

CEEAMA E-NEWS

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Electrical Consultants' Newsletter

August 2019

From the Secretary's Desk



Hello Friends,

Let us express our condolences and concern towards Flood Victims from Maharashtra and other states of India. This year it was an unprecedented natural calamity. However, we all know that in urban areas it is equally manmade. I read a renowned columnist few days back saying, "Rivers are not man made like roads and transmission lines – so we do not have right to change their path". Uncontrolled urban growth has done this and now has lost resilience to deviations forced by nature. In the massive rescue and relief operations, MSEDCL offered

last mile service at few places where the staff travelled through water (In boats) to ensure safety. Congratulations!

It is worth thinking whether we are likely to follow some thing similar in our field electrical engineering – "flooding" of power requirement due to E Vehicles! Are we trying to follow E Vehicles path blindly? Find a thought-provoking article in this issue on this subject, inspired from some recently known facts about charging requirements of E Vehicles.

The second round of "round table meetings" will be on "Importance of codes and standards in Electrical designs". The dates are now finalized, and are 27th Sept at Pune and 11th Oct at Mumbai. This time we appeal to members to express their thoughts about the subject in one page and send it to suchita.warty@fairactexpo.com. We will select 5 members and invite them for these conferences along with other invitees.

CEEAMA GC has now finalized CEEAMATECH 2020 program and the event is expected to be launched soon. As you know CEEAMA has chosen a very interesting upcoming topic of "Industry4.0 and it's relevance to Electrical engineers". You will receive all the details about the program soon along with more opportunities for participation.

CEEAMA Annual General meeting is getting scheduled during second fortnight of September 2019 and I request all members to be on lookout for the invitation email. We will be very glad to receive most of you during AGM.

Goodbye till next issue.

Narendra Duvedi

Hon Secretary.

Article: Electric Vehicles, their charging and intentions of government.

Electric Vehicles, their charging and intentions of government.

Recently a leading CAR manufacturing company introduced its E vehicle in India and has started accepting booking. This appears to be a mid-size car, expected to run about 400KM on full charge. Although I was curious, I had so far not taken specific efforts to quantify "BATTERY CHARGING LOAD" in terms of "Power" and "Energy" if such vehicles increase in bulk, as government is planning. I am presenting this here as I have understood. If this is true and happens the way it appears, it will give rise to so many questions.

The review said, CAR has three charging options namely,

- 1) Built-in charger of 2.8KW, which will take 20 hours for full charge. (56Kwh)
- 2) Wall mounted of 7.2KW which will take 6 hours for full charge. (43Kwh)
- 3) External charger of 50KW which will take 90 minutes for full charge. (80 Kwh)
- 4) Cost of CAR is Rs.23 Lacs and estimated cost of batteries is about 60%. The company is giving battery guarantee for 160000KM. (Usually battery guarantee is on prorata basis – Proportionate funds are provided to buy new batteries based on actual use). So expenses on batteries for 160000KM are approximately Rs.10 Lacs.

Above information gives idea about charging KW and KWh for this and similar cars. we have attempted to use this information to know estimated

- 1) Fuel cost of running E Vehicle
- 2) Electrical load on distribution system
- 3) Expected power quality issues if timely restrictions are not introduced on charger specifications.

Let us consider these one by one.

1) Approximate fuel cost of running E Vehicle.

A normal urban CAR user in this category travels 60 / 70 Kms every day. So his weekly travel would be 350Kms. He may require at least 2/3 hours charging every day during night with a demand of 7.2KW. He may charge another 3 / 4 hours at public parking with built in charger with requirement of 2.8KW. The energy requirement will be as follows.

