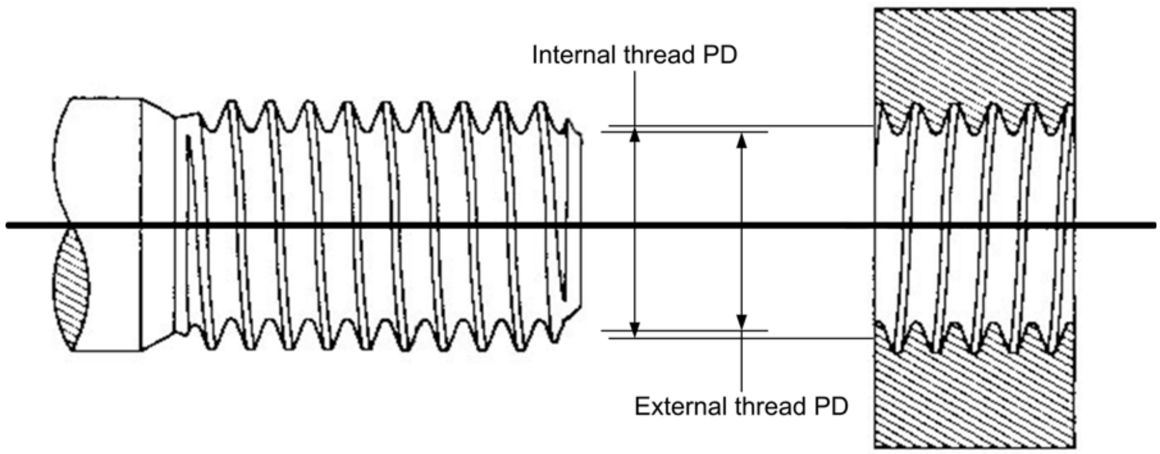
6e and 6E Pitch Diameter Allowances
Provide Space for Heavy Coatings

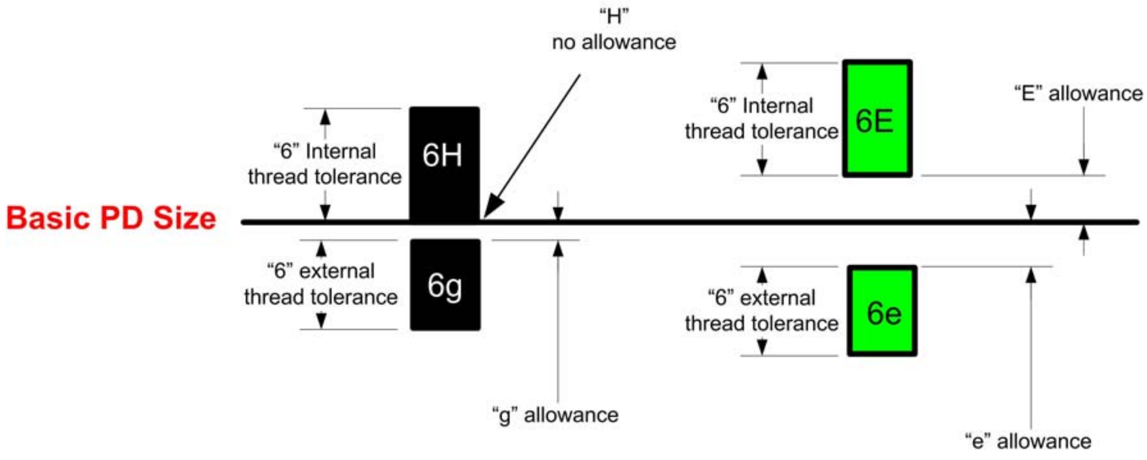


Many of the newer, high-performance corrosion-resistant finishes are thicker than older standard fastener finishes such as commercial electroplated zinc with clear or yellow chromate. To achieve equal corrosion resistance, the new finishes containing trivalent chrome are applied thicker than the hexivalent chrome finishes they are replacing.

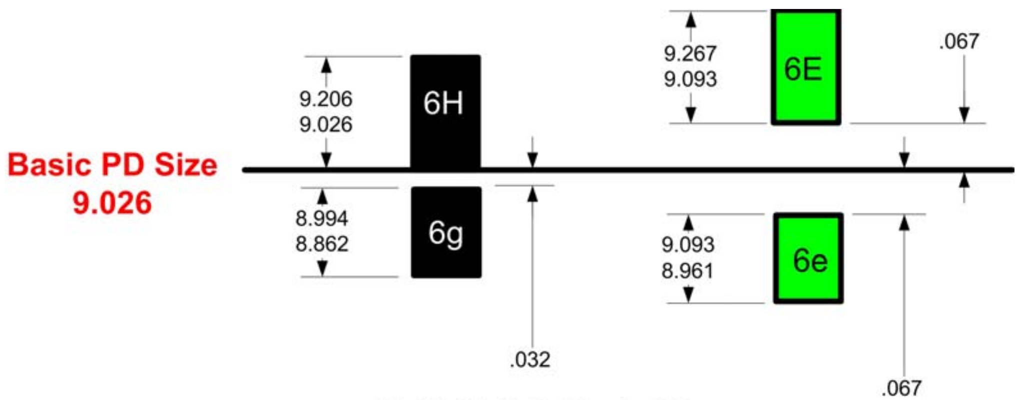
The heavier application of finishes on threaded fasteners results in more problems related to thread interference in assembly. Thread fit cannot be ignored when high performance finishes are required. The design and manufacturing solutions to this dilemma are to either make the internal thread pitch diameter larger, the external thread pitch diameter smaller, or to revise both the internal and external thread pitch diameters to provide the extra room needed to accommodate the heavier finish build-up between the mating threads.

