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General Product Description

Protecta® FR Damper is used to fire proof ventilation ducts where they penetrate fire rated constructions such as fire compartments and fire walls, preventing the passage of fire and smoke both surrounding and inside the ventilation duct.

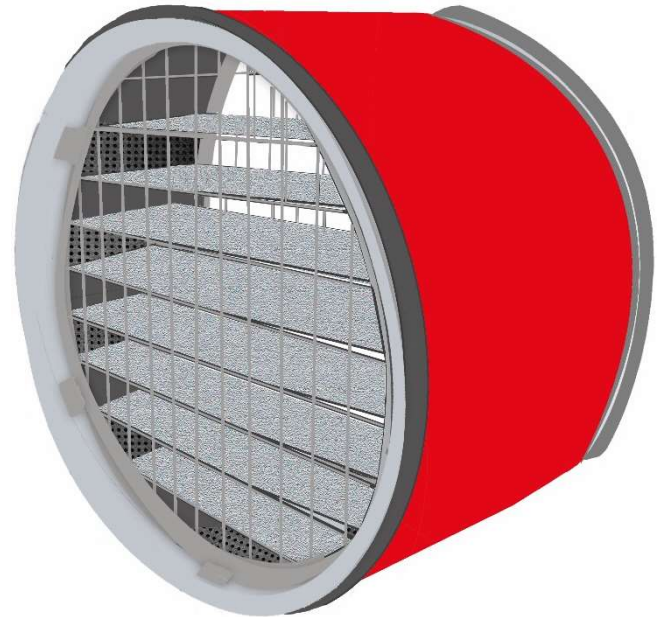
The product consist of a steel casing containing horizontal steel blades treated with a technically advanced heat expanding graphite which closes off the whole damper in a fire. The aperture surrounding the dampers are fire sealed with Protecta FR Board in walls and Protecta® EX Mortar in floors.

The damper can be installed in the fire seal and the ventilation ducting attached or the damper can be connected to the ducting and then fire sealed.

The aperture where the ducts pass through can include one or multiple ventilation ducts. One can also pass through other technical services such as cables, cable trays and pipes within the same aperture.

Properties

- Maintenance free and no electrical connections necessary.
- The same damper can be installed in both walls and floors.
- It seals against penetration of fire and smoke both surrounding and inside the ventilation duct.
- Closes in the area where the fire is located but not elsewhere so the ventilation system can be used to extract smoke from areas that are not on fire.
- Keeps the temperature in the duct network lower than 120°C and will therefore protect fans and sensitive units in the system.
- Insulation of ducts is not necessary.
- Service life of more than 50 years; the damper will last the same life cycle as the ventilation system.
- The dampers are designed to fit standard ducting equipment so that the ducting system installer can easily fit the dampers.
- The dampers are attached to the inside of the ducts, giving the benefit of space saving.
- An aperture can include several dampers and in addition technical services such as cables, cable trays and pipes.
- The dampers are only 15 cm long and bends can be connected right behind the fire seal (can also be special ordered in other sizes).
- The damper can be attached to a vent on one side.



Fire Resistance

Construction	Description	Classification
Flexible and rigid walls with thickness $\geq 100\text{mm}$	$\leq \text{Ø } 400\text{mm}$ FR Damper/duct with $\geq 200\text{mm}$ stone wool mat on both sides	EI 120 (E 120)
	$\leq \text{Ø } 1250\text{mm}$ FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 60 (E 90)
	$\leq 600\text{mm}$ high x 1000mm wide FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 120 (E 120)
	$\leq 1200\text{mm}$ high x 1700mm wide FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 90 (E 90)
Rigid floors with thickness $\geq 150\text{mm}$	$\leq \text{Ø } 400\text{mm}$ FR Damper/duct with $\geq 150\text{mm}$ stone wool mat on top side	EI 120 (E 180)
	$\leq \text{Ø } 1000\text{mm}$ FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 90 (E 90)
	$\leq 600 \times 1000\text{mm}$ FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 60 (E 90)
	$\leq 1000 \times 1000\text{mm}$ FR Damper/duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 90 (E 90)

The stone wool mat described is with thickness $\geq 30\text{mm}$ and density $\geq 80\text{kg/m}^3$ with or without aluminium foil, attached according to the products installation instructions.

