

A Study of Compliance of Installation Guideline With Respect To Diesel Generators (Dg Sets) Installed In Industrial Sector

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ABSTRACT; Diesel generating units (DG Sets) are widely used in various places, Diesel generators are used to produce electricity without connecting to a power grid. DG Sets are used for the emergency power supply as well as it is used where electrical power is not available. DG Set Installation requires to be carried out as per Standard Installation guidelines to ensure satisfactory operation of the DG set. Installation guideline provides the detailed guideline for the installation of DG sets. Other than technical compliance in installation, it must comply with Local / State / Central Government and all other Statutory regulatory requirements as applicable. Installation Guidelines provides the detailed guideline & specification which helps to install the DG Sets properly hence quality of the DGsets can be maintained. For safe & smooth operation of DG set and increase their efficiency which may leads to customer satisfaction. Proper installation of DG sets can reduce several maintenance work & servicing activities.

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I OBJECTIVE OF THE STUDY

- 1) To study the compliance of installation guideline w.r.t DG Sets installation
- 2) To analyze the performance of OEM/Dealer's with respect to DG Sets installation
- 3) To study the impact on performance of DG set w.r.t maintenance & servicing during warranty period
- 4) To study the customer satisfaction with respect to quality of installation work of DG Sets

II SAMPLE SIZE

- 1) **11** number of DG Set with various rating, which are installed in Industrial sector in Pune region
- 2) Total sample size is **11 Number** of Installed DGsets in Industrial area

III SAMPLING TECHNIQUE USED

The research is about the Diesel Generator which is installed in industrial sector in Pune region. Sampling is the strategy of selecting a smaller section of the population that will accurately represent the patterns of the target population at large. The main purpose of the sampling was to improve quality of data by focusing on a smaller group.

The research is about the installed DG sets in industrial Sector in Pune region. Pune region has been selected as there are plenty of Industrial units as well as the well versed for Diesel Generator manufacturer, OEM, Distributor/Dealer, Service providers, and the use of DGsets are found to be wider viz. in Industrial, Residential Buildings, Commercial Buildings, Hospitals, School, Colleges, Government Offices, Airport, Bus & Railway stations, Malls, Private, Public sectors. secondly, the researcher found it is convenient to focus on the region of vicinity

It was desirable on the part of the researcher to gather relevant information from all the sectors however every individual sector has the wider range hence researcher has decided to collect the data from Industrial sector & kept other sectors for further research.

Sampling technique used is Nonrandom- combination of convenience & Judgmental sampling in which the judgmental based on possibility of getting data

IV DATA COLLECTION

Data collection means gathering information. There are many methods available to gather information, and a wide variety of information sources.

Taking into consideration all the facts the researcher has used.

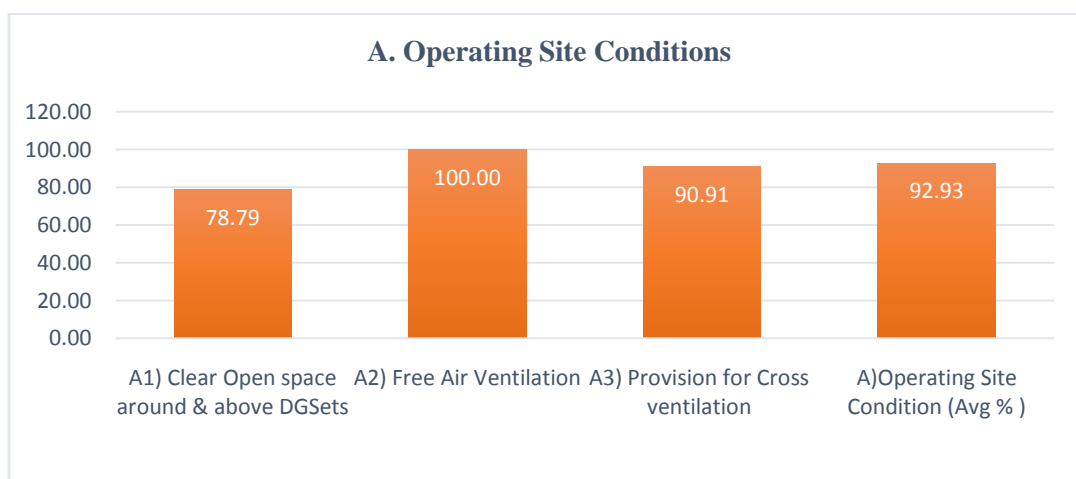
- 1) Records: Information, data collected through the records in which physical evaluation was carried out with the samples.
- 2) Individual interviews: Individual's responses, opinions and views were considered.

