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Motion systems and more

# Dyna Shock System SAS

VISCOELASTIC DEVICES WITH HYDROSTATIC COMPRESSION OF ELASTOMER

## VISCOELASTIC SHOCK ABSORBERS / AUTOMATIC STROKE RETURN

## BA5 range from 25 to 150 kJ

### Technology

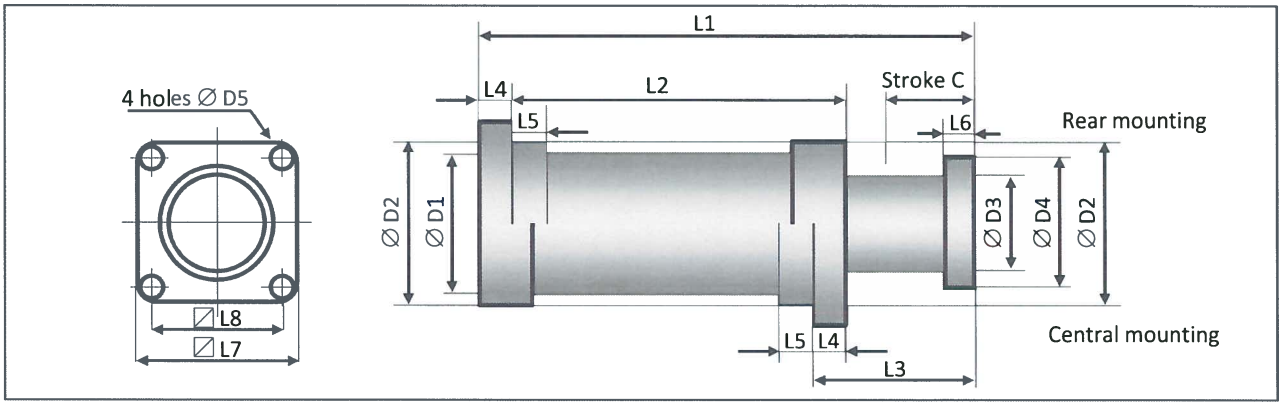
The shock absorbers are designed on the principal of compression of hydrostatic viscoelastic fluids. The viscosity and the compressibility of our fluids allow in a same device to obtain both functions the one of a shock absorber and the one of a spring, without the need of any additional rearming mechanism (gas or mechanical spring). The two functions can be used separately or in combination, in the same product.

### Advantages

- Simple design – High reliability
- High damping coefficient
- Low sensitivity to temperature variances
- Security by integrated static preload
- Simple integration

### Applications

Protection against shocks in Industry, Material Handling, Rolling Mill, Railway, Defence, Waterways, Paper industry, ...

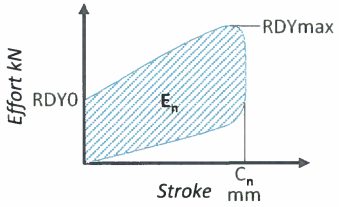



| | DIMENSIONAL CHARACTERISTICS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L1 mm | L2 mm | L3 mm | L4 mm | L5 mm | L6 mm | L7 mm | L8 mm | D1 mm | D2 mm | D3 mm | D4 mm | D5 mm | Mass kg |
| BA5A-105 | 415 | 275 | 140 | 20 | 30 | 15 | 135 | 105 | / | 116 | 87 | 120 | 14 | 25 |
| BA5B | 500 | 325 | 175 | 25 | 33 | 30 | 155 | 125 | 142 | 142 | 115 | 138 | 15 | 40 |
| BA5C | 520 | 315 | 205 | 30 | 36 | 35 | 175 | 140 | 160 | 160 | 132 | 158 | 18 | 45 |
| BA5D | 585 | 350 | 235 | 35 | 40 | 40 | 215 | 170 | 180 | 180 | 153 | 185 | 22 | 73 |
| BA5E | 670 | 405 | 265 | 40 | 45 | 45 | 250 | 195 | 215 | 215 | 182 | 220 | 26 | 117 |

