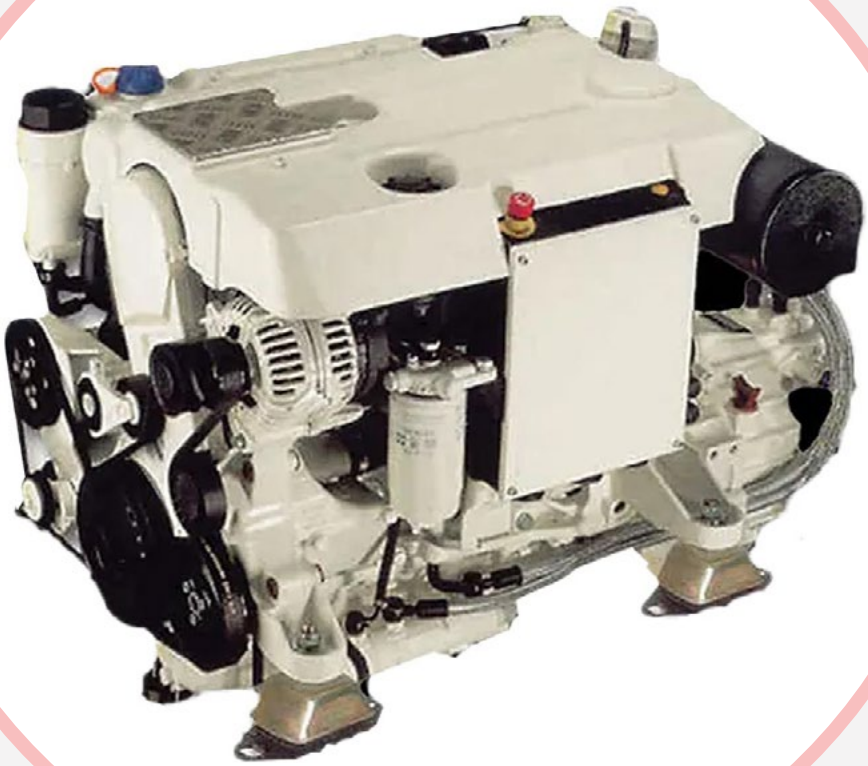
MACKAY
INDUSTRIAL

SELECTION PRINCIPLES



SECTION A

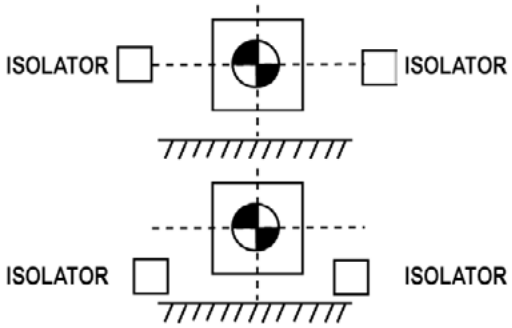
SELECTION PRINCIPLES:

TEMPERATURE

Extremes of temperature can affect the service life of rubber isolators. Generally, operating temperature should not exceed 60o C but occasional temperatures of up to 80o C can be accommodated.

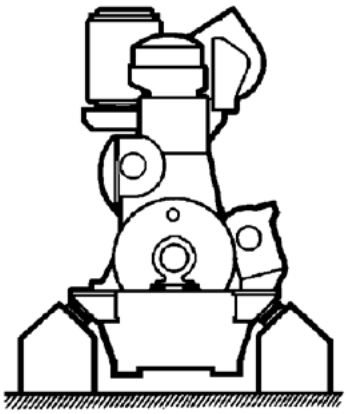
PROTECTION

While most rubber compounds deteriorate if in constant contact with oil or grease, experience has shown that small amounts of oil will not cause a reduction in the mechanical properties of elastomers. It is advisable where oil or grease is prevalent to install isolators so that contact is avoided.



