

# Regulating damper

# DRU



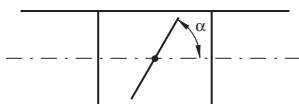
## Description

Has a turning, cut-off blade. The blade is stepless adjustable 0–90°. The damper admits an insulation thickness of approx. 50 mm.

The blade is designed to generate a minimum of noise. The noise is approx. the same as for a perforated blade. But the blade is less sensitive to clogging since it lacks perforations.

Setting angle  $\alpha$

$\alpha = 0^\circ =$  open blade,  $\alpha = 90^\circ =$  closed blad

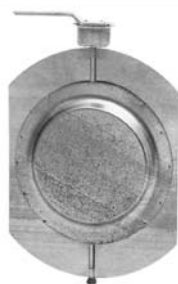


There is a separate assembly, measuring, balancing and maintenance instruction for this product.

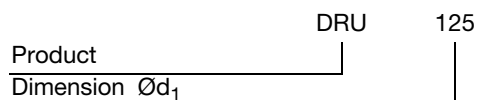
Ø 80–1000 fullfills pressure class A in closed position.

The cup at Ø 80–630 can be complemented with the special insulation cup IK at insulation thicker than 50 mm.

## Reinforced blade

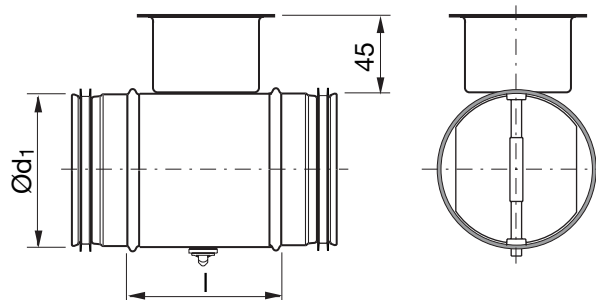


## Ordering example

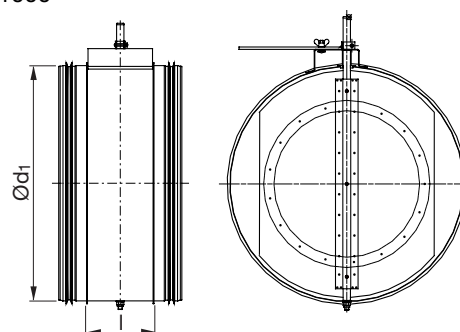


## Dimensions

Ø 80–630



Ø 800–1000



| Ød <sub>1</sub><br>nom | l<br>mm | m<br>kg | Sealing class past<br>closed blade |
|------------------------|---------|---------|------------------------------------|
| 80                     | 100     | 0,34    | 0                                  |
| 100                    | 100     | 0,40    | 0                                  |
| 112                    | 100     | 0,43    | 0                                  |
| 125                    | 100     | 0,46    | 0                                  |
| 140                    | 100     | 0,54    | 0                                  |
| 150                    | 100     | 0,60    | 0                                  |
| 160                    | 100     | 0,65    | 0                                  |
| 180                    | 100     | 0,69    | 0                                  |
| 200                    | 100     | 0,80    | 0                                  |
| 224                    | 100     | 0,90    | 0                                  |
| 250                    | 100     | 1,28    | 0                                  |
| 280                    | 100     | 1,40    | 0                                  |
| 300                    | 100     | 1,62    | 0                                  |
| 315                    | 100     | 1,70    | 0                                  |
| 355                    | 100     | 2,01    | 0                                  |
| 400                    | 100     | 2,82    | 0                                  |
| 450                    | 100     | 3,70    | 0                                  |
| 500                    | 115     | 4,70    | 0                                  |
| 560                    | 115     | 5,51    | 0                                  |
| 600                    | 115     | 5,90    | 0                                  |
| 630                    | 115     | 6,21    | 0                                  |
| 800                    | 230     | 18,2    | 0                                  |
| 1000                   | 230     | 24,4    | 0                                  |



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| Property  | Ø 80-315 | Ø 400 | Ø 500 | Ø 630 | Ø 800x1000 |
|---|----------|-------|-------|-------|------------|
| The blade is set via a knob in a protective cup.                                  | x        | x     | x     | x     |            |
| The setting of the blade is read against an embossed scale at the rim of the cup. | x        | x     | x     | x     |            |
| The blade is locked with two screws, type Pozidriv (PZD2).                        | x        | x     | x     | x     |            |
| The blade has reinforced locking with a sturdy wing nut.                          |          |       |       |       | x          |
| The blade is reinforced.  |          |       | x     | x     |            |
| The blade is additionally reinforced.   |          |       |       |       | x          |
| With sturdy handle.   |          | x     | x     | x     |            |
| With additionally reinforced handle.  |          |       |       |       | x          |
| With reinforced stop beads.   |          |       | x     | x     |            |
| The axle is reinforced.   |          |       |       |       | x          |
| The damper can be delivered prepared for motor.                                   | x        | x     | x     | x     |            |
| The damper can be delivered with motor.   | x        | x     | x     | x     | x          |

## Technical data

Pressure drop graphs with noise data for dimensioning

The solid curves show the pressure drop,  $\Delta p_t$ , over the damper as a function of flow  $q$ , and setting angle  $\alpha$ . The dashed curves give the A-weighted sound power data,  $L_{WA}$ , in dB to the duct.

### Example

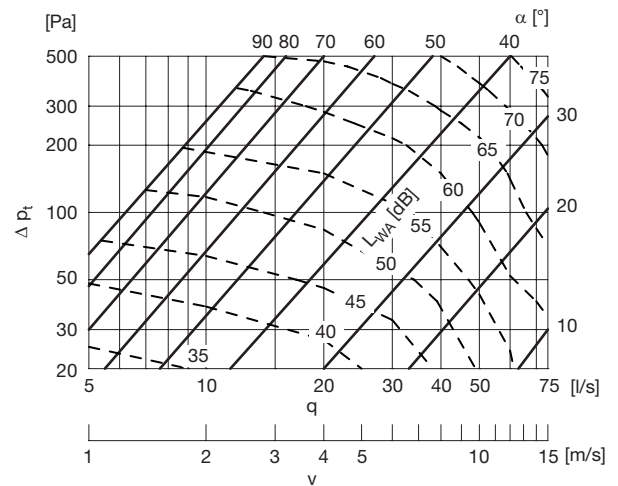
Given

Dimension Ø100  
Flow 60 l/s  
Pressure drop 200 Pa

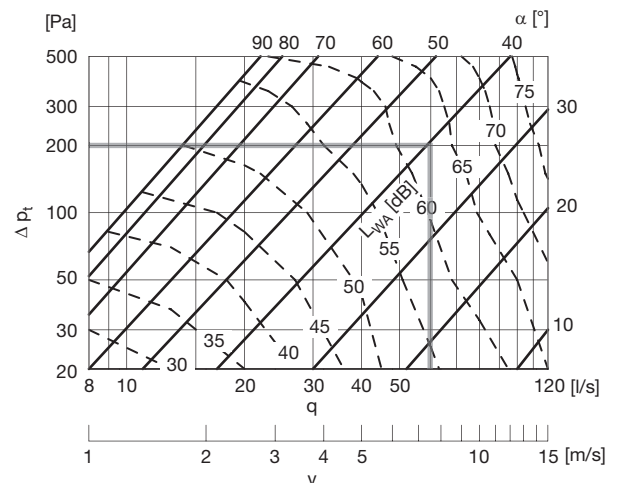
Obtained from graph

Setting angle 40°  
Sound power level 63 dB (A)

