

Grow!

Develop!

Welcome to the Product Compliance Virtual Chapter

Improve!

Progress!

Learn!

Network

Welcome to the Product Compliance Virtual Chapter

Intro: Samir Sharma

IEEE PSES Virtual Chapter; VP – Communications

Global Director – Product Compliance and Safety at Lindsay Corporation USA

Speaker: Markus Fiebig, Senior Product Manager E-Bulb at JOB GmbH in Ahrensburg (Germany)

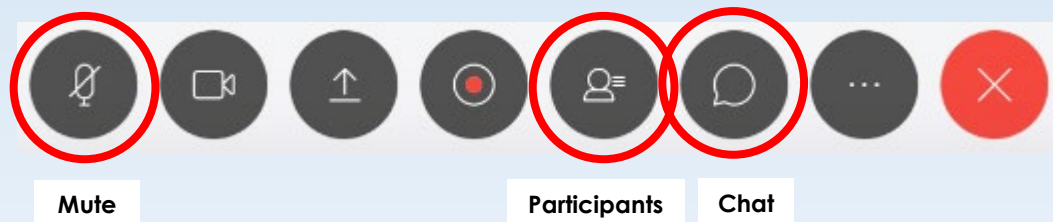


Agenda

- WebEx Fundamentals
- Chapter Welcome and Overview
 - Meet your Board
- Presentation: Markus Fiebig: Making safe products safer with Device-integrated Fire Protection
- Upcoming Activities

Webex Fundamentals

- Participants are muted upon entry into the meeting.
 - Hover over the bottom of the screen to display the WebEx menu.
 - To unmute, click the mic picture in the WebEx menu at the bottom of your screen **OR** next to your name in the participants panel.
- Raise WebEx hand if you want to ask a question.
- Use the chat feature in WebEx menu for questions/comments.
 - The chat feature allows you communicate privately with other participants, just select the name of the person in the dropdown menu.



Welcome and Overview

Mission

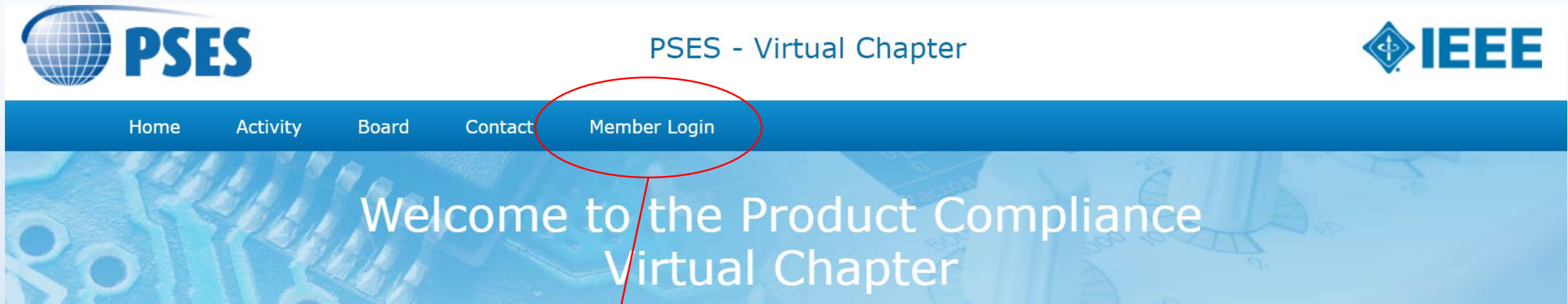
- To enhance professional skills by providing education, networking and leadership opportunities to IEEE PSES members, especially those that do not have local chapters nearby.

Vision

- Increase involvement among PSES members by providing a forum where they can share, inform, educate and bring value to the engineering community.
- Provide a forum where the compliance community can benefit from the accumulated knowledge of the society.
- Assist local chapters by providing material they can cover when they cannot secure a speaker.

PSES VC Website

<http://ewh.ieee.org/soc/pses/virtual-chapter/>



The screenshot shows the top navigation bar of the PSES Virtual Chapter website. On the left is the PSES logo, in the center is the text "PSES - Virtual Chapter", and on the right is the IEEE logo. Below these is a dark blue navigation menu with the following items: Home, Activity, Board, Contact, and Member Login. The "Member Login" item is circled in red. Below the navigation bar is a large blue banner with the text "Welcome to the Product Compliance Virtual Chapter" in white.



The screenshot shows the main content area of the website. It features a light blue background with technical drawings and a calculator. A blue button with the text "ENTER MEMBERS ONLY SECTION »" is centered. Below the button, a paragraph of text reads: "This area of the web site contains Virtual Chapter Slides and Presentations and other members only online benefits." A red arrow points from the "Member Login" link in the navigation bar to this button.

