OLEO INTERNATIONAL

LEADING THE WORLD IN ENERGY ABSORPTION



ELEVATOR IMPACT PROTECTION

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2015

ELEVATOR

OLEO INTERNATIONAL



Oleo is a leading expert in energy absorption technology supplying solutions to the elevator, industrial and rail sectors.

Our ongoing investment in research and development ensures that we are continually updating our designs and introducing new products and services to our portfolio.

We are able to supply an energy absorption solution to suit any requirement – we provide solutions not just products.

We sell worldwide through our offices in the United Kingdom, China, India, Germany and the USA and through a wide range of distributors.



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Oleo elevator buffers are designed to protect people and equipment from forces generated from an impact resulting from equipment failure or operator error.

Oleo has achieved this on most buffer types using hydraulic energy absorption systems combined with a gas return spring to give unsurpassed energy dissipation and recovery, the exception to this is the LSB range of buffers which use mechanical springs.

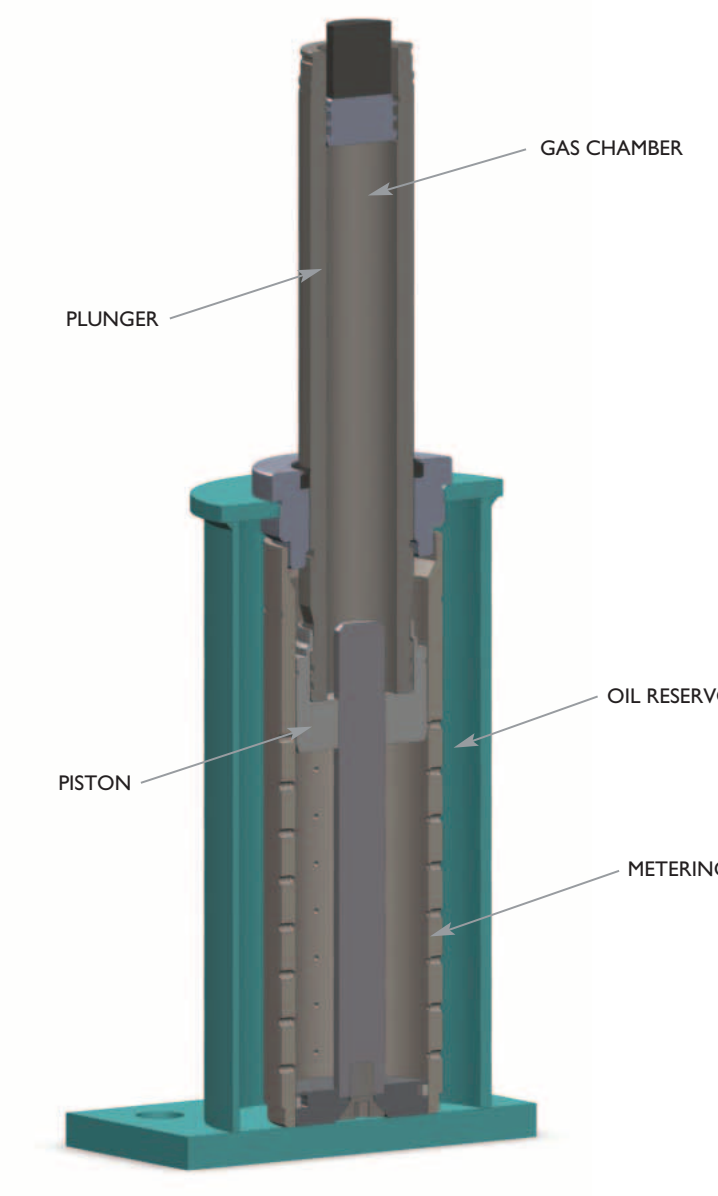
Oleo has a complete range of elevator buffers for every application offering a lighter, stronger, high quality product with minimum life-cycle costs.

Our elevator buffers are sold worldwide offering exceptional performance across a wide mass and speed range. Oleo buffers have worldwide certification and approvals which include EN81.1, ASME A17.1 GB7588, EK1002 and GOSTS R53780.

Oleo buffers are primarily available as standard designs but we would welcome the opportunity to look at a specific requirement.



HYDRAULIC OPERATING PRINCIPLE



The illustration shows the robust construction of the Oleo elevator hydraulic buffer unit. On impact the plunger is forced down around the gas rod and through the metering tube displacing oil through holes, thereby decelerating the impact mass. Following impact the gas hydraulic buffer returns to its full height using a unique method of moving the gas within the chamber.

The buffers performance on impact relies solely on oil displacement, the gas spring serves only to re-extend the plunger.

When the plunger is forced into the cylinder rapidly the oil displaced by the plunger has to pass through the metering holes at very high velocity. This raises the pressure in the oil chamber to a level which optimises the closure force of the unit.

This very useful feature is accomplished by Oleo's innovative metering designs which progressively alter the flow area as the unit closes. The actual metering designs are precisely calculated to provide the best possible protection.

The Oleo hydraulic unit therefore possesses the unique feature that its characteristics change according to operational needs. The majority of the impact energy is absorbed within the unit and the already low recoil force is damped by the reverse flow of oil, leaving very little energy and recoil force to be returned to the impacting vehicle.

ELEVATOR SAFETY

Elevator buffers are safety devices which are required to be mounted at the base of an elevator shaft. As with any safety device, elevator buffers have to meet with a variety of specifications. One of the most important of these specifications is the manner in which the buffers must bring an impacting elevator car to rest. There are different technical specifications for elevator buffers in different regions worldwide however all employ the same basic performance criteria.

Since the very early days of elevators, a variety of safety systems have been employed to ensure that the elevator will not free fall. The purpose of elevator buffers is to provide protection against the malfunction of an elevator control system resulting in the elevator continuing to travel past the lowest stop to the base of the elevator shaft. The buffers are specified in accordance with the operating velocity and mass of the elevator.

Although freefall is not a realistic event for an elevator, the specification and code requirements are based on the assumption of freefall.

The requirement for elevator buffers fall into two categories depending on the type of buffer.

1. **Energy accumulation buffers:** These can take the form of simple mechanical springs or polymer buffers which store the absorbed energy of the impact in the form of strain energy. In some accumulation buffers this stored energy can be dissipated on the return movement of the buffer leading to two separate requirements:

   a) Buffers with linear and non linear characteristics – these can be used if the elevator does not exceed 1.0 m/s

   b) Buffers with buffered return movement – these can be used for elevators that do not exceed 1.6 m/s.

2. **Energy dissipation buffers:** These are usually hydraulic buffers which dissipate the energy of the impact in the form of heat during the travel of the buffer. This type of buffer can be used for all rated speeds, but must be used for speeds of 1.6 m/s or over.

BUFFER PERFORMANCE CRITERIA – ENERGY DISSIPATION BUFFERS

Performance criteria in all specifications is governed by 2 underlying rules which state that the buffer must arrest a freefalling mass travelling at 115% of the rated speed of the elevator:

(i) With an average deceleration not exceeding 1g.

(ii) Without exceeding a deceleration of 2.5g for a time period greater than 0.04 seconds.

In addition a further, but separate, requirement states that the buffer stroke must be at least as great as free fall distance required to reach 115% of the rated elevator velocity. It is this requirement that dictates the stroke and consequently the installation height of elevator buffers. Due to customer demands, most elevator buffers do not deviate far from the minimum stroke requirement.