### Ø80



### Ø100

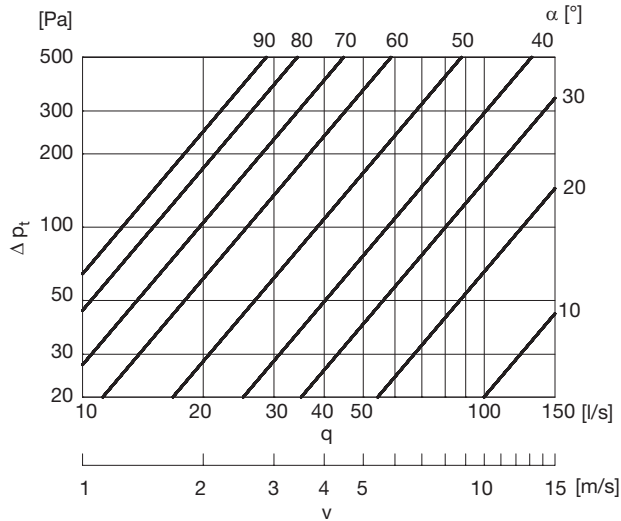


# Regulating damper

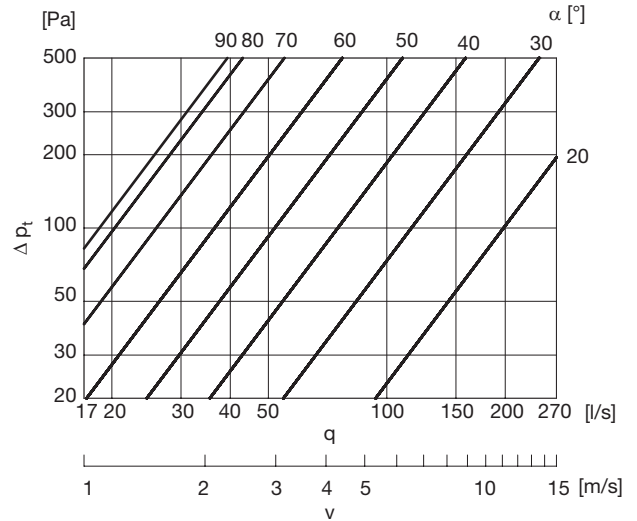
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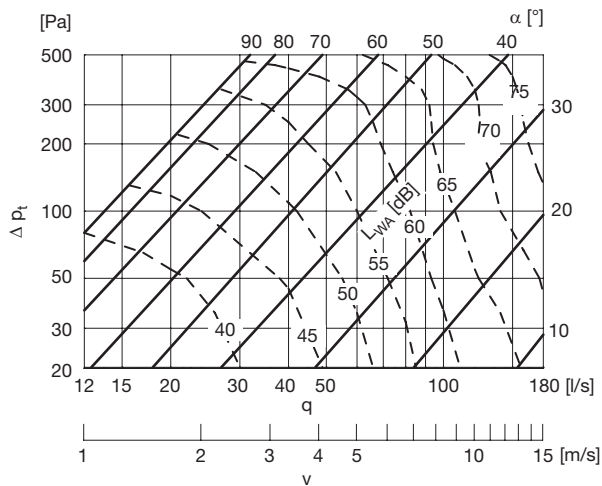
Ø112



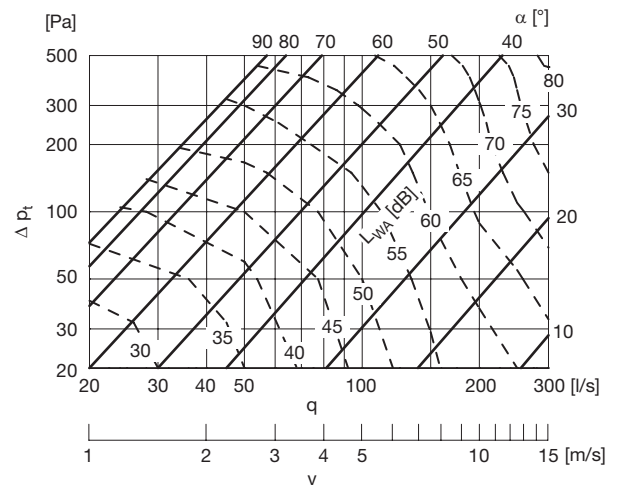
Ø150



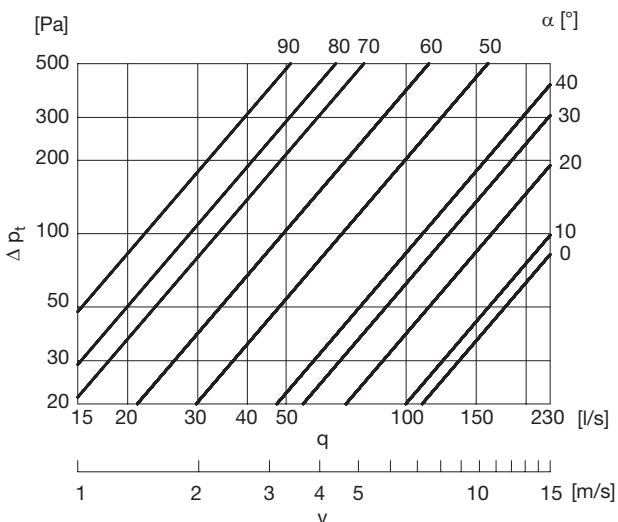
Ø125



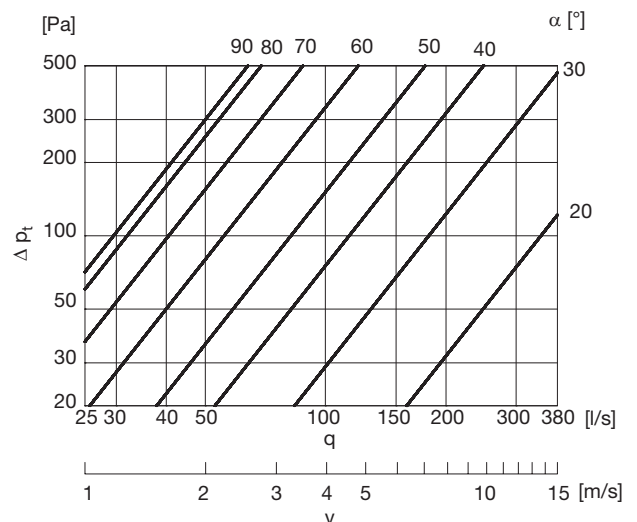
Ø160



Ø140



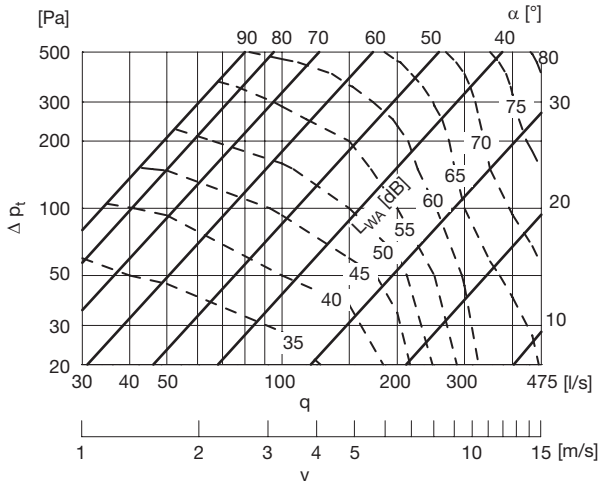
Ø180



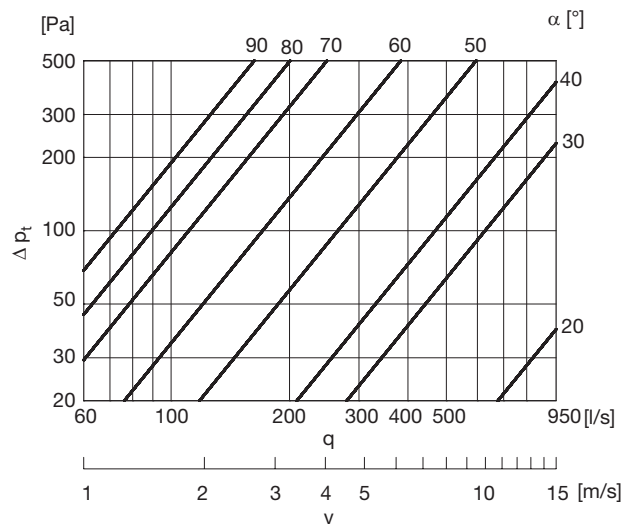
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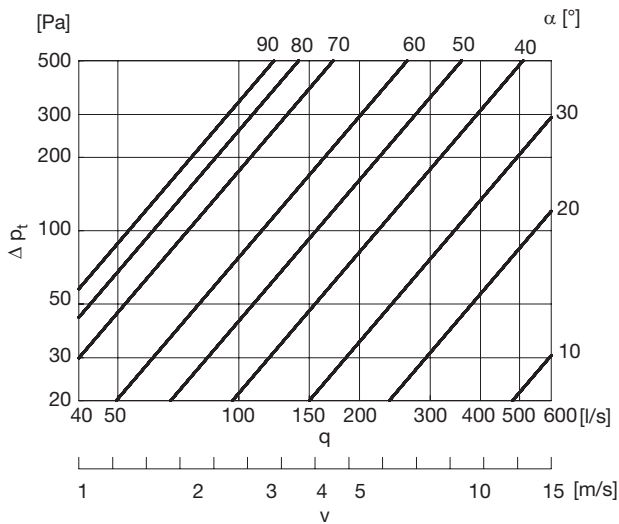
Ø200