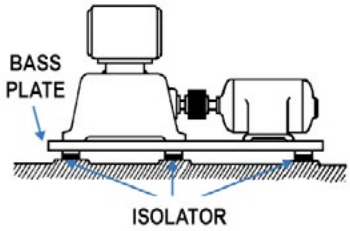
MOUNT POSITIONING

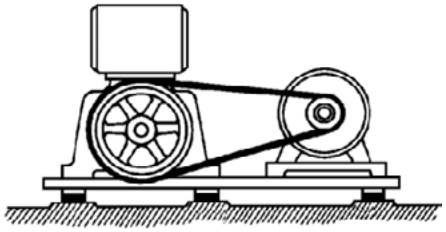
The stability of a resiliently supported mechanism is greatest when the isolators are in a horizontal plane passing through the centre of gravity of the mechanism or where the isolators are placed far away from the centre of gravity. Most machines, because of their design, require mounting below the centre of gravity which tends towards instability. For this reason, a small percentage of the isolators efficiency must be sacrificed for the sake of mechanical stability.



STABILITY

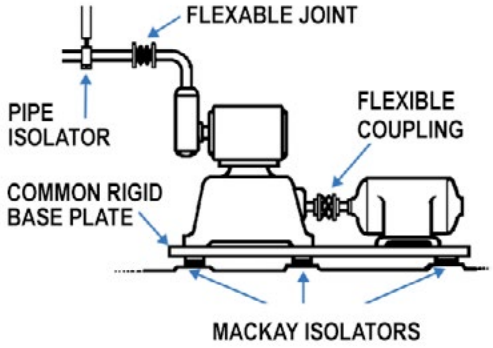
To maintain stability and relative positions between the drive and belt driven units, install both on a common rigid baseplate and then resiliently support the baseplate.





FLEXIBLE COUPLINGS

The efficiency of a resilient isolator under a mechanism can be seriously impaired by the rigidity of the connecting members, such as water and steam pipes, conduit etc. For best performance, it is essential all connecting members be joined as flexibly as possible using flexible couplings and flexible joints.



SELECTION

The main consideration is to select the isolator to carry the load as shown in the load rating charts, giving preference to the top end of the ratings, and then choosing the one to suit your specific fitting requirements. Mackay isolators have each been engineered to specific requirements of deflections under working conditions and providing the disturbing or forced frequency is above 15Hz, selection is simple.

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VIBRATION ISOLATORS

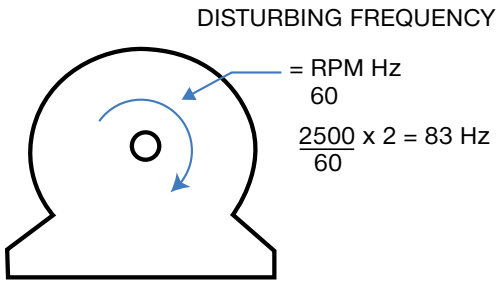
LOW FREQUENCY SELECTION

When frequencies under 15Hz are encountered or when there are HEAVY impact loads imposed on the isolator, consult with Mackay's technical division for advice. For normal purposes, the disturbing frequency can be considered as the revolutions per second of the offending item; i.e. R.P.M. 60

MULTI-CYLINDER ENGINES

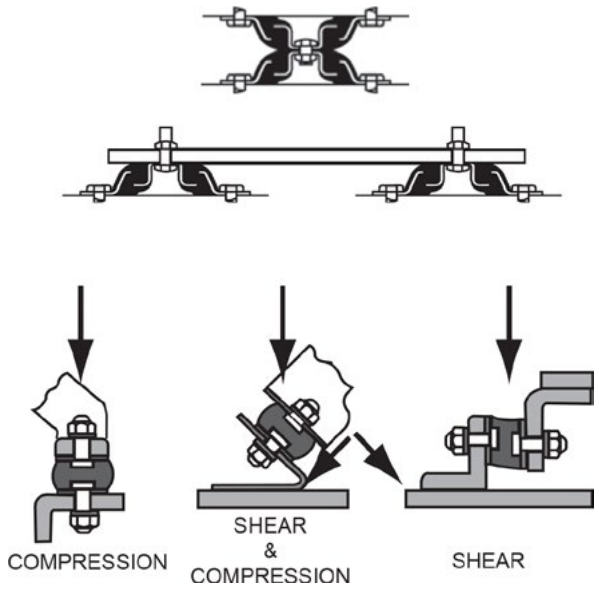
In multi-cylinder engines it is usually the number of working impulses per revolution which constitutes the disturbing frequency.

