Loy Yang A Victoria

Sound Snap *Acoustic Enclosures*

NAP SILENTFLO

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Acoustic enclosures with modular panel system

Introduction

As legislation and local standards are introduced to control noise the need for a modular acoustic panel system has grown. In response to this demand, NAP Silentflo provides the unique Sound Snap system. Its practical design and wide range of applications are illustrated in this catalogue. Following many years of development the Sound Snap panel system is now widely used in hundreds of installations. This is because it is proven, developed, tested and economical, for all applications in noise and vibration control involving screens, enclosures, plenums, barriers or acoustic air handling units.

Superior Performance

Often the theoretical performance of panel systems fails to live up to expectations because of poor sealing, misalignment or manufacturing variations. Sound Snap panels eliminate these problems and give maximum field performance as a result of the overlapping snap lock design, achieved *without* fasteners or rivets.

Designed to cover a range of performances, the panels are available in a variety of finishes and thicknesses. Standard panels are 50mm and 100mm thick. These provide reductions of up to 35 dB(A). Special panels are available on request.

Standard Modular Panels

Sound Snap enclosures can be erected using standard sized panels to suit most requirements. The panels can be installed and disassembled as required, to suit production or machine changes and changes in plant layout. The use of modular panels makes installation fast and simple even for inexperienced teams.

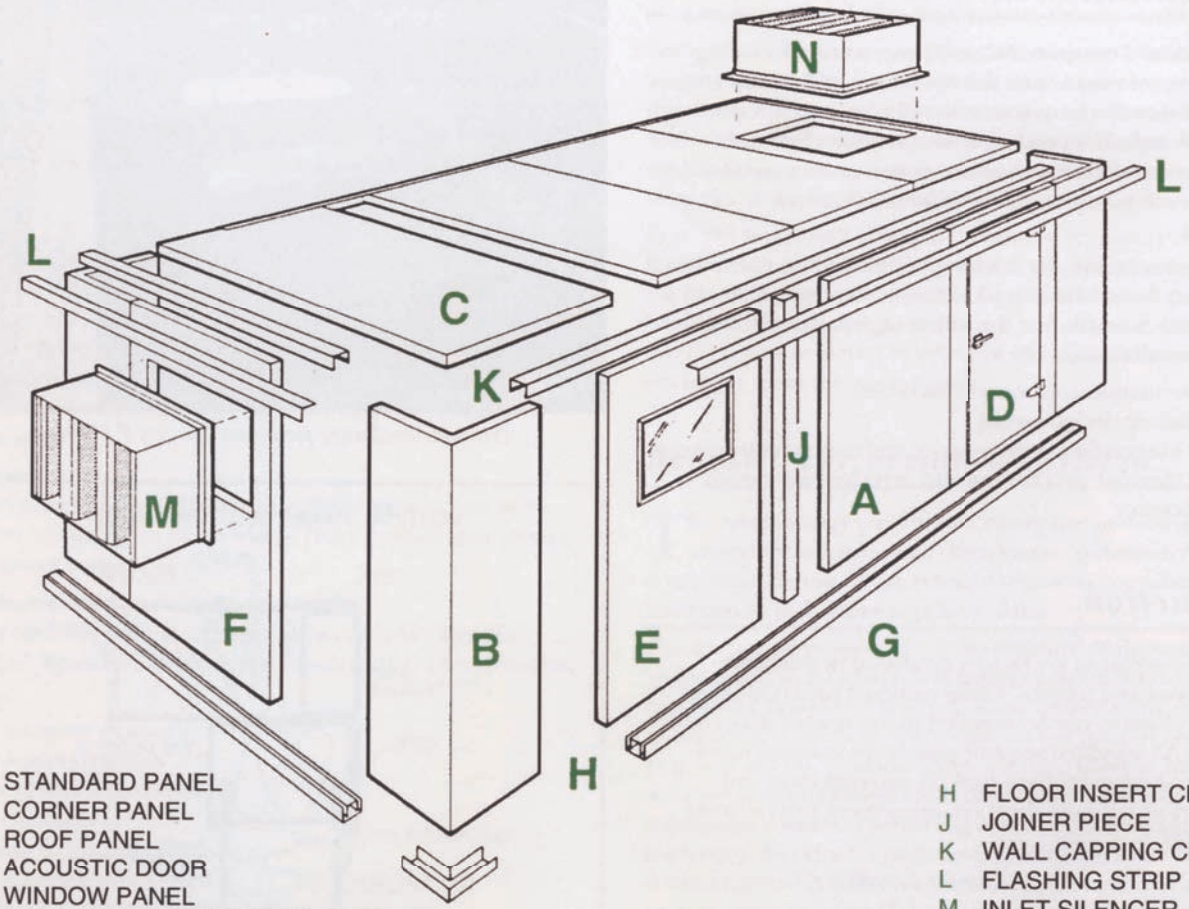
The great advantages of using these panels with or without frames (depending on size or design requirements) are the flexibility, efficiency, standardization and cost saving gained, even though all the features of custom built equipment are retained. The panels are manufactured without damage to the galvanised sheet coating and present an attractive appearance with no rough metal edges, unsightly weld marks or ugly bolt fixings.