V DATA ANALYSIS AND INTERPRETATION

The data so collected was analyzed according to the physical evaluation of individual samples & interpreted as per the graphical representations provided herewith as bellow.

A) Operating Site Conditions

Operating site is the place in which DG Sets has installed. As per the installation guideline given by Manufacturer, Local/ State / Central Government and all other Statutory regulatory requirements the operating site must have clear open space in & around DG Sets with dust free location & also have the provision for cross ventilation. A clear space leads to easy operation, maintenance & serviceability of the DGsets.



VI OBSERVATIONS:

Total sample was analyzed based on A1, A2, A3, & Average % of A, after analyzing the data it is observed that the provision for Free Air ventilation is found 100 % as per the installation guideline it is complying whereas the compliance of clear open space around & above DG sets are found 78.79 %.

VII FINDING:

The average compliance of total sample w.r.t to operating site condition is found 92.93%

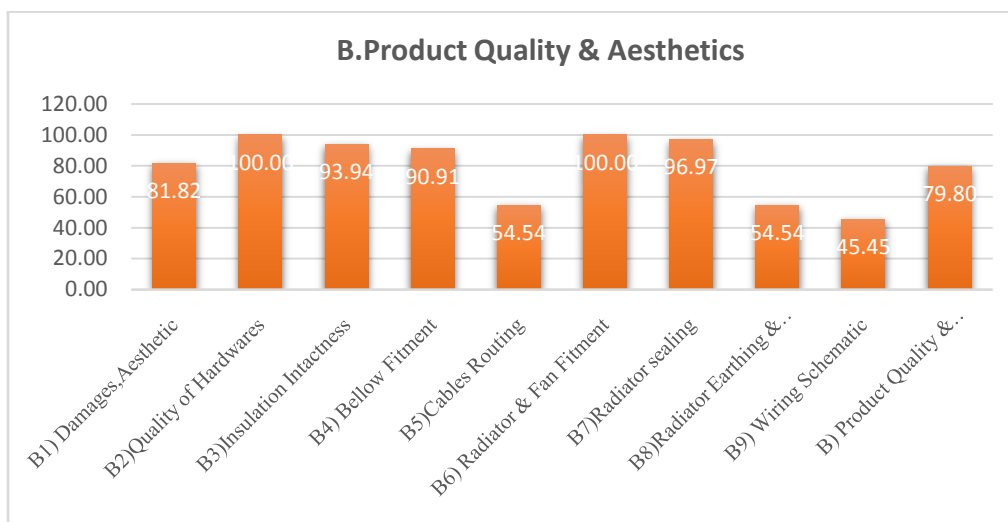
Comments:

- Clear open space compliance found 78.79% hence it can affect on operation, maintenance of DG Set
- Improper ventilation can generate dust & fumes which may affect on DGSet performance

B) Product Quality & Aesthetics:

Product Quality is depending on the various parameters & their compliances like quality of hardware, Insulation intactness, Bellow fitment etc. which has mentioned in the bellow graphical presentation.

Damages, Aesthetic is the visual checks for the quality of DG Sets like Paint, Transportation damages, loose connections etc.



Observations: -

After comparing the data for product quality & aesthetics it has been observed that percentage of quality of hardness & radiator fan fitment is observed as 100% hence it completely complies the installation guideline however the compliance of Wiring schematic is 45.45%, Radiator earthing & coolant is 54.54% & Cable routing is 54.54%