- **Impact speed**: BA5 series shock absorbers are designed for impact velocities up to 4 m/s. Higher velocities require custom modification.
- Outside protection: painting – Reservoir: Zn6CFe

| | MECHANICAL CHARACTERISTICS * | | | |
|---|---|---|---|---|
| | En kJ | Stroke mm | RDY0 kN | RDYmax kN |
| BA5A-105 | 25 | 105 | 167 | 310 |
| BA5B | 50 | 120 | 310 | 540 |
| BA5C | 75 | 140 | 400 | 700 |
| BA5D | 100 | 160 | 470 | 820 |
| BA5E | 150 | 180 | 640 | 1100 |

* Based on following data:
- Impact speed: 2 m/s
- Operating temperature: -20°C to +40°C




*Symbols:*
$E_n$ = nominal energy capacity
$C_n$ = maximum stroke
RDY = dynamic reaction

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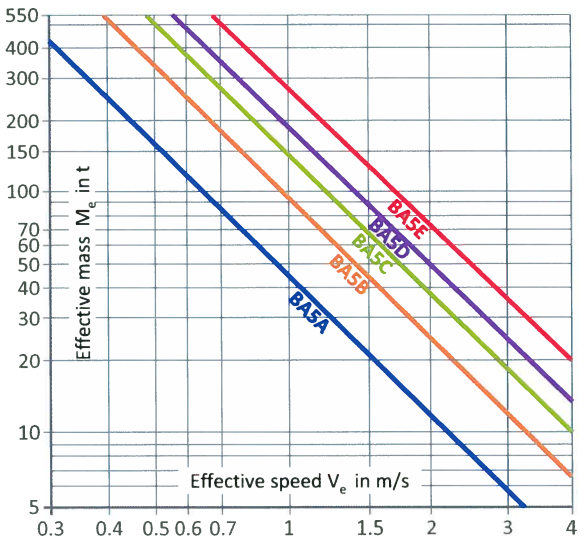
## SELECTION OF A STANDARD SHOCK ABSORBER

## BA5 range

### 1 SELECTION CHART




### 2 EFFECTIVE ENERGY CALCULATION

$$E_e = \tfrac{1}{2} M_e V_e^2$$

### 3 ALLOWABLE IMPACT FREQUENCY

$$F < 15 \times \frac{E_n}{E_e} \text{ impacts/hour}$$

### 4 EFFECTIVE STROKE CALCULATION

$$C_e = C_n\left(\sqrt{\frac{E_e}{E_n(0.03V_e + 0.24)}} + 1.36 - 1.17\right)$$

### 5 EFFECTIVE REACTION $Rdy_e$ CALCULATION

$$Rdy_e = \left[\left(\frac{Rdymax - Rdy0}{C_n}\right) x C_e + Rdy0\right](0.1V_e + 0.8)$$

### 6 APPLICATION EXAMPLE

Given data:
Shock to absorb with 2 shock absorbers in series

- Effective mass = 300 t
- Effective speed = 1.2 m/s ⇒ 0.6 m/s / device
- Impact frequency = 15 impacts/hour
- Maximum allowable structural load = 1000 kN

① Selection chart gives BA5E.

The mechanical characteristics are:

- $E_n$ = 150 kJ
- $C_n$ = 180 mm
- Rdymax = 1100 kN
- Rdy0 = 640 kN

② The energy to dissipate per shock is 108 kJ.

③ The allowable impact frequency F is <15*150/108

④ The effective stroke $C_e$ will be 156 mm.

$$180\left(\sqrt{\frac{108}{150(0.03 \times 0.6 + 0.24)}} + 1.36 - 1.17\right)$$

⑤ The effective dynamic reaction $Rdy_e$ will be 893 kN.

$$\left[(1100 - 640) \times \frac{156}{180} + 640\right](0.1 \times 0.6 + 0.8)$$

$Rdy_e$ < 1000 kN (resistance of the structure)

**All performance characteristics can be modified.**

**Please advise us of your specific requirements.**