



# Shropshire

## Fire and Rescue Service

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**Brigade Order  
Operations  
11**

**Part 13**

**Lifts**

## Brigade Order Operations 11

### Part 13 – Lifts

#### **Purpose**

The purpose of this order is to outline information and procedures to allow crews to operate effectively at incidents involving rescue from lifts.

This order also outlines the procedure for operating Firefighting Lifts

#### **Strategic aims and objectives**

This Brigade Order supports the following strategic aims :

Strategic Aim 1 “Reduce the risk to life and material loss from fire, road traffic collisions and other emergencies in the community”

Strategic Aim 2 “Protect life, property and the environment from fire and other emergencies

Strategic Aim 3 “ Secure the highest level of safety and welfare for all staff and Authority members by providing effective leadership, training, equipment and systems of work

#### **Roles, responsibilities and review**

The **Head of Operations** is responsible for ensuring this Order is implemented across the Brigade.

**Incident Commanders** will be responsible for the day to day operation of the Order.

The **Head of Operations** will review this Order biennially in **August** and when organisational changes take place.

## **Introduction**

As part of our operational requirement to attend special service calls we are often mobilised to deal with incidents involving lifts, usually when people are trapped within the lift car due to malfunction, or where someone has been trapped in the lift mechanism. In some large modern buildings with complex lift systems there are resident mechanics. This is not common however therefore it is important that firefighters make themselves familiar with the main lift types, the basic methods of operation, safety devices and the actions to be taken when attending incidents of this type.

This Brigade Order will cover the operational procedures required to conclude any type of rescue.

## **Mobilisation**

On receipt of a call requesting our attendance at an incident involving a rescue from a lift Fire Control will mobilise the following appliances:

Persons trapped in the lift car: 1 Pumping appliance  
Persons trapped in lift machinery: 1 Pumping appliance, Rescue Tender and Incident Command

## **Electric lifts**

### **Driving mechanism**

Electric lifts are the most common type. An electric lift consists essentially of a platform or car suspended by steel ropes from a winding machine. The car runs on guides so that it is free to move only in a vertical direction. A person in the car or on the landing can start or stop, the machine by operating the push button control. There is nearly always a counter weight which also runs in vertical guides and balances the car plus 50% of its load. This reduces the energy used in driving the lift. The guides are usually T shaped or circular in shape and are made of steel. The control is electronically operated.

The winding mechanism comprises of an electric motor, worm gear and brake. It is usually mounted on a common bedplate. The rotation of the motor is transmitted to the lift car by a worm reduction gear and steel wire ropes. The ropes are either wound on a drum or run through V shaped grooves in a traction sheave mounted on the worm wheel shaft of the gear. With traction drive, a counterweight is essential in order to provide the necessary tension in the ropes to make them group in the traction grooves. The machine is fitted with a brake operating on the coupling which connects the motor shaft and the worm shaft. The coupling serves as both coupling and brake drum. The brake is fitted with friction shoes which act on the drums by means of springs or weights. An electric solenoid holds them off when the motor is

operating. The motor shaft at the free end is extended and made square to accept a handle, removable smooth wheel or fixed smooth wheel by which the winding gear can be hand operated.

## Lift car

The lift car usually consists of two separate units, the framework and the car body. Some modern lifts do not, however, have a separate frame and fire crews would have to bear this in mind if it was necessary to cut into the walls of the car.

The car frame is formed from steel channel sections and rolled steel angles bolted or welded together. The main suspension channels, generally termed the crown bars, are fixed to the top frame, to which is bolted the housing for the two top guide shoes. The bottom sections carry the safety gear and the two bottom guide shoes. The lifting ropes are either attached direct to the top crown bars or pass over guide pulleys attached to them.

The car bodywork is in panels assembled within the framework and fixed to the encircling steelwork. There may be an access trap in the car roof. An electronic interlock prevents the lift being started whilst it's open.

## Safety devices

To prevent any uncontrolled descent of the car, a safety gear is invariably fitted. This clamps the car to the guides if the ropes break or if the speed of the descent exceeds a pre-determined value. As an additional precaution the safety gear is sometimes arranged to operate if the ropes stretch unequally.