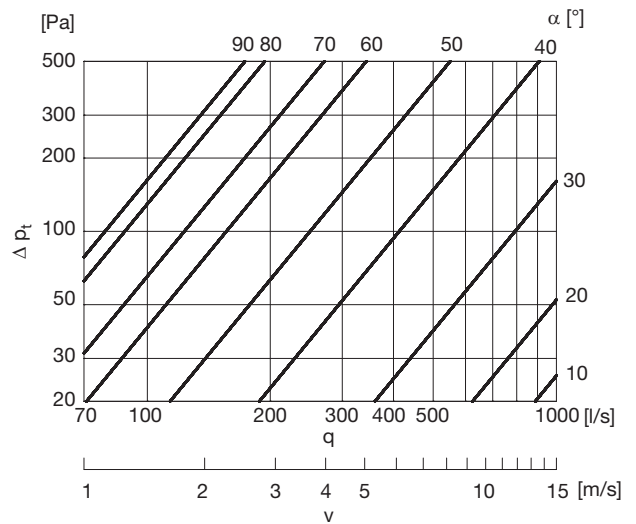
Ø280



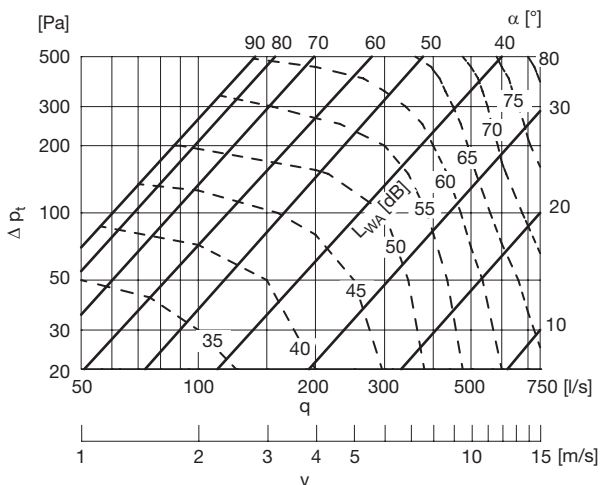
Ø224



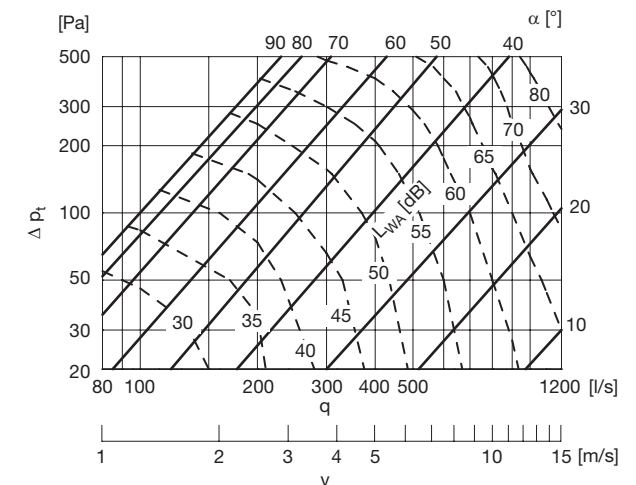
Ø300



Ø250



Ø315



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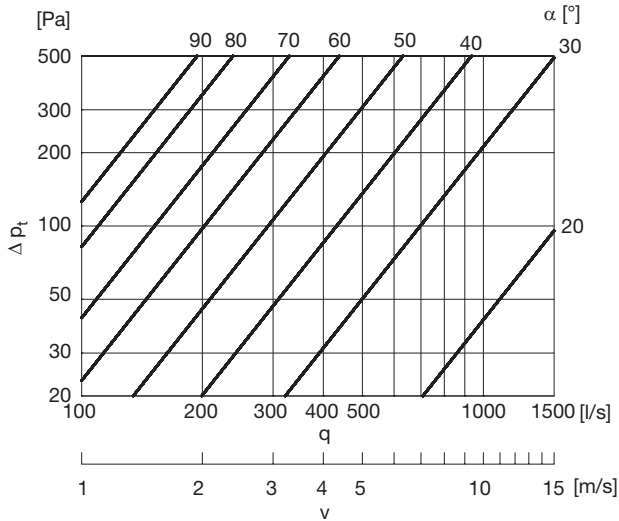


# Regulating damper

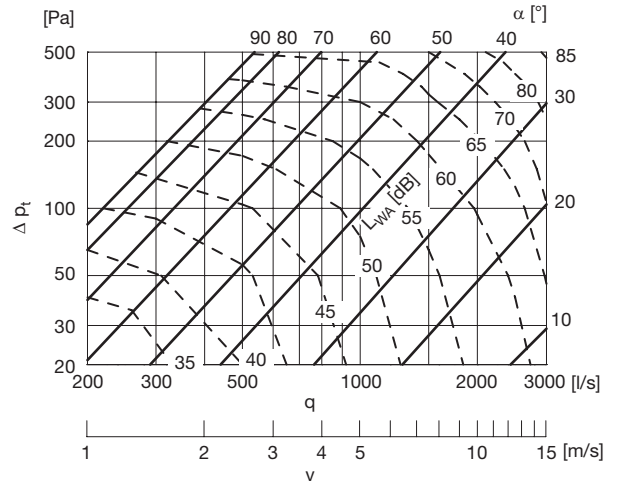
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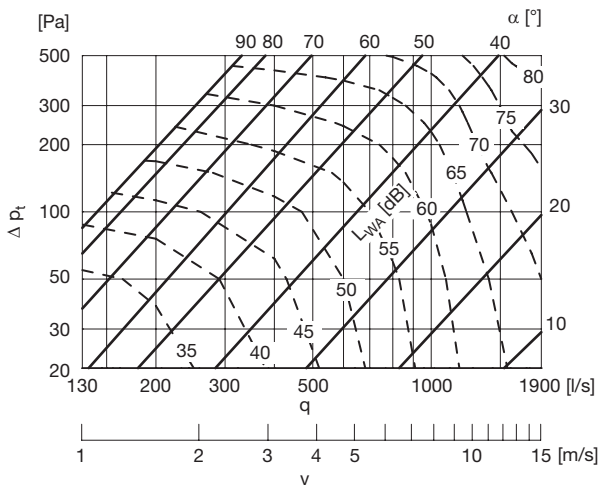
Ø355



