SDP63 to SDP160

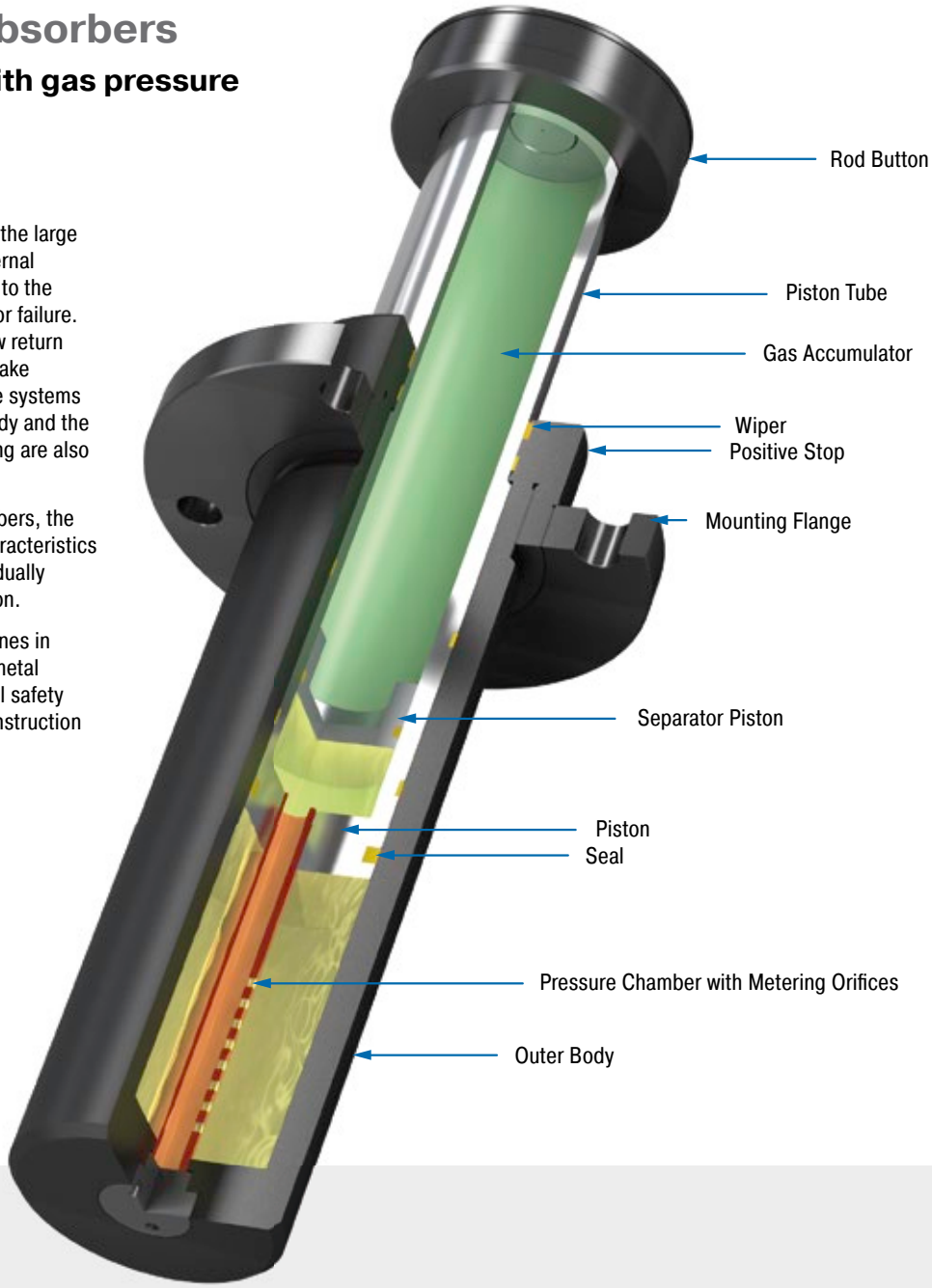
Safety Shock Absorbers

High return forces with gas pressure accumulator

Reliabity: The emergency stop from the large scale SDP63 to 160 series have internal system seals. Even dirt or damages to the piston rod do not lead to a leakage or failure. Compressed gas accumulators allow return forces of up to 100 kN, which can make applications in multiple bridge crane systems safer, for example. The absorber body and the robust, large-sized piston rod bearing are also designed for heavy duty operations.

