

# SM-718 ESX 12-25 Service Manual



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**Preliminary**

**GROUP 12  
BATTERY**

Battery Service . . . . .Section 1

**Preliminary**

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## **Section 1 Battery Service**

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#### **Section 1**

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Preliminary

## Battery Handling



### Caution

Remove all jewelry (watch, rings, bracelets, etc.) before working on electrical systems. Severe burns can result from contact with electrical circuits.



### Warning

Battery service must be done by trained personnel. Battery acid can cause severe burns and injury. Do not smoke or have open flames around batteries.

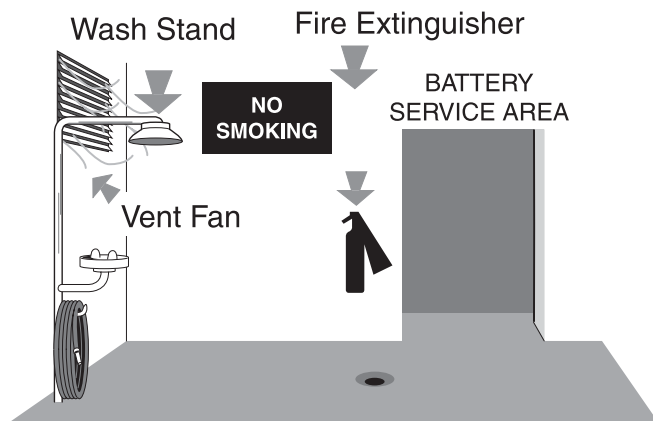


### Warning

Electric truck batteries are heavy and awkward to handle. On charge, they give off hydrogen and oxygen which, in certain concentrations, are explosive. Electric truck batteries are also costly, so before you remove, service, or install a truck battery, consult BATTERY MANUFACTURER for more recommendations and instructions on handling and charging batteries. Carefully read and follow recommendations and instructions.

Change or service batteries only in an area designated for this purpose. Refer to page 4 for additional information.

- Be sure this area has provisions to flush and neutralize acid spillage.
- Be certain the area has proper ventilation to ventilate fumes from charging batteries.
- Check to see that there is fire protection. Fire extinguishers should be properly maintained and located in designated areas.



### Danger

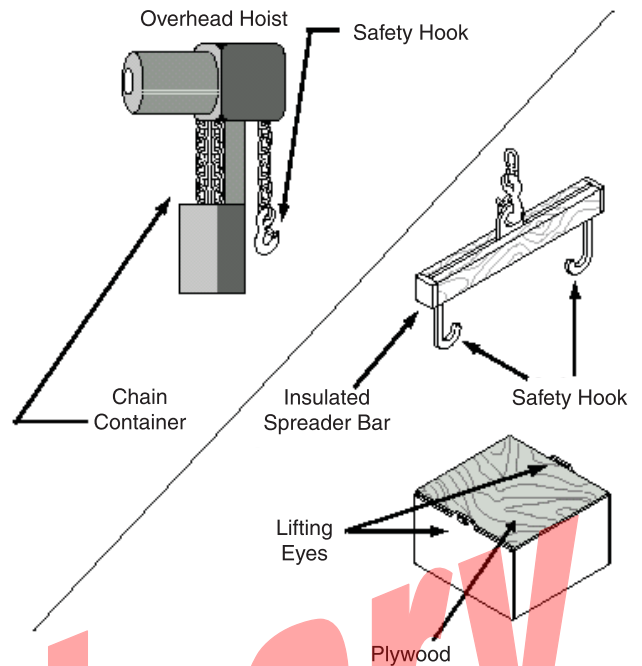
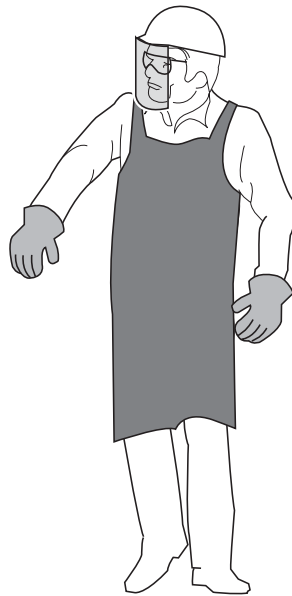
**Explosive gas is always present around batteries, especially when they are being charged.**

- No smoking allowed in the charging area.
- Battery electrolyte must never be checked with an open flame.
- Open flame, sparks, or electric arcs must never be allowed in the battery charging area.
- The battery contains corrosive sulfuric acid which can cause injury. If acid contacts your eyes or skin, flush immediately with water and get medical assistance.



