

*Dedicated to People Flow™*



# Hydraulic Performance and Safety Upgrades

# Hydraulic Elevators and the Unseen Risk

## Hydraulic Elevator Cylinder Upgrades

The operation of a hydraulic elevator is a simple process that occurs repeatedly during its life cycle. However, there may be a problem lying hidden beneath the ground.

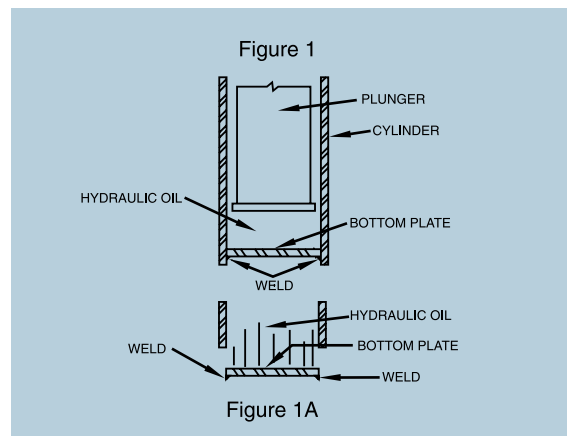
Corrosion and electrolysis can cause damage to your underground hydraulic cylinder, leading to leaks and ultimately even a failure of cylinder integrity. This creates an unsafe condition, with

an uncontrolled descent of the elevator cab due to the catastrophic loss of hydraulic oil from the system, also resulting in environmental contamination.

KONE can help increase your sense of security regarding this issue. Contact your KONE representative to help identify if your elevator has a single-bottom cylinder and for further information on upgrading to a double-bottom cylinder.

### Outdated single-bottom cylinder design (Figure 1)

The single-bottom cylinder design was the industry standard and met all codes prior to 1971. However, this type of design allows the possibility of failure should the bottom plate rupture (**Figure 1A**). Corrosion and electrolysis can result in failure of the bottom plate, whereby oil suddenly escapes into the ground and the elevator descends uncontrollably.



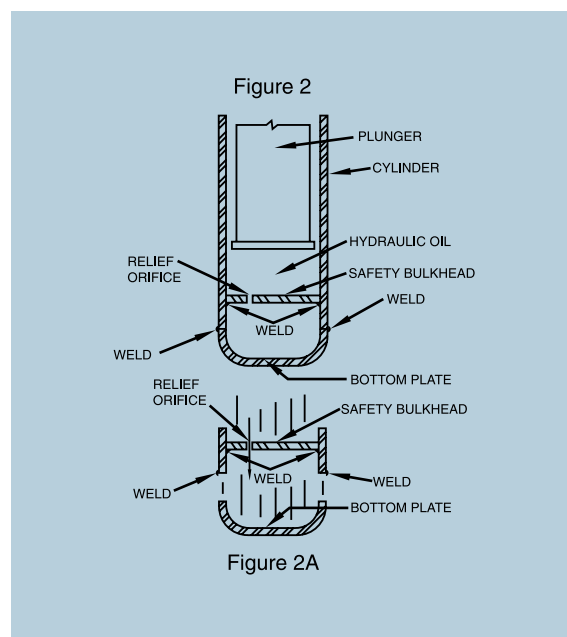
### Double-bottom cylinder design (Figure 2)

The double-bottom design became the industry standard in 1971 to protect against failure of the bottom plate. This new cylinder design features a bottom plate plus an additional safety bulkhead inside the cylinder equipped with a small relief orifice. The orifice is designed to only allow a small amount of oil to slowly escape, thus limiting the speed of the elevator's descent in the event of a rupture of the bottom plate. The result is a more secure mode of transportation for passengers.

### PVC casing

Code requires that you install the double-bottomed cylinder with a PVC (Polyvinyl Chloride) casing. This PVC liner surrounds the entire cylinder in the underground hole in order to prevent electrolysis and other causes of corrosion, providing additional protection for your investment.

(See ANSI code requirements.)



