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# **EUROVIB (Acoustic Products) Limited**

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## **TECHNICAL GUIDE**

A short form Technical Guide for  
Consultants/Design Engineers to assist in specification &  
selection of Vibration Isolators for Building Service Equipment

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### Foreword

Vibration isolators represent one of the smallest items of expense in a building services system yet they protect capital plant frequently worth thousands of pounds, and play a vital role in protecting our working environment. Properly selected they will prolong the life of the plant and very much assist in what are otherwise described as 'noise' problems.

The Design Engineer should always consider individually isolating capital plant because, whilst it is true that most Original Equipment Manufacturers will provide or offer integral isolation this is of necessity an optimum solution that will not necessarily suit all locations and applications. Indeed it may sometimes be counter productive. In any event the connecting services to equipment must always be considered for vibration isolation. It should be understood that a typical building services scheme can be vibration isolated at a cost of less than one per cent of the mechanical bill and can cost equally as much to do badly as to do well. Vibration and associated structural noise are an unacceptable contaminant to our working environment.

The design and specification of vibration hardware should be quality and life-expectancy matched to the machinery and services it supports. Eurovib aspire to produce the very best that is compatible with good engineering principles and a tight design budget. The finest assurance we can give to the profession and the trade is that our replacement business is currently zero.

This Technical Guide is an attempt to set out an accessible solution to most common vibration problems. It is not a Technical Design Thesis but a document that designer/draughtsmen can refer to on a day to day basis to assist them to provide their client with a trouble free job.

All of the isolation products in this Guide (and many others not featured) have individual sales and/or certified dimension sheets. All components in products are sourced to relevant British standard/I.S.O Standards, and all products incorporate generous stability and overload factors.

**VIBRATION ISOLATION DESIGN GUIDE**  
**RECOMMENDED MINIMUM STATIC DEFLECTION ON 150 RC SLAB**  
**AT VARYING SPAN BETWEEN COLUMNS**

EQUIPMENT This applies to all machines or services attached to the machines	LOCATION & HORSEPOWER								
	Basement/Solid Grd .			Up to 9.0m span			Up to 15.0m span		
	up to (kw)			up to (kw)			up to (kw)		
	5	10	50	5	10	50	5	10	50
Down to 2000 rpm	87 <sub>2</sub>	92 <sub>3</sub>	94 <sub>4</sub>	99 <sub>15</sub>	99 <sub>20</sub>	99 <sub>25</sub>	99 <sub>20</sub>	99 <sub>20</sub>	99 <sub>30</sub>
Down to 1400 rpm	82 <sub>3</sub>	87 <sub>4</sub>	90 <sub>5</sub>	97 <sub>20</sub>	98 <sub>25</sub>	99 <sub>35</sub>	98 <sub>25</sub>	98 <sub>25</sub>	98 <sub>40</sub>
Down to 700 rpm	78 <sub>10</sub>	82 <sub>12</sub>	86 <sub>15</sub>	92 <sub>30</sub>	93 <sub>35</sub>	95 <sub>45</sub>	90 <sub>35</sub>	90 <sub>35</sub>	95 <sub>50</sub>
Down to 440 rpm	74 <sub>20</sub>	77 <sub>25</sub>	82 <sub>30</sub>	91 <sub>70</sub>	92 <sub>75</sub>	93 <sub>85</sub>	87 <sub>75</sub>	88 <sub>80</sub>	91 <sub>90</sub>