- a) $7.2KW \times 3 \text{ hrs} \times 7 \text{ days} = 151Kwh$
- b) $2.8KW \times 4 \text{ hrs} \times 7 \text{ days} = 78 \text{ Kwh.}$
- c) Considering 35% load factor (As battery charging current reduces when battery gets charged over the period) Actual energy consumption would be $= (151+78) \times 0.35 = 80Kwh$
- d) Cost of this electrical energy would be Rs.800.00. This would mean $800/350 = Rs.2.30/Km.$
- e) If cost of battery replacement to be Rs.1000000 and batteries would need replacement after 160000Km, this cost comes to Rs.6.25/ km.
- f) **Considering Both these costs (d and e) , per KM fuel cost would be Rs.8.55.**

Just for comparison, the cars running on petrol in this category say **HONDA CITY travel about 15Km in One Liter of petrol – so the fuel cost per Km is $80/15 = 5.35.Km.$**

2) Approximate electrical load on distribution system.

50KW chargers may not be used by most of the users (Except for public charging stations), however 7.2KW chargers would be preferred by most of them.

First concern would be required capacity of domestic LT connections and that of transformers supporting these connections. As per government plans if the policy favors use of E Vehicles in a big way, 500 cars in an area would be a very common scene in India. Further such urban houses normally have more than one car.

- a) The MVA requirement in the area would increase by $500 \times 7 = 3500KW$ or 4.5 MVA only due to charging of Electrical Vehicles. Double of this if we consider 2 cars per house.
- b) This will mean, the calculations related to, load and diversity factors for urban residential distribution

planning would change drastically. Individual connections will have to be augmented for such everyday battery charging.

- c) If common facilities are to be built, some smart metering system will have to be created.
- d) Typical urban high-rise housing and commercial complexes have very limited space for roof top solar generation, so available Solar support will be negligible compared to this requirement.
- e) It appears that a separate network may be required to be built for this purpose. As present urban distribution networks will not be able to take this additional load.

3) Expected power quality issues if timely restrictions are not introduced on charger specifications

- a) These battery chargers involve AC – DC conversion and if proper power electronic technologies (Active front end rectifiers using IGBTs) are not used, they are bound to draw heavy “LOW FREQUENCY HARMONIC CURRENTS”. This will mean more system losses and heating.
- b) If the charger designs are not controlled through proper regulations, manufacturers may introduce chargers working on single phase supply as well demanding huge nonlinear currents.
- c) Harmonics and imbalance also adversely affect protection arrangement and increase system losses. If not controlled properly, this may result into voltage distortion.
- d) It should be noted here that the car owners will be from all parts of the society and will have very little knowledge about charger technology.

Now if government is expecting E Vehicle Boom, Energy ministry should immediately create **an approval cell (Just like MNRE is working for approving Solar Inverters) for battery chargers**. Only approved battery chargers should be used for charging E Vehicles. Electrical safety also will be major concern for installations of these chargers in public place. Very strict norms should be introduced and followed related to this as the users will be common citizens, with very little background about electricity.

All this raises few more questions related to this E Vehicle drive, which are as follows:

- 1) If E Vehicles are expected to charge their batteries on available grid power (Most of which is thermal), India will be burning more coal on smaller Geographical footprint – so what are we aiming at? In reality pollution will increase.
- 2) In case planners are thinking about using solar energy to fulfill most of this requirement, what India is doing on “Energy storage systems”? They will require huge investment and battery imports.
- 3) Have strategy planners thought about Hydrogen fuel cell-based E Vehicles?
- 4) There is possibility of using “replaceable charged battery trays” on charging stations – just like getting petrol on petrol pumps. This would require lot of standardization from vehicle side. This will allow separate charging stations and car user will not have to bother about battery replacement cost. Huge infrastructure will have to be created for such charging stations, but there is possibility of using storage systems on solar PV and optimize costs.
- 5) Last non-electrical question is, will this “Technology destruction” kill employment dependent on IC engine-based vehicles? A huge eco system exists in our country which is dependent on IC engines. Can India afford this at present? Should India follow a “Wait and Watch” strategy for few more years.

Last few days the articles and news in business news papers are found to be examining whether present “DEEP in Passenger Vehicle market” is due to government propaganda related to E Vehicles? Worth thinking isn't it?

By

Narendra Duvedi, Vinayak Vaidya.