Executive Board

- Chair: Yike Hu
- Vice Chair: Kati Wenzel
- Secretary: Mariel Acosta-Geraldino
- VP of Member Services: Banshi Patel
- VP of Communications: Samir Sharma
- VP of Technical activities: V. Jayaprakasan
- Webmaster: Jim Douglas

Executive Board (Elect)

- Chair: Tom Brenner
- Vice Chair: Sherri Tischler
- Secretary: open
- VP of Member Services: Banshi Patel
- VP of Communications: Samir Sharma
- VP of Technical Activities: V. Jayaprakasan
- Webmaster: Jim Douglas

Getting Involved

- Members of local chapters may join our activities and our chapter.
 - Members of the virtual chapter receive copy of the slides
- There are 4 ways of getting involved, in order of associated workload:
 - 1) Chapter Member - join the live/recorded versions;
 - 2) Presenter - in addition to joining the live presentations, this person would be willing to become a presenter at one of our meetings;
 - 3) Core Team Member - part of the organizing committee; and
 - 4) Executive Board - nominated to the executive board.

Today's Presentation

- Speaker:
Markus Fiebig
Senior Product Manager E-Bulb
- Topic:
Making safe products safer
with Device-integrated Fire
Protection



Some figures for the US

As you know ...

- 500.000 **family homes burn down** in the US every year (NFPA, 2017)
- **\$13 billion loss due to fires in US p.a.** (USFA.fema.gov, 2017)
+ 10 billion in losses from Northern California wildfires
- Over **3,173 deaths** due to fire consequences (e.g. smoke) **yearly in the US** (NFPA, 2017)



Some figures for the US

As you know ...

- 30% of all fires start due to electricity within electrical devices (NFPA)

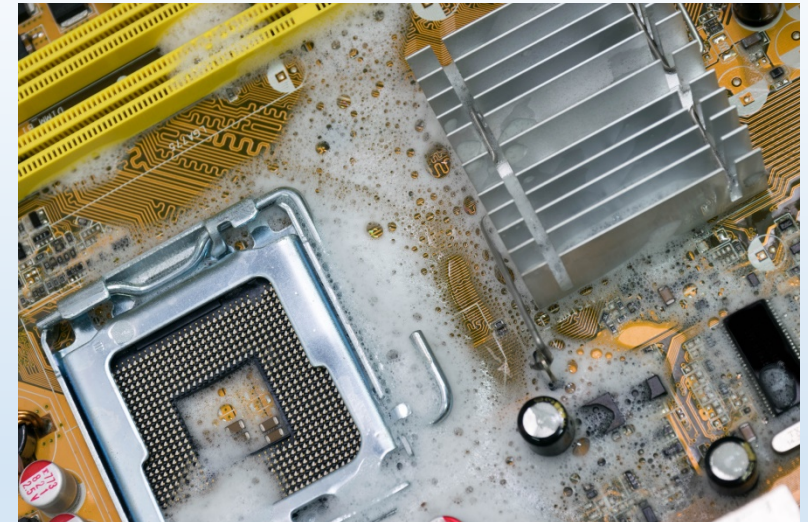
These fires lead to:

- business interruption, which is TOP 1 risk for businesses, inter alia caused by fire (Allianz, 2018)
- Regular product recalls due to fire hazard (u.a. CPSC)
 - E.g. dryer 2019, lawnmower 2019, refrigerator 2018, washing machine 2016, coffee maker 2015, dishwasher 2015