Integrated System

The standard panel width is 750mm and the panels are available in lengths up to a maximum of 3.6m. Panels 900mm and 1200mm wide are also available. Integrated with the panels are complementary components; corner panels, glazed panels, doors, windows, access hatches, ventilation silencers, inlet and outlet feed chutes, cable and pipe penetrations and locating channels.

Gas turbine acoustic enclosure in cyclone area.

Unique design



A STANDARD PANEL
B CORNER PANEL
C ROOF PANEL
D ACOUSTIC DOOR
E WINDOW PANEL
F SPECIAL PANEL (WITH CUT OUT)
G FLOOR CHANNEL

H FLOOR INSERT CHANNEL
J JOINER PIECE
K WALL CAPPING CHANNEL
L FLASHING STRIP
M INLET SILENCER
N DISCHARGE SILENCER

Roof panels are similar to wall panels. Standard corner, insert and spacer channels provide wall-ceiling and ceiling-ceiling connections without degrading the performance. Roof spans up to 3.6m can be unsupported but for greater distances or larger external enclosures support beams or frames may be required.

These Laboratory tested products are developed in our own test centre and then independently laboratory rated. Fire rated mineral wool or glass fibre insulating material is specially selected to achieve maximum performance. The highest quality steels and materials ensure the finest grade products and workmanship.

NAP Silentflo has experience in many thousands of noise control applications. Use our experience to help solve your problems.

We offer a comprehensive design service based upon proven experience and the understanding of the requirements of your particular plant or machinery.

Applications

The wide range of panels enables enclosures and structures of any size to be assembled. This catalogue refers to the most common uses of Sound Snap Panels including:

- Machine acoustic enclosures
- Diesel engine enclosures
- Acoustic air handling units
- Noise screens
- Freeway barriers

The Sound Snap panels have been proven in many rugged situations and a variety of applications such as:

- Compressor enclosures
- Gas turbine enclosures
- Electric motor enclosures
- Boiler feed pump enclosures
- Blower enclosures
- Pumping stations
- Personnel shelters
- Observation or control rooms
- Offices, quiet rooms
- Recording studios, video or audio
- Communications booths
- Audiometry and health science facilities
- Transformer enclosures
- Laboratory and vibration test centres
- Cooling tower screens
- Condenser screens

Sound Snap panels are recognised by consultants and engineers alike and selected for their functionality, low cost, ease of installation, attractive appearance, high noise absorption and high performance.

Technical Description

Rapid Installation

Our standard components, and proven manufacturing techniques ensure that the enclosures and panels are supplied efficiently and at lower overall cost than inferior designs. Our individual coding system keyed to assembly drawings, ensures minimum on-site delays sorting out the location of each piece, enabling simple, fast, 2-man installations.

Control of noise, either by shielding, reflection or absorption is achieved only by careful consideration of the particular situation. NAP Silentflo has the widest experience to consider the perfect combination of:

- High attenuation and sound absorption
- Most efficient design layout
- Correct observation, maintenance and access requirements
- Correct thermal, mechanical and aerodynamic design
- Cost efficiency

Construction

Sound Snap panels are factory produced in standard thicknesses and lengths. Using matched panels made to measure enclosures can be supplied to site ready for assembly or built up. All standard acoustic panels are manufactured from heavy gauge galvanised steel on external faces and internal perforated steel sheet retaining inert, fire resistant acoustic infill.

Special Finishes

Other finishes available include stainless steel, painted or coated sheet steel or combinations such as stainless steel perforated sheet only. Acoustic foam infill or oil and water resistant membranes are also available in alternative constructions.

Enclosures are supplied with assembly instructions, thereby allowing installation by inexperienced personnel. However, for best results our professional installation teams can perform the work to ensure optimum effectiveness.

