

From Editor's Desk

Dear fellow CEEAMA Members,

We are pleased to bring to you the February 2021 Edition of CEEAMA E-News.

The world is still going through a turmoil due to the aftermath of the Pandemic and in some parts of the Globe, the second wave is doing too much of a damage and survival seems to be the main objective for many people thus the economic activities take a back seat. Amidst this cloud of fear, the world's two greatest democracies namely United States of America and India have seen highly disturbing demonstrations. The Capitol Hill and Red Fort has seen the ugly side of freedom of expression and we all need to be careful about these pseudo liberals as these attacks on the basic fabric of our democracy can have serious impact on our Country. We all must observe the principles of Nation First...

The COVID-19 Vaccination programme has just completed one month and the results seem to be very encouraging with no major side effects after over 8 million vaccinations across the country. In next few months a lot of our CEEAMA Members who are in 50-65 years age group will be vaccinated . We encourage all eligible members to get vaccinated without any fear.

The recently announced Budget has tried to bring some cheer on the faces of Common Man as well as Industry Professionals but the struggle for revenue generation continues. The continued impetus on Atmanirbhar Bharat is a welcome sign for Indian Manufacturing Industry.

Though the second wave of COVID-19 is looming large on us, with adequate precautions and social distancing, we are able to come back to near normal life. This has encouraged us to plan CEEAMATECH Exhibition (with personal attendance) sometime during summer of 2021. Though it would be premature to talk more about it today, several Exhibitors and their decision makers have shown very encouraging response to this idea. If all goes well, we may be able to make an official announcement about it in March 2021, E-News.

CEEAMA is continuing with efforts of knowledge sharing and enhancement by means of Webinars ,and the Webinar report for January 2021, talks more about it. As most of us are back to our normal work life, we may think of arranging these Webinars after working hours to facilitate higher participation. As always, we appeal to all members to send their Technical Articles to us, so that the value of E News gets enhanced.

We are seeing higher response to the "Technical Quiz", introduced in December 2020, which is very encouraging.

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

Warm Regards, Abhay Pimpalkhare Editorial Committee



Electrical Heat Tracing

Article By: LFM : 067 Mr. Subhash Bahulekar Newton PowerTeam

1.0 Definition:

Maintain or raise temperature of equipment using electrical current through tracing cables.



2.0 Purpose:

Trace heating may be used to protect pipes, floors, vessels, instrument enclosures, and other infrastructural surfaces from freezing or fluid coagulation, to maintain a constant flow temperature in hot water systems, or to maintain process temperatures for piping that must transport substances that solidify at ambient temperatures. Electric trace heating cables are an alternative to steam trace heating where steam is unavailable or unwanted.

Trace heating takes the form of an electrical heating element run in physical contact along the length of a pipe. The pipe is usually covered with thermal insulation to retain heat losses from the pipe. Heat generated by the element then maintains the temperature of the pipe.

3.0 History:

Since ages, humans discovered various forms of heat sources viz. Sunlight, Geothermal hot springs, and artificial fire to warm/heat up his environment for comfort, cooking, and to thaw solidified fluids for his convenience, and benefits.

In the 18th Century, with the discovery of steam energy, industrial revolution greatly intensified. Steam got many usages including that for frost-prevention of fluids. But it took 20th Century to use electricity for the same.

Electric trace heating began in the 1930s but initially no dedicated equipment was available. Mineral insulated cables ran at high current densities to produce heat, and control equipment was adapted from other applications. Mineral-insulated resistance heating cable was introduced in the 1950s, and parallel-type heating cables that could be cut to length in the field became available. Self-limiting thermoplastic cables were marketed in 1971.

Control systems for trace heating systems were developed from capillary filled-bulb thermostats and contactors in the 1970s to networked computerized controls in the 1990s, in large systems that require centralized control and monitoring.

International standards applied in the design and installation of electric trace heating systems includes IEEE standards 515 and 622, British standard BS 6351, and IEC standard 60208.



4.0 Types:

A) Constant electric power "series"

A series heating cable is made of a run of high-resistance wire, insulated and often enclosed in a protective jacket. It is powered at a specific voltage and the resistance heat of the wire creates heat. The downside of these types of heaters is that if they are crossed over themselves, they can overheat and burn out, they are provided in specific lengths and cannot be shortened in the field, also, a break anywhere along the line will result in a failure of the entire cable. The upside is that they are typically inexpensive (if plastic style heaters) or, as is true with mineral insulated heating cables, they can be exposed to very high temperatures. Mineral insulated heating cables are good for maintaining high temperatures on process lines or maintaining lower temperatures on lines which can get extremely hot such as high temperature steam lines. Typically, series elements are used on long pipe line process heating, for example long oil pipe lines and quay side of load pipes on oil refineries.

