

LEADING THE WORLD IN ENERGY ABSORPTION



ELEVATOR

Safety Buffers



A background image of industrial machinery, featuring a large, vertical, cylindrical component in the center, surrounded by various metal structures, pipes, and walkways. The scene is brightly lit, possibly from overhead lights, creating a clean and professional atmosphere.

Keeping People Safe

Oleo leads the world in energy absorption in many critical applications, often as the last line of protection for people and equipment.

Every day millions of people around the world rely on Oleo to provide their safety.

It is our responsibility to ensure all international standards for the industries we supply are adhered to, but we strive for more than that - to enable our partners to provide the safest energy absorption solutions remains a core principle.

Our mission is clearly and simply to keep people safe.



OLEO PROVIDES ELEVATOR PASSENGER SAFETY IN THE WORLDS MOST ICONIC BUILDINGS



The Elevator Industry

The elevator industry is constantly developing all over the world, from small passenger lifts to high mass freight elevators, low speed applications covering a few floors to ultra high speed systems moving swiftly to the penthouse.

Elevators form the core of the transport system for many modern structures and with building sizes and passenger volumes increasing, the need for elevators to handle more people, travelling over increasing distances and moving at higher speeds, whilst ensuring safety is maintained at the highest levels has never been greater.

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

Irrespective of your requirements, Oleo has a complete range of globally certified buffers to suit elevators operating with wide mass ranges at almost any speed. By choosing Oleo, your elevator system can benefit from ultimate protection with buffers that offer lightweight construction, extreme durability and minimum life-cycle costs.



**OLEO TEST TOWER,
UK HEADQUARTERS**



Research and Development

Our purpose is to provide the highest levels of protection in order to keep people safe. We pride ourselves on being innovative in response to both industry standards and customer demands. Continuous investment in research and development, state of the art technology and modern manufacturing processes has made Oleo leading experts in energy absorption.

All buffers are tested and validated internally prior to obtaining accreditation from the relevant standards authorities. Our independent test facility is accredited to ISO 17025 and offers state of the art test rigs and diagnostic equipment to ensure the most accurate performance data is obtained during arduous test programmes.



ELEVATOR SIMULATION TOOL



Simulation

Complex mathematical algorithms developed by our dedicated simulations team are used in combination with FEA modelling and CFD software enabling Oleo to develop products with optimised performance characteristics that ensure maximum passenger safety. Moreover, our ability to simulate buffer performance in conjunction with other elevator components allows us to work closely with elevator manufacturers to ensure the ultimate level of protection for equipment and passengers.



DESIGN AND ANALYSIS



Consultancy

Consultancy is a growing part of our business. We regularly undertake projects to produce bespoke energy absorption solutions for customers including design, analysis and testing services.

Our experience, simulation and test facilities enable Oleo to offer partnership opportunities for elevator manufacturers who wish to benefit from our profound knowledge and expertise.



GLOBAL PRESENCE, LOCAL SUPPORT



Global Presence

The elevator industry is a global business, but a local presence is required to ensure the highest levels of customer satisfaction and reduce the total elevator cost.

Oleo has manufacturing sites and distribution centres in various strategic locations around the world to ensure products are available quickly and at competitive prices.



WORLDWIDE COMPLIANCE



Global Certification

Documentation and certification form an important part of customers' requirements in the elevator industry. To make life simple Oleo products are available with all the necessary documents required to ensure a smooth transition from order to installation.

For applications in Europe, North America, China, Russia or Korea, Oleo can offer certified products to meet your needs.



EASY, ONLINE ORDERING



E-commerce

Convenience at your fingertips – placing orders for elevator buffers has never been easier!

Our online configurator allows the selection of the ideal unit to suit your requirements and the ability to purchase buffers with a quick delivery.



Products selected using Oleo's Configurator can be purchased immediately using our E-Commerce platform on the Oleo website.

Giving you what you want, when you want it.



CONVENIENCE AT YOUR FINGERTIPS

KEEPING PEOPLE SAFE



Elevator Safety

Elevator buffers are safety devices which are required to be mounted at the base of an elevator shaft underneath the elevator car or counterweight. As with any safety device, elevator buffers have to meet detailed specifications in order to satisfy international standards.

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 lift continuing to travel past the lowest stop to the base of the elevator shaft.

The most important aspect of the global standards is the manner in which the buffers must bring an impacting elevator car to rest. There are differences between the various technical standards however all employ the same basic performance criteria.

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

Our hydraulic buffers are classified as 'energy dissipation buffers' and they dissipate the energy from an impact in the form of heat during the travel of the buffer. This type of buffer can be used for all rated speeds, but are generally used for speeds of 1.0m/s or over.