Surface Densities

The surface weight of the standard 50mm panel is 19kg/m^2 and for the 100mm panel 39kg/m^2. The panels are sized so that weights are kept to a minimum. Individual panel lengths should be limited to 3.6m for ease of erection, freight and handling.

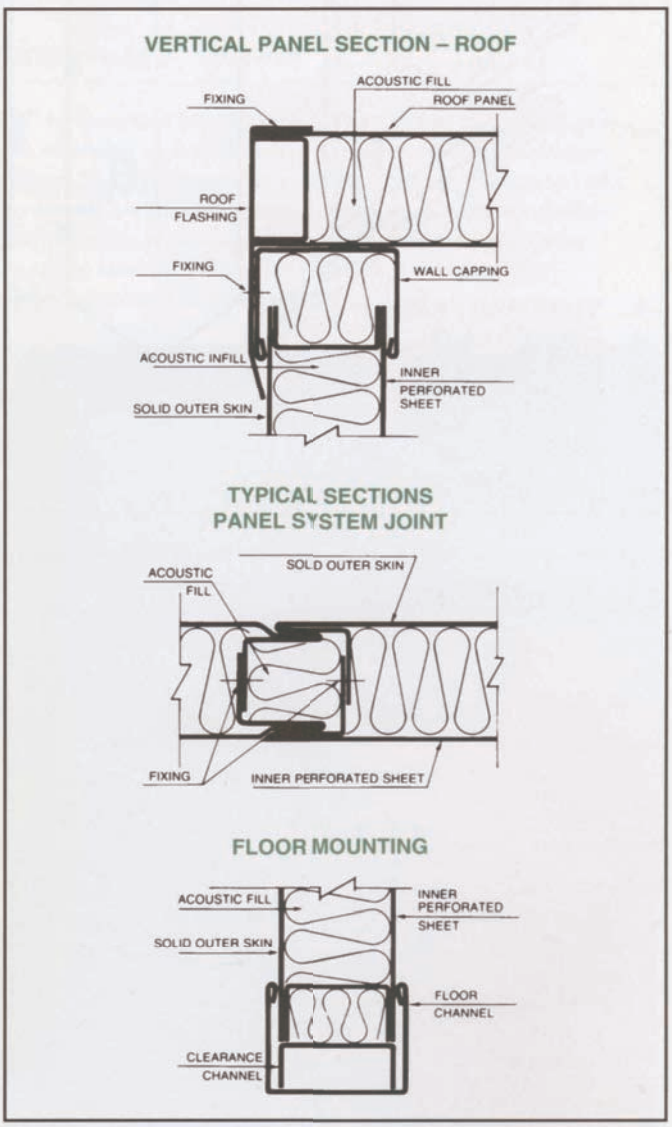
Standard Components

Wall and Roof Panels

Thickness	50mm, 75mm, 100mm
Width (nominal)	750mm, 900mm, 1200mm
Length	1800, 2400, 2700, 3000, 3600mm

Outerskin (Solid)
1.0, 1.2, 1.5mm

Acoustic enclosure for power Station F D Fans



Inner Skin (Solid or perforated)
0.5, 0.8, 1.0, 1.5mm

Infill Mineral Wool 65, 80 kg/m^3
Fibreglass 50 kg/m^3

Infill Facings
Fibreglass cloth scrim, melinex membrane (23 micron), wire gauze.

Special Applications & Examples

Glazed Wall Panels
6mm single glazing or double glazing in rubber gasket and rounded corners. Double glazing has absorbent reveals. Size 600 x 600mm standard.

Corner Panels
One piece Construction as standard with both legs 200 long or 375 long and in thicknesses as given. Corner panels are full height and load bearing.

Doors
Nominally 800 x 2000mm, with Stainless Steel butt hinges, tubular latch and lever handles. Cabin latch and D pulls are optional. Door uses compression seal closing on neoprene gasket. Hinged RHS or LHS and opening inward or outward (recommended for safety reasons). Available as single or double doors. Sliding doors single or multiple, manual or motor drive.

Windows
Full windows in special frame size 750 x 600mm and 900 x 750mm according to panel width. Glazing 6mm and 100mm with acoustic absorbent reveal.

Ventilation, Inlet and Discharge
Using NAP Silentflo Duct Attenuators or NAP Silentflo Flowline Acoustic Louvres sized to suit airflow requirements.

Other
Floor locating channels
Floor insert channels
Joiner pieces with screws
Roof channels
Capping strips and rivets
Flashing angles with rivets
Structural frame painted mild steel square tube, RHS or galvanised C Section
Special manufactured access hatches, penetrations or feed chutes to suit.