Finding: -

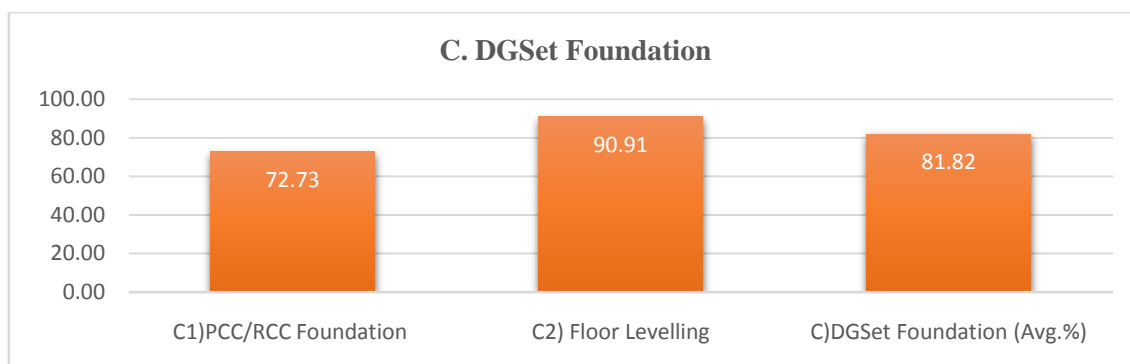
The average compliance of total sample w.r.t product quality & aesthetics found 79.80%

Comments:

- Compliance of Damages& Aesthetic is found 81.82% only. Hence the nonconference of this can affect on the quality of the DG Set & rectification work may require within the warranty period.
- Quality of Hardware, Radiator & Fan fitment has found satisfactory(100% Complied)
- Insulation intactness (93.94%),Bellow fitment (90.91%),Radiator sealing (96.97) these compliance can be further improved during operations, Servicing.
- Noncompliance of Radiator earthing & wiring schematic can affect on safety of the people.
- Coolant level & their quality can affect on performance of DG Sets like overheating, leads to increase wear of bearings & moving components.

C) DG Set Foundations: -

Foundation supports the weight of the DGsets & provides the leveled platform to the DG Set, Proper foundation helps to keep satisfactory operation & avoids vibration problems which may leads to failure of DGsets. Foundations consist of PCC/RCC Foundation, Floor leveling etc.



Observation: -

After analyzing the data it is observed that compliance of PCC/RCC foundation is 72.73%, compliance of floor levelling is 90.91%. & overall compliance is 81.81%.

Finding: -

The average compliance of total sample w.r.t DG Set foundation is observed as 81.82%

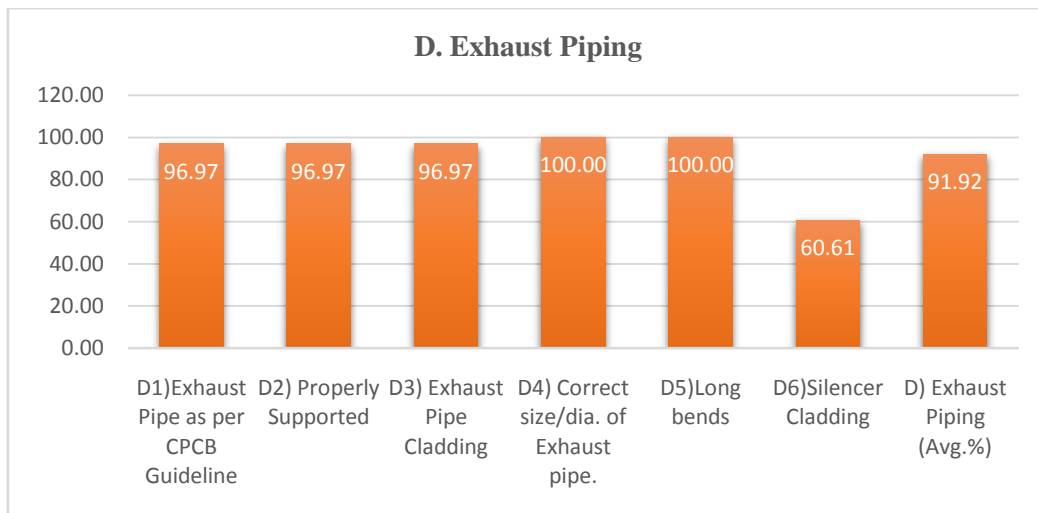
Comments:

- Once the DG Set is installed then foundation cannot be rectified and hence it can affect on the serviceability and performance of the DG Set on long term basis.