e.g. two cylinder engine direct drive operating at 2500 r.p.m. = Disturbing Frequency of 83 Hz.



SERIES AND PARALLEL ASSEMBLIES

The isolation efficiency of low disturbing frequencies can be increased by using two isolators in series. This effectively doubles the deflection obtained with one isolator of the same load carrying capacity - by placing them in parallel, you double the load rating at the same deflection



CALCULATING DEFLECTIONS

If the isolator selected has a higher load carrying rating than required, the deflection of your actual loading can be calculated approximately by using this formula;

$$\frac{\text{RATED DEFLECTION X ACTUAL LOAD}}{\text{RATED LOAD}}$$

and then referring to the graph illustrated, the isolation efficiency can be ascertained (should always exceed 70% under normal operating conditions).

DISTURBING FREQUENCIES & DEFLECTIONS

The graph illustrates the percentage of vibration isolation that is possible to obtain for simple linear vibration in a resiliently mounted assembly with various combinations of static deflection and disturbing frequencies.

The area (shaded) below the resonance line indicates the region of magnification of the vibration that occurs when the ratio of the disturbing frequency to the natural frequency of the mounted assembly is less than the square root of 2. The area above the resonance line shows the percentage of the vibratory forces that are prevented from reaching the supporting structure when correct isolators are selected. Example; With a disturbing frequency of 5 Hz and a deflection of 30mm you will obtain an isolating efficiency of 50%, while with a deflection of 3mm your vibration will magnify by a factor of 1.5. When referencing the load and deflection data shown within this catalogue it should be noted that they are static values and allowances should be factored in to obtain an accurate dynamic stiffness value. As shown in the table below.

Further advice on vibration isolation applications or comprehensive technical information is available on request from the Technical Department at Mackay Consolidated Industries.

Dynamic / Static Ratio	
Duro	**Ratio**
35	1.0
40	1.1
45	1.1
50	1.2
55	1.3
60	1.4
65	1.5
70	1.7
75	1.8

