ASCO Froment Load Banks

Let me breathe!

If these guidelines are followed, satisfactory load bank performance will be achieved, when standard equipment is installed indoors. These notes are based on the assumption that the load bank is installed in the plant room, drawing its inlet air directly from within the room, and the hot outlet air is ducted to the outside.

Airflow Requirements

As a 'rule of thumb', the airflow requirement of a resistive load bank, in m3/sec, is equal to the maximum rating in kW divided by 80.

For example, a 600 kW load bank requires 600/80 = 7.5m3/sec, of air to flow through it.

The published figure for an individual load bank model may vary a little from this 'rule of thumb' but it will give a sufficiently accurate figure to ensure that ducts and louvres are adequately sized.

The airflow is required at both the inlet and the outlet of the load bank.

There is often other equipment in the plant room that may also require a fresh air supply; for example heating plant, a generating set, a compressor, or another load bank. In these cases, the total air requirement of all the plant must be added together to arrive at the required fresh airflow. This total figure must be used when sizing the air inlet grilles or louvres.

Ducts

Installation of duct

Note that the surface of ductwork connected to the outlet of the load bank will rise to about the same temperature as the hot air discharge. This may be hazardous if personnel have access to the area, since there is a risk of burns from the hot duct surface. Also, the heat gain into the room, from the duct, may be unacceptable. A double-skin or insulated duct is recommended.

Straight ducts directly connected to load bank flanges

Short lengths of straight duct (up to five time the duct width), connected to the load bank inlet or outlet flanges, will have a negligible effect on the airflow through the load bank, provided the duct size and shape is the same as the flange to which it is connected.

Changes in duct shape or cross-sectional area (XSA)

An enlargement in the XSA may be required to connect a load bank outlet to a discharge weather louvre.

An enlargement in the height and/or width of the discharge duct should be arranged so that the included angle between opposite sides does not exceed 30°. This will give a gradual and smooth transition in duct shape.

A reduction in duct cross sectional area (XSA), in the direction of airflow, is not permissible.

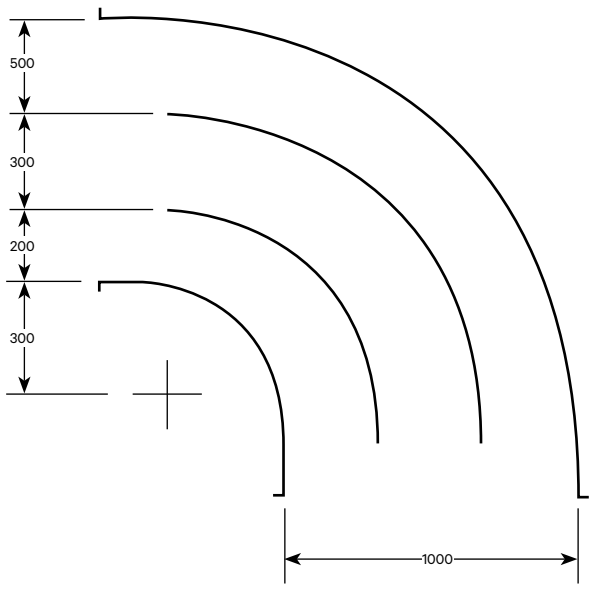
A reduction in duct height or width is acceptable if there is also an enlargement in the other dimension proportional to the inverse square of the reduction. For example, a 960mm x 1000mm duct could become an 800mm x 1440mm duct. Again, included angles should be less than 30°. Such a change in section would not seriously affect the airflow in the load bank.

Avoid ducts with an aspect ratio greater than 3:1. That is, either dimension should not be more than three times the other.

Bends in ducts

A single right angle bend in the duct will also have a negligible affect on the airflow, provide the bend is curved. The bend should have a minimum inside radius of 30% of duct width (in the same plane), and incorporate turning vanes positioned at about 20% and 50% of the duct width. The duct, both before and after the bend, should be the same shape and size as the load bank flange to which it is connected.

For example:



Sound attenuator

Any sound attenuator should be specified so that the pressure drop through it, at the required airflow, does not exceed 5% of the quoted total fan static pressure (FSP) generated by the load bank fan. This may necessitate a duct enlarging section to connect an oversize attenuator to the load bank flange. If this is not possible, additional fan duty must be specified for the load bank fan, as required. Sometimes this larger fan can further aggravate noise generation.

If attenuators are fitted on both the inlet and outlet, their total resistance to airflow must be added together, and the total must not exceed 5% of the FSP.

Attenuators incorporated in the plant room inlet grilles should be sized for a maximum pressure drop of 10Pa.

Grilles and louvres

All grilles and louvres should incorporate bird screens to prevent access by birds or vermin into the plant room and equipment.

Inlet

The free area of any inlet grille or opening into the plant room should be at least twice the area of the load bank air outlet, (not the load bank air inlet). If other plant in the same plant room requires air, then the size should be such that the maximum air inlet velocity is below 3m/sec. This should ensure that the depression within the plant room would always be less than 10Pa, relative to the outside environment. The distance from the fan inlet to a blank face of a wall or panel, square to the fan centre line, should be not less than 1m, or one fan diameter, whichever is the greater.

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Outlet

Weather louvres should preferably be specified with a free area of more than 65%, and should have a total free area of twice that of the load bank air outlet. This means that their total physical area may be up to three times that of the load bank air outlet.

Effects of natural wind

The inlet and outlet grilles or louvres should preferably be on the same side of the building. The effect of natural wind is then cancelled out, regardless of its direction. Other arrangements need careful attention, combined with detailed site and local knowledge to ensure satisfactory operation in all expected weather conditions.

In some geographical locations, the prevailing wind is very predictable and reliable. Discharge can then be arranged facing down wind. However, reliable operation may not be possible on the exceptional days when the prevailing wind is reversed.

Measures to minimise the risk of hot air re-circulation

Air inlets at low level, combined with air outlets at high level, help to reduce the risk of hot air re-circulation. Alternatively, the inlets and outlets should be spaced well apart. As a guide, if the inlet and outlet louvres are on the same level, in the same flat wall, they should have a clear space between them of at least three times the width of the largest louvre.

In rooftop applications, a vertical hot air discharge will usually work well. This can be achieved by installing a right angle bend in the outlet duct, pointing upwards. Such a duct design should take account of the need to prevent rain or snow from falling directly into the load bank element chamber. The turning duct does not necessarily need to be fixed directly to the load bank, but can be spaced away by a few cm.

Careful consideration should be given to the likely effect of nearby buildings, walls or even parked vehicles, which could seriously disrupt the free escape of hot air, and result in hot air re-circulation.

Other nearby air handling plant can also interfere with the airflow to, or from, the load bank. Generally, equipment should be spaced well apart, and positioned so that their airflows tend to complement each other, rather than compete.

There always needs to be a clear route for cool air to approach the air inlet, in addition to the volume occupied by the hot air that is moving away. Strategically placed barriers and screens can be very helpful.

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