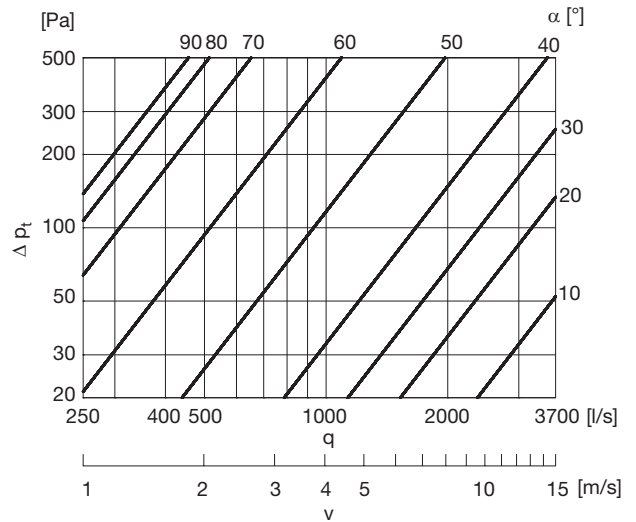
Ø500



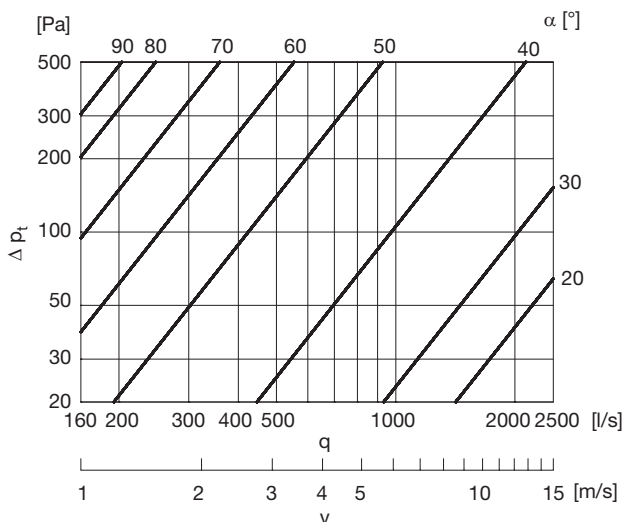
Ø400



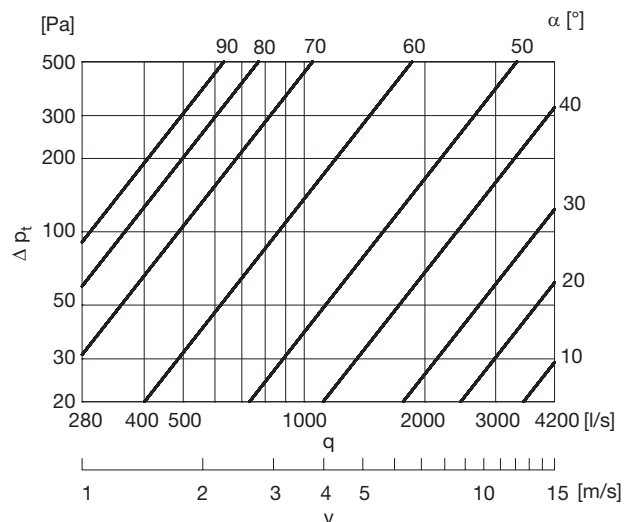
Ø560



Ø450



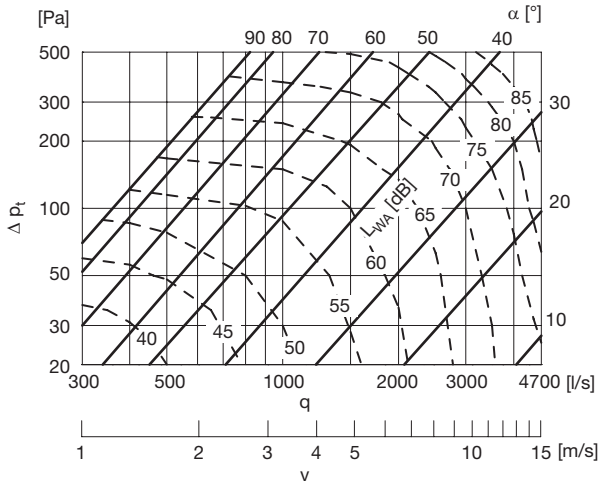
Ø600



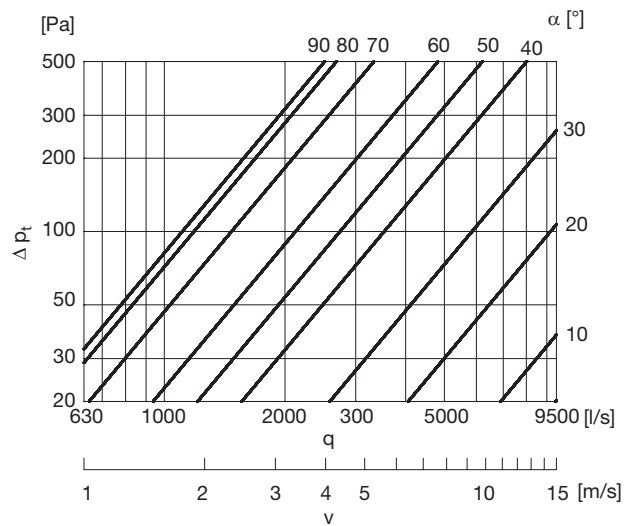
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# DRU

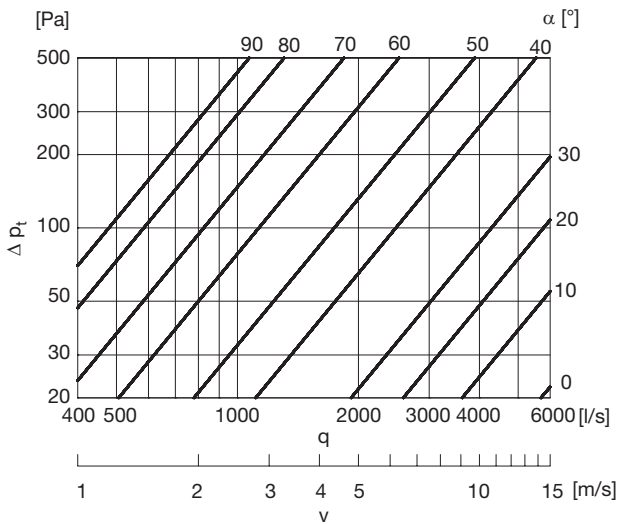
Ø630



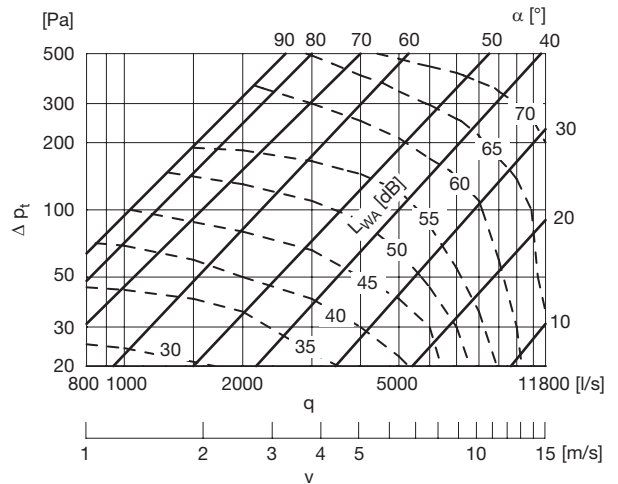
Ø900



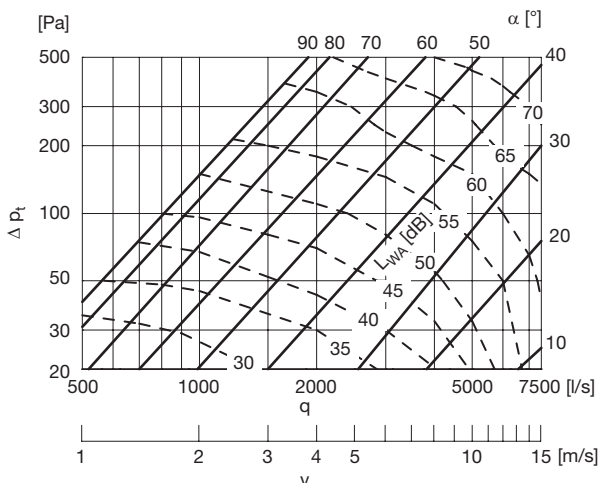
Ø710



Ø1000



Ø800



# Regulating damper

# DRU

## Sound data

Sound power level  $L_{W}$ , [dB] to duct in the octave bands 1–8, 63–8000 Hz, as a function of dimension, flow and pressure drop.

