Reliability Factor

The table below shows the values used when a corrected bearing life has less than a 10% breakage probability.

Reliability %	Rating Life	a_1
90	L_{10}	1
95	L_5	0.62
96	L_4	0.53
97	L_3	0.44
98	L_2	0.33
99	L_1	0.21

American Bearing Manufacturers Association

Applying 99% Reliability Factor to Bearing Life

CEMA C L_1 Life = 2,363 hrs

MD30X L_1 Life = 21,656 hrs

- ✓ **9X Greater** Bearing Life
- ✓ **Greater** Reliability
- ✓ **Improved** Sustainability
- ✓ **Lower** Overall Cost

90% SAVINGS

- ✓ Lower Initial Cost
- ✓ Lower Life Cost

MD30X — 1¢ PER HOUR / IDLER

CEMA C — 10¢ PER HOUR / IDLER

WHY PAY MORE FOR LESS?

Contact Us

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317-730-7592 or 630-209-0523

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LIFE OF AN IDLER

In 1996, Conveyor Equipment Manufacturers Association (CEMA) changed its conveyor idler specifications.

This change enabled manufacturers to build idlers with inadequately sized "Sealed for Life" ball bearings when comparing it to the pre-1996 tapered roller bearing idler.

The result of this change is a reduction in bearing life and idler life.

We agree "Sealed for Life" ball bearings are exceptional alternatives to the roller bearing. **We simply DISAGREE with the manufacturers' interpretation of the CEMA criteria on the size of the ball bearing they use.**

MINE DUTY IDLERS®
IN A CLASS OF ITS OWN

L_{10} Formula in Determining Bearing Life, Used by Idler Manufacturers

C	Basic Dynamic Load Rading
P	Equivalent Dynamic Bearing Load
x	3 for ball bearings
n	Speed, RPM
$L_{10}h$	Bearing Life with 90% reliability

$$\text{If } L_{10}h = \left(\frac{10^6}{60n}\right)\left(\frac{C}{P}\right)^x \text{ then } \left(\frac{C}{P}\right)^x = \frac{(L_{10}h \times 60n)}{10^6}$$

$$\left(\frac{C}{P}\right)^x = \frac{(L_{10}h \times 60n)}{10^6}$$

30,000 L_{10} Hours

$$\left(\frac{C}{P}\right)^x = \frac{(30{,}000 \times 60 \times 500)}{10^6}$$

$$\left(\frac{C}{P}\right)^x = \frac{(900{,}000{,}000)}{1{,}000{,}000}$$

$$\left(\frac{C}{P}\right)^x = 900$$

275,000 L_{10} Hours

$$\left(\frac{C}{P}\right)^x = \frac{(275{,}000 \times 60 \times 500)}{10^6}$$

$$\left(\frac{C}{P}\right)^x = \frac{(8{,}250{,}000{,}000)}{1{,}000{,}000}$$

$$\left(\frac{C}{P}\right)^x = 8{,}250$$

The definition of L_{10} for belt conveyor idlers:

The basic rated life (number of operating hours at 500 RPM) based on a 90% statistical model which is expressed as the total number of revolutions 90% of the bearings in an apparently identical group of bearings subjected to identical operating conditions will attain or exceed before a defined area material fatigue (flaking, spalling) occurs on one of its rings or rolling elements. L_{10} life is also associated with 90% reliability for a single bearing under a certain load.

BALL BEARING 6204

30,000 Hours L_{10}

$$\frac{C}{P} = \sqrt[3]{900} = 9.6549$$

$$P = \frac{C}{9.6549} = \frac{1}{9.6549} = 0.10357(C)$$

$$3P = 3(0.10357) = 0.3107(C)$$

If the Basic Dynamic Load Rating is 2877, then

$$C = 0.3017(2877) = 894\,lbs$$

BALL BEARING 6306

275,000 Hours L_{10}

$$\frac{C}{P} = \sqrt[3]{8250} = 20.2062$$

$$P = \frac{C}{20.2062} = \frac{1}{20.2062} = 0.04949(C)$$

$$3P = 3(0.04949) = 0.1485(C)$$

If the Basic Dynamic Load Rating is 6002, then

$$C = 0.1485(6022) = 891\,lbs$$

PLANNED OBSOLESCENCE

CEMA STANDARD 502-2004

There are many conditions that affect idler life. Those considered in this selection procedure are:

1. Type of material handled
2. Idler load
3. Impact forces
4. Effect of load on predicted bearing L_{10} life
5. Belt speed
6. Roll diameter
7. Environmental, maintenance and other special conditions

There are 4 overlooked equations when estimating idler life.

1. IML, or the **forces due to idler height deviation**. Zero IML assumes that the conveyor structure is perfectly aligned, square and parallel and that the idlers are manufactured to an exact height.
2. K4A Factor = Effect of **maintenance** on potential idler life = 0.75 *(Good to Fair Maintenance)*
3. K4B Factor = Effect of **environment** on potential idler life = 0.50 *(Dirty/Wet Environment)*
4. K4C Factor = Effect of **operating temperature** on potential idler life = 1.0 *(≤120°Fahrenheit)*

Assuming IML is Zero, applying these factors against 30,000 hrs L_{10} life, **the new L_{10} life is 11,250 hrs**

Assuming IML is Zero, applying these factors against 275,000 hrs L_{10} life, **the new L_{10} life is 103,125 hrs**