Just like all ACE safety shock absorbers, the characteristic curve or damping characteristics of each individual absorber is individually adjusted to the respective application.

Whether its crane systems or machines in heavy duty applications e.g. in the metal industry or in mining, these powerful safety shock absorbers reliably protect construction designs against expensive failure.



Technical Data

Energy capacity: 9,100 Nm/Cycle to 582,000 Nm/Cycle

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

Reacting force: At max. capacity rating = 110 kN to 1.000 kN

Operating temperature range: -20 °C to +60 °C. Other temperatures on request.

Mounting: In any position

Positive stop: Integrated

Material: Outer body: Painted steel; Rod end button: Steel; Piston tube: Hard chrome plated steel

Damping medium: HLP 46

Filling pressure: Approx. 5 bar. Rod return by integrated nitogen accumulator.

Application field: Shelf storage systems, Heavy load applications

Note: The shock absorber can be pushed through its stroke. In creep speed conditions the shock absorber provides minimal resistance and there is no braking effect.

On request: Special oils, special flanges, additional corrosion protection etc.

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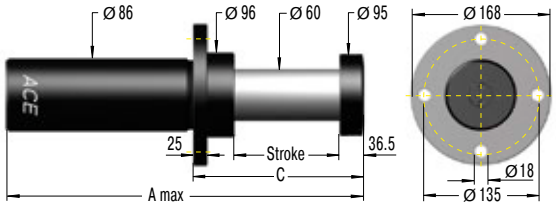
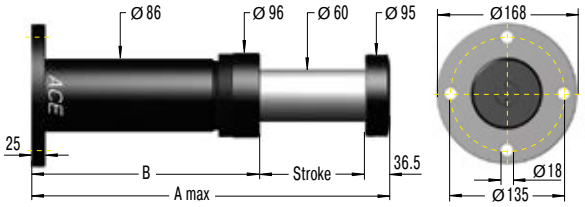
SDP63EU-F Front Flange



SDP63EU-R Rear Flange



Technical Data

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SDP63-400EU-F-XXXXX**

Safety Shock Absorber
Bore Size Ø 63 mm
Stroke 400 mm
EU Compliant
Mounting Style: Front Flange
Identification No. assigned by ACE

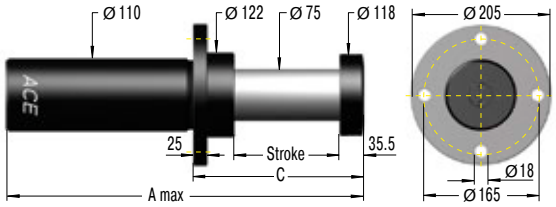
Please indicate identification no. in case of replacement order

Performance and Dimensions

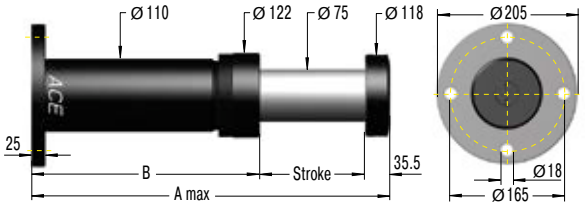
TYPES	Energy capacity Nm/cycle	Reacting force N	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	C mm	Weight kg
SDP63-50EU	9,100	200,000	1,500	8,000	50	280	193.5	145	11
SDP63-75EU	13,600	200,000	1,500	10,000	75	360	248.5	170	12.5
SDP63-100EU	18,200	200,000	1,500	11,000	100	425	288.5	195	12.5
SDP63-150EU	27,300	200,000	1,500	15,000	150	560	373.5	245	17
SDP63-200EU	36,400	200,000	1,500	17,000	200	700	463.5	295	19
SDP63-250EU	43,200	190,000	1,500	18,000	250	840	553.5	345	21
SDP63-300EU	49,100	180,000	1,500	20,000	300	980	643.5	395	24
SDP63-400EU	54,500	150,000	1,500	20,000	400	1,265	828.5	495	29
SDP63-500EU	59,100	130,000	1,500	20,000	500	1,555	1,018.5	595	34
SDP63-600EU	60,000	110,000	1,500	20,000	600	1,840	1,203.5	695	39

In case of an existing side load angle, please consult ACE.