The 'close in and pull out' Principle

A combined close in and pull out solution is one that prevents spread of fire by closing off the fire inside the fire compartment and that uses the ventilation system outside the area of the fire to pull out any smoke that filters out through the fire compartments constructions. Protecta® FR Dampers have to be used in all ventilation duct penetrations in fire compartments and fire walls. The dampers will close off the fire compartment but not in the parts of the building that are not on fire. For the principle to work effectively it is recommended that the ventilation unit is protected with a battery backup and a bypass of the filters so that the smoke from the fire does not blind them.

When using Protecta® FR Dampers the ventilation ducts do not need to be fully insulated.

Dust Formation and General Maintenance

Tests conducted on Protecta® FR Damper to determine dust formation inside the damper has shown that dust does not collect inside the damper, and no more than in any other components in the ventilation system. The dust has a tendency to be blown through the dampers as long as the ventilation system is in constant operation and installed in normal indoor environments (Z₂).

It is recommended that the ventilation system is designed and cleaned according to local regulations and building codes to provide access for inspections and cleaning, along with the frequency of these cleaning routines. Protecta® FR Damper can easily be cleaned using a vacuum cleaner if this should be needed. Ducts from kitchens and similar, where there is the risk of grease and high humidity, must be fitted with grease filters or similar that are cleaned at fixed frequencies.

Minimum Distances and Limitations

The maximum size of an aperture is 1200 x 2400mm in floors and 1500mm height x 2400mm width or 1200mm height x unlimited width in walls. An aperture can include several services, and they may also include a combination, e.g. cables, cable trays and pipes.

The minimum permitted separation between adjacent seals/apertures is 200mm. Services should be a minimum of 25mm from seal edges. Services within the system Protecta® fire seal do not require a minimum separation, except when pipes where combustible pipe insulation penetrates the seal and plastic pipe penetrations which should be a minimum of 30 mm from other services in the aperture. There must be sufficient distance between two ventilation ducts so that the fire seal can be constructed as stated in the installation instructions.

Supporting Constructions

Flexible walls must have a minimum thickness of 100mm and comprise steel studs or timber studs*) lined on both faces with minimum 2 layers of 12.5mm thick boards.

Rigid walls must have a minimum thickness of 100mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.

Rigid floors must have a minimum thickness of 150mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m³.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

*) Timber studs: no part of the penetration seal may be closer than 100mm to a stud, and minimum 100mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

Sound Insulation

Description	Sound Classification
Protecta FR Board in wall	55 dB
Protecta EX Mortar in floor	64 dB

The sound insulation values are valid for the fire seal only and not any other components in the construction, as for instance the ventilation ducts.

Protecta® products has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

Casing Leakage Classification

Protecta® FR Dampers are fitted with high quality gaskets in circular ducts, and are tested according to EN 1751 to the highest possible **class C** for all sizes. Testing was conducted at BRE's accredited laboratory and test reports can be provided upon request.

Case leakage classification for rectangular dampers is dependent on which locking mechanism is chosen, and the classification will be the same as the classification of the locking mechanism used. Polyseam can deliver dampers with most common types of locking mechanisms that are available in the marketplace.

Loadbearing Properties in Floors

Protecta® EX Mortar has been subject to concentrated load and impact tests in floors according to ETAG 026-2 and EOTA TR001 Clause 2. The tests were conducted on the minimum allowed cast depth of **100mm**.

According to the loading limits in the table below, reinforcement is not necessary, however it is highly recommended that the edges of the aperture are brushed free of any dust or loose particles and that any contamination is washed away using clean water. Moistening the edges well before casting will improve adhesion.