**Instantaneous safety gear:** The instantaneous safety gear is designed to stop the lift car within a short distance. It is not used on lifts with speeds greater than one metre per second as a sudden stop from higher speeds would cause severe shock to passengers. *Firefighters should never attempt to reset safety gear which has operated*

**Progressive safety gear:** the progressive safety gear, sometimes known as the flexible guide clamp gear, is used on lifts faster than one metre per second and is designed to bring an over-speeding car to a smooth sliding stop. It consists of two clamps one for each guide, bolted to the bottom of the car frame. Each clamp has two wedge shaped steel jaws to grip the guide rail and a heavy flexible spring to regulate the pressure the jaws exert. The gear is actuated by a governor. When the downward speed of the lift car exceeds a pre-determined limit, fly-wheels within the governor are driven outwards by centrifugal force and operate a safety switch to cut off the power and apply the brake

## Procedures - electric lifts

**Persons must be aware of the term SHEAR TRAP - this is the area between the lift landing and the lift car opening. Any movement of the lift car poses significant risk of life threatening injuries to any person crossing the SHEAR TRAP**

- Officer in charge should carry out a Dynamic Risk Assessment.
- In circumstances where there is no threat to life the safest practice may be to await the arrival of a lift engineer. If possible contact the trapped person and reassure them.
- Locate the lift motor room and isolate the power to the lift. Leave a firefighter stationed at this point throughout operations.
- If urgent actions to protect life are necessary, locate lift car. Do not leave opened doors unattended.
- Check the suspension rope and counterweight rope are taut. Slack rope indicates car is not secure.
- Improvised securing devices should be considered i.e. Hydraulic Rescue equipment or Fire Service lines.
- Personnel may be put at significant risk when placing securing devices and may need to cross the shear trap. This should only be done in exceptional circumstances.
- Before attempting to lower the lift, raise it slightly to ensure the weight of the car is being securely held by the suspension mechanism.
- Personnel observing the movement of the lift car or working at landing openings may need to be protected from fall. Consider use of line safety equipment as a means of work positioning.

### **To release people trapped within a lift car:**

- Using the winding handle (in the lift motor room) wind the car to the nearest floor level.
- Automatic locks will allow car and landing doors to open, using lift keys.
- Secure landing gates carefully before leaving.

### **To release person trapped in machinery:**

- Generally it is best to move the car in the opposite direction to which it was travelling when trapping the person.
- Establish the correct direction for hand winding.
- It may be possible to lever the car horizontally far enough to free a trapped person.
- If the counter weight needs to be moved the guide shoes can be removed and the weight swung clear.
- If it is necessary to move the weight manually, it should be noted that the direction of winding will be the reverse of that shown for the car.
- If the casualty has been trapped for a period of time then the Officer in Charge must take guidance from ambulance staff prior to releasing the casualty.
- Once the rescue is complete leave power isolated until lift engineer arrives to check the lifts serviceability.

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## Hydraulic lifts

Hydraulic lifts can be found in a variety of buildings. They are generally only found in building of up to 4 floors.

A hydraulic oil pump and motor power the lift. To raise the car, the motor drives the pump, which pumps oil at pressure into the jack, that then lifts the car. The car is raised by power and lowered by gravity. Firefighters must appreciate that with hydraulic lifts the machine room may be remote from the installation itself. Crews should familiarise themselves with premises that have hydraulic lifts and also make themselves aware of the location of the machine rooms.

### Safety devices

Safety devices interlock with the hydraulic control gear so that their operation immediately stops the car. Landing and lift doors are mechanically and electronically interlocked. An indirect acting lift has conventional safety gear. To release it, the car must be moved upwards by power, hand pump, or lifting tackle. The gear is electronically interlocked, so that when it is engaged the main motor drive cannot function. A service engineer must be requested to override this interlock if the gear is to be released by main motor power.

