



CEEAMA E-NEWS

Published by Consulting Electrical Engineers Association of Maharashtra

Now Available on CEEAMA Website: www.ceeama.org

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Volume 3 Issue # 25

Electrical Consultants' Newsletter

September 2021

From Editor's Desk

Dear fellow CEEAMA Members,

We sincerely regret that due to certain unavoidable circumstances we were unable to publish the last Two Editions of CEEAMA E News , and we are happy to bring to you the September Edition.

Though the second wave of COVID-19 caused severe panic and damage to the country's population and Economy, there has been a great realisation that now for next few years we have to learn to live with this Pandemic and I feel people at large are adjusting to a different pattern of social behavior. Even though there is a scare of a third wave, its impact is likely to be less as the vaccination program has gained momentum and even those who were not very receptive to it due to certain misconceptions, are now queuing up for it !

The timing of the second wave was also quite bad, since it came when people were recovering from the impact of first wave, business activities were picking up and economy was limping back on track. However, it is certain that Industry and Business Houses will devise new methods of doing business and continuing operations. After all human spirit doesn't get dampened easily!

Encouraged by the fantastic response we received for the series of 4 Webinars related to Safety aspects of Hospitals, that were conducted in the month of May 2021, CEEAMA intends to conduct such series of Webinars on various subjects. These will be conducted every alternate month, starting in September 2021. We are sure that we will see even more participation in these Webinars. Watch out for our next announcement!

We are getting good response to the "Technical Quiz", introduced in December 2020, which is encouraging. The results of the last Quiz will be given in this issue.

To All those members who want to advertise their products, I appeal to use CEEAMA news as a platform. You will be glad to know that our E News has a circulation of over 3000 & the rates are also very competitive. Do write to us on our official E mail for more details.

Best wishes from the Team, and don't forget to follow social distancing, stay safe & Remain healthy.

Warm Regards,

Abhay Pimpalkhare
Editorial Committee

Fire Hazard Due To Arc Fault & Its Prevention

Article By:

LFM : 049

Mr. K.S.Chandavar

K S Chandavar & Associates

Introduction:

The electrical appliances we use today have increased multi folds in recent years. An average household is all equipped with air conditioners, microwave oven, dishwasher, induction heater, mixer, toaster, washing machine, refrigerator, TV, computer and the list goes on and on. The commercial spaces have a similar list of equipment and apparatus.

With increased usage of electrical devices, the risks and safety hazards have also increased. It is estimated that about 35% of all the fires are caused by electrical faults. And out of all fires caused by electricity about 33% are attributed to hazardous arcing faults. Therefore, it is very important to detect and isolate the arcing faults

Types of Arcing Faults:

Arcing faults in electric cables or systems are among the most frequent causes of fires. We distinguish between serial and parallel arcing faults as given below:

- Parallel arcing faults occur between phase conductors and earth or a protective conductor, between two phase conductors or between a phase conductor and a neutral conductor.
- Serial arcing faults can be caused in the event of an interruption in a conductor or as a result of loose contacts.

Possible Causes of Arcing Faults:

The most common causes of serial arcing faults include defective electrical device, damaged cable insulation, crushed cables when laid through open doors and windows, cable breakage due to excessively tight bending radii, kinks in plugs and cables and loose contacts and connections in switches or socket outlets.

Additionally, environmental influences such as heat, moisture and gases can affect cables, as can UV radiation and rodents if the cables are outside. Conductive soiling and condensation can also give rise to undesired contact.

If damage to a cable causes a narrow point where the cable has a reduced cross-section, this can lead to a temperature increase when the cable is subjected to current loading, which can in turn lead to the oxidation of the hot copper and the formation of copper oxide. The insulation is then heated and carbonized. As the heating becomes more intense, the copper melts and gasifies, creating an air gap and causing sporadic arcs to occur. At around 6,000°C, these can stabilize via the carbonized insulation.