# Why should I upgrade?

Upgrading your hydraulic elevator equipment can provide the following benefits:

- Increased safety
- Reduced liability
- Fewer service interruptions
- Optimized availability
- Decreased operating expenses
- Energy savings and efficiency
- Improved ride quality
- Better leveling
- Quieter operation
- Parts availability
- Code compliance
- ADA compliance

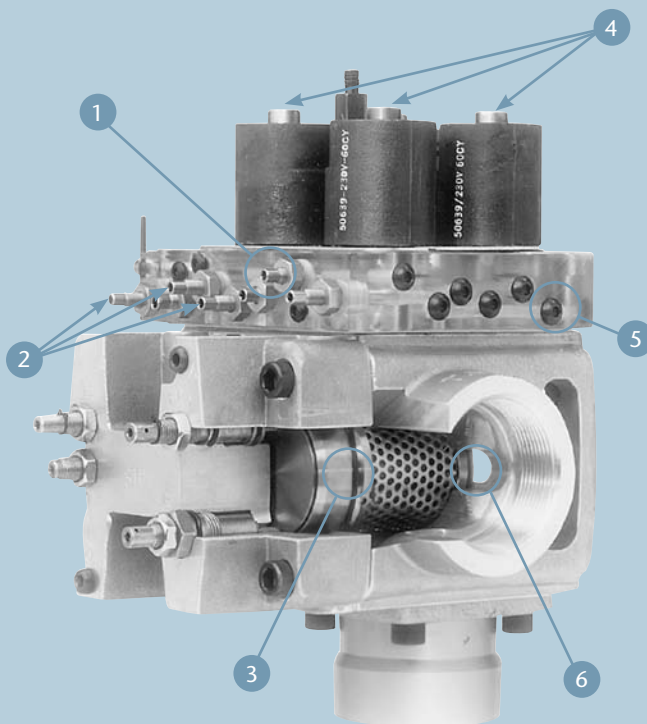
## KONE Hydraulic Elevator Upgrade

- Does your hydraulic elevator make occasional (or frequent) rough starts and/or stops?
- Do you experience inaccurate leveling in either the Up or Down direction?
- Are you experiencing increased downtime due to required repairs of your existing valve?
- Does your valve frequently need to be readjusted?
- Have you been told that parts are no longer available or hard to find because your equipment is obsolete?
- Are you concerned that your elevator does not meet the latest safety and ADA codes?

If you find yourself saying yes to some or all of these questions...it is no doubt time to consider a **KONE Hydraulic Elevator Upgrade**.

Such upgrades from KONE can decrease or even eliminate the problems which forced you to answer yes. Smoother operation, improved two-way leveling, minimized downtime and a current inventory of parts are all valuable benefits immediately available with an upgrade. This will also help you meet code and current ADA requirements and can help reduce your operating expenses.

## Hydraulic Valve Upgrade



1. Externally accessible pilot oil flow strainers are quick and easy to service. This reduces downtime if contaminants in the oil enter the valve.
2. Pilot oil rate adjusters are individualized and easily accessible to provide for quick and easy adjustments to achieve the highest quality ride.
3. Bi-directional fail-safe operation means that the failure of a seal on either piston would cause the elevator to stall in the direction of travel controlled by that piston. This prevents the car from slowly dropping into the pit.
4. Patented high-efficiency solenoids will continue to operate with up to a 30% voltage drop ensuring proper leveling even during power "brown outs."
5. A specially designed and patented up leveling speed regulator provides accurate stall-proof performance and smoother operation.
6. Each valve is provided with replaceable main valve seats, eliminating the need for lengthy and costly repairs.

# Hydraulic System Upgrades

## 1. Tank Heater

Keeps the hydraulic oil warm to prevent rough starts and stops, which occur when the hydraulic oil is cold.

## 2. Oil Cooler

A device to keep the oil from overheating and causing malfunctions of valve operation or shutdowns. Ideal for a high-use elevator or if the machine room is small or warm.

## 3. RSQ Pak

When a power interruption occurs, the RSQ Pak will provide sufficient power to gently lower the elevator to the lowest floor and open the doors automatically so passengers may exit the elevator without assistance.

## 4. Low Oil Detector

This device is mounted inside the hydraulic tank to monitor the oil level. It is designed to shut the motor off if the oil drops below operating level, preventing cavitation and possible damage to the motor.

## 5. Controller

The solid-state controller provides a higher dependency rate and will meet the most recent safety codes for fire control, ADA requirements and other elevator functionality that is standard on new installations.

## 6. Machine Room Door

Code requires all elevator machine rooms to be equipped with a self-closing and self-locking door.

## 7. Scavenger Pump

A Scavenger Pump, also known as an oil return pump, returns the overflow of oil from the cylinder head back to the pump unit, rather than allowing it to collect in a drip pan in the elevator pit.

## 8. Valve

A new precision fabricated valve provides smoother operation and ride, dependable two-way leveling and minimized downtime.

## 9. Double-bottom Cylinder

An underground metal cylinder which houses pressurized hydraulic oil causes the plunger or piston to rise, pushing the elevator up from the bottom.

