

# Design & Access Statement

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**Change of Use to Hot-food Takeaway from Commercial,  
Business and Service and Installation of Extractor Flue  
pipe at  
30-32, Perry Street, Gravesend, DA11 8RE**

This document has been prepared in support of the planning application for the change of use of the above address to a hot food take-away and the evidence given in this document should be read alongside the plans forms and other documents submitted with the application.

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## INTRODUCTION

This design and access statement is submitted in connection with a full planning application for proposed change of use to a hot-food takeaway from Commercial, Business and Service and installation of extractor flue pipe at 30-32, Perry Street, Gravesend, DA11 8RE.

Application site is Middle Shop facing the Perry Street with the front access. The application is a two-storey property. The ground floor is commercial and, in the floors, above are residential. The Commercial unit is about to closed due to lost in business. The extent of the application site is 45 sq.m.

Canopy and flue pipe will be constructed by using Helios GBW 500/4, Extract Duct With Hepa contamination filters , Attenuation Fan , Silencer to reduce Noise and Odour..

This statement should be read alongside the submitted floor plans, site block plan and location plan.

## Policy Context

- Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires planning applications to be determined in accordance with the relevant development plan:  
“If regard is to be had to the development plan for the purposes of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise.”
- Relevant policies in the National Planning Policy Framework and the above documents are discussed below.
- The Framework sets out the Government’s planning policies for England and how these are expected to be applied. At paragraph 14 it sets out a presumption in favour of sustainable development:  
“At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking.”
- It states that for decision-taking, this means approving development proposals that accord with the development plan without delay; and where the development plan is absent, silent or its relevant policies are out-of-date, planning permission should be granted unless.  
Any adverse impact of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the Framework as a whole; or Specific policies in the Framework indicate development should be restricted.
- Paragraph 17 of the Framework identifies 12 core principles that should underpin plan-making and decision taking. The 3rd of these states that the planning system should proactively drive and support sustainable economic development to deliver, amongst other things, the homes that the country needs.

- Paragraph 134 states that where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, his harm should be weighed against the public benefits of the proposal, including securing its optimum viable use.
- Paragraph 216 of the Framework advises that emerging plans may be taken into account in decision making, with weight to be given to such policies according to the stage of preparation of the plan; the extent of unresolved objections to it; and the degree of consistency of emerging policies with policies in the Framework.

### **Planning Considerations**

- Change of Use to Hot-food Takeaway from a Class E, Installation of Extractor Flue pipe A modest internal renovation and alteration are to be done to suit the change of use. The extractor flue pipe is to be installed without making any impact to the neighbourhood.
- noise impacts of the development.  
The proposed development will require a extraction system for the activity falling within primary cooking. We are proposing to use a very high spec system where all potential noise will be eliminated by the provision of the proposed silencer and The appropriate rubber mounts and filters will be used when installing the extractor flue pipe to control the noise and odour respectively. Further information can be found in drawing no 30-32 - DA11 8RE - 00003 A01.
- The opening hours will be as follows.  
**Monday – Saturday 11.00 to 23.00**  
**Sunday & Bank Holiday 11.00 to 23.00**

However, the opening hours can be either reduced or changed according to the advice of the Planning officer.

- 1No Commercial Waste bin (660 L) and 1No recycling bin are to be provided within Refuse Enclosures. The rubbish bins will be kept within the premises at the back. and will be collected from back side. All the bins will be taken back within the premises soon after the collection. This process will be done without causing any nuisance to the road users and tenants of the residential units above the application site.

### **APPEARANCE**

The shop front will not be changed. The extractor flue pipe is to be installed to the rear elevation as shown in the rear elevation drawings.

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- **Site Access**

Main access is fronting to Perry Street and location of the door is to be centred at the front view. Pedestrians' access to the application site is via this front entrance. Access to the upper floor residential unit is via side door which is located at Side elevation. All the refuse will be placed in allocated wheelie bins without spilling. The bins will be via alley way side.

- **Collection of Waste Oil/Fat**

A local waste oil collector to be contacted for regular collection of these containers (list of collectors can be obtained from Environmental Agency) - the waste collector to be licenced by the Environmental Agency and a copy of the waste transfer note to be obtained from the company each time of collection.

- **Public Transport**

Vehicle movements unaffected by this proposal as my client are mainly targeting the local customers and road users

The application site is well served by public transport, with local bus routes and There are plenty of Car parking on both side of street as well.

- **Car Park**

There are some street parking available on street.

- **Fire Safety**

Shop has a fire exist door. Fire safety assessment will be carried out by Professional and implemented prior open shop.

## **SUMMARY**

- This statement has demonstrated that the proposed change of use would comply with the policies in the Framework. In particular, the property would assist in boosting local business. The proposed use will create at least 5 number of full-time jobs and 2 part time jobs which will ease the strain on the local planning authority with the current unemployment numbers.

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- Furthermore, the proposed development would not result in any harm to the significance of the property. The proposal would preserve the character of the street scene and would enhance the property.
  - It is considered that the proposed development will not adversely impact neighbouring amenity or the visual amenity of the host building. Nor is it considered to have a detrimental impact upon the character and appearance of the area. The proposed development will not cause disturbance to neighbouring properties nor to the host property.
  - Therefore, in accordance with Section 38(6) of the Planning and Compulsory Purchase Act 2004, and the presumption in favour of sustainable development at paragraph 14 of the Framework, it is respectfully requested that this application is approved.

## APPENDIX

1. CANOPY - BAFFLE\_FILTERS-696548
2. ATTENUATOR- CAICE-Attenuator-Brochure-23-3-23
3. Gigabox

Photograph supplied courtesy of KES (South) Ltd

# Filters For Kitchen Extract



## Veevent Baffle Grease Filter

Baffle filters work very differently to the mesh style filters; rather than collecting the grease within the filter medium, the filters work by forcing the grease laden air to change direction and velocity as it passes through the filter. Because the grease droplets are unable to change direction as quickly, they become separated from the air and are deposited on the baffle blades and drained into drip trays. This method of grease filtration removes any potential risk of spread of fire, should a fire occur on the cooking surface below. Without a grease build up in the filter, there is no increase in the operating resistance allowing a constant airflow to be maintained, reducing energy consumption. The Veevent is manufactured in stainless steel and, unlike other baffle filters on the market, has aerodynamically profiled baffle blades. This ensures maximum airflow and grease retention whilst creating minimum pressure loss. Handles are fitted as standard to the shortest side, with drain holes in top and bottom leading edge, the filters can be fitted either way up. Five standard sizes are available from stock for next day delivery.

**Data Sheet AF111**

## Mesh Type Grease Filter (Type AGMB)

These filters are used on those kitchen extract systems where functionality and economics are Paramount and where the grease load is relatively low. Grease is collected in the wire mesh media and with regular cleaning – at least once a week – will last many years. The filter consists of a rigid aluminium frame, with a knitted wire mesh filter pad, which is graded for maximum grease retention, and weld mesh facings to both sides. Handles are fitted as standard to the shortest dimension. These filters can be manufactured to any required size but the most popular sizes are always available from stock for next day delivery.

**Available Options:** For kitchen extract installations which require an aesthetically pleasing appearance or where the filters are visible to customers, we recommend the Type AGM. Constructed in a similar way to the AGMB, the filter has expanded aluminium facings.

**Data Sheet AF112**

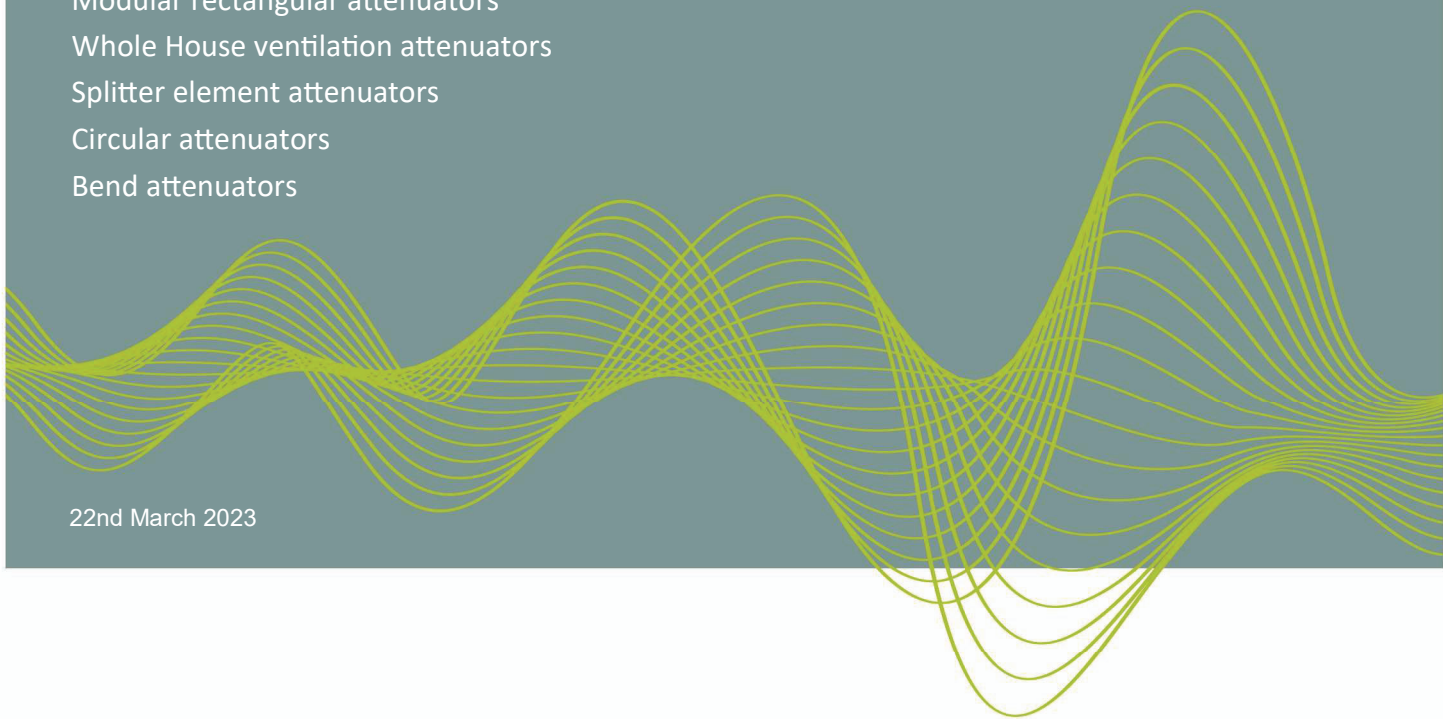


**Please Note:** These filters are not suitable for cleaning with caustic soda. We are pleased to offer our Grease Filter Cleaning Crystals which, when dissolved in water, will remove deposited grease without damaging the filter. Crystals are available in 10Kg tubs which will make approximately 425 litres of cleaning solution. The cleaning solution is alkaline and appropriate care must be taken when handling. A full set of instructions are issued with the crystals.

# Attenuator Brochure

Rectangular attenuators with splitters  
Rectangular attenuators with linings  
Modular rectangular attenuators  
Whole House ventilation attenuators  
Splitter element attenuators  
Circular attenuators  
Bend attenuators

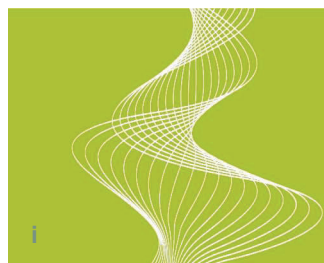
22nd March 2023



# Contents

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|                                            |          |                                                 |    |
|--------------------------------------------|----------|-------------------------------------------------|----|
| <b>Introduction</b>                        | <b>1</b> | <b>WG - Whole House Ventilation Attenuators</b> |    |
|                                            |          | For use with standard plastic ductwork          | 20 |
| <b>Range Overview</b>                      | <b>2</b> |                                                 |    |
|                                            |          | <b>CG - Circular Attenuators</b>                |    |
| <b>Construction Codes Explained</b>        | <b>4</b> | With spigot ends                                | 22 |
|                                            |          | With flanged ends                               | 23 |
| <b>LG - Lining Attenuators</b>             |          |                                                 |    |
| With profile flanges - most popular option | 6        | <b>RG - Bend Attenuators with Linings</b>       |    |
| With spigot ends                           | 7        | With profile flanges                            | 24 |
| With internal flanges                      | 8        |                                                 |    |
| With profile flange / spigot end           | 9        | <b>BG - Bend Attenuators with Splitters</b>     |    |
| With profile flange / internal flange      | 10       | With profile flanges                            | 25 |
| With rectangular spigot end caps           | 11       |                                                 |    |
| With circular spigot end caps              | 12       | <b>EG - Splitter Element Attenuators</b>        |    |
|                                            |          | For installation within apertures               | 26 |
| <b>SG - Splitter Attenuators</b>           |          |                                                 |    |
| With profile flanges - most popular option | 13       | <b>Aristas Attenuator Selector</b>              | 27 |
| With spigot ends                           | 14       |                                                 |    |
| With internal flanges                      | 15       | <b>Attenuator Constructional Specification</b>  | 28 |
| With profile flange / spigot end           | 16       |                                                 |    |
| With profile flange / internal flange      | 17       | <b>Attenuator Performance</b>                   | 32 |
| With removable splitters                   | 18       |                                                 |    |
|                                            |          | <b>Crosstalk Selection Guide</b>                | 38 |
| <b>MG - Modular Attenuators</b>            |          |                                                 |    |
| With profile flanges                       | 19       | <b>Attenuator Pressure Loss Corrections</b>     | 39 |



# Introduction



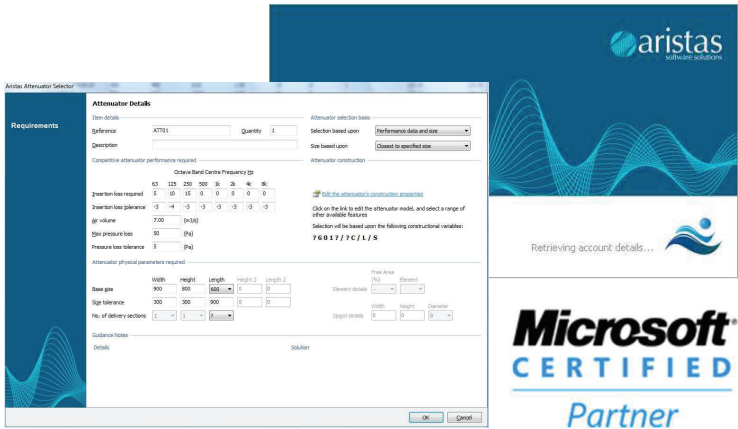
CAICE supply more attenuators in the UK than any other company, and we have reached this position by delivering quality products, on time, and at the right price. This is achieved through a professional and friendly team of acoustic engineers and support staff that are available across the UK to provide clients with a first class service.

The CAICE Attenuator Brochure provides comprehensive details on a wide range of standard products, that should meet most requirements. However if you can't find it here then CAICE has the expertise to research, develop, test and construct almost any attenuator product you can think of, so please give us a call.

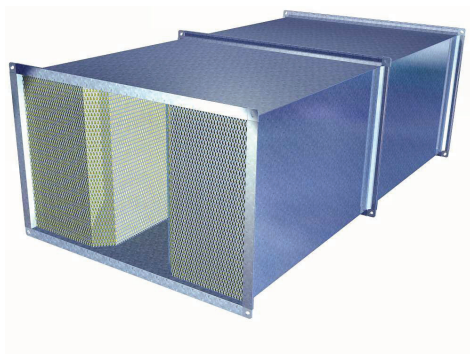
Some of the things that make CAICE attenuator products stand apart from our competitors are detailed below.

- **Construction** - CAICE have undertaken rigorous destruction testing on the products to ensure that they are fit for purpose. Attenuator casings have been pressure tested up to 2000 Pa to ensure that flanges do not deflect beyond the limits specified within DW/TM1. Our largest splitter elements have been stacked in modules up to 7m high to ensure they do not deform under their own weight. Splitter attenuators have been tested with airway velocities up to 25 m/s to ensure splitter facing deformation and mineral wool fibre egress is within acceptable limits.
- **Performance** - CAICE are the only company in the UK to have invested in a UKAS accredited attenuator testing laboratory capable of measuring static and dynamic performance fully in accordance with BS EN ISO 7235: 2009 "Acoustics - laboratory measurement procedures for ducted silencers and air terminal units - insertion loss, flow noise and total pressure loss". This has enabled an extensive testing programme to be undertaken that has provided us with more accurate performance data for our products, than was previously possible.
- **Manufacturing technology** - our Production Centre utilises a range of highly specialised machinery that largely automates the attenuator manufacturing process. A duct line produces attenuator casings with integral 20 or 30mm profile flanges. Expanded metal for splitter facings is de-coiled and fibre glass tissue is bonded as part of the process. A splitter line de-coils and roll-forms all the splitter frame parts and all the parts finally come together on the Attenuator Assembly Line. Consequently we can make attenuator products quicker, more cost effectively and to a higher quality than any other UK manufacturer.
- **The Aristas Attenuator Selector** - has been written by Aristas our software development division, who are a Microsoft Certified Partner. The selector brings together all the constructional and performance elements of the attenuator range that we have gained through our extensive research and development programme. It enables us to select the right product to suit the application at the right price. In addition the selector is now available to clients, making it easy to quickly compile attenuator schedules that are based on the latest attenuator performance data.

We hope this brochure provides all the information that you need on the CAICE attenuator range. However if there are any further details that you require then please do not hesitate to call us or arrange an appointment to see your local CAICE acoustic engineer.



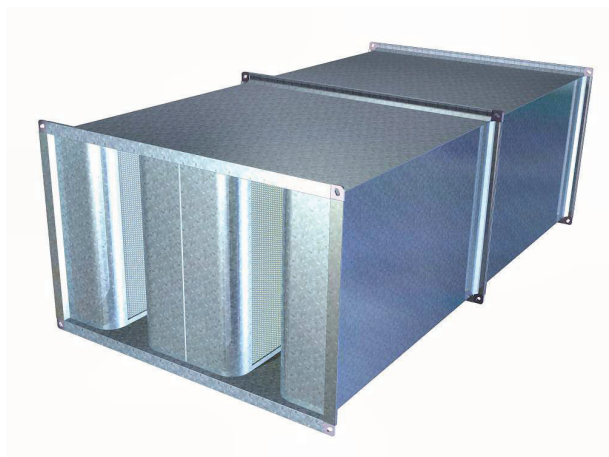
# Range Overview



## LG - Lining Attenuators

**For smaller applications** - a rectangular duct attenuator constructed from galvanised sheet steel, with lining type acoustic elements. Provided with 30mm profile flanges as standard, which are compatible with MEZ, DOBY or METU flanging systems. Also available with 20mm profile flanges, internal flanges or spigot ends up to certain sizes if required.

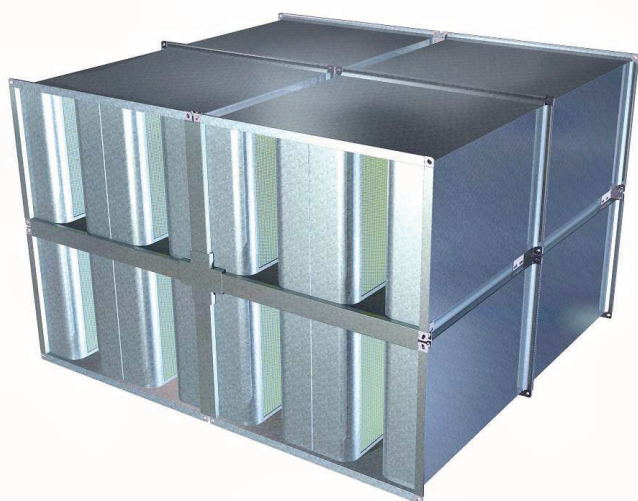
| Element Orientation | Minimum (mm) |        | Maximum (mm) |        | Lengths (mm) |
|---------------------|--------------|--------|--------------|--------|--------------|
|                     | Width        | Height | Width        | Height |              |
| Vertical            | 100          | 100    | 800          | 1200   | 450 to 4800  |
| Horizontal          | 100          | 100    | 1200         | 800    |              |



## SG - Splitter Attenuators

**For medium applications** - a rectangular duct attenuator constructed from galvanised sheet steel, with splitter type acoustic elements. Provided with 30mm profile flanges as standard, which are compatible with MEZ, DOBY or METU flanging systems. Also available with 20mm profile flanges, internal flanges or spigot ends up to certain sizes if required.

| Element Orientation | Minimum (mm) |        | Maximum (mm) |        | Lengths (mm) |
|---------------------|--------------|--------|--------------|--------|--------------|
|                     | Width        | Height | Width        | Height |              |
| Vertical            | 250          | 250    | 2500         | 2000   | 450 to 4800  |
| Horizontal          | 250          | 250    | 2000         | 2500   |              |



## MG - Modular Attenuators

**For larger applications** - a modular rectangular duct attenuator constructed from galvanised sheet steel, with splitter type acoustic elements. Provided with 30mm profile flanges as standard, which are compatible with MEZ, DOBY or METU flanging systems. Modular parts kit provided for easy on site assembly. Larger units may require supporting steelwork by others, depending on the particular application.

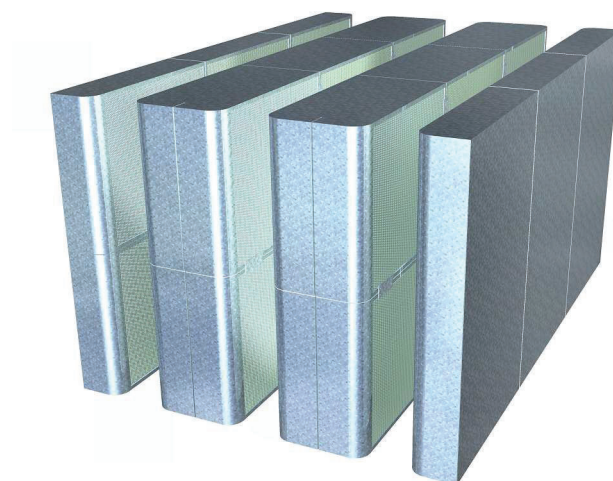
### Size Range

| Element Orientation | Minimum (mm) |        | Maximum (mm) |        | Lengths (mm) |
|---------------------|--------------|--------|--------------|--------|--------------|
|                     | Width        | Height | Width        | Height |              |
| Vertical            | 1266         | 250    | 100000       | 20000  | 450 to 4800  |
| Horizontal          | 250          | 1266   | 100000       | 20000  |              |

## EG - Element Attenuators

**For installation within apertures** - a set of attenuator splitter elements, constructed from galvanised sheet steel. Provided loose for installation into builders work openings, or within plant such as air handling units. Multiple piece splitters provided with easy fix assembly brackets. Optional brackets for fixing within apertures can also be supplied if required.

| Element Orientation | Minimum (mm) |        | Maximum (mm) |        | Lengths (mm) |
|---------------------|--------------|--------|--------------|--------|--------------|
|                     | Width        | Height | Width        | Height |              |
| Vertical            | 250          | 250    | 100000       | 7000   | 450 to 4800  |
| Horizontal          | 250          | 250    | 7000         | 100000 |              |

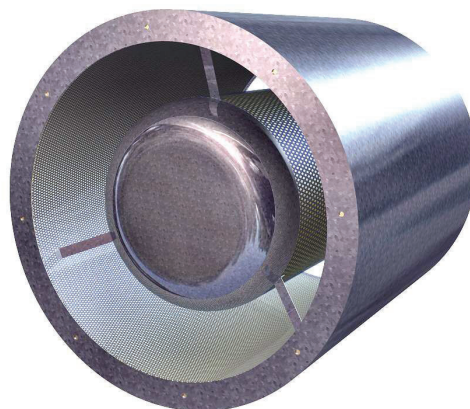


## CG - Circular Attenuators

**For circular duct or plant applications** - a circular duct attenuator constructed from spiral wound or plain galvanised sheet steel, with a peripheral, out of air stream acoustic lining. Larger units also available with a central acoustic pod. End connections can either be spigots or end ring flanges with threaded inserts (as shown) for direct connection to plant, such as axial flow fans.

### Size Range

| Minimum Internal Diameter (mm) | Maximum Internal Diameter (mm) | Lengths (mm) |
|--------------------------------|--------------------------------|--------------|
| 100                            | 2000                           | 300 to 3000  |

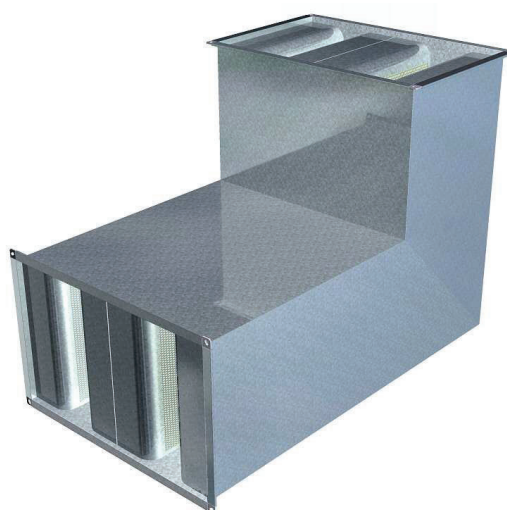


## RG or BG - Bend Attenuators

**For applications with limited space** - a bend duct attenuator constructed from galvanised sheet steel, with lining type acoustic elements (RG), or splitter type acoustic elements (BG as shown). Provided with 30mm profile flanges as standard. Also available with 20mm flanges or spigot ends up to certain sizes if required. Bend attenuators are generally only used when a straight unit cannot be accommodated, as they have higher pressure losses.

### Size Range

| Element Orientation | Minimum (mm) |        | Maximum (mm) |        | Centre Line Lengths (mm) |
|---------------------|--------------|--------|--------------|--------|--------------------------|
|                     | Width        | Height | Width        | Height |                          |
| Vertical            | 150          | 150    | 2500         | 2000   | 450 to 4800              |
| Horizontal          | 150          | 150    | 2000         | 2500   |                          |



# Construction Codes Explained

| Models |                                             |
|--------|---------------------------------------------|
| L      | Rectangular attenuator with linings         |
| S      | Rectangular attenuator with splitters       |
| M      | Modular rectangular attenuator              |
| E      | Splitter element attenuator                 |
| C      | Circular attenuator                         |
| R      | Right angled bend attenuator with linings   |
| B      | Right angled bend attenuator with splitters |

| Base Material |                                       |
|---------------|---------------------------------------|
| G             | Standard gauge galvanised sheet steel |

| Number of Delivery Sections |                                                                                                                                                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01                          | This number confirms how many sections will be delivered to site for each attenuator or splitter. For 02 and above assembly will be required by others |

|   |   |    |   |
|---|---|----|---|
| S | G | 02 | V |
|---|---|----|---|

|   |   |
|---|---|
| 3 | C |
|---|---|

|   |
|---|
| B |
|---|

|   |   |   |   |
|---|---|---|---|
| S | M | A | N |
|---|---|---|---|

|    |
|----|
| B2 |
|----|

|   |
|---|
| X |
|---|

| Element Type |                                            |
|--------------|--------------------------------------------|
| V            | Elements installed in the vertical plane   |
| H            | Elements installed in the horizontal plane |
| U            | Un-podded (circular attenuators only)      |
| P            | Podded (circular attenuators only)         |

| Pressure Rating |                                   |
|-----------------|-----------------------------------|
| 0               | Zero pressure rating              |
| 1               | Low pressure (+500 / -500 Pa)     |
| 2               | Medium pressure (+1000 / -750 Pa) |
| 3               | High pressure (+2000 / -750 Pa)   |
| -               | Not applicable.                   |

| Packing |                                                                                                                    |
|---------|--------------------------------------------------------------------------------------------------------------------|
| L       | Lightweight pallet wrapping on casing ends (EG units are palletised first then wrapped collectively on the pallet) |
| H       | Heavy duty polythene wrapping on casing ends                                                                       |
| B       | Bubble wrapping for externally painted units (EG units are individually bubble wrapped and then palletised)        |

| Optional Features |                                                              |
|-------------------|--------------------------------------------------------------|
| S                 | Side elements (EG splitters are supplied with steel backing) |
| M                 | Infill protected by Melinex polyester film                   |
| T                 | Thermal double skin casing                                   |
| A                 | Acoustic double skin casing                                  |
| N                 | Non-standard element set back or element ends                |
| F                 | Splitter fixing brackets (EG units only)                     |

| Special Features |                              |
|------------------|------------------------------|
| X                | Denotes any special features |

| Paint Options |                                                                                 |
|---------------|---------------------------------------------------------------------------------|
| B1            | Base colour - polyester powder paint internal surfaces                          |
| B2            | Base colour - polyester powder paint external surfaces only                     |
| B3            | Base colour - polyester powder paint internal and external surfaces             |
| C1            | Client specified colour - polyester powder paint internal surfaces              |
| C2            | Client specified colour - polyester powder paint external surfaces only         |
| C3            | Client specified colour - polyester powder paint internal and external surfaces |

| End Connections |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| A               | Plain rectangular spigots matching the case width and height                           |
| B               | 20mm profile flanges                                                                   |
| C               | 30mm profile flanges                                                                   |
| D               | Rectangular spigot end caps                                                            |
| E               | Circular spigot end caps                                                               |
| F               | 20mm profile flange one end and plain spigot on the other                              |
| G               | 30mm profile flange one end and plain spigot on the other                              |
| H               | 30mm profile flange one end and 30mm internal MEZ with M8 corner nutserts on the other |
| I               | 30mm internal MEZ flanges with M8 corner nutserts                                      |
| K               | Plain circular spigots (circular attenuators only)                                     |
| L               | Circular end ring flanges with nutserts (circular attenuators only)                    |
| N               | Circular end ring flange one end and spigot on the other (circular attenuators only)   |

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## Typical Construction Code

**Example:** SG02V / 3C / B / SM / B2 / X

A rectangular attenuator with splitter elements, constructed from galvanised sheet steel.