Comprehensive experiments into the origins of serial arcing faults at the normal voltage of 230 Volts and using the most common cable type yielded the following result:

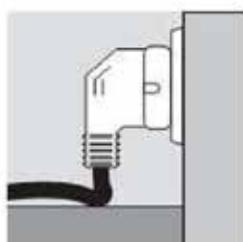
Fault locations need a certain level of energy to carbonize and to reach significant arc stability. The time taken for flames to occur depends greatly upon the load current. For currents under 3Amps, arcs are very unstable, with only a glow usually being visible.

However, over a longer period this can carbonize the fault location such that a stable arc forms for a period lasting between a few tenths of a second and a few seconds. The ignition energy for this lies at around 300 joules. At currents below 2Amps, even a stable arc frequently does not have the power required to ignite the cable.

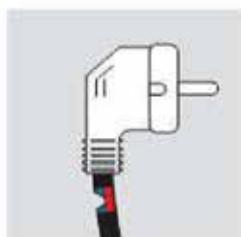
The probability of hazardous arcing faults occurring is greatest in the mid-range between 3Amps and 10 Amps and the majority of common domestic electrical appliances fall into this category. Here, the occurrence of the first significant flames (i.e., sustained flames lasting over 5 or 50 ms) lies at around 80 percent. In the upper range above 10Amps, the power of the arc is so high that flames occur very quickly and without carbonization. On the other hand, the arc stability is extremely low. At the same time, the probability of significant flames lies below 35% and the probability of stable flames below 5%.

One reason for this is the vaporization of the carbonized material, which prevents the formation of a carbon path. Moreover, high power serial arcs sometimes melt the two copper conductors back together and "repair" the fault point. Even if stable arcs at above 10Amps are rare, the brief and powerful flames that can occur in this range, however, represent a serious danger.

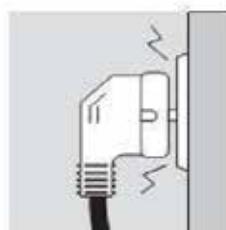
Situation when Arc Fault can occur



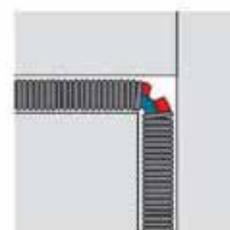
Power supply cord subjected to excessive forces (by furniture or a position)



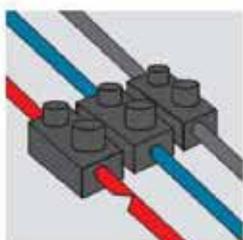
Power supply cord defective following inappropriate or excessively numerous operations



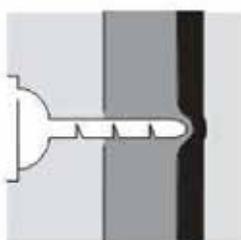
Power sockets in poor condition



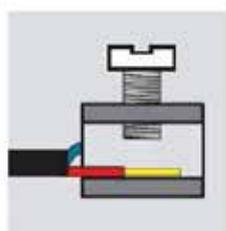
Ageing of cable protective devices



Cable weakened at connection



Accidental damage to a cable

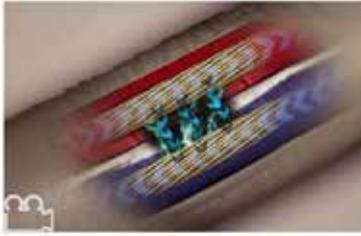


Loose connections

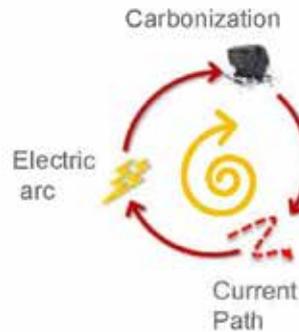
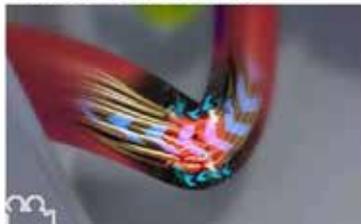


Cables damaged by their environment: UV, vibrations, moisture, rodents.