Uses and Examples

Acoustic Enclosures should not impede the operation, maintenance or efficiency of the enclosed equipment. Careful integration of the design with the machinery is essential for a useful and effective enclosure. Individual user requirements generally determine the final layout.

The examples illustrated show the advantages of the Sound Snap panel system including:

- Wide range of sizes
- Quality construction with a minimum of loose pieces.
- Tested and guaranteed
- Wide choice of materials
- Simple and fast to install
- Self supporting, load bearing
- Demountable

Acoustic Performance

The noise reduction achieved by Sound Snap panels depends on several factors, including:

- Source noise level and frequency spectrum
- Enclosure size
- Distance and shielding effects
- Panel thickness and weight
- Receiving room acoustics
- Limitations by design features, eg. chutes, ventilation

For the most accurate results measured noise levels and proper acoustic calculations are essential. As the panel system is standardized the final noise level achieved will vary according to the source characteristics and enclosure design. Before establishing or accepting specific acoustic criteria consult NAP Silentflo of the feasibility of achieving such levels.

Practical single wall acoustic enclosures achieve reductions of 25-30 dB(A) in the free field noise level. Specification calling for higher performance should be discussed in detail with NAP Silentflo. The highest performance and lowest resultant noise level is always achieved by effective vibration isolation of the enclosure from the noise source.

Acoustic Performance Criteria

The terminology used in describing the performance of acoustic enclosures can often cause confusion. A summary is presented below of the relevant terms for use when making comparison with other suppliers' data.

The transmission loss (TL) is the measure of the sound power attentuation of an item when tested under laboratory conditions. It is thus a theoretical maximum value obtained under ideal conditions. Each component used in an enclosure (e.g. wall panels, acoustic doors, acoustic louvres, roof panels, windows, exhaust system) may have totally different transmission losses. The overall acoustic performance of an enclosure, therefore, results from the interaction of many components with different transmission losses. The acoustic performance and size of the weakest component, therefore, determines the overall attenuation achieved.

Cardboard corrugator acoustic enclosure.

Laboratory Rated Test Results

The noise level reduction achieved at installation depends not only on the transmission loss of the components, but on the size of the enclosure, the internal absorption and other physical effects. With a constant transmission loss, any enclosure with greater internal absorption will achieve a lower external noise level. For this reason, the noise level reduction (NR) or the insertion loss (IL) are the most suitable as practical performance criteria for acoustic enclosures.

Noise Reduction is the difference in sound pressure level (Lp) from inside to outside the enclosure at a given measurement point. Insertion loss is the Lp difference measured with and without the enclosure at the same location and under the same operating conditions. The insertion loss of an enclosure is always less than the transmission loss. With equal insertion losses, a different noise reduction will be obtained according to the frequency spectrum of the source.

NAP Silentflo uses transmission loss (TL) as it is the Laboratory result which can be used to provide either the NR or IL for a specific situation.

Specification

NAP SILENTFLO SOUND SNAP PANELS

1.1 50mm panels shall have an external steel sheet 1.0mm thick. 100mm panels shall have an external steel sheet 1.6mm thick. All internal perforated sheet shall be 0.6mm thick galvanised steel with 2.4mm diameter holes on 6.35 staggered centres giving an open area of 11%.

1.2 50mm or 100mm thick inert sound absorbing acoustic infill shall be incombustible, mildew resistant and comply with AS1530/1976 with combustion characteristics of 0 for ignitability, spread of flame, heat evolved and smoke developed.

1.3 All internal panel stiffeners shall be a minimum of 0.8mm thick galvanised steel. Vertical stiffeners shall be spaced so that the unsupported panel width does not exceed 450mm. Spot welds shall not exceed 100mm on centres and all marks shall be coated with cold galvanising paint.

1.4 For the 50mm panel the acoustic infill shall have a minimum density of 60 kg/m³. The density of the acoustic infill for a 100mm thick panel shall be 80kg/m³. Infill shall be compressed 5% to minimise fibre breakdown. No voids are allowed.

1.5 Capping channels, joiners and flashing strips shall be made of 1.6mm thick galvanised steel, formed to prevent a direct path for sound or air leakage. All sections shall be roll formed and cut to length to minimise breaks and joins. All voids shall be filled with acoustic infill on installation.