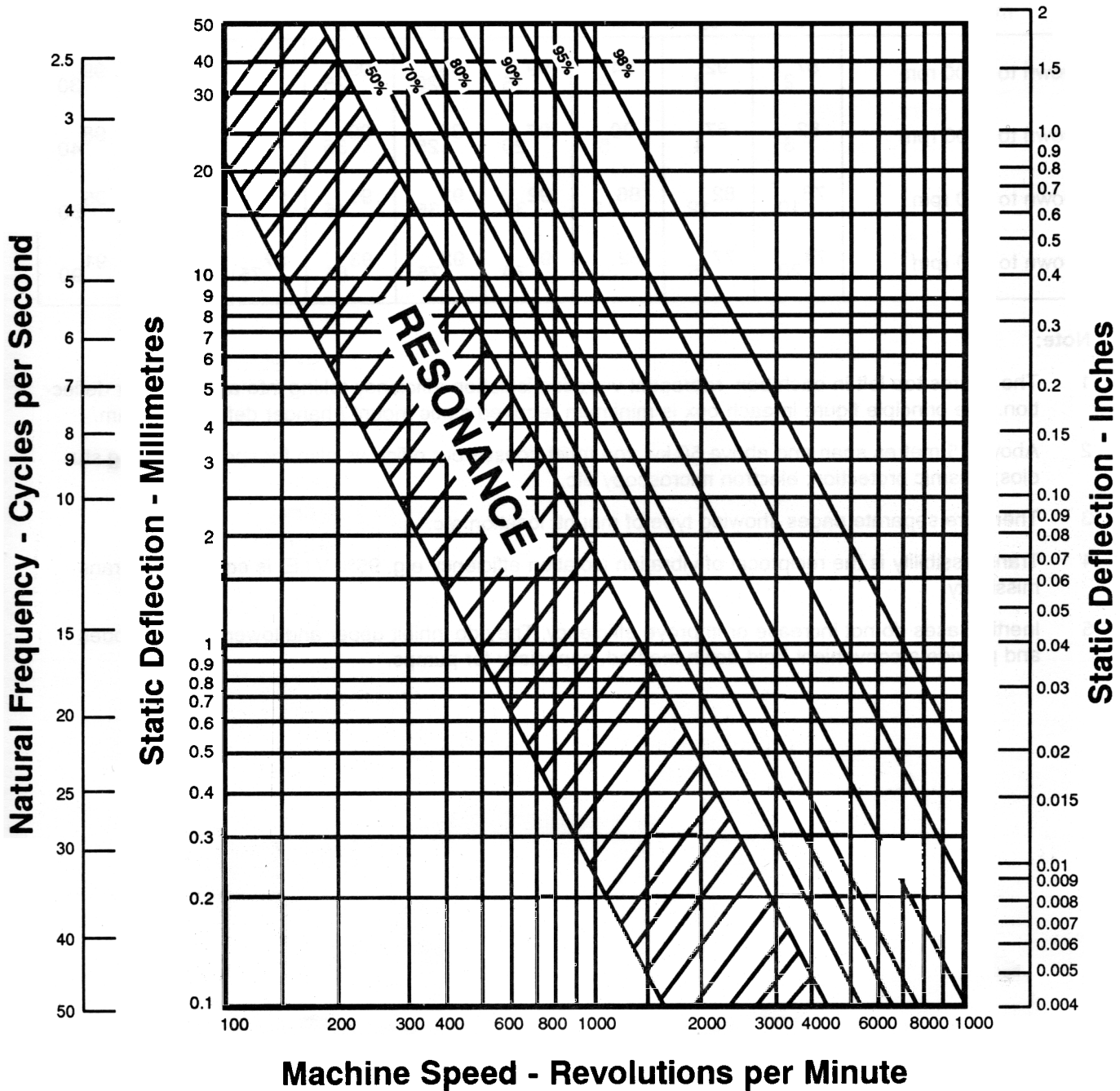
**Note:**

- 1 The figures top left in each box represent vibration isolation efficiency taking into account floor deflection. The principle figure in each box is minimum required static mount / hanger deflection in mm.
- 2 Above 15 metres span and above 50 kw you must consult our office as also for special work eg studios; seismic protection; electron microscopy etc.
- 3 There are separate pages showing type of mount, location etc.
- 4 Transmissibility is the reciprocal of vibration isolation efficiency e.g. 95% V.I.E. is equal to 5% transmissibility.
- 5 Inertia Bases do not increase or improve efficiency. They do inhibit upper and lower rocking modes and provide a convenient hold-down method, especially for pumps.

# VIBRATION ISOLATION DESIGN GUIDE

## Performance

### Forcing Frequency - Cycles per Second



Whilst every attempt has been made to ensure accuracy, & to incorporate the best design principles, the Company will not accept responsibility for use/misuse of this guide without individual reference to our Design Office.