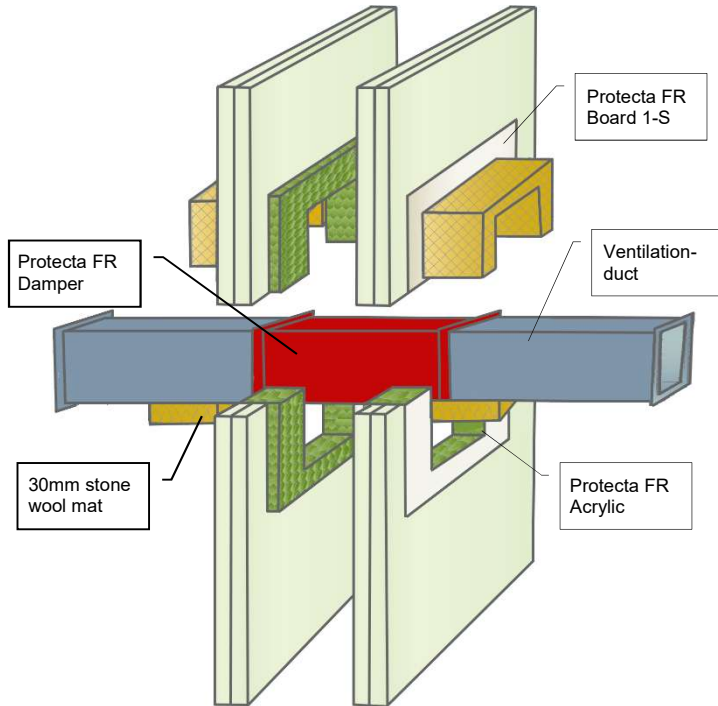
Protecta® EX Mortar should not be cast in surface treated concrete. The mortar must be mixed to a thick but fluid mass at a rate of approx. 2 parts of powder to 1 part water. Maximum loadbearing performance will be achieved 28 days after casting.

Test results:

Test in 1500x1000mm frame	Results
Soft body impact, serviceability	500Nm
Soft body impact, safety in use	700Nm
Hard body impact, serviceability	6 Nm
Hard body impact, safety in use	10 Nm
Concentrated load to ETAG 26-2	15 kN

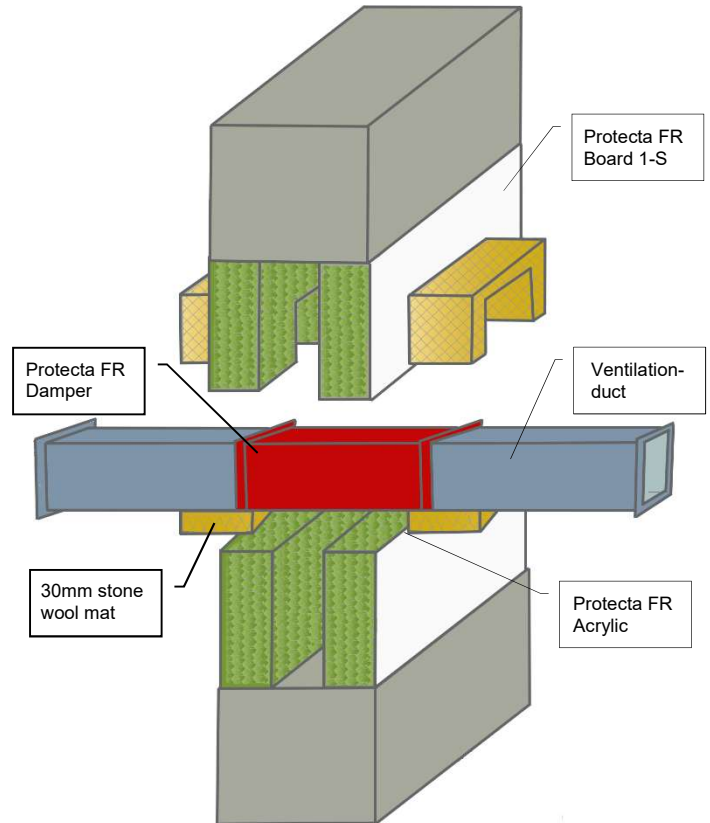


Installation Instructions in Flexible Walls



1. Before installing Protecta® FR Board ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Protecta® FR Coating and Protecta® FR Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Use the product Protecta® FR Board 1-S 50mm with two boards in the aperture. The coated side of the board should be flush with the surface of the wall on both sides.
4. When fire sealing shaft walls consisting of gypsum only on one side, subject to authority approval, install Protecta® FR Board on the exposed side only.
5. Cut the required board(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the board can be sealed with Protecta® FR Coating or Protecta® FR Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
6. Cut a hole for the damper and glue the damper into the boards with Protecta® FR Acrylic or Protecta® FR Coating.
7. All joints, gaps or imperfections in the installed seal must be filled with Protecta® FR Acrylic on both sides.
8. Connect the ventilation ducts to the damper.
9. Insulate the duct towards the fire seal on both sides with 30mm thick stone wool mat in lengths given in the table on page 1. If the duct is ending in the wall then insulate on one side only.
10. Protecta® FR Board can be over-painted with most emulsion or alkyd (gloss) paints.