SDP80EU-F Front Flange



SDP80EU-R Rear Flange



Technical Data

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SDP80-200EU-F-XXXXX**

Safety Shock Absorber
Bore Size Ø 80 mm
Stroke 200 mm
EU Compliant
Mounting Style: Front Flange
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Performance and Dimensions

TYPES	Energy capacity Nm/cycle	Reacting force N	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	C mm	Weight kg
SDP80-50EU	11,800	260,000	2,500	16,000	50	285	199.5	155	19
SDP80-100EU	23,600	260,000	2,500	16,000	100	440	304.5	205	23
SDP80-150EU	35,500	260,000	2,500	20,000	150	580	394.5	255	27
SDP80-200EU	47,300	260,000	2,500	20,000	200	730	494.5	305	32
SDP80-250EU	56,800	250,000	2,500	25,000	250	865	579.5	355	35
SDP80-300EU	65,500	240,000	2,500	25,000	300	1,010	674.5	405	39
SDP80-400EU	80,000	220,000	2,500	30,000	400	1,285	849.5	505	47
SDP80-500EU	90,900	200,000	2,500	30,000	500	1,575	1,039.5	605	55
SDP80-600EU	98,200	180,000	2,500	30,000	600	1,865	1,229.5	705	64
SDP80-800EU	101,800	140,000	2,500	30,000	800	2,450	1,614.5	905	80

In case of an existing side load angle, please consult ACE.

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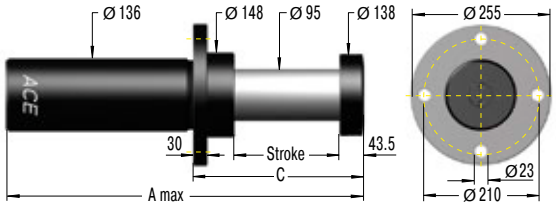
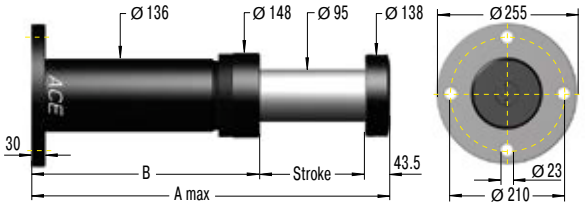
SDP100EU-F Front Flange



SDP100EU-R Rear Flange



Technical Data

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SDP100-400EU-F-XXXXX**

Safety Shock Absorber
Bore Size Ø 100 mm
Stroke 400 mm
EU Compliant
Mounting Style: Front Flange
Identification No. assigned by ACE

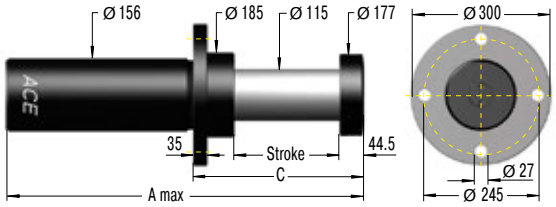
Please indicate identification no. in case of replacement order

Performance and Dimensions

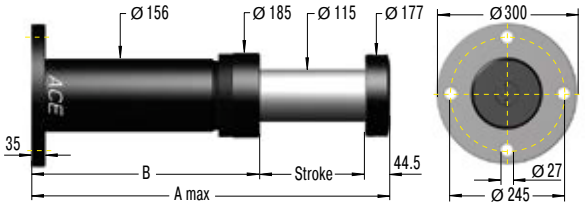
TYPES	Energy capacity **Nm/cycle**	Reacting force **N**	Return force min. **N**	Return force max. **N**	Stroke **mm**	A max. **mm**	B **mm**	C **mm**	Weight **kg**
SDP100-100EU	47,000	520,000	3,900	38,000	100	460	316.5	230	38
SDP100-200EU	95,000	520,000	3,900	38,000	200	750	506.5	330	53
SDP100-250EU	114,000	520,000	3,900	40,000	250	890	596.5	380	59
SDP100-300EU	131,000	500,000	3,900	40,000	300	1,035	691.5	430	66
SDP100-400EU	160,000	480,000	3,900	40,000	400	1,325	881.5	530	81
SDP100-500EU	182,000	440,000	3,900	40,000	500	1,610	1,066.5	630	93
SDP100-600EU	196,000	360,000	3,900	46,000	600	1,880	1,236.5	730	103
SDP100-800EU	218,000	300,000	3,900	46,000	800	2,450	1,606.5	930	125
SDP100-1000EU	236,000	260,000	3,900	46,000	1,000	3,020	1,976.5	1,130	160

In case of an existing side load angle, please consult ACE.

