The process to estimate fatigue life for a Disc Spring is iterative in nature. It is not possible to select a fatigue life and then work backward to arrive at a Disc Spring configuration. The basic steps to estimating fatigue life are as follows:

1. Determine the application requirements in the least loaded state. This should specify the force required for the Disc Springs to exert in the minimally compressed condition.

2. Determine the fully loaded condition of the Disc Spring. This may be specified by a length of travel or an additional load that will be exerted on the Disc Spring.

3. Using the above information, select the configuration of Disc Springs that is likely to work in a static application. This should be based on:
   - Size and Series of the Discs so that a minimum preload of approximately 15% - 20% of the maximum load rating of the Disc is maintained at all times. If this preload is not maintained, it is likely that the Disc Spring will fail at the top ID edge due to reversing compressive stresses.
   - The number of Discs to accommodate required travel. The maximum deflection must not exceed the recommended compression of the Disc.
   - Orientation and quantity of Discs so that the maximum load rating of the Discs is not exceeded during the highest loaded portion of the application.
   - As a general rule, it is better to use larger and lighter duty Disc Springs (Series B or C) in an application than smaller and heavier duty Disc Springs (Series A).

4. Using the selected size of the Disc Spring, determine the compression that will be present at the two extreme conditions. If only forces are known, then the calculations need to be performed to determine what the compression will be. These can either be interpolated from the catalog values or discretely determined using the formulae provided in DIN EN 16984. When using the formulae, both stress and the resulting spring force are determined by the compression of the Disc Spring.

5. For the Disc Spring selected, determine what the critical point of the Disc will be. Depending on the Disc being used, critical points may be on the following edges:
   - Bottom ID Point II
   - Bottom OD Point III
   In practice, it is best to evaluate the stresses at both points. The highest stressed edge will be the limiting factor for the determining the life of the Disc Spring.

6. Calculate the stresses for both Points II & III at both compression levels. This can be accomplished by interpolating values from the catalog tables, but it is best to utilize the well proven formulae provided in DIN EN 16984.

7. Using the charts in Figure 1 and Figure 2, determine the intersection of the minimum stress on the abscissa and the maximum stress on the ordinate.

8. As a rule, it is best to maintain the 15% - 20% preload on the Disc in the least stressed condition, then minimize the travel required per Disc.
The charts below represent typical expected life of Discs tested under laboratory conditions. To use these charts properly, it is necessary to determine the stresses at both minimum and maximum deflection points of the Disc. Tensile stresses are always the determining factor in causing failure due to fatigue, so as a minimum, evaluating the stresses at Points II and III is required. It is recommended that both be evaluated and the worst case used.

These values are based on laboratory testing using fatigue testing equipment producing sinusoidal loading cycles and resulting in a 99% probability of fatigue life. These figures are valid for single Discs and stacks in series of 10 Discs or fewer utilizing a 15% - 20% preload. Cycling was performed at room temperature and at a rate not to induce significant heating utilizing hardened and highly polished surfaces and guidance.

Stacking Discs in parallel greatly reduces fatigue life as individual Disc deflections may be attenuated due to interactions with the mating Disc, resulting in localized higher stresses. High frequency applications without proper lubrication may also reduce fatigue life due to heat generated from friction. Guiding of stacked Discs, design of the abutting surfaces, and the use of hardened washers is especially important in fatigue applications. Misalignment of mating Discs must be uniform to prevent contact points which will result in stress concentrations and premature failure.

These values only apply to DIN standard materials that are not shot peened. Shot peening Discs can extend the fatigue life of certain Discs, but testing is required to determine the exact benefit.
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