The unit shall be delivered to site split in two sections in length, and splitters shall be installed in the vertical plane.

The unit casing shall have a high pressure rating, with 30mm profile flanges at both ends. The attenuator shall be protected by bubble wrap.

The attenuator shall be provided with side splitters and the infill shall be protected by Melinex polyester film. The unit shall have a base colour polyester powder paint finish on external surfaces only. The unit shall also have a special feature.

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## Other Materials

This brochure only provides details on attenuators constructed from galvanised sheet steel. However CAICE can also provide attenuators constructed from a range of other materials where required:

**Stainless steel** - for duct systems handling corrosive chemically laden air, or with high standards of cleanliness, or for external applications, etc.

**Plastic** - for duct systems handling corrosive chemically laden air, etc. Various types of plastic are available depending on the application.

**Heavy duty galvanised steel** - for industrial applications, or where casings need to be welded for very high pressure duct systems, etc. Rolled steel angle (RSA) flanges would normally be provided for these types of application.

Generally attenuators can be constructed in these materials to the same sizes as the standard galvanised sheet steel products that are detailed in this brochure. However if you require more detailed information on attenuators constructed in alternative materials then please contact our sales personnel for further assistance.

## Construction Code Format

The first three sections of the construction code, up to and including the packing are always shown:

**Example:** SG02V / 3C / L

Optional features, paint options and special features are only shown if applicable, and in the order as they are shown in the construction codes layout on the previous page.

### Further examples:

- SG02V / 3C / B / S / B2
- SG02V / 3C / H / SM / X
- SG02V / 3C / L / X

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## Fire Rating

All CAICE attenuators detailed within this brochure are capable of maintaining their internal air circulating area when subjected to an internal temperature of 300° C for a period of 120 minutes.

These attenuators are therefore suitable for installation within smoke or heat exhaust systems, providing the internal temperature does not exceed 300° C for a period longer than 120 minutes.

Warrington Fire Research have undertaken an independent assessment and compiled a report that supports this statement.

For more onerous conditions or where proprietary systems, such as Flameshield are specified, matching attenuators can also be provided by enhancing the constructional specification of the products.

Fire rating is a diverse topic, and therefore if you do require more details on the attenuator options that we can provide then please contact our sales personnel for further assistance.

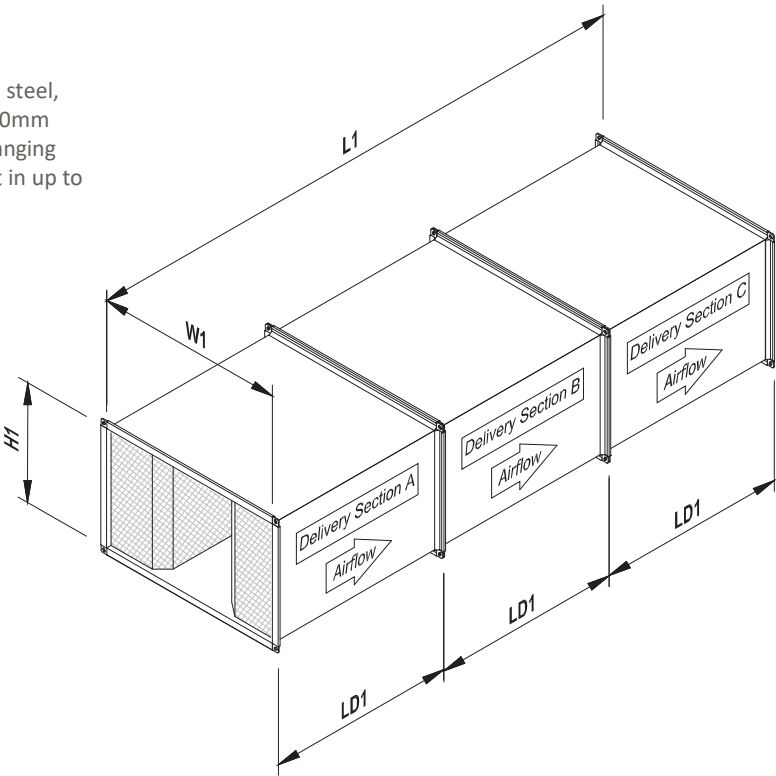
# LG - Lining Attenuators

## With Profile Flanges - most popular LG option

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with 20 or 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. For ease of handling, units can be delivered to site split in up to four sections in length.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Thermal or acoustic double skinning
- Internal and external paint finish
- Integral inlet or outlet plenums



### Available Widths and Heights:

| End Connection Type                 | Element Orientation    | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|-------------------------------------|------------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                                     |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flanges<br>Preferred   | Vertical               | 150                   | 150    | 800    | 1000   | 150                     | 1001   | 800    | 1200   |
|                                     | Horizontal             | 150                   | 150    | 1000   | 800    | 1001                    | 150    | 1200   | 800    |
| 20mm profile flanges<br>Alternative | Vertical or Horizontal | 150                   | 150    | 600    | 600    | 150 or 601              |        | 800    | 800    |

For medium pressure casings with 20mm profile flanges, either the width or the height dimension must be at least 601.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

### Available Lengths:

| End Connection Type                 | Number of Delivery Sections in Length | L1                                                         |
|-------------------------------------|---------------------------------------|------------------------------------------------------------|
| 30mm profile flanges<br>Preferred   | 1                                     | 450, 600, 750, 900, 1050, 1200, 1500, 1800, 2100, 2400     |
|                                     | 2                                     | 900, 1200, 1500, 1800, 2100, 2400, 3000, 3600, 4200, 4800  |
|                                     | 3                                     | 1350, 1800, 2250, 2700, 3150, 3600                         |
|                                     | 4                                     | 1800, 2400, 3000, 3600, 4200, 4800                         |
| 20mm profile flanges<br>Alternative | 1                                     | 500, 650, 800, 950, 1100, 1250, 1600, 1900, 2200, 2500     |
|                                     | 2                                     | 1000, 1300, 1600, 1900, 2200, 2500, 3200, 3800, 4400, 5000 |
|                                     | 3                                     | 1500, 1950, 2400, 2850, 3300, 3750                         |
|                                     | 4                                     | 2000, 2600, 3200, 3800, 4400, 5000                         |

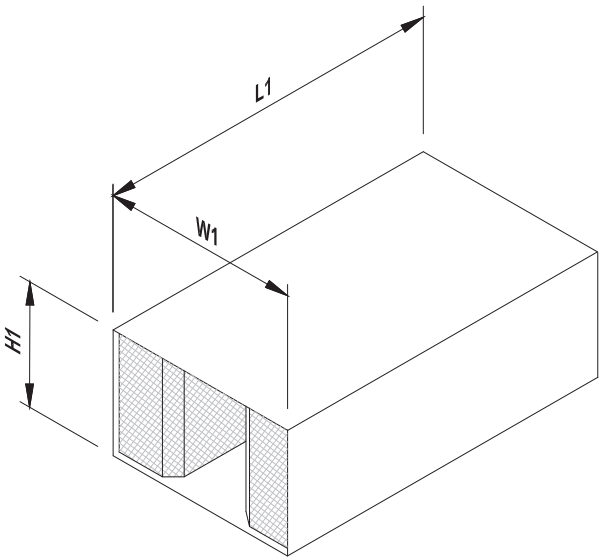
# LG - Lining Attenuators

## With Spigot Ends

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with spigot connections at both ends, suitable for slip jointing into adjoining ductwork.

Options available:

- 25, 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



## Available Widths and Heights:

| End Connection Type | Element Orientation    | High Pressure Casings |        |        |        | Zero Pressure Casings |        |        |        |
|---------------------|------------------------|-----------------------|--------|--------|--------|-----------------------|--------|--------|--------|
|                     |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                | H1 min | W1 max | H1 max |
| Spigot ends         | Vertical or Horizontal | 100                   | 100    | 400    | 400    | 100 or 401            |        | 600    | 600    |

For non-rated zero pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

## Available Lengths:

| End Connection Type | L1                                   |
|---------------------|--------------------------------------|
| Spigot ends         | 465, 615, 765, 915, 1065, 1215, 1365 |

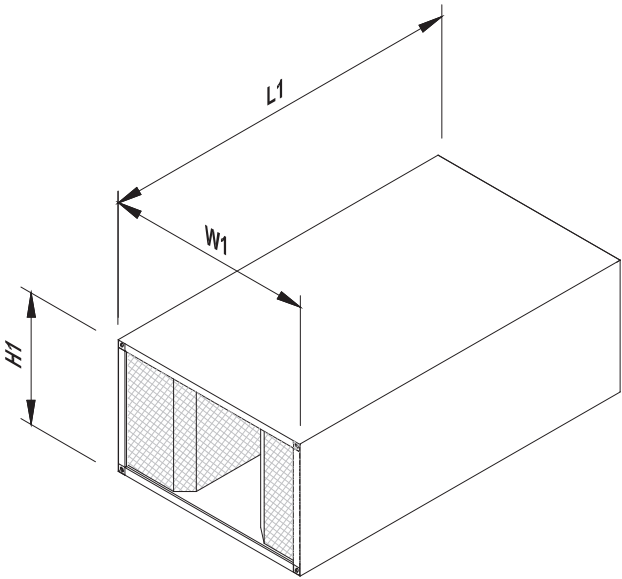
# LG - Lining Attenuators

## With Internal Flanges

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with 30mm internal flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. Flange corner holes fitted with M8 nutserts to enable easy connection.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type   | Element Orientation    | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|-----------------------|------------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                       |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm internal flanges | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401              |        | 800    | 800    |

For medium pressure casings either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

### Available Lengths:

| End Connection Type   | L1                              |
|-----------------------|---------------------------------|
| 30mm internal flanges | 620, 770, 920, 1070, 1220, 1370 |

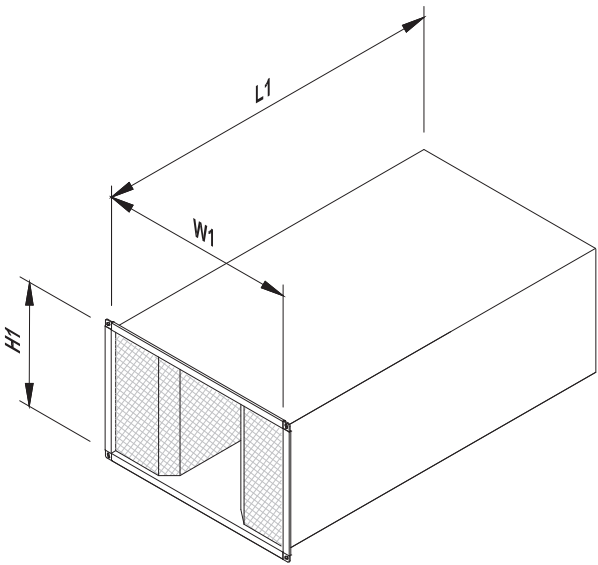
# LG - Lining Attenuators

## With Profile Flange / Spigot End

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with 20 or 30mm profile flange at one end, suitable for MEZ, DOBY or METU flanging systems. At the other end a spigot connection is provided, suitable for slip jointing into adjoining ductwork.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



## Available Widths and Heights:

| End Connection Type                      | Element Orientation    | High Pressure Casings |        |        |        | Zero Pressure Casings |        |        |        |
|------------------------------------------|------------------------|-----------------------|--------|--------|--------|-----------------------|--------|--------|--------|
|                                          |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                | H1 min | W1 max | H1 max |
| 20mm or 30mm profile flange / spigot end | Vertical or Horizontal | 150                   | 150    | 400    | 400    | 150 or 401            |        | 600    | 600    |

For non-rated zero pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

## Available Lengths:

| End Connection Type              | L1                              |
|----------------------------------|---------------------------------|
| 20mm profile flange / spigot end | 560, 710, 860, 1010, 1160, 1310 |
| 30mm profile flange / spigot end | 535, 685, 835, 985, 1135, 1285  |

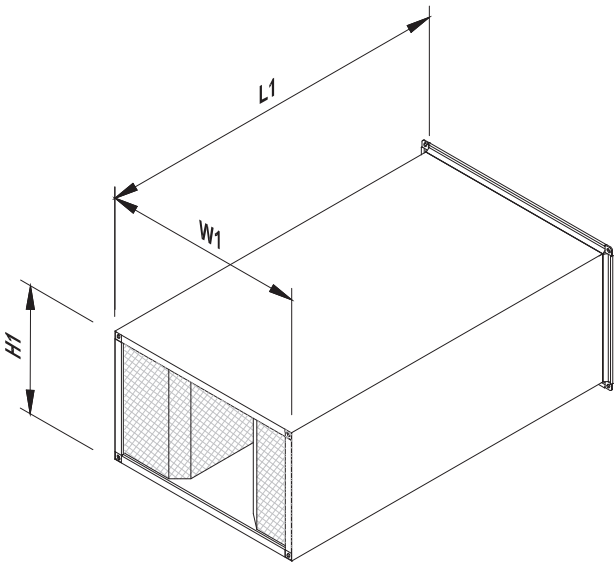
# LG - Lining Attenuators

## With Profile Flange / Internal Flange

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with 30mm profile flange at one end, and 30mm internal flange at the other end. Flanges suitable for MEZ, DOBY or METU flanging systems. Internal flange corner holes fitted with M8 nutserts to enable easy connection.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type                        | Element Orientation    | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|--------------------------------------------|------------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                                            |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flange / 30mm internal flange | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401              |        | 800    | 800    |

For medium pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

### Available Lengths:

| End Connection Type                        | L1                             |
|--------------------------------------------|--------------------------------|
| 30mm profile flange / 30mm internal flange | 535, 685, 835, 985, 1135, 1285 |

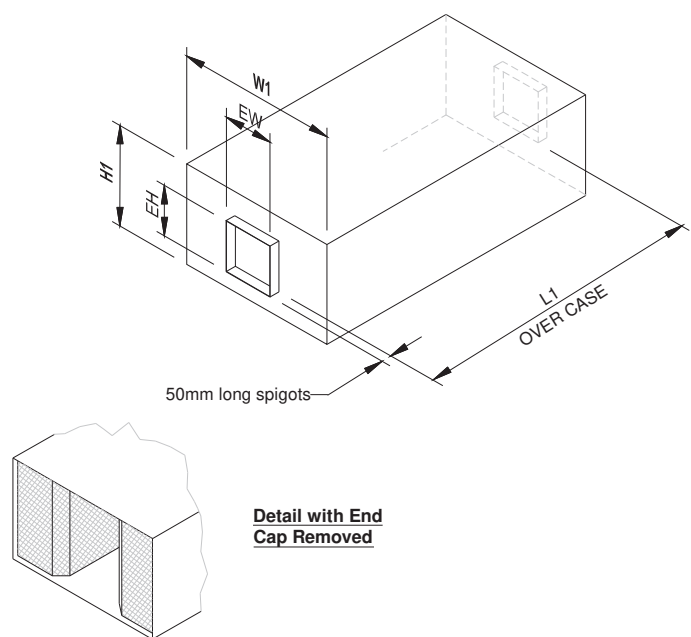
# LG - Lining Attenuators

## With Rectangular Spigot End Caps

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with end caps at both ends, with rectangular spigot connections suitable for slip jointing into adjoining ductwork. Elements are often provided out of air stream to minimise pressure loss.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type         | Element Orientation | Low Pressure Casings |        |        |        | Zero Pressure Casings |        |        |        |
|-----------------------------|---------------------|----------------------|--------|--------|--------|-----------------------|--------|--------|--------|
|                             |                     | W1 min               | H1 min | W1 max | H1 max | W1 min                | H1 min | W1 max | H1 max |
| Rectangular spigot end caps | Vertical            | 150                  | 150    | 400    | 400    | 150 or 401            | 600    | 1200   |        |
|                             | Horizontal          | 150                  | 150    | 400    | 400    | 150 or 401            | 1200   | 600    |        |

For non-rated zero pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

Spigot connections EW by EH are made to suit the adjoining duct, with a minimum size of 100 x 50mm. EW and EH can both be smaller than W1 and H1, as shown above, or one can be sized to match the outer case dimension.

### Available Lengths:

| End Connection Type         | L1                                   |
|-----------------------------|--------------------------------------|
| Rectangular spigot end caps | 470, 620, 770, 920, 1070, 1220, 1370 |

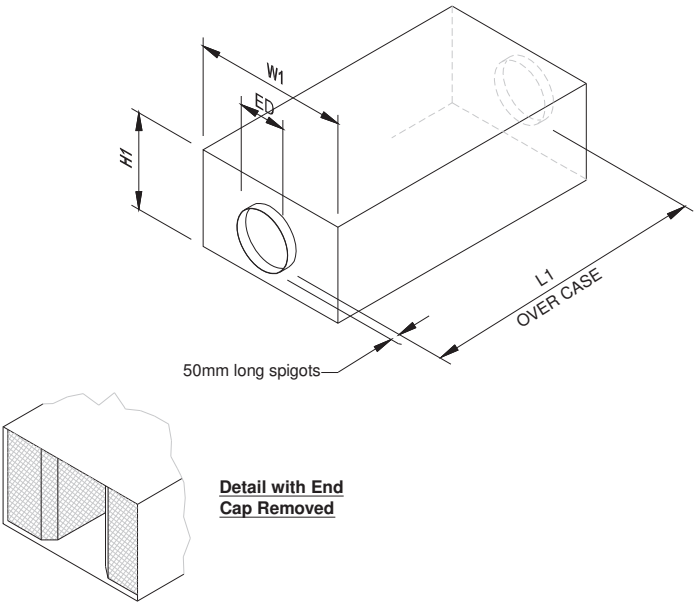
# LG - Lining Attenuators

## With Circular Spigot End Caps

Rectangular duct attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with end caps at both ends, with circular spigot connections suitable for slip jointing into adjoining ductwork. Elements are often provided out of airstreams to minimise pressure loss.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type      | Element Orientation | Low Pressure Casings |        |        |        |
|--------------------------|---------------------|----------------------|--------|--------|--------|
|                          |                     | W1 min               | H1 min | W1 max | H1 max |
| Circular spigot end caps | Vertical            | 150                  | 150    | 600    | 1200   |
|                          | Horizontal          | 150                  | 150    | 1200   | 600    |

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

Spigot connection ED is made to suit the adjoining duct, with a minimum size of 100mm diameter. ED must be smaller than W1 and H1, as shown above.

### Available Lengths:

| End Connection Type      | L1                                   |
|--------------------------|--------------------------------------|
| Circular spigot end caps | 470, 620, 770, 920, 1070, 1220, 1370 |

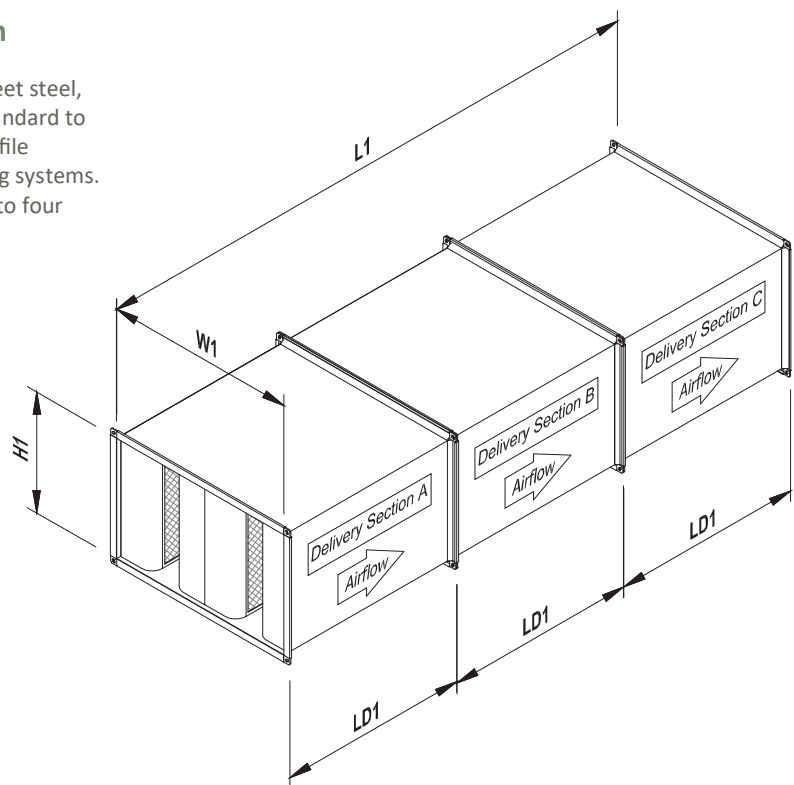
# SG - Splitter Attenuators

## With Profile Flanges - most popular SG option

Rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with 20 or 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. For ease of handling, units can be delivered to site split in up to four sections in length.

Options available:

- 200, 250, 300, 350 or 400 wide centre splitters
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Thermal or acoustic double skinning
- Internal and external paint finish
- Integral inlet or outlet plenums



## Available Widths and Heights:

| End Connection Type                 | Element Orientation | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|-------------------------------------|---------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                                     |                     | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flanges<br>Preferred   | Vertical            | 250                   | 250    | 2500   | 1500   | 250                     | 1501   | 2500   | 2000   |
|                                     | Horizontal          | 250                   | 250    | 1500   | 2500   | 1501                    | 250    | 2000   | 2500   |
| 20mm profile flanges<br>Alternative | Vertical            | 250                   | 250    | 1500   | 1000   | 250                     | 1001   | 1500   | 1200   |
|                                     | Horizontal          | 250                   | 250    | 1000   | 1500   | 1001                    | 250    | 1200   | 1500   |

For ease of handling attenuators above 6600mm periphery and 1200mm long will be delivered to site split in length.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

## Available Lengths:

| End Connection Type                 | Number of Delivery Sections in Length | L1                                                         |
|-------------------------------------|---------------------------------------|------------------------------------------------------------|
| 30mm profile flanges<br>Preferred   | 1                                     | 450, 600, 750, 900, 1050, 1200, 1500, 1800, 2100, 2400     |
|                                     | 2                                     | 900, 1200, 1500, 1800, 2100, 2400, 3000, 3600, 4200, 4800  |
|                                     | 3                                     | 1350, 1800, 2250, 2700, 3150, 3600                         |
|                                     | 4                                     | 1800, 2400, 3000, 3600, 4200, 4800                         |
| 20mm profile flanges<br>Alternative | 1                                     | 500, 650, 800, 950, 1100, 1250, 1600, 1900, 2200, 2500     |
|                                     | 2                                     | 1000, 1300, 1600, 1900, 2200, 2500, 3200, 3800, 4400, 5000 |
|                                     | 3                                     | 1500, 1950, 2400, 2850, 3300, 3750                         |
|                                     | 4                                     | 2000, 2600, 3200, 3800, 4400, 5000                         |

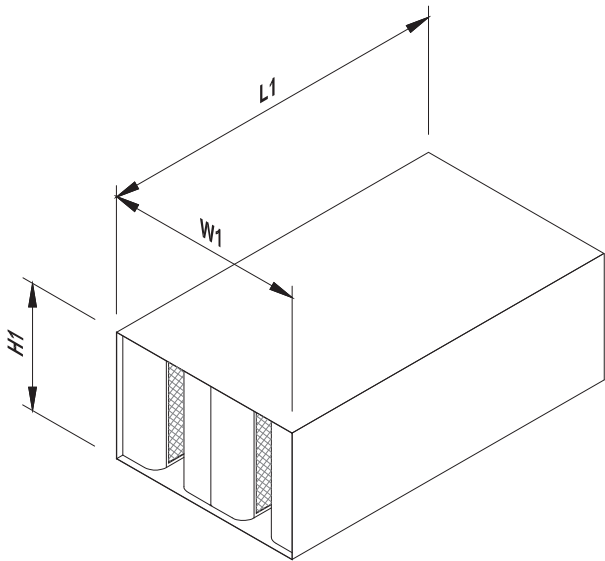
# SG - Splitter Attenuators

## With Spigot Ends

Rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with spigot connections at both ends, suitable for slip jointing into adjoining ductwork.

Options available:

- 100, 125, 150, 175 or 200 wide side splitters only on smaller units, with 200 or 250 wide centre splitters on larger units
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Internal and external paint finish



## Available Widths and Heights:

| End Connection Type | Element Orientation    | High Pressure Casings |        |        |        | Zero Pressure Casings |        |        |        |
|---------------------|------------------------|-----------------------|--------|--------|--------|-----------------------|--------|--------|--------|
|                     |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                | H1 min | W1 max | H1 max |
| Spigot ends         | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401            |        | 600    | 600    |

For non-rated zero pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

## Available Lengths:

| End Connection Type | L1                                   |
|---------------------|--------------------------------------|
| Spigot ends         | 465, 615, 765, 915, 1065, 1215, 1365 |

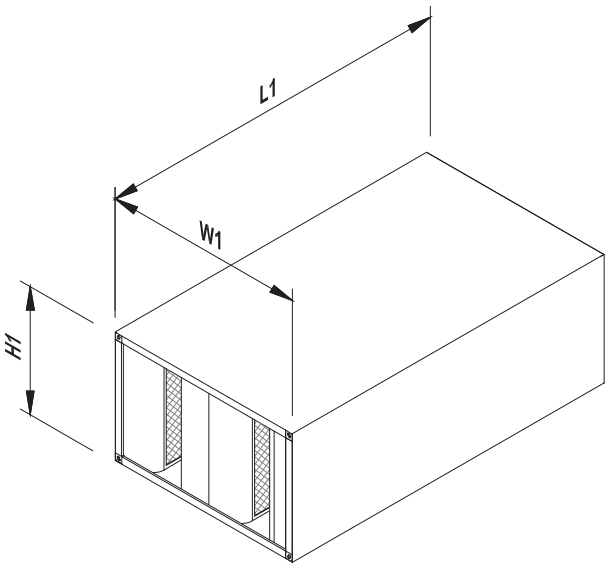
# SG - Splitter Attenuators

## With Internal Flanges

Rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with 30mm internal flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. Flange corner holes fitted with M8 nutserts to enable easy connection.

Options available:

- 100, 125, 150, 175 or 200 wide side splitters only on smaller units, with 200, 250 or 300 wide centre splitters on larger units
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Internal and external paint finish



## Available Widths and Heights:

| End Connection Type   | Element Orientation    | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|-----------------------|------------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                       |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm internal flanges | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401              |        | 800    | 800    |

For medium pressure casings either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

## Available Lengths:

| End Connection Type   | L1                              |
|-----------------------|---------------------------------|
| 30mm internal flanges | 620, 770, 920, 1070, 1220, 1370 |

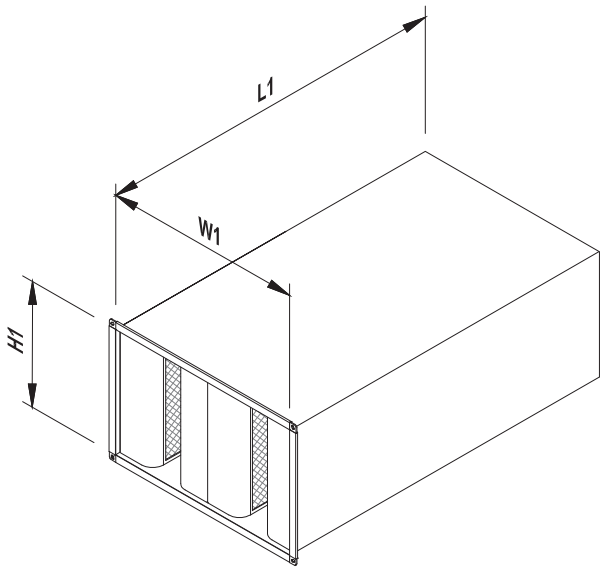
# SG - Splitter Attenuators

## With Profile Flange / Spigot End

Rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with 20 or 30mm profile flange at one end, suitable for MEZ, DOBY or METU flanging systems. At the other end a spigot connection is provided, suitable for slip jointing into adjoining ductwork.