**FANS & AHU'S  
& DUCTWORK****VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN BASEMENT PLANTROOMS OR  
AT GROUND LEVEL WITH NO BASEMENT (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
A.H.U'S:	Neoprene pads or strips under unit	RR/1 (see pipework spec. also). RR/03; RR/06
FANS:		
Low press. base mounted fans upto 300 dia	Turret mounts direct to fan set	VT/1
Low press. base mounted fans upto 600 dia	Turret mounts direct to fan set or low deflection springs	VT/1; VT/2; or CS/1
Low press. base mounted fans over 600 dia	Turret mounts direct to fan set or spring mounts	VT/2; VT/4; or OS/0; OS/1
High press. upto 300 dia	Low deflection enclosed springs	CS/1
High press. upto 600 dia	Enclosed springs or open springs	ES/0 ES/1 or OS/0; OS/1
High press. over 600 dia	Enclosed or open springs under steel inertia frame	B/SF-ES/0; ES/1 or OS/0; OS/1
Suspended axial fans 300 dia	Spring hangers	HES/0
Suspended axial fans upto 600 dia	Spring hangers	HES/0
Suspended axial fans over 600 dia	Spring hangers	HES/1
ROOF UNITS:		
Ductwork:		
Sheet metal ducting upto 1200 girth	Fire resistant class 1 flexible connectors Hang at N.E. max centres as defined by HVCA and install 6mm pads in pipeclips	401 N.I.C 30/6 or 30/12
Sheet metal ducting over 1200 girth	Fire resistant class 1 flexible connectors Spring Hangers	401 HES/0; HES/1

**Note:**

See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03

- 2 Where pipework passes through walls/slabs with less than 3 hangers distance from equipment you must install a bellows connector either side of the penetration, and/or resiliently seal pipe penetration.
- 3 The final connections (ducts, pipes & electrical) to all moving plant must be flexible.

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**PUMPS & PIPEWORK****VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN BASEMENT PLANTROOMS OR  
AT GROUND LEVEL WITH NO BASEMENT (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
<b>PUMPS:</b> Close coupled or belt drive with motor & pump at same level on a common base frame	Pads directly under frame or pads inserted in concrete sandwich Or Turret mounts directly under pump frame Or Steel/spring inertia frame	RR/1 or RR/2 VT/1 or VT/2 B/SF-0S/0 or B/SF-0S/1
Packaged units eg Pressurisation	Pads directly under packaged Frame	RR/1
Belt driven with top mounted motor	Pads in concrete sandwich Or steel/spring inertia frame	RR/2 B/SF-0s/0 or B/SF-0S/1
Diaphragm action pumps	Spring/concrete inertia base	B/PF Plus viscous dampers (by others)
Vertical drive pumps	Pads under pump support brackets Or pads in concrete sandwich	RR/2 RR/2
In-line pumps & gas boosters	Low deflection spring hangers	HES/0 OR HES/1
<b>PIPEWORK:</b> Upto & inc. 50mm	Expansion bellows, screwed. 6mm pads in pipe clip	TRB/16/020 N.I.C. 30/6
65 to 100mm inc.	Expansion bellows, flanged. Spring hangers @ max 3600 centres	TRB/16/021 HES/0
125 & 150mm	Expansion bellows, flanged. Spring hangers @ max 5000 centres	TRB/16/021 HES/1
Over 150mm	Expansion bellows, tied & flanged. Spring hangers @ max 6000 centres	TRB/16/122 HES/2
Gas & Liquid lines	12mm pads in pipe clips	N.I.C. 30/12

**Note:**

- 1 See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03
- 2 Where pipework passes through walls/slabs with less than 3 hangers distance from equipment you must install a bellows connector either side of the penetration, and/or resiliently seal pipe penetration.
- 3 The final connections (ducts, pipes & electrical) to all moving plant must be flexible.