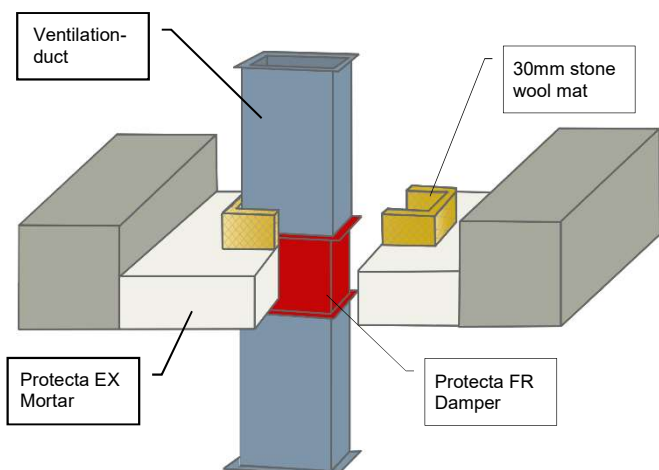
Installation Instructions in Rigid Walls



1. Before installing Protecta® FR Board ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Protecta® FR Coating and Protecta® FR Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Use the product Protecta® FR Board 1-S 50mm with two boards in the aperture. The coated side of the board should be flush with the surface of the wall on both sides, but not at such distance so the ends of the damper is covered.
4. Cut the required board(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the board can be sealed with Protecta® FR Coating or Protecta® FR Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
5. Cut a hole for the damper and glue the damper into the boards with Protecta® FR Acrylic or Protecta® FR Coating.
6. All joints, gaps or imperfections in the installed seal must be filled with Protecta® FR Acrylic on both sides.
7. Connect the ventilation ducts to the damper.
8. Insulate the duct towards the fire seal on both sides with 30mm thick stone wool mat in lengths given in the table on page 1. If the duct is ending in the wall then insulate on one side only.
9. Protecta® FR Board can be over-painted with most emulsion or alkyd (gloss) paints.



Installation Instructions in Rigid Floors



1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. Bare metal pipes or similar passing through the seal must be protected against corrosion using a suitable primer/protection system.
3. Install the damper in the aperture with a temporary support, for instance with the shutter board.
4. Install a stone wool shutter board or another type of shutter to achieve the required 100mm thickness of mortar. Make sure that this achieves a very tight seal – any small openings should be sealed with Protecta® FR Acrylic.
5. Pour clean water into a suitable mixing vessel and pour enough mortar to obtain the required consistency. Mix well to avoid lumps. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the mortar's Technical Data Sheet.
6. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth of 100mm.
7. Connect the ventilation ducts to the damper.
8. Insulate the duct towards the fire seal on the top side with 30mm thick stone wool mat in lengths given in the table on page 1.

Standard Sizes of FR Dampers

Dimension	Article number and barcode	Weight
Ø 63 mm	PRO195 - 5060153111478	0.51 kg
Ø 80 mm	PRO196 - 5060153111485	0.68 kg
Ø 100 mm	PRO197 - 5060153111492	1.24 kg
Ø 125 mm	PRO198 - 5060153111508	1.57 kg
Ø 160 mm	PRO199 - 5060153111515	2.35 kg
Ø 200 mm	PRO200 - 5060153111522	3.36 kg
Ø 250 mm	PRO201 - 5060153111539	3.90 kg
Ø 315 mm	PRO202 - 5060153111546	7.36 kg
Ø 400 mm	PRO203 - 5060153111553	11.28 kg
Ø 500 mm	PRO204 - 5060153111560	14.60 kg
Ø 630 mm	PRO205 - 5060153111577	20.90 kg
Ø 800 mm	PRO206 - 5060153111584	32.24 kg
Ø 1000 mm	PRO207 - 5060153117647	49.80 kg
Ø 1250 mm	PRO208 - 5060153117654	74.00 kg

The length of the dampers in the table are 150mm plus overlap/ connection for the ventilation ducts. Longer and shorter dampers can be manufactured on request.

