Life Is On | Schneider Electric

*Partner Project Business*
*Power Breakers Line of Business*

# Conformity Declaration
# *Déclaration de conformité*

**Customer Name:** *SEZEM Saint-Petersburg Russia*
**Project reference:** *"Made in Russia"*
**Reference:** *PP_CCB_214_01*
**Product:** *EasyPact CVS*

***We undersigned, Schneider Electric, guarantee that today 2018-08-23, the MTTF figures for the Compact NSX and Masterpact devices are as stated below:***

| | 2013 | | |
|---|---|---|---|
| | Lower limit at 90% | MTTF (years) | Failure rate (hours) |
| EasyPact CVS C1 | 1472 | 1505 | 7.58E-08 |
| EasyPact CVS C2 | 589 | 609 | 1.88E-07 |

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# *Annex*

The **failure rate** $\lambda(t)$ is the probability that the device fails between the $t^{th}$ and the $(t+1)^{th}$ demand, given the condition that it is still operating after the $t^{th}$.
A failure rate is usually measured using units such as $hour^{-1}$, $month^{-1}$, $demand^{-1}$ etc…
*The order of magnitude of an electrical device failure rate is $10^{-8}$ to $10^{-6}$ /h, for an electronic device $10^{-8}$/h, for an electronic board $10^{-6}$/h.*

A failure rate is generally not a constant function of time. Its variations may be represented by a curve which shape is characteristic and looks like the following (bathtub curve).

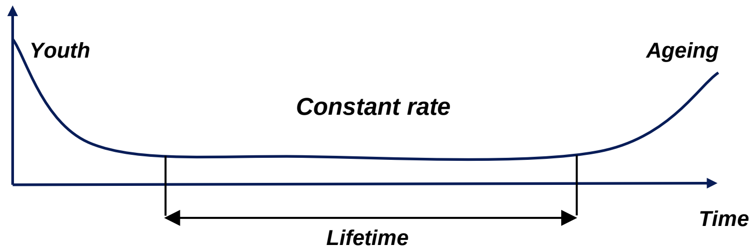


Fig 1

The horizontal part of the curve is related to the ”lifetime”, which is the period of time during which the failure rate may be considered constant.

Failure rate ($\lambda$) and MTTF can be easily understood only when the failure rate is constant with time. With this assumption, the reliability at time t, i.e. the probability that the device will not fail between time 0 (at which the device is supposed operating) and time t, is given by the formula:

$R(t) = \exp(-\lambda t)$

The MTTF is then equal to $1/\lambda$, and we have:

$R(t) = \exp(-t/MTTF)$

*As an example, for 1000 devices operating since t=0 and a constant failure rate $\lambda = 10^{-6}$/hour.*
*The following table shows the relationship between the elapsed time in years and the average number of devices still operating (out of order devices are supposed not being replaced).*

| *Time (years)* | *1* | *2* | *5* | *10* | *20* |
|---|---|---|---|---|---|
| ***R(t)*** | *0,99* | *0,98* | *0,96* | *0,92* | *0,84* |
| ***Proportion of failures*** | *0,01* | *0,02* | *0,04* | *0,08* | *0,16* |
| ***Average number of failures*** | *9* | *17* | *43* | *84* | *161* |

As well, the annual number of failures in a set of n identical installed devices has an average of:

N = n /MTTF (if unit is year) = n x 8760/MTTF (if unit is hour).

*For MTTF = 100 years, a set of 1000 operating devices. On average, 1000/100 = 10 failures per year. An average of 10 failures may eventually lead to 3 or 4, or 20, but probably not 100 failures*.