MINIMUM POSSIBLE STROKE LENGTHS

Oleo Buffer Type					MIN Stroke	Rated Buffer Speed	MAX Buffer Speed (115% of Rated Elevator Speed)	Reduced Stroke Elevator Speed before striking terminal slowdown device (ASME A17.1)	Reduced Stroke Elevator Speed before striking terminal slowdown device (EN81.1)
					mm	m/s	m/s	m/s	m/s
LSB 10					73.3	1.00	1.15	1.47	n/a
		MLB 13			120	1.30	1.50	1.88	n/a
LSB 16	SEB 16	MLB 16			173	1.60	1.84	2.26	n/a
			LB 16		203	1.60	1.84	2.45	n/a
LSB 18	SEB 18	MLB 18			219	1.80	2.07	2.54	n/a
			LB18		249	1.80	2.07	2.71	n/a
	SEB 20	MLB 20			279	2.03	2.33	2.87	n/a
			LB 20		300	2.03	2.33	2.98	n/a
	SEB 25	MLB 25			435	2.54	2.92	3.59	3.59
			LB 25		462	2.54	2.92	4.53	3.70
		MLB 32			679	3.15	3.62	5.49	5.49
			LB 32		699	3.15	3.62	5.57	5.57
		MLB 35	LB 35		881	3.56	4.09	6.26	6.26
		MLB 40	LB 40		1141	4.06	4.67	7.12	7.12
			LB 50		1740	5.09	5.85	8.80	8.80
			LB 55		2109	5.61	6.45	9.68	9.68
				HSL 58	2350	5.85	6.73	10.22	10.22
			LB 60		2504	6.09	7.00	10.55	10.55
				HSL 72	3600	7.25	8.34	12.74	12.74
				HSL 87	5200	8.70	10.01	15.21	15.21
				HSL 101	7000	10.10	11.62	17.65	17.65
				HSL 115	9200	11.55	13.28	20.23	20.23

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

Reduced stroke values provided in this brochure are for reference only.

Oleo International are not responsible for the incorrect application of reduced stroke.

Local rules must be checked before applying.



ELEVATOR SAFETY

The design engineer must consider the stroke requirements in the overall height of the buffer. If telescopic solutions are not to be used then the overall height must be at least double the minimum stroke with a further height requirement to restrict lateral movement when the buffer is fully extended.

Lateral movement should be restricted to +/-5 mm per metre of stroke from the centre.

EMERGENCY TERMINAL SPEED LIMITING DEVICE

The function of an emergency terminal speed limiting device is to automatically reduce the speed of a car or counterweight by removing power from the driving machine. The device effectively slows the car or counterweight to the rated speed of the buffer before impact. This device would normally be independent of the normal terminal slowdown devices. This is important when selecting a buffer for a particular application. If the emergency terminal speed limiting device is part of the installation then the 'reduced stroke' rules can apply. This effectively reduces the size of the buffer required for a particular application.

REDUCED STROKE

The calculation for reduced stroke is based on the stroke of the buffer and not the speed of the elevator. The reduced stroke calculation differs in some countries but the basic rules are as follows:

The stroke must not be less than:

a) One half (50%) of the stroke for elevators that do not exceed 4.0 m/s

b) One third (33.3%) of the stroke for elevators where the speed exceeds 4.0 m/s.

Minimum strokes also apply under some code requirements including EN81.1. Under EN81.1 the minimum stroke should be 420 mm for 50% calculation and 540 mm for the 33.3% calculation. This does not apply under all code requirements.

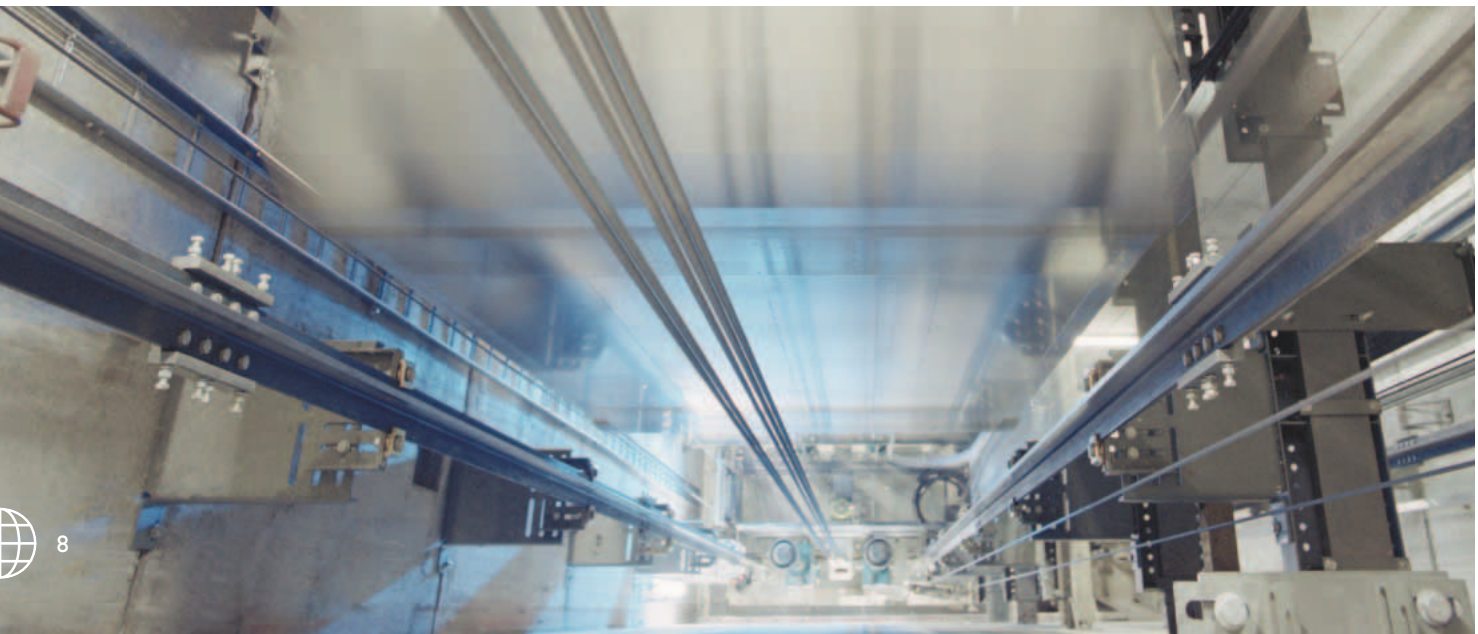
Using the reduced stroke calculation a buffer rated at 5.09 m/s could be used on an installation of 8.8 m/s if used with a terminal speed limiting device.

BUFFER PERFORMANCE

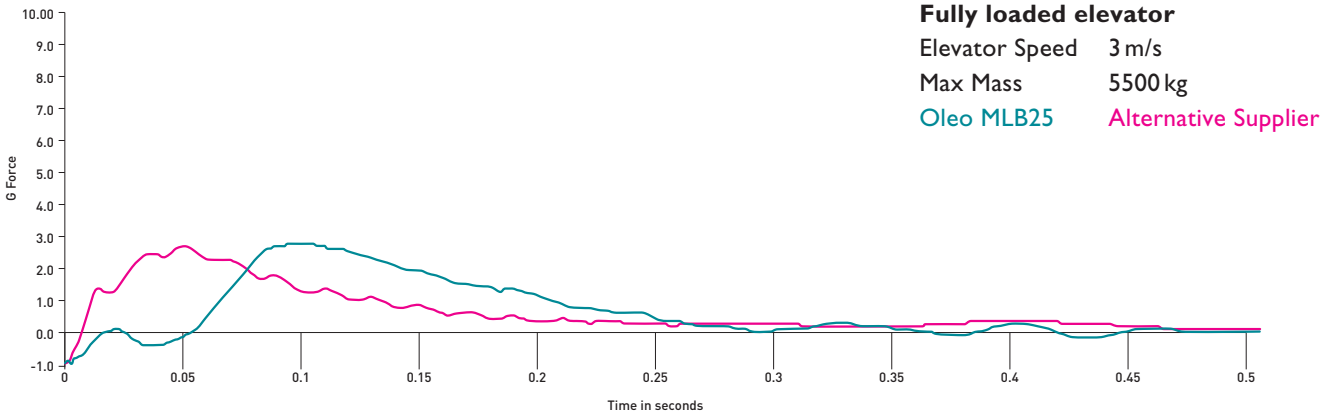
The minimum stroke for an elevator buffer is specified (within EN81.1 and ASME A17.1), as the necessary distance to bring an impacting mass, travelling at 115% of the buffer's rated speed, to rest with a uniform deceleration of 1g. However, this is only true if the buffer exerts a constant retardation force over its entire stroke.