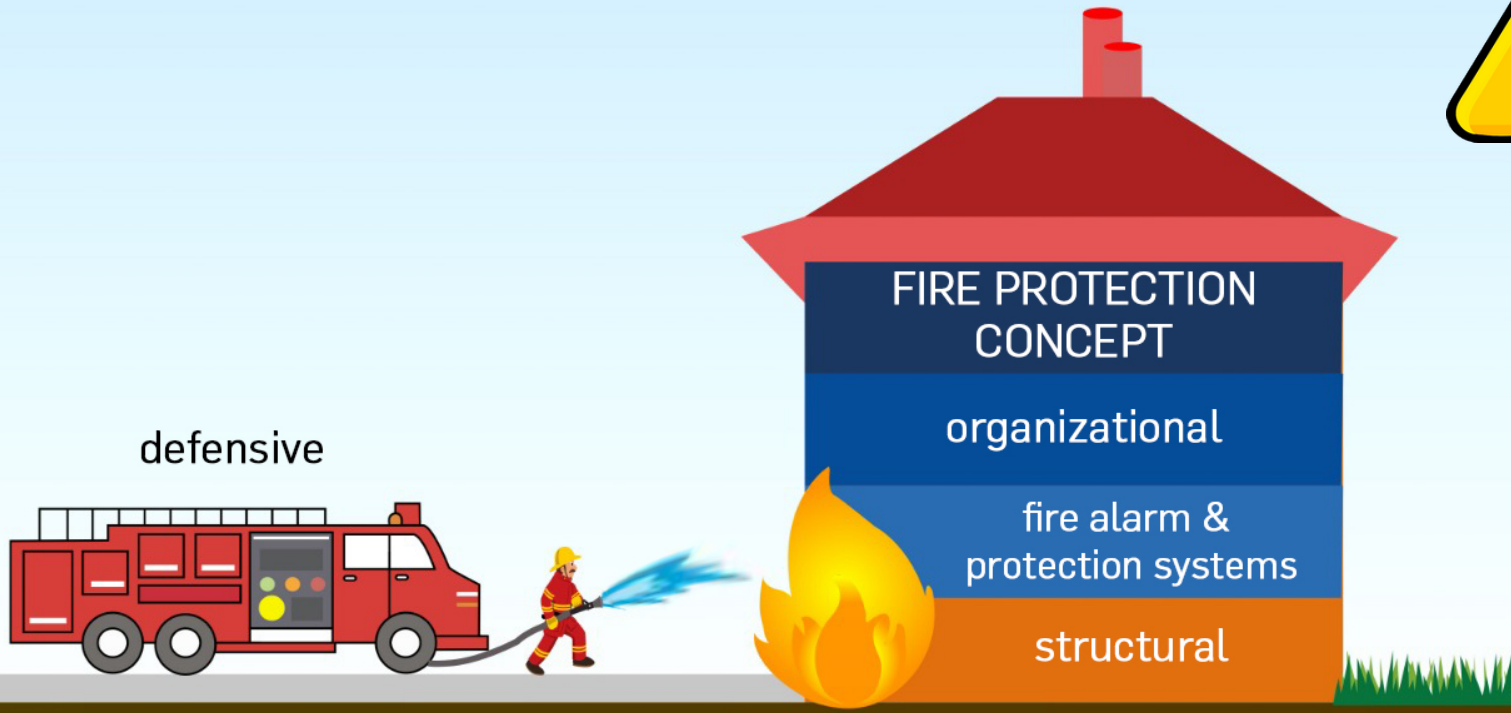


Potential failure causes are manifold:

- Overload / voltage fluctuations / ESD / ...
- Improper ambient conditions
- Component failure
 - **Connectors!**
 - e.g. > 10.000.000.000.000 soldering joints
- Aging / cold soldering joints / corrosion
- Production error



Traditional Fire Prevention Concepts



The existing concepts are good.

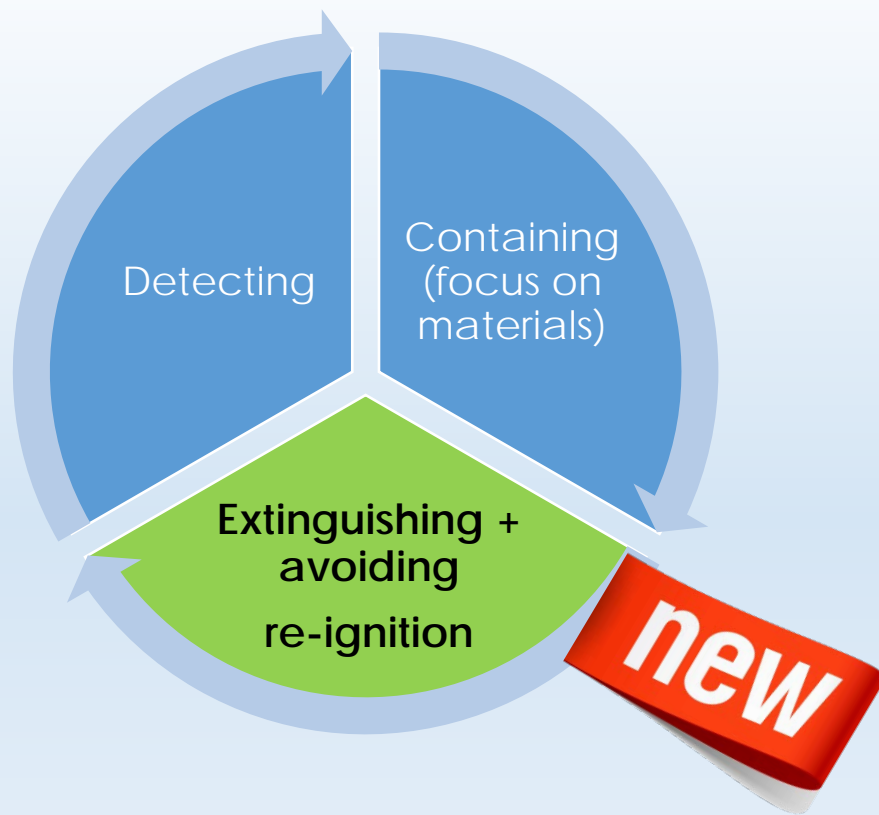
However, are they sufficient enough for the rising dangers of fire due to the growing number of electrical devices in the field?

Smart Home Trend



Stand-by = always powered

Device-integrated Fire Protection



Many fires in the industry arise **inside** of devices and machinery

Current fire prevention concepts are good, but only start extinguishing when the fire is outside of devices.

But, it would be most effective to extinguish a fire **at the source of origin**, before the fire spreads.

The idea: Device-integrated Fire Prevention

Comparable to a fire sprinkler system within electrical appliances or a fire fighter inside ☺

The Smallest Fire Extinguisher in the World – a CIFEA*

*CIRCUIT INTERRUPTERS WITH FIRE EXTINGUISHING AGENT, UL 60692



- Directly in the device, on the pcb!
- Directly at source of highest risk!
- **Irreversibly cuts power supply**
- Stops re-ignition!
- **Extinguishes the fire!**