| dim<br>Ød <sub>1</sub> | Pressure<br>loss<br>[Pa] | Velocity app. 1 [m/s] |     |     |     |    |    | Velocity app. 3 [m/s] |    |    |     |     |     | Velocity app. 6 [m/s] |    |    |    |    |     |     |     |    |    |    |    |
|------------------------|--------------------------|-----------------------|-----|-----|-----|----|----|-----------------------|----|----|-----|-----|-----|-----------------------|----|----|----|----|-----|-----|-----|----|----|----|----|
|                        |                          | Centre frequency [Hz] |     |     |     |    |    | Centre frequency [Hz] |    |    |     |     |     | Centre frequency [Hz] |    |    |    |    |     |     |     |    |    |    |    |
|                        |                          | 63                    | 125 | 250 | 500 | 1k | 2k | 4k                    | 8k | 63 | 125 | 250 | 500 | 1k                    | 2k | 4k | 8k | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| 80                     |                          | Flow 5 [l/s]          |     |     |     |    |    | Flow 15 [l/s]         |    |    |     |     |     | Flow 30 [l/s]         |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 65                    | 65 | 65 | 65  | 59  | 55  | 49                    | 46 | 67 | 67 | 67 | 67  | 60  | 57  | 50 | 47 |    |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 63                    | 63 | 60 | 54  | 51  | 43  | 34                    | 29 | 65 | 65 | 62 | 56  | 53  | 44  | 35 | 30 |    |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 60                    | 60 | 53 | 48  | 43  | 30  | 23                    | 15 | 61 | 64 | 57 | 51  | 46  | 32  | 24 | 16 |    |    |
|                        | 50                       | 53                    | 49  | 43  | 40  | 33 | 23 | 15                    | 8  | 56 | 54  | 47  | 43  | 36                    | 25 | 16 | 9  | 59 | 59  | 52  | 47  | 40 | 27 | 17 | 10 |
|                        | 20                       | 47                    | 42  | 36  | 32  | 25 | 16 | 7                     | 1  | 51 | 47  | 39  | 35  | 28                    | 18 | 8  | 2  | 54 | 52  | 44  | 39  | 32 | 20 | 9  | 4  |
| 100                    |                          | Flow 8 [l/s]          |     |     |     |    |    | Flow 25 [l/s]         |    |    |     |     |     | Flow 50 [l/s]         |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 67                    | 64 | 64 | 57  | 54  | 48  | 48                    | 48 | 72 | 69 | 69 | 62  | 59  | 52  | 52 | 52 | 52 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 59                    | 58 | 58 | 50  | 48  | 40  | 37                    | 37 | 66 | 65 | 64 | 57  | 54  | 45  | 42 | 42 | 42 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 58                    | 55 | 53 | 46  | 41  | 34  | 26                    | 24 | 65 | 64 | 62 | 54  | 48  | 40  | 31 | 29 | 29 |    |
|                        | 50                       | 48                    | 42  | 38  | 33  | 26 | 19 | 16                    | 14 | 55 | 53  | 48  | 42  | 35                    | 26 | 22 | 18 | 64 | 63  | 60  | 53  | 44 | 33 | 28 | 22 |
|                        | 20                       | 43                    | 35  | 30  | 23  | 17 | 9  | 7                     | 6  | 50 | 49  | 42  | 37  | 28                    | 17 | 15 | 14 | 62 | 61  | 57  | 51  | 41 | 27 | 25 | 15 |
| 125                    |                          | Flow 12 [l/s]         |     |     |     |    |    | Flow 40 [l/s]         |    |    |     |     |     | Flow 75 [l/s]         |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 71                    | 68 | 65 | 59  | 56  | 50  | 50                    | 47 | 76 | 73 | 70 | 63  | 60  | 53  | 53 | 50 | 50 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 65                    | 62 | 57 | 51  | 46  | 41  | 38                    | 38 | 72 | 71 | 65 | 59  | 53  | 47  | 43 | 43 | 43 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 64                    | 59 | 53 | 47  | 39  | 34  | 29                    | 27 | 71 | 70 | 63 | 55  | 47  | 40  | 35 | 32 | 32 |    |
|                        | 50                       | 57                    | 42  | 41  | 31  | 29 | 20 | 17                    | 15 | 63 | 54  | 50  | 41  | 36                    | 27 | 25 | 20 | 70 | 68  | 60  | 51  | 43 | 34 | 32 | 24 |
|                        | 20                       | 56                    | 32  | 39  | 29  | 27 | 11 | 15                    | 11 | 62 | 48  | 48  | 34  | 34                    | 20 | 22 | 15 | 68 | 65  | 56  | 47  | 39 | 29 | 28 | 17 |
| 160                    |                          | Flow 20 [l/s]         |     |     |     |    |    | Flow 60 [l/s]         |    |    |     |     |     | Flow 120 [l/s]        |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 68                    | 67 | 64 | 59  | 55  | 53  | 52                    | 51 | 73 | 71 | 68 | 62  | 59  | 55  | 54 | 53 | 53 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 61                    | 58 | 56 | 50  | 48  | 42  | 40                    | 40 | 71 | 65 | 62 | 56  | 53  | 47  | 44 | 44 | 44 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 59                    | 54 | 50 | 45  | 40  | 35  | 33                    | 31 | 70 | 64 | 60 | 53  | 48  | 42  | 39 | 38 | 38 |    |
|                        | 50                       | 42                    | 36  | 33  | 28  | 25 | 20 | 17                    | 16 | 54 | 50  | 46  | 37  | 33                    | 29 | 25 | 25 | 69 | 63  | 58  | 48  | 42 | 37 | 32 | 32 |
|                        | 20                       | 37                    | 30  | 30  | 26  | 19 | 16 | 11                    | 10 | 49 | 46  | 43  | 35  | 27                    | 24 | 19 | 18 | 68 | 61  | 55  | 44  | 36 | 32 | 27 | 23 |
| 200                    |                          | Flow 30 [l/s]         |     |     |     |    |    | Flow 100 [l/s]        |    |    |     |     |     | Flow 200 [l/s]        |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 70                    | 64 | 61 | 55  | 52  | 52  | 55                    | 55 | 75 | 69 | 65 | 59  | 55  | 55  | 59 | 59 | 59 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 62                    | 57 | 55 | 47  | 44  | 42  | 42                    | 42 | 71 | 65 | 61 | 53  | 50  | 48  | 47 | 47 | 47 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 57                    | 52 | 48 | 41  | 39  | 36  | 34                    | 34 | 69 | 64 | 58 | 50  | 47  | 44  | 42 | 42 | 42 |    |
|                        | 50                       | 40                    | 38  | 33  | 30  | 28 | 27 | 23                    | 22 | 51 | 45  | 41  | 36  | 32                    | 32 | 28 | 28 | 63 | 56  | 51  | 44  | 39 | 39 | 34 | 34 |
|                        | 20                       | 34                    | 31  | 26  | 25  | 23 | 18 | 16                    | 16 | 44 | 37  | 33  | 29  | 27                    | 25 | 21 | 19 | 56 | 47  | 43  | 36  | 29 | 27 | 24 | 22 |
| 250                    |                          | Flow 50 [l/s]         |     |     |     |    |    | Flow 150 [l/s]        |    |    |     |     |     | Flow 300 [l/s]        |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 69                    | 66 | 59 | 53  | 50  | 54  | 53                    | 52 | 71 | 67 | 61 | 56  | 53  | 56  | 55 | 54 | 54 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 59                    | 57 | 52 | 46  | 44  | 41  | 44                    | 44 | 63 | 60 | 55 | 49  | 46  | 44  | 46 | 46 | 46 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 56                    | 52 | 45 | 41  | 38  | 36  | 34                    | 31 | 62 | 57 | 51 | 46  | 43  | 40  | 38 | 35 | 35 |    |