A hydraulic buffer can be designed to closely match this idealised performance. This is achieved by precise control of hydraulic oil flow across an orifice throughout the buffer stroke. However, this can only be achieved for one specific impact mass. The same performance is not achievable for the range of elevator masses that are encountered in the real world where the elevator car mass varies with passenger load.

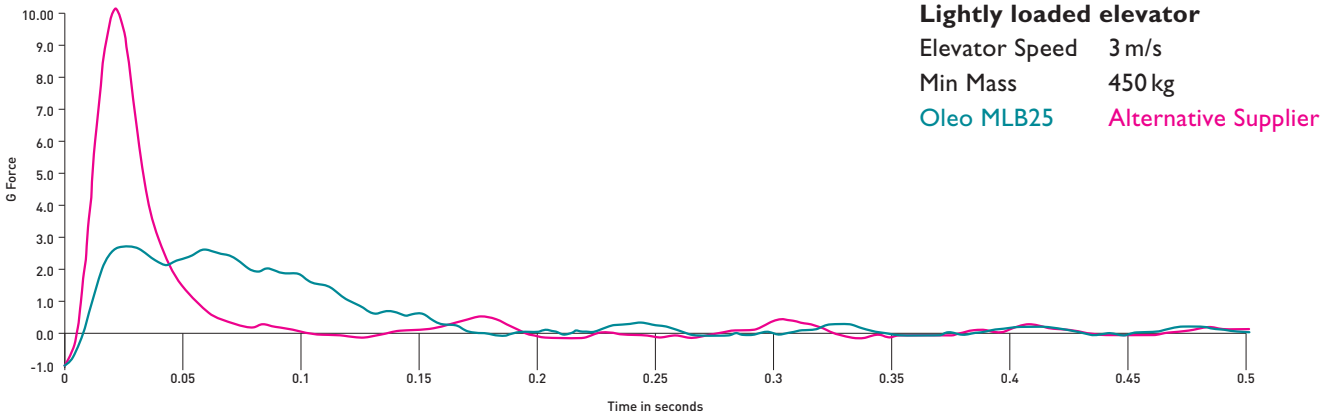
In the elevator application, where there is a need to protect passenger safety, it is important to try to minimise the deceleration experienced during stopping. This can be easily resolved when the elevator is fully loaded but at low loads the same retardation force will slow the elevator more quickly and therefore initially result in higher deceleration for the passenger.



The graphs below compare test data from two hydraulic buffers that both meet the elevator code specification requirement being used to stop an elevator car travelling at 3 m/s. This shows the g force that will be experienced by passengers travelling in fully and lightly loaded conditions.



The performance of the Oleo and the alternative supplier's elevator buffer is similar.



The performance of the Oleo buffer design shows its benefits with a much lower peak deceleration force of 2.6g in comparison to 10g for the alternative supplier's elevator buffer.

In both load conditions both buffers keep the average deceleration below 1g and do not allow 2.5g for more than 40 milliseconds and therefore are both fully compliant with elevator code specification requirements.

The limiting of peak deceleration force is not required by any elevator code or industry specification. Alternative buffers achieve the average 1g criterion by an initial period of high deceleration followed by extending the final stages as the elevator is coming to rest. The other key elevator buffer specification requires that passengers do not experience more than 2.5g for more than 40 milliseconds but within this period g forces are not limited. However, as illustrated above, in certain conditions very high instantaneous g forces occur and this may cause passenger discomfort.

Oleo has an overall passenger safety aware approach and seeks to avoid the passenger discomfort that may arise from instantaneous deceleration that may even exceed 10g in some circumstances. Many years of in-house testing and the development of mathematical algorithms that accurately simulate the performance of hydraulic buffers enable Oleo unsurpassed force control. The design philosophy is to minimise g force for all passenger load conditions the benefits are highlighted in the test data shown above.

ELEVATOR SAFETY

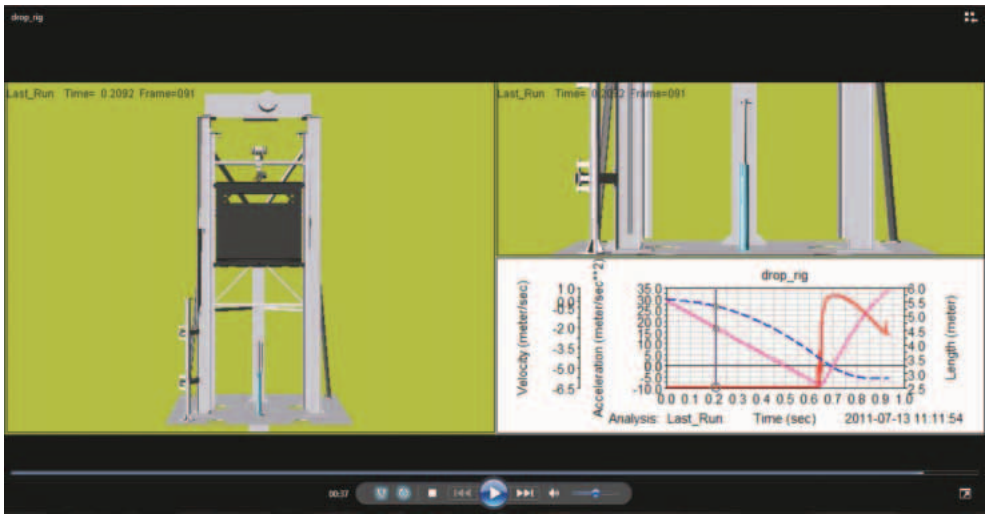
ELEVATOR SWITCHES

Oleo elevator buffers are designed to withstand many more maximum load impacts than elevators are likely to experience in their service life. Despite this, elevator buffers remain an emergency only device. It is never a desirable outcome in the real world to have to rely on buffers to bring your elevator to a stop – that said, it is absolutely essential that you can rely on the buffers in the event that they are required.

It is for this reason that many elevator buffers are fitted with a switch. The switch is positioned to detect that the buffer is fully extended and therefore ready for impact in the case of an emergency. If for any reason the switch does not detect full buffer extension, the entire elevator system is shut down.

MODELLING AND ANALYSIS

Oleo employs computer modelling and analysis to refine elevator buffers performance. Simulations are compared directly with test results obtained on Oleo's own in-house dynamic test facility. The ability to both simulate and test, has allowed increased optimisation of elevator buffer performance, providing benefits in terms of cost, safety and reliability.



Oleo provide elevator impact simulation to validate test results

BUFFER TYPE TESTING

Elevator buffers are subjected to a type test before they can be sold to the market. Type test requirements vary depending on country but most follow the guidelines of the European specification EN81.1 or ASME A17.1.

To comply with the requirements of EN81.1 the buffer must perform to the criteria detailed earlier. To establish this, the buffers are subject to drop tests. This is where a mass is dropped in freefall. The drop tests must take place at a temperature between 0°C and 25°C. Tests are conducted with masses at either extreme of the stated mass range of the buffer. Subsequent to the maximum mass drop, the mass must remain on the buffer for a minimum of 5 minutes, after which the buffer must fully re-extend within a time period of 90 seconds. Measurements must be made of the displacement, velocity and acceleration of the freefalling masses at a sample rate of at least 100Hz.