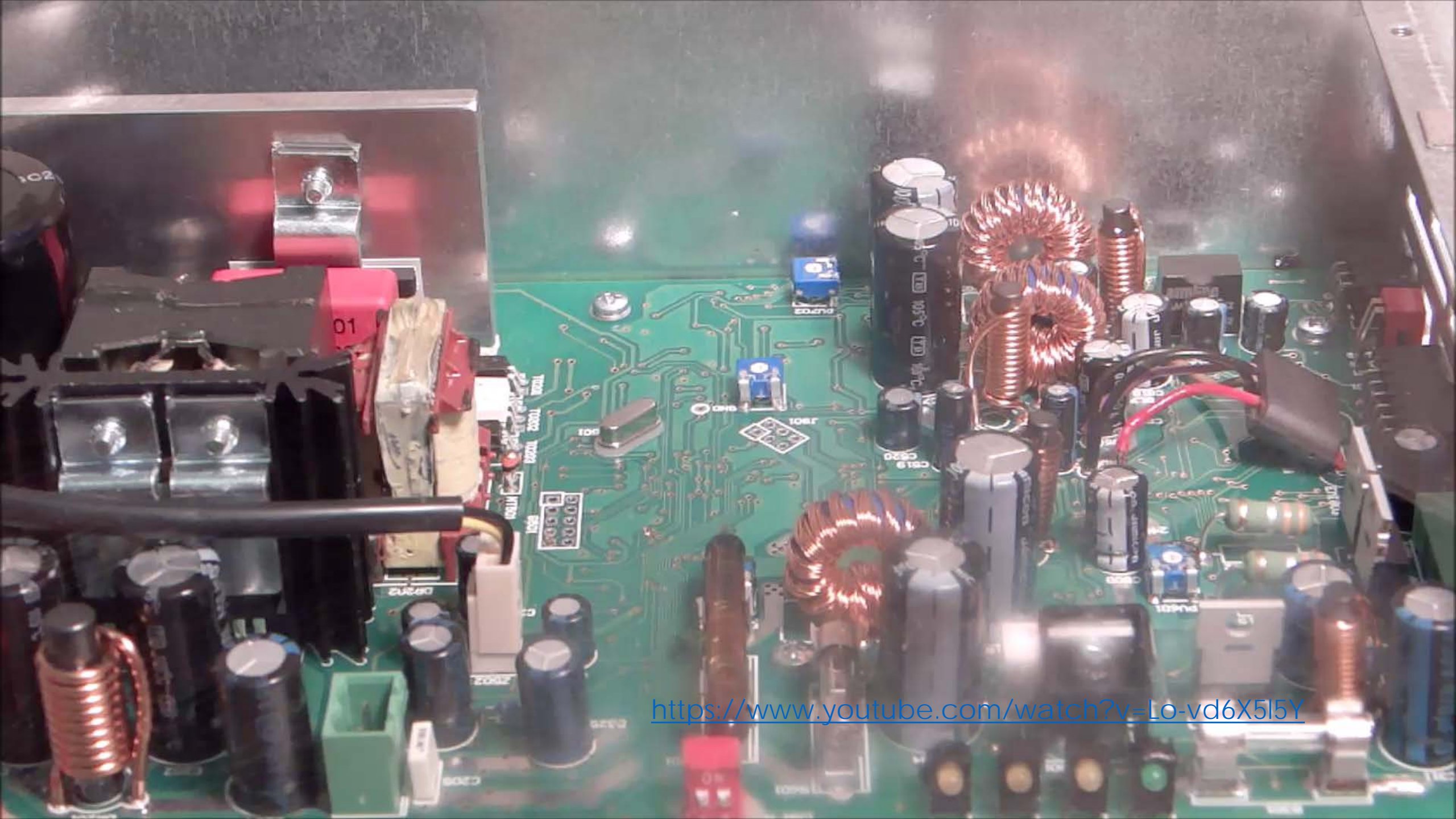
Answering the following questions

- What is a CIFEA and how does it work?
- What tests have been done?
- What are the capabilities and limitations?
- Are CIFEAs already state-of-the-art?
- Is it mandatory? Standards and regulations
- What are the benefits for society, consumers, and manufacturers?

What is a CIFEA?