B) Constant wattage :

A constant wattage cable is composed of multiple constant electric power zones and is made by wrapping a fine heating element around two insulated parallel bus wires, then on alternating sides of the conductors a notch is made in the insulation. The heating element is then normally soldered to the exposed conductor wire which creates a small heating circuit; this is then repeated along the length of the cable. There is then an inner jacket which separates the bus wires from the grounding



braid. In commercial and industrial cables, an additional outer jacket of rubber or Teflon is applied.

The benefits of this system over series elements are that, should one small element fail, then the rest of the system will continue to operate, on the other hand damaged sections of cable (usually 3 ft span) will stay cold and possibly lead to freeze ups in said section. Also, this cable can be cut-to-length in-field due to its parallel circuitry, however, due to the circuit only running to the last zone on the cable, when installing on site you normally have to install slightly beyond the end of the pipe work. When installing constant wattage, or any heat tracing cable, it is important to not overlap or touch the cable to itself as it will be subject to overheating and burnout. Constant wattage cable is always installed with a thermostat to control the power output of the cable, making it a very reliable heating source.

The disadvantage of this cable is that most constant wattage cables do not have soldered connections to the bus wires but press on type contact and are therefore more prone to have cold circuits due to loose connections caused by cable manipulation and installation.

C) Self-regulating :



Self-regulating heat tracing tapes are cable whose resistance varies with temperature low resistance for temperatures below the cable set point and high resistance for temperatures above the cable set point. When the cable temperature reaches the set point the resistance reaches a high point and resulting in no more heat being supplied. These cables use two parallel bus wires which carry electricity but do not create significant heat. They are encased in a semi-conductive polymer. This polymer is loaded with carbon; as the polymer element heats, it allows less current to flow so the cable is inherently power saving and only delivering heat and power where and when required by the system. The cables are manufactured and then irradiated and by varying both the carbon content and the dosage then different tape with different output characteristics can be produced. The benefits of this cable are the ability to cut to length in the field. It is more rugged, and much more reliable than a constant wattage cable; it cannot over-heat itself so it can be crossed over, but it is bad practice to install tape in this way. Self-regulating and constant wattage heating cables have specific maximum exposure temperature, which means that if they are subject to high temperatures then the tape can be damaged beyond repair. Also, self-limiting tapes are subject to higher inrush currents on cold starting up similar to an induction motor, so a higher rated contactor is required.

5.0 Engineering:

The design of an electrical trace heating system is complex, with information needing to be drawn from many sources at different phases of the project execution. Frequently, the electrical trace heating system design package is not available/complete until a late stage in the project execution, and is usually issued as a bulletin to the main electrical construction contract.

A) Consideration:

- Environmental conditions (IP ratings)
- Hazardous areas
- lowest ambient design temperature
- Control method (e.g., thermostats)
- Pipe material, size and length
- Pipe fitting type
- Insulation type and thickness
- Fluid flow conditions
- Areas of heat loss (e.g., supports, pump bases)
- Maintenance access (manholes)

B) Design philosophy:

- A continuous and reliable service
- Safety to personnel and equipment
- Ease of maintenance & interchangeability
- Standardised on one cable output rating

C) Design Inputs:

P&ID, Instrument types /Hook Ups, Piping Isometric diagrams, Plot Plan, Equipment Layout and Piping BOM including Piping Line List and Insulation Summary sorted to provide a breakdown of electrically traced lines only.

CEEAMA E-NEWS | FEBRUARY-2021



D) Typical BOM:

- Heating cable
- Temperature controller (thermostats)
- Temperature transmitters
- End connectors / Power connectors
- Cables from Control Panel to tracer
- Glass Tape /Pipe Strap/ Tie wires/clamps
- Junction boxes / RTD enclosures
- Cable glands, lugs
- Joints, splices, and end seals Earthing
- Caution Lables

E) Distribution board:

- Isolating Transformer (1/3 phase)
- Isolation & protection (Fuse, Contactor/SS controller, O/C, E/F, RCBO, etc.)
- Continuity monitor and low current alarms
- RTD inputs and controllers
- Metering, indications, and misc. accessories.

F) Application in Hazardous Area:

Typically, the electrical enclosures (DB, etc.), End connectors, Power connectors, and accessories required would be Ex'd' type. The temperature associated with the T-Rating shall not exceed the autoignition temperature (<80%) of the flammable or combustible materials that may be present.