In order to eliminate erroneous noise and high frequency vibration from accelerometer traces, low pass filtering is usually applied to a signal sampled at a higher than required sampling frequency.

RANGE OVERVIEW

Buffer unit	Rated Speed	Reduced Stroke Elevator Speed before striking terminal slowdown device (ASME A17.1)	Reduced Stroke Elevator Speed before striking terminal slowdown device (EN81.1)	Stroke (min)	Impact mass range		Height (extended)	Height (compressed)	Height to reservoir top	Weight no oil (dry)	Oil volume
	m/s	m/s	m/s	mm	Kg min	Kg max	mm Dim H (max)	mm Dim C (min)	mm Dim F (nom)	Kg	litres
LSB 10	1.00	3.6	n/a	73.3	380	3250	222.9	146.0	102.4	3.6	0.5
LSB 16	1.60	6.7	n/a	173.7	450	3250	485.6	307.0	239.6	6.7	0.9
LSB 18	1.80	7.6	n/a	219.7	450	3250	577.6	353.0	285.6	7.6	1.0
SEB 16	1.60	2.26	n/a	173	450	4545	540.5	350.3	307.0	11.2	1.5
SEB 18	1.80	2.54	n/a	219	450	4545	643.5	404.3	364.0	12.8	1.8
SEB 20	2.03	2.87	n/a	279	450	4545	777.5	481.3	438.0	14.8	2.2
SEB 25	2.54	3.59	3.59	435	450	4545	1126.5	674.3	631.0	20.0	3.3
MLB 13	1.30	1.88	n/a	120	450	5500	408.0	273.5	238.0	8.7	1.0
MLB 16	1.60	2.26	n/a	173	450	5500	530.0	342.5	307.0	10.6	1.4
MLB 18	1.80	2.54	n/a	219	450	5500	632.0	398.5	363.0	12.0	1.7
MLB 20	2.03	2.87	n/a	279	450	5500	780.0	486.5	451.0	14.4	2.2
MLB 25	2.54	3.59	3.59	435	450	5500	1162.0	712.5	677.0	20.4	3.3
MLB 32	3.15	5.49	5.49	679	450	5500	1728.5	1033.0	981.0	29.0	5.2
MLB 35	3.56	6.26	6.26	881	600	5500	2108.3	1208.8	1167.0	60.9	19.5
MLB 40	4.06	7.12	7.12	1141	600	5500	2693.3	1533.8	1492.0	76.4	25.0
LB 16	1.60	2.45	n/a	203	500	8330	617.8	396.8	355.0	24.0	4.6
LB 18	1.80	2.71	n/a	249	500	8330	723.3	455.8	414.0	26.4	5.6
LB 20	2.03	2.98	n/a	300	500	8330	839.3	520.8	479.0	28.9	6.6
LB 25	2.54	4.53	3.70	462	500	8330	1211.3	730.8	689.0	38.6	10.0
LB 32	3.15	5.57	5.57	699	700	8330	1706.3	988.8	947.0	55.2	20.0
LB 35	3.56	6.26	6.26	881	1000	8330	2108.3	1208.8	1167.0	66.4	24.5
LB 40	4.06	7.12	7.12	1141	1000	8330	2693.3	1533.8	1492.0	81.9	31.5
LB 50	5.09	8.80	8.80	1740	1500	7500	4215.6	2439.5	2343.0	208.4	27.8
LB 55	5.61	9.68	9.68	2109	1250	7500	5038.6	2893.5	2797.0	241.8	33.3
LB 60	6.09	10.55	10.55	2504	1500	10000	6180.6	3597.5	3455.0	480.2	73.0
HSL 58	5.85	10.22	10.22	2350	4000	10000	4890.0	2540.0	1942.5	779.0	98.0
HSL 72	7.25	12.74	12.74	3650	4000	10000	7290.0	3690.0	3017.5	1051.0	144.0
HSL 87	8.70	15.21	15.21	5200	4000	10000	10290.0	5190.0	4492.5	1450.0	207.0
HSL 101	10.10	17.65	17.65	7000	5000	8000	12569.0	4193.0	3633.0	3000.0	275.0
HSL 115	11.55	20.23	20.23	9200	5500	8000	14900.0	5717.0	5157.0	3497.0	490.0

A COMPLETE RANGE OF ELEVATOR BUFFERS FOR EVERY APPLICATION

While we have made every effort to ensure that the information in this brochure is up to date and accurate, we do not accept responsibility for your reliance on the information contained herein. All products are subject to availability and may be withdrawn without prior notice. All products are subject to change without prior notice.

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

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Oleo International are not responsible for the incorrect application of reduced stroke.

Local rules must be checked before applying.

Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2.

LSB SERIES

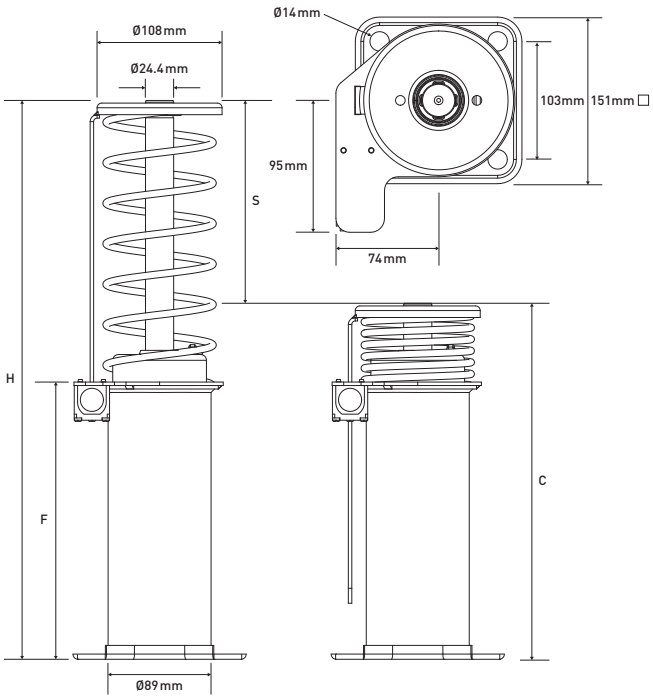
The LSB oil buffer series is a self contained, maintenance free* unit designed for low and medium speed applications. The LSB series is designed to be low cost while maintaining Oleo's recognised performance standards.

Oleo's LSB buffers weigh approx half of a conventional buffer and have a small space envelope, this means that shipping costs are significantly reduced. In addition there is the option to supply the buffers oil filled rather than with a separate container of oil saving valuable time during elevator installation and reducing the risk of errors and spillage.

The LSB series is designed and built according to strict engineering standards and is universally approved and globally certified.

*other than statutory inspections.