|                        | 50                       | 44                    | 41  | 35  | 32  | 29 | 24 | 22                    | 20 | 52 | 48  | 40  | 38  | 34                    | 30 | 28 | 24 | 61 | 56  | 47  | 45  | 40 | 38 | 33 | 28 |
|                        | 20                       | 33                    | 35  | 29  | 29  | 25 | 12 | 10                    | 10 | 47 | 44  | 37  | 35  | 31                    | 25 | 22 | 17 | 59 | 54  | 46  | 42  | 38 | 36 | 30 | 24 |
| 315                    |                          | Flow 80 [l/s]         |     |     |     |    |    | Flow 250 [l/s]        |    |    |     |     |     | Flow 500 [l/s]        |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 68                    | 65 | 59 | 53  | 50  | 50  | 53                    | 50 | 74 | 71 | 65 | 58  | 55  | 55  | 58 | 55 | 55 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 60                    | 55 | 50 | 45  | 43  | 40  | 43                    | 40 | 70 | 65 | 58 | 52  | 49  | 48  | 49 | 49 | 46 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 54                    | 52 | 45 | 41  | 38  | 36  | 36                    | 31 | 66 | 64 | 56 | 50  | 47  | 46  | 44 | 39 | 39 |    |
|                        | 50                       | 34                    | 34  | 30  | 26  | 22 | 21 | 19                    | 15 | 49 | 49  | 43  | 38  | 34                    | 32 | 30 | 24 | 64 | 63  | 55  | 49  | 45 | 42 | 40 | 32 |
|                        | 20                       | 26                    | 30  | 27  | 21  | 16 | 15 | 13                    | 11 | 44 | 46  | 41  | 35  | 30                    | 27 | 25 | 18 | 62 | 61  | 54  | 48  | 43 | 37 | 34 | 24 |
| 400                    |                          | Flow 130 [l/s]        |     |     |     |    |    | Flow 400 [l/s]        |    |    |     |     |     | Flow 800 [l/s]        |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 79                    | 73 | 67 | 62  | 57  | 60  | 59                    | 58 | 82 | 75 | 68 | 65  | 59  | 62  | 61 | 60 | 60 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 67                    | 62 | 56 | 50  | 48  | 48  | 48                    | 45 | 74 | 68 | 62 | 56  | 53  | 52  | 52 | 49 | 49 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 61                    | 56 | 49 | 44  | 42  | 39  | 39                    | 34 | 72 | 67 | 58 | 53  | 49  | 47  | 46 | 40 | 40 |    |
|                        | 50                       | 42                    | 37  | 31  | 29  | 28 | 27 | 25                    | 20 | 57 | 52  | 44  | 39  | 37                    | 34 | 26 | 71 | 66 | 56  | 50  | 47  | 44 | 44 | 33 |    |
|                        | 20                       | 40                    | 34  | 27  | 25  | 24 | 23 | 21                    | 11 | 55 | 50  | 40  | 35  | 34                    | 32 | 30 | 20 | 70 | 65  | 54  | 47  | 44 | 40 | 38 | 28 |
| 500                    |                          | Flow 200 [l/s]        |     |     |     |    |    | Flow 600 [l/s]        |    |    |     |     |     | Flow 1200 [l/s]       |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 84                    | 77 | 70 | 64  | 63  | 62  | 61                    | 60 | 85 | 78 | 71 | 65  | 64  | 63  | 62 | 61 | 61 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 71                    | 65 | 59 | 53  | 50  | 50  | 47                    | 47 | 77 | 70 | 64 | 58  | 56  | 55  | 54 | 51 | 51 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 63                    | 58 | 53 | 47  | 46  | 44  | 42                    | 37 | 72 | 66 | 60 | 55  | 53  | 51  | 49 | 43 | 43 |    |
|                        | 50                       | 46                    | 40  | 36  | 33  | 32 | 29 | 29                    | 25 | 59 | 52  | 47  | 44  | 42                    | 38 | 38 | 31 | 71 | 63  | 57  | 54  | 51 | 46 | 46 | 37 |
|                        | 20                       | 41                    | 33  | 29  | 27  | 26 | 19 | 18                    | 20 | 56 | 47  | 42  | 40  | 38                    | 32 | 30 | 26 | 70 | 60  | 54  | 52  | 49 | 44 | 40 | 32 |
| 630                    |                          | Flow 300 [l/s]        |     |     |     |    |    | Flow 900 [l/s]        |    |    |     |     |     | Flow 1800 [l/s]       |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 88                    | 80 | 73 | 69  | 66  | 64  | 63                    | 62 | 90 | 83 | 75 | 71  | 68  | 67  | 65 | 64 | 64 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 78                    | 72 | 65 | 62  | 59  | 55  | 55                    | 49 | 80 | 74 | 67 | 64  | 60  | 57  | 57 | 50 | 50 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 71                    | 66 | 59 | 54  | 50  | 46  | 45                    | 40 | 78 | 71 | 66 | 59  | 56  | 49  | 48 | 44 | 44 |    |
|                        | 50                       | 54                    | 49  | 45  | 39  | 34 | 36 | 30                    | 26 | 66 | 58  | 53  | 48  | 43                    | 40 | 39 | 30 | 77 | 68  | 62  | 57  | 51 | 45 | 47 | 36 |
|                        | 20                       | 45                    | 35  | 38  | 30  | 29 | 29 | 26                    | 20 | 61 | 50  | 47  | 43  | 38                    | 36 | 33 | 25 | 76 | 65  | 57  | 55  | 46 | 42 | 39 | 30 |
| 800                    |                          | Flow 500 [l/s]        |     |     |     |    |    | Flow 1500 [l/s]       |    |    |     |     |     | Flow 3000 [l/s]       |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | -                     | -  | -  | -   | -   | -   | -                     | -  | 72 | 65 | 62 | 63  | 62  | 62  | 61 | 56 | 56 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | -                     | -  | -  | -   | -   | -   | -                     | -  | 67 | 60 | 56 | 55  | 53  | 52  | 49 | 43 | 43 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | -                     | -  | -  | -   | -   | -   | -                     | -  | 63 | 55 | 51 | 49  | 47  | 44  | 40 | 34 | 34 |    |
|                        | 50                       | -                     | -   | -   | -   | -  | -  | -                     | -  | -  | -   | -   | -   | -                     | -  | 60 | 50 | 46 | 44  | 41  | 37  | 33 | 25 | 25 |    |
|                        | 20                       | 31                    | 33  | 27  | 22  | 21 | 11 | 12                    | 1  | 44 | 36  | 32  | 28  | 25                    | 17 | 13 | 2  | 56 | 40  | 37  | 34  | 29 | 23 | 14 | 9  |
| 1000                   |                          | Flow 800 [l/s]        |     |     |     |    |    | Flow 2400 [l/s]       |    |    |     |     |     | Flow 4750 [l/s]       |    |    |    |    |     |     |     |    |    |    |    |
|                        | 500                      | -                     | -   | -   | -   | -  | -  | 68                    | 62 | 58 | 58  | 57  | 57  | 56                    | 53 | 77 | 70 | 66 | 67  | 64  | 64  | 63 | 57 | 57 |    |
|                        | 200                      | -                     | -   | -   | -   | -  | -  | 64                    | 56 | 53 | 52  | 52  | 51  | 48                    | 38 | 72 | 64 | 58 | 56  | 54  | 52  | 50 | 42 | 42 |    |
|                        | 100                      | -                     | -   | -   | -   | -  | -  | 60                    | 52 | 46 | 45  | 44  | 41  | 37                    | 28 | 67 | 58 | 53 | 49  | 47  | 44  | 40 | 32 | 32 |    |
|                        | 50                       | 50                    | 40  | 32  | 34  | 31 | 26 | 21                    | 10 | 56 | 47  | 40  | 39  | 36                    | 31 | 27 | 15 | 62 | 54  | 48  | 44  | 41 | 37 | 33 | 25 |
|                        | 20                       | 47                    | 22  | 27  | 29  | 19 | 6  | 2                     | 1  | 50 | 34  | 33  | 32  | 25                    | 17 | 7  | 2  | 53 | 45  | 39  | 35  | 32 | 28 | 22 | 14 |



