5079	0.1	0.5423
3/8"	0.675	0.24	18	0.0556	0.6715	0.5826	0.1667	0.6460	0.5571	0.4067	0.4623	0.6426	0.1	0.6777
1/2"	0.84	0.32	14	0.0714	0.8356	0.7213	0.2143	0.8022	0.6879	0.5343	0.6057	0.7977	0.1	0.8418
3/4"	1.05	0.339	14	0.0714	1.0460	0.9317	0.2143	1.0114	0.8971	0.5533	0.6247	1.0070	0.1	1.0523
1"	1.315	0.4	11.5	0.0870	1.3309	1.1917	0.2609	1.2896	1.1504	0.6609	0.7479	1.2841	0.1	1.3371
1.25"	1.66	0.42	11.5	0.0870	1.6529	1.5138	0.2609	1.6104	1.4713	0.6809	0.7679	1.6050	0.1	1.6592
1.5"	1.9	0.42	11.5	0.0870	1.8919	1.7528	0.2609	1.8493	1.7102	0.6809	0.7679	1.8439	0.1	1.8982
2"	2.375	0.436	11.5	0.0870	2.3658	2.2267	0.2609	2.3223	2.1831	0.6969	0.7839	2.3168	0.1	2.3721
2.5"	2.875	0.682	8	0.1250	2.8622	2.6622	0.2500	2.8039	2.6039	0.9320	1.0570	2.7961	0.1	2.8684
3"	3.5	0.766	8	0.1250	3.4885	3.2885	0.2500	3.4250	3.2250	1.0160	1.1410	3.4172	0.1	3.4947
3.5"	4	0.821	8	0.1250	3.9888	3.7888	0.2500	3.9219	3.7219	1.0710	1.1960	3.9141	0.1	3.9951
4"	4.5	0.844	8	0.1250	4.4871	4.2871	0.2500	4.4188	4.2188	1.0940	1.2190	4.4109	0.1	4.4934
5"	5.563	0.937	8	0.1250	5.5493	5.3493	0.2500	5.4751	5.2751	1.1870	1.3120	5.4673	0.1	5.5555
6"	6.625	0.958	8	0.1250	6.6060	6.4060	0.2500	6.5305	6.3305	1.2080	1.3330	6.5227	0.1	6.6122

Check out my other guides for general information.