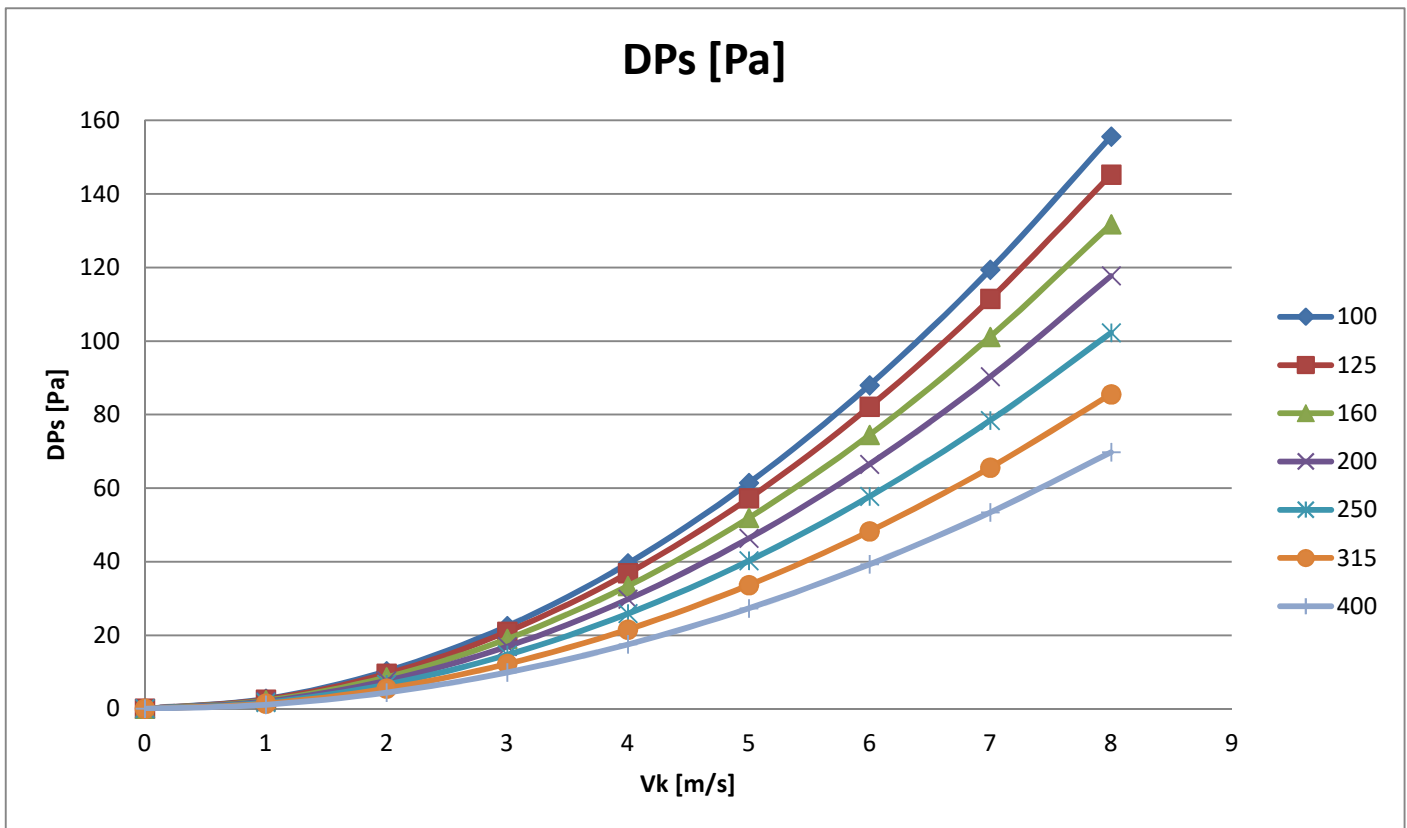
Protecta® FR Damper for rectangular ducts are manufactured to precise measurements, and are not standard goods.