Several suppliers of threaded fasteners have addressed the heavy coating-thread interference problem by making the internal threads to the thread class “6E” instead of “6H” and the external threads to the thread class “6e” instead of “6g”. The use of the combination of “6E” and “6e” class threads instead of the most common combination of “6H” with “6g” thread classes provides approximately four time the space to accommodate plating and/or coating build-up.

Internal thread class “6E” provides a plating allowance where as the more common thread class “6H” does not provide any. The external thread class “6e” provides approximately twice the plating allowance than does the “6g” thread class. The illustrations in this article show the size relationships of the thread classes “6E” to “6H” and “6e” to “6g”. The illustrations also show that the external thread pitch diameter sizes must always remain smaller the “basic” pitch diameter size and the internal thread pitch diameter size must always remain larger than the “basic” pitch diameter size to assure a non-interference fit in assembly. Hopefully the example of M10 X 1.5 providing exact pitch diameter sizes makes the exact nature of these relationships more clear for the reader.



Relationship of Pitch Diameter Tolerances and Allowances



M10 X 1.5 Pitch Diameter Tolerance and Allowance

Unfortunately, neither the American Society of Mechanical Engineers (ASME) or the International Standards Organization (ISO) provide tables for the pitch diameter sizes for internal thread class "6E" or external thread class "6e". That leaves the task of using the thread formulas to determine the "6E' and "6e" pitch diameter sizes to every individual thread component manufacturer.

In an effort to make the use of the"6E" and "6e" thread classes easier for manufacturing "before coating" threads with greater allowance I have compiles the tables for those thread classes in this article.

External Threads -6e					
Size	Basic	"e" es	"6" tol	High PD	Lo PD
M5 X 0.8	4.480	-0.060	0.095	4.420	4.325
M6 X 1.0	5.350	-0.060	0.112	5.290	5.178
M8 X 1.0	7.350	-0.060	0.112	7.290	7.178
M8 X 1.25	7.188	-0.063	0.118	7.125	7.007
M10 X 1.0	9.350	-0.060	0.112	9.290	9.178
M10 X 1.25	9.188	-0.063	0.118	9.125	9.007
M10 X 1.5	9.026	-0.067	0.132	8.959	8.827
M12 X 1.25	11.188	-0.063	0.132	11.125	10.993
M12 X 1.5	11.026	-0.067	0.140	10.959	10.819
M12X 1.75	11.863	-0.071	0.150	11.792	11.642
M14 X 1.5	13.026	-0.067	0.140	12.959	12.819
M14 X 2.0	12.701	-0.071	0.160	12.630	12.470
M16 X 1.5	15.026	-0.067	0.140	14.959	14.819
M16 X 2.0	14.701	-0.071	0.160	14.630	14.470
M18 X 1.5	17.026	-0.067	0.140	16.959	16.819
M18 X 2.5	16.376	-0.080	0.170	16.296	16.126
M20 X 1.5	19.026	-0.067	0.140	18.959	18.819
M20 X 2.5	18.376	-0.080	0.170	18.296	18.126
M24 X 2.0	22.701	-0.071	0.170	22.630	22.460
M24 X 3.0	22.051	-0.085	0.200	21.966	21.766
Note: Corrected March 7, 2006					

Internal Threads 6E					
Size	Basic	"E" es	"6" tol	High PD	Lo PD
M5 X 0.8	4.480	0.060	0.125	4.665	4.540
M6 X 1.0	5.350	0.060	0.148	5.558	5.410
M8 X 1.0	7.350	0.060	0.148	7.558	7.410
M8 X 1.25	7.188	0.063	0.156	7.407	7.251
M10 X 1.0	9.350	0.060	0.148	9.558	9.410
M10 X 1.25	9.188	0.063	0.156	9.407	9.251
M10 X 1.5	9.026	0.067	0.174	9.267	9.093
M12 X 1.25	11.188	0.063	0.174	11.425	11.251
M12 X 1.5	11.026	0.067	0.185	11.278	11.093
M12X 1.75	11.863	0.071	0.198	12.132	11.934
M14 X 1.5	13.026	0.067	0.185	13.278	13.093
M14 X 2.0	12.701	0.071	0.211	12.983	12.772
M16 X 1.5	15.026	0.067	0.185	15.278	15.093
M16 X 2.0	14.701	0.071	0.211	14.983	14.772
M18 X 1.5	17.026	0.067	0.185	17.278	17.093
M18 X 2.5	16.376	0.080	0.224	16.680	16.456
M20 X 1.5	19.026	0.067	0.185	19.278	19.093
M20 X 2.5	18.376	0.080	0.224	18.680	18.456
M24 X 2.0	22.701	0.071	0.224	22.996	22.772
M24 X 3.0	22.051	0.085	0.264	22.400	22.136
Note: Corrected March 7, 2006					

The final acceptance of threads after coating should be determined by using 6H GO plug gages for internal threads and 6h GO ring gages for external threads. The use of these class gages for final thread acceptance assures that thread interference will not occur during product assembly.

For more information on this or other fastener technology or quality related issues contact the author via e-mail through the website www.greensladeandcompany.com.