Damage to the insulating material



Damage to the conductor or loose connection



Above pictures show how insulating material ignites and how an arc fault occurs.

Detection of arcing faults:

A portfolio of interacting protective components geared towards personal, line, and preventive fire protection is required for complete protection of electrical installations.

Miniature circuit breakers and fuse systems are designed to protect cables, systems and devices in case of overload and short circuit. They disconnect the current, depending upon the fault impedance, usually between phase conductors or between a phase conductor and a neutral conductor in the event of parallel arcs.

Residual current protective devices (RCDs) protect against dangerous electric shocks from indirect and direct contact by disconnecting the monitored circuit quickly and safely from the mains supply when a certain residual current is exceeded. The cause of the fault can be a defective electrical device, for example. Residual current operated circuit breakers (RCCBs) detect residual currents and **arcing faults** to earth and can provide additional fire protection in this case, depending upon the rated residual current. For many areas of application, the installation of RCCBs with rated residual currents of maximum 30 mA / 100 mA has therefore become mandatory in new buildings.

The arc fault detection devices (AFDD) shall be capable of detecting all types of arcing faults. These devices are also called arc fault current interrupters (AFCI). The AFDD not only detects current and voltage but they also continuously measure the level, stability and duration of high-frequency noise. Integrated filters process, analyses and evaluate these signals according to numerous criteria in order to determine, for example, the total energy, arc energy, plateau arc voltage, arc stability and flame occurrence. If the conditions for an arcing fault are fulfilled, the connected circuit is shut down within a fraction of a second.

Fire hazards, from electrical cables to terminal equipment, can thus be recognized and prevented at an early stage.



AFDD of Siemens, Type 5SV6



MCB+AFDD of Schneider, Acti 9iDPN N

Standards for Arc Fault Protection:

In the United States, AFDD or AFCIs (arc-fault circuit interrupters) have been mandatory for many years now.

The International Electrotechnical Commission (IEC), the European Committee for Standardization (CENELEC), and the German Commission for Electrical, Electronic & Information Technologies (DKE) have also recognized the urgency of the matter and adopted arcing fault protection as a recommendation.

The following standards are prescribed for arc fault protection,

1. NEC (USA) - All domestic circuit to be protected by AFCI (AFDD), from 2008.
2. IEC 62606 & IEC 60364-4-42 (2014) recommends the use of AFDD to protect against arc fault in final circuit from 2013.

It is suggested that the AFDD shall be installed at the origin of the final circuit to be protected.

Summary:

In most gadget and gizmo savvy houses of today, the danger of arc fault is always lurking around the corner. Add to that the trend of high-rise building and the hazard is even more serious.

Therefore, it becomes necessary if not mandatory to provide AFDD (AFCI) protection with proper discrimination in all residential, commercial and industrial installations.

Ref:

1. Siemens – White Paper, Protection Concepts, AFDD,

<https://new.siemens.com/global/en/products/energy/low-voltage/systems/...>

Report on Webinars conducted in Jan 2021 TO July 2021

Webinar Sr No.	Date	Webinar Presenter	Total Attendees
1	15th January 2021	TSI Power Pvt Ltd.	90
2	12th May 2021	CEEAMA Webinar Series: Topic : CEA 2010 /21 - Form III and electrical safety. NBC & NEC Speaker : Mr. Ulhas Vajre	359
3	13th May 2021	CEEAMA Webinar Series: Topic :Fire Fighting Provisions code compliance and monitoring Speaker : Mr. Abhay Pimpalkhare	359
4	14th May 2021	CEEAMA Webinar Series: Topic : Considerations in Electrical Design for Hospital Speaker : Mr. Chidambar Joshi	359
5	15th May 2021	CEEAMA Webinar Series: Topic : Electrical Safety Audits case studies and summary Speaker : Mr. Narendra Duvedi	359
6	25th June 2021	Eaton Power Quality Pvt. Ltd	130
7	23rd July 2021	Piller Power India Pvt. Ltd.	125

The response from presenters as well as attendees is quite encouraging. CEEAMA expresses its gratitude to both.