Persons maintaining batteries must wear protective clothing such as:

- Face and head shields
- Long shirt sleeves
- Gauntlet gloves
- Rubber apron



Be sure the battery service area is equipped with material handling equipment designed for the purpose of removing and replacing batteries, such as a conveyor or overhead hoist equipped with safety hooks.

**IMPORTANT**

**To prevent side forces from damaging the battery, the distance between the lifting hooks (of the spreader bar) must be adjusted to the same dimension as measured between the battery lifting eyes. Make sure the lifting hooks are the correct size to fit the lifting eyes of the battery.**

- When using an overhead hoist, be sure to use an insulated spreader bar or similar lifting device.
- Be sure the hoist is equipped with a chain container to accumulate excess lifting chain. When this is not possible, be sure the battery is covered with a nonconductive material, such as plywood, as shown below.
- If the battery does not have a cover of its own, cover it with a non-conductive material such as plywood.



**Danger**

**Never lay tools or other metal objects on a battery. Metal objects contacting battery terminals will cause short circuits. The shorted circuits could ignite battery fumes and cause the battery to explode.**

## Battery Removal

1. Move truck to the designated battery service area.

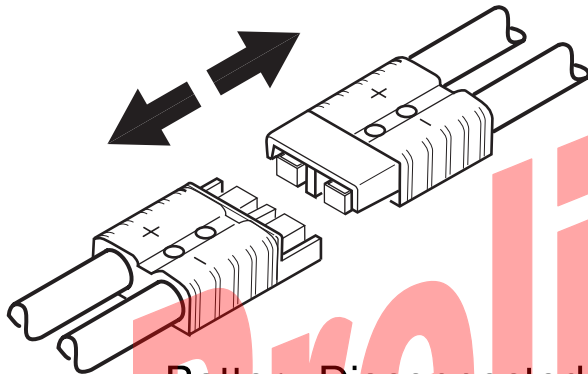


### CAUTION

**SAFE PARKING. Before working on truck:**

- Park truck on a hard, level and solid surface, such as a concrete floor with no gaps or breaks.
- Put upright in vertical position and fully lower the forks or attachment.
- Put all controls in neutral. Turn key switch OFF and remove key.
- Apply the park brake and block the wheels.

2. Turn key switch OFF and disconnect battery.



3. Lift and latch seat deck to access battery.

4. If the battery to be handled is uncovered, cover battery with a non-conductive material (plywood, heavy cardboard, etc.) prior to removal from truck.

### IMPORTANT

**Do not wash battery in truck.**



### CAUTION

**An overhead hoist of sufficient lifting capacity (refer to "Weights" in Group 40) should be used to lift battery. The safety hooks of the insulated spreader bar should be attached to the lifting eyes provided in the battery casing.**

5. Be sure battery is covered. Attach lifting device. Lift and remove battery.

## Battery Maintenance

### Note

**To obtain maximum performance and battery life, follow the instructions supplied by your battery vendor.**

Industrial batteries are used to supply the electrical power to operate an electric industrial truck. Their voltage depends on the number of individual cells they contain. There are approximately two volts for each cell in the commonly used lead-acid type battery. Batteries normally range from 6 volts to 72 volts. Their capacity varies depending on the application. Only use batteries that comply with factory specifications as to size and capacity.