Technical Data

Appearance	Ready manufactured in steel and graphite
BREEAM	Approved, EC1 ^{PLUS} on all fire seals
Interior climate, installed	Z2: Relative air moisture up to 85% and temperatures between 5 and 40 °C
Trigger-temperature in fire	100 °C
Temperature, full closure	160 °C
Time to full closure	From 50 seconds to 2 minutes
Expansion rate graphite	15.5 to 17
Density graphite	2.6 kg per ltr
Thickness graphite	1.6 mm
Leakage classification	Class C according to EN 1751 (circular)
Free air opening	Between 84.2% and 85.4%
Pressure in fire	FR Damper resists minimum 300Pa
Standard for connections	EN 1506:2007
Standard for fire testing	EN 1366-12:2014 & EN 1363-1:2012
Standard for aerodynamics	EN 1751:2014
Standard for sound levels	EN ISO 5135:1998
Flash point	None
Storage	In temperatures between 5°C and 30°C
Life span	Under normal conditions; 50 years +
Installation temperature	+5 °C to +50 °C
Colour	Galvanized steel with section of red colour to identify placement of the fire seal
Packaging	1 damper per box

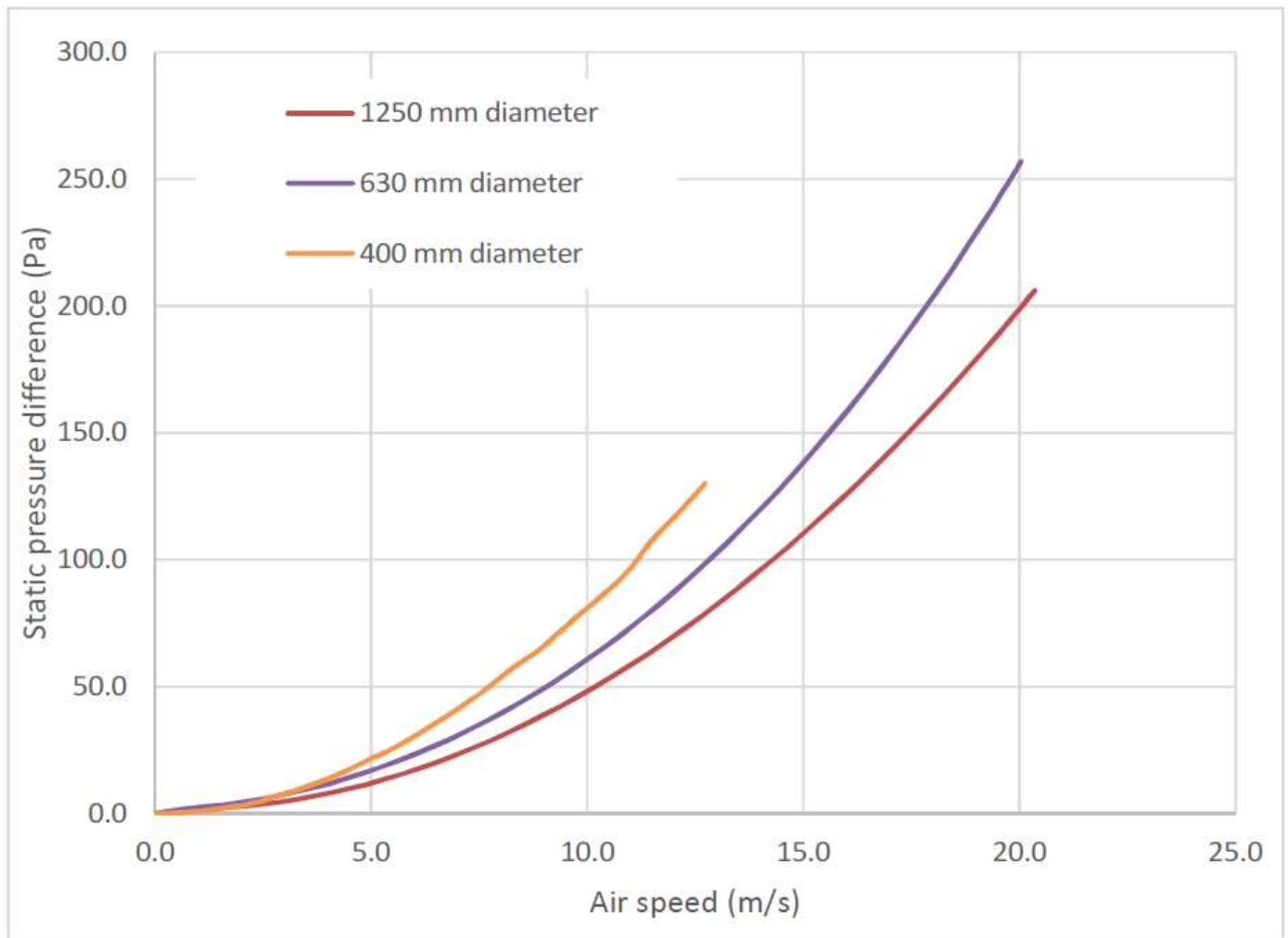
Appendix A – Pressure Differences Ø100 – Ø315mm