The buffers are specified for installation in accordance with the rated speed and mass of the elevator.

Buffer performance criteria - energy dissipation buffers

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

- With an average deceleration not exceeding 1g.
- Without exceeding a deceleration of 2.5g for a time period greater than 0.04 seconds.

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



Oleo Buffer Performance

The minimum stroke for an elevator buffer is specified (within EN81-20 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.

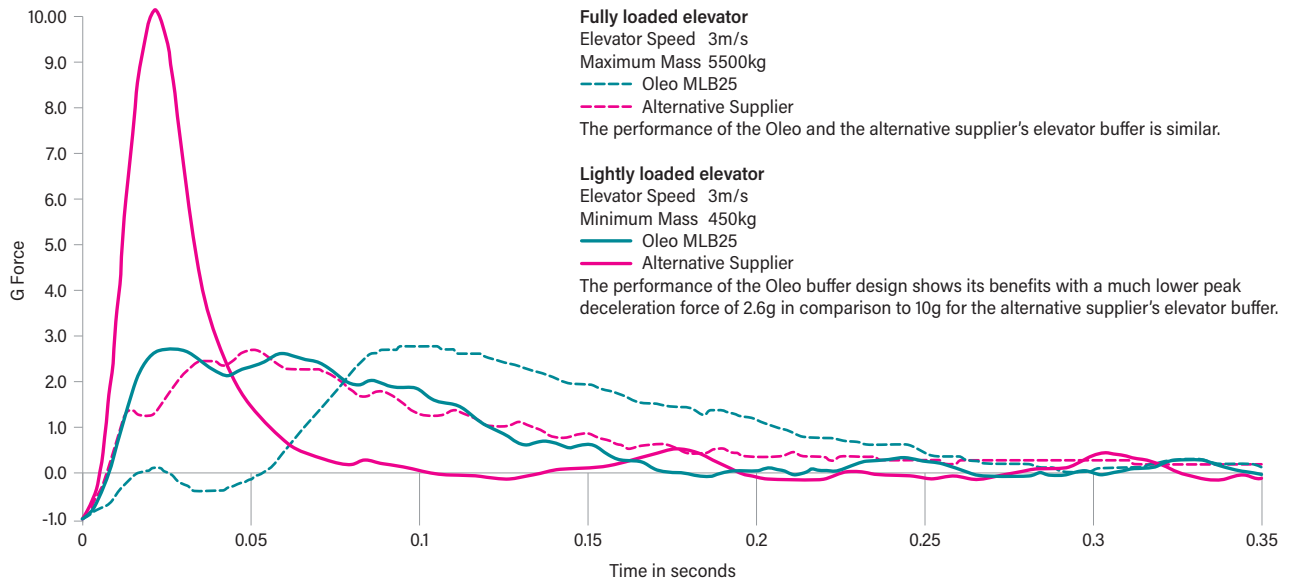
A hydraulic buffer can be designed to closely match this idealised performance. This is achieved by precise control of hydraulic oil flow across an orifice throughout the buffer stroke. However, this can only be achieved for one specific impact mass. The same

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 BURJ KHALIFA TOWERS OVER DOWNTOWN DUBAI



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

Oleo units incorporate special metering designs that allow the energy to be dissipated in a controlled fashion.

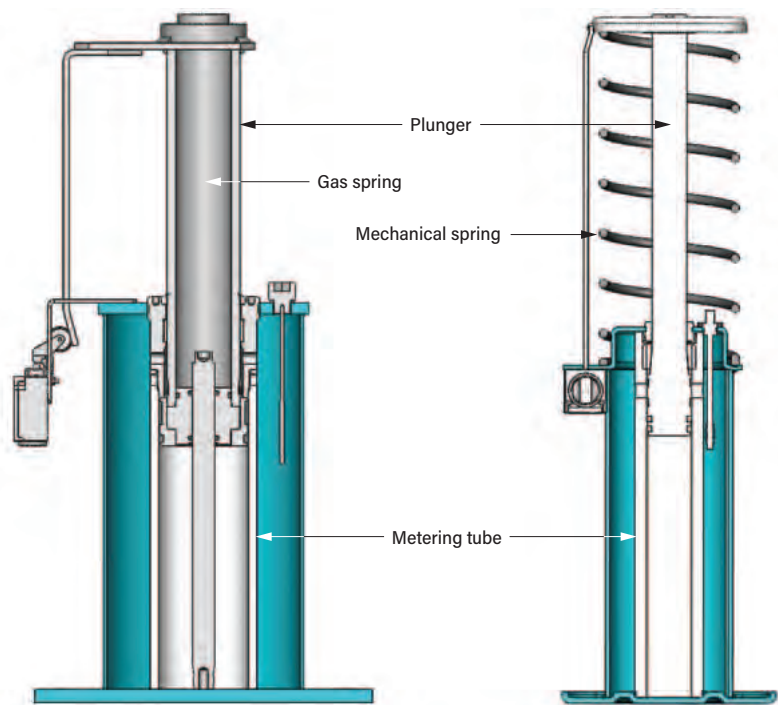
In both load conditions both buffers keep the average deceleration below 1g and do not allow 2.5g for more than 40 milliseconds and therefore are both fully compliant with elevator code specification requirements.