Options available:

- 100, 125, 150, 175 or 200 wide side splitters only on smaller units, with 200 or 250 wide centre splitters on larger units
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type                      | Element Orientation    | High Pressure Casings |        |        |        | Zero Pressure Casings |        |        |        |
|------------------------------------------|------------------------|-----------------------|--------|--------|--------|-----------------------|--------|--------|--------|
|                                          |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                | H1 min | W1 max | H1 max |
| 20mm or 30mm profile flange / spigot end | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401            |        | 600    | 600    |

For non-rated zero pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

### Available Lengths:

| End Connection Type              | L1                              |
|----------------------------------|---------------------------------|
| 20mm profile flange / spigot end | 560, 710, 860, 1010, 1160, 1310 |
| 30mm profile flange / spigot end | 535, 685, 835, 985, 1135, 1285  |

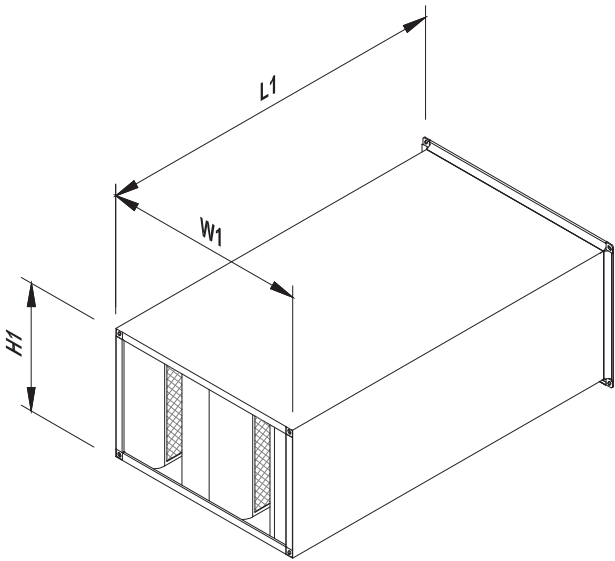
# SG - Splitter Attenuators

## With Profile Flange / Internal Flange

Rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with 30mm profile flange at one end, and 30mm internal flange at the other end. Flanges suitable for MEZ, DOBY or METU flanging systems. Internal flange corner holes fitted with M8 nutserts to enable easy connection.

Options available:

- 100, 125, 150, 175 or 200 wide side splitters only on smaller units, with 200, 250 or 300 wide centre splitters on larger units
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type                        | Element Orientation    | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|--------------------------------------------|------------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                                            |                        | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flange / 30mm internal flange | Vertical or Horizontal | 250                   | 250    | 400    | 400    | 250 or 401              |        | 800    | 800    |

For medium pressure casings, either the width or the height dimension must be at least 401mm.

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard.

### Available Lengths:

| End Connection Type                        | L1                             |
|--------------------------------------------|--------------------------------|
| 30mm profile flange / 30mm internal flange | 535, 685, 835, 985, 1135, 1285 |

# SG - Removable Splitter Attenuators

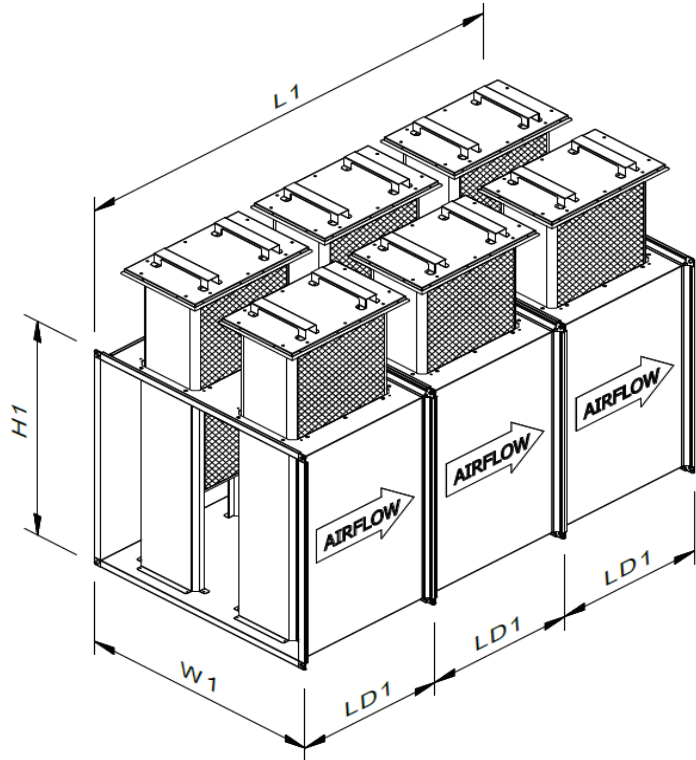
## With Profile Flanges -

Kitchen extract systems require cleaning in compliance with building insurance requirements and fire safety regulations.

Removal of the attenuator splitters provides access allowing cleaning in accordance with TR19: Guide to good practice — Internal Cleanliness of Ventilation Systems.

This attenuator design features 200 wide centre splitters integrated with individual access/fixing panels as standard. Options available are:

- Vertical splitter orientation with access top or bottom
- Horizontal splitter orientation with access from the side
- Melinex wrapped infill
- Internal and external paint finishes
- Integral inlet or outlet plenums



### Available Widths and Heights:

| End Connection Type  | Element Orientation | Medium Pressure Casings |        |        |        |
|----------------------|---------------------|-------------------------|--------|--------|--------|
|                      |                     | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flanges | Vertical            | 300                     | 300    | 1800   | 1200   |
|                      | Horizontal          | 300                     | 300    | 1200   | 1800   |

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

Rectangular duct attenuator, constructed from galvanised sheet steel, with removable splitter type acoustic elements. Casing provided with 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. For ease of handling, attenuators will be provided split in up to four equal length sections for assembly on site by others.

### Available Lengths:

| Number of Delivery Sections in Length | L1                           |
|---------------------------------------|------------------------------|
| 1                                     | 600, 750, 900, 1050, 1200    |
| 2                                     | 1200, 1500, 1800, 2100, 2400 |
| 3                                     | 1800, 2250, 2700, 3150, 3600 |
| 4                                     | 2400, 3000, 3600, 4200, 4800 |

Attenuators should be positioned to allow clear unimpeded access and safe withdrawal of the splitters, with a suitable access hatch positioned in the ductwork either side of the attenuator. Access into the attenuator for removal of splitter elements must only be performed once the ventilation system is turned off. Splitter removal is a two person operation, and suitable support and/or lifting equipment should be used. Once supported, the fixing screws retaining each splitter/access panel can be removed and the splitter withdrawn from the casing. The clean weight of the largest splitter in the range is approximately 20 kg. Refitting the splitters is a reversal of the removal operation. The system should be checked for air leakage once re-installation of all splitters is complete with all fixings in place, and all access panels have been refitted and secured.

# MG - Modular Attenuators

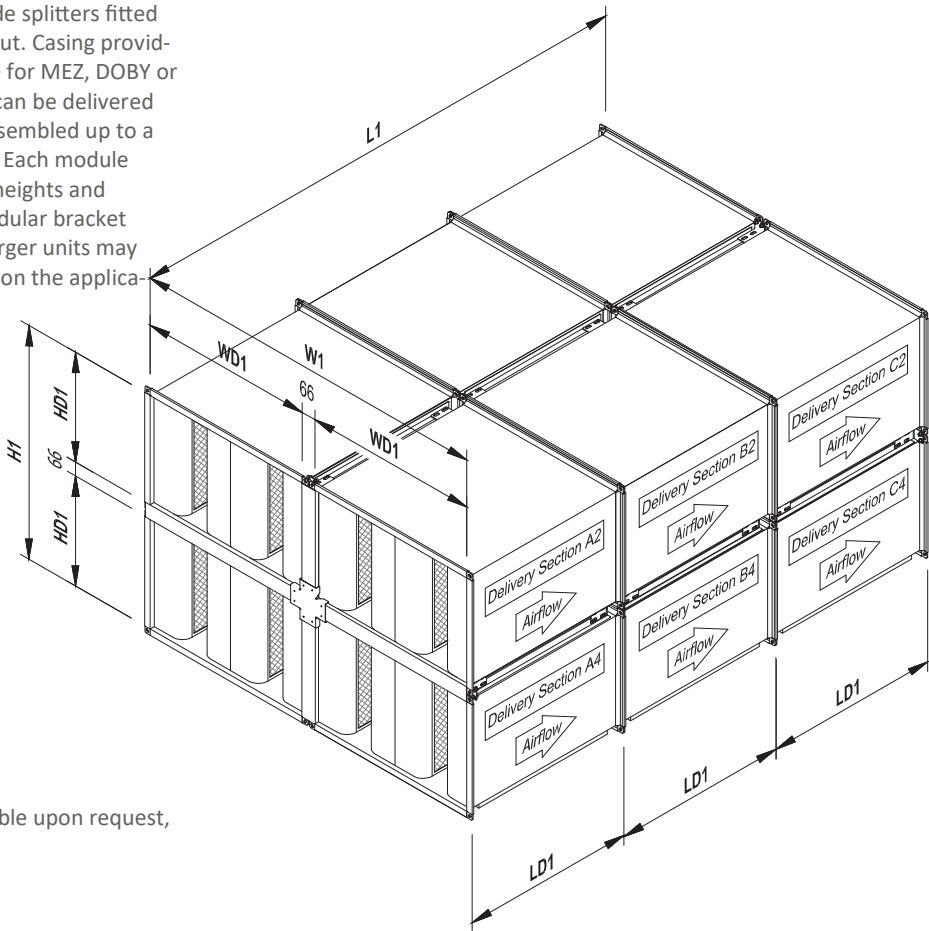
## With Profile Flanges

Modular rectangular duct attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted to each module as standard to reduce noise breakout. Casing provided with 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems. For ease of handling units can be delivered to site split in width, height or length and can be assembled up to a maximum cross section of 100m wide by 20m high. Each module must be identical in size, and the available widths, heights and lengths per module are shown below. A unique modular bracket system enables quick and easy on site assembly. Larger units may require supporting steelwork by others, depending on the application.

Options available:

- 200, 250, 300, 350 or 400 wide centre splitters
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Thermal or acoustic double skinning
- Internal and external paint finish
- Integral inlet or outlet plenums

**Modular Attenuator Joining Instructions** are available upon request, and are issued to site with all modular units.



### Available Widths and Heights - per Module:

| End Connection Type  | Element Orientation | High Pressure Casings |         |         |         | Medium Pressure Casings |         |         |         |
|----------------------|---------------------|-----------------------|---------|---------|---------|-------------------------|---------|---------|---------|
|                      |                     | WD1 min               | HD1 min | WD1 max | HD1 max | WD1 min                 | HD1 min | WD1 max | HD1 max |
| 30mm profile flanges | Vertical            | 600                   | 250     | 2500    | 1500    | 600                     | 1501    | 2500    | 2000    |
|                      | Horizontal          | 250                   | 600     | 1500    | 2500    | 1501                    | 600     | 2000    | 2500    |

For ease of handling modules above 6600mm periphery and 1200mm long will be delivered to site split in length.

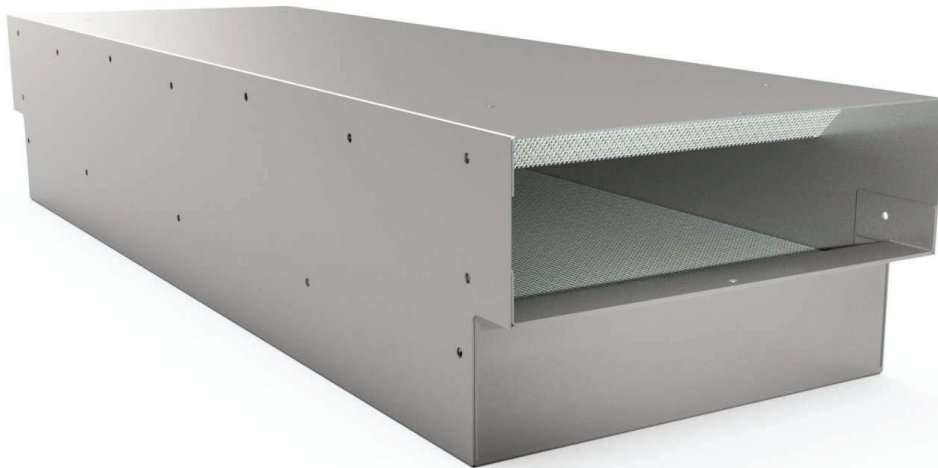
Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio per module should not exceed 6:1.

### Available Lengths:

| End Connection Type  | Number of Delivery Sections in Length | L1                                                        |
|----------------------|---------------------------------------|-----------------------------------------------------------|
| 30mm profile flanges | 1                                     | 450, 600, 750, 900, 1050, 1200, 1500, 1800, 2100, 2400    |
|                      | 2                                     | 900, 1200, 1500, 1800, 2100, 2400, 3000, 3600, 4200, 4800 |
|                      | 3                                     | 1350, 1800, 2250, 2700, 3150, 3600                        |
|                      | 4                                     | 1800, 2400, 3000, 3600, 4200, 4800                        |

# WG - Whole House Ventilation Attenuators

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## Features

- Reduce noise transmission from MVHR appliances and also control cross-talk between rooms.
- For both domestic and commercial applications.
- Aids compliance with Approved Documents F of the Building Regulations.
- Reliable acoustic performance data.
- Compatible with 204x60 and 220x90 plastic ductwork.
- Robust galvanised steel construction, resistant to corrosion.
- Polyester powder paint finish available.
- Central Spigot options are available upon request.

## Summary

The Whole House Ventilation attenuator from Caice offers a reliable and cost effective method of reducing noise in a domestic ventilation system.

Part F of the Building Regulations requires consideration to adequate ventilation and noise control provision in dwellings, and also in other buildings — *“To ensure good acoustic conditions, the average A-weighted sound pressure level in noise sensitive rooms, such as bedrooms and living rooms, should not exceed 30dB LAeq,T.”*

Achievement of such low noise levels can only be assured where all proper acoustic design considerations have been taken into account. Requiring the specification and selection of quality products with reliable performance data, as this will facilitate an accurate acoustic analysis of the ventilation system.

With our highly regarded reputation for attenuator products, you can be assured of reliable and accurate performance data. Our attenuator test rig allows us to measure acoustic and aerodynamic performance to the latest standard BS EN ISO7235:2009.

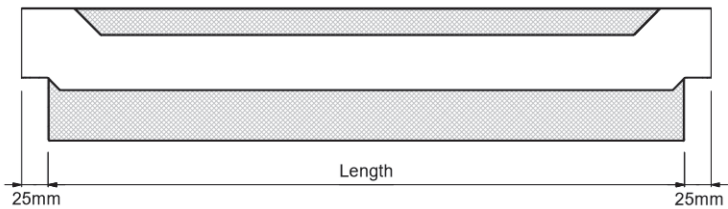
This product is also suitable for use in commercial applications such as schools or offices.

For installations using circular ductwork, we are also able to offer attenuators from our CG or PG range to suit duct sizes from 100mm to 500mm diameter, with nominal 50mm wall thickness. Please refer to our attenuator brochure for more details, or contact a member of our sales team.

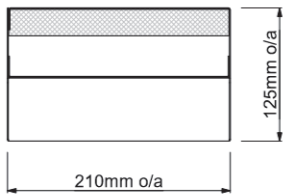
# WG - Whole House Ventilation Attenuators

## Type 1: to suit 204x60 duct

Side View



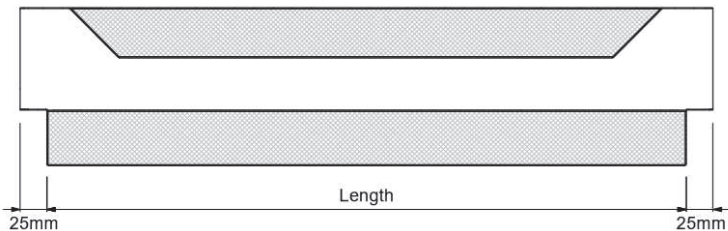
End View



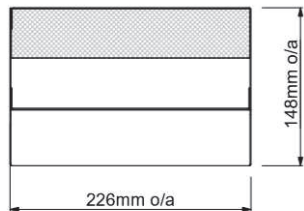
Connecting ducts to be inserted inside spigots and sealed during installation.

## Type 2: to suit 220x90 duct

Side View



End View



Connecting ducts to be inserted inside spigots and sealed during installation.

### Acoustic Performance

| Type   | Length<br>(mm) | Insertion Loss (dB) |     |     |     |    |    |    |    |
|--------|----------------|---------------------|-----|-----|-----|----|----|----|----|
|        |                | 63                  | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Type 1 | 600            | 0                   | 3   | 8   | 12  | 25 | 40 | 48 | 32 |
|        | 900            | 1                   | 4   | 11  | 17  | 33 | 49 | 51 | 42 |
|        | 1200           | 1                   | 4   | 14  | 22  | 42 | 55 | 54 | 52 |
|        |                |                     |     |     |     |    |    |    |    |

| Type   | Length<br>(mm) | Insertion Loss (dB) |     |     |     |    |    |    |    |
|--------|----------------|---------------------|-----|-----|-----|----|----|----|----|
|        |                | 63                  | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Type 2 | 600            | 0                   | 3   | 8   | 14  | 28 | 40 | 48 | 33 |
|        | 900            | 1                   | 3   | 13  | 20  | 40 | 50 | 54 | 44 |
|        | 1200           | 1                   | 4   | 17  | 26  | 52 | 55 | 55 | 55 |
|        |                |                     |     |     |     |    |    |    |    |

### Pressure Loss

| Airflow (l/s) | Pressure Loss (Pa) |        |
|---------------|--------------------|--------|
|               | Type 1             | Type 2 |
| 15            | 1                  | 1      |
| 30            | 4                  | 4      |
| 60            | 15                 | 17     |
| 80            | 27                 | 31     |

(data based on 1200mm lengths)

Other versions of this product are available with shallower or deeper height options. These may be used in applications where it is necessary to accommodate spatial constraints, or to vary the insertion loss or pressure loss characteristics of the attenuator.

Please contact a member of our sales team for further information.

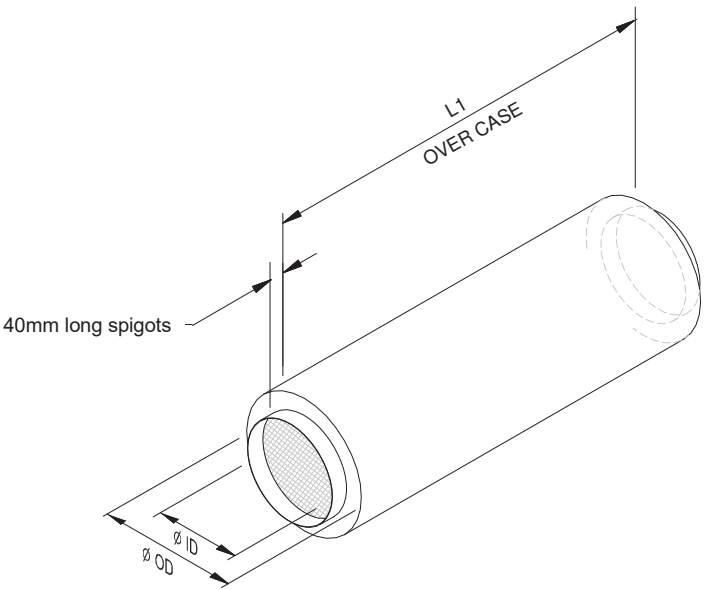
# CG - Circular Attenuators

## With Spigot Ends

Circular duct attenuator, constructed from spiral wound galvanised sheet steel with a peripheral out of airstream acoustic lining. Casing provided with circular spigot connections with EPDM seals. The internal diameters shown below are duct diameters. The outside spigot diameter will be 3mm less than this and it should be slip jointed inside the connecting ductwork.

Options available:

- Melinex wrapped infill
- Internal and external paint finish



## Available Sizes

| Internal Diameter<br>ID | Outside Diameter<br>OD | Available Lengths<br>L1 |     |     |      |      |
|-------------------------|------------------------|-------------------------|-----|-----|------|------|
| 100                     | 205                    | 300                     | 600 | 900 | 1200 | 1500 |
| 125                     | 230                    |                         |     |     |      |      |
| 150                     | 255                    |                         |     |     |      |      |
| 160                     | 255                    |                         |     |     |      |      |
| 180                     | 285                    |                         |     |     |      |      |
| 200                     | 305                    |                         |     |     |      |      |
| 250                     | 360                    |                         |     |     |      |      |
| 300                     | 405                    |                         |     |     |      |      |
| 315                     | 405                    |                         |     |     |      |      |
| 355                     | 455                    |                         |     |     |      |      |
| 400                     | 505                    |                         |     |     |      |      |
| 450                     | 565                    |                         |     |     |      |      |
| 500                     | 605                    |                         |     |     |      |      |

All units suitable for medium pressure systems.

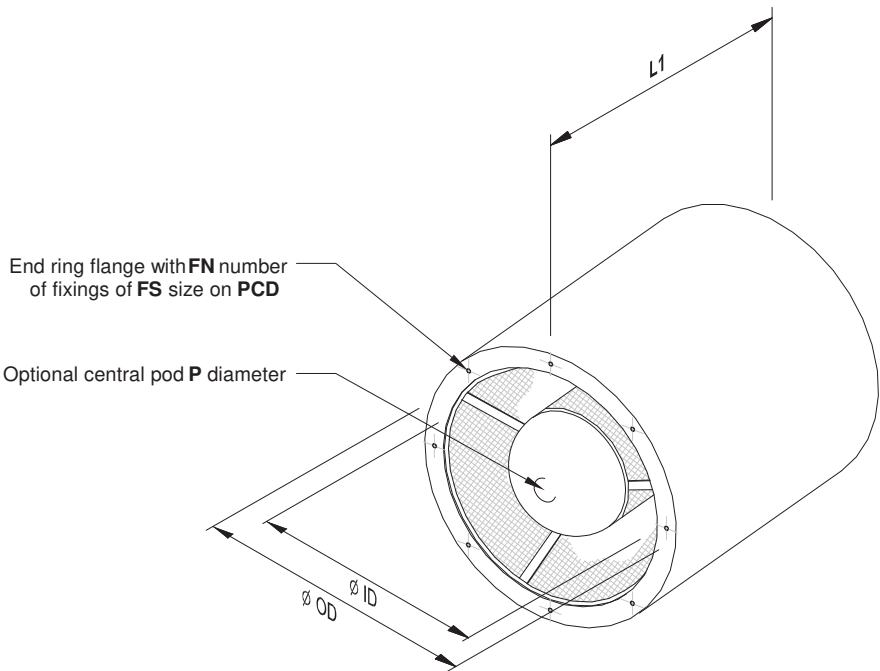
# CG - Circular Attenuators

## With End Rings

Circular duct attenuator, constructed from spiral wound or plain galvanised sheet steel, with a peripheral out of airstream acoustic lining. Casing provided with end rings suitable for direct connection to circular fans or flanged ducts. End rings have threaded inserts to enable quick installation.

Options available:

- Central pod for increased performance
- Melinex wrapped infill
- Internal and external paint finish



## Available Sizes

| Internal Diameter ID | Outside Diameter OD | Pod Diameter P | Lengths in 300mm Increments L1 |     |      |      | Lengths based on ID L1 |      |      | Hole Pattern A |     |      | Hole Pattern B |     |      |
|----------------------|---------------------|----------------|--------------------------------|-----|------|------|------------------------|------|------|----------------|-----|------|----------------|-----|------|
|                      |                     |                |                                |     |      |      |                        |      |      | FN             | FS  | PCD  | FN             | FS  | PCD  |
| 315                  | 405                 | 170            | 600                            | 900 | 1200 | 1500 | 315                    | 473  | 630  | 8              | M8  | 355  | 8              | M8  | 355  |
| 355                  | 455                 | 170            | 600                            | 900 | 1200 | 1500 | 355                    | 533  | 710  | 8              | M8  | 395  | 8              | M8  | 395  |
| 400                  | 505                 | 210            | 600                            | 900 | 1200 | 1500 | 400                    | 600  | 800  | 8              | M10 | 450  | 12             | M8  | 438  |
| 450                  | 605                 | 210            | 600                            | 900 | 1200 | 1500 | 450                    | 675  | 900  | 8              | M10 | 500  | 12             | M8  | 487  |
| 500                  | 635                 | 265            | 600                            | 900 | 1200 | 1500 | 500                    | 750  | 1000 | 12             | M10 | 560  | 12             | M8  | 541  |
| 560                  | 715                 | 265            | 600                            | 900 | 1200 | 1500 | 560                    | 840  | 1120 | 12             | M10 | 620  | 16             | M10 | 605  |
| 630                  | 805                 | 335            | 600                            | 900 | 1200 | 1500 | 630                    | 945  | 1260 | 12             | M10 | 690  | 16             | M10 | 674  |
| 710                  | 905                 | 335            | 600                            | 900 | 1200 | 1500 | 710                    | 1065 | 1420 | 16             | M10 | 770  | 16             | M10 | 751  |
| 800                  | 1005                | 420            | 600                            | 900 | 1200 | 1500 | 800                    | 1200 | 1600 | 16             | M10 | 860  | 24             | M10 | 837  |
| 900                  | 1125                | 420            | 600                            | 900 | 1200 | 1500 | 900                    | 1350 | 1800 | 16             | M12 | 970  | 24             | M10 | 934  |
| 1000                 | 1255                | 500            | 600                            | 900 | 1200 | 1500 | 1000                   | 1500 | 2000 | 16             | M12 | 1070 | 24             | M10 | 1043 |

All units suitable for medium pressure systems.

Larger sizes up to 2000mm diameter are available, details upon request.

These units are also available with an end ring on one end and a 50mm long spigot on the other end.

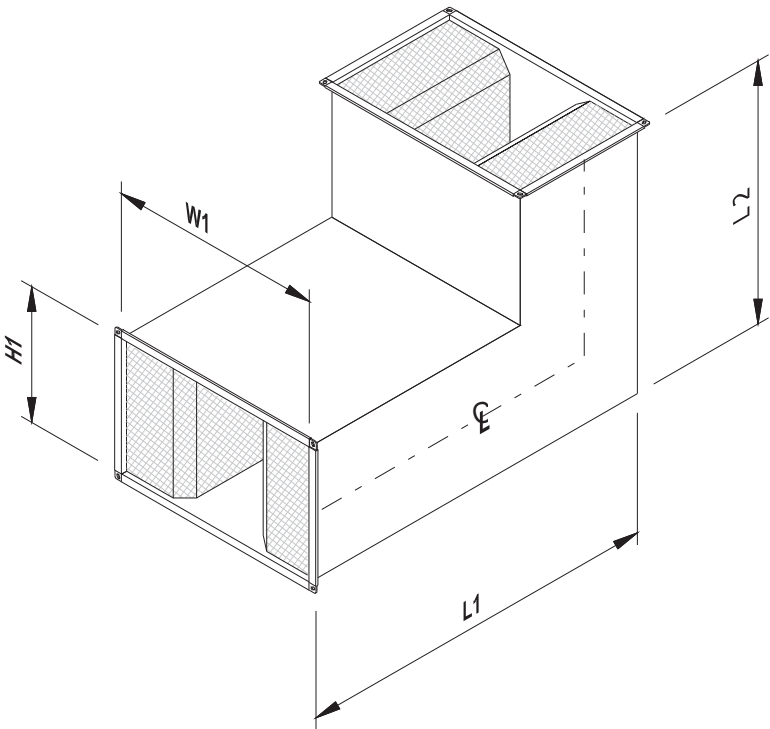
# RG - Bend Attenuators with Linings

## With Profile Flanges

Bend attenuator, constructed from galvanised sheet steel, with lining type acoustic elements. Casing provided with 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems.

Options available:

- 50, 75, 100, 125, 150, 175 or 200 wide linings
- Vertical or horizontal lining orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type  | Element Orientation | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|----------------------|---------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                      |                     | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flanges | Vertical            | 150                   | 150    | 800    | 1000   | 150                     | 1001   | 800    | 1200   |
|                      | Horizontal          | 150                   | 150    | 1000   | 800    | 1001                    | 150    | 1200   | 800    |

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

### Available Lengths:

| End Connection Type  | Centre Line Length |
|----------------------|--------------------|
| 30mm profile flanges | From 450 to 2400   |

Although bend attenuators are constructed to a standard design, they are generally made to suit. Therefore if you require a bend attenuator beyond the size range shown, please contact one of our acoustic engineers.

