Declaration for MTBF value

Subjects: 1. Medium Voltage Iron Core Reactors
2. Air Core Reactors

We Hans von Mangoldt GmbH & Co. KG Aachen, who are official manufacturer of variant types of reactors, do hereby confirm that mean time between failures (MTBF) for variant types of reactors had been done on the base of failures data related to the period from 01.10.2011 till 01.01.2016.

Calculation:
Safety integrity level which is calculated according to formula:

\[
\lambda = \frac{1}{\text{MTBF}}
\]

where MTBF is mean time between failures, which is defined as total working time of produced for dedicated time period divided by the sum of failures occurred during this period and is calculated according to formula:

\[
\text{MTBF} = \frac{\sum_{i=1}^{n} p_i \times t_i}{N_p}
\]

where \( p_i \) is number of installed reactors,
\( t_i \) is working period of \( n \)-th reactors,
\( N_p \) is number of failures during investigated time,
\( n \) is number of reactors delivered during investigated time.

<table>
<thead>
<tr>
<th>Related products</th>
<th>MTBF [year]</th>
<th>MTBF [h]</th>
<th>( \lambda ) [h(^{-1})]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Medium Voltage Iron Core Reactors</td>
<td>205</td>
<td>1.795.800</td>
<td>55.685x10(^{-3})</td>
</tr>
<tr>
<td>2. Air Core Reactors</td>
<td>272</td>
<td>2.382.720</td>
<td>41.969x10(^{-3})</td>
</tr>
</tbody>
</table>

An behalf of Hans von Mangoldt GmbH & Co. KG

Managing Director

Quality Department

Registered location: Aachen * Court of jurisdiction: Aachen HRA 1150 * Fully liable partner: Hans von Mangoldt Geschäftsführungs - GmbH
Registered location: Aachen * Court of jurisdiction: Aachen HRB 540 * Managing Director: Dr.-Ing. Christian Kaehter
Certified to DIN EN ISO 9001:2008 (Reg. No. 2117/3158) and to DIN EN ISO 14001:2009 (Reg. No. 2117/3157) * VAT-No. DE 123595431