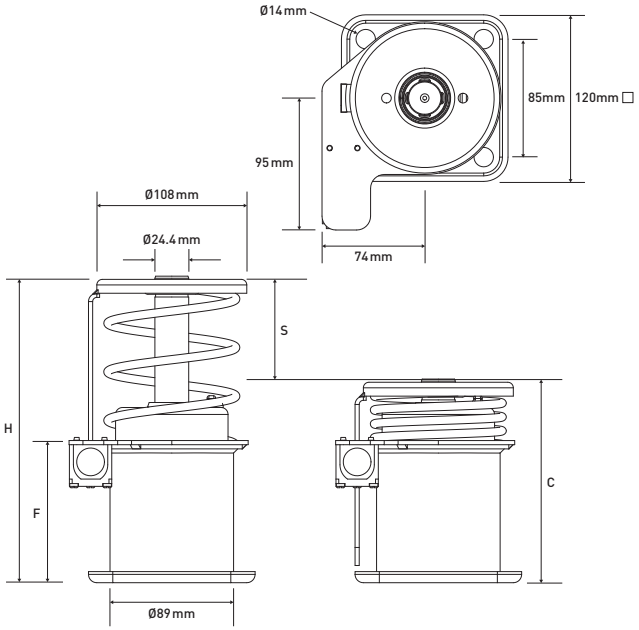
Dimensions for LSB 16,18





Model		LSB 10	LSB 16	LSB 18
Rated speed	m/s	1.00	1.60	1.80
Stroke 'S' (min.)	mm	73.3	173.7	219.7
Impact mass range	kg	380-3250	450-3250	450-3250
Height 'H' **max.** (extended)**	mm	222.9	485.6	577.6
Height 'C' **min.** (compressed)**	mm	146.0	307.0	353.0
Height 'F' to reservoir top	mm	102.4	239.6	285.6
Weight no oil (dry)	kg	3.6	6.7	7.6
Oil volume	litres	0.5	0.9	1.0
Reduced stroke: Rated speed with terminal speed limiting device, based on ASME A17.1 rule 2.22.4.1.2				
Reduced stroke ASME A17.1 North America	m/s	3.6	6.7	7.6
Reduced stroke EN81.1 Europe	m/s	n/a	n/a	n/a

Dimensions for LSB 10



In the event that the LSB elevator buffers are delivered without oil the buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at 15° C – hydraulic.

Pour point -18° C or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawing.

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SEB SERIES

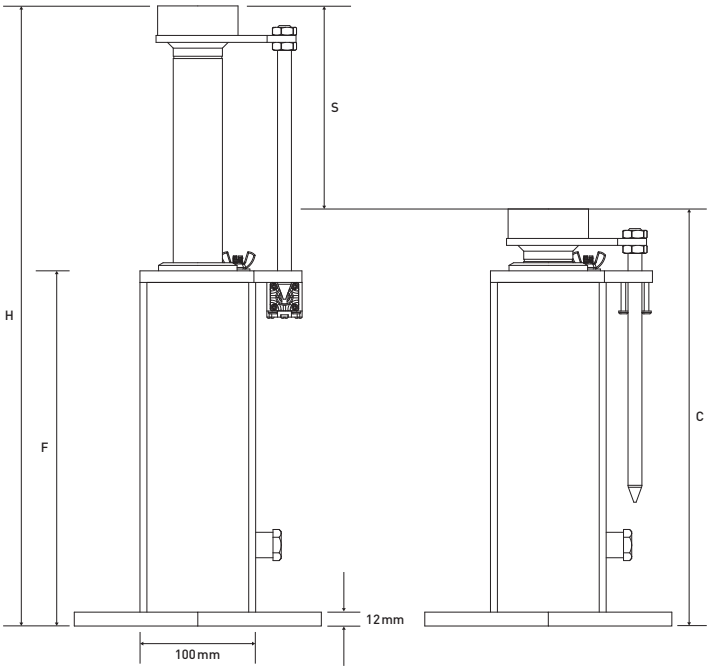
The SEB buffer range has been available for over twenty years with thousands successfully installed around the world.

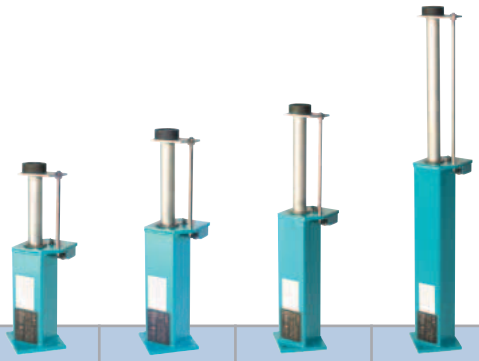
The SEB gas hydraulic buffer series provides a premium robust solution for medium speed applications.

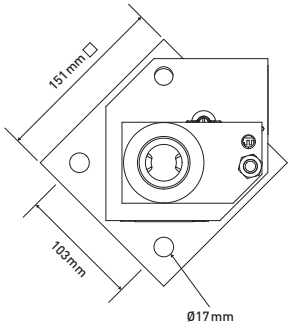
A self contained, maintenance free* unit designed to weigh approximately half of a conventional buffer and have a small space envelope. This means that shipping costs are significantly reduced and allows for quick and easy installation.

The SEB series is designed and built according to strict engineering standards and is universally approved and globally certified.

*other than statutory inspections.







Model		SEB 16	SEB 18	SEB 20	SEB 25
Rated speed	m/s	1.60	1.80	2.03	2.54
Stroke 'S' (min.)	mm	173	219	279	435
Impact mass range	kg	450-4545	450-4545	450-4545	450-4545
Height 'H' **max.** (extended)**	mm	540.5	643.5	777.5	1126.5
Height 'C' **min.** (compressed)**	mm	350.3	404.3	481.3	674.3
Height 'F' to reservoir top	mm	307.0	364.0	438.0	631.0
Weight no oil (dry)	kg	11.2	12.8	14.8	20.0
Oil volume	litres	1.5	1.8	2.2	3.3
Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2					
Reduced stroke ASME A17.1 North America	m/s	2.26	2.54	2.87	3.59
Reduced stroke EN81.1 Europe	m/s	n/a	n/a	n/a	3.59

SEB elevator buffers are delivered without oil. Buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at 15° C – hydraulic.

Pour point -18° C or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawings.

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MLB SERIES

The MLB series has been designed to complement the successful LB series while retaining key operational characteristics.

The MLB gas hydraulic buffer series is a self contained, maintenance free* unit designed for quick and easy installation, primarily designed for medium speed elevator applications, typical applications include low to medium rise buildings.

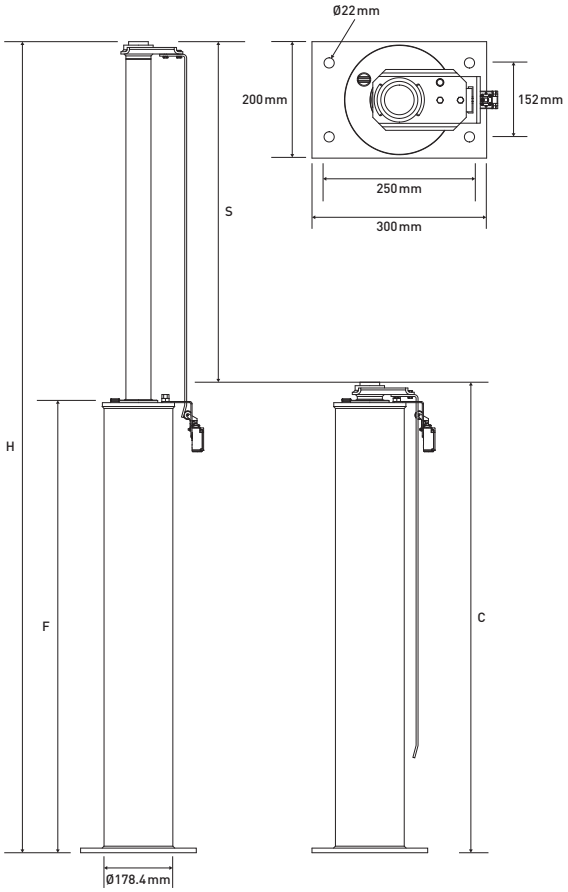
Oleo's MLB buffers weigh approx half of a conventional buffer and have a small space envelope, this means that shipping costs are significantly reduced. In addition there is the option to supply the MLB 13 – MLB 32 oil filled rather than with a separate container of oil saving valuable time during elevator installation and reducing the risk of errors and spillage. The MLB 35 and MLB 40 are delivered without oil.

The MLB series is designed and built according to strict engineering standards and is universally approved and globally certified.