Standard construction units suitable for medium pressure systems.

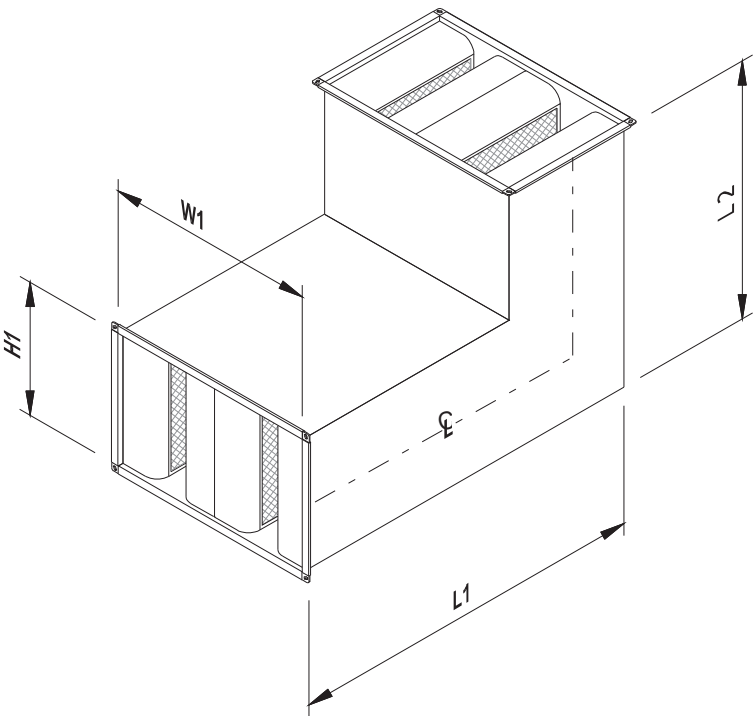
# BG - Bend Attenuators with Splitters

## With Profile Flanges

Bend attenuator, constructed from galvanised sheet steel, with splitter type acoustic elements. Side splitters fitted as standard to reduce noise breakout. Casing provided with 30mm profile flanges at both ends, suitable for MEZ, DOBY or METU flanging systems.

Options available:

- 200, 250, 300, 350 or 400 wide centre splitters
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Internal and external paint finish



### Available Widths and Heights:

| End Connection Type              | Element Orientation | High Pressure Casings |        |        |        | Medium Pressure Casings |        |        |        |
|----------------------------------|---------------------|-----------------------|--------|--------|--------|-------------------------|--------|--------|--------|
|                                  |                     | W1 min                | H1 min | W1 max | H1 max | W1 min                  | H1 min | W1 max | H1 max |
| 30mm profile flanges<br>Standard | Vertical            | 250                   | 250    | 2500   | 1500   | 250                     | 1501   | 2500   | 2000   |
|                                  | Horizontal          | 250                   | 250    | 1500   | 2500   | 1501                    | 250    | 2000   | 2500   |

Attenuators can be provided in 1mm increments within the width and height ranges shown above, although 25mm increments are standard. Maximum aspect ratio should not exceed 6:1.

### Available Lengths:

| End Connection Type  | Centre Line Length |
|----------------------|--------------------|
| 30mm profile flanges | From 550 to 3600   |

Although bend attenuators are constructed to a standard design, they are generally made to suit. Therefore if you require a bend attenuator beyond the size range shown, please contact one of our acoustic engineers.

Standard construction units suitable for medium pressure systems.

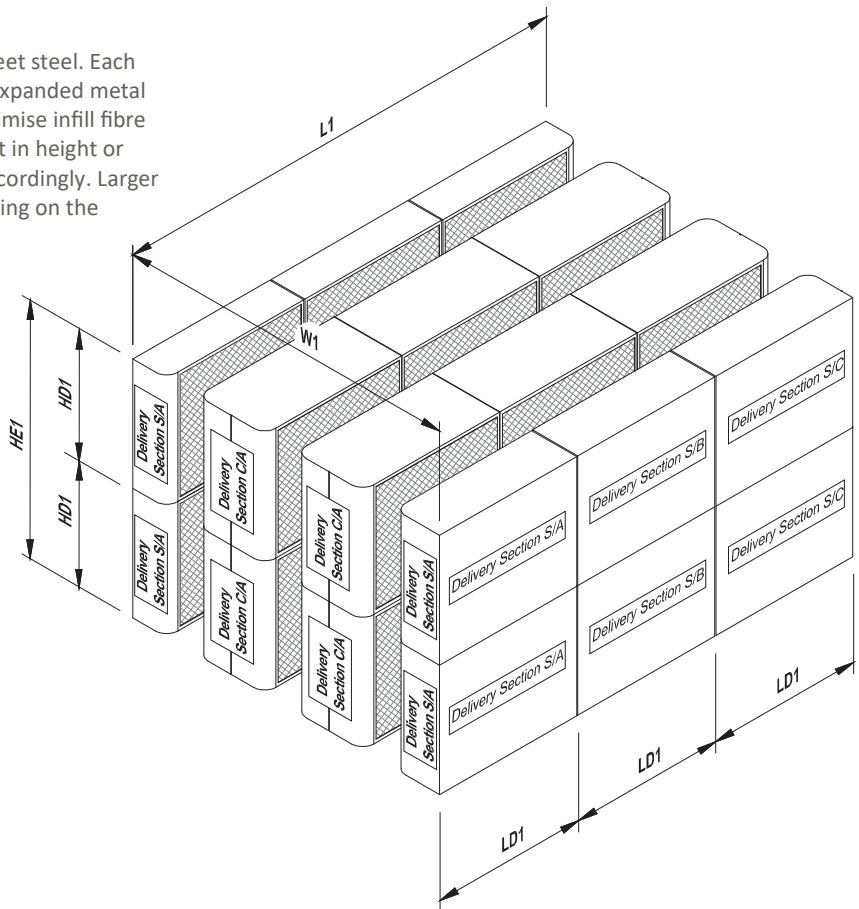
# EG - Splitter Element Attenuators

## For Installation within Apertures

A set of splitter elements, constructed from galvanised sheet steel. Each splitter provided with bullnose aerodynamic fairings and expanded metal facings. Fibre glass tissue bonded to rear of facings to minimise infill fibre egress. For ease of handling splitters can be delivered, split in height or length, and quick fix joining brackets are then provided accordingly. Larger units may require supporting steelwork by others, depending on the application.

Options available:

- 200, 250, 300, 350 or 400 wide centre splitters
- 100, 125, 150, 175 or 200 wide side splitters fitted with steel backing to enclose infill
- Vertical or horizontal splitter orientation
- Melinex wrapped infill
- Paint finish
- Integral inlet or outlet plenums on units with side splitters, by reducing length of centre splitters
- Fixing brackets for securing splitters into the aperture



## Available Aperture Widths and Heights:

| Element Orientation | High Pressure Casings |        |        |        |
|---------------------|-----------------------|--------|--------|--------|
|                     | W1 min                | H1 min | W1 max | H1 max |
| Vertical            | 250                   | 250    | 100000 | 7000   |
| Horizontal          | 250                   | 250    | 7000   | 100000 |

EG splitter element attenuators can be provided in 1mm increments within the aperture width and height ranges shown above, although 25mm increments are standard.

## Available Lengths:

| Number of Delivery Sections in Length | L1                                                        |
|---------------------------------------|-----------------------------------------------------------|
| 1                                     | 450, 600, 750, 900, 1050, 1200, 1500, 1800, 2100, 2400    |
| 2                                     | 900, 1200, 1500, 1800, 2100, 2400, 3000, 3600, 4200, 4800 |
| 3                                     | 1350, 1800, 2250, 2700, 3150, 3600                        |
| 4                                     | 1800, 2400, 3000, 3600, 4200, 4800                        |

Standard lengths are shown in the table above, but where required EG splitter element attenuators can be provided in 1mm increments between 450 and 4800mm long.

Splitter elements will be factory assembled up to a maximum size of 2200mm high by 2400mm long, unless requested otherwise.

# Aristas Attenuator Selector

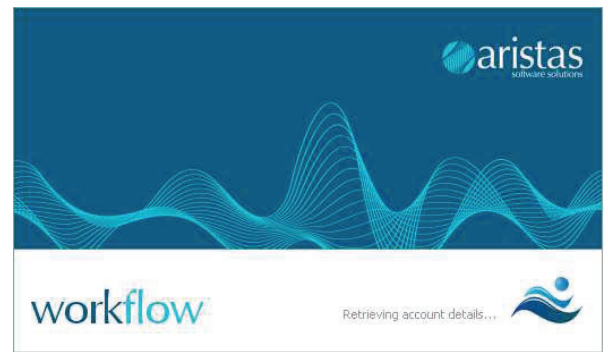


The Attenuator Selector software package has been developed to bring together all CAICE's attenuator construction and performance knowledge into one place. Working in collaboration with our software development division, Aristas, we are able to offer our clients a suite of software, which is unique in our industry.

## Aristas Workflow

Workflow is a dedicated product scheduling and project management package enabling our clients to:

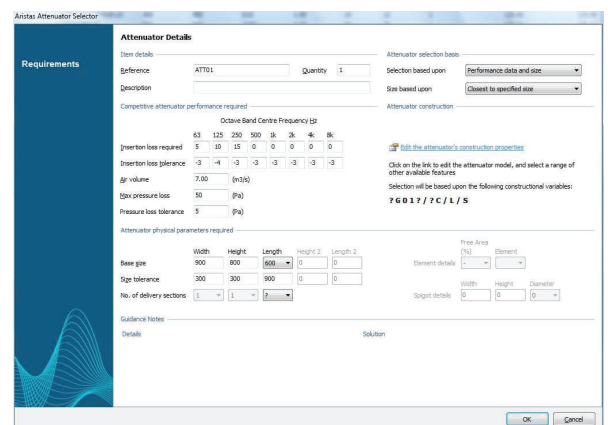
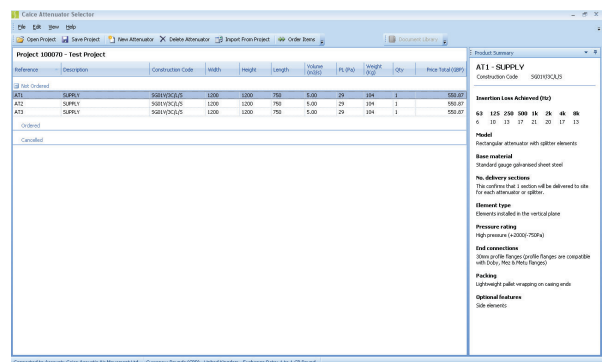
- Create projects and add attenuator selections.
- Save the projects as files and share them with work colleagues using the program.
- Add, modify, copy, paste or delete attenuator selections within a project as well as importing items from other projects.
- Compile attenuator schedules and obtain attenuator drawings in PDF, Word or Excel compatible formats.
- Additional functionality is available to Reseller clients for creating quotations and ordering attenuators on-line from CAICE.



## Aristas Attenuator Selector

Hosted within Workflow, the Attenuator Selector provides the opportunity for clients to:

- Select attenuators from the CAICE range, and choose constructional features and options for each attenuator, such as end connections, Melinex, double skinning, etc.
- Select attenuators based on various permutations of input data, such as attenuator or duct size, air volume, pressure loss, insertion loss, etc.
- Choose the most appropriate attenuator from a list of selections that meet the input criteria and are shown in price order.

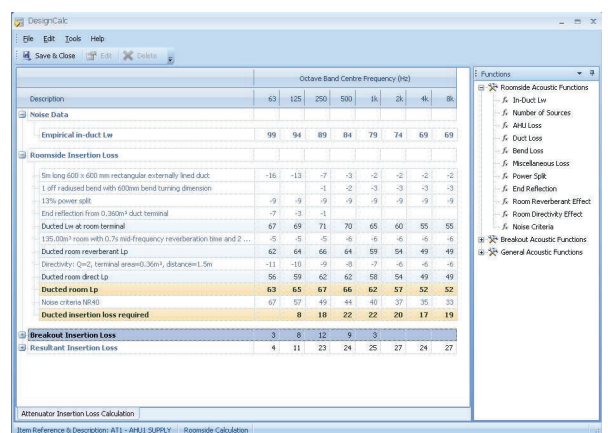


## Aristas DesignCalc and QuickCalc

DesignCalc and QuickCalc are part of the Aristas Acoustic Calculation Suite, which is integrated within the Attenuator Selector.

- DesignCalc delivers a range of acoustic calculations for determining accurate attenuator insertion loss requirements. Calculations include: ductwork system analysis for room side and atmosphere, crosstalk analysis, flow generated noise, etc.
- QuickCalc allows our clients to very quickly estimate their attenuator insertion loss requirements.

For more details on this software please visit our web site or contact our sales personnel.



# Attenuator Constructional Specification

## Construction Codes

CAICE construction codes are used to confirm the physical properties of each attenuator, and this specification is therefore based around these construction codes. All CAICE attenuator quotations, schedules, order acknowledgements and drawings are issued with a list of the applicable construction codes and their definitions to confirm the scope of products that has been allowed.

## Attenuator Range

The CAICE attenuator range comprises the following base models:

**LG - Lining Attenuator** for smaller applications - a rectangular duct attenuator constructed from galvanised sheet steel, with lining type acoustic elements. Provided with 30mm profile flanges as standard, with options of 20mm profile flanges, internal flanges or spigot ends up to certain sizes if required.

**SG - Splitter Attenuator** for medium applications - a rectangular duct attenuator constructed from galvanised sheet steel, with splitter type acoustic elements. Provided with 30mm profile flanges as standard, with options of 20mm profile flanges, internal flanges or spigot ends up to certain sizes if required.

**MG - Modular Attenuator** for larger applications - a modular rectangular duct attenuator constructed from galvanised sheet steel, with splitter type acoustic elements. Provided with 30mm profile flanges as standard. A modular parts kit is provided for easy on site assembly. Larger units may require supporting steelwork by others, depending on the particular application.

**EG - Element Attenuator** for installation within apertures - a set of attenuator splitter elements, constructed from galvanised sheet steel. Provided loose for installation into builders work openings, or within plant such as air handling units. Multiple piece splitters provided with easy fix assembly brackets. Fixing brackets can also be supplied if required.

**CG - Circular Attenuator** for circular duct or plant applications - a circular duct attenuator constructed from spiral wound or plain galvanised sheet steel, with a peripheral, out of air stream acoustic lining. Larger units also available with a central acoustic pod. End connections can either be spigots or end ring flanges with threaded inserts for direct connection to plant, such as axial flow fans, etc.

**RG - Bend Attenuator with Linings** for smaller applications with limited space - a bend duct attenuator constructed from galvanised sheet steel, with lining type acoustic elements. Provided with 30mm profile flanges as standard, with options of 20mm profile flanges or spigot ends up to certain sizes if required.

**BG - Bend Attenuator with Splitters** for larger applications with limited space - a bend duct attenuator constructed from galvanised sheet steel, with splitter type acoustic elements. Provided with 30mm profile flanges as standard.

These attenuators are all capable of maintaining their internal air circulating area when subjected to an internal temperature of 300° C for a period of 120 minutes, and are therefore suitable for installation within smoke or heat exhaust systems within these limits. CAICE attenuators are also available in stainless steel or plastic, and where appropriate special attenuators can also be designed to suit any application. Please contact CAICE for details.

## Attenuator Casings

Attenuator casings are manufactured on an automated duct line from galvanised sheet steel coil. All longitudinal joints in rectangular and circular casings are made using the Pittsburgh Seam method, which provides a firm mechanical joint. High-pressure duct sealant is applied inside the casing along the length of each seam, and for rectangular casings behind each flanged corner that coincides with a seam, to provide an airtight seal.

Casings can be provided with the following range of end connections, and the attenuator models that are applicable for each type of connection are shown in brackets.

**A - Plain Rectangular Spigots** matching the casing width and height (LG, SG, RG).



**C - 30mm Profile Flanges** formed on an automated duct line from the parent metal of the casing, and fitted with one or two piece flange corners (LG, SG, MG - RG and BG models also available but fitted with 30mm MEZ flanges).

**D - Rectangular Spigot End Caps** fitted to each end of the attenuator, where the rectangular spigot is generally smaller than the casing width and height. This enables elements to be provided out of air stream if required to minimise pressure loss (LG).

**E - Circular Spigot End Caps** fitted to each end of the attenuator, where the circular spigot is smaller than the casing width and height. This enables elements to be provided out of air stream if required to minimise pressure loss (LG).

**F - 20mm Profile Flange** at one end and **Plain Rectangular Spigot** at the other, matching the casing width and height (LG, SG)

**G - 30mm Profile Flange** at one end and **Plain Rectangular Spigot** at the other, matching the casing width and height (LG, SG)

**H - 30mm Profile Flange** at one end and **30mm Internal MEZ Flange** at the other with M8 nutserts fitted to corners (LG, SG)

**I - 30mm Internal MEZ Flanges** with M8 nutserts fitted to corners (LG, SG).

**K - Circular Spigots** matching the internal diameter of the circular attenuator (CG).

**L - Circular End Ring Flanges** with nutserts (CG).

Spigot connections are suitable for slip jointing inside connecting ductwork. Profile flanges and internal flanges are suitable for connecting to ductwork that is fitted with DOBY, MEZ or METU flanging systems.

CAICE profile flanges are unique as they are formed on a special flanging machine that takes the end of the plain casing and roll forms it into a flange. As the flange is an integral part of the case it adds strength and rigidity to the casing, and air leakage is also minimal when compared to conventional slide on flanging systems, such as DOBY, MEZ or METU.

Attenuator casings will comply with one of following pressure classifications:

**3 - High Pressure** for Class C ductwork systems operating at static pressures between - 750 and + 2000 Pa.

**2 - Medium Pressure** for Class B ductwork systems operating at static pressures between - 750 and + 1000 Pa.

**1 - Low Pressure** for Class A ductwork systems operating at static pressures between - 500 and + 500 Pa.

**0 - Zero Pressure** for static or very low velocity applications where attenuators do not require a pressure classification.

Rectangular attenuator casings do not comply strictly to the case thickness and external stiffener requirements of DW/144, as this is a standard for ductwork not attenuators. The acoustic elements that are fitted within attenuator casings act as internal tie bars and add significant strength and rigidity to the case, which makes them very different to plain ductwork. However DW/144 refers to DW/TM1 for certain performance requirements, and our casings do comply with the flange deflection limits and maximum air leakage rates for the pressure classifications above, as specified within DW/TM1. This has been certified from independent tests undertaken by BSRIA.

Attenuators can be delivered to site split in sections, for ease of handling, with final assembly on site.

**01 upwards - Number of Delivery Sections** that will be delivered to site to make up the final assembly.

LG, SG and MG attenuators with profile flanges, which are 900mm long or above, can be split in length if access space on site is restricted, or just to make them easier to handle. Attenuators over 6600mm periphery and 1200mm long are split in length as standard.

Modular attenuators can be provided above certain dimensional parameters, and casings can be split in width, height or length to form the final assembly size on site. Modular rails are fitted longitudinally along the case, wherever an adjacent casing is to be joined in width or height as part of the assembly. They are also fitted on the underside of the bottom casings within an assembly to act as a bearing surface for support or lifting. A

# Attenuator Constructional Specification

## Attenuator Acoustic Elements

LG and RG attenuator casings are fitted with internal side linings that are constructed from galvanized sheet steel mesh (XPM). The air inlet and outlet ends of the linings are chamfered to minimise pressure loss.

SG, MG and BG attenuator casings are fitted with internal centre and side splitters, although smaller units can be provided with side splitters only. Each splitter has a four part peripheral frame comprising a top and bottom channel, and bullnose sections on the air inlet and outlets ends that have aerodynamically rounded profiles to minimise pressure loss. The channel and nose parts are constructed from galvanised sheet steel. Splitter facings are fixed to the sides of the peripheral frames, and continuously retained to form a closed box. The facings are constructed from galvanized sheet steel mesh (XPM).

Channel stiffeners are fitted to the rear of linings and splitter facings at pre-determined centres to ensure that they remain uniform, and avoid bowing particularly when installed in the horizontal plane. The airways between the linings and splitters should therefore be consistent along the length of the attenuator to ensure that the acoustic and aerodynamic performance is achieved.

Linings and splitters are assembled and fixed to the casings with TEK screws, which provide an airtight seal. The linings and splitters are normally set back slightly from the ends of the casings, as this helps prevent damage to the elements during handling.

EG attenuators are a set of splitters only, without a casing, for installation into apertures. The splitters are constructed identically to those fitted within SG, MG and BG attenuators, and where required they can be provided in sections for ease of handling or where space restrictions are applicable. Easy fit assembly brackets are provided as standard whenever splitters are provided in sections.

CG circular attenuators are fitted with a peripheral lining that is out of air stream, and larger models can be provided with a central cylindrical pod. The lining and pod are constructed from galvanized sheet steel mesh (XPM), and the pod is provided with aerodynamically profiled noses on the air inlet and outlet, which are constructed from galvanised sheet steel. Pods are fixed securely in place using three brackets at each end.

Linings, splitters and pods are filled with mineral wool acoustic media, which is over packed to a controlled density to avoid settlement. Fibre glass tissue is then bonded to the rear of the linings, splitter facings and pods to reduce fibre egress from the infill.

The following types of acoustic elements can be provided, and the models that are applicable for each type are shown in brackets:

**V - Vertical Elements** that are installed in the vertical plane (LG, SG, MG, RG and BG).

**H - Horizontal Elements** that are installed in the horizontal plane (LG, SG, MG, RG and BG).

**U - Unpodded** where a central pod is not fitted (CG)

**P - Podded** where a central is fitted (CG).

## Attenuator Packing and Labelling

Attenuators will be provided to site with one of the following protective packing options:

**L - Lightweight Pallet Wrapping** applied around each end of the attenuator casings and taped in place where required, to protect against ingress of dirt. For EG attenuators the splitter elements are palletised first and wrapped collectively on the pallet.

**H - Heavy Duty Polythene Wrapping** applied around each end of the attenuator casings and taped in place where required, to protect against ingress of dirt.

**B - Bubble Wrapping** applied around externally painted attenuator casings and taped in place where required, to protect the finish. For EG attenuators that are painted, the splitter elements are individually bubble wrapped first and taped, then palletised using cardboard where required for additional protection.

All attenuator products are generally packed onto pallets and securely banded in place, so they can be safely dispatched to site and offloaded by fork lift truck or crane. Pallet labels are affixed to clearly identify the items that have been packed on each pallet.



Unit labels are affixed to all attenuator products to confirm the item reference, description, construction code, size, weight and contact details for CAICE. Where attenuators are split for assembly on site, the unit label also confirms the section reference, so that the products can be easily assembled in accordance with drawings.

## Attenuator Optional Features

Attenuators can be provided with the following range of optional and special features:

**S - Side Elements** are standard on LG and RG models and are normally provided as standard for SG and MG models, as they help to reduce noise breakout from the attenuator casings, and they also promote smoother airflow through the attenuator. Side elements are optional on EG models, but where they are provided they are fitted with a galvanised sheet steel backing to retain the mineral wool infill.

**M - Melinex Protected Infill** is an option available for all attenuator models, where fibre egress must be negligible for clean applications, such as clinical areas in hospitals, pharmaceutical clean rooms, laboratories, etc. Melinex should also be used when the attenuator will be handling moisture or chemically laden air, or when cleaning will be required, so that the infill is protected. Melinex is a polyester film, and when this is used the fibre glass tissue that is normally bonded to the rear of the XPM is omitted.

**T - Thermal Double Skin Casing** is an option available for LG, SG and MG models, but they must have casings fitted with profile flanges at both ends. Side elements are provided to the full length of the casings, rather than with the normal set backs, and top and bottom thermal panels containing mineral wool are fitted internally within the casing. This provides nominal thermal insulation, but can also be used to give the attenuator casing the following sound reduction index for noise breakout situations:

| Sound Reduction Index (R)   | (dB) in each Octave Band centre frequency (Hz) |     |     |     |    |    |    |    |
|-----------------------------|------------------------------------------------|-----|-----|-----|----|----|----|----|
|                             | 63                                             | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Thermal double skin casing  | 18                                             | 16  | 19  | 36  | 47 | 53 | 54 | 59 |
| Acoustic double skin casing | 22                                             | 21  | 28  | 24  | 30 | 41 | 50 | 57 |

**A - Acoustic Double Skin Casing** is an option available for LG, SG and MG models, but they must have casings fitted with profile flanges at both ends. Acoustic panels are fitted internally within the casing, on the top, bottom and sides, and to the full length of the case. This provides the sound reduction index shown above for noise breakout situations:

**N - Non Standard Element Configuration** is an option for LG, SG, MG, EG, RG and BG models. Attenuator acoustic elements can be set back to form integral inlet or outlet plenums within the attenuator. Elements can also be provided with square ends, rather than aerodynamically profiled. This option is particularly useful when attenuators are connecting directly to fan products.

**F - Fixing Brackets** are only applicable for EG models and can be used to secure the splitters into an aperture.

## Attenuator Paint Options

**B1, B2 or B3 Base Colour Paint Finish** for internal, external, or internal and external surfaces respectively. These are available for all models, except EG attenuators, which can only have a B2 external finish applied. The attenuators are polyester powder painted to a standard stock colour BS 00 A 05 goose grey with a satin finish, to provide protection against corrosive atmospheres, such as swimming pools, coastal locations, etc.

**C1, C2 or C3 Client Specified Colour Paint Finish** for internal, external, or internal and external surfaces respectively. These are available for all models, except EG attenuators, which can only have a C2 external finish applied. The attenuators are polyester powder painted to a client specified colour, which is normally provided for aesthetic purposed to match ductwork, or plant.

## Special Features

**X - Special Feature** is applicable to all attenuator models, and denotes anything beyond the standard optional features. This could include fire rating, special construction, special labelling, bolt on components such as dampers or filters, etc, etc.

# Attenuator Performance

## ISO 7235 Attenuator Testing Laboratory

Attenuator testing is undertaken in the purpose built facility shown below, which is located in Sturminster Newton, Dorset, and operated by Lee Cunningham Partnership, the acoustic consultancy division of CAICE.

The facility is designed in accordance with BS EN ISO 7235: 2009 "Acoustics - Laboratory measurement procedures for ducted silencers and air terminal units - insertion loss, flow noise and total pressure loss".

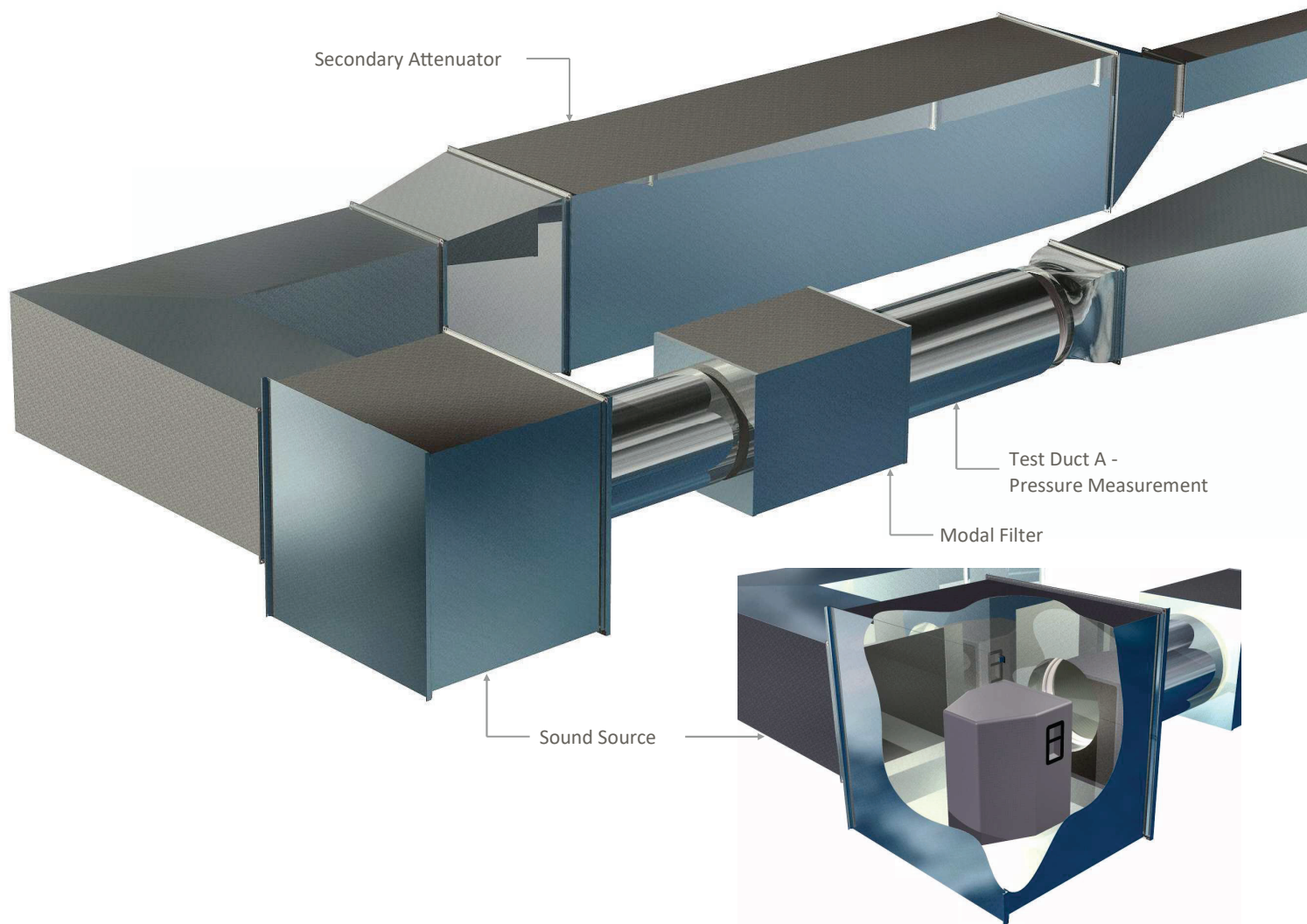
To underline our commitment to provide quality performance data, during the testing programme the facility was a UKAS accredited testing laboratory (No. 4241) for attenuator testing in accordance with ISO 7235: 2009.

