FASTENER THREAD FITS

Comparing Fine Threaded with Coarse Threaded Fasteners

Fastener threads provide both load holding when tightened and the ability to move during tightening and loosening. A fastener's pitch and lead, determined by whether it has a coarse or fine thread, is a factor in fastener performance. A coarse thread will move a larger distance with each rotation than a finer thread of the same diameter. If speed of assembly is a factor, a coarse thread may be preferred, as it will assemble faster. If adjustment is required, a fine thread will provide a less sensitive adjustment and a greater ability to control adjustment.

Each flank of thread carries a percentage of the clamping load. This load is not distributed equally among the thread pitches in most applications. It is generally thought that a fine pitch thread will have a more uniform load distribution among its engaged pitches when installed.

Finally, starting can be a factor. Fine threads can be more susceptible to cross threading if assembly conditions are not controlled. In general, both coarse and fine threads have advantages depending on the fastening output required.

Differences in Thread Classes 1B, 2B, 3B; and 1A, 2A and 3A

A thread's class is an arbitrary but well-established set of precision measurements established by the United States, The United Kingdom and Canada in the late 1940's. It is universally used, accepted and maintained more than sixty years later. Its success is testimony to its sound engineering. In general, each diameter and pitch combination have been assigned a set of measurements within which it is to be manufactured for each of the three classes. The B denotes an internal thread such as that found on a nut. A 1A class would be slightly smaller on average than a 2A, which is in turn easier to make than a 3A. Similarly, a 1B would provide a looser fit than a 2B, which in turn, would not be as precise as a 3B. With three external and three internal classes, a total of nine combinations are possible in theory. In practice, only a few are in general application. A 2A/2B is popular for general fastening. 3A/2B finds application in more precision assemblies and 3A/3B serves where high precision is warranted.

EFFECTS OF TEMPERATURE CHANGES ON FASTENERS

Fastener Effects Due to Temperature Changes, Both Elevated and Cryogenic

Out of the box, fasteners come with a set of static and dynamic strengths, which are determined by their grade, material and size. In application, the availability of these strengths are affected by a range of factors. Among these factors, temperature variations can reduce available fastening power in an installed fastener to a large degree. Metal fasteners are made of "building blocks" of steel grains, which are molecules of metallic and other elements. Tensile, yield, impact and the other fastener strength properties are the result of these molecular bonds. As temperatures at an application site rise, these bonds weaken. Fastener strength drops as temperatures rise above ambient levels. At 300º Fahrenheit, an alloy steel fastener's strength is lower. And with continued time at an elevated temperature, a tensile fastener under load will progressively lose its ability to fasten at room temperature strength levels.

At very cold temperatures, these same molecular bonds lose their ability to "flex" or relieve fastening stresses under application load. As a result, fasteners can become brittle at low temperature levels and also provide less than room temperature fastening performance.