D) Exhaust Piping :

Exhaust piping is one of the important factor affecting the successful operation & life of DGsets.It collects exhaust gases from engine cylinder and discharges them safely.

Various guidelines are provided for the exhaust piping. It should have minimum back pressure because exhaust back pressure leads to poor performance of the engine & can have the lower fuel economy.



Observation: -

After data analysis it is observed that there is not much deviation to comply the exhaust piping as per the guideline. However Percentage of compliance of silencer cladding is found 60.61%

Finding: -

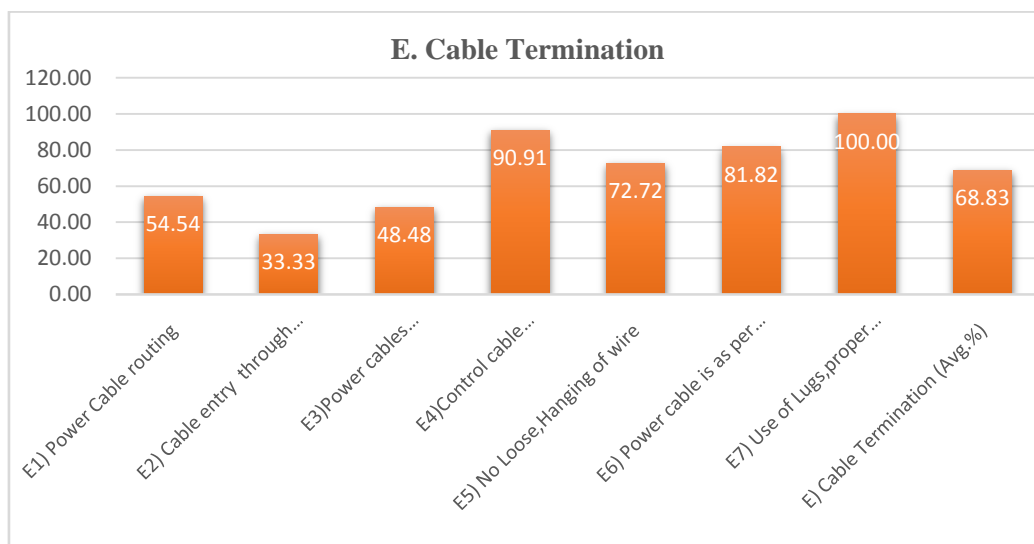
The average compliance of total sample w.r.t to exhaust piping is found as 79.80%

Comments:

- Percentage of compliance of silencer cladding is found 60.61%. Hence it can leads to directs the hot flue gases harmlessly.

E) Cable Terminations:

Cable termination is important to operated DGsets healthy & safely. Proper size of cables, phase sequence, tight crimping etc. are the important things during the cable termination. Proper cable routing & dressing, cable entry through glands is important to avoid tension on alternator terminal, terminal box, & control panel termination.



Observation: -

After comparing the data for cable termination it is found that percentage of Cable entry through gland is 33.33%, percentage of power cable dressing is 48.48%, and percentage of power cable routing is 54.54%.

Finding: -

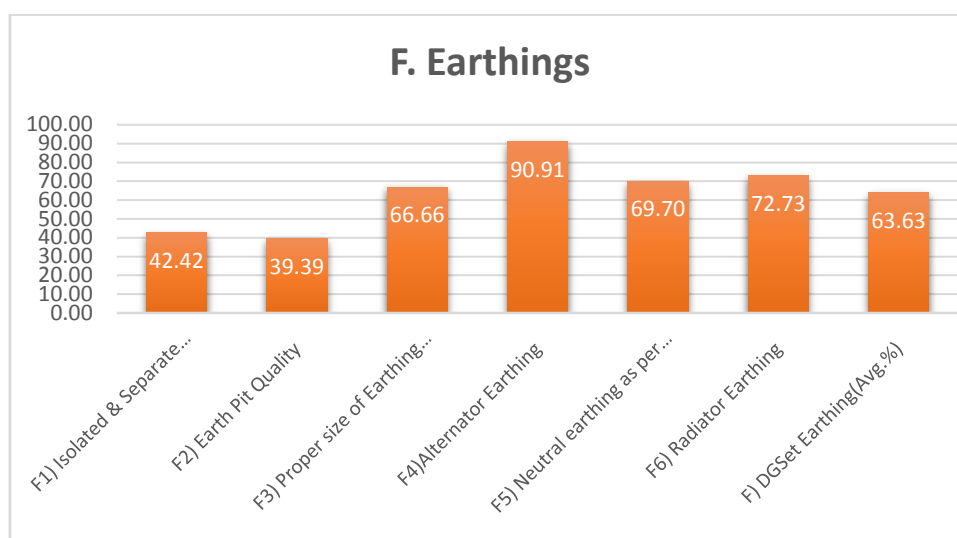
The average compliance of total sample w.r.t to cable termination is found as 68.83%