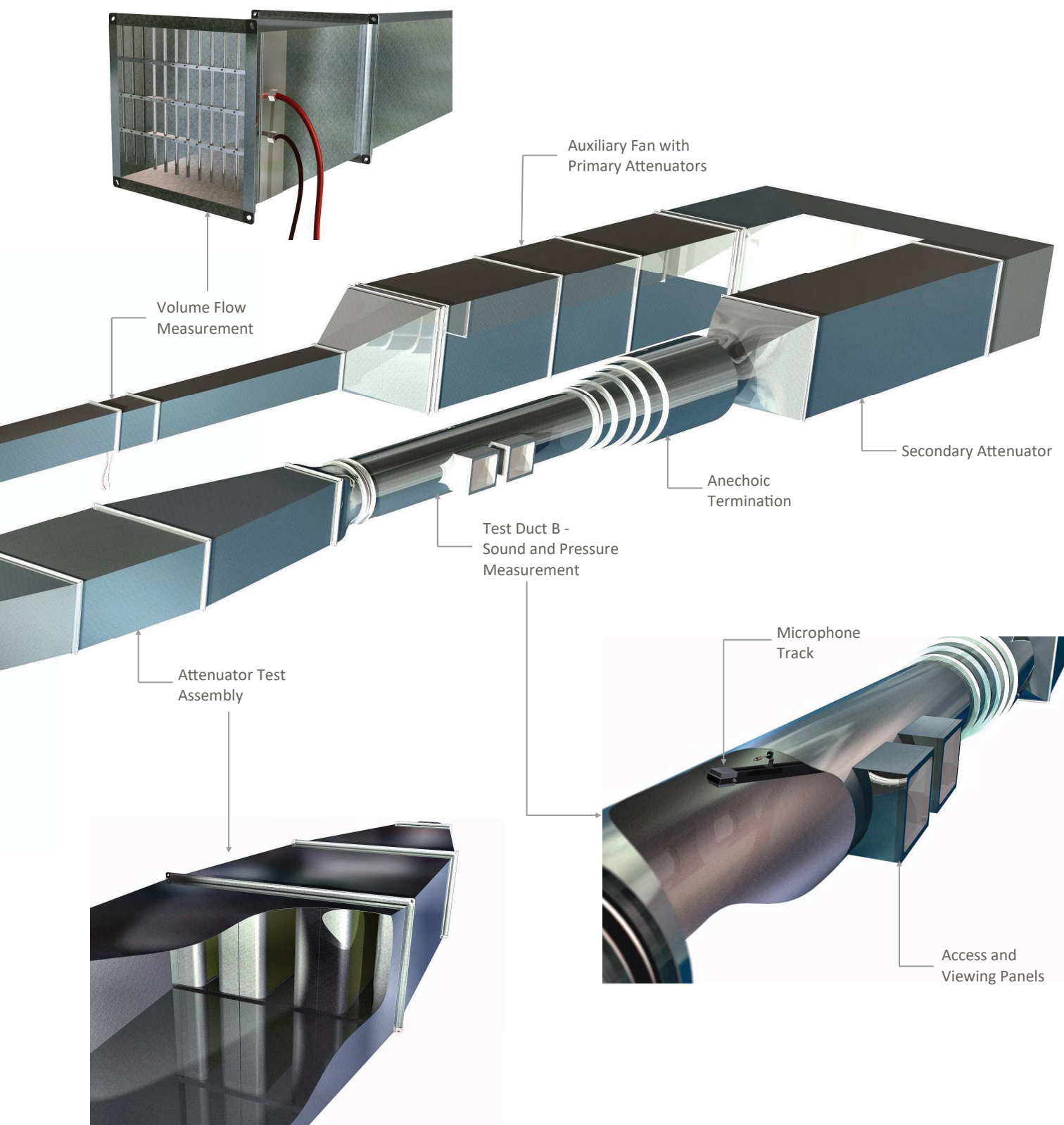
A range of attenuator performance properties can be determined within the facility.

- Static insertion losses
- Dynamic insertion losses in forward or reverse flow
- Forward or reverse flow generated sound power levels
- Total pressure loss

Insertion loss and flow generated data can be provided in octave bands from 63 to 8000Hz, or in one third octave bands from 50 to 10000Hz.

Rectangular attenuators can be tested between 280 and 1200mm square with a maximum length of 4800mm, and circular attenuators from 300 to 1200mm diameter.





# Attenuator Performance

## Test Facility Layout and Components

The test facility is essentially a closed loop ductwork system constructed from galvanised sheet steel, with a number of integral components. The main Test Duct sections A and B, are 630mm diameter, and the total length of the loop is over 50m.

### Attenuator Test Assembly

This consists of two transitions and the test object - which is either the test attenuator or an identically sized substitution duct, that replaces the attenuator.

### Sound Source and Test Duct A

Random noise is generated by a speaker that is located within the sound source chamber. The modal filter exists to damp any higher order modes generated within the sound source chamber thus creating a plane wave sound field within Test Duct A. Pressure and temperature measurement stations are also located within this section.

### Test Duct B

A microphone is automatically moved along a diagonal track within Test Duct B to measure the noise level in five different positions, which determines the average sound pressure level.

An anechoic termination helps to reduce noise reflections back down the duct that could interfere with the noise measurements.

Another pressure measurement station is located in this section.

### Auxiliary Fan and Volume Flow Measurement

An auxiliary fan system is located within the ductwork loop to provide airflow up to  $2\text{m}^3/\text{s}$ .

High performance primary and secondary attenuators are installed on both sides of the fan to minimise noise transmission to the microphone position.

The fan can be rotated through 180 degrees, which enables air to be moved across the test object in either forward or reverse flow modes.

The volume flow measurement section uses a Wilson Flow Grid to measure the airflow that is generated by the auxiliary fan. Further pressure and measurement stations are also located within this section.

### Test Data Acquisition

All data is gathered at a control station and recorded using an in-house software programme, which automatically produces a comprehensive Attenuator Test Report for each test object.

## Attenuator Performance Properties

In order to explain attenuator performance properties, it is helpful to understand the basic testing procedures.

The same test procedures must be carried out firstly on the attenuator itself and then secondly on an empty replacement or substitution duct. The substitution duct has exactly the same geometric properties as the test attenuator and both are referred to as the test object when under test.

### Static Insertion Loss

This is determined by subtracting the noise levels measured with an attenuator installed from the noise levels measured with the substitution duct installed. It is referred to as static because there is no air passing through the test object.

### Dynamic Insertion Loss

Again this is determined by subtracting the noise levels measured with an attenuator installed from the noise levels measured with the substitution duct installed. However it is referred to as dynamic as there is air passing through the test object.

Dynamic insertion losses can be measured with either forward or reverse airflow across the test object, and with up to five different airflow rates for each direction.

### Flow Generated Sound Power Levels

When air passes through an attenuator it generates noise. This is defined as attenuator flow generated noise, regenerated noise or self-noise.

Attenuator flow generated sound power levels can be determined with either forward or reverse airflow across the test object, and again with up to five different airflow rates for each direction.

Noise levels also need to be measured under the same conditions with the substitution duct installed to ensure that flow noise generated through the ductwork loop itself is not additive to the attenuator flow generated noise.

### Total Pressure Loss

This is determined by subtracting the differential pressure across the attenuator from the differential pressure across the substitution duct.

A total pressure loss coefficient is calculated for each attenuator by measuring the total pressure loss at five different airflow rates.



## Scope of Attenuator Testing

The full extent of performance data that can be provided for a single test attenuator is therefore as follows:

- Static insertion loss
- Dynamic insertion loss at 5 forward flow rates
- Dynamic insertion losses at 5 reverse flow rates
- Flow generated sound power level at 5 forward flow rates
- Flow generated sound power level at 5 reverse flow rates
- Total pressure loss coefficient

A total of 43 tests would be required to obtain this data for a single attenuator, and each test requires noise levels to be obtained in five measurement positions. This is a total of 215 measurement sets, which takes about 4 hours to complete.

Although not all tests have been undertaken in this detail, CAICE have tested over 200 different attenuators in order to establish performance data for their range, which further underlines our investment and commitment to quality data.

## Repeatability of Test Data

UKAS required periodic audits to take place to check repeatability of test data. The following tables show typical performance data from a number of re-tests that have been undertaken on the same specimen attenuator to monitor consistency of results.

| Test | (dB) in each Octave Band centre frequency (Hz) |      |      |      |      |      |      |      |
|------|------------------------------------------------|------|------|------|------|------|------|------|
|      | 63                                             | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   |
| 1    | 8.5                                            | 11.1 | 19.2 | 37.2 | 47.9 | 46.0 | 34.0 | 26.8 |
| 2    | 8.6                                            | 11.0 | 19.0 | 36.9 | 47.9 | 46.1 | 34.3 | 27.0 |
| 3    | 7.7                                            | 11.0 | 19.2 | 37.5 | 47.8 | 45.3 | 33.4 | 27.1 |
| Diff | 0.9                                            | 0.1  | 0.2  | 0.6  | 0.1  | 0.8  | 0.9  | 0.3  |

### Dynamic Insertion Loss repeatability

| Test | (dB) in each Octave Band centre frequency (Hz) |      |      |      |      |      |      |      |
|------|------------------------------------------------|------|------|------|------|------|------|------|
|      | 63                                             | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   |
| 1    | 2.9                                            | 10.0 | 17.9 | 34.4 | 43.9 | 44.6 | 32.6 | 29.3 |
| 2    | 2.5                                            | 10.9 | 18.6 | 34.7 | 43.2 | 44.6 | 32.8 | 29.0 |
| 3    | 2.7                                            | 10.4 | 17.9 | 34.2 | 42.7 | 44.8 | 32.8 | 29.1 |
| Diff | 0.4                                            | 0.9  | 0.7  | 0.5  | 1.2  | 0.2  | 0.2  | 0.3  |

### Flow Generated Sound Power Level repeatability

| Test | (dB) in each Octave Band centre frequency (Hz) |      |      |      |      |      |      |      |
|------|------------------------------------------------|------|------|------|------|------|------|------|
|      | 63                                             | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   |
| 1    | 52.0                                           | 46.8 | 44.0 | 43.7 | 44.7 | 39.3 | 30.8 | 16.0 |
| 2    | 51.6                                           | 47.8 | 43.8 | 44.0 | 44.5 | 38.5 | 30.1 | 16.1 |
| 3    | 51.1                                           | 47.6 | 43.6 | 43.4 | 44.5 | 38.4 | 29.7 | 15.2 |
| Diff | 0.9                                            | 1.0  | 0.4  | 0.6  | 0.2  | 0.9  | 1.1  | 0.9  |

It can be seen that the test data is remarkably consistent, and in particular static insertion loss never varies by more than 0.9dB in any octave band.

Whilst this shows good repeatability of results, we also need to consider the accuracy of the test data.

## Measurement Uncertainty of Test Data

ISO 7235 makes the statement that “exact information on the precision achievable cannot be given at this time”. However it does

| ISO 7235 Estimates                         | 50 to 100 Hz | 125 to 500 Hz | 630 to 1250 Hz | 1600 to 10000 Hz |
|--------------------------------------------|--------------|---------------|----------------|------------------|
| Standard deviation of reproducibility (dB) | 1.5          | 1.0           | 2.0            | 3.0              |
| Expanded measurement uncertainty (dB)      | 3.0          | 2.0           | 4.0            | 6.0              |

The **standard deviation of reproducibility** is the maximum amount of variance expected if the same specimen attenuator was tested across a number of different ISO 7235 laboratories. Their estimate is made based on a range of tests undertaken on a 1m long attenuator.

The **expanded measurement uncertainty** is for a coverage probability of 95% and this takes into account the huge variety of attenuator types and sizes that could be tested within an ISO 7235 facility. In the absence of more specific data their estimate is taken as twice the standard deviation of reproducibility.

## How Accurate is the Test Data?

When the standard itself only provides estimates of accuracy, this does not particularly promote confidence.

However it must be understood that there are only a handful of ISO 7235 laboratories in the world, and most of these are operated by attenuator manufacturers who do not provide access to their confidential test data. It is therefore difficult to make definitive statements on accuracy.

# Attenuator Performance

What we do know is that ISO 7235 has gone to extraordinary lengths to ensure that every element of the test facility complies with very stringent requirements. All sound, temperature, pressure and airflow measurement instrumentation has to perform to the highest standards of precision, and carried UKAS accredited calibration certificates. There are also numerous commissioning procedures that have to be undertaken to ensure various components fully meet the performance requirements of the standard.

The previous attenuator test standard was BS 4718 and this contained very few stringent requirements. The current American standard ASTM E477 is more detailed than BS 4718, but it is still far less stringent than ISO 7235.

Through our extensive knowledge of ISO 7235 and the close scrutiny of UKAS during the accreditation process we are confident that the test data is more accurate than the estimates given within ISO 7235. This is supported by the excellent repeatability that we have seen across a vast testing programme and a variety of different attenuator types and sizes. Our estimated measurement uncertainties are shown below:

| CAICE Estimates of Expanded Measurement Uncertainty | (dB) in each Octave Band centre frequency (Hz) |     |     |     |    |    |    |    |
|-----------------------------------------------------|------------------------------------------------|-----|-----|-----|----|----|----|----|
|                                                     | 63                                             | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Static insertion loss                               | 2                                              | 2   | 2   | 2   | 3  | 3  | 3  | 3  |
| Dynamic insertion loss                              | 2                                              | 2   | 2   | 2   | 3  | 3  | 3  | 3  |
| Flow generated Lw                                   | 3                                              | 3   | 3   | 3   | 4  | 4  | 4  | 4  |
| Total pressure loss                                 | Within 5 Pa                                    |     |     |     |    |    |    |    |

## Test Attenuator Quality

**The single most important factor in obtaining good test data is the constructional quality of the attenuator being tested.**

A highly sophisticated ISO 7235 test facility is completely undermined unless the dimensional tolerances of the test attenuator are closely controlled. All test attenuator casings, splitter widths and airway widths are therefore constructed to a tolerance of +/- 1mm.

This constructional accuracy ensures that when the test data is subsequently extrapolated to provide data for the range, the expanded data remains accurate.

There are three other constructional factors that must also be closely controlled and inspected.

**Gaps between the splitters and casing** - can dramatically reduce mid and high frequency insertion loss. Our high build quality ensures that all splitters fit tightly into the casing and gaps are therefore minimised.

**Inconsistently packed splitter infill** - can again undermine performance. If it is under packed then the mineral wool infill can settle leaving gaps at the top of the splitter, which will reduce mid to high frequency insertion loss. If it is excessively over packed it will actually increase performance. It could also cause the splitter facing to bulge thereby reducing the airway and increasing pressure loss and flow generated noise. Mineral wool slabs must therefore be pre-cut to the correct size before packing, to ensure consistency and to avoid settlement or over packing.

**Splitter facing deformation** - can cause large variations in airway width along the length of the splitter. This will cause inconsistencies with insertion loss, flow generated noise and pressure loss test data. We provide channel stiffeners that are fixed to the rear of the expanded steel mesh splitter facings. These are fitted at pre-determined centres to minimise splitter facing deformation.

## Deriving Performance for the Entire Range

The SG splitter attenuator with 30mm flanges has 18 standard lengths, uses 5 different centre splitter widths and each width of splitter can be provided in 17 standard free area configurations from 20 to 60% in 2.5% increments. This one model therefore has 1530 standard permutations, although we often deviate from these and there are also numerous models in the CAICE range.

**Consequently the attenuator configuration permutations across the entire range are almost limitless.**

This provides tremendous flexibility in terms of selection options, but it does mean that it is impossible to test every possible permutation of attenuator within the range.

CAICE have therefore devised a sophisticated technique that for a particular splitter width can accurately predict the full range of static insertion loss performance from a relatively small set of sample tests.

Hence it is imperative that test attenuators are constructed to the highest standards otherwise expanded data will not be accurate.

The table below illustrates the principle of the prediction technique where we test three different attenuator lengths, and for each length we test a range of three free areas.

### The Range of Sample Tests

| Attenuator Length | % Free Area |      |      |      |      |
|-------------------|-------------|------|------|------|------|
|                   | 20.0        | 27.5 | 37.5 | 45.0 | 50.0 |
| 1                 | ü           |      | ü    |      | ü    |
| 2                 | ü           | ?    | ü    | ?    | ü    |
| 3                 | ü           |      | ü    |      | ü    |

We also test two random attenuators, shown in the table by the ? and compare the test data to the predicted data. Typical results are shown below that highlight the accuracy of this technique.

#### Static Insertion Loss at 27.5%FA

|           | (dB) in each Octave Band centre frequency (Hz) |     |      |      |      |      |      |      |
|-----------|------------------------------------------------|-----|------|------|------|------|------|------|
|           | 63                                             | 125 | 250  | 500  | 1k   | 2k   | 4k   | 8k   |
| Predicted | 6.4                                            | 9.4 | 17.1 | 34.7 | 49.2 | 38.2 | 23.9 | 18.8 |
| Measured  | 5.7                                            | 9.2 | 16.9 | 35.6 | 50.0 | 39.3 | 24.2 | 19.4 |
| Diff      | 0.7                                            | 0.2 | 0.2  | -0.9 | -0.8 | -1.1 | -0.3 | -0.6 |

#### Static Insertion Loss at 45.0%FA

|           | (dB) in each Octave Band centre frequency (Hz) |     |      |      |      |      |      |      |
|-----------|------------------------------------------------|-----|------|------|------|------|------|------|
|           | 63                                             | 125 | 250  | 500  | 1k   | 2k   | 4k   | 8k   |
| Predicted | 4.5                                            | 5.7 | 11.7 | 25.9 | 32.6 | 19.1 | 12.4 | 9.3  |
| Measured  | 3.9                                            | 5.5 | 11.8 | 26.2 | 32.4 | 18.8 | 13.6 | 9.7  |
| Diff      | 0.6                                            | 0.2 | -0.1 | -0.3 | 0.2  | 0.3  | -1.2 | -0.4 |

### Performance Data you can Trust

Attenuator performance is an immensely complex topic and CAICE are very much on the leading edge of development work in this field of acoustics.

Our research work is ongoing as we constantly look to improve our methods and accuracy of performance data.

**We hope that this again underlines our position as the leading UK attenuator manufacturer and helps to provide our clients with performance data that you can trust.**

### Attenuator Performance in the Real World

Attenuator testing to ISO 7235 provides performance data that is achieved in ideal laboratory conditions.

#### How is this performance data affected when attenuators are installed in non-ideal conditions?

Dynamic Insertion Loss is meant to account for the change in performance that occurs as the airflow increases through an attenuator.

However ISO 7235 states that where the airway velocity falls short of 20m/s airflow will hardly have an effect on the insertion loss. Therefore up to this velocity the difference between Static Insertion Loss and Dynamic Insertion Loss is negligible, and this has been proven during our test programme.

An airway velocity of 20m/s would correspond to an attenuator pressure loss of between 100 to 200Pa, depending on the free area of the attenuator.

Attenuators are generally selected to a maximum pressure loss of 50Pa, and therefore Dynamic Insertion Losses are of little use for day to day attenuator applications.

CAICE have therefore adopted a policy to use Static Insertion Losses for selection of attenuators, although we can provide Dynamic Insertion Losses if required.

Two other problems exist with Dynamic Insertion Losses:

1. Dynamic Insertion Losses are determined in the laboratory under ideal airflow conditions. What happens when the attenuator is subjected to the sort of turbulent airflow conditions that often exist on site? ISO 7235 points out that a design airway velocity of 10 to 15m/s may give you 20m/s on site due to non-uniform airflow distribution. It is impossible to predict how evenly the air will flow through the attenuator on site, which again makes Dynamic Insertion Losses questionable.
2. Even if attenuator manufacturers can provide Dynamic Insertion Losses, how accurate are they? CAICE are currently the only attenuator manufacturer in the UK that can provide both Static and Dynamic Insertion Losses, UKAS accredited in accordance with ISO 7235: 2009 and our latest very stringent test procedures provide good accuracy. We would seriously question data derived from other, older test standards, or where manufacturers have not ensured that the test attenuators are constructed to the highest standards.

Attenuator pressure loss and flow generated noise can be adversely affected by poor airflow conditions on site. Attenuators should therefore be installed as far away as possible from bends, change of sections, fan discharges, etc, to ensure that airflow is uniformly distributed across the attenuator.

Where poor airflow conditions do exist across attenuators, the site pressure loss can be up to two or three times the expected laboratory pressure loss. Flow generated noise through the attenuator will also increase considerably.

### If In Doubt Test It

We hope that this section of the brochure has provided a good overview of the complexities of Attenuator Performance.

However if you have any doubts at all over attenuators that are required for a particular project then we would be pleased to provide further advice accordingly.

**The CAICE Attenuator Testing Laboratory is also available to our clients to substantiate performance data where required, and our advice would generally be that if you have any doubt at all then test it.**

# Crosstalk Selection Guide

## Guide to Crosstalk Attenuation Selection

The following guide is intended to provide a quick method for selection of crosstalk attenuators in a common ducted system or ceiling void return air path. For accurate selection, or where attenuators are intended for use in sensitive locations such as high acoustically rated partitions (typically in excess of Rw40), please refer to one of our acoustic engineers.

When making selections for crosstalk attenuators, it is necessary to consider the following aspects:

### 1. The level of speech reaching the receiving room:

The source of crosstalk nuisance is assumed to be raised speech, for which the average sound pressure level (500-4kHz) is 70dB\*.

The room to room acoustic loss for a typical common ductwork system or via the ceiling void is approximately 7dB, therefore the average speech level within the receive room is taken to be  $70 - 7 = 63$  dB.

### 2. The noise criteria for the design of mechanical services in each space being considered:

If crosstalk is being assessed between two adjacent room areas with different noise criteria, then the lowest criteria should be used.

Subtract the required NR level from the received speech level to give the additional average insertion loss requirement.

The following tables provide a guide to rectangular crosstalk attenuator selection, based on a 32.5% free area LG type unit.

| Attenuator Length | Average Insertion Loss (500 - 4kHz) dB |
|-------------------|----------------------------------------|
| 600               | 22                                     |
| 900               | 28                                     |
| 1200              | 34                                     |
| 1500              | 40                                     |
| 1800              | 46                                     |

| Crosstalk Path                      | Room NR  | Received speech level minus lowest NR | Attenuator Length Required |
|-------------------------------------|----------|---------------------------------------|----------------------------|
| Conference room to conference room  | 30 to 30 | $63 - 30 = 33$                        | 1200                       |
| Conference room to cellular office  | 30 to 35 | $63 - 30 = 33$                        | 1200                       |
| Open plan office to cellular office | 35 to 38 | $63 - 35 = 28$                        | 900                        |
| Cellular office to corridor         | 38 to 45 | $63 - 38 = 25$                        | 900                        |
| Male to female toilet               | 45 to 45 | $63 - 45 = 18$                        | 600                        |

## Sizing of Crosstalk Attenuators

For CG type attenuators, it is acceptable to size these units to correspond to the duct cross-section, since the attenuation takes place out of the air stream, and hence pressure drop is negligible.

For ducted LG type units, the attenuator cross-section should ideally be sized to maintain a maximum pressure drop of 10Pa. This requires a limiting velocity of 1.5m/s for a 32.5% free area attenuator.

For non-ducted LG type units, the attenuator cross-section should ideally be sized to maintain a maximum pressure drop of 5Pa. This requires a limiting velocity of 1.0m/s for a 32.5% free area attenuator.

### Example

Air volume  $0.09\text{m}^3/\text{s}$ . Ducted crosstalk attenuation required between NR45 toilet areas.

Attenuator cross-section required to maintain 1.5m/s is calculated by  $(\text{volume} / \text{face velocity}) = 0.09 / 1.5 = 0.06\text{m}^2$

Typical attenuator cross-sections for  $0.06\text{m}^2$  face area: 300 x 200, 400 x 150.

For NR 45 areas, insertion loss requirements =  $63 - 45 = 18\text{dB}$ , therefore 600mm long attenuator is selected.

\* Note: Average level for raised speech derived from raised speech sound pressure level (ref: Parkin Humphries & Cowell).

# Attenuator Pressure Loss Corrections

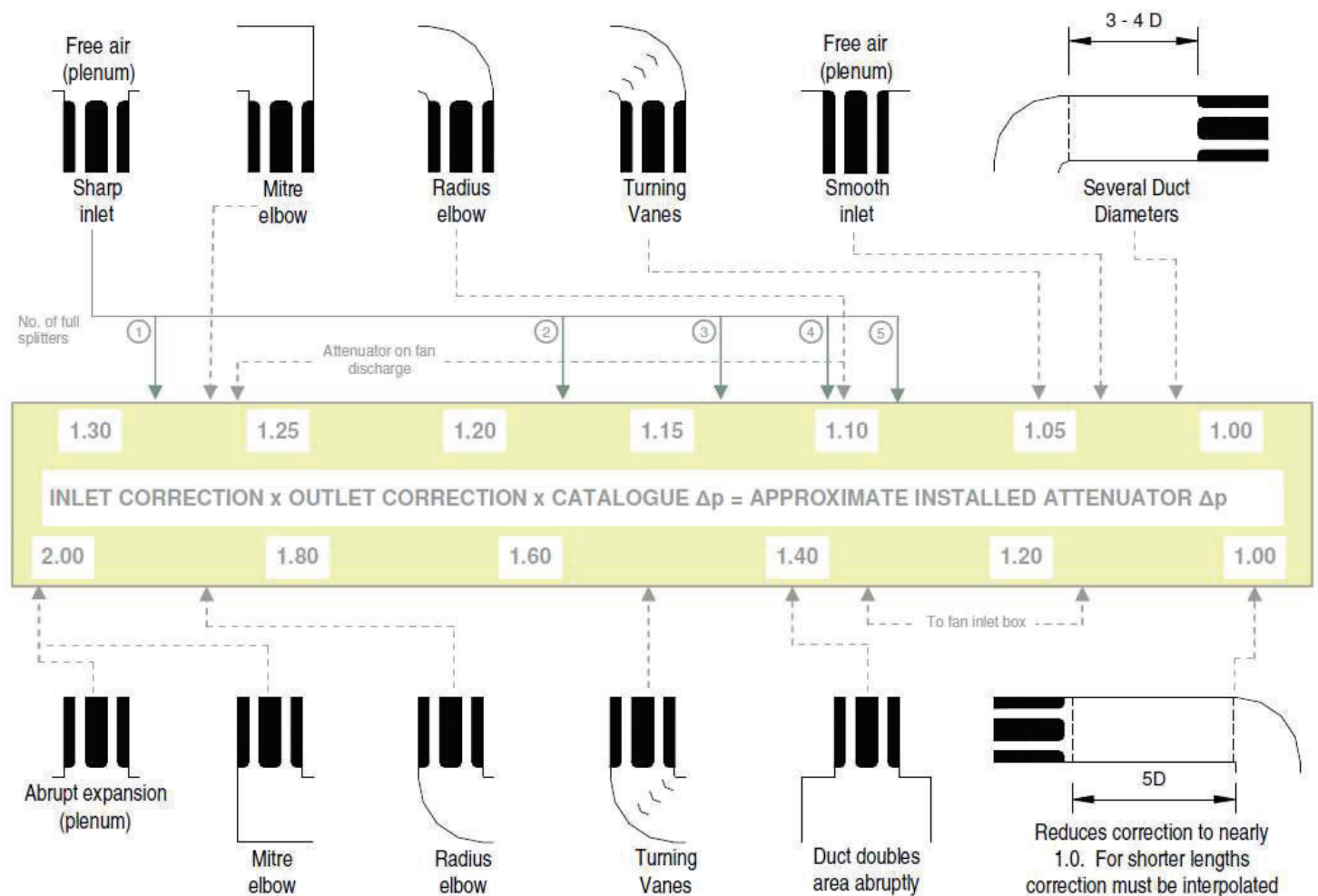
## Attenuator Pressure Loss Values - ISO 7235:2009

Attenuator pressure loss values are stated in accordance with ISO 7235:2009. These pressure loss values are based upon aerodynamically straight airflows approaching and leaving the attenuator.