On behalf of CEEAMA GC, I appeal to all CEEAMA life members to come forward and share such unique and useful knowledge and experience with all of us. Kindly contact Mr. Narendra Duvedi on +91982528734 to take this forward.

CEEAMA Website is now open in its NEW AVTAR. I request all members to have a look at it and check all new facilities. Gradually one can expect that this website will be a unique archive of useful knowledge and information on various subjects related to electrical engineering. I appeal all members to take advantage of advertising on CEEAMA Website to promote their products and services. The prospective visitor base consists of over 8000 electrical engineering professionals with ever increasing number.

Lastly - Look forward to mails from CEEAMA for more such informative webinars. CEEAMA also appeals E News readers to suggest more subjects of their interests. The organizers will take maximum efforts to locate experts on such subjects and invite them to conduct webinars.

RESULTS OF CEEAMA E-QUIZ
MAY 2021



Mr. Dinesh Redekar

Mr. Subramanyan Iyer

Mr. Navneet Neve

CEEAMA - E-Quiz

SEPTEMBER 2021

1. Let - through energy of Cable must be
 - A. Higher than Circuit Breaker
 - B. Lower than Circuit Breaker
 - C. Lower than Fuse
 - D. None of the above

2. Not a electrical Cable conductor material
 - A. Copper
 - B. XLPE
 - C. Silver
 - D. Nickel

3. Non-magnetic Gland plate required for
 - A. Single core cable
 - B. 4 Core cable
 - C. Un-armoured cable
 - D. Aluminium Conductor Cable

4. Not applicable for Cable testing
 - A. Oxygen Index
 - B. Acid Gas generation
 - C. No-Load loss
 - D. Fire Survival

5. Not applicable for PD measurements
 - A. Accoustic detection
 - B. Pressure Detection
 - C. Chemical detection
 - D. Optical detection

6. Constant Torque Load
 - A. Centrifugal Fan
 - B. High Speed Compressor
 - C. Reciprocating compressor
 - D. Blower

7. Heat Tracing Components
 - A. Fibre Glass Tape
 - B. Cable End Seal
 - C. Self-regulating Heating Cable
 - D. All of the above

8. Hazardous Area – Equipment Protection Method

- A. Oil Immersion
- B. Confine the explosion
- C. Limit the energy
- D. All of the above

9. Under SC conditions, the contactor or starter shall cause no danger to persons or installation

- A. Type I co-ordination
- B. Type II co-ordination
- C. Both A & B
- D. Type III Co-ordination

10. Current limiting circuit breakers are designed on the principle of

- A. thermal energy let-through
- B. magnetic repulsion of the contacts
- C. Both A & B
- D. Time grading

Rules for the QUIZ:

- The Quiz will be open for 10 days from the date of EMAIL.
- Each correct answer received on DAY 1 will get 100 points
- Next days the points will reduce as 90 – 80 – 70 and on 10th day points will be ZERO even if the answer is correct.
- All participants will receive E certificate signed by CEEAMA President with the points earned mentioned on the same.

Please use following google form link to participate in the QUIZ.

<https://forms.gle/YUNm23GUsVUc3UuZ7>

"Thank you all for the overwhelming response to the E-NEWS in general and E-Quiz in particular.

MCQ based quiz is always tricky and surprisingly can take us aback when we realise our conceptions (misconceptions) about the subject / system / product.

The aim of the feature was to create inquisitiveness in your mind and help you check your technical quotient quickly. The response will also help us to present articles and webinars on subjects which are important, but which lack enough awareness / knowledge in general.

It can open a pandora box for our discussions and arguments and probable solutions. Engineering evolves with conception. It gets fuelled with community discussions and capitalist actions. All stakeholders start realising the need to take a closer look and help improve standards as we have seen in the past century. Surely it makes the world a better place.

Wish you all a better luck this time.

Do spread the word."