# Regulating damper

# DRU

| dim<br>Ød <sub>1</sub> | Pressure<br>loss<br>[Pa] | Velocity app. 9 [m/s] |     |     |     |    |    |    |    | Velocity app. 12 [m/s] |     |     |     |    |    |    |    | Velocity app. 15 [m/s] |      |     |     |    |    |    |    |
|------------------------|--------------------------|-----------------------|-----|-----|-----|----|----|----|----|------------------------|-----|-----|-----|----|----|----|----|------------------------|------|-----|-----|----|----|----|----|
|                        |                          | Centre frequency [Hz] |     |     |     |    |    |    |    | Centre frequency [Hz]  |     |     |     |    |    |    |    | Centre frequency [Hz]  |      |     |     |    |    |    |    |
|                        |                          | 63                    | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 63                     | 125 | 250 | 500 | 1k | 2k | 4k | 8k | 63                     | 125  | 250 | 500 | 1k | 2k | 4k | 8k |
| 80                     |                          | Flow 45 [l/s]         |     |     |     |    |    |    |    | Flow 60 [l/s]          |     |     |     |    |    |    |    | Flow 75 [l/s]          |      |     |     |    |    |    |    |
|                        | 500                      | 72                    | 70  | 70  | 70  | 63 | 60 | 53 | 49 | 77                     | 76  | 75  | 75  | 68 | 64 | 56 | 53 | 80                     | 80   | 80  | 80  | 72 | 68 | 60 | 56 |
|                        | 200                      | 70                    | 68  | 67  | 60  | 57 | 48 | 38 | 32 | 75                     | 74  | 71  | 65  | 61 | 51 | 41 | 34 | 78                     | 77   | 72  | 70  | 64 | 53 | 42 | 35 |
|                        | 100                      | 66                    | 65  | 63  | 57  | 51 | 36 | 27 | 18 | 74                     | 73  | 70  | 60  | 57 | 45 | 32 | 25 | 77                     | 75   | 71  | 65  | 58 | 46 | 33 | 26 |
|                        | 50                       | 63                    | 62  | 58  | 52  | 45 | 28 | 18 | 11 | 73                     | 71  | 66  | 55  | 52 | 40 | 25 | 19 | 75                     | 72   | 67  | 58  | 53 | 41 | 26 | 20 |
|                        | 20                       | 59                    | 58  | 51  | 46  | 38 | 21 | 10 | 5  | 70                     | 67  | 60  | 47  | 44 | 32 | 17 | 13 | 72                     | 68   | 62  | 50  | 47 | 36 | 20 | 15 |
| 100                    |                          | Flow 75 [l/s]         |     |     |     |    |    |    |    | Flow 100 [l/s]         |     |     |     |    |    |    |    | Flow 120 [l/s]         |      |     |     |    |    |    |    |
|                        | 500                      | 78                    | 75  | 75  | 67  | 64 | 57 | 57 | 57 | 84                     | 81  | 80  | 72  | 68 | 62 | 61 | 61 | 88                     | 86   | 85  | 76  | 72 | 65 | 64 | 64 |
|                        | 200                      | 74                    | 73  | 72  | 64  | 59 | 50 | 47 | 46 | 80                     | 79  | 78  | 69  | 66 | 55 | 51 | 51 | 84                     | 83   | 81  | 72  | 68 | 59 | 55 | 54 |
|                        | 100                      | 73                    | 72  | 71  | 62  | 56 | 46 | 36 | 33 | 79                     | 78  | 75  | 65  | 60 | 49 | 44 | 42 | 82                     | 81   | 78  | 69  | 63 | 54 | 48 | 45 |
|                        | 50                       | 72                    | 70  | 68  | 58  | 51 | 40 | 29 | 23 | 77                     | 76  | 70  | 60  | 53 | 43 | 36 | 31 | 80                     | 79   | 74  | 65  | 57 | 48 | 40 | 35 |
|                        | 20                       | 70                    | 67  | 63  | 53  | 44 | 33 | 26 | 17 | 74                     | 73  | 65  | 54  | 46 | 37 | 27 | 20 | 78                     | 77   | 69  | 60  | 50 | 41 | 31 | 24 |
| 125                    |                          | Flow 110 [l/s]        |     |     |     |    |    |    |    | Flow 145 [l/s]         |     |     |     |    |    |    |    | Flow 180 [l/s]         |      |     |     |    |    |    |    |
|                        | 500                      | 83                    | 80  | 76  | 68  | 65 | 58 | 54 | 54 | 89                     | 87  | 81  | 73  | 69 | 62 | 62 | 58 | 91                     | 88   | 83  | 75  | 71 | 63 | 63 | 59 |
|                        | 200                      | 79                    | 78  | 71  | 65  | 58 | 51 | 48 | 47 | 87                     | 85  | 78  | 70  | 63 | 56 | 52 | 48 | 88                     | 86   | 80  | 71  | 66 | 59 | 54 | 49 |
|                        | 100                      | 78                    | 77  | 70  | 61  | 51 | 45 | 39 | 35 | 86                     | 83  | 75  | 66  | 58 | 50 | 44 | 39 | 87                     | 84   | 78  | 69  | 61 | 53 | 47 | 42 |
|                        | 50                       | 77                    | 76  | 68  | 57  | 45 | 39 | 33 | 25 | 84                     | 80  | 71  | 61  | 52 | 44 | 36 | 28 | 86                     | 82   | 75  | 65  | 55 | 47 | 39 | 33 |
|                        | 20                       | 76                    | 75  | 64  | 53  | 40 | 33 | 30 | 18 | 81                     | 76  | 66  | 55  | 45 | 38 | 32 | 19 | 85                     | 81   | 71  | 60  | 48 | 41 | 34 | 22 |
| 160                    |                          | Flow 180 [l/s]        |     |     |     |    |    |    |    | Flow 240 [l/s]         |     |     |     |    |    |    |    | Flow 300 [l/s]         |      |     |     |    |    |    |    |
|                        | 500                      | 78                    | 77  | 74  | 67  | 63 | 60 | 59 | 58 | 84                     | 84  | 80  | 72  | 68 | 65 | 65 | 65 | 89                     | 89   | 85  | 77  | 73 | 69 | 69 | 69 |
|                        | 200                      | 76                    | 73  | 70  | 63  | 59 | 53 | 50 | 50 | 80                     | 80  | 77  | 69  | 66 | 58 | 55 | 55 | 85                     | 84   | 80  | 73  | 70 | 64 | 59 | 58 |
|                        | 100                      | 75                    | 72  | 69  | 61  | 54 | 48 | 45 | 44 | 78                     | 76  | 73  | 66  | 61 | 53 | 50 | 48 | 83                     | 80   | 77  | 70  | 65 | 58 | 54 | 52 |
|                        | 50                       | 74                    | 71  | 66  | 58  | 49 | 40 | 38 | 33 | 76                     | 72  | 68  | 62  | 55 | 47 | 43 | 38 | 80                     | 76   | 72  | 66  | 59 | 51 | 47 | 42 |
|                        | 20                       | 73                    | 66  | 61  | 54  | 43 | 35 | 30 | 25 | 74                     | 68  | 63  | 57  | 48 | 40 | 35 | 27 | 76                     | 71   | 65  | 61  | 52 | 43 | 39 | 30 |
| 200                    |                          | Flow 300 [l/s]        |     |     |     |    |    |    |    | Flow 400 [l/s]         |     |     |     |    |    |    |    | Flow 475 [l/s]         |      |     |     |    |    |    |    |
|                        | 500                      | 85                    | 79  | 72  | 65  | 62 | 61 | 65 | 65 | 92                     | 85  | 79  | 72  | 68 | 66 | 71 | 70 | 95                     | 89   | 82  | 73  | 71 | 70 | 74 | 73 |
|                        | 200                      | 83                    | 77  | 70  | 62  | 58 | 55 | 54 | 54 | 90                     | 83  | 77  | 69  | 65 | 62 | 61 | 60 | 92                     | 85   | 79  | 71  | 66 | 64 | 64 | 63 |
|                        | 100                      | 82                    | 76  | 69  | 59  | 56 | 53 | 50 | 50 | 88                     | 80  | 73  | 65  | 61 | 58 | 55 | 53 | 90                     | 83   | 76  | 68  | 63 | 61 | 58 | 56 |
|                        | 50                       | 81                    | 74  | 65  | 56  | 52 | 49 | 45 | 42 | 85                     | 76  | 68  | 60  | 56 | 52 | 48 | 45 | 88                     | 80   | 72  | 64  | 59 | 56 | 52 | 48 |
|                        | 20                       | 80                    | 70  | 60  | 52  | 46 | 43 | 38 | 32 | 81                     | 72  | 62  | 54  | 50 | 45 | 40 | 36 | 86                     | 76   | 67  | 59  | 54 | 50 | 47 | 39 |
| 250                    |                          | Flow 450 [l/s]        |     |     |     |    |    |    |    | Flow 600 [l/s]         |     |     |     |    |    |    |    | Flow 750 [l/s]         |      |     |     |    |    |    |    |
|                        | 500                      | 78                    | 75  | 68  | 61  | 58 | 61 | 60 | 59 | 87                     | 83  | 76  | 68  | 68 | 68 | 68 | 68 | 94                     | 90   | 82  | 74  | 71 | 74 | 74 | 74 |
|                        | 200                      | 74                    | 69  | 63  | 57  | 55 | 54 | 54 | 53 | 82                     | 79  | 72  | 64  | 63 | 63 | 62 | 61 | 88                     | 84   | 77  | 69  | 68 | 67 | 68 | 65 |