Static Stiffness X Ratio =Dynamic Stiffness

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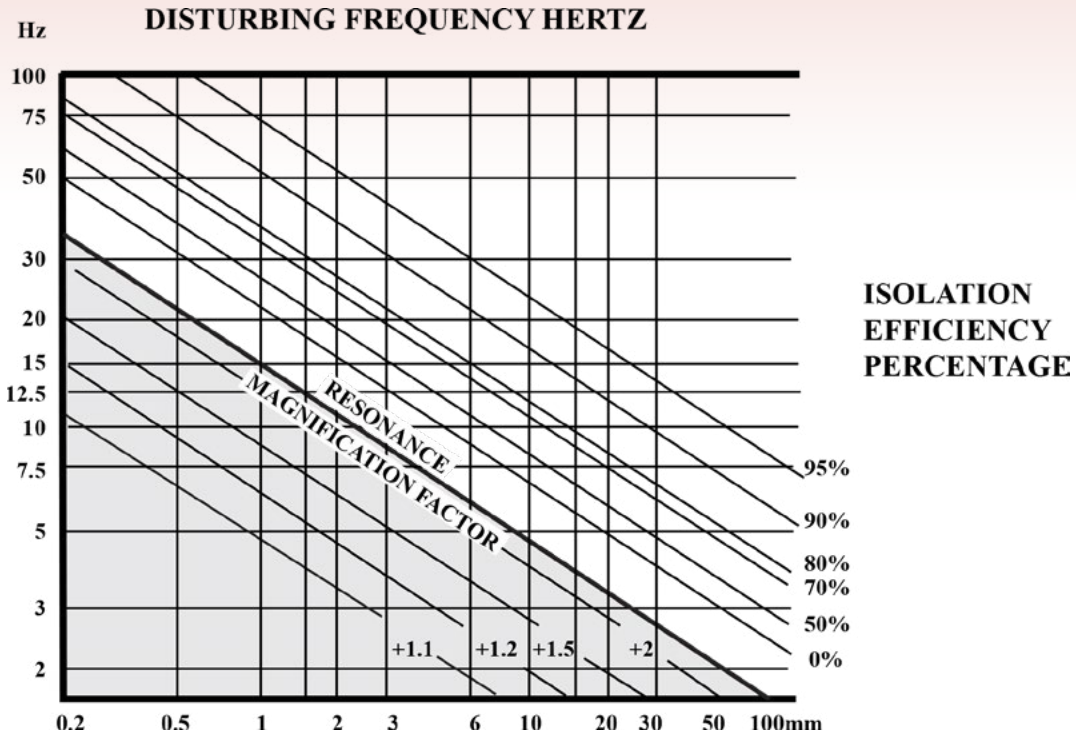

To assist you in selecting the correct isolator from the Mackay range we have listed the isolation efficiency that should be used under normal conditions of operation. The isolation efficiency at any given deflection and disturbing frequencies can be obtained by using the simple graph above.

SUGGESTED ISOLATION EFFICIENCY GUIDE			
	Factories, Schools, Dept. Stores ISOLATION EFFICIENCY		Hospitals, Theatres, Libraries ISOLATION EFFICIENCY
AIR HANDLING UNITS		80%	94%
AXIAL FLOW FANS	UP TO 8 kW 8kW to 38 kW MORE THAN 38kW	70% 75% 80%	90% 94% 96%
CENTRIFUGAL COMPRESSORS		94%	99.5%
CENTRIFUGAL FANS	UP TO 4kW 4kW TO 18kW MORE THAN 18kW	70% 80% 90%	94% 96% 98%
FAN COIL UNITS	HUNG SUPPORTED	80% 90%	90% 96%
PIPES	HUNG	70%	90%
PUMPS	UP TO 2 kW 2kW TO 4kW MORE THAN 4 kW	70% 80% 90%	94% 96% 98%
RECIPROCATING COMPRESSORS	UP TO 8kW 8 kW TO 38kW MORE THAN 38kW	70% 80% 90%	94% 96% 98%
UNIT AIR CONDITIONERS	HUNG SUPPORTED	80% 90%	90% 96%

All properties nominal, contact Mackay for Technical advice

All Dimensions in Millimetres

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MACKAY

Selection of Mackay Engine Mounts

Mobile or Stationary

Mobile
Select safety interlocked isolator selection

Stationary
Does not need to be safety interlocked

1 or 2 cylinder engine

YES → **MD** (Good rebound – Common for small marine engines) Section 4

NO → Vibration isolation important

NO → **M140 or M139** (Basic encapsulated design) Section 3

YES → Is rebound a significant issue

NO → **IsoMounts** (Common for marine engines) Section 4

BRB Section 4

YES → **Recessed Flange** (Cab mounting) Section 5

Centre-fixing (Chassis mounting) Section 6

1 or 2 cylinder engine

YES → **Conflex** (High deflection) Section 3

NO → Vibration isolation important

NO → **Multi Cushions mid-sized** (General purpose) Section 1

General machinery Section 3

Plate (Shaker screens) Section 10

YES → **High deflection** Section 11

(1) Calculate weight per mountfor installation.

(2) Click here to Refer to Product Selection Tool

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