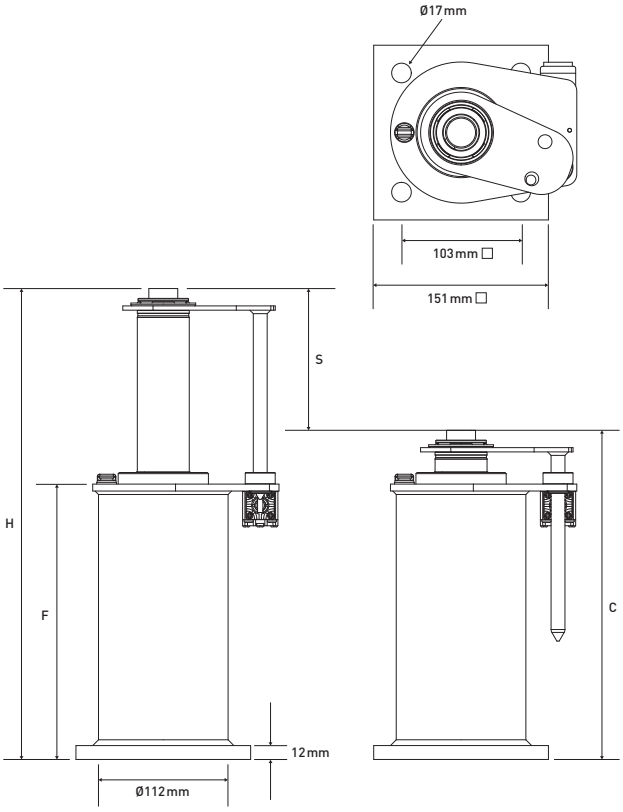
The MLB series provides a cost effective solution with excellent performance characteristics across an exceptionally wide mass range.

*other than statutory inspections.

Dimensions for MLB 35, 40

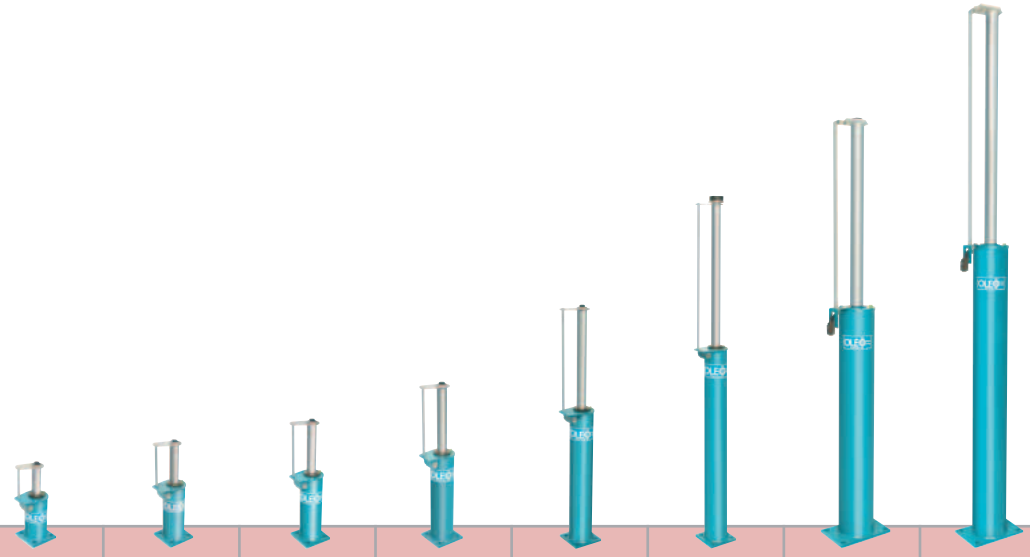


Dimensions for MLB 13, 16, 18, 20, 25, 32









Model		MLB 13	MLB 16	MLB 18	MLB 20	MLB 25	MLB 32	MLB 35	MLB 40
Rated speed	m/s	1.30	1.60	1.80	2.03	2.54	3.15	3.56	4.06
Stroke 'S' (min.)	mm	120	173	219	279	435	679	881	1141
Impact mass range	kg	450-5500	450-5500	450-5500	450-5500	450-5500	450-5500	600-5500	600-5500
Height 'H' **max.** (extended)**	mm	408.0	530.0	632.0	780.0	1162.0	1728.5	2108.3	2693.3
Height 'C' **min.** (compressed)**	mm	273.5	342.5	398.5	486.5	712.5	1033.0	1208.8	1533.8
Height 'F' to reservoir top	mm	238.0	307.0	363.0	451.0	677.0	981.0	1167.0	1492.0
Weight no oil (dry)	kg	8.7	10.6	12.0	14.4	20.4	29.0	60.9	76.4
Oil volume	litres	1.0	1.4	1.7	2.2	3.3	5.2	19.5	25.0
Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2									
Reduced stroke ASME A17.1 North America	m/s	1.88	2.26	2.54	2.87	3.59	5.49	6.26	7.12
Reduced stroke EN81.1 Europe	m/s	n/a	n/a	n/a	n/a	3.59	5.49	6.26	7.12

In the event that the MLB elevator buffers are delivered without oil the buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at 15° C – hydraulic.

Pour point -18° C or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawing.

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

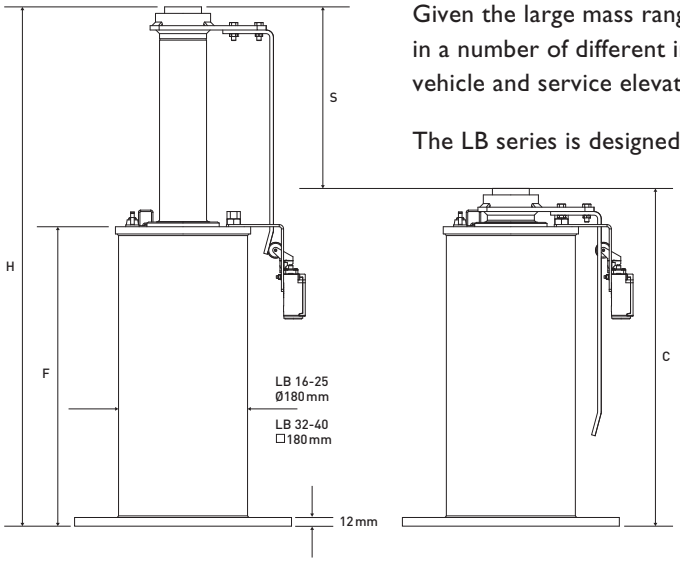
Reduced stroke values provided in this brochure are for reference only.

Oleo International are not responsible for the incorrect application of reduced stroke.

Local rules must be checked before applying.

LB SERIES

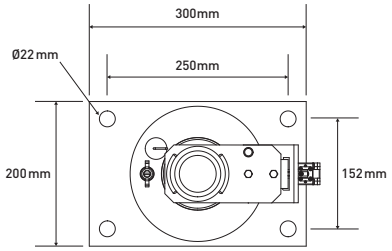
Oleo has been offering the LB series for over thirty years. The Oleo LB gas hydraulic buffer series is globally recognised for its excellent performance and reliability. It is a self contained, maintenance free* unit designed for heavy and high speed installations offering our largest mass range.

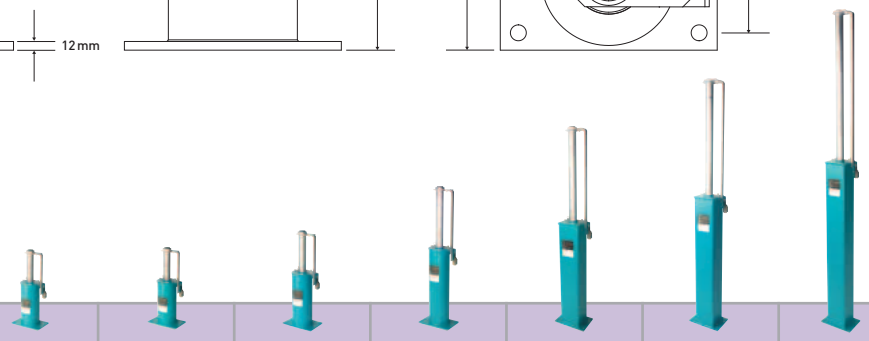


Given the large mass range and rated speed of the LB series, this buffer can be found in a number of different installations including, low, medium and high rise buildings, vehicle and service elevators.