## Attenuator Pressure Loss Values - Actual

In the majority of installations, it is probable that the idealised airflow requirements of ISO 7235:2009 will not be achieved. Where less than ideal conditions arise, the building services design engineer must make due allowance for increased pressure losses where unfavourable high air velocity or turbulent airflow conditions exist on the entry to or exit from the attenuator. In these circumstances substantially increased pressure loss values will occur. To assist the building services design engineer, the following approximate corrections should be made to arrive at an estimated overall pressure loss value for the attenuator unit.

### For Attenuator Inlet Flow Conditions



### For Attenuator Discharge Flow Conditions

All the above corrections are only approximate and effectively apply to the attenuator pressure drop alone. They do not include the usual  $\Delta p$  corrections for duct elbows, plenums, etc.

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Introduction to Acoustic and Building Services Acoustics

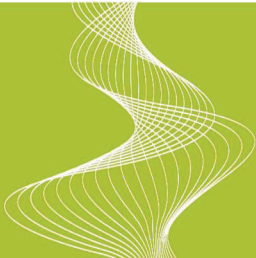
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**GigaBoxes are real multi-functional options that offer almost unlimited flexibility in various applications.**

Compact frame construction and assembly-friendly accessories make a variable and thus optimal adaptation possible by simply repositioning the casing panels to the structural conditions. With five or (with series T120) three possible discharge directions this gives design flexibility to suit all site conditions. All types have integrated crane hooks for easier positioning as standard.

They are particularly suitable for medium to higher air flow volumes against high resistances in ventilation systems of every type. Furthermore, the new series GB.. T120 is suited for extraction of dirty, hot air up to 120° C. Altogether, 26 models are available with air flow volumes from 1400 to 19 000 m³/h for duct diameters 250 to 710 mm.

GigaBoxes from Helios are delivered complete with:

- Discharge adapter from square to circular ducted system for low-loss discharge

- Flexible sleeves to reduce vibration transmission and for the connection to ducts in the usual standard diameters.

Backward curved high output centrifugal impeller guarantees an energy-efficient operation at low noise emission.



Outdoor installation with wall bracket (accessories).



Roof installation with outdoor cover hood and external weather louvers (accessories).



Installation in the attic with anti vibration mounts (accessories).



**GigaBox for air flow temperatures up to max. 120° C.**



GB.. T120: The motor which is located outside of the air flow is separated from the impeller through a temperature insulated partition panel. The motor-impeller-unit is removable without disassembly of the ducting.



Assembly of the discharge adapter for GB.. T120 with centrifugal discharge direction to the top or to the side.



GB.. T120 with simply removable inspection cover.

The double-walled, removeable 20 mm thick side panels are noise and temperature insulated with flame-retardant mineral wool.

This allows for a variable installation and simple inspection access. Extensive accessories like wall bracket, condensate collector incl. condensate spigot (for GB.. T120 included in delivery), external weather louvers to cover the exhaust opening, outdoor cover hood for protected outdoor installation ensure for the necessary flexibility on site.

The T120 model impresses with outstanding benefits:

- Air flow temperature up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor-impeller-unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.

- Condensate collector with condensate spigot included in delivery.
- Accessory components suitable for use to max. 120° C.

For applications with high air flow temperatures and/or steam/humidity present in the exhaust air, the GigaBox T120 is ideally suitable.

Ideal for application in exhaust air systems of process technology or in commercial kitchens.



**The powerful and adaptable GigaBox from Helios.**

## GigaBox and accessory



### ■ Application

Multifunctional fan box, suitable for medium to higher air flow volumes against high resistances in every type of ventilation system. The compact frame construction offers easy conversion of the outlet position. Together with a choice of ideal accessories make these units ideal for all applications.

**The GB.. T120 types** are suitable for the extraction of dirty, humid and hot air up to max. 120° C, i.e. as extract air fan in commercial kitchens and many applications of process technology.

### ■ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool.

Intake cone for ideal airflow, spigot and flexible connector for duct connection. With outlet adapter (from square to circular) on the exhaust side for low-loss discharge and flexible connector to reduce vibration transmission. The flexible connectors are supplied as standard and correspond to the max. permissible air flow temperature of +70 °C and/or +120 °C with the types GB.. T120. Lifting lugs are standard for using crane hooks.

**With GB.. T120** the motor is located outside of the air flow. The thermally insulated partition panel is also the support plate for the motor and impeller unit and can be removed completely for inspection without removing the complete fan from the system.

### ■ Speed control

All types (except GBD 630/4 T120) are speed controllable by voltage reduction using a 5-step transformer controller or an electronic controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The performances of the speeds are given in the performance curve. 3-phase models are controllable with frequency inverters by installation of a sinusoidal filter (accessories) between inverter and motor. Type GBD 630/4 is only controllable by frequency inverter.

### ■ Assembly

#### □ Assembly of types GB..

Adaptable installation position and flexible assembly using the five possible discharge directions via the discharge adapter. Removable panels allow inspection access on all sides.

#### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Inspection cover with handle, for cleaning and maintenance simply remove. Lifting lugs are standard for using crane hooks. Vibration transmission to the building is minimised by anti vibration mounts (type SDD-U, accessories). Vibration transmission to the ducting is prevented by using the standard flexible connector supplied.

### ■ Impeller

Smooth running centrifugal impeller with backward curved polymer blades (size 250 from steel) on a galvanised steel back plate, direct driven. Size 500 and all GB.. T120 types with impellers from aluminium. These energy efficient impellers are low noise. Dynamically balanced assembled with the motor to DIN ISO 1940 Pt.1 – class 6.3 or 2.5.

### ■ Motor

IEC-standard motor or maintenance-free external rotor motor protected to IP 54 or 44. Thermal overload protection through built-in thermal contacts. Suitable for continuous operation S1. Insulation class F. Ball bearings are lubricated for life.

### ■ Electrical connection

Terminal box protection to IP 54.

### ■ Air flow direction

The air flow direction of centrifugal fans is not reversible, but can be set by positioning the fan to the required air flow direction. Furthermore the position can be set individually to constructional conditions through conversion of discharge adapter and panels. The correct motor rotation direction is marked through rotation arrows on the motor and has to be checked at start-up.

### ■ Incorrect direction of rotation

If the fan is operated in the incorrect direction of rotation the motor will overheat and the thermal contact will trip. Typical indication for this is a very low air flow combined with high noise levels and vibration.

### ■ Ambient temperature

The maximum permitted air flow temperature is given in the individual fan chart.

### ■ Surrounding temperature

From – 40° C to + 40° C.

| Information                               | Pages |
|-------------------------------------------|-------|
| Design of systems, acoustic               | 12 on |
| General techn. information, speed control | 17 on |

| Type GB..        | Sound press.<br>Case breakout | Sound press.<br>Intake | Air flow volume $\dot{V}$ m³/s against static pressure |       |       |       |       |       |       |       |       |       |       |       |       |
|------------------|-------------------------------|------------------------|--------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                  | L <sub>PA</sub> dB(A)         | L <sub>PA</sub> dB(A)  | (ΔP <sub>stat.</sub> ) in Pa                           |       |       |       |       |       |       |       |       |       |       |       |       |
|                  | at 4 m                        | at 4 m                 | 0                                                      | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 500   | 600   | 700   | 800   |
| GBW 250/4        | 27                            | 39                     | 0.389                                                  | 0.319 | 0.244 | 0.147 |       |       |       |       |       |       |       |       |       |
| GBW 315/4        | 29                            | 41                     | 0.414                                                  | 0.361 | 0.300 | 0.236 | 0.153 | 0.042 |       |       |       |       |       |       |       |
| GBW 355/4        | 34                            | 46                     | 0.817                                                  | 0.747 | 0.675 | 0.594 | 0.505 | 0.400 | 0.258 |       |       |       |       |       |       |
| GBD 355/4/4      | 34                            | 46                     | 0.836                                                  | 0.772 | 0.711 | 0.638 | 0.577 | 0.492 | 0.367 | 0.089 |       |       |       |       |       |
| GBW 400/4        | 38                            | 50                     | 1.142                                                  | 1.092 | 1.036 | 0.975 | 0.917 | 0.85  | 0.764 | 0.656 | 0.511 |       |       |       |       |
| GBD 400/4/4      | 38                            | 50                     | 1.097                                                  | 1.031 | 0.961 | 0.889 | 0.811 | 0.725 | 0.628 | 0.469 | 0.114 |       |       |       |       |
| GBW 450/4        | 40                            | 52                     | 1.514                                                  | 1.433 | 1.361 | 1.292 | 1.217 | 1.122 | 1.006 | 0.867 | 0.692 | 0.083 |       |       |       |
| GBD 450/4/4      | 40                            | 52                     | 1.514                                                  | 1.431 | 1.344 | 1.256 | 1.161 | 1.061 | 0.947 | 0.822 | 0.664 | 0.083 |       |       |       |
| GBW 500/4        | 45                            | 57                     | 2.333                                                  | 2.236 | 2.139 | 2.042 | 1.947 | 1.85  | 1.744 | 1.628 | 1.506 | 1.219 | 0.778 | 0.042 |       |
| GBD 500/4/4      | 44                            | 57                     | 2.458                                                  | 2.367 | 2.278 | 2.189 | 2.097 | 2.006 | 1.903 | 1.789 | 1.664 | 1.369 | 0.947 | 0.014 |       |
| GBW 500/6        | 35                            | 46                     | 1.600                                                  | 1.478 | 1.347 | 1.189 | 0.978 | 0.678 | 0.144 |       |       |       |       |       |       |
| GBD 560/4/4      | 44                            | 57                     | 3.497                                                  | 3.397 | 3.300 | 3.203 | 3.106 | 3.011 | 2.911 | 2.811 | 2.706 | 2.461 | 2.142 | 1.731 | 1.144 |
| GBD 560/6/6      | 35                            | 48                     | 2.400                                                  | 2.261 | 2.114 | 1.953 | 1.767 | 1.539 | 1.239 | 0.767 |       |       |       |       |       |
| GBD 630/4/4      | 48                            | 61                     | 4.153                                                  | 4.058 | 3.961 | 3.869 | 3.775 | 3.683 | 3.592 | 3.500 | 3.403 | 3.194 | 2.953 | 2.675 | 2.333 |
| GBD 630/6/6      | 43                            | 56                     | 3.192                                                  | 2.992 | 2.794 | 2.597 | 2.375 | 2.103 | 1.767 | 1.356 | 0.792 |       |       |       |       |
| GBD 710/6/6      | 46                            | 59                     | 5.194                                                  | 4.989 | 4.783 | 4.564 | 4.333 | 4.083 | 3.811 | 3.511 | 3.178 | 2.333 | 0.753 |       |       |
| Type GB.. T120   | L <sub>PA</sub> dB(A)         | L <sub>PA</sub> dB(A)  | (ΔP <sub>stat.</sub> ) in Pa                           |       |       |       |       |       |       |       |       |       |       |       |       |
|                  | at 4 m                        | at 4 m                 | 0                                                      | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 500   | 600   | 700   | 800   |
| GBW 355/4 T120   | 36                            | 49                     | 0.961                                                  | 0.894 | 0.831 | 0.767 | 0.683 | 0.567 | 0.418 | 0.201 |       |       |       |       |       |
| GBD 355/4/4 T120 | 36                            | 49                     | 0.964                                                  | 0.908 | 0.846 | 0.778 | 0.697 | 0.594 | 0.469 | 0.192 |       |       |       |       |       |
| GBW 400/4 T120   | 40                            | 53                     | 1.369                                                  | 1.293 | 1.217 | 1.136 | 1.053 | 0.942 | 0.806 | 0.622 | 0.439 |       |       |       |       |
| GBD 400/4/4 T120 | 40                            | 53                     | 1.353                                                  | 1.275 | 1.193 | 1.106 | 1.014 | 0.900 | 0.761 | 0.581 | 0.381 |       |       |       |       |
| GBW 450/4 T120   | 45                            | 57                     | 1.975                                                  | 1.887 | 1.800 | 1.700 | 1.625 | 1.525 | 1.426 | 1.317 | 1.208 | 0.917 | 0.528 |       |       |
| GBD 450/4/4 T120 | 45                            | 57                     | 1.994                                                  | 1.914 | 1.833 | 1.750 | 1.653 | 1.556 | 1.450 | 1.336 | 1.206 | 0.897 | 0.372 |       |       |
| GBW 500/4 T120   | 45                            | 59                     | 2.318                                                  | 2.244 | 2.158 | 2.075 | 1.989 | 1.903 | 1.800 | 1.696 | 1.575 | 1.300 | 0.975 | 0.511 |       |
| GBD 500/4/4 T120 | 45                            | 59                     | 2.319                                                  | 2.239 | 2.157 | 2.081 | 1.994 | 0.191 | 1.833 | 1.739 | 1.642 | 1.381 | 1.061 | 0.533 |       |
| GBD 560/4/4 T120 | 48                            | 62                     | 3.417                                                  | 3.322 | 3.247 | 3.164 | 3.078 | 2.994 | 2.910 | 2.817 | 2.722 | 2.533 | 2.336 | 2.064 | 1.671 |
| GBD 630/4 T120   | 53                            | 67                     | 3.928                                                  | 3.867 | 3.803 | 3.742 | 3.667 | 3.594 | 3.533 | 3.469 | 3.397 | 3.242 | 3.097 | 2.908 | 2.703 |

## Special application for GigaBox T120 – commercial kitchens

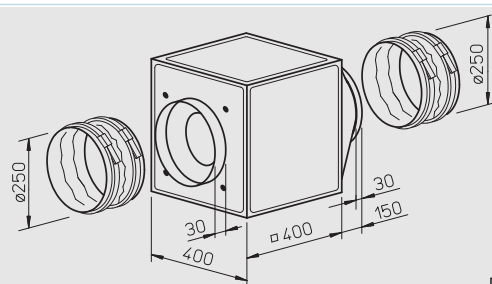
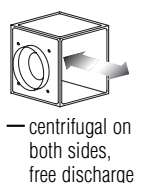
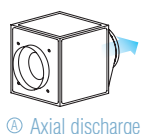
For the design of exhaust air systems in commercial kitchens the VDI 2052 (2006) "Ventilation equipment for kitchens – design, layout, approval" is applied. This follows for extract air fan:

- ☐ Fans of exhaust air systems must be designed and installed in such a way that they are easily accessible, can be easily controlled and cleaned.
- They must be able to be switched off from the kitchen.
- The motors must be located outside of the extract air flow.
- Connected kitchen extraction hoods must separate solid and liquid components, if possible.
- A backdraft into following units is to be prevented.

These specific requirements from the GigaBoxes GB.. T120 are fulfilled in an outstanding manner. Easily accessible casing and double-walled side panels make cleaning simple with grease dissolving agents and steam possible.

Requirements in excess thereof of kitchen extract air units and the appropriate fire protection can deviate country-specifically; these special requirements of the respective country, in which the unit is to be used, must be considered.

## Models GB..



### ■ Specification

#### ■ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal airflow, spigot and flexible connector for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved centrifugal impeller highly efficient with blades from steel on galvanised steel disc, direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free and speed controllable external rotor motor, protection to IP 44. With ball bearings and radio suppressed as standard.

#### □ Electrical connection

Terminal box fitted on the motor as standard, protection to IP 54.

#### □ Motor protection

Motors have thermal contacts wired in series with the windings which automatically reset.

#### □ Speed control

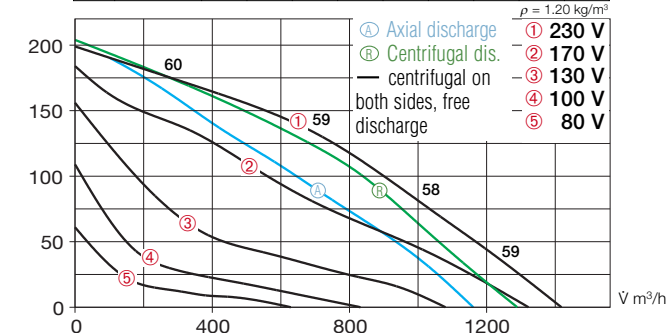
Speed controllable through voltage reduction by 5 step transformer controller or electronic speed controller. The duties at different speeds are given in the performance curve.

#### □ Assembly

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter.

## GBW 250/4

| Frequency                     | Hz    | Total | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
|-------------------------------|-------|-------|-----|-----|-----|----|----|----|----|
| L <sub>WA</sub> Case breakout | dB(A) | 47    | 37  | 45  | 40  | 33 | 30 | 22 | 19 |
| L <sub>WA</sub> Intake        | dB(A) | 59    | 41  | 49  | 52  | 54 | 55 | 49 | 39 |
| L <sub>WA</sub> Extract       | dB(A) | 62    | 42  | 53  | 56  | 57 | 54 | 53 | 44 |



### ■ Accessories

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 250** Ref. No. 5625

**External weather louvers** to cover exhaust opening.

**GB-WSG 250** Ref. No. 5637

**Outdoor cover hood** for outdoor installation.

**GB-WSD 250** Ref. No. 5746

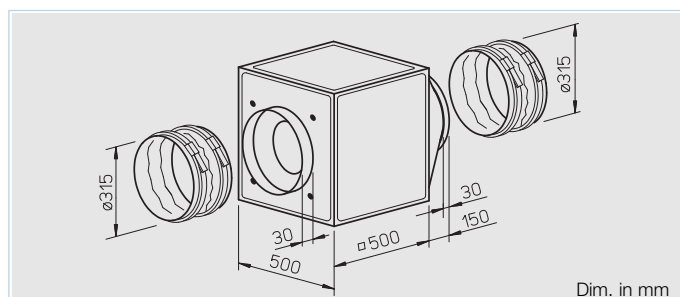
**Condensate collector** with condensate spigot for pipe connection.

**GB-KW 250** Ref. No. 5642

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

| Type                                                                              | Ref. No. | Air flow volume (FID) | R.P.M. | Sound press. level case breakout | Motor power (nominal) | Current full load | speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller without motor protect. unit | Type           | Ref. No. |
|-----------------------------------------------------------------------------------|----------|-----------------------|--------|----------------------------------|-----------------------|-------------------|------------------|----------------|----------------------------------------|----------------------|-----------------------------------------------------------|----------------|----------|
|                                                                                   |          | V m³/h                | min⁻¹  | dB(A) at 4 m                     | kW                    | A                 | A                | No.            | +°C                                    | +°C                  | kg                                                        |                |          |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 44</b> |          |                       |        |                                  |                       |                   |                  |                |                                        |                      |                                                           |                |          |
| <b>GBW 250/4</b>                                                                  | 5509     | 1400                  | 1290   | 27                               | 0.11                  | 0.44              | 0.48             | 923            | 65                                     | 65                   | 20                                                        | <b>TSW 1.5</b> | 1495     |

# Models GB..



## ■ Specification

### ■ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulation and flame-retardant mineral wool. Intake cone for ideal airflow, spigot and flexible connector for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

### □ Impeller

Smooth running centrifugal highly efficient impeller with backward curved blades from steel on galvanised steel disc, direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

### □ Motor

Maintenance-free and speed controllable external rotor motor, protection to IP 44. With ball bearings and radio suppressed as standard.

### □ Electrical connection

Terminal box fitted on the motor as standard, protection to IP 54.

### □ Motor protection

Motors have thermal contacts wired in series with the windings which automatically reset.

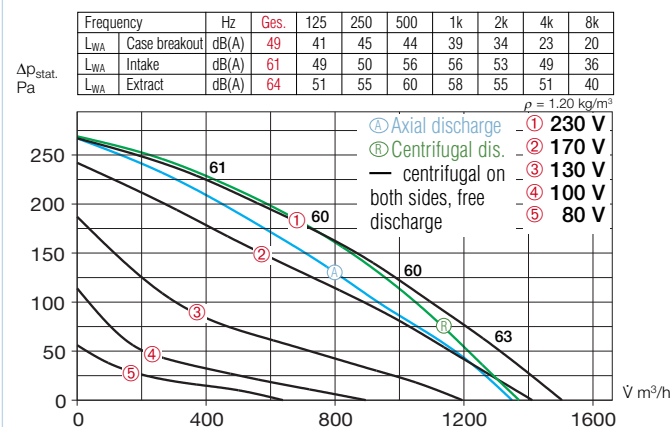
### □ Speed control

Speed controllable through voltage reduction by 5 step transformer controller or electronic speed controller. Duties at different speeds are given in the performance curve.

### □ Assembly

Arbitrary installation position and flexible assembly by five possible discharge directions via the

## GBW 315/4



## discharge adapter.

For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## ■ Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level exhaust

in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the

- case breakout level at 4 m (freefield conditions).

## ■ Accessories

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 315** Ref. No. 5625

**External weather louvers** to cover exhaust opening

**GB-WSG 315** Ref. No. 5638

**Outdoor cover hood** for outdoor installation.

**GB-WSD 315** Ref. No. 5747

**Condensate collector** with condensate spigot for pipe connection.

**GB-KW 315** Ref. No. 5643

## ■ Information Pages

Design of systems, acoustic 12 on  
General techn. information, speed control 17 on

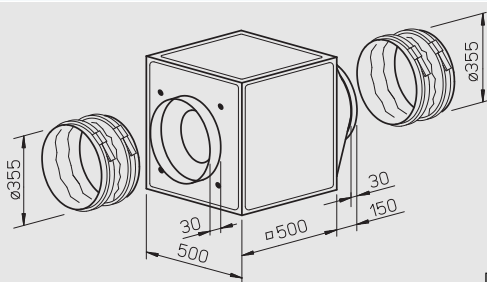
## ■ Accessory-Details Pages

Speed controller and full motor protection unit 397 on

| Type                                                                              | Ref. No. | Air flow volume (FID) | R.P.M. | Sound press. level case breakout | Motor power (nominal) | Current full load | speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller without motor protect. unit |                     |
|-----------------------------------------------------------------------------------|----------|-----------------------|--------|----------------------------------|-----------------------|-------------------|------------------|----------------|----------------------------------------|----------------------|-----------------------------------------------------------|---------------------|
|                                                                                   |          | V m³/h                | min⁻¹  | dB(A) at 4 m                     | kW                    | A                 | A                | No.            | +°C                                    | +°C                  | kg                                                        | Type Ref. No.       |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 44</b> |          |                       |        |                                  |                       |                   |                  |                |                                        |                      |                                                           |                     |
| <b>GBW 315/4</b>                                                                  | 5510     | 1490                  | 1325   | 29                               | 0.135                 | 0.58              | 0.60             | 923            | 55                                     | 55                   | 31                                                        | <b>TSW 1.5</b> 1495 |

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

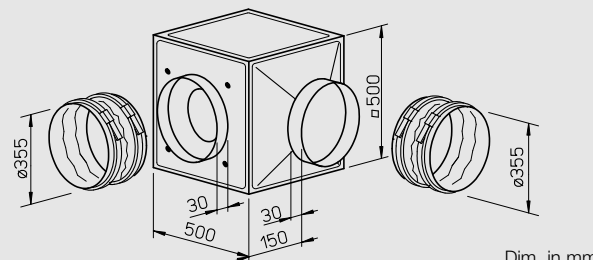
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) have to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved centrifugal impeller highly efficient with polymer blades on galvanised steel disc (with GB.. T120 aluminium impeller), direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

#### □ Electrical connection

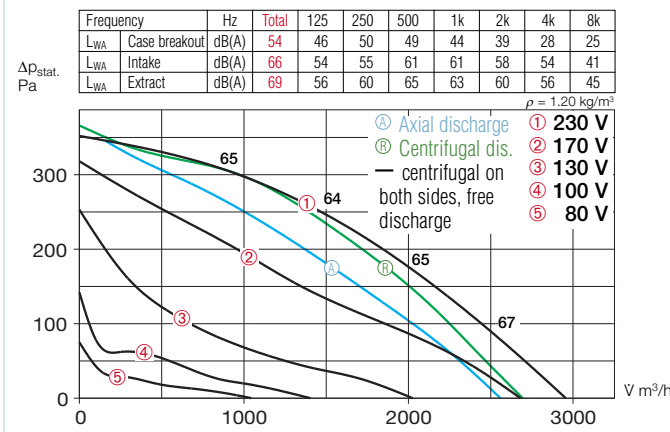
Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

| Type                                                                                        | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit | Full motor protection unit using the thermal contacts |
|---------------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-----------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------------------------------------------------------|
|                                                                                             |          | V m <sup>3</sup> /h   | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A         | A                        | Nr.            | +°C                                    | +°C                  | Type Ref. No.                                          | Type Ref. No.                                         |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 355/4                                                                                   | 5511     | 2940                  | 1325              | 34                               | 0.29                  | 1.30      | 1.40                     | 864            | 60                                     | 60                   | MWS 1.5 1947                                           | TSW 1.5 1495 MW <sup>1)</sup> 1579                    |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 355/4/4                                                                                 | 5512     | 2700/3010             | 1115/1355         | 34                               | 0.20/0.30             | 0.35/0.70 | 0.70                     | 867            | 55                                     | 55                   | RDS 1 1314                                             | TSO 0.8 1500 M4 <sup>2)</sup> 1571                    |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 355/4 T120                                                                              | 5770     | 3460                  | 1340              | 36                               | 0.32                  | 1.60      | 1.80                     | 935            | 120                                    | 120                  | MWS 3 1948                                             | TSW 3.0 1496 MW <sup>1)</sup> 1579                    |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 355/4/4 T120                                                                            | 5771     | 2990/3470             | 1100/1360         | 36                               | 0.22/0.33             | 0.40/0.80 | 0.80                     | 947            | 120                                    | 120                  | RDS 1 1314                                             | TSO 0.8 1500 M4 <sup>2)</sup> 1571                    |

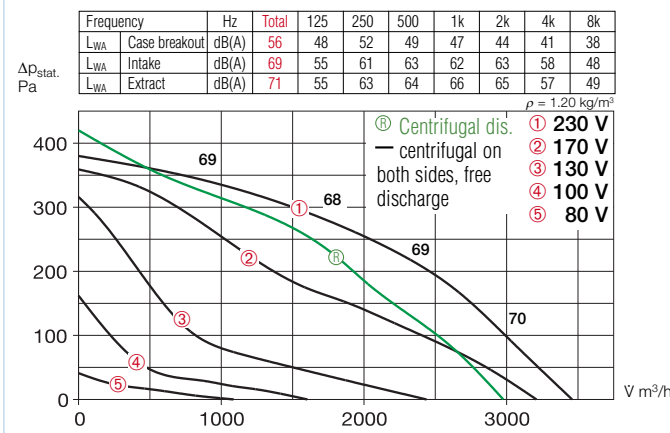
1) incl. operation switch

2) incl. operation and 2 speed switch

## GBW 355/4



## GBW 355/4 T120



### Motor protection

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

### Speed control

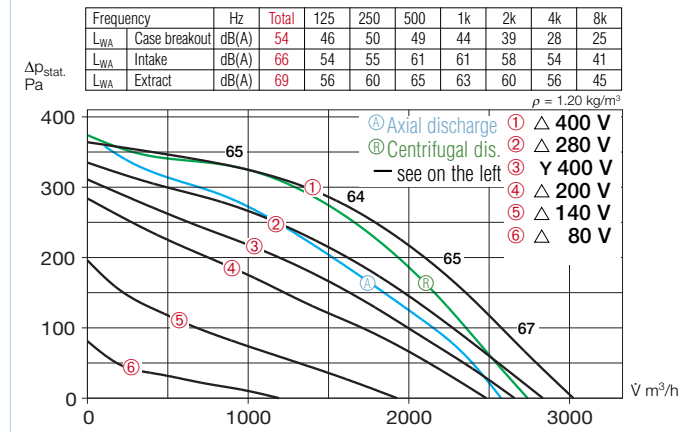
All types are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve.