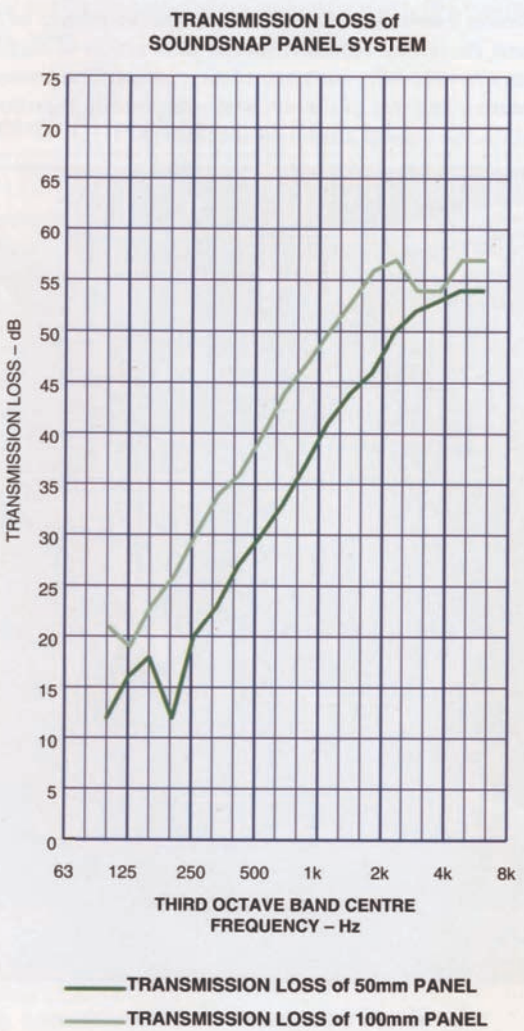
1.6 The manufacturers shall at the time of tendering supply certified test data from an independent N.A.T.A. registered laboratory, with a reverberation chamber in excess of 200m³.

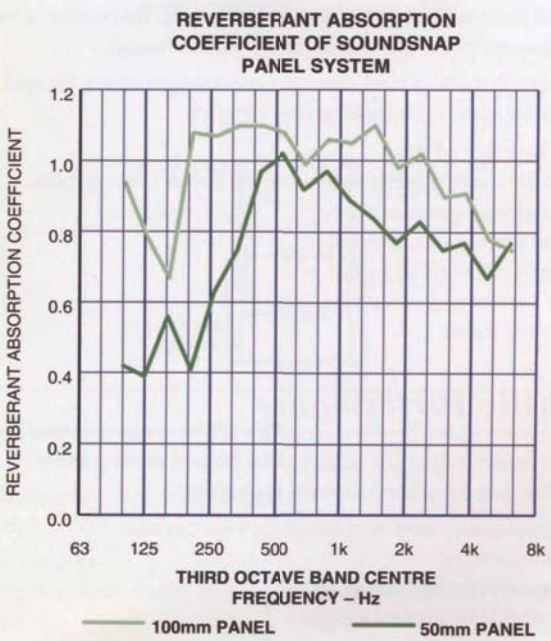
a. The minimum allowable transmission loss, including all components, shall be:

Transmission Loss, dB vs Frequency, Hz

Panel	125	250	500	1k	2k	4k	STC
50mm	16	20	30	41	50	54	30
100mm	21	29	39	50	56	56	41

b. A composite panel with an area of at least 10m² shall have the following minimum absorption coefficients:





Product Specification

Absorption Coefficient vs Frequency, Hz

Panel	125	250	500	1k	2k	4k
50mm	0.39	0.63	1.02	0.89	0.83	0.67
100mm	0.79	1.07	1.08	1.05	1.02	0.78

c. Where appropriate, a certificate shall be supplied indicating the air leakage characteristics of a panel assembly and associated fixing sections.

d. 50mm panels shall have a thermal resistance of at least 1.3m² K/W. 100mm panels shall have a thermal resistance of at least 2.6m² K/W. Resistances shall be measured at 20°C mean temperature difference.

1.7 Standard panels shall be supplied in widths of 750mm or 900mm and lengths as required on the drawings, up to a maximum of 3.6m.

1.8 3.6m long panels, when installed as structural members, shall have a deflection of less than 8mm under a distribution of 0.8 kN/m (50mm panel) or 1.2 kN/m (100mm panel).

Air Handling Units

The demand for quiet packaged Air Handling Units has led to the development of the NAP Silentflo Acoustic AHU. These are smaller, more compact and quieter than conventional units, and provide more energy efficient heating and cooling.

They provide high acoustic performance, maximum operating efficiency, minimum building space requirements, and are easily accessible for inspection and routine maintenance.