The LB series is designed and built according to strict engineering standards and is universally approved and globally certified.

*other than statutory inspections.





Model		LB 16	LB 18	LB 20	LB 25	LB 32	LB 35	LB 40
Rated speed	m/s	1.60	1.80	2.03	2.54	3.15	3.56	4.06
Stroke 'S' (min.)	mm	203	249	300	462	699	881	1141
Impact mass range	kg	500-8330	500-8330	500-8330	500-8330	700-8330	1000-8330	1000-8330
Height 'H' **max.** (extended)**	mm	617.8	723.3	839.3	1211.3	1706.3	2108.3	2693.3
Height 'C' **min.** (compressed)**	mm	396.8	455.8	520.8	730.8	988.8	1208.8	1533.8
Height 'F' to reservoir top	mm	355.0	414.0	479.0	689.0	947.0	1167.0	1492.0
Weight no oil (dry)	kg	24.0	26.4	28.9	38.6	55.2	66.4	81.9
Oil volume	litres	4.6	5.6	6.6	10.0	20.0	24.5	31.5
Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2								
Reduced stroke ASME A17.1 North America	m/s	2.45	2.71	2.98	4.53	5.57	6.26	7.12
Reduced stroke EN81.1 Europe	m/s	n/a	n/a	n/a	3.70	5.57	6.26	7.12

LB elevator buffers are delivered without oil. Buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at 15° C – hydraulic.

Pour point -18° C or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawings.

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

Reduced stroke values provided in this brochure are for reference only.

Oleo International are not responsible for the incorrect application of reduced stroke.

Local rules must be checked before applying.

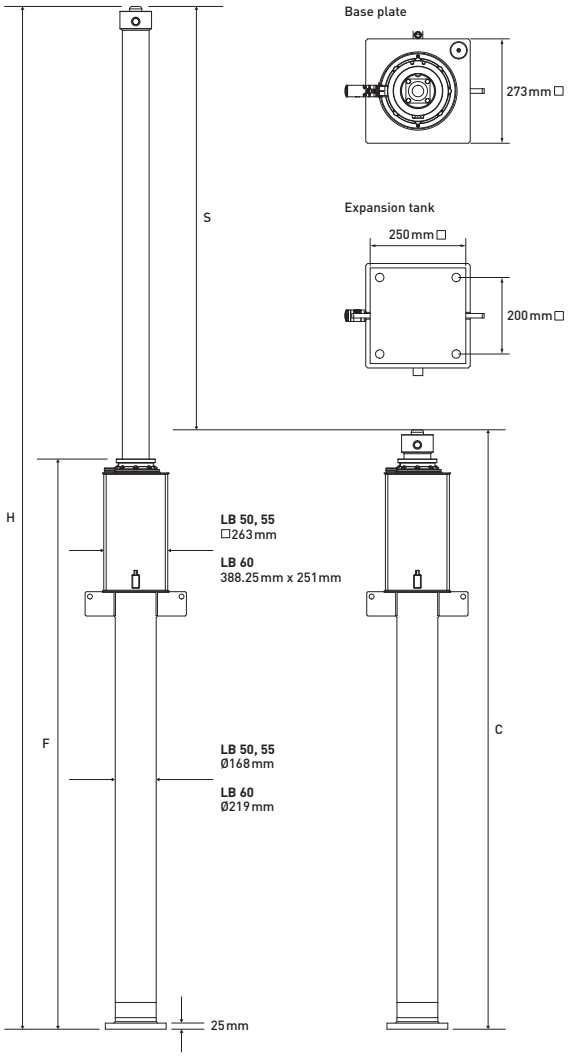
HIGH SPEED LB SERIES

The Oleo LB 50-60 gas hydraulic buffer range is designed specifically for high speed elevator applications typically seen in high rise buildings where speeds over 5 m/s are achieved. If approved terminal speed limiting devices are employed by applying the reduced stroke calculation the LB 50-60 can deal with speeds up to 10.55 m/s.

The Oleo principle of designing self contained, maintenance free* buffer units is applied to the LB 50-60 series of buffers and offers an easy installation process, this makes Oleo buffers the best solution for the life of the installation.

The LB series is designed and built according to strict engineering standards and is universally approved and globally certified.

*other than statutory inspections.





Model		LB 50	LB 55	LB 60
Rated speed	m/s	5.09	5.61	6.09
Stroke 'S' (min.)	mm	1740	2109	2504
Impact mass range	kg	1500-7500	1250-7500	1500-10000
Height 'H' **max.** (extended)**	mm	4215.6	5038.6	6180.6
Height 'C' **min.** (compressed)**	mm	2439.5	2893.5	3597.5
Height 'F' to reservoir top	mm	2343.0	2797.0	3455.0
Weight no oil (dry)	kg	208.4	241.8	480.2
Oil volume	litres	27.8	33.3	73.0
Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2				
Reduced stroke ASME A17.1 North America	m/s	8.80	9.68	10.55
Reduced stroke EN81.1 Europe	m/s	8.80	9.68	10.55

LB elevator buffers are delivered without oil. Buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at 15° C – hydraulic.

Pour point -18° C or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawings.

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

Reduced stroke values provided in this brochure are for reference only.

Oleo International are not responsible for the incorrect application of reduced stroke.

Local rules must be checked before applying.

HIGH SPEED LIFT RANGE

The new Oleo HSL telescopic gas hydraulic buffer range is designed specifically for high speed elevator applications typically seen in high rise buildings where speeds over 4.82 m/s are achieved. If approved terminal speed limiting devices are employed by applying the reduced stroke calculation the HSL115 can deal with speeds up to 20.23 m/s.

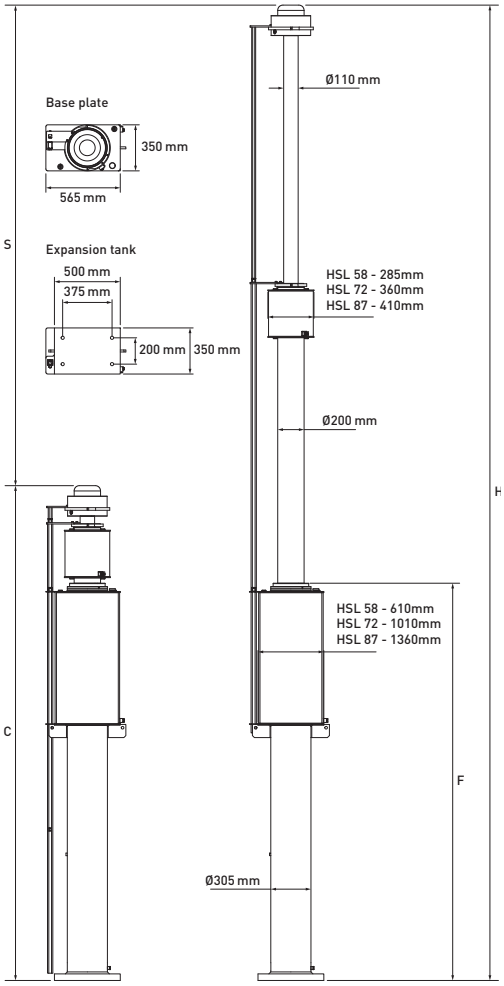
The HSL Series offers considerably more installation possibilities than conventional single stage buffers due to telescopic technology. This allows for lower compressed unit heights and smaller buffer envelopes at higher elevator speeds.

The Oleo principle of designing self contained, maintenance free* buffer units is applied to the HSL series of buffers and offers an easy installation process, this makes Oleo buffers the best solution for the life of the installation.