Comments:

- Cable entry through canopy is found without gland hence it can damage the cable due to sharp edge cutting. Also possibility of dust & flood water can entered through it

F) Earthings:

Earthing is important before DG Sets put in to the operation. Four no of earth pits are required as per the Indian Electricity rules. Guideline for Earth pit quality, distance between two earth pit, earthing material, size etc are provided.



Observations: -

After data analysis (F1,F2,F3,F4,F5,F6,F) it is observed that the compliance of earth pit quality work is found 39.39% which is at very low level. Overall earthing performance is also found at low level (63.63%).

Finding: -

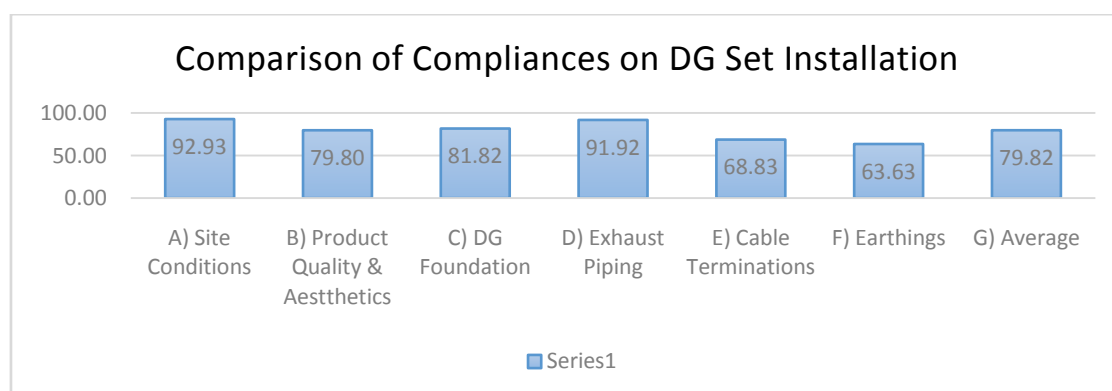
The average compliance of total sample w.r.t to DG Set earthing is found as 63.63%

Comments:

- Noncompliance of earthing can lead to affect on the quality of the DG Set & can causes serious accidents.

G) Comparison of Compliances on DG Set installation:

Based on above graphical, observation researcher has done the bellow mentioned graphical comparison in which overall compliances of installation guideline on DG Sets installation has shown. These values are observed during physical verification of each samples w.r.t. installation guidelines.



Observation: -

After analyzing data for all the groups (A,B,C,D,E,F) i.e. the parameters on which DG Sets to be installed as per the Installation guideline. It is observed that 63.63 % of earthing work has complied, 68.83% of cable termination work has complied these both the percentages showing that the impact of noncompliance of these two parameters can affect on long term performance on DG set.

After analyzing for all the parameters it was found that not a single parameter complies 100% as per guidelines.

Findings: -

Total average for the Compliances on DG Set installation is found as 79.82%.

VIII. CONCLUSION

- 1) Installation guidelines are not completely complying to the set guidelines. Compliances of some parameters like cable termination, Earthings is found at very low level, which may cause accident & can affect on long term performance on DG Sets
- 2) Total average percentage of compliances is 79.82% which may lead to decrease in the customer satisfaction
- 3) Service & Maintenance work will be increased.
- 4) OEM/Dealer's performance for DG Set installation is affected.
- 5) Noncompliance of Radiator earthing & wiring schematic can affect on safety of the people & life DG Set

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