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 (for energy dissipation buffers). However, as illustrated above, in certain conditions

very high instantaneous g-forces occur and the effects on elevator passengers are unproven.

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 to provide buffers with unsurpassed energy absorption performance.



Oleo refine the metering design to ensure energy is absorbed evenly through an impact.



Passenger/Residential Elevators

Passenger elevators are commonly found in low rise residential buildings, normally operating at low speed with low passenger loads.

Elevators operating in residential buildings often transport very few passengers meaning the performance of the safety devices at low mass is critical. We design our buffers around the concept of protecting the equipment in an emergency situation, irrespective of mass, keeping g-forces to a minimum and ensuring optimum passenger safety.



TYPICAL PASSENGER ELEVATOR



Express Elevators



ONE WORLD TRADE CENTER

With buildings getting ever taller, express elevators are in increasing demand. These elevators are designed to move people quickly from the ground floor directly to the sky lobby, observation deck or penthouse apartment.

In recent years the industry has seen huge leaps in the velocity of these elevators and Oleo has been involved in enabling this trend by offering ultra high speed, telescopic buffer technology.



Commercial Elevators

Service elevators are primarily found in commercial buildings such as office and mixed use structures, industrial and large residential buildings.

They are similar in design to passenger elevators with regard to ride comfort but need to operate at higher capacities and often faster speeds. Service elevators can have more than one elevator car working in a single shaft to improve people flow through a large building, thus increasing the working mass of a single shaft.

Shopping malls, airports, stadiums, office blocks and convention centres are all typical locations to find service elevators, where it is essential to move large amounts of people quickly and efficiently.

Oleo has a full range of buffers covering all the speed and load requirements of service elevators.



A TYPICAL COMMERCIAL ELEVATOR USED IN HOSPITALS



Freight/Service Elevators

Freight elevators are typically heavy duty elevators, designed for very high masses, meaning they are strong in structure, moving at slow speed. Primarily these elevators are used in commercial buildings including offices, retail, hotel, public transportation and airport facilities.

Oleo elevator buffers are employed as safety devices to limit the damage to stock and freight being carried in these elevators, should there be a system malfunction or failure.



SERVICE ELEVATOR IN A HOTEL



Vehicle Elevators



AUTOMATED CAR PARKING SYSTEM

Vehicle elevators are fast becoming a popular choice in heavily populated areas and high end residential complexes.

The lifts are designed to move vehicles safely and efficiently. Once again, due to the potential masses and speeds involved, Oleo buffers are often considered the ideal choice for this application.

For years Oleo has offered the ultimate protection for elevator passengers and we now do the same for their prize possessions!



Modernisation

After many years in operation your elevator may require replacing or modernising. This can be a challenging process to install a new elevator system which has to satisfy the latest legal requirements whilst increasing carrying capacity, and improving comfort and efficiency at higher speeds.

Oleo can help you by offering solutions to replace your current buffers in order to allow improved speed and capacity of the lifts, helping the end customer to increase the efficiency of people flow in their building.



UPGRADES AND REFURBISHMENT



Special Applications

There are, of course, many other applications where external or non-standard requirements have to be considered and these have a significant bearing on the design and potential performance of the buffer.

In the case of some drop tower rides, Oleo elevator buffers are used in an emergency event should the ride fail during normal operation, in which case it is able to absorb this extra energy in the same controlled manner as an everyday elevator.



TOWER OF TERROR

Oleo is also able to customise designs in order to meet extremely aggressive service conditions. Examples include the "explosion-proof" and "outdoor" specifications which are both non-standard buffers that incorporate specially customised parts in order to meet the demands of their intended application.



INDUSTRIAL APPLICATIONS

Some examples of special applications include amusement rides, outdoor industrial applications, marine vessels and the mining industry.

Typically, where harsher environmental conditions have to be considered for the elevator design and its components.



MARINE VESSELS



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