Vk [m/s]	DPs [Pa]					
	Diameter [mm]					
	100	125	160	200	250	315
0	0	0	0	0	0	0
1	2.71	2.52	2.27	2.02	1.73	1.42
2	10.20	9.50	8.60	7.65	6.62	5.50
3	22.48	20.95	19.00	16.92	14.66	12.22
4	39.54	36.86	33.42	29.80	25.86	21.58
5	61.38	57.20	51.90	46.32	40.22	33.61
6	88.00	82.10	74.47	66.50	57.73	48.27
7	119.42	111.45	101.15	90.28	78.39	65.60
8	155.60	145.25	131.73	117.69	102.22	85.56



Appendix B – Pressure Differences Ø400 – Ø1250mm

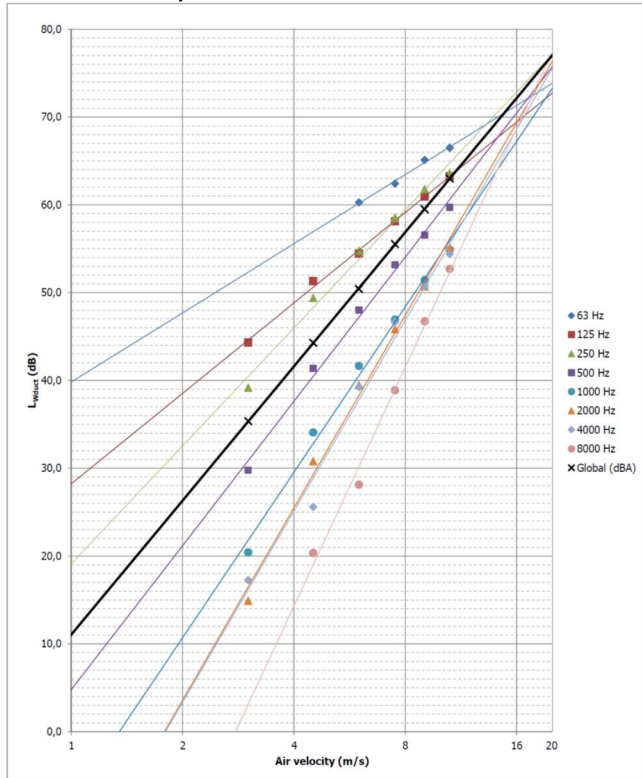
Approx. V _k [m/s]	DPs [Pa]			Approx. V _k [m/s]	DPs [Pa]		
	Diameter [mm]				Diameter [mm]		
	400	630	1250		400	630	1250
0	0.00	0.00	0.00	11	93.43	76.30	54.10
1	1.30	1.95	1.80	12	118.54	87.69	72.60
2	2.93	3.45	2.30	13	130.25	100.02	82.80
3	8.77	8.32	5.50	14	-	113.30	93.80
4	12.47	11.74	8.10	15	-	142.84	105.40
5	22.59	15.84	11.50	16	-	159.14	130.80
6	27.75	20.65	15.50	17	-	176.51	144.50
7	41.38	32.50	25.60	18	-	194.95	158.90
8	48.72	39.59	31.70	19	-	235.19	174.00
9	64.91	47.49	38.50	20	-	257.04	189.80
10	74.50	56.23	46.00	21	-	-	206.30



