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Application Guidance Notes: Technical Information from STAMFORD | AvK

AGN047 – Telecommunication Applications

DESCRIPTION

Whilst, normally, the most cost effective way to consider the size of alternator required for a particular application is by £ per kVA. This would oversimplify alternator selection when 'Telecom' loads are to be supported. A typical telecommunication installation has loads that consist of power electronics – consisting of rectifiers and inverters – used in the switch mode power supply (SMPS). Other loads include batteries, lighting and air conditioning units, depending on base transceiver station (BTS) location. Nominating an alternator for 'telecom' loads by simply considering the maximum kW required; therefore, introduces an unacceptable risk that the alternator may not be technically able to support all load with a performance capability required to guarantee neither load or alternator malfunction.

BASE TRANSCEIVER STATION LOADS

When considering an alternator for such loads, harmonics and the thermal dynamics of the alternator have to be taken into consideration, to ensure best product performance. The harmonic distortion created by the load is commonly grouped under the heading of Non Linear Loads [NLLs]. The NLLs cause harmonic currents resulting in high voltage distortion levels on the alternator output voltage waveform and additional heating in the alternator windings. The high level of voltage distortion can affect the operation of the load. Alternators need to be sized correctly to reduce the voltage distortion levels and to accommodate any additional heat produced by the harmonic currents. The alternators` reactance values become all-important.

Telecom specifications advise that NLL will be connected. This type of equipment will vary in age and therefore could be based on different power electronics technology. It could range from older 6-pulse thyristors, to more modern 12-pulse thyristor, to the latest 'Modular' units

which use Switched Mode technology based on high frequency transistor systems. This raises a ‘watch-out’ for alternator nominations and will affect real to-the-limit cost effective sizing of an alternator against the basic specified kVA.

Correct nomination of a capable alternator will now involve consideration of:

- The extra heating effect within the alternator, resulting from the harmonic distortion created by the NLL. The NLL characteristics are therefore requested. Consideration with regard to alternator sizing becomes further complicated if no real harmonic current distortion % data is provided. In these circumstances, typical values are used.

- Compatibility with other site loads, such as battery charging units – possibly UPS systems, lighting and air conditioning units.

- The total site load, as a risk assessment exercise based on unbalanced load conditions, and the required voltage regulation.

Conclusion

The process of nominating an alternator for a telecommunication application involves good engineering practice, to assess the implications of all loads, particularly the NLLs. For further information on NLL, refer to AGN 025.

Also, consultation with Application Engineering is highly recommended. Contact applications@cummins.com.

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