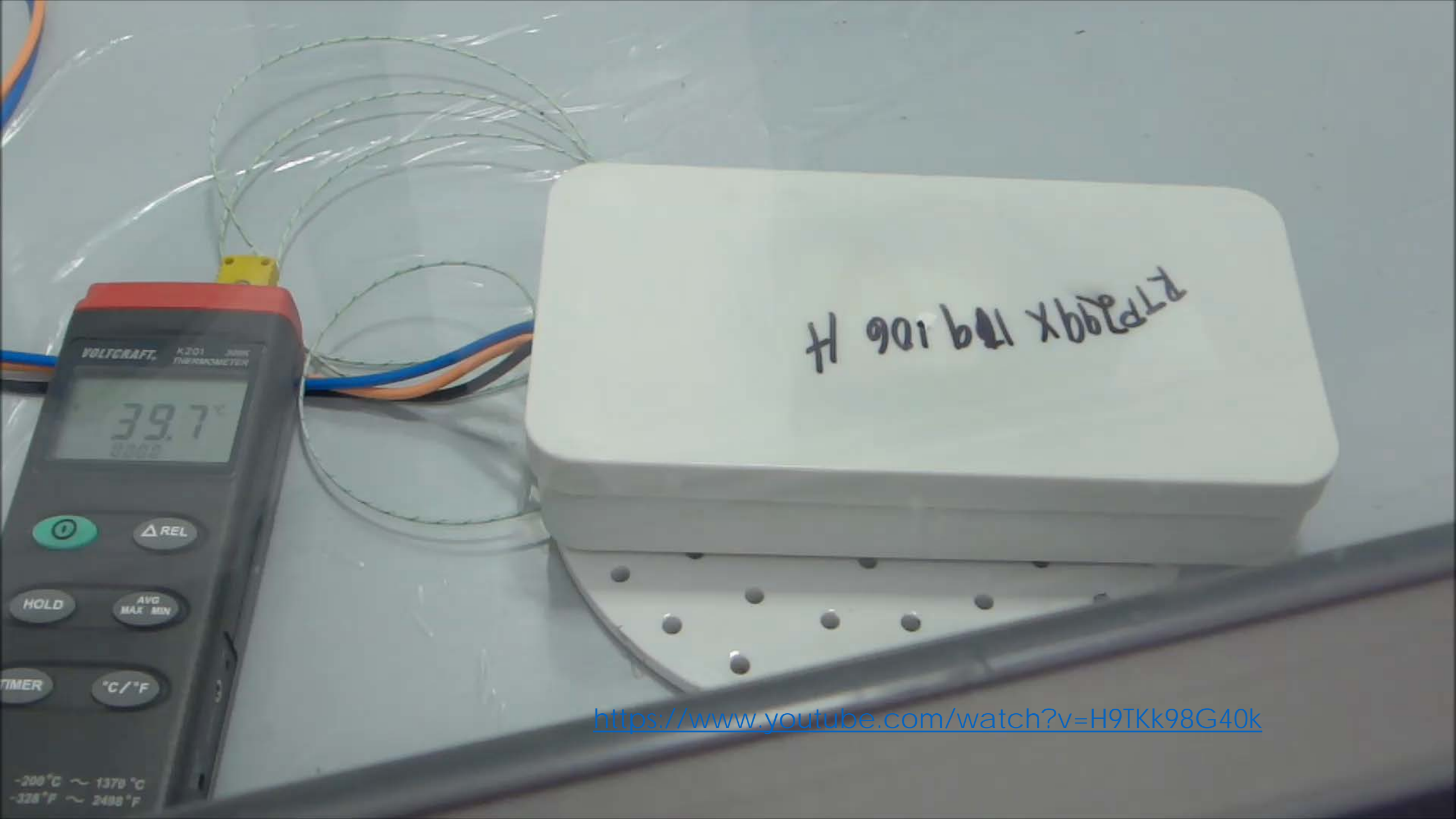
- JOB Groups CIFEAs are called E-Bulbs and are filled with **3M™ NOVEC™ Engineered Fluid**.
- This non-toxic, non-conductive extinguishing liquid is released into the device when the defined temperature is reached and the Thermo-Bulb bursts (like a sprinkler bulb).
- By releasing its content, the E-Bulb extinguishes the fire, and interrupts the electric current.
- Transition-free, the liquid immediately converts into gas. As a result of cooling and (partly) by oxygen reduction, a fire on a PCB will be extinguished within seconds.
- And, because the current is interrupted, the electric fire cannot re-ignite!
- **Automatically, 24/7, works even without power!**



<https://www.youtube.com/watch?v=Lo-vd6X5I5Y>



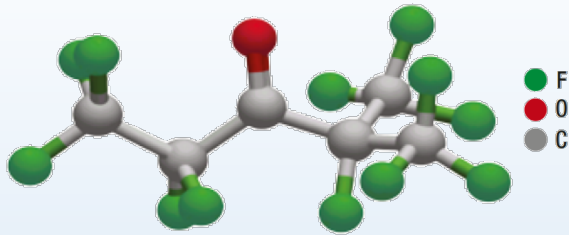
<https://www.youtube.com/watch?v=sFQspDhAmcg>



H 901 b01 x b02 d17

<https://www.youtube.com/watch?v=H9TKk98G40k>

The extinguishing agent - NOVEC



The special NOVEC Engineered Fluid is a C₆-Fluoroketone with the chemical formular:



Liquid at room temperature. Its boiling point is at 49° C

Features:

- Non-toxic
- Non-conductive
- Non-corrosive
- No residues after activation
- 0% ODP (Ozone)
- Very little global-warming potential

Technical details: E-Bulb

Dimension [standard]*	5x 20 mm	5x 40 mm	7x 40 mm
Gas volume V_{Gas} [ml]	16.6	42.0	88.5
Protected volume $V_{4\%}$ [ml] ¹	416	1,049	2,212
Protected volume $V_{4\%}$ [fl oz] ²	14	35 ½	75

*other sizes and volumes are available on request

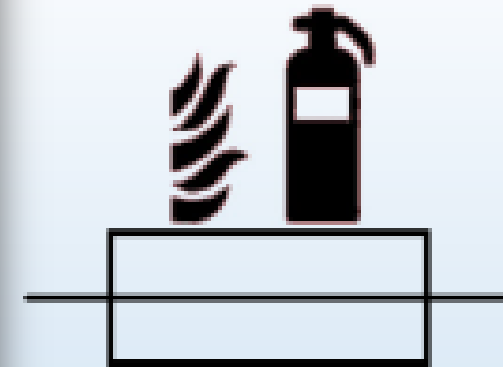
¹) According NFPA 2001

E-Bulb is available in a variety of electrical specifications.