SDP120EU-F Front Flange



SDP120EU-R Rear Flange



Technical Data

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SDP120-800EU-F-XXXXX**

Safety Shock Absorber
Bore Size Ø 120 mm
Stroke 800 mm
EU Compliant
Mounting Style: Front Flange
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Performance and Dimensions

TYPES	Energy capacity Nm/cycle	Reacting force N	Return force min. N	Return force max. N	Stroke mm	A max. mm	B mm	C mm	Weight kg
SDP120-100EU	64,000	700,000	5,600	35,000	100	460	315.5	249	58
SDP120-200EU	127,000	700,000	5,600	70,000	200	750	505.5	355	72
SDP120-400EU	236,000	650,000	5,600	75,000	400	1,325	880.5	555	99
SDP120-600EU	300,000	550,000	5,600	75,000	600	1,880	1,235.5	755	125
SDP120-800EU	327,000	450,000	5,600	75,000	800	2,450	1,605.5	955	160
SDP120-1000EU	364,000	400,000	5,600	75,000	1,000	3,020	1,975.5	1,155	192
SDP120-1200EU	436,000	400,000	5,600	75,000	1,200	3,590	2,345.5	1,355	225

In case of an existing side load angle, please consult ACE.

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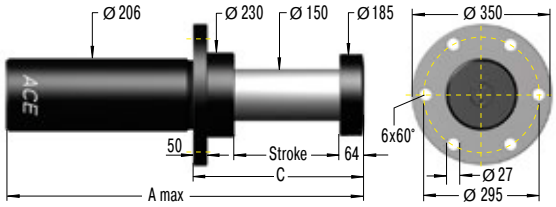
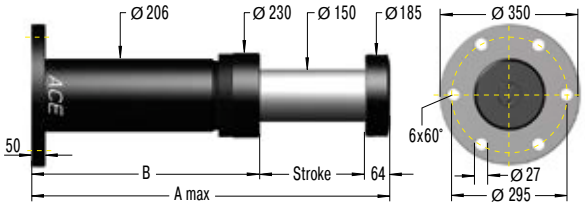
SDP160EU-F Front Flange



SDP160EU-R Rear Flange



Technical Data

Impact velocity range: 0.5 m/s to 4.6 m/s. Other speeds on request.

The calculation and selection of the most suitable damper should be carried out or be approved by ACE.

Complete details required when ordering

Moving load: m (kg)
Impact velocity range: v (m/s) max.
Creep speed: vs (m/s)
Motor power: P (kW)
Stall torque factor: ST (normal, 2.5)
Number of absorbers in parallel: n

or technical data according to formulae and calculations on page 259.

Ordering Example **SDP160-400EU-F-XXXXX**

Safety Shock Absorber
Bore Size Ø 160 mm
Stroke 400 mm
EU Compliant
Mounting Style: Front Flange
Identification No. assigned by ACE

Please indicate identification no. in case of replacement order

Performance and Dimensions

TYPES	Energy capacity **Nm/cycle**	Reacting force **N**	Return force min. **N**	Return force max. **N**	Stroke **mm**	A max. **mm**	B **mm**	C **mm**	Weight **kg**
SDP160-200EU	182,000	1,000,000	1,000	80,000	200	860	596	440	105
SDP160-400EU	345,000	950,000	1,000	80,000	400	1,485	1,021	640	165
SDP160-500EU	409,000	900,000	1,000	90,000	500	1,765	1,201	740	195
SDP160-600EU	469,000	860,000	1,000	95,000	600	2,065	1,401	840	230
SDP160-800EU	545,000	750,000	1,000	100,000	800	2,660	1,796	1,040	290
SDP160-1000EU	545,000	600,000	1,000	110,000	1,000	3,225	2,161	1,240	350
SDP160-1200EU	545,000	500,000	1,000	110,000	1,200	3,815	2,551	1,440	410
SDP160-1600EU	582,000	400,000	1,000	110,000	1,600	4,995	3,331	1,840	530

In case of an existing side load angle, please consult ACE.

