National Pipe Thread vs. National Pipe Thread Fuel

THREAD DESIGN

The requirements for NPT (National Pipe Thread) are spelled out in ANSI B1.20.1
The requirements for NPTF (National Pipe Thread Fuel) are spelled out in ANSI B1.20.3

Both NPT and NPTF have the same threads-per-inch, pitch diameters, and taper-per-inch. The differences come in the major and minor diameters, the root and crest of the threads.

The NPTF thread crests fall within the parameters of the NPT requirements, but have a smaller range than the NPT.

The NPTF thread roots are different than the NPT thread roots. NPTF thread roots are designed to interfere with the crest of the mating thread with the intention of creating a mechanical seal through thread form deformation at assembly. NPTF threads have two classes identified: Class 1 and Class 2. NPT thread roots are designed to allow clearance with the mating thread crests on assembly.

PRODUCT ASSEMBLY

NPT threads are designed to screw together. In most cases there will be no interference between the root and crest of the threads at assembly. The thread is designed to be assembled with some form of sealant to assure a leak free joint.

NPTF threads will screw together with NPT threads and should have no noticeable assembly problem. There will most likely be an interference fit between the root and crest on either the major or minor diameter of the thread, depending on which part is NPTF. To accomplish a seal on the joint, a sealant will be required.

NPTF threads are designed to screw together. They are designed to have interference at the roots and crests of the threads on both the major and minor diameters. This interference should cause no assembly problem. The thread deformation caused by the interference fit and the wrench tightening is designed to make a dry mechanical seal.

Because of the gauging requirements of the NPTF Class 1 product thread, sealant should be used to assure a leak-proof connection. Because of the gauging requirements of the NPTF Class 2 product thread, the seal accomplished through mechanical deformation should require no sealant to make a leak-proof joint. This is critical in some applications where the pipe content is corrosive to chemical sealant.

GAGE REQUIREMENTS

Both NPT and NPTF threads have a requirement for an L1 gage. The gage is called L1 because it relates to the L1 dimension in the thread specification. Even though both the NPT's and the NPTF's L1 requirement are identical, the gages may be different because of other factors. Specifically, the L1 gages for sizes below and including 3/8” are identical. The sizes over and including 1/2” are not identical and thus not interchangeable. The difference between NPT-L1 and NPTF-L1 is at the Plug Gage Major Diameter and the Ring Gage Minor Diameter.

There are no such NPT gages: L2; L3 or 6-Step Crest Check. If you have NPT gages marked: L2; L3 or 6-Step Crest Check, they are really ANPT gages which have been inappropriately remarked to meet a customer's demand. The gage maker should have educated the customer instead of supplying the incorrectly marked gages. The gages sent to a calibration laboratory, the laboratory should return the gages without calibration because there is no standard which defines the gages.

If your NPT product design requirements indicate additional measurements must be taken, consider changing the product requirement to ANPT per ANSI SAE AS71051. The NPT and ANPT product threads in the sizes up to and including 2 inches are identical. Beginning at 2-1/2 inches, the wrenching length of the coupling is different between NPT and ANPT product threads. NPT has 2 threads and ANPT has 3 threads.

The NPTF thread standard defines a class 1 and a class 2 thread, also several gage members to measure different features of the product thread.

NPTF Class 1 requires both L1 and L2 ring gages for the male thread and L1 and L3 plug gages for the female thread. Crest Check and Root Check gages are not required for either the internal or external thread. Because of the gauging requirements of the NPTF Class 1 product thread, sealant should be used to assure a...
leak-proof connection.

NPTF Class 2 requires L1, L2, Crest Check and Root Check ring gages for the male thread and L1, L3, Crest Check and Root Check plug gages for the female thread. Because of the gauging requirements of the NPTF Class 2 product thread, the seal accomplished through mechanical deformation should require no sealant to make a leak-proof joint. This is critical in some applications where the pipe content is corrosive to chemical sealant.

HOW TO USE

COMMENTS
The data provided is accurate to the best of my knowledge. Please use it at your own risk. Refer comments/corrections to gageguy@gagecrib.com.