## 10. Machine Room Ventilation

Machine rooms must be ventilated and kept at a recommended room temperature of 65-90 degrees Fahrenheit to allow the controls and oil temp to operate properly.

## 11. Soft Starter

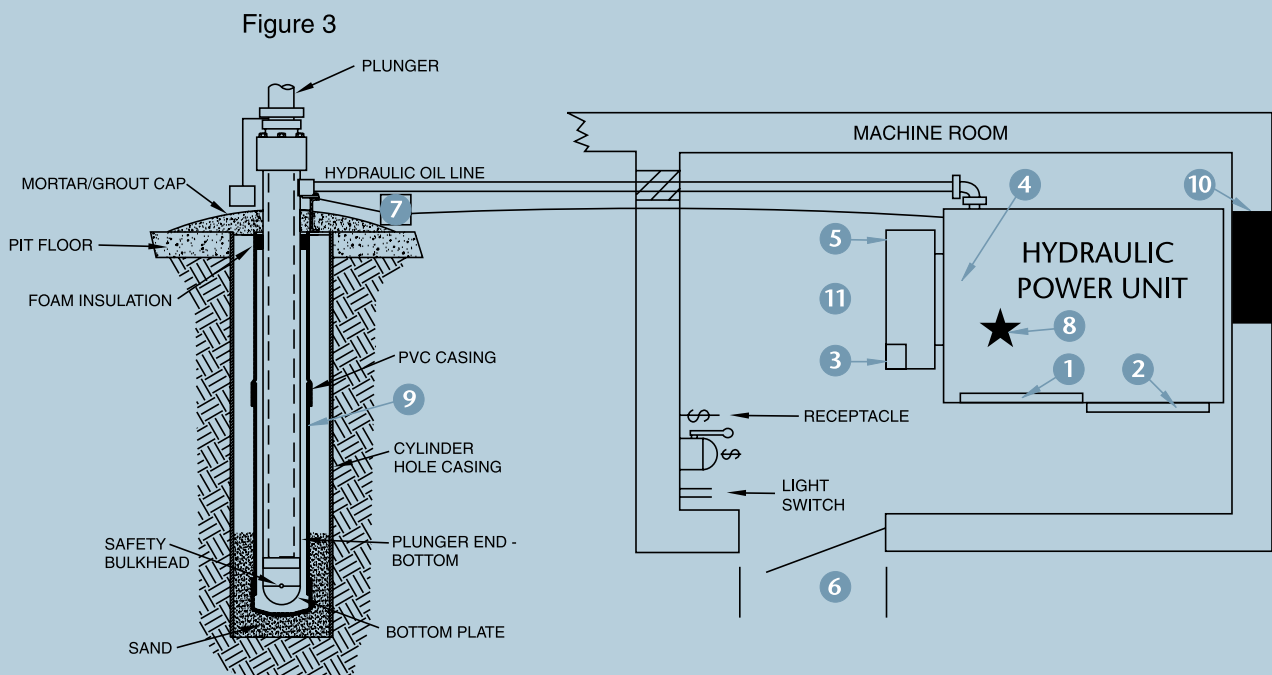
Replaces the existing, obsolete mechanical starter and provides potential energy savings by changing the amount of energy used based on the load, while keeping the motor at the same speed. Also adds phase and voltage protection to major components, which prevents burnout and enhances the motor life.

*Additional upgrade options are also available. Contact your local KONE Sales Representative for further information.*

1. Tank Heater
2. Oil Cooler
3. RSQ Pak
4. Low Oil Timer

5. Controller
6. Machine Room Door
7. Scavenger Pump
8. Valve
9. Double-bottom Cylinder

10. Machine Room Ventilation
11. Soft Starter



# ANSI Code Regulations

ANSI Code requires a safety bulkhead found in double-bottom designs. The Maintenance, Repair and Replacement section of A17.1 affects existing elevators. Code states:

## **8.6.5.8 Safety Bulkhead**

Hydraulic cylinders installed below ground shall conform to 3.18.3.4, or the car shall be provided with safeties conforming to 3.17.1 and guide rails, guide rail supports and fastenings conforming to 3.23.1.

## **3.18.3.4 Safety Bulkhead**

Cylinders buried in the ground shall be provided with a safety bulkhead having an orifice of a size that would permit the car to descend at a speed not greater than 15 ft/min (0.075 m/s), nor less than 5 ft/min (0.025 m/s). A space of not less than 1 inch (25 mm) shall be left between the welds of the safety bulkhead and the cylinder head. Safety bulkheads shall conform to 3.18.3.6. A safety bulkhead shall not be required where a double cylinder is used and where both inner and outer cylinders conform to 3.18.3.





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