**BOILERS  
REFRIGERATION PLANT  
ENGINES & GENERATORS****VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN BASEMENT PLANTROOMS  
OR AT GROUND LEVEL WITH NO BASEMENT (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
Reciprocating compressors or items incorporating them	Restrained springs directly under equipment base frame	RS/1 or RS/2
Centrifugal or screw compressors	Pads directly under machine base	RR/2
Absorbtion machines	Pads directly under machine base	RR/1
Condensers/dry air coolers	Pads directly under equipment	RR/2
Cooling Towers	Pads directly under equipment	RR/2
Diesel engines	Restrained springs directly under skid	RS/1 or RS/2
Gas turbines	Pads directly under skid	RR/2
Boilers	Pads directly under boiler	RR/1

**Note:**

- 1 Isolation of most equipment inc. packaged chillers and heat pumps can be selected from the above.
- 2 For connecting pipework and ductwork isolation see separate bulletins.
- 3 If outside and bolting is required, hold-down must not violate the isolation, eg use neoprene washers or grommets. Internally hold-down may not be required except for seismic zones in which case ask us for special guidance.
- 4 It is sometimes difficult to adequately load pad material in base applications. In these cases pads in concrete sandwich may be required.
- 5 Final connections (duct, pipes & electrical) to all moving plant must be flexible.
- 6 See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03

**FANS & AHU'S  
& DUCTWORK****VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN PLANTROOMS ABOVE BASEMENT  
OR ABOVE GROUND LEVEL (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
A.H.U'S:	Springs under steel inertia frame	B/SF-ES/0; ES/1; ES/3 OR OS/0; OS/1
FANS:		
Low press. base mounted fans upto 300 dia	Enclosed or Open springs	CS/1; ES/0 or OS/0
Low press. base mounted fans upto 600 dia	Spring mounts	ES/0; OS/0
Low press. base mounted fans over 600 dia	Spring mounts	ES/1; OS/0; OS/1
High press. upto 300 dia	Enclosed or Open springs	ES/0 or OS/0
High press. upto 600 dia	Enclosed or Open springs	ES/0; ES/1 or OS/0
High press. over 600 dia	Restrained spring under steel inertia frame	B/SF-RS/0; RS/1
Suspended axial fans 300 dia	Spring hangers	HES/1
Suspended axial fans upto 600 dia	Spring hangers	HES/1
Suspended axial fans over 600 dia	Spring hangers	HES/1; HOS/1
ROOF UNITS:	Soft neoprene strip on roof curb	N.I.C 30/6 or 30/12
Ductwork:		
Sheet metal ducting upto 1200 girth	Fire resistant class 1 flexible connectors Hang at N.E. max centres as defined by HVCA and install	401 HES/1
Sheet metal ducting over 1200 girth	Fire resistant class 1 flexible connectors Hang at N.E. max centres as defined by HVCA and install Spring Hangers	401 HES/1

**Note:**

- 1 See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03
- 2 Where pipework passes through walls/slabs with less than 3 hangers distance from equipment you must install a bellows connector either side of the penetration, and/or resiliently seal pipe penetration.
- 3 The final connections (ducts, pipes & electrical) to all moving plant must be flexible.

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**PUMPS & PIPEWORK****VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN PLANTROOMS ABOVE BASEMENTS  
OR ABOVE GROUND LEVEL (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
<b>PUMPS:</b> Close coupled or belt drive with motor & pump at same level on a common base frame	Steel/spring inertia frame	B/SF-ES/0 OR B/SF-ES/1
Packaged units eg Pressurisation	Turret mounts	VT/1; VT/2
Belt driven with top mounted motor	Concrete steel/spring inertia frame	B/PF-ES/0 OR B/PF-OS/0
Diaphragm action pumps	Spring/concrete inertia base	B/PF Plus viscous dampers (by others)
Vertical drive pumps	Spring/concrete inertia base	B/PF-ES/0; OS/0
In-line pumps & gas boosters	Low deflection spring hangers	HES/0 OR HES/1
<b>PIPEWORK:</b> Upto & inc. 50mm	Expansion bellows, screwed. Spring hangers @ max 2000 centres	TRB/16/020
65 to 100mm inc.	Expansion bellows, flanged. Spring hangers @ max 3600 centres	TRB/16/021 HES/0
125 & 150mm	Expansion bellows, flanged. Spring hangers @ max 5000 centres	TRB/16/021 HES/1
Over 150mm	Expansion bellows, flanged. Spring hangers @ max 6000 centres	TRB/16/122 HES/2
Gas & Liquid lines	12mm pads in pipe clips	N.I.C. 30/12

**Note:**

- 1 See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03
- 2 Where pipework passes through walls/slabs with less than 3 hangers distance from equipment you must install a bellows connector either side of the penetration, and/or resiliently seal pipe penetration.
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**BOILERS  
REFRIGERATION PLANT  
ENGINES & GENERATORS**

