



**Load Ratings and Bearing Life**

**Static Load Ratings**

The static load rating ( $C_0$ ) given in the product listings (pages 10-29) is the radial load which a non-rotating bearing will support without damage. In evaluating static load conditions, any forces exerted during assembly and test must be considered along with vibration and impact loads sustained during handling, test, shipment and assembly.

**Dynamic Load Ratings**

Dynamic loading (C) includes built-in preload, weight supported members and the effect of any accelerations due to vibration or motion changes. The dynamic load rating (C) for a radial or angular contact ball bearing is a calculated, constant radial load which a group of apparently identical bearings can theoretically endure for a rating life of one million revolutions. The dynamic load rating is a reference value only; a base value rating life of one million revolutions has been chosen for ease of calculation. The dynamic load rating values (C) given in the product listings (pages 10–29) include the effects of race-to-ball conformity and are in accordance with ABMA Standard #12.

**Rating Life**

The rating life ( $L_{10}$ ) of a group of apparently identical ball bearings is the life in millions of revolutions that 90% of the group will complete or exceed. For a single bearing,  $L_{10}$  also refers to the life associated with 90% reliability.

The magnitude of the rating life,  $L_{10}$ , in millions of revolutions for ball bearing application is:  $L_{10} = (C/P_E)^3$

The method of computing design life (L) and the nomographs (pages 46-50) are also in conformance with industry standards, with allowance for the effects of curvature on the equivalent radial load resulting from the application of thrust load.

Life calculations can be significantly affected by many factors such as the material or the lubricant. Miniature and instrument ball bearings are normally made of either AISI 440C Stainless Steel or SAE 52100 Chrome Alloy Steel.

**Life Modifiers**

NHBB recommends that the load rating published for 52100 be reduced by 20% for 440C. This is a conservative approach to insure that the bearing capacity is not exceeded under the most adverse conditions. This is incorporated in the  $a_2$  modifier as shown. The table below provides selected modifiers for calculating failure rates down to 1% ( $L_1$ ).

**Table of Reliability  
 Material Life Modifier  $a_2$**

Required Reliability—%	$L_n$	Value of $a_2$	
		52100	440C
90	$L_{10}$	1.00	0.50
95	$L_5$	0.62	0.31
96	$L_4$	0.53	0.27
97	$L_3$	0.44	0.22
98	$L_2$	0.33	0.17
99	$L_1$	0.21	0.11



