Bearing Life

Bearing life is usually expressed as the number of hours an individual bearing will operate before the first evidence of metal fatigue develops in the rings or rolling elements. In past years, four different terms were used when referring to bearing life. The terms commonly used were B_{10} or L_{10} and B_{50} or L_{50} . The terms B_{10} and L_{10} had the same meaning and the terms B_{50} and L_{50} also had the same meaning. In today's terminology the preferred term is L_{10} . However, L_{50} is sometimes used, therefore both meanings must be understood.

L_{10} life: The preferred term in specifying bearing life.

The American Bearing Manufacturers Association (ABMA), formerly the AFBMA defines the Basic Rating Life, L_{10} as the bearing life associated with a 90% reliability when operating under conventional conditions, i.e. after a stated amount of time 90% of a group of identical bearings will not yet have developed metal fatigue. L_{10} life is also referred to by manufacturers as the 'minimum expected life'.

L_{50} life: Or average life.

Although the L_{10} life is the proper method of specifying fatigue life per the ABMA, another term is often used in the industry. The L_{50} or average life is accepted as the bearing life associated with a 50% reliability, i.e., after a stated amount of time, only 50% of a group of identical bearings will not yet have developed metal fatigue. L_{50} life equals five times the L_{10} life.
In other words, to get a L_{50} life equal to a L_{10} 80,000-hour life, you must specify the L_{50} life to be 400,000 hours. The following chart shows a comparison of L_{10} to L_{50} equivalents.

Required L_{10} Life Hours	Equivalent L_{50} (avg) Life Hours
20,000	100,000
40,000	200,000
80,000	400,00
100,000	500,000
200,000	1,000,000

No Guarantee

Bearing Basic Rating Life is theoretical and is based on a collection of statistics. Specifying a L_{10} life does not guarantee that the bearings will have a 90% reliability when installed in the real world. The calculation for Basic Rating Life assumes proper lubrication is provided, no shock or vibration exists, alignment is virtually perfect, no debris enters the bearings and ambient temperatures are not extreme. In the real world, none of these conditions are realistic and the "installed life" of the bearing will depend on the application and maintenance.

To get as close as possible to the specified life, the installer and end user must follow the recommendations in the manufacturer's installation and maintenance instructions. Once the bearing life expectancy is clearly defined, that information can then be combined with other bearing requirements to select the most appropriate bearing for each application.