

LifeJacket®

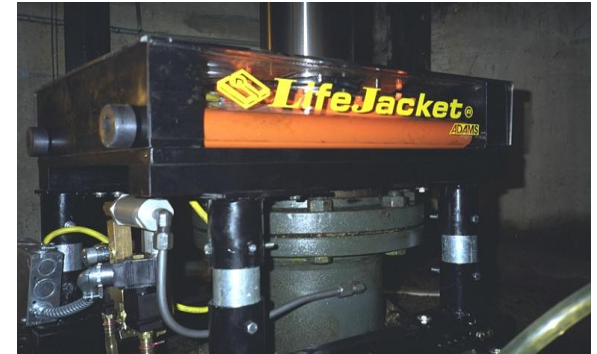
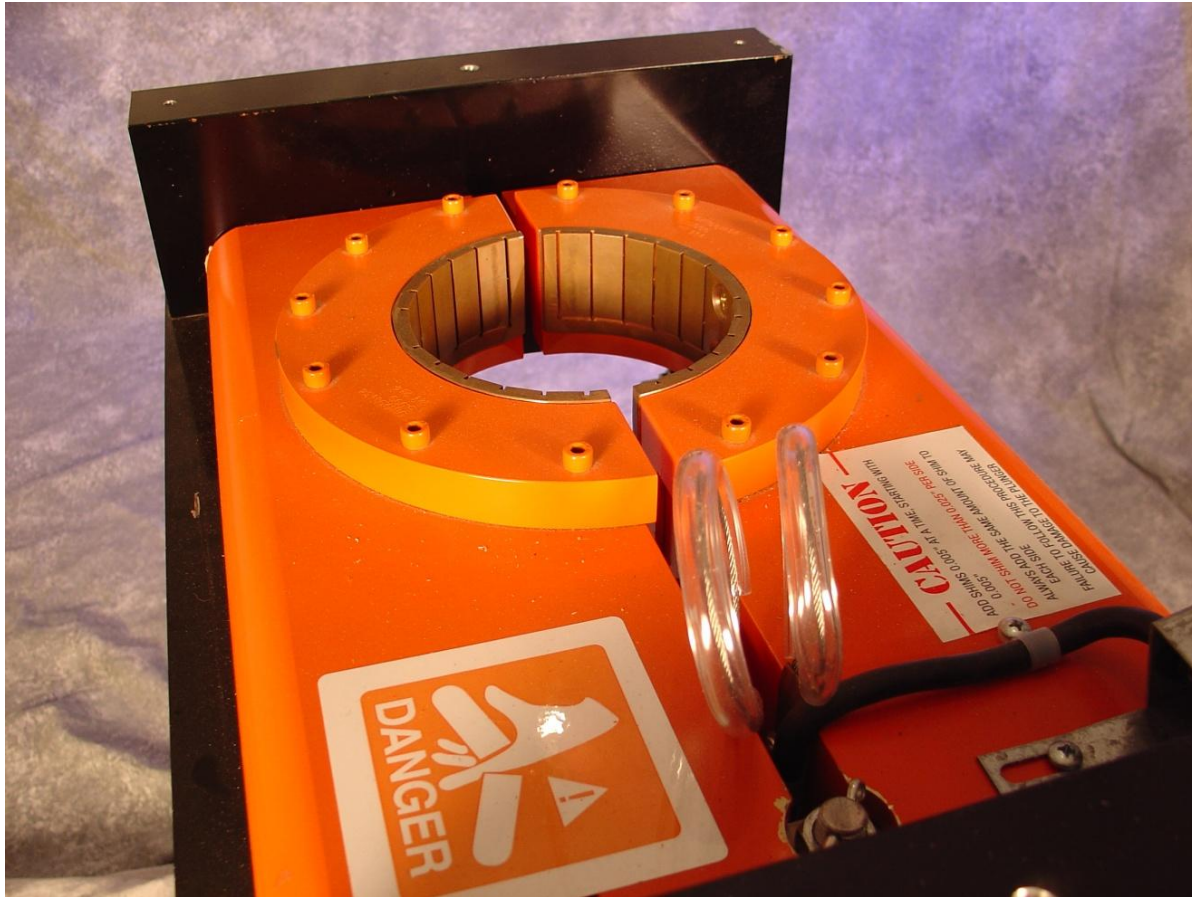
Hydraulic Elevator Safety Brake