Permitted Use

ACE safety shock absorbers are machine elements to brake moving masses in a defined end position in emergency stop situations for axial forces. The safety shock absorbers are not designed for regular operational usage.

Calculation of safety shock absorbers

The calculation of safety shock absorbers should generally be performed or checked by ACE.

Deceleration Properties

The orifice sizing and drill pattern in the pressure chamber are individually designed for each safety shock absorber. The respective absorption characteristic is optimised corresponding to the maximum mass that occurs in the emergency stop and the impact speed. Correspondingly, each safety shock absorber is given an individual identification number.

Model Code

For types SCS33 to 64, the individual five-digit identification numbers can be taken from the last digits of the shock absorber model code shown on the label. Example: SCS33-50EU-1XXXX. For type series SDH38 to SDH63 and SDP63 to SDP160, the identification number is a five digit number. Example: SDH38-400EU-F-XXXXX. In addition to the model code, the label also shows the authorised maximum impact velocity and maximum authorised impact mass for the unit.

Mounting

To mount the shock absorber, we recommend the use of original ACE mounting accessories shown in catalogue.

The mounting of each shock absorber must be exactly positioned so that the reaction force (Q) can be adequately transmitted into the mounting structure.

ACE recommends installation via the front flange -F mounting style that ensures the maximum protection against buckling. The damper must be mounted so that the moving loads are decelerated with the least possible side loading to the piston rod. The maximum permissable side load angles are detailed in our current catalogue.

The entire stroke length must be used for deceleration because only using part of the stroke can lead to overstressing and damage to the unit.

Mounting style **front flange**

Safety Shock Absorber SDH

Safety Shock Absorber SDP

Environmental Requirements

The permissible **temperature range** for each shock absorber type can be found in our current catalogue.
Caution: Usage outside the specified temperature range can lead to premature breakdown and damage of of the shock absorbers which can then result in severe system damage or machine failures.

Trouble free operation outdoors or in damp environments is only warranted if the dampers are coated with a specific corrosion protection finish.

Initial Start-Up Checks

First impacts on the shock absorber should only be tried after correctly mounting and with reduced impact speeds and – if possible – with reduced load. Differences between calculated and actual operating data can then be detected early on, and damage to your system can be avoided. If the shock absorbers were selected on calculated data that does not correspond to the maximum possible loading (i.e. selection based on drive power being switched off or at reduced impact speed) then these restricted impact conditions must not be exceeded during initial testing or subsequent use of the system. Otherwise you risk damaging the shock absorbers and/or your machine by overstressing materials. After the initial trial check that the piston rod fully extends again and that there are no signs of oil leakage. Also check that the mounting hardware is still securely tightened. You need to satisfy your- self that no damage has occurred to the piston rod, the body, or the mounting hardware.

Fixed Mechanical Stop

Safety shock absorbers do not need an external stop as a stroke limiter. The stroke of the safety absorber is limited by the stop of the impact head on the shock absorber. For types SCS33 to SCS64, the fixed stop point is achieved with the integrated stop collar.

What Needs to be Checked after a Full Load Impact?

Safety shock absorbers that were originally checked only at reduced speed or load need to be checked again after a full load impact (i.e. emergency use) has occurred. Check that the piston rod fully extends to its full out position, that there are no signs of oil leakage and that the mounting hardware is still securely fixed. You need to satisfy yourself that no damage has occurred to the piston rod, the body, or the mount- ing hardware. If no damage has occurred, the safety shock absorber can be put back into normal operation (see **initial start-up**).

Maintenance

Safety shock absorbers are sealed systems and do not need special maintenance. Safety shock absorbers that are not used regularly (i.e. that are intended for emergency stop systems) should be checked within the normal time frame for safety checks, but **at least once a year**. At this time special attention must be paid to checking that the piston rod resets to its fully extended position, that there is no oil leakage and that the mounting brackets are still secure and undamaged. The piston rod must not show any signs of damage. Safety shock absorbers that are **in use regularly** should be checked **every three months**.

