**INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC) SYSTEM FOR CERTIFICATION TO STANDARDS RELATING TO EQUIPMENT FOR USE IN EXPLOSIVE ATMOSPHERES (IECEx SYSTEM)**

**Title: ExTAG/638A/CD – Draft ExTAG Decision Sheet –** **Ex m fault assessment**

**Circulated to: ExTAG – IECEx Testing and Assessment Group**

**INTRODUCTION**

This revised document, ExTAG/638A/CD – Draft ExTAG Decision Sheet – Ex m fault assessment, has been prepared by CML/UL/FM taking into account comments received on ExTAG/638/CD and is issued for consideration by ExTAG.

In accordance with OD 035 this document is issued for a six week comment period.

Please submit comments on this new Draft DS using the comments table, a separate document, by –

**2021 05 28**

to

[**Christine Kane**](mailto:christine.kane@iecex.com)

**ExTAG Secretariat**

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| **Address:**  **IECEx Secretariat**  **Level 33 Australia Square**  **264 George Street**  **Sydney NSW 2000**  **Australia**  **Web:** [**www.iecex.com**](file://\\iscserver\public\IECEx_System%20(1)\03599\AppData\Local\Microsoft\Windows\christine.kane\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\christine.kane\AppData\Local\Microsoft\Windows\christine.kane\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\AppData\Local\Users\horn02\AppData\Local\christine.kane\AppData\Local\Microsoft\christine.kane\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Christine.Kane\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\AppData\Local\jugauthier\AppData\Local\Temp\notesC9812B\www.iecex.com) |

**COLLECTION OF IECEx / ExTAG DECISIONS**

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| Standard:  IEC 60079-18:2014 | **Clauses:**  7.2.2, 7.2.4 | **Draft Decision Sheet:**  ExTAG/638A/CD |
| **Subject:**  Fault assessment for IEC 60079-18 Ex m encapsulated equipment  **Status of document:**  Draft | **Key words:**  Fault assessment, encapsulation, Ex mb, Ex ma | Date: April 2021 **Originator of proposal:**  CML/UL/FM  **TC/SC involved:**  TC31/MT60079-18 |

**Background:**

IEC60079-18 Clause 7.2.1 requires that testing and assessment under fault conditions is carried out and clauses 7.2.2 (components), 7.2.3 (isolating components) and 7.2.4 (separations) go on to give requirements for components and spacings which do not need to be considered to fail (i.e. that are infallible).

However, for components which are not infallible, there is no clear definition of what faults should be considered for those components. There is a note under clause 7.2.1 which says "examples of faults are a short circuit in any component, the failure of any component, and a fault between tracks in the printed wiring board.."

In either case, the effect of the component failure on the rest of the circuit shall be considered. But what about the component itself? If it only has to be considered to fail to open or short circuit, then it would never dissipate power and therefore will not get hot. But if it has to be considered to fail to any state **between** open and short circuit, then it could dissipate power and get hot.

**QUESTION:** Is it necessary to consider failing components to the state where they could dissipate the most power?

**ANSWER 1:** Yes, certain components at high risk of this mode of failure should be considered to fail such that they dissipate most power.

The number and combinations of faults shall be applied (as already defined in the standard and directed by DS2015/002) and the effect of those faults on the operation, temperature, and ratings of other components, shall be considered.

The following shall also be considered:

For PCB tracks – the short circuiting of any spacing which is not in accordance with the requirements of 7.2.4

For components – the failure to short circuit or open circuit of any component which is not rated in accordance with Clause 7.2.2

Additionally, components with a high risk of failure into an undefined resistive state (semiconductors, electrolytic capacitors, and VDR’s), which are not rated according to 7.2.2, shall be considered to fail into the state where they can dissipate the maximum power available from the supply at the point in the circuit where they are located.

*NOTE – it may prove impractical for the CB to perform such an analysis without detailed knowledge of the operation of the circuit in question and, in such cases, the manufacturer may produce a suitable FMEA to address this requirement”*

**ANSWER 2:** No, since the protection method relies on the use of encapsulation to prevent exposure of components to the combustible material, considering components as failing only to short or open circuit is adequate when applying faults to the circuit for the purpose of determining the surface temperature of the encapsulation material.

**Outcome of initial consultation**

Following circulation of ExTAG/638/CD as a draft decision sheet it was noted that 12 ExTL were in favour of Answer 1 and 5 ExTL in favour of Answer 2.

It was also noted that TC31 representative stated Answer 2 was the intent of the standard and Answer 1 was a restriction that should be discussed at the maintenance team.

This exercise has gathered useful information which can be used to assist the maintenance team in their discussion. It was considered that this decision sheet could not publish a conclusion other than noting the different methods are being applied for fault assessment.

It is proposed that either Answer is acceptable according to the current wording of the standard. However it should be recognised by those ExTL using Answer 1, that the future edition of 60079-18 may reinforce Answer 2.  Conversely, it should be recognized by those ExTL using Answer 2, that this may change in the future Edition of 60079-18.