MAINTENANCE MANUAL

INCLUDES SDS SHEETS & TROUBLESHOOTING GUIDE
The Malta Dynamics Mobile Grabber Maintenance Manual

These instructions apply to the following model(s): X1240 & X1250

Manual Revision Date: 25 March 2019

Please visit www.MaltaDynamics.com for the latest user instruction manual revision available for this product offering as well as supporting documentation.

Maintenance Manual

Includes SDS Sheets & TROUBLESHOOTING GUIDE
TABLE OF CONTENTS

Owners Inspection Record ------------------------------------------ 4
Maintenance & Service Safety Tips --------------------------------- 4
Replacement Parts ----------------------------------------------- 4-5
Anchor Points ---------------------------------------------------- 5
Bolts ----------------------------------------------------------- 5
Deep Cycle Battery Care & Maintenance --------------------------- 6-7
Battery Charger -------------------------------------------------- 7
Battery Troubleshooting ------------------------------------------ 8
Main Power Switch ----------------------------------------------- 9
Remote Control --------------------------------------------------- 9
Grease Fittings -------------------------------------------------- 9
Hydraulics -------------------------------------------------------- 9
Hydraulic System & Component Maintenance & Repair -------------- 10-11
Manual ----------------------------------------------------------- 11
Labels & Decals --------------------------------------------------- 11
Towing Coupler --------------------------------------------------- 11
Wheels & Tires ---------------------------------------------------- 12-13
Axles ------------------------------------------------------------- 14-19
General Maintenance – Electric Brakes ---------------------------- 20-22
Manufacturer Safety Data Sheets ------------------------------- 23-49
TroubleShooting Guide ------------------------------------------ 50-51
OWNERS INSPECTION RECORD

It is the responsibility of the owner to arrange inspection per the schedule found inside the Malta Dynamics Mobile Grabber manual. The schedule, as well as the info found in this manual, is subject to change without notice. Please visit our website at www.MaltaDynamics.com or contact the manufacturer for the latest information regarding the XSeries Malta Dynamics Mobile Grabber.

MAINTENANCE & SERVICE SAFETY TIPS

Maintenance and repair should only be performed by personnel who are trained and qualified to service this aerial platform.

All maintenance and service procedures should be performed in a well-lighted and well-ventilated area.

Anyone operating or servicing this equipment must read and completely understand all operating instructions and safety hazards in this manual and operating manual.

All tools, supports and lifting equipment to be used must be of proper rated load and in good working order before any service work begins. Work area should be kept clean and free of debris to avoid contaminating components while servicing.

All service personnel must be familiar with employer and governmental regulations that apply to servicing this type of equipment.

Keep sparks and flames away from all flammable or combustible materials.

Properly dispose of all waste material such as lubricants, rags, and old parts according to the relative law provisions obtaining in the country.

Before attempting any repair work, turn Battery Disconnect Switch to the “OFF” position.

Preventive maintenance is the easiest and least expensive type of maintenance.

REPLACEMENT PARTS

Use only original replacement parts. Parts such as batteries, wheels, railings, etc. with the weight and dimensions different from original parts will affect stability of the Malta Dynamics Mobile Grabber and must not be used without manufacturer’s consent.
All replacement tires must be of the same size and load rating as originally supplied tires to maintain safety and stability of the XSeries.

**ANCHOR POINTS**