Upcoming Webinar Organised By CEEAMA

PILLER POWER POWER INDIA PVT LTD

Organised by



WEBINAR ON

"A TRULY GREEN UPS SOLUTION (WITHOUT BATTERY) FOR HIGHER POWER APPLICATION"

KEYNOTE SPEAKER

SANGITA TIWARI

Sales Manager-Western India
Piller Power India Pvt. Ltd.

17th September 2021 | 4:00PM - 5:30PM

Co-Organised by



ELECTRONIC AUTOMATION PVT LTD.

Organised by



WEBINAR ON

NEW PRODUCT RANGES — ANNUNCIATORS, MONITORING DEVICES, ENERGY METERS. UPDATES IN CURRENT PRODUCTS

KEYNOTE SPEAKER

MR. ASHOK SHANBHAG
Managing Director

MR. C.R. BHANDARE
General Manager Marketing

MR. VENU GOPAL SHARMA
Product Specialist.

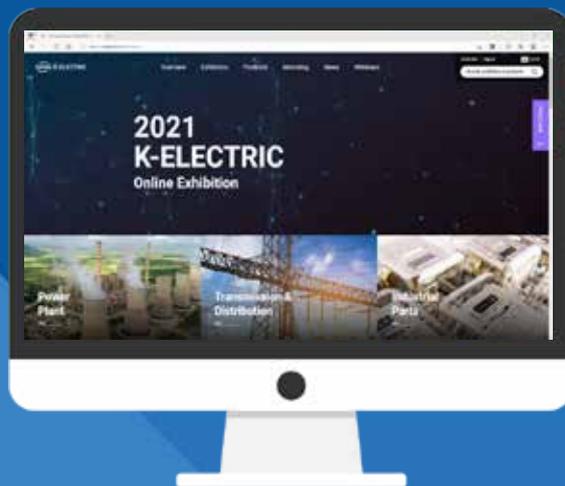
24th September 2021 | 4:00PM - 5:30PM

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K-ELECTRIC Online Exhibition

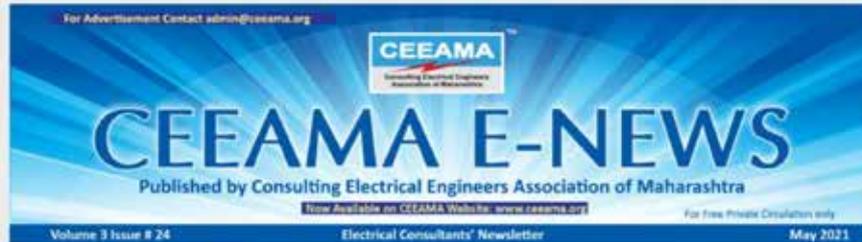


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From Editor's Desk

Dear fellow CEEAMA Members,

We have great pleasure in bringing out to you, the May 2021 Edition of CEEAMA E-News.

In the last over 12 months, we have been regularly writing about the Covid-19 Pandemic and its impact on social, economical and other spheres of our lives. We have also discussed about the second wave and its possible severity, however, all this was done from a distance. But on 21st of April, when the news of sad and sudden demise of Mr. Suhas Keskar, President CEEAMA, came in, we all were speechless! It was so unexpected that it took some time before we all came to terms with reality. The contribution of Mr. Suhas Keskar to CEEAMA was immense as he was associated with it since inception. I joined CEEAMA due to Mr. Keskar and Mr. Yardi. He came across as a thorough gentleman, who treated people with respect and worked tirelessly for the growth of CEEAMA. He was also fond of music and had strong spiritual inclination too. His passing away is a personal loss to me as he has been a friend, philosopher and guide for me.

On 9th May 2021, CEEAMA arranged a condolence meet in which everyone paid rich tributes to him. The compilation of such messages is summarised in this edition. We all pray God to give strength to his family to bear this untimely loss and may the departed soul rest in peace! Om 🙏

CEEAMA is continuing with efforts of knowledge sharing. In the month we arranged a series of 4 Webinars related to the pandemic. We got a very good response to these. The Webinar synopsis are available in the newsletter.

We are getting good response to the "Technical Updates" section.

Rest wishes from the Editor.

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