G) Engineering Deliverables:

- Sizing Calculations (cable suppliers' software: i) Pentair Tracecalc, ii) Thermon Computrace)
- Heat Tracing power layout
- SLD, JB looping diagram
- Heating Schedule, and BOM/MTO

6.0 Installation procedure:

The heating tape runs on the underside of the pipe, strapped every 300mm with fixing fibre tape.

"Warning – Electric Trace Heating" labels installed in a visible position on the insulation weather barrier, at intervals not exceeding 3 metres. Short pipe spur lengths tee-ing off from a main pipe run is heat traced by looping the cable up and down the tee'd length from the main run. Ambient thermostat is used to energise the trace heating distribution board set at desired temp.

Ensure that the heating cable installation is protected from both mechanical damage and effects of the weather, until the thermal insulation is applied.







7.0 Recommended Vendors:

Raychem / Thermon / Bartec / Emerson / Danfoss / Pentair

8.0 Market Outlook :

Global Electric Heat Tracing market accounted for \$1.54 billion in 2019 and is expected to reach \$3.36 billion by 2027 growing at a CAGR of 10.2% during the forecast period. Rising demand for energy-efficient electric heat tracing systems and low maintenance cost associated with electric heat tracing systems are the major factors driving the market growth.

9.0 References/courtesy/Disclaimer:

Various sources have been used to compile the information presented in this article, some of which are Thermon, AIChE, Inst Tools, Wikipedia, Prigol engg., Trade India, Heatingelementsplus and Businesswire.com. Although every attempt has been made to ensure the accuracy of this material, neither CEEAMA nor any of its contributors to this publication assumes responsibility for any inaccuracies or omissions in the data presented. As a safety precaution, information utilized from this publication should be verified from the relevant sources.



CEEAMA WEBINAR 2020 - 2021			
SR	DATE	COMPANY NAME	NUMBER OF ATTENDEES
29	8-Jan-2021	Chandresh Cables Ltd - AVOCAB	109
30	15-Jan-2021	TSI Power Pvt Ltd	97

Report on Webinars conducted in Jan 2021

Number of attendees shows that the response from presenters as well as attendees is quite encouraging. CEEAMA expresses its gratitude to both.

Draft supply code 2020 has been published by MERC during the month of December and likely to be implemented soon. This has a separate chapter on Power quality particularly Dynamic voltage level compliance. TSI Power Pvt Ltd has a product, which will be quite helpful in improving and maintaining voltage levels.

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.

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. As promised, we will continue with this webinar series for coming months.





Mr. Ram Shfram Mr. Kiran Rane Ms. Kiran Dangi

1. VFD Driven motors contribute_____ to the fault

CEEAMA - E-Quiz

FEBRUARY 2021

- A. 20% of rating
- B. 100% of rating
- C. 0% of the rating
- D. 18% of the rating
- 2. Fault calculation is arrived using following method
 - A. Numerical MVA
 - B. PU
 - C. Ohmic
 - D. All of the above
- 3. Symmetrical faults are
 - A. LLLG
 - B. LL
 - C. LG
 - D. None
- 4. Non Symmetrical faults are
 - A. LLLG
 - B. LLL
 - C. LL
 - D. None
- 5. ETAP Software is commercially available for calculation of
 - A. Electrical Fault Study
 - B. Electrical Relay Settings
 - C. Electrical Arc fault Study
 - D. All of the above
- 6. ANSI/IEEE no. 27 means
 - A. Overload relay
 - B. Under Voltage Relay
 - C. Circuit Breaker
 - D. Under current relay
- 7. Instantaneous relay operates in
 - A. 20-40ms
 - B. 60-80ms
 - C. 100-120ms
 - D. 1s



- 8. IEC standard for lightning protection is
 - A. 61505
 - B. 60504
 - C. 61304
 - D. 62305
- 9. Which of these is not an earthing arrangement?
 - A. TT
 - B. TI
 - C. TN
 - D. IT
- 10. Ignition sources of Dust Explosion
 - A. Static Electricity
 - B. Hot Surfaces
 - C. Both A & B
 - D. None of the above

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/hZWiCKM9rtcjmf1u9

"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."





Silver Partners

SOUTH ASIA'S LARGEST POWER CONTROL COMPANY



Media Partners



CEEAMA CIN No.: U91990MH2011NPL212166 • Web: www.ceeama.org • Email: admin@ceeama.org

Registered Office : A Wing, Office No.103, Sanpada Station Complex, Navi Mumbai 400705

Organised by



Co-organised by



FairAct Exhibitions and Events LLP

Incorporated under Indian Companies Act 1956

1st Floor, India Printing House, 42, G. D. Ambekar Marg, Wadala, Mumbai 400031 Tel: +91 22 66562115 / 16 • Email: ceeamatech@fairactexpo.com

Consulting Electrical Engineers Association of Maharashtra