### Lowering the lift car

Firefighters can lower the lift by a special hand lowering valve sited at the hydraulic power unit, the control is usually of the dead man type, either a knob or lever which is pulled or pressed to release the oil from the jack and so allow the lift to lower by gravity. The control will normally be marked as such and painted red. Hand lowering instructions are usually posted by the hydraulic power unit.

## Procedures - hydraulic lifts

- The Office in Charge should carry out a Dynamic Risk Assessment.
- In circumstances where there is no threat to life the safest practice may be to await the arrival of the Lift Engineer. If possible contact the trapped person and reassure them.
- Isolate power and check reading on the lift pressure gauge.
- If no pressure reading i.e the gauge reads zero and lift car is not at the lowest point it may be being held by the emergency braking system or lodged against an obstruction in the shaft.

**In either case an extremely dangerous situation exists. If possible wait for an engineer to attend.**

### **If there is a pressure reading on the gauge:**

- Move the car upwards by means of the hand pump.
- When upward movement is observed, it may be presumed that the weight of the car is being held by the suspension mechanism and is safe to lower the car using the Emergency Lowering Valve.
- If the car does not move upwards when the hand pump is operated it must be assumed that the car is not being held securely by its suspension mechanism, in this case treat as you would a lift with no pressure reading.

## **Firefighting lifts**

### **General**

A fire-fighting lift, unlike a normal passenger lift, is designed to operate so long as is practicable when there is a fire in parts of the building beyond the confines of the fire-fighting shaft, and can be used to transport fire-fighters and their equipment to a floor of their choice. The lift may be used in normal times as a passenger lift by the occupants of the building. Fire-fighting lift cars should be clearly and conspicuously marked with a notice stating " Fire-fighting Lift". A fire-fighting lift SWITCH should be provided to enable the fire service to obtain immediate control of the fire-fighting lift. Provision should be made to control access to the fire-fighting switch.

### **Operation**

Lifts in the fire-fighting shaft should operate normally until the fire-fighting lift switch is activated. When the fire-fighting lift is activated it immediately renders inoperative all call buttons both on the lift landings and in the lift car, and brings the fire-fighting lift to the fire service access level.

The firefighting lift should be returned to the fire service access level by switching the firefighting lift switch from "0" to "1", from "Off" to "On", or by use of a firefighting lift "CONTROL KEY". The car controls should become active only after it has arrived at the fire service access level. Once the fire-fighting lift has arrived at the fire service access level, its doors should open and it should then operate as follows:

- Fire service personnel can select a landing by sustained pressure on a floor number until the car doors close.
- If a floor number is released before the doors have fully closed, the doors will immediately reopen and the call will be cancelled.
- Once the lift is moving, it is possible to register additional calls on the car controls and the car will stop at the first floor encountered.

- Once the lift arrives at a registered floor, the doors remain CLOSED unless they are operated by continuous pressure on the “DOOR OPEN” control. It should not be possible to open the doors without sustained pressure on the control.
- Release of the “DOOR OPEN” control before the doors are fully open should cause the doors to automatically re-close (this allows fire service personnel to observe the situation immediately outside the lift landing doors).
- Once the doors are fully open they should remain open until a new call is registered within the car.
- The lift car can be returned to the fire service access level at any time by switching the firefighting lift switch from “1” to “0” (for at least 5 seconds) then back to “1”.

**NOTE:** Lifts must be secured by Fire Service personnel even when they are not used. This will ensure that occupants do not inadvertently use the lift and arrive in a hostile environment.

- Lift Operator – Remains in the lift car to transport personnel and equipment between the ground floor and the bridgehead.
- Secondary Lift Supply – On loss of the primary supply the lift comes to an emergency stop and the lights go out. The emergency lighting comes on immediately. There is then a delay of up to 30s whilst the secondary supply is established which is indicated by the restoration of the main lighting in the lift car.

**Crews should periodically carry out familiarisation training on firefighting lifts within their turn-out area to encompass all elements of its functionality**

### Points of reference

Manual of Firemanship II Book 12	Chapter 2 page 25
Fire Service Manual Operations	Volume 2 Rope Working
A Guide to Dynamic Risk Assessment	Section 2.2
Specific Incident Procedures (SIP)	Lifts