Repair Notice

If any damage to the shock absorber is detected or if there are any doubts as to the proper functioning of the unit please send the unit for service to ACE. Alternatively contact your local ACE office for further advice.

Detailed information on the above listed points can be taken from the corresponding operating and assembly instructions.

Issue 08.2016 – Specifications subject to change

Calculation Bases for the Design of Safety Shock Absorbers

More formulae on page 10 to 13

ACE shock absorbers provide linear deceleration and are therefore superior to other kinds of damping element. It is easy to calculate around 90 % of applications knowing only the following four parameters:

1. Mass to be decelerated (weight)	**m**	**[kg]**
2. Impact velocity at shock absorber	**v_D**	**[m/s]**
3. Propelling force	**F**	**[N]**
4. Number of absorbers in parallel	**n**	

Key to symbols used

W_1	Kinetic energy per cycle	Nm	^2v_D	Impact velocity at shock absorber	m/s
W_2	Propelling force energy per cycle	Nm	F	Propelling force	N
W_3	Total energy per cycle ($W_1 + W_2$)	Nm	c	Cycles per hour	1/hr
$^1W_4$	Total energy per hour ($W_3 \cdot x$)	Nm/hr	s	Shock absorber stroke	m
me	Effective weight	kg	Q	Reaction force	N
m	Mass to be decelerated	kg	t	Deceleration time	s
n	Number of shock absorbers (in parallel)		a	Deceleration	m/s^2
^2v	Velocity at impact	m/s			

[1] All mentioned values of W4 in the capacity charts are only valid for room temperature. There are reduced values at higher temperature ranges.

[2] v or v_D is the final impact velocity of the mass. With accelerating motion the final impact velocity can be 1.5 to 2 times higher than the average. Please take this into account when calculating kinetic energy.

In all the following examples the choice of shock absorbers made from the capacity chart is based upon the values of (W_3), (W_4), (me) and the desired shock absorber stroke (s).

Note: When using several shock absorbers in parallel, the values (W_3), (W_4) and (me) are divided according to the number of units used.

Application	Formulae	Example
19 Wagon against 2 shock absorbers	$W_1 = m \cdot v^2 \cdot 0.25$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = v \cdot 0.5$	m = 5000 kg v = 2 m/s F = 3500 N s = 0.10 m (chosen)
20 Wagon against wagon	$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.5$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = v_1 + v_2$	m = 7000 kg v_1 = 1.2 m/s m_2 = 10000 kg v_2 = 0.5 m/s F = 5000 N s = 0.10 m (chosen)
21 Wagon against wagon 2 shock absorbers	$W_1 = \frac{m_1 \cdot m_2}{(m_1+m_2)} \cdot (v_1+v_2)^2 \cdot 0.25$ $W_2 = F \cdot s$ $W_3 = W_1 + W_2$ $v_D = \frac{v_1 + v_2}{2}$	m = 7000 kg v_1 = 1.2 m/s m_2 = 10000 kg v_2 = 0.5 m/s F = 5000 N s = 0.10 m (chosen)

Example			
19	$W_1 = 5000 \cdot 2^2 \cdot 0.25$	= 5000	Nm
	$W_2 = 3500 \cdot 0.10$	= 350	Nm
	$W_3 = 5000 + 350$	= 5350	Nm
	$v_D = 2 \cdot 0.5$	= 1	m/s
	Chosen from capacity chart: Model SDH38-100EU self-compensating		
20	$W_1 = \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.5$	= 5950	Nm
	$W_2 = 5000 \cdot 0.10$	= 500	Nm
	$W_3 = 5950 + 500$	= 6450	Nm
	$v_D = 1.2 + 0.5$	= 1.7	m/s
	Chosen from capacity chart: Model SDH50-100EU self-compensating		
21	$W_1 = \frac{7000 \cdot 10000}{(7000+10000)} \cdot 1.7^2 \cdot 0.25$	= 2975	Nm
	$W_2 = 5000 \cdot 0.10$	= 500	Nm
	$W_3 = 2975 + 510$	= 3475	Nm
	$v_D = (1.2 + 0.5) : 2$	= 0.85	m/s
	Chosen from capacity chart: Model SDH38-100EU self-compensating		