2012



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LifeJacket® Plunger Gripper



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Hydraulic Elevator Safety

- Before LifeJacket, all hydraulic elevators were originally installed without fall prevention safety; it was considered unnecessary
- Several accidents in the 1960's and 1970's showed these elevators to be susceptible to catastrophic failure
- **Electrolysis** is the main source of damage to cylinders and other critical underground components in the hydraulic system



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Hydraulic Elevator Safety

- Due to earlier hydraulic failures, elevator codes began requiring new installations to include double bulkhead cylinders in 1972
- The purpose was to prevent a sudden and significant loss of oil pressure in the event of single bulkhead failure
- Subsequent hydraulic failures led to retroactive code requirements in 2000, aimed at improving safety for all hydraulic elevators

Prior to 1972, all hydraulic elevators were installed without cylinder safety devices



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Hydraulic Elevator Safety

- In 2000, elevator codes required one of three options for providing hydraulic elevator safety
 1. Install Double Bulkhead cylinder, replacing the original cylinder if installed before 1972
 2. Install a car safety to prevent the elevator car from falling, or
 3. Install a **“Plunger Gripper”** safety device to similarly prevent a falling elevator car



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LifeJacket® Plunger Gripper

- Developed in 1996
- Over 2900 units installed without a single failure
- Steel jaws fitted with copper shoes prevent any damage to plunger or the elevator
- 100% reusable, providing extended life
- 100% safety, regardless of the type of hydraulic system failure

100% Safety, 100% Reusable



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Why LifeJacket® ?

- Due to hydraulic elevator design, complete system inspection is impossible
- In addition to the cylinder failure, other critical components of the hydraulic system can and do fail! (e.g. piping, valves, pipe fittings, etc.)
- These system failures, without addressing safety requirements, can lead to significant equipment damage and potentially loss of life
- **LifeJacket reduces liability**



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LifeJacket® Electrical System Operation

- Compares demanded operation with actual operation by monitoring the elevator control valve coil voltages and the encoder pulse signals providing direction & speed
- Software evaluates if emergency condition exists (uncontrolled or excessive downward movement) then signals LifeJacket valves to set the plunger gripper
- Microprocessor and Xilinx verify each other to assure correct operation
- Provides contact closure to elevator system to prevent subsequent elevator operation



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LifeJacket® Hydraulic System Operation

- Spring loaded LifeJacket control cylinder is directly connected to elevator hydraulic circuit
- Hydraulic circuit controls pressure in the control cylinder
- When pressure drops in the control cylinder, the plunger gripper sets
- This is achieved by 1). energizing the LifeJacket valves, or 2). hydro-mechanically due to a pressure drop in the elevator system
- Two control valves provide redundancy for secure operation
- The discharged fluid goes into the pit can



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LifeJacket® Set Conditions

- LifeJacket monitors the hydraulic system for **failures**
- LifeJacket will set if:
 - Car exceeds uncontrolled downward speed >30 FPM
 - Car exceeds 125% of rated speed
 - System self-detects damaged or missing operational components
 - System detects damaged or missing battery or lack of AC power



