

## 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 <sub>1</sub>
90	L <sub>10</sub>	1
95	L <sub>5</sub>	0.62
96	L <sub>4</sub>	0.53
97	L <sub>3</sub>	0.44
98	L <sub>2</sub>	0.33
99	L <sub>1</sub>	0.21

*American Bearing Manufacturers Association*

### Applying 99% Reliability Factor to Bearing Life

CEMA C L<sub>1</sub> Life = 2,363 hrs

MD30X L<sub>1</sub> 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?

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Sales@MineDutyProducts.com  
317-730-7592 or 630-209-0523

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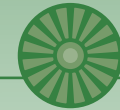
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✕ @MineDutyIdlers

# 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<sub>10</sub> Formula in Determining Bearing Life, Used by Idler Manufacturers

C	Basic Dynamic Load Rating
P	Equivalent Dynamic Bearing Load
x	3 for ball bearings
n	Speed, RPM
L <sub>10</sub> h	Bearing Life with 90% reliability

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

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### 30,000 L<sub>10</sub> Hours

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

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

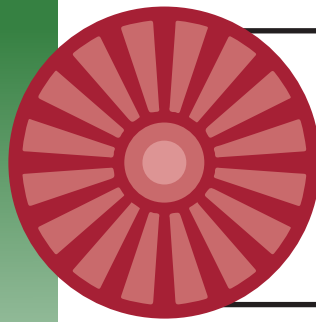
$$\left(\frac{C}{P}\right)^x = 900$$

### 275,000 L<sub>10</sub> 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<sub>10</sub> 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<sub>10</sub> life is also associated with 90% reliability for a single bearing under a certain load.

## BALL BEARING 6204

30,000 Hours L<sub>10</sub>

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

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

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

If the Basic Dynamic Load Rating is 2877, then

$$C = 0.3017(2877) = 894 \text{ lbs}$$

## BALL BEARING 6306

275,000 Hours L<sub>10</sub>

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

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

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

If the Basic Dynamic Load Rating is 6002, then

$$C = 0.1485(6022) = 891 \text{ lbs}$$

## 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<sub>10</sub> 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<sub>10</sub> life, the new L<sub>10</sub> life is **11,250 hrs**

Assuming IML is Zero, applying these factors against 275,000 hrs L<sub>10</sub> life, the new L<sub>10</sub> life is **103,125 hrs**

**PLANNED OBSOLESCENCE**