**VIBRATION ISOLATION DESIGN GUIDE  
FOR EQUIPMENT IN PLANTROOMS ABOVE BASEMENTS  
OR ABOVE GROUND LEVEL (GRADE)**

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
Reciprocating compressors or items incorporating them	Restrained springs directly under equipment base frame	RS/0 or RS/1
Centrifugal or screw compressors	Restrained springs directly under machine base	RS/0; RS/1
Absorbion machines	Pads directly under machine base	RR/2
Condensers/dry air coolers	Restrained springs directly under equipment	RS/0
Cooling Towers	Restrained springs directly under equipment	RS/0; RS/1
Diesel engines	Restrained springs directly under skid	RS/0; RS/1
Gas turbines	Pads directly under skid	RR/2
Boilers	Pads directly under boiler	RR/2

**Note:**

Isolation of most equipment inc. packaged chillers and heat pumps can be selected from the above.

- 2 For connecting pipework and ductwork isolation see separate bulletins.
- 3 If outside and bolting is required, hold-down must not violate the isolation, eg use neoprene washers or grommets. Internally hold-down may not be required except for seismic zones in which case ask us for special guidance.
- 4 It is sometimes difficult to adequately load pad material in base applications. In these cases pads in concrete sandwich may be required.
- 5 Final connections (duct, pipes & electrical) to all moving plant must be flexible.
- 6 See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03

## VIBRATION ISOLATION DESIGN GUIDE FOR EQUIPMENT AT ROOF LEVEL

EQUIPMENT	TYPE OF TREATMENT	EUROVIB PRODUCT REF
All plant	Spring/steel or spring/concrete inertia bases (restrained)	B/SF-RS/0; RS/1
Base mounted ducts	Fire resistant class 1 flexibles Restrained mounts	401 RS/0; RS/1
Suspended ducts	Flex. connectors Swing/spring hangers	401 H0S/0; H0S/1
Base mounted pipes	Flex. Exp. Bellows Restrained springs	TRB/16/020; TRB/16/021 RS/0; RS/1
Suspended pipes	Flex. Exp. Bellows Swing/spring hangers	TRB/16/020; TRB/16/021 RS/0; RS/1

**Note:**

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2. For connecting pipework and ductwork isolation see separate bulletins.  
  
If outside and bolting is required, hold-down must not violate the isolation, eg use neoprene washers or grommets. Internally hold-down may not be required except for seismic zones in which case ask us for special guidance.
4. It is sometimes difficult to adequately load pad material in base applications. In these cases pads in concrete sandwich may be required.
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6. See recommended static deflection & efficiencies for plant on minimum 150 mm concrete slab, Data sheet 96.06.03

### **O.E.M. DESIGN**

Assistance to O.E.M.'s to evaluate vibration requirements in their products and to provide a solution. The selection and scheduling of suitable AVM's to suit O.E.M. production or site application.

### **CONSULTANT/DESIGNER PROJECT ANALYSIS**

Analysis of an overall scheme and selection of suitable AVM's. Assistance in preparation of engineering specifications and detailed product specification for tendering purposes.

### **SEISMIC & ORDINANCE SHOCK**

Proper assessment of risk including analysis, evaluation and treatment by computer modelling. Supply of seismically rated products. Full design and project management services provided.

### **SPECIAL PRODUCTS**

This guide generally concentrates on standard stock products. We also supply high deflection and/or special application mounts and will gladly process any vibration isolation enquiry.

### **QUOTATIONS**

Telephone, fax and written quotations provided free of charge.

### **SITE SURVEYS**

Instrument and measurement surveys to determine vibration problems and solutions.

### **COMMISSIONING**

Acceptance and commissioning services available.

### **INSTALLATION SERVICES**

Eurovib are not contractors, but will provide site supervision for the installation of our products.

### **TESTING**

Testing our own and other products for isolation, performance and requirement.

**WE PRIDE OURSELVES IN PERSONAL INDIVIDUAL CUSTOMER AND CLIENT SERVICE; HIGH QUALITY PRODUCTS AT THE MOST COMPETITIVE RATES.**

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**A member of the T.E.P.E Ltd Group**