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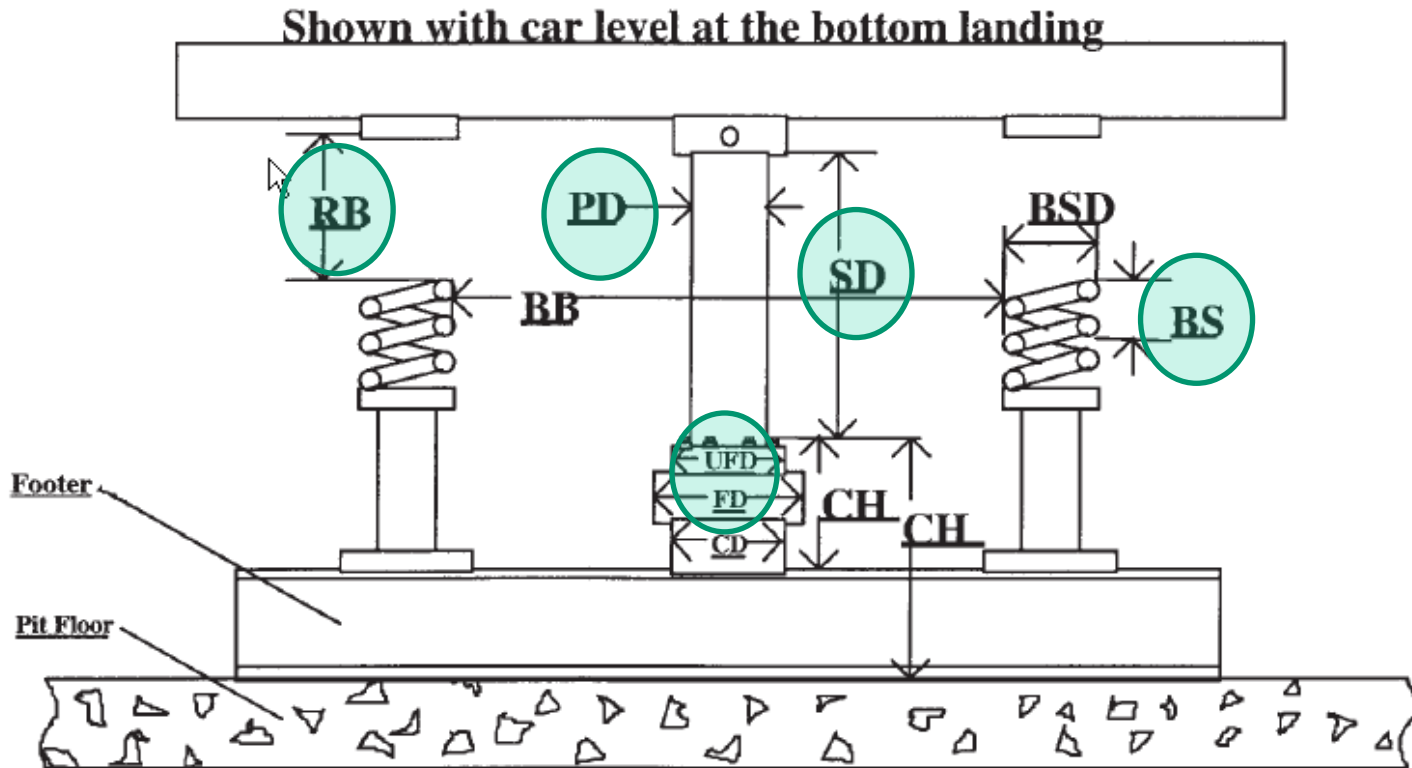
How Do Other Systems Compare?

Does The	LifeJacket®	Type A or B Safety	In-Ground sealed system	Rupture Valve	Cylinder Protection System
Sense a failure in a Cylinder	✓	Only in an Over speed Cond.	✓		
Sense failure in Piping	✓	Only in an Over speed Cond.		✓ (If DP is large enough)	
Softly stop the elevator	✓	✓ (Type B)		✓ (If adjusted correctly)	
Sense a partial pressure breach	✓		✓		
Sense fail speeds down to 30 fpm	✓		✓		
Have proven results	✓	✓		✓	✓
Not require adding mass to elevator	✓		✓	✓	✓
Cost less than Cylinder change	✓	✓		✓	✓



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Preliminary* LifeJacket® Survey



***A completed Survey Form is required to properly design a LifeJacket System. Forms are available at www.adamselevator.com**

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Preliminary* LifeJacket® Survey (Determining Applicability)

Measurement	Test
Plunger Diameter	3.5 – 8.625 inches
Height Clearance	$(SD - 6.5") > (RB + BS)$
Buffer to Buffer Distance	Greater than 15.75 inches (ideally)
Flange diameter	< 17 inches

Note: If Runby must be reduced in order to create sufficient clearance for LifeJacket, confirm allowance for this reduction with local code authority having jurisdiction over project. In California, 1" of remaining runby is allowed in Title 8.

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