

The Drawing

The drawing together with quality standards should give the manufacturer a clear picture of the customer's needs. An important condition for that is that all specified items are measurable. Otherwise misunderstandings are preprogrammed. The following items should be specified in a spring drawing:

Load curve

Besides the diameters the load curve is the most important characteristic of a spring and should be carefully specified. According to the type of curve we can proceed as follows:

In case of a spring deflecting beyond flat and having a peak and a valley in its curve ($h_0/t > 1.6$) it is the simplest and most accurate way to specify the peak and valley load only. This determines every other point of the curve within the specified limits.

For all other types of curve it is necessary to determine one, two or three spring heights and specify the forces and their tolerance limits at these heights. For repeatability reasons we recommend not to use the deflection but only the spring height as a characteristic for measuring loads.

Depending on the spring function in your application you may want to specify the spring load measured during the up or down stroke. In this case you may consider

that the amount of the hysteresis caused by the friction between the spring and its mating parts and also by the load tester itself (do you know the hysteresis error of your load tester?) may affect the accuracy of your test result. Therefore we recommend to measure on down and up stroke and compute the mean of both readings. By this we also get a better reproducibility between your results and ours.

Dimensions

You need OD/ID for sure, because they mate with design elements of your clutch etc. If it is a finger type spring, the finger root diameter is to be specified only if it is functional for your design envelope. The thickness and the free height or cone angle determine the load curve. If the load curve has been exactly specified, neither one of both needs to be specified, because they are a function of the load curve. If at all you may determine one of them, preferably the thickness. If you specify and tolerance both together with the load curve, we have an overdetermined situation, which will inevitably cause difficulties for the manufacturer.

Life

If the spring is dynamically loaded you should specify the life in conjunction with the spring heights in between the spring is cycled. This covers all other parameters which influence life, such as

surface roughness and treatments, hardness, coining of edges, grain structure etc. So you can forget about this never ending list of in most cases not measurable characteristics.

If you for any reason believe a spring drawing should show at least anything about the surface quality, we have worked out a lengthy standard which you may take over and incorporate it into your own system of quality standards.

Relaxation

In case of higher thermal loading you may require to limit the relaxation to a certain percentage of the load before test. We can assist you in working out specific test procedures which suit your application best and render repeatable and comparable results on either side.

Cleanliness and Rust Protection

It is hard to create a measurable standard for the cleanliness of the spring surface. The better if you have one. If not, it doesn't matter. We know what's required. If you have no Rust Protection Standard, you may only note: Oiled for rust protection.