### Sound levels

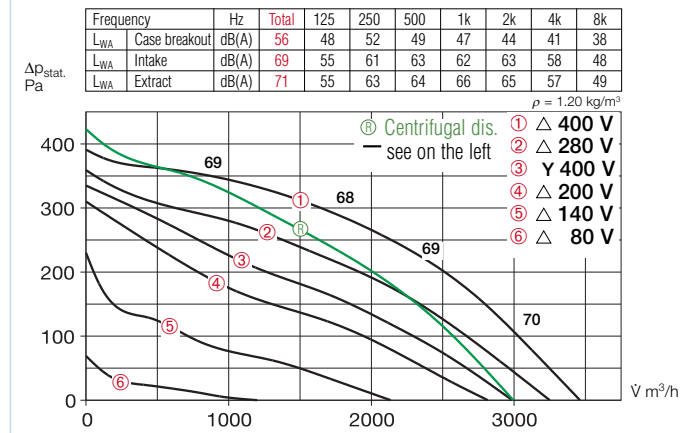
Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

## GBD 355/4/4



## GBD 355/4/4 T120



### Accessories of both types

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 355** Ref. No. 5625

**External weather louvers** to cover exhaust opening.

**GB-WSG 355** Ref. No. 5638

**Outdoor cover hood** for outdoor installation.

**GB-WSD 355** Ref. No. 5747

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2<sup>3)</sup>** Ref. No. 1351

<sup>3)</sup> full motor protection unit recommended:  
MD Ref. No. 5849

### Specific accessories

for types GB..

**Condensate collector** with condensate spigot for pipe connection.  
**GB-KW 355** Ref. No. 5643

(Condensate collector with condensate spigot included in delivery with GB.. T120).

for types GB.. T120

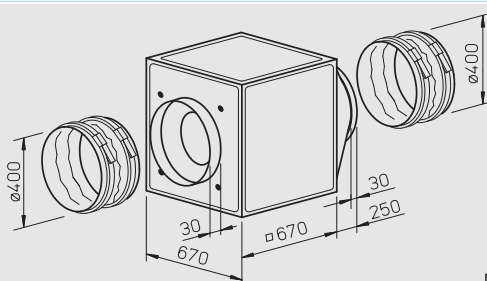
**Rain drainage** for outdoor installation (drill holes for rain drainage is already prepared).

**GB-RA** Ref. No. 9418

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

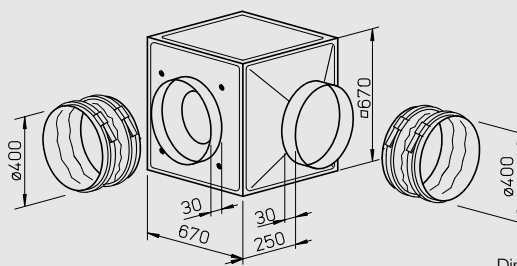
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square into circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved centrifugal impeller highly efficient with polymer blades on galvanised steel disc (with GB.. T120 aluminium impeller), direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

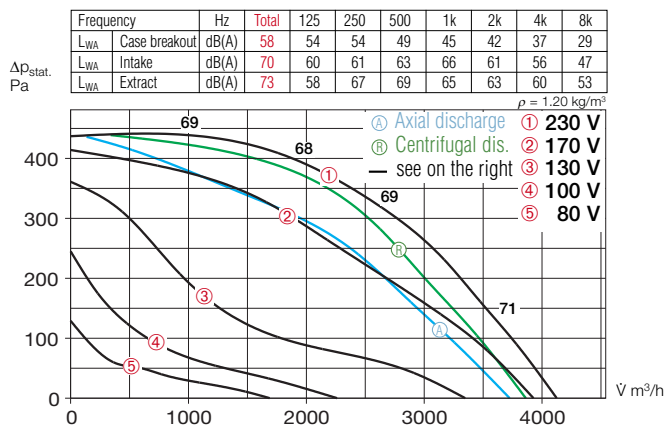
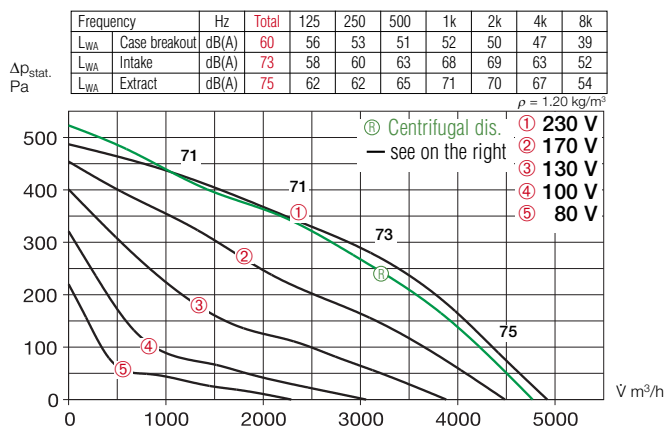
#### □ Electrical connection

Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

| Type                                                                                        | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit | Full motor protection unit using the thermal contacts |
|---------------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-----------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------------------------------------------------------|
|                                                                                             |          | V m <sup>3</sup> /h   | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A         | A                        | Nr.            | +°C                                    | +°C                  | Type Ref. No.                                          | Type Ref. No.                                         |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 400/4                                                                                   | 5513     | 4110                  | 1360              | 38                               | 0.53                  | 2.40      | 2.80                     | 864            | 50                                     | 50                   | MWS 3 1948                                             | TSW 3.0 1496 MW <sup>1)</sup> 1579                    |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 400/4/4                                                                                 | 5514     | 3300/3950             | 910/1270          | 38                               | 0.29/0.46             | 0.50/0.78 | 0.92                     | 867            | 50                                     | 45                   | RDS 1 1314                                             | TSW 1.5 1501 M4 <sup>2)</sup> 1571                    |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 400/4 T120                                                                              | 5772     | 4930                  | 1280              | 40                               | 0.54                  | 2.50      | 2.50                     | 935            | 120                                    | 100                  | MWS 3 1948                                             | TSW 3.0 1496 MW <sup>1)</sup> 1579                    |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 400/4/4 T120                                                                            | 5773     | 4010/4870             | 975/1255          | 40                               | 0.29/0.48             | 0.50/1.10 | 1.10                     | 947            | 120                                    | 120                  | RDS 2 1315                                             | TSW 1.5 1501 M4 <sup>2)</sup> 1571                    |

1) incl. operation switch

2) incl. operation and 2 speed switch

**GBW 400/4**

**GBW 400/4 T120**

**Motor protection**

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

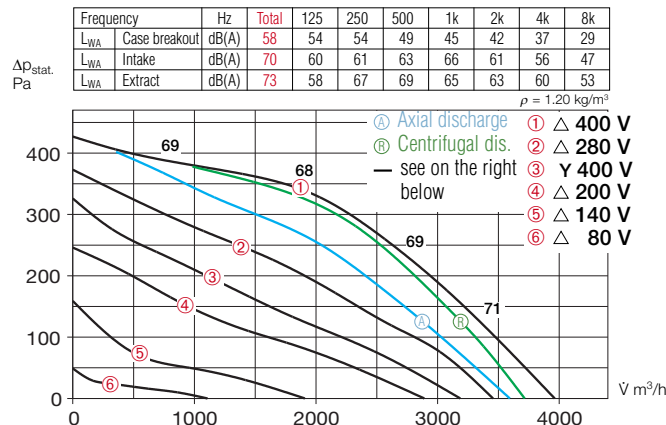
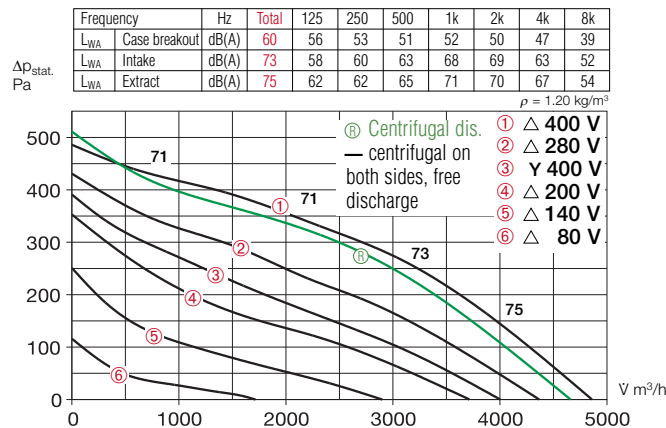
**Speed control**

All types are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve.

**Sound levels**

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

**GBD 400/4**

**GBD 400/4 T120**

**Accessories of both types**

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 400** Ref. No. 5626

**External weather louvers** to cover exhaust opening.

**GB-WSG 400** Ref. No. 5639

**Outdoor cover hood** for outdoor installation.

**GB-WSD 400** Ref. No. 5748

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2<sup>3)</sup>** Ref. No. 1351

<sup>3)</sup> full motor protection unit recommended:  
MD Ref. No. 5849

**Specific accessories**

for types GB..

**Condensate collector** with condensate spigot for pipe connection.  
**GB-KW 400** Ref. No. 5644

(Condensate collector with condensate spigot included in delivery with GB.. T120).

for types GB.. T120

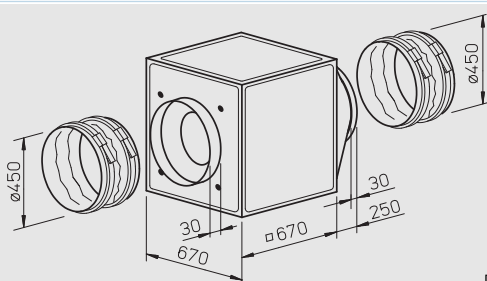
**Rain drainage** for outdoor installation (drill holes for rain drainage is already prepared).

**GB-RA** Ref. No. 9418

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

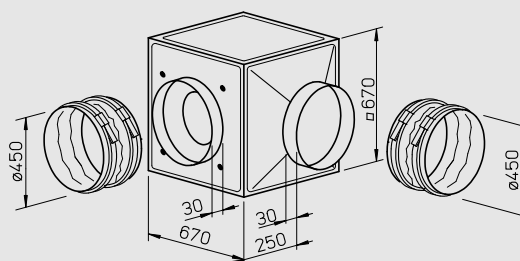
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature consulting and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved centrifugal impeller highly efficient with polymer blades on galvanised steel disc (with GB.. T120 aluminium impeller), direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

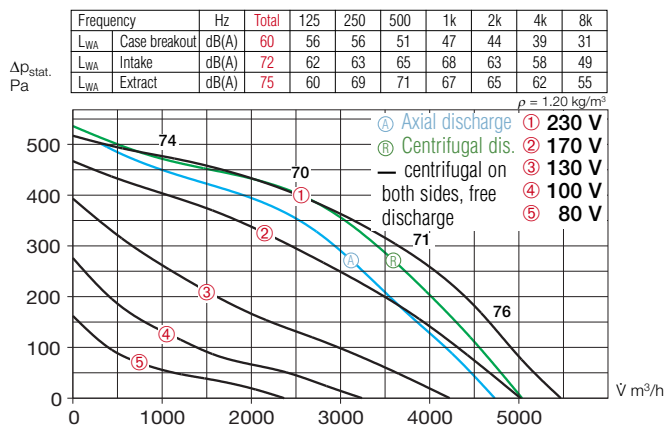
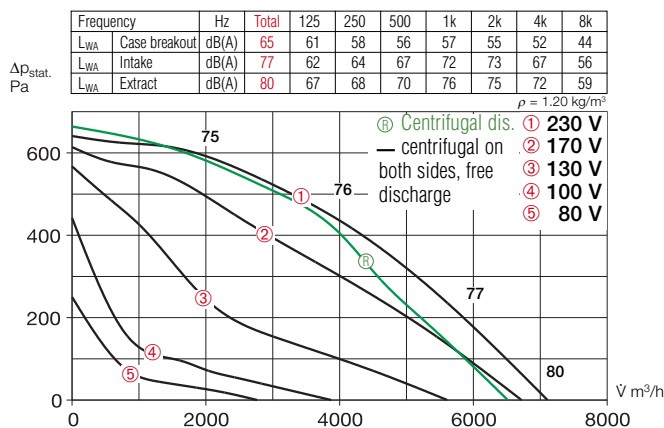
#### □ Electrical connection

Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

| Type                                                                                        | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit | Full motor protection unit using the thermal contacts |
|---------------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-----------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------------------------------------------------------|
|                                                                                             |          | V m <sup>3</sup> /h   | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A         | A                        | Nr.            | +°C                                    | +°C                  | kg                                                     |                                                       |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 450/4                                                                                   | 5515     | 5450                  | 1270              | 40                               | 0.76                  | 3.50      | 3.50                     | 864            | 45                                     | 45                   | 49                                                     | MWS 5 1949 TSW 5.0 1497 MW <sup>1)</sup> 1579         |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 450/4/4                                                                                 | 5516     | 4350/5450             | 880/1240          | 40                               | 0.36/0.67             | 0.70/1.30 | 1.30                     | 867            | 55                                     | 55                   | 49                                                     | RDS 2 1315 TSD 1.5 1501 M4 <sup>2)</sup> 1571         |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBW 450/4 T120                                                                              | 5774     | 7110                  | 1370              | 45                               | 1.00                  | 4.60      | 5.50                     | 935            | 120                                    | 100                  | 74                                                     | MWS 7.5 1950 TSW 7.5 1596 MW <sup>1)</sup> 1579       |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |           |                          |                |                                        |                      |                                                        |                                                       |
| GBD 450/4/4 T120                                                                            | 5775     | 6210/7180             | 1100/1350         | 45                               | 0.65/0.90             | 1.10/1.60 | 1.80                     | 947            | 120                                    | 110                  | 74                                                     | RDS 2 1315 TSD 3.0 1502 M4 <sup>2)</sup> 1571         |

1) incl. operation switch

2) incl. operation and 2 speed switch

**GBW 450/4**

**GBW 450/4 T120**

**Motor protection**

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

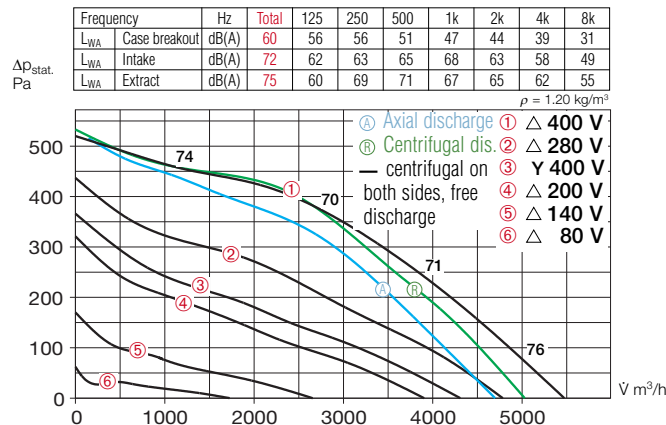
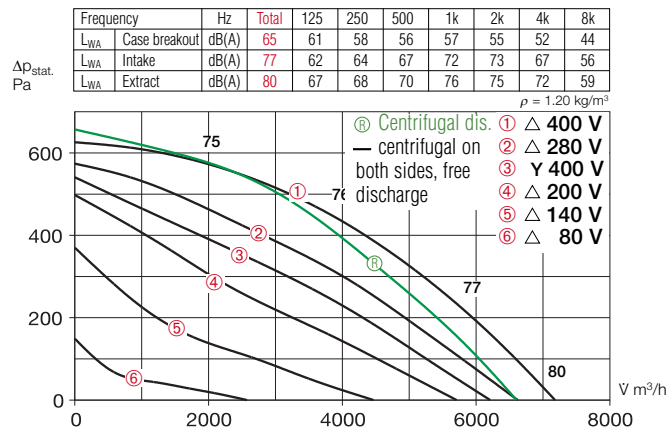
**Speed control**

All types are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve.

**Sound levels**

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

**GBD 450/4**

**GBD 450/4 T120**

**Accessories of both types**

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 450** Ref. No. 5626

**External weather louvers** to cover exhaust opening.

**GB-WSG 450** Ref. No. 5639

**Outdoor cover hood** for outdoor installation.

**GB-WSD 450** Ref. No. 5748

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2<sup>3)</sup>** Ref. No. 1351

<sup>3)</sup> full motor protection unit recommended:  
MD Ref. No. 5849

**Specific accessories**

for types GB..

**Condensate collector** with condensate spigot for pipe connection.  
**GB-KW 450** Ref. No. 5644

(Condensate collector with condensate spigot included in delivery with GB.. T120).

for types GB.. T120

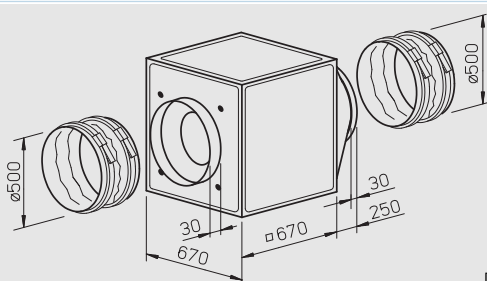
**Rain drainage** for outdoor installation (drill holes for rain drainage is already prepared).

**GB-RA** Ref. No. 9418

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

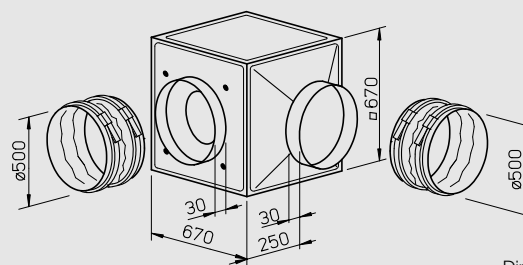
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

**NEW!**

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

#### □ Electrical connection

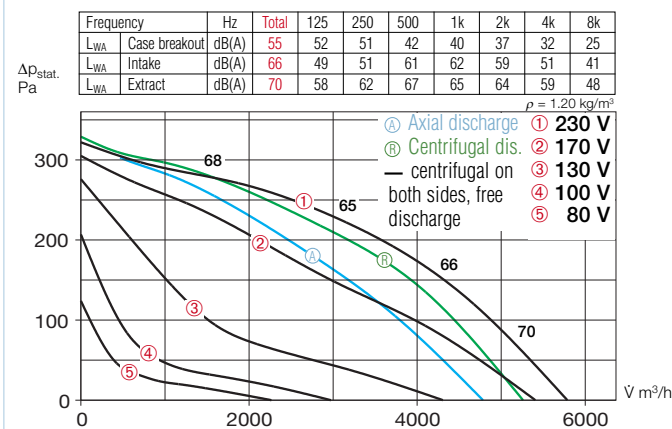
Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

| Type                                                                                        | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | full load  | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit | Full motor protection unit using the thermal contacts |
|---------------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|------------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------------------------------------------------------|
|                                                                                             |          | $\text{m}^3/\text{h}$ | $\text{min}^{-1}$ | $\text{dB(A) at 4 m}$            | $\text{kW}$           | $\text{A}$ | $\text{A}$               | Nr.            | $^{\circ}\text{C}$                     | $\text{kg}$          | Type Ref. No.                                          | Type Ref. No.                                         |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |            |                          |                |                                        |                      |                                                        |                                                       |
| GBW 500/6                                                                                   | 5519     | 5760                  | 880               | 35                               | 0.52                  | 2.30       | 2.60                     | 864            | 45                                     | 45                   | MWS 3 1948                                             | TSW 3.0 1496 MW <sup>1)</sup> 1579                    |
| GBW 500/4                                                                                   | 5517     | 8400                  | 1350              | 45                               | 1.38                  | 6.40       | 8.20                     | 865            | 65                                     | 55                   | MWS 10 1946                                            | — — —                                                 |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |            |                          |                |                                        |                      |                                                        |                                                       |
| GBD 500/4/4                                                                                 | 5518     | 8000/8850             | 1075/1340         | 45                               | 0.97/1.45             | 1.60/2.80  | 2.90                     | 867            | 50                                     | 50                   | RDS 7 1578                                             | TSD 5.5 1503 M4 <sup>2)</sup> 1571                    |
| <b>1 Phase motor, 230 V / 1 ph. / 50 Hz, capacitor motor, protection to IP 54</b>           |          |                       |                   |                                  |                       |            |                          |                |                                        |                      |                                                        |                                                       |
| GBW 500/4 T120                                                                              | 5776     | 8345                  | 1340              | 45                               | 1.40                  | 6.1        | 7.0                      | 301            | 120                                    | 100                  | MWS 10 1946                                            | — — MW <sup>1)</sup> 1579                             |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |            |                          |                |                                        |                      |                                                        |                                                       |
| GBD 500/4/4 T120                                                                            | 5777     | 7320/8350             | 1070/1365         | 45                               | 1.07/1.50             | 1.80/3.00  | 3.0                      | 947            | 120                                    | 110                  | RDS 4 1316                                             | TSD 3.0 1502 M4 <sup>2)</sup> 1571                    |

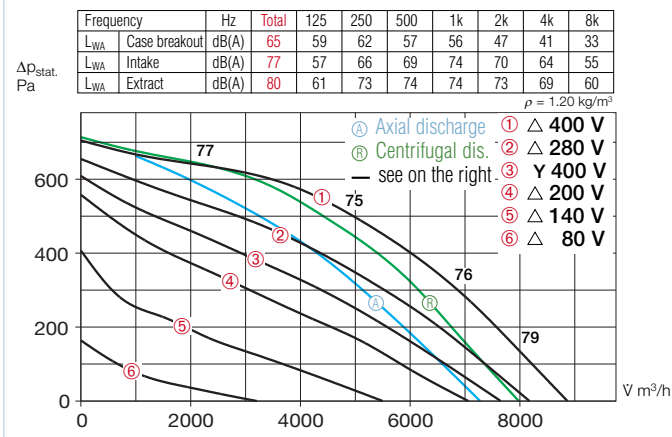
1) incl. operation switch

2) incl. operation and 2 speed switch

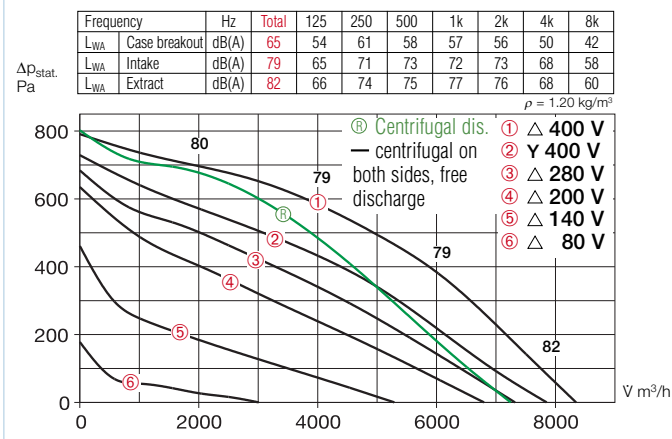
## GBW 500/6



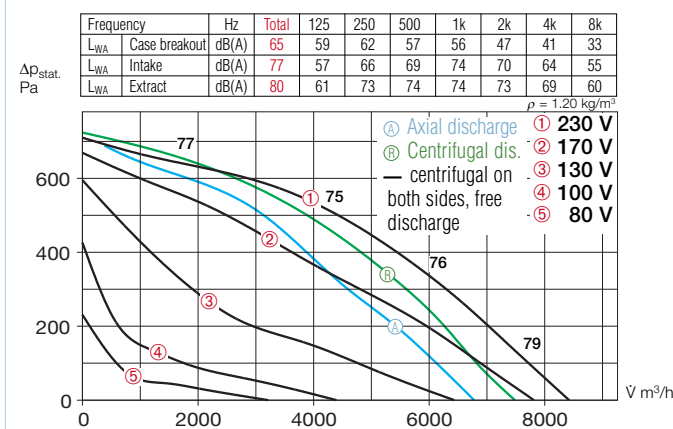
## GBD 500/4/4



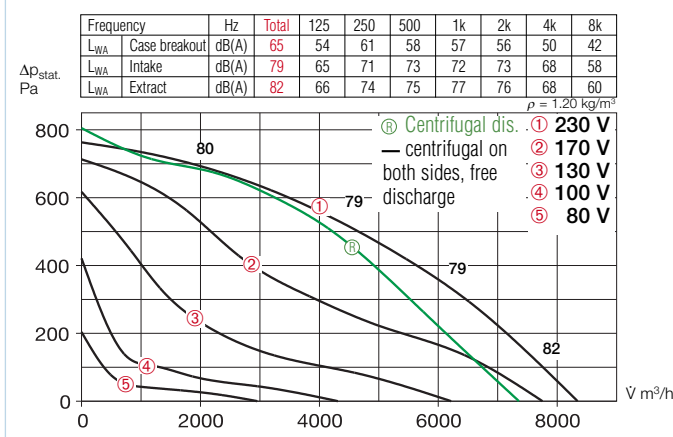
## GBD 500/4/4 T120



## GBW 500/4



## GBW 500/4 T120



## Motor protection

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

## Speed control

All types are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve.

## Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:

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  - sound level extract
- in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

## Information Pages

Design of systems, acoustic 12 on  
 General techn. information, speed control 17 on

## Accessory-Details Pages

Speed controller and full motor protection unit 397 on

## Accessories of both types

Anti vibration mounts for installation indoors. Set of 4.

SDD-U Ref. No. 5627

Wall bracket for wall mounting.

GB-WK 500 Ref. No. 5626

External weather louvers to over exhaust opening.

GB-WSG 500 Ref. No. 5639

Outdoor cover hood for outdoor installation.

GB-WSD 500 Ref. No. 5748

On/Off and 2-speed switch for 3-phase star/delta motors.

DS 2 <sup>3)</sup> Ref. No. 1351

## Specific accessories

for types GB..

Condensate collector with condensate spigot for pipe connection. GB-KW 500 Ref. No. 5644

(Condensate collector with condensate spigot included in delivery with GB.. T120).

for types GB.. T120

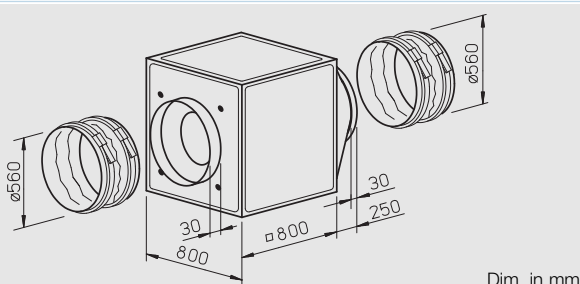
Rain drainage for outdoor installation (drill holes for rain drainage is already prepared).

GB-RA Ref. No. 9418

<sup>3)</sup> full motor protection unit recommended: MD Ref. No. 5849

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
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### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

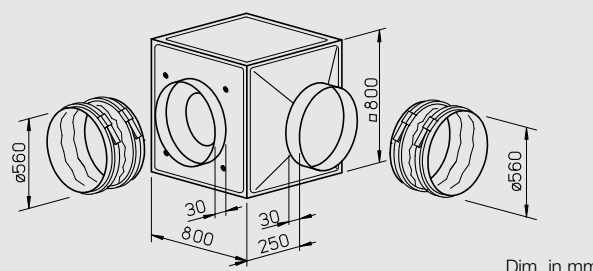
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

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#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

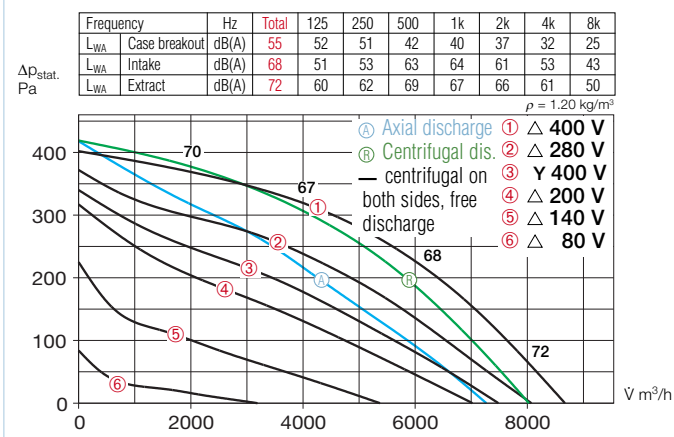
#### □ Electrical connection

Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

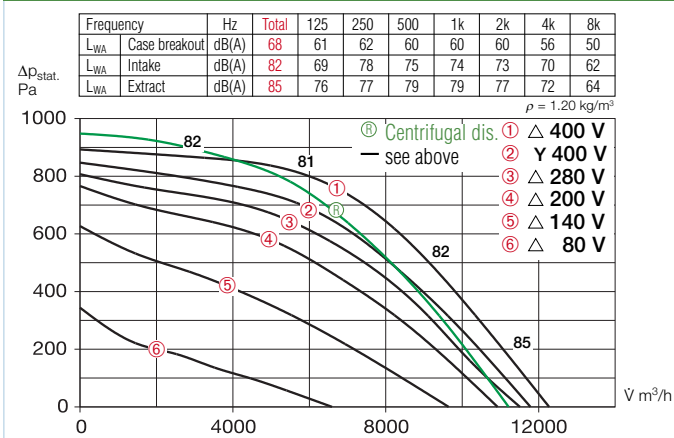
| Type                                                                                 | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | Current full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit |       |          |         | Full motor protection unit using the thermal contacts |                  |          |
|--------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-------------------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------|----------|---------|-------------------------------------------------------|------------------|----------|
|                                                                                      |          | l m³/h                | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A                 | A                        | Nr.            | +°C                                    | +°C                  | kg                                                     | Type  | Ref. No. | Type    | Ref. No.                                              | Type             | Ref. No. |
| 2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54 |          |                       |                   |                                  |                       |                   |                          |                |                                        |                      |                                                        |       |          |         |                                                       |                  |          |
| GBD 560/6/6                                                                          | 5522     | 7800/8640             | 690/870           | 35                               | 0.51/0.80             | 0.90/1.90         | 1.90                     | 867            | 60                                     | 60                   | 80                                                     | RDS 4 | 1316     | TSD 3.0 | 1502                                                  | M4 <sup>1)</sup> | 1571     |
| GBD 560/4/4                                                                          | 5521     | 11500/12590           | 1110/1350         | 44                               | 1.70/2.50             | 2.80/4.80         | 4.90                     | 867            | 55                                     | 45                   | 90                                                     | RDS 7 | 1578     | TSD 7.0 | 1504                                                  | M4 <sup>1)</sup> | 1571     |
| 2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54 |          |                       |                   |                                  |                       |                   |                          |                |                                        |                      |                                                        |       |          |         |                                                       |                  |          |
| GBD 560/4/4 T120                                                                     | 5778     | 11520/12300           | 1250/1400         | 48                               | 1.85/2.50             | 3.20/6.80         | 6.80                     | 520            | 120                                    | 120                  | 105                                                    | RDS 7 | 1578     | TSD 7.0 | 1504                                                  | M4 <sup>1)</sup> | 1571     |

<sup>1)</sup> incl. operation and 2 speed switch

## GBD 560/6/6



## GBD 560/4/4 T120



### Motor protection

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

### Speed control

All types are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve.

### Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

### Accessories of both types

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 560** Ref. No. 5626

**External weather louvers** to cover exhaust opening.

**GB-WSG 560** Ref. No. 5640

**Outdoor cover hood** for outdoor installation.

**GB-WSD 560** Ref. No. 5749

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2<sup>2)</sup>** Ref. No. 1351

<sup>2)</sup> full motor protection unit recommended:  
MD Ref. No. 5849

### Specific accessories

for types GB..

**Condensate collector** with condensate spigot for pipe connection.  
**GB-KW 560** Ref. No. 5645  
(Condensate collector with condensate spigot included in delivery with GB.. T120).

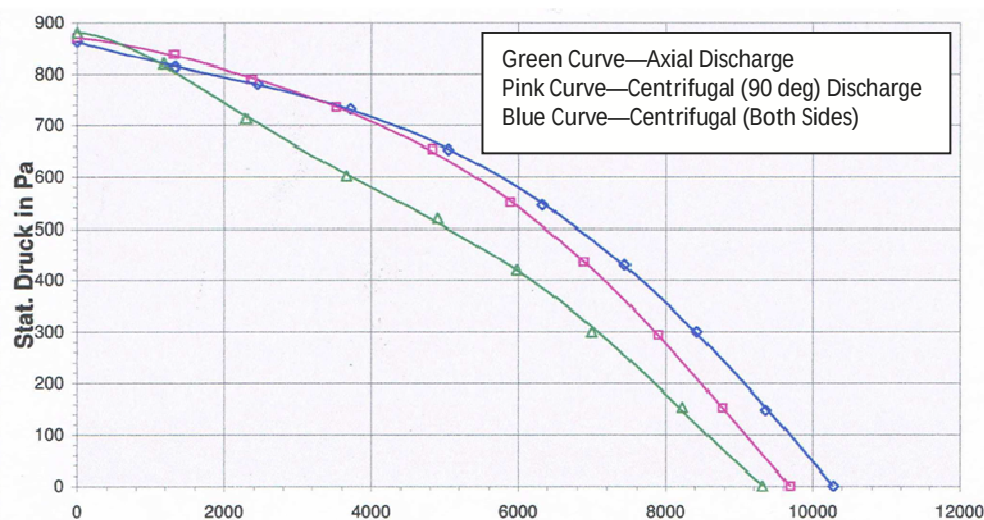
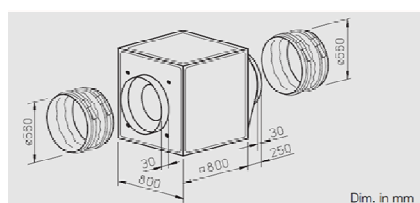
for types GB.. T120

**Rain drainage** for outdoor installation (drill holes for rain drainage is already prepared).

**GB-RA** Ref. No. 9418

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

# GBW 560/4


 $\Delta p_{stat}$   
Pa

| Frequency       |               | Hz    | Total | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
|-----------------|---------------|-------|-------|-----|-----|-----|----|----|----|----|
| L <sub>WA</sub> | Case breakout | dB(A) | 64    | 64  | 64  | 48  | 50 | 46 | 43 | 37 |
| L <sub>WA</sub> | Intake        | dB(A) | 77    | 57  | 66  | 69  | 74 | 70 | 64 | 55 |
| L <sub>WA</sub> | Extract       | dB(A) | 81    | 62  | 74  | 75  | 75 | 74 | 70 | 61 |

Self supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel. Intake cone for ideal airflow, spigot and flexible connector for duct connection. With discharge adapter (square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks. Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvres (accessories).

## Impeller:

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 - class 6.3

## Motor:

Maintenance free external rotor motor or IEC standard motor protected to IP 44 and 54. With ball bearings and radio suppressed as standard.

## Electrical Connection:

Standard terminal box (IP54) fitted on the motor support plate.

## Motor Protection:

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

## Speed Control:

Speed controllable by voltage reduction using transformer controller.

| Type      | Ref. No. | R.P.M.            | Sound Level  | Motor power (nominal) | Current Full Load | Maximum air flow temp. | Nom. weight (net) | 5 step trans. controller |      |
|-----------|----------|-------------------|--------------|-----------------------|-------------------|------------------------|-------------------|--------------------------|------|
|           |          | min <sup>-1</sup> | dB(A) at 4 m | kW                    | Amps              | +°C                    | kg                | Type                     | Ref. |
| GBW 560/4 | 5508     | 1370              | 44           | 2.0                   | 8.7               | 60                     | 90                | TSW 10                   | 1498 |

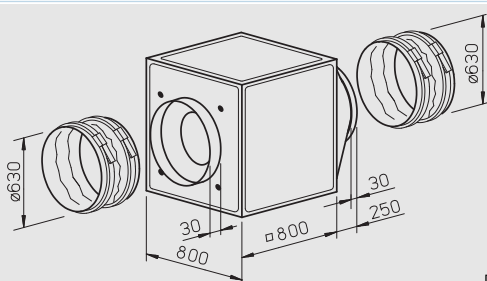
Volume Flow m³/s against static pressure

|      |      |      |      |      |      |      |     |      |      |      |      |
|------|------|------|------|------|------|------|-----|------|------|------|------|
| 0    | 50   | 100  | 150  | 200  | 250  | 300  | 400 | 500  | 600  | 700  | 800  |
| 2.77 | 2.72 | 2.55 | 2.48 | 2.41 | 2.31 | 2.22 | 2.0 | 1.72 | 1.44 | 1.00 | 0.36 |

Type Ref.

## Models GB..

Arbitrary installation position and flexible assembly by five possible discharge directions.



### ■ Special features of type GB.. T120

- Designed for moving dirty, humid and hot air volumes up to max. 120° C.
- Motor located outside of air flow.
- Temperature insulated partition panel between motor and impeller, lined with 20 mm thick, flame-retardant mineral wool.
- Easily accessible motor and impeller unit, removable without disassembling the system components.
- Inspection cover with handle, simply remove for cleaning and maintenance.
- Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared.

### □ Assembly of types GB.. T120

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via the discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

### ■ Feature

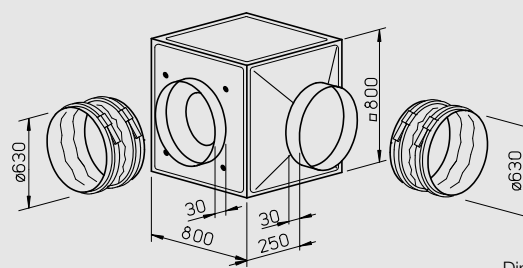
#### □ Assembly of types GB..

Arbitrary installation position and flexible assembly by five possible discharge directions via the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## Models GB.. T120

NEW!

Designed for moving dirty, humid and hot air up to max. 120° C.



### ■ Specification of both types

#### □ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve (for the respective max. permissible air flow temperature) for duct connection. With discharge adapter (from square into circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

#### □ Impeller

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

#### □ Motor

Maintenance-free external rotor motor or IEC-standard motor protected to IP 44 or 54. With ball bearings and radio suppressed as standard.

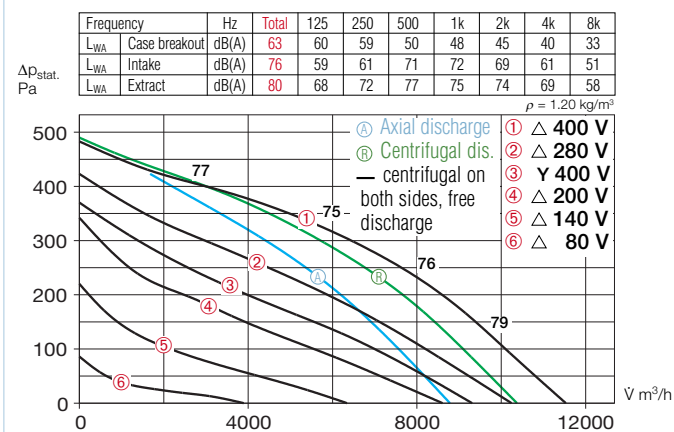
#### □ Electrical connection

Standard terminal box (IP 54) fitted on the motor; with GB.. T120 fitted on the motor support plate.

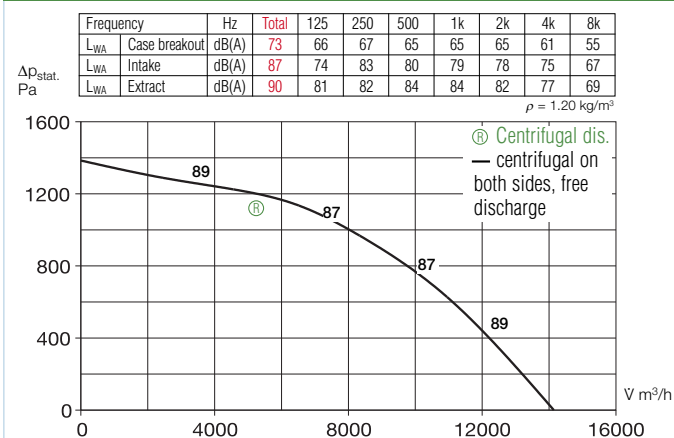
| Type                                                                                        | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | Current full load | Current speed controlled | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller with motor protect. unit | Full motor protection unit using the thermal contacts |
|---------------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-------------------|--------------------------|----------------|----------------------------------------|----------------------|--------------------------------------------------------|-------------------------------------------------------|
|                                                                                             |          | V m <sup>3</sup> /h   | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A                 | A                        | Nr.            | +°C                                    | +°C                  | kg                                                     | Type Ref. No. Type Ref. No. Type Ref. No.             |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54</b> |          |                       |                   |                                  |                       |                   |                          |                |                                        |                      |                                                        |                                                       |
| GBD 630/6/6                                                                                 | 5524     | 9700/11490            | 630/820           | 43                               | 0.76/1.35             | 1.50/2.40         | 2.40                     | 867            | 60                                     | 60                   | 103                                                    | RDS 4 1316 TSD 5.5 1503 M4 <sup>1)</sup> 1571         |
| GBD 630/4/4                                                                                 | 5523     | 13500/14950           | 1120/1380         | 48                               | 2.55/3.65             | 4.50/6.60         | 7.90                     | 867            | 75                                     | 50                   | 105                                                    | RDS 11 1332 TSD 11.0 1513 M4 <sup>1)</sup> 1571       |
| <b>3 Phase motor, 400 V / 3 ph. / 50 Hz, protection to IP 54</b>                            |          |                       |                   |                                  |                       |                   |                          |                |                                        |                      |                                                        |                                                       |
| frequency inverter / sinusoidal filter                                                      |          |                       |                   |                                  |                       |                   |                          |                |                                        |                      |                                                        |                                                       |
| GBD 630/4 T120                                                                              | 5779     | 14000                 | 1445              | 53                               | 4.40                  | 8.10              | —                        | 776            | 120                                    | 120                  | 131                                                    | FUG 12 6109 / FU-SF 16 6117 — —                       |

<sup>1)</sup> incl. operation and 2 speed switch

## GBD 630/6/6



## GBD 630/4 T120



### Motor protection

Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

### Speed control

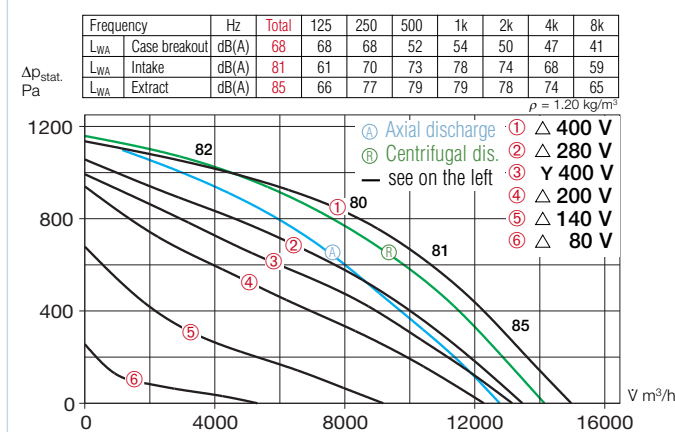
All types (except GB 630/4 T120) are speed controllable by voltage reduction using a transformer controller. The 3-phase models can also be 2 speed controlled by star/delta switch (accessories DS 2 or full motor protection unit M 4). The duties at different speeds are given in the performance curve. Type GBD 630/4 T120 is exclusively controllable by frequency inverter.

### Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the
- case breakout level at 4 m (freefield conditions).

## GBD 630/4/4



### Accessories of both types

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**Wall bracket** for wall mounting.

**GB-WK 630** Ref. No. 5626

**External weather louvers** to cover exhaust opening.

**GB-WSG 630** Ref. No. 5640

**Outdoor cover hood** for outdoor installation.

**GB-WSD 630** Ref. No. 5749

### Specific accessories

for types GB..

**Condensate collector** with condensate spigot for pipe connection. **GB-KW 630** Ref. No. 5645

(Condensate collector with condensate spigot included in delivery with GB.. T120).

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2** Ref. No. 1351

for types GB.. T120

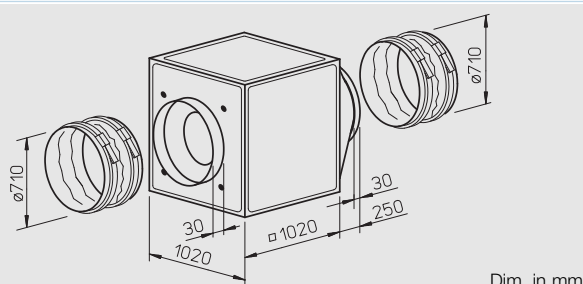
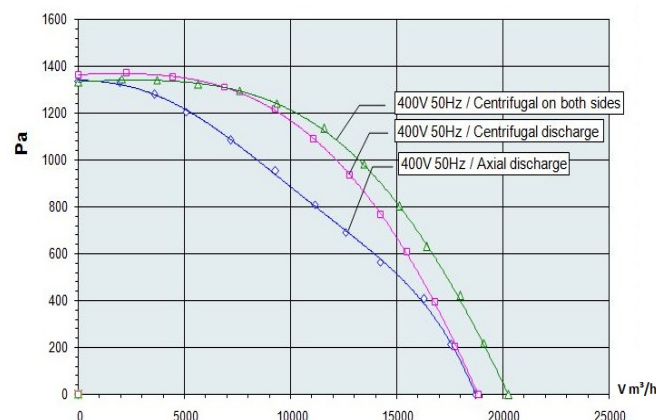
**Rain drainage** for outdoor installation (drill holes for rain drainage is already prepared).

**GB-RA** Ref. No. 9418

2) full motor protection unit recommended: MD Ref. No. 5849

| Information                                     | Pages  |
|-------------------------------------------------|--------|
| Design of systems, acoustic                     | 12 on  |
| General techn. information, speed control       | 17 on  |
| Accessory-Details                               | Pages  |
| Speed controller and full motor protection unit | 397 on |

## GBD 710/4/4



| Type                                                     | Ref. No. | Air flow<br>volume<br>(FID) | R.P.M. | Sound press.<br>level case<br>breakout | Motor<br>power<br>(nominal) | Current<br>full load | Current<br>speed<br>controlled | Wiring<br>diagram | Maximum air flow<br>temperature<br>full load    controlled |     | Nominal<br>weight<br>(net) | Inverter controller |          | Full motor protection<br>unit using the<br>thermal contacts |          |
|----------------------------------------------------------|----------|-----------------------------|--------|----------------------------------------|-----------------------------|----------------------|--------------------------------|-------------------|------------------------------------------------------------|-----|----------------------------|---------------------|----------|-------------------------------------------------------------|----------|
|                                                          |          | l m³/h                      | min⁻¹  | dB(A) at 4 m                           | kW                          | A                    | A                              | Nr.               | +°C                                                        | +°C | kg                         | Type                | Ref.     | Type                                                        | Ref. No. |
| 2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ |          |                             |        |                                        |                             |                      |                                |                   |                                                            |     |                            |                     |          |                                                             |          |
| GBD 710/4/4                                              | 5529     | 20285                       | 1465   | TBC                                    | 5.5                         | 9.9                  | 10.2                           | TBC               | 50                                                         | 50  | 167                        | 5.5kW IP55          | 131B5488 | -                                                           |          |

# GBD 710/4/4 T120

## Models GB... T120

**NEW!**

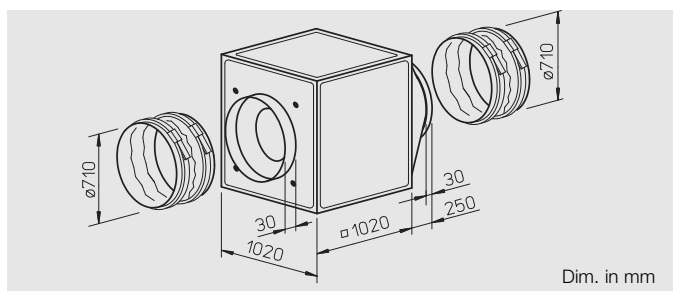
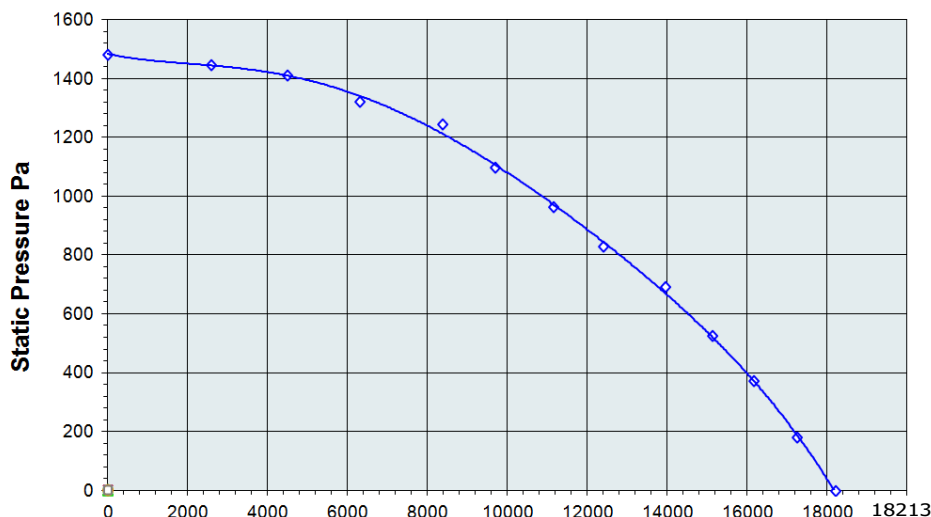
Designed for moving dirty, humid and hot air up to max. 120° C.



Centrifugal discharge



centrifugal on both sides, free discharge



Designed for moving dirty, humid and hot air volumes up to max. 120 C. Motor located outside of air flow. Temperature insulated partition panel between motor and impeller, lined with 20mm thick, flame retardant mineral wool. Condensate collector with condensate spigot included in delivery. Drill hole for rain drainage (accessories) for outdoor installation is prepared. Self supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel. Intake cone for ideal air-flow, spigot and flexible connector for duct connection. With discharge adapter (square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

Installation must be carried out with condensation discharge showing downward. Flexible assembly by three possible centrifugal discharge directions via discharge adapter. Outdoor installation is possible using outdoor cover hood and external weather louvres (accessories).

Impeller: Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 - class 6.3

**Motor:** Maintenance free external rotor motor or IEC standard motor protected to IP 44 and 54. With ball bearings and radio suppressed as standard.

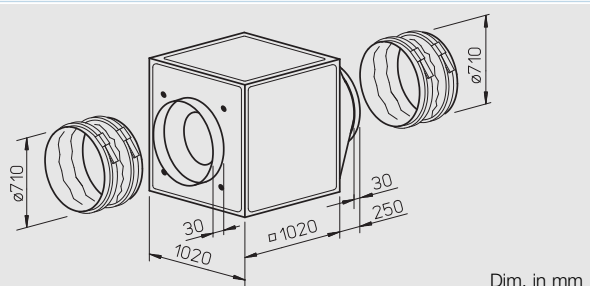
**Electrical Connection:** Standard terminal box (IP54) fitted on the motor support plate.

**Motor Protection:** Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

| Type                                                            | Ref. No. | Air flow volume (FID) | R.P.M. | Sound press. level case breakout | Motor power (nominal) | Current full load | Current speed controlled | Wiring diagram | Maximum air flow full load | Maximum air flow temperature controlled | Nominal weight (net) | Inverter controller |          | Full motor protection unit using the thermal contacts |          |
|-----------------------------------------------------------------|----------|-----------------------|--------|----------------------------------|-----------------------|-------------------|--------------------------|----------------|----------------------------|-----------------------------------------|----------------------|---------------------|----------|-------------------------------------------------------|----------|
|                                                                 |          | V m³/h                | min⁻¹  | dB(A) at 4 m                     | kW                    | A                 | A                        | Nr.            | +°C                        | +°C                                     | kg                   | Type                | Ref.     | Type                                                  | Ref. No. |
| <b>2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/△</b> |          |                       |        |                                  |                       |                   |                          |                |                            |                                         |                      |                     |          |                                                       |          |
| GBD 710/4 T120                                                  | 5756     | 20285                 | 1465   | TBC                              | 5.5                   | 9.9               | 10.2                     | TBC            | 120                        | 120                                     | 167                  | 5.5kW IP55          | 131B5488 | -                                                     |          |

Type Ref.

## Models GB..



## ■ Specification

## ■ Casing

Self-supporting frame construction from aluminium hollow profiles. Double-walled side panels from galvanised sheet steel, lined with 20 mm thick temperature insulating and flame-retardant mineral wool. Intake cone for ideal inflow as well as spigot and flexible sleeve for duct connection. With discharge adapter (from square to circular) on the pressure side for low-loss discharge and flexible sleeve to reduce vibration transmission. Simple positioning by standard crane hooks.

## □ Impeller

Smooth running backward curved aluminium centrifugal impeller highly efficient and direct driven. Energy efficient with a low noise development. Dynamically balanced together with the motor to DIN ISO 1940 Pt.1 – class 6.3.

## □ Motor

Maintenance-free and speed controllable external rotor motor, protection to IP 44. With ball bearings and radio suppressed as standard.

## □ Electrical connection

Terminal box fitted on the motor as standard, protection to IP 54.

## □ Motor protection

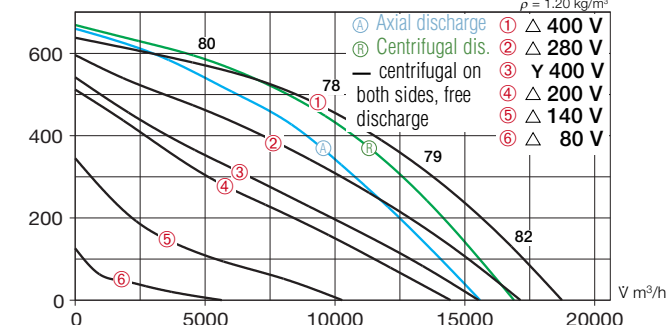
Motors have thermal contacts wired to the terminal block and must be connected to a motor protection unit.

## □ Speed control

All models are speed controllable using a transformer controller for voltage reduction. The 3 ph.-models can also be operated on two speeds using a Y/Δ switch DS 2 or a full motor protection unit M4. The voltage steps are given in the performance curve.

## GBD 710/6/6

| Frequency                     | Hz    | Total | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
|-------------------------------|-------|-------|-----|-----|-----|----|----|----|----|
| L <sub>WA</sub> Case breakout | dB(A) | 66    | 63  | 62  | 53  | 51 | 48 | 43 | 36 |
| L <sub>WA</sub> Intake        | dB(A) | 79    | 62  | 64  | 74  | 75 | 72 | 64 | 54 |
| L <sub>WA</sub> Extract       | dB(A) | 83    | 71  | 75  | 80  | 78 | 77 | 72 | 61 |



## ■ Information Pages

|                                           |       |
|-------------------------------------------|-------|
| Design of systems, acoustic               | 12 on |
| General techn. information, speed control | 17 on |

## ■ Accessory-Details Pages

|                                                 |        |
|-------------------------------------------------|--------|
| Speed controller and full motor protection unit | 397 on |
|-------------------------------------------------|--------|

## □ Assembly

Arbitrary installation position and flexible assembly by five possible discharge directions of the discharge adapter. For wall mounting the wall bracket (accessories) has to be used. Outdoor installation is possible using outdoor cover hood and external weather louvers (accessories).

## ■ Sound levels

Total sound power levels and the spectrum figures in dB(A) are given for:

- sound level case breakout
- sound level intake
- sound level extract

in the tables above the performance curve. Beside, the sound power level (on intake) is stated over the rated characteristic curve. In the table below you can also find the

- case breakout level at 4 m (freefield conditions).

## ■ Accessories

**Anti vibration mounts** for installation indoors. Set of 4.

**SDD-U** Ref. No. 5627

**External weather louvers** to cover exhaust opening.

**GB-WSG 710** Ref. No. 5641

**Outdoor cover hood** for outdoor installation.

**GB-WSD 710** Ref. No. 5750

**Condensate collector** with condensate spigot for pipe connection.

**GB-KW 710** Ref. No. 5646

**On/Off and 2-speed switch** for 3-phase star/delta motors.

**DS 2<sup>2)</sup>** Ref. No. 1351

| Type                                                                                 | Ref. No. | Air flow volume (FID) | R.P.M.            | Sound press. level case breakout | Motor power (nominal) | Current   |                  | Wiring diagram | Maximum air flow temperature full load | Nominal weight (net) | 5 step transformer controller |                             | Full motor protection unit using the thermal contacts |          |          |                  |      |
|--------------------------------------------------------------------------------------|----------|-----------------------|-------------------|----------------------------------|-----------------------|-----------|------------------|----------------|----------------------------------------|----------------------|-------------------------------|-----------------------------|-------------------------------------------------------|----------|----------|------------------|------|
|                                                                                      |          |                       |                   |                                  |                       | full load | speed controlled |                |                                        |                      | with motor protect. unit      | without motor protect. unit | Type                                                  | Ref. No. | Type     | Ref. No.         | Type |
|                                                                                      |          | Ṽ m³/h                | min <sup>-1</sup> | dB(A) at 4 m                     | kW                    | A         | A                | Nr.            | +°C                                    | +°C                  | kg                            | Type                        | Ref. No.                                              | Type     | Ref. No. |                  |      |
| 2 speed motor, 3 Phase motor, 400 V / 3 ph. / 50 Hz, Y/Δ-wiring, protection to IP 54 |          |                       |                   |                                  |                       |           |                  |                |                                        |                      |                               |                             |                                                       |          |          |                  |      |
| GBD 710/6/6                                                                          | 5525     | 16500/18700           | 690/890           | 46                               | 1.55/2.45             | 2.90/4.70 | 4.70             | 867            | 50                                     | 50                   | 157                           | RDS 7                       | 1578                                                  | TSD 7.0  | 1504     | M4 <sup>1)</sup> | 1571 |

<sup>1)</sup> incl. operation and 2 speed switch <sup>2)</sup> required full motor protection unit: model MD, Ref. No. 5849