Utilizing NAP Silentflo Sound Snap panels, Duct attenuators, and with conventional fans, coils and filters, the entire package is custom designed to suit individual requirements.

By combining all acoustic and thermal characteristics in one unit, a quiet, space efficient and guaranteed capacity unit is suitable for today's design of individual floor by floor and zone designs in large buildings, commercial and civic complexes.

The tested panel system has a guaranteed noise level and is easily demountable with no loss in performance. They provide an attractive seam, weld free finish, with no vertical fixings, and supplied in a range of thicknesses. Refer standard panel specification.

These units can be supplied completely built up, saving on installation time and handling costs. Their compact design can cut plant room areas and downduct acoustic treatments substantially. Noise levels of NC30 or less can now be achieved underneath or adjacent to plant rooms, without massive acoustic treatment and expensive architectural modifications. Available with vertical or horizontal air discharge.

They are available in a range of capacities from 5m³/s to 50m³/s. The fan size, coil dimensions and weight are selected according to design requirements, space limits, and performance criteria. A typical unit is illustrated below. Note that individual requirements can be accommodated using the NAP Silentflo standardized acoustic component system.

Special Requirements

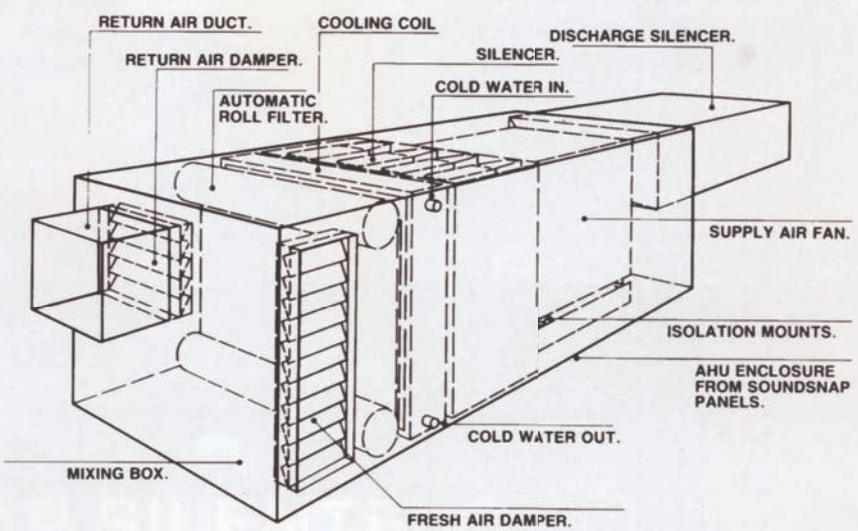
With many years of experience and hundreds of proven installations NAP Silentflo has an unequalled record in special customer order projects.

In many situations panels are manufactured to suit special requirements such as for restricted space applications, odd shaped panels or non standard thicknesses. Designing and manufacturing enclosures for special applications is "standard" to NAP Silentflo. Our acoustic engineers are always available to assist in solving difficult requirements. In many instances a higher transmission loss than that specified is required. In these situations the development of composite panels can be conducted by NAP Silentflo to provide the required performance. Ask for our reference lists.

Design Notes

Before considering enclosure systems, all relevant considerations should be taken into account by following the guidelines set out below and providing the information requested.

NAP SILENTFLO ACOUSTIC A.H.U.



The above diagram illustrates a typical Acoustic AHU for a large building project. Both straight through (illustrated) and return types are available.

Katherine Power Station, Northern Territory.

1. Determine maximum enclosure dimensions that will encase the machine without interfering with nearby equipment. Ensure the minimum distance from the machine to the enclosure is at least 500mm to avoid airborne sound excitation of the enclosure walls.
2. Establish the location of doorways, access hatches and windows for observation (of controls etc.), access, inspection and maintenance. Standard sizes for these items are given on page 3 of this catalogue but special sizes can be supplied to order. Provide details of specialist requirements. Note glass to be used.
3. Locate necessary air inlet and discharge silencers. Soundsnap enclosures, properly ventilated, should not cause overheating if selected correctly. Air inlets should be at low level and air discharges should be at high level to follow the normal convective path.
4. Pipe and cable penetrations can be cut on site with panels split horizontally. Larger apertures or cut outs should be detailed so that panels can be sized to suit and minimize site work.
5. Other requirements must be detailed including: weatherproofing, airtightness, corrosive conditions, removable panel location, maximum panel sizes, packaging requirements and special materials.

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