Currents:

Class 1: <1A | Class 2: <5A | Class 3: <10A | Class 4: <16A

Voltages: 0..250V AC/DC



Electrical graphical symbol

✓ MPA verified

✓ VDE tested

✓ UL listed

✓ VdS certified



✓ 3D / 2D models

✓ Footprint model

✓ Datasheets

✓ Electrical graphical symbol

Answering the following questions

- What is a CIFEA and how does it work?
- **What tests have been done?**
- What are the capabilities and limitations?
- Are CIFEAs already state-of-the-art?
- Is it mandatory? Standards and regulations
- What are the benefits for society, consumers, and manufacturers?

Comprehensive testing



- **UL report Mitigating the Risk of Appliance Printed Wiring Board Fires**

- successfully ceased arcing fires with CIFEAs

- **CIFEAs UL listing based UL 60692 (2018)**

- aging, temperature rise and current-carrying capacity test, transient overload test, short circuit, ...



- **VdS extinguishing capability tests (2019)**

- extinguishing capability tests



- **Aging tests (ongoing)**

- "85/85 test" (85°C, 85% humidity, DC, several days), cycle tests, ...



- **Extinguishing capability and power cut off tests by MPA Dresden (2013, update 2019)**



- **Safety and reliability tests by VDE Germany (2016)**

- comprehensive electrical and mechanical strength tests, performance safety



- **Saltspray, shock and vibration tests by Paconsult (2017, 2019, 2020)**

CIFEA: capabilities & limitations

Capabilities:



- 24/7 automatic fire protection (no power needed)
- Detection
- Irreversible power cut, prevents re-ignition
- Extinguishes electrical fires (bulb size depending, typically up to 2,2 liters)

CIFEA: capabilities & limitations

Limitations:

- Effectiveness depending on CIFEA location



Close to hotspots



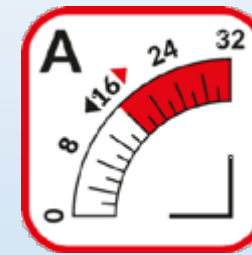
Within thermal flow



Within thermal flow



Active guidance of thermal flow



current stay within specification

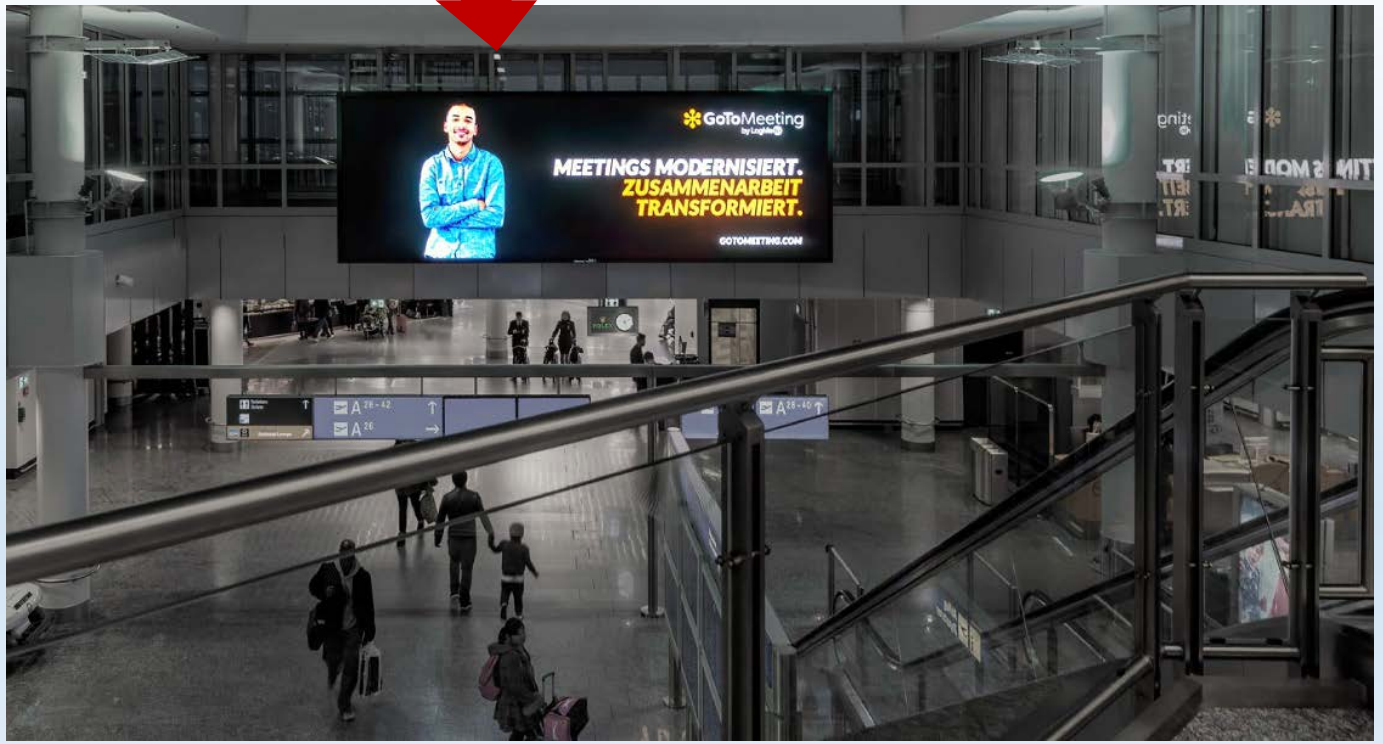
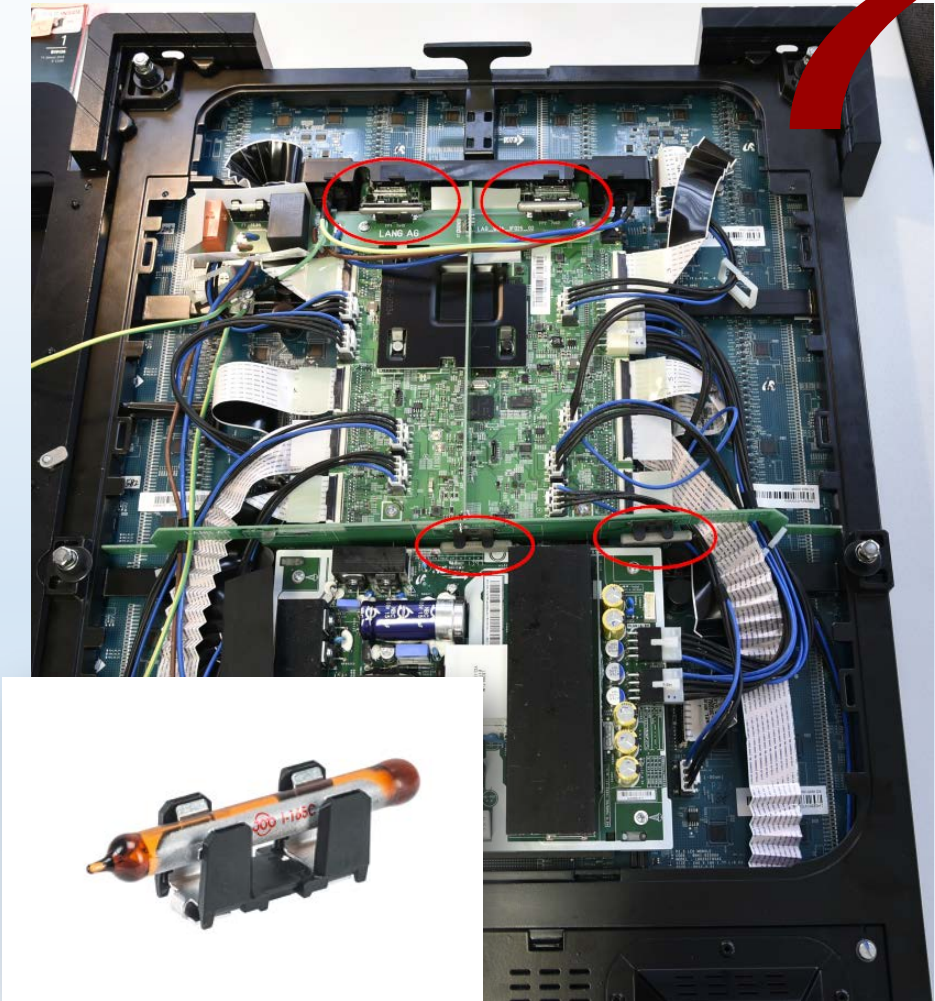


not a fuse. Shorter overcurrent situation tolerated

...

CIFEA design-in support provided

CIFEAs state-of-the-art in sensitive areas



CIFEAs state-of-the-art in sensitive areas



Source: Media Frankfurt @photoschwarzinger

Reference project: Frankfurt (FRA)

- Customer: Media Frankfurt (part of Fraport AG)
- 72 LED panels from SAMSUNG
- 4 E-Bulbs per panel designed-in, fire barrier
- [Press Release](#)

Acceptance by local fire brigade and construction authorities

Requested in tenders / state-of-the-art technology

SAMSUNG

Answering the following questions

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- What are the benefits for society, consumers, and manufacturers?

Standards and regulations



- UL & VdS certified components.
- UL 60692 (CIFEA) as amendment to UL 60691



- Germany started standardization process and requests support on IEC level (SC32c) to standardize extinguishing fuses (CIFEA) on global level.



- German Institute for Fire Prevention (DlVB)
- promotes Device-integrated Fire Protection as new key topic



Answering the following questions

- What is a CIFEA and how does it work?
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- Are CIFEAs already state of the art?
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- **What are the benefits for society, consumers, and manufacturers?**

Benefits for Society and Consumers

- ✓ Safer Products
- ✓ Lower risk of fire hazards
- ✓ ... , lower risk of fire caused fatalities, increased safety for fire fighters, less damage costs, less insurance claims , increase in GDP, ...



