

Tender Springs vs. Helper Springs

How do they compare?

Some readers may have heard of helper springs and/or tender springs. Others may have actually seen them, but not known what they were called, or what they are meant to do. The terminology is confusing. They sound similar and they even look similar, but a helper spring and a tender spring are used quite differently.



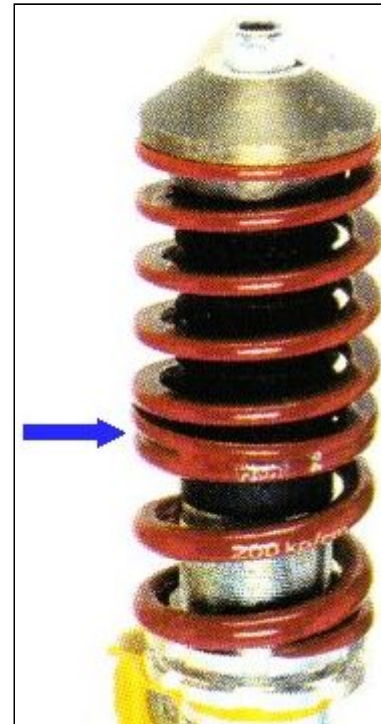
In the the picture at left we see a helper spring (located on the upper part of the shock on a Honda Accord BTCC car). A helper spring is used to keep the main spring tight between the perches when the suspension is at full droop. It "helps" keep the main spring snug, if you will. A helper spring has a very soft rate, on the order of 10 lbs/in. It's just strong enough to push the main spring up against the upper spring perch, but that's about it.

A tender spring happens to look very similar to the spring in the photo, but it is stiffer than a helper spring. A tender spring has a rate in the region of 150 lbs/in to 300 lbs/in (looking at the Eibach ERS catalogue). A tender spring is meant to be used in conjunction with a much stiffer linear rate main spring. Using the two springs together yields a

The key to the design of both helper springs and tender springs is that they are wound from flat wire. Thus when loaded the springs compress until they completely bind up into the shape of a small disc. The helper spring in particular is meant to be entirely compressed when the car is at static ride height. A tender spring may not be fully compressed at static ride height but will quickly become so as the suspension goes into bump. When a helper spring is completely compressed it essentially forms a small "spacer" about 3/8" tall. A tender spring is made from thicker wire and so does not compress quite as flat (around 1" to 2").

This picture* shows a tender spring and a main spring combination. Instead of using an aluminum connecting spacer to hold the two springs together, in this instance they are actually welded together (indicated by the blue arrow). This is a viable alternative, but it makes it impossible to independently change either the main spring or the tender spring. Still, in some cases this may be desirable (such as on the rear of an E30 chassis using a Ground Control spring kit). For the E30 application one could weld a helper spring to the bottom of a main spring. This would ensure that the spring stays tight within the rear perches when the trailing arms are at full droop.

Many of the German coil over kits will come from the factory with some type of helper or tender spring because the TUV mandates that springs must stay tight in the perches even with the spring perches turned to their lowest setting (i.e. the H&R kit shown at right). Note in the picture how the actual main spring is quite short (only 2 coils). By the time the car settles to its static ride height and the tender spring is almost fully compressed there is little travel left in bump (maybe 2"). Thus the main spring does not need to be very long as it will not be compressed far enough to cause it to bind. Keep in mind that depending on the rate of a tender spring, the main spring may partially compress before the tender spring is compressed flat.



* Picture is from pp. 53-54 of BMP catalogue #11.

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