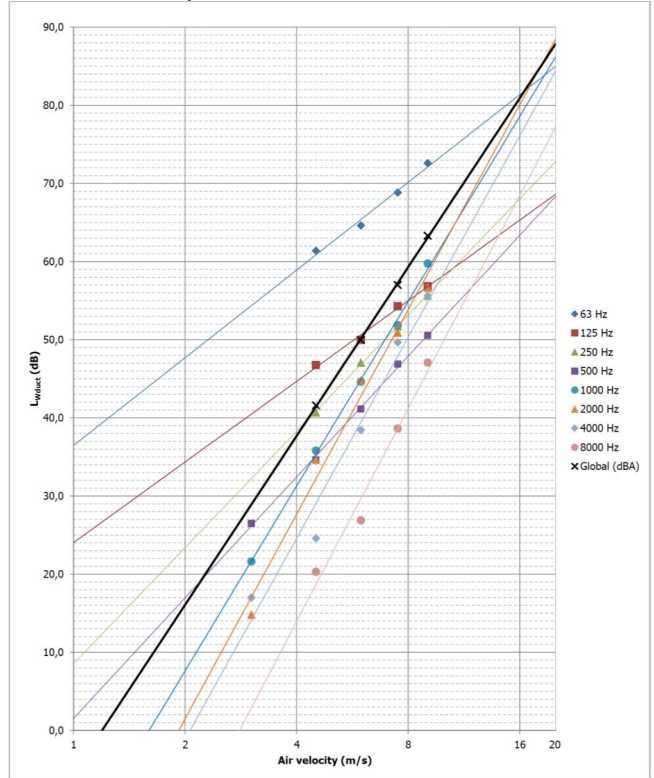


Appendix C – Sound Power Levels

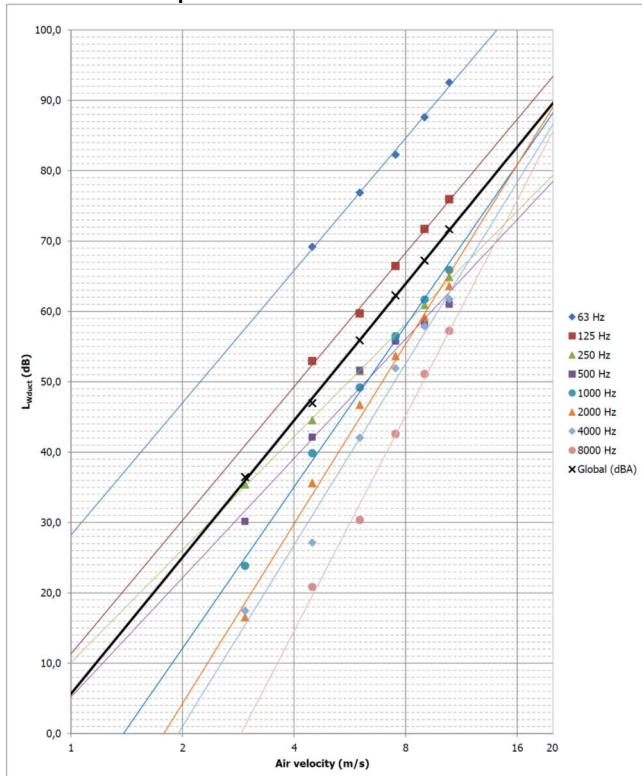
Protecta FR Damper Ø 100mm



Protecta FR Damper Ø 250mm



Protecta FR Damper Ø 400mm



$$L_{Wduct} (dBA) = 22,033 \cdot \ln(\text{Air velocity}) + 11,053$$

$$L_{W63Hz} (dB) = 11,358 \ln(x) + 39,824$$

$$L_{W250Hz} (dB) = 19,374 \ln(x) + 19,12$$

$$L_{W1000Hz} (dB) = 27,177 \ln(x) - 8,1366$$

$$L_{W4000Hz} (dB) = 31,363 \ln(x) - 18,375$$

$$L_{W125Hz} (dB) = 14,853 \ln(x) + 28,238$$

$$L_{W500Hz} (dB) = 23,688 \ln(x) + 4,7794$$

$$L_{W2000Hz} (dB) = 31,606 \ln(x) - 18,32$$

$$L_{W8000Hz} (dB) = 39,236 \ln(x) - 40,094$$