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General Principles of Acoustic & Cooling Design for Generator Housings

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When designing Acoustic – Canopies / Containers & Plantroom attenuation, achieving the target Noise level is of great importance, however prior to considering the design in this respect other areas should also be taken into account.

Our standard approach for all projects of these types is as follows:

1) When we design an acoustic canopy / container, or plantroom equipment to house any Generator set we follow the same basic rules as detailed here:
   - i) Ensure that the Duct Allowance from the radiator fan (or forced ventilation fan) is apportioned between the inlet and discharge air attenuation in such a fashion that the unit cannot induce sufficient pressure differential between inlet and discharge to prevent personnel escape in the event of an Emergency.
   - ii) Ensure that sufficient cooling air is allowed to enter the unit to ensure correct cooling is achieved. In doing this also ensures that the engine combustion airflow is allowed for.
   - iii) Ensure that the inlet louvred area is of sufficient face area / open area to prevent carry-over of water (rain) across the inlet weather louvres due to velocity.
   - iv) By intelligent selection and design of inlet and discharge attenuation prevent escape of noise from within the unit to ensure matching or bettering of required noise level. This can be by use of acoustic baffles / single blade and chevron acoustic louvres or splitter attenuators.

   In other words “DON’T TRAP / DON’T CHOKE / DON’T SOAK / KEEP QUIET.

2) Example: Based on a Diesel Generator Set – using a Volvo TAD1641GE Engine. This engine is supplied from the manufacturer complete with a standard with a purpose designed radiator package. In standard UK conditions this has a cooling airflow of: 7.0m^3/s. At an available duct allowance after the radiator of 30mmWG (300Pascals).

3) The design of louvres varies significantly from supplier to supplier; in our case all louvres are formed from Mild or stainless steel or Aluminium as required and are aerodynamic in profile. Architectural Extruded louvres are commonly very inefficient and use large amounts of duct allowance. Duct allowance which could be more economically used in the sizing of the attenuators.

4) Therefore based on our standard inlet louvre design, which has a 60% open area and ‘Z’ section blade profile, we can accommodate inlet velocities of 3.0m/s as a design ideal and up to 3.5m/s as a maximum with our standard louvre blade profiles, at inlet velocities higher than these figures blade-special profiles are employed.

This will vary significantly with other suppliers.

5) Acoustic Performance: Our calculation methods allow us to calculate for both Engine noise & noise from the radiator fan individually, including calculations for both reverberation and directivity within the enclosure. The Calculation Method is one of the areas we believe offers us commercial advantage in the market place and hence we do not supply full calculations even at time of unit design, following order placement. However, we are happy to offer summarised versions as part of the design process following order placement. We will also offer Certificates of Conformity stating that we guarantee our designs will meet stated levels if measured under standard test conditions, free field.

   Wherever possible our Engine noise data is taken from the generator set manufacturers published data & cross-referenced against data provided directly from the Engine manufacturers directly, our membership of the Generator Manufacturers Trade Organisation AMPS gives us regular access to these Companies.

   With regard to Radiator information we calculate Fan noise levels from 1st principles using industry standard texts to allow accurate calculation of the direct and reverberant noise levels within the housing.

6) If other conditions apply we are happy to carry out specific surveys if ordered and then certify performance as required.

For the specific example stated above with the Volvo, at a performance level of 65dB(A)@1m free field and with no specific detail of the unit quoted I would anticipate the inlet and discharge attenuation in both cases to be by splitter attenuator, and wall construction (if a generator canopy was to be offered) would be: 50mm Thick preformed construction, comprising of a 3.0mm thick (10SWG) “Zintec”, Zinc coated steel outer skin and a 0.7mm (22SWG) perforated steel inner skin. The intervening space packed with High-density mineral wool and additional heavy-mass layers as required.

Bespoke Calculations take place on an Enquiry by Enquiry basis.