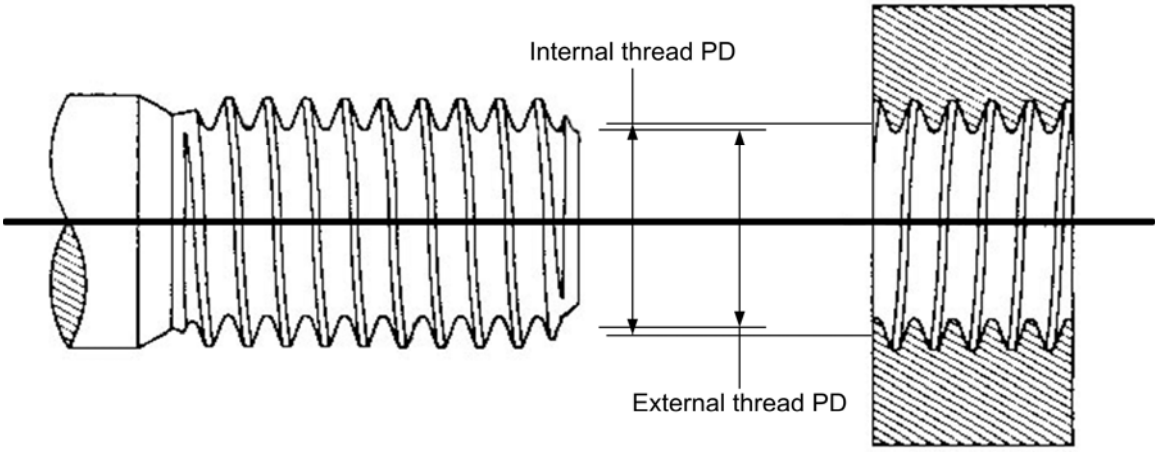
6e and 6E Pitch Diameter Allowances Provide Space for Heavy Coatings



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.

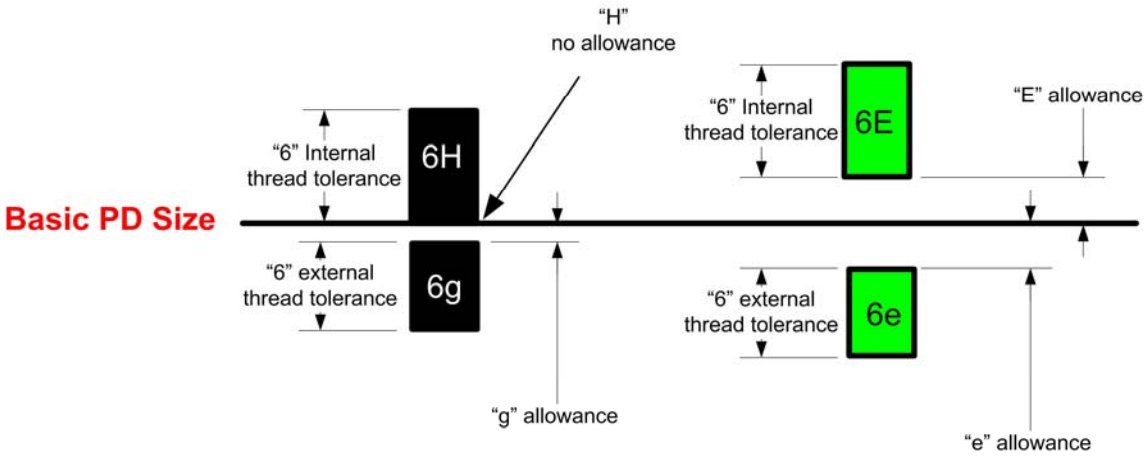
Several suppliers of threaded fasteners have addressed the heavy coating-thread interference problem by making the internal threads to the thread class “6E” instead of “6H” and the external threads to the thread class “6e” instead of “6g”. The use of the combination of “6E” and “6e” class threads instead 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”

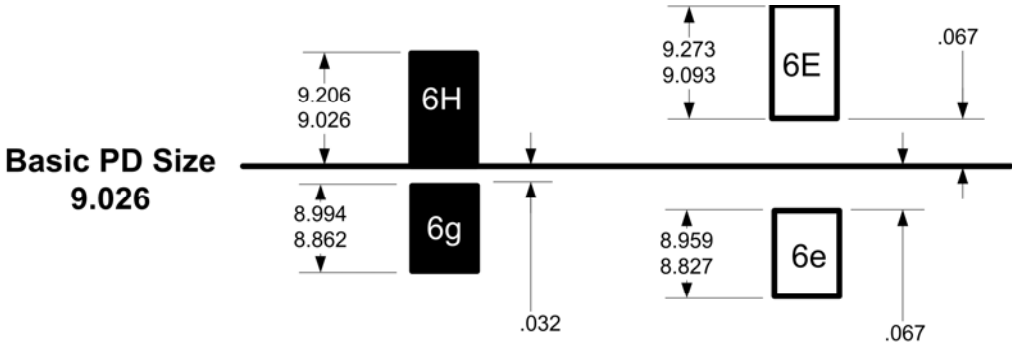
This article was published in FASTENER WORLD Magazine
Written by Joe Greenslade in June 2005

Greenslade & Company, Inc.
sales@greensladeandcompany.com

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

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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.

6e Pitch Diameter Tolerance and Position for External Threads					
Size	**Basic**	**es**	**"6" tol**	**High PD**	**Low PD**
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	10.863	-0.071	0.150	10.792	10.642

6E Pitch Diameter Tolerance and Position for Internal Threads					
Size	**Basic**	**EI**	**"6" tol**	**High PD**	**Low PD**
M6 X 1.0	5.350	0.060	0.150	5.560	5.410
M8 X 1.0	7.350	0.060	0.150	7.560	7.410
M8 X 1.25	7.188	0.063	0.160	7.411	7.251
M10 X 1.0	9.350	0.060	0.150	9.560	9.410
M10 X 1.25	9.188	0.063	0.160	9.411	9.251
M10 X 1.5	9.026	0.067	0.180	9.273	9.093
M12 X 1.25	11.188	0.063	0.180	11.431	11.251
M12 X 1.5	11.026	0.067	0.190	11.283	11.093
M12X 1.75	10.863	0.071	0.200	11.134	10.934

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 at sales@greensladeandcompany.com.

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