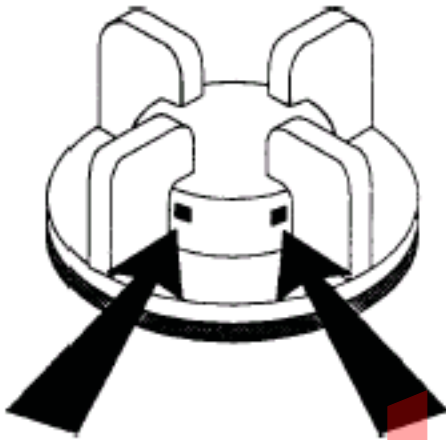
### Maximum Battery Life

- Do not add acid to a battery. Only qualified battery representatives should determine if this is necessary.
- When lifting a battery, use a lifting device designed for this purpose.
- Check the electrolyte level after placing a battery on charge. The electrolyte level in a battery should be slightly below the lower lip of the filling hole vent. Do not overfill. Overfilling causes loss of electrolyte.
- Keep the battery clean, dry and in good condition.
- Keep metal objects and tools away from the top of the battery. Short circuits will cause battery damage and could ignite battery fumes, causing the battery to explode.
- Maintain good battery cable connections.
- Check power cables and wiring for damage that can cause premature drainage of the battery.
- Do not overcharge a battery.
- Do not undercharge a battery.
- Follow the instructions provided by the supplier(s) of the battery and battery charging equipment.
- Maintain accurate battery records. If battery troubles occur, these records will help you and your battery representative determine the nature of the problem.



### Battery Vents

- When Charging Batteries: The vent caps must be kept in place to avoid electrolyte spray. Care must be taken to assure that vent caps are functioning. The vents must be open to allow the battery to breathe. The battery cover must be removed/opened to dissipate heat and explosive gas.
- When Cleaning Batteries: The vent caps must be tightly in place.



Keep Vents Holes Clear

### Battery Cleaning

The easiest and most satisfactory method of cleaning a battery is to wash it with a low-pressure cold water spray. The battery top can also be washed with a baking soda solution and rinsed with clear water.

#### IMPORTANT

- Remove battery from truck before washing.
- Vent caps must be free of obstruction and in good condition.
- Battery top should be clean and free of cracks or breaks.
- Battery terminals must be clean and solidly mounted.
- Damaged batteries should be repaired or replaced. Consult your battery vendor.
- Check to be sure all vent caps are tight before washing the battery.
- Fill a bucket with cold water. Add a box of baking soda to the bucket. Stir the solution until dissolved. Keep this solution around the battery service area at all times.
- After washing battery, thoroughly rinse with clear cold water.

### Battery Charging

Follow the instructions supplied by the battery charger vendor.

### Battery Electrolyte

- Check with battery manufacturer's documentation before working on battery electrolyte.
- Always use a carboy tilter or siphon when handling battery electrolyte.
- When mixing electrolyte, always pour acid into water-NEVER pour water into acid. Pouring water into acid will cause a dangerous chemical action or splash.

### Clean Battery Compartment

- Using baking soda and water solution, clean the walls and floor of the compartment. Rinse with clear water.
- Blow off the compartment walls and floor with an air hose. Allow to air-dry.



#### CAUTION

**Wear eye protection and protective clothing when cleaning or drying with compressed air. Reduce air pressure to 207 kPa (30 psi). Debris removed with air pressure can cause injury.**



## GROUP 12, BATTERY



### Replacement Batteries



#### CAUTION

**Use a battery properly sized to the dimensions of the battery compartment. Batteries too small can shift and cause damage to the truck or injury to the operator or bystanders. Only use batteries that comply with factory recommendations as to size and capacity.**

### Battery Installation

If the battery is uncovered, cover the battery with a nonconductive material (i.e., plywood, heavy cardboard, etc.) prior to installation.

- Using an overhead hoist and insulated spreader bar, lift battery into battery compartment.
- Install battery retainer, if applicable.
- Remove non-conductive material from battery.
- Connect battery to truck.

### Keeping Battery Records

Records should be maintained to get the best service out of your battery and truck.

These records should contain:

- Test Date. Each test should be dated for future reference and comparison.
- Specific Gravity and Temperature Readings. Each battery cell should be checked and recorded before and after charging. The specific gravity reading of the electrolyte, calculated using a multiplier to account for the ambient temperature, should not be less than 1.260. If below 1.250, the battery should be recharged and tested.
- Variation Between Each Cell Tested. The variation in specific gravity reading between cells should not be greater than 15 points (0.015). If readings are greater, there are defective cells.

#### NOTE

**The pilot cell should be changed occasionally to distribute any electrolyte loss over the battery when taking readings.**

- Load Voltage Tests should be performed and recorded indicating the condition of a battery while it is performing work.
- Actual Operating Hours of the Battery. Record the actual time the battery is in use before putting it on charger.
- Charging Time. Keep an accurate record of the actual time the battery is on charger. After each charge, check to see if the battery is fully charged. Test the battery before placing it back into service. Record these results.
- Visually Inspect for loose terminal connections or posts, a cracked case, damaged cell covers (vent caps), or excessive corrosion. This data should be noted to help determine work environment and possible trouble areas.