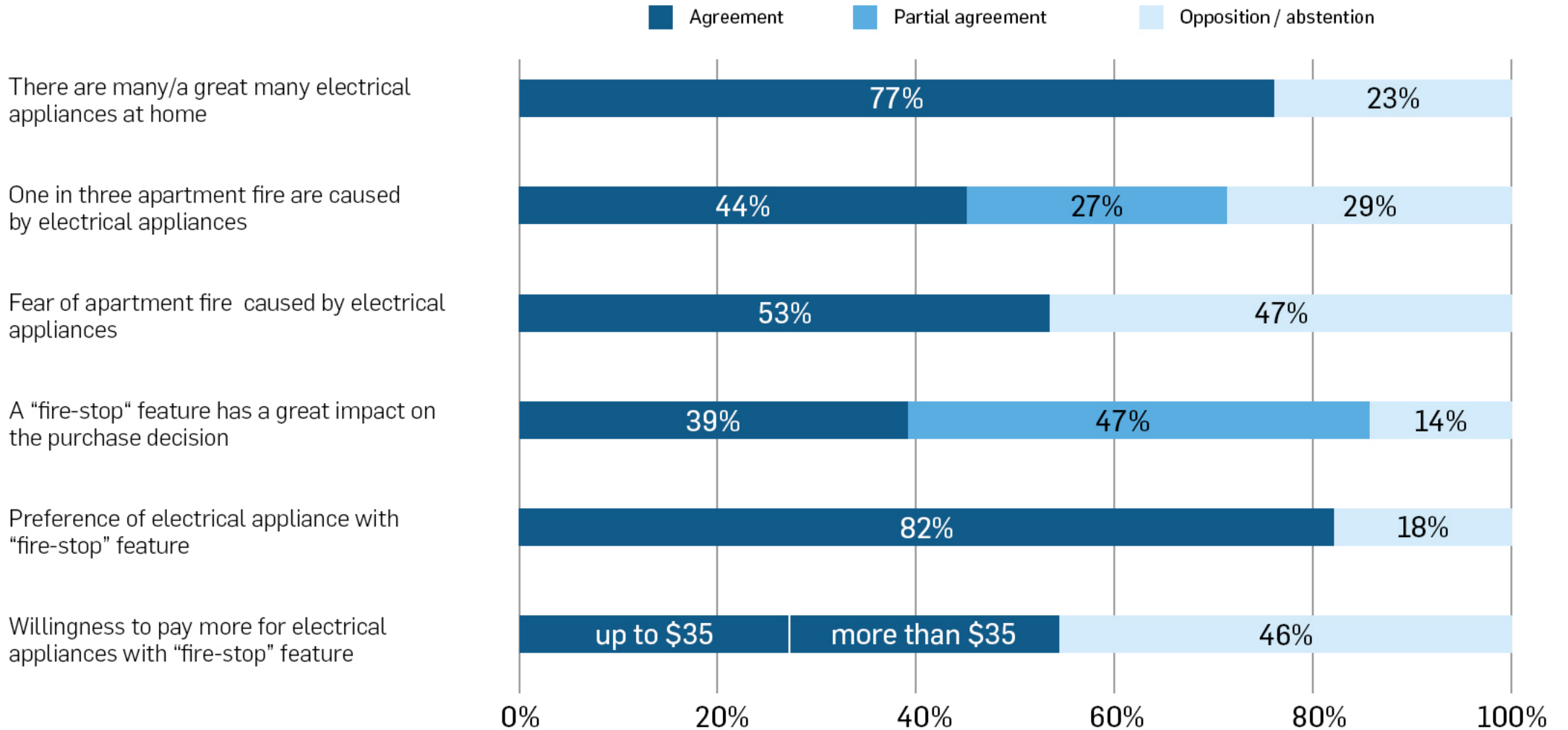
Benefits for manufacturers

- ✓ Safer products - securing lives, property and lowering business interruption
- ✓ Reduce flame retardant materials
- ✓ Cost saving – Lowering the risk of product recalls and lower product recall costs
- ✓ Approbation advantages (securing the product / fire load)
- ✓ Acceptance by insurances (by lowering the insurance risk)
- ✓ Device integrated fire protection as unique selling proposition (USP) against global competition



Forsa Survey about Device-integrated Fire Protection

According to a representative survey, conducted by the independent market and opinion research institute Forsa on the topic of "Fire hazard from electrical appliances in the home" (05/2020):



Q&A

Thank you for listening.



Contact details:

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Volunteering Opportunities

- Different participation levels
 - Interested in becoming a presenter for one of the sessions, or interested in becoming a member of the core team, you may contact: PSES VC Chair Yike Hu yhu@exponent.com

Job Opportunities

Eurofins MET Laboratories

<https://www.metlabs.com/career-opportunities/>

1. Entry-level Project Safety Engineer (Baltimore, MD)
 2. Entry-level Project Safety Engineer (Union City, CA)
 3. Experienced Hazardous Location Project Safety Engineer (Baltimore, MD)
- Do you have job opportunities you would like us to advertise?
 - Please contact Samir Sharma (Samir.Sharma@lindsay.com)

Upcoming Activities

- Next Core Team Meeting: Thursday, September 10, 2020

Members get bcc in the distribution of the agenda, so you can join if interested.

- Upcoming Presentation Schedule:
 - Sept. 17th : BREXIT by Heribert Schorn
 - Oct. 15th : OSHA by Kevin Robinson

Professional Development and Feedback

- Let us know what you thought about the meeting!
 - What topics would you like to see covered ?
 - What are your suggestions for improvement?
- Do you need PH?
 - We can send you a certificate of participation for 1H
- Please contact our Chapter Secretary, Mariel Acosta:
mariel@us.ibm.com

Thank you for attending!