|                        | 100                      | 72                    | 68  | 60  | 56  | 52 | 49 | 45 | 42 | 79                     | 76  | 69  | 62  | 60 | 60 | 58 | 57 | 85                     | 81   | 74  | 67  | 65 | 63 | 62 | 59 |
|                        | 50                       | 69                    | 67  | 58  | 54  | 48 | 44 | 37 | 32 | 76                     | 72  | 65  | 59  | 56 | 54 | 51 | 48 | 82                     | 78   | 70  | 64  | 61 | 58 | 55 | 52 |
|                        | 20                       | 66                    | 65  | 56  | 52  | 44 | 39 | 32 | 27 | 73                     | 68  | 61  | 56  | 51 | 46 | 42 | 38 | 79                     | 75   | 65  | 60  | 56 | 53 | 47 | 46 |
| 315                    |                          | Flow 750 [l/s]        |     |     |     |    |    |    |    | Flow 1000 [l/s]        |     |     |     |    |    |    |    | Flow 1200 [l/s]        |      |     |     |    |    |    |    |
|                        | 500                      | 82                    | 78  | 71  | 64  | 60 | 60 | 60 | 60 | 89                     | 85  | 77  | 69  | 68 | 67 | 69 | 65 | 92                     | 88   | 80  | 72  | 71 | 70 | 72 | 68 |
|                        | 200                      | 77                    | 72  | 66  | 59  | 58 | 57 | 56 | 52 | 86                     | 79  | 72  | 65  | 63 | 62 | 63 | 58 | 88                     | 83   | 75  | 68  | 66 | 65 | 64 | 59 |
|                        | 100                      | 76                    | 71  | 64  | 57  | 54 | 52 | 50 | 44 | 84                     | 77  | 69  | 62  | 60 | 58 | 57 | 53 | 87                     | 80   | 72  | 65  | 63 | 61 | 59 | 55 |
|                        | 50                       | 75                    | 70  | 61  | 54  | 50 | 46 | 43 | 35 | 82                     | 74  | 66  | 59  | 55 | 52 | 49 | 46 | 85                     | 77   | 69  | 62  | 59 | 55 | 52 | 48 |
|                        | 20                       | 74                    | 68  | 58  | 51  | 46 | 39 | 36 | 26 | 80                     | 71  | 63  | 56  | 48 | 44 | 39 | 38 | 82                     | 74   | 66  | 60  | 54 | 47 | 46 | 40 |
| 400                    |                          | Flow 1200 [l/s]       |     |     |     |    |    |    |    | Flow 1500 [l/s]        |     |     |     |    |    |    |    | Flow 1900 [l/s]        |      |     |     |    |    |    |    |
|                        | 500                      | 88                    | 81  | 74  | 70  | 63 | 66 | 65 | 64 | 95                     | 87  | 79  | 75  | 69 | 71 | 70 | 69 | 98                     | 90   | 82  | 78  | 73 | 74 | 73 | 72 |
|                        | 200                      | 83                    | 76  | 68  | 61  | 60 | 59 | 58 | 54 | 89                     | 82  | 75  | 69  | 67 | 64 | 63 | 60 | 92                     | 84   | 77  | 70  | 69 | 67 | 65 | 63 |
|                        | 100                      | 82                    | 75  | 67  | 60  | 58 | 55 | 53 | 47 | 86                     | 80  | 72  | 66  | 63 | 61 | 58 | 55 | 89                     | 82   | 74  | 68  | 66 | 64 | 61 | 58 |
|                        | 50                       | 80                    | 73  | 65  | 58  | 56 | 51 | 47 | 39 | 83                     | 77  | 68  | 63  | 58 | 56 | 52 | 48 | 86                     | 80   | 71  | 66  | 62 | 59 | 55 | 51 |
|                        | 20                       | 77                    | 70  | 63  | 55  | 53 | 47 | 42 | 30 | 80                     | 74  | 64  | 60  | 54 | 50 | 45 | 40 | 83                     | 78   | 68  | 64  | 58 | 51 | 47 | 42 |
| 500                    |                          | Flow 1800 [l/s]       |     |     |     |    |    |    |    | Flow 2400 [l/s]        |     |     |     |    |    |    |    | Flow 3000 [l/s]        |      |     |     |    |    |    |    |
|                        | 500                      | 91                    | 84  | 76  | 68  | 67 | 68 | 68 | 67 | 96                     | 88  | 80  | 72  | 70 | 73 | 72 | 71 | 102                    | 94   | 85  | 78  | 75 | 77 | 77 | 76 |
|                        | 200                      | 85                    | 78  | 72  | 65  | 63 | 61 | 60 | 57 | 91                     | 84  | 76  | 70  | 66 | 66 | 65 | 61 | 96                     | 89   | 80  | 72  | 68 | 68 | 68 | 67 |
|                        | 100                      | 82                    | 74  | 69  | 62  | 59 | 57 | 55 | 50 | 88                     | 75  | 70  | 63  | 60 | 58 | 56 | 52 | 93                     | 85   | 76  | 69  | 65 | 63 | 61 | 58 |
|                        | 50                       | 79                    | 71  | 66  | 59  | 55 | 52 | 48 | 43 | 85                     | 72  | 67  | 60  | 56 | 53 | 49 | 44 | 90                     | 80   | 72  | 65  | 62 | 57 | 53 | 49 |
|                        | 20                       | 76                    | 67  | 63  | 56  | 50 | 47 | 41 | 36 | 82                     | 69  | 64  | 57  | 52 | 48 | 43 | 37 | 87                     | 75   | 67  | 61  | 58 | 54 | 46 | 40 |
| 630                    |                          | Flow 2800 [l/s]       |     |     |     |    |    |    |    | Flow 3700 [l/s]        |     |     |     |    |    |    |    | Flow 4900 [l/s]        |      |     |     |    |    |    |    |
|                        | 500                      | 96                    | 88  | 80  | 76  | 72 | 72 | 70 | 68 | 103                    | 95  | 86  | 82  | 77 | 77 | 76 | 73 | 107                    | 98   | 90  | 85  | 81 | 81 | 80 | 76 |
|                        | 200                      | 90                    | 83  | 76  | 71  | 67 | 63 | 63 | 56 | 98                     | 90  | 82  | 78  | 74 | 70 | 70 | 62 | 103                    | 95   | 87  | 82  | 78 | 76 | 73 | 66 |
|                        | 100                      | 89                    | 82  | 75  | 68  | 63 | 58 | 55 | 50 | 95                     | 88  | 79  | 74  | 70 | 65 | 63 | 57 | 100                    | 92   | 84  | 79  | 75 | 71 | 67 | 62 |
|                        | 50                       | 87                    | 80  | 72  | 65  | 58 | 52 | 48 | 42 | 92                     | 84  | 75  | 69  | 65 | 60 | 56 | 51 | 97                     | 89   | 80  | 74  | 70 | 65 | 60 | 56 |
|                        | 20                       | 84                    | 77  | 68  | 61  | 52 | 45 | 42 | 33 | 89                     | 82  | 70  | 63  | 59 | 55 | 49 | 43 | 94                     | 86   | 75  | 68  | 64 | 58 | 52 | 48 |
| 800                    |                          | Flow 4500 [l/s]       |     |     |     |    |    |    |    | Flow 6000 [l/s]        |     |     |     |    |    |    |    | Flow 7500 [l/s]        |      |     |     |    |    |    |    |
|                        | 500                      | 78                    | 70  | 66  | 66  | 65 | 64 | 63 | 58 | 83                     | 73  | 69  | 69  | 68 | 66 | 65 | 60 | 84                     | 75   | 71  | 70  | 69 | 67 | 66 | 61 |
|                        | 200                      | 72                    | 64  | 60  | 59  | 57 | 55 | 52 | 46 | 77                     | 67  | 63  | 62  | 60 | 58 | 55 | 49 | 80                     | 70   | 66  | 65  | 63 | 61 | 58 | 52 |
|                        | 100                      | 68                    | 59  | 55  | 53  | 51 | 48 | 44 | 37 | 73                     | 63  | 59  | 57  | 55 | 52 | 48 | 42 | 77                     | 67   | 62  | 60  | 57 | 55 | 51 | 45 |
|                        | 50                       | 66                    | 55  | 51  | 48  | 45 | 42 | 37 | 30 | 71                     | 60  | 55  | 52  | 49 | 47 | 41 | 35 | 76                     | 65   | 61  | 58  | 54 | 52 | 47 | 40 |
|                        | 20                       | 61                    | 46  | 43  | 39  | 35 | 32 | 25 | 18 | 69                     | 58  | 53  | 50  | 47 | 41 | 37 | 29 | 74                     | 63   | 59  | 56  | 52 | 48 | 43 | 36 |
| 1000                   |                          | Flow 7100 [l/s]       |     |     |     |    |    |    |    | Flow 9450 [l/s]        |     |     |     |    |    |    |    | Flow 11800 [l/s]       |      |     |     |    |    |    |    |
|                        | 500                      | 81                    | 74  | 69  | 69  | 67 | 65 | 64 | 58 | 85                     | 77  | 71  | 70  | 68 | 67 | 65 | 60 | 86                     | 79   | 72  | 71  | 69 | 68 | 66 | 61 |
|                        | 200                      | 76                    | 69  | 63  | 60  | 57 | 55 | 53 | 45 | 80                     | 71  | 65  | 64  | 61 | 58 | 57 | 50 | 83                     | 74   | 68  | 67  | 64 | 61 | 60 | 55 |
|                        | 100                      | 72                    | 64  | 58  | 55  | 52 | 49 | 47 | 39 | 76                     | 67  | 61  | 59  | 56 | 54 | 52 | 46 | 80                     | 72   | 65  | 63  | 60 | 59 | 57 | 53 |
|                        | 50                       | 68                    | 60  | 54  | 52  | 48 | 45 | 43 | 36 | 73                     | 65  | 59  | 58  | 54 | 52 | 50 | 45 | 78                     | 70</ |     |     |    |    |    |    |