ABB India Ltd.

An Interactive Session at Mumbai on 10th August 2019
On latest trends on Lightning Protection and Earthing



Upcoming Events

- Round Table Meetings on 27th September at Pune and 11th October at Mumbai on "Importance of codes and standards in electrical designs"



RNI No. MAHBIL/2009/31733

महाराष्ट्र शासन राजपत्र

असाधारण भाग चार-अ

वर्ष ५, अंक ७९]

शुक्रवार, जुलै १९, २०१९/आषाढ २८, शके १९४१

[पृष्ठे २, किंमत : रुपये १५.००

असाधारण क्रमांक १७७

प्राधिकृत प्रकाशन

महाराष्ट्र शासनाने केंद्रीय अधिनियमान्वये तयार केलेले
(भाग एक, एक-अ आणि एक-ल यांमध्ये प्रसिद्ध केलेले नियम व आदेश यांब्यतिरिक्त) नियम व आदेश.

उद्योग, ऊर्जा व कामगार विभाग

मंत्रालय, मादाम कामा रोड, हुतात्मा राजगुरु चौक, मुंबई ४०० ०३२, दिनांक १९ जुलै २०१९

अधिसूचना

केंद्रीय विद्युत प्राधिकरण (विद्युत पुरवठा व सुरक्षा संबंधी उपाययोजना) विनियम, २०१०.

क्रमांक संकोर्ण. २०१६/प्र.क्र. ६९/ऊर्जा-५.—विद्युत अधिनियम, २००३ (२००३ चा ३६) च्या कलम ५३ व कलम १७७ च्या पोट-कलम (२) अन्वये बनविलेल्या केंद्रीय विद्युत प्राधिकरण (विद्युत पुरवठा व सुरक्षा संबंधी उपाययोजना) विनियम, २०१० च्या विनियम ३० व ४३ च्या पोट-विनियम (२) याद्वारे प्रदान करण्यात आलेल्या अधिकारांचा वापर करून आणि याकारिता यासंदर्भात यापूर्वी निर्गमित केलेल्या सर्व अधिसूचना अधिकृत करून, महाराष्ट्र शासन याद्वारे विनियम ३० आणि ४३ च्या प्रयोजनासाठी ११ किलोव्होल्ट हे नोटोफाईंड व्होल्टेज म्हणून अधिसूचित करित आहे. या नोटोफाईंड व्होल्टेजच्या वरील प्रत्येक विद्युत संघ मांडणीचे निरीक्षण व चाचणी विद्युत निरीक्षकाकडून करण्याबाबत सदर अधिनियमातील व विनियमातील तरतुदीनुसार अधिसूचित करित आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने,

प्रशांत पुं. बडगोरी,
शासनाचे उप सचिव.

(१)

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महाराष्ट्र शासन राजपत्र असाधारण भाग चार-अ, जुलै १९, २०१९/आयाड २८, शके १९४१

INDUSTRIES, ENERGY AND LABOUR DEPARTMENT
Mantralaya, Madam Cama Road, Hutatma Rajguru Chowk,
Mumbai 400 032, dated the 19th July 2019.

NOTIFICATION

CENTRAL ELECTRICITY AUTHORITY (MEASURES RELATING TO SAFETY AND ELECTRIC SUPPLY) REGULATION, 2010.

No. Misc. 2016/CR-69/Energy-5.—In pursuance of regulation 30 and sub-regulation (2) of regulation 43 of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulation, 2010 made under section 53 and sub-section (2) of section 177 of the Electricity Act, 2003 (36 of 2003), and in supersession of all other notifications issued in this behalf, the Government of Maharashtra hereby notifies the 11 Kilovolt (KV) to be the notified voltage for the purposes of regulations 30 and 43 of the said Regulation, above which every electrical installation shall be inspected and tested by the Electrical Inspector for the purposes of the said Act and the said Regulation.

By order and in the name of the Governor of Maharashtra,

PRASHANT P. BADGERI,
Deputy Secretary to Government.