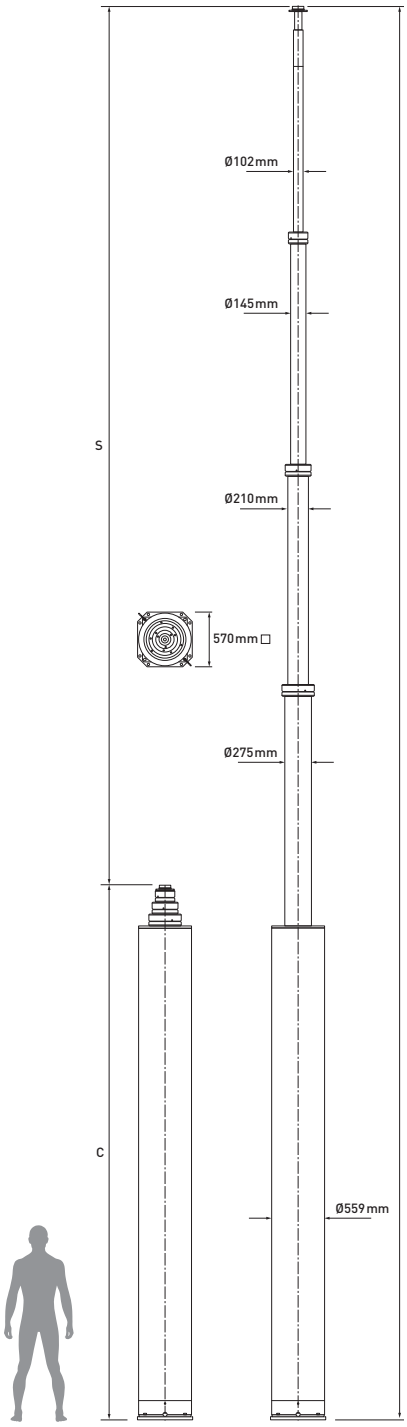
The HSL series is designed and built according to strict engineering standards and has achieved the EN81 and GB 7588 certification.

*other than statutory inspections.



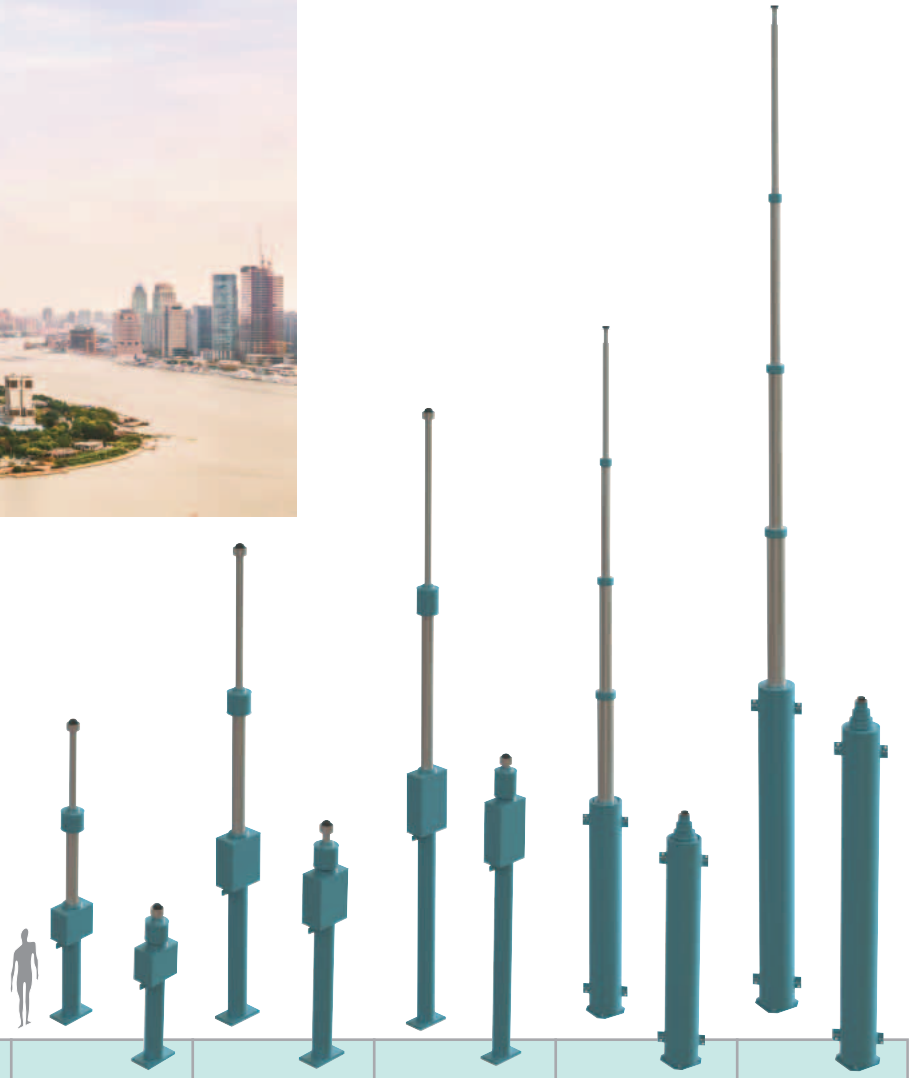


HSL 58, 72, 87



HSL 101, 115





Model		HSL 58	HSL 72	HSL 87	HSL 101	HSL 115
Rated speed	m/s	5.85	7.25	8.70	10.10	11.55
Stroke 'S' (min.)	mm	2350	3650	5200	7000	9200
Impact mass range	kg	4000-10000	4000-10000	4000-10000	5000-8000	5500-8000
Height 'H' **max.** (extended)**	mm	4965.5	7415.5	10490.5	12569.0	14900.0
Height 'C' **min.** (compressed)**	mm	2541.5	3691.5	5216.5	4193.0	5717.0
Height 'F' to reservoir top	mm	1942.5	3017.5	4492.5	3633.0	5157.0
Weight no oil (dry)	kg	779.0	1051.0	1450.0	3000.0	3497.0
Oil volume	litres	98.0	144.0	207.0	275.0	490.0
Reduced stroke: Rated speed with terminal speed limiting device, based on EN81.1 rule 10.4.3.2 and ASME A17.1 rule 2.22.4.1.2						
Reduced stroke ASME A17.1 North America	m/s	10.22	12.74	15.21	17.65	20.23
Reduced stroke EN81.1 Europe	m/s	10.22	12.74	15.21	17.65	20.23

HSL elevator buffers are delivered without oil. Buffers need to be filled with oil as per the installation instructions.

The oil used must conform to the specification on the buffer data plate – ISOVG68 – SG.88/.90 at -18°F – hydraulic.

Pour point 60°F or lower. Viscosity index 75 or higher.

** The max and min figures provided take account of the extremes of the tolerance to provide absolute maximum and absolute minimum dimensions. For more details please request detailed installation drawings.

Approved emergency terminal slow down devices in accordance with the local code requirements must be correctly installed before reduced stroke can only be applied.

Reduced stroke values provided in this brochure are for reference only.

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ELEVATOR

END STOPS

INDUSTRIAL

RAIL

WE PROVIDE SOLUTIONS
NOT JUST PRODUCTS

Notes for all Oleo Elevator buffers:

Environmental temperature acceptable conditions -15˚C to +70˚C. Note: for *special conditions* outside of this consult OLEO International.

Buffer to be mounted in a suitable structure to support deceleration forces in accordance with installation sheet.

Disclaimer:

While we have made every effort to ensure that the information in this brochure is up to date and accurate, we do not accept responsibility for your reliance on the information contained herein. All products are subject to availability and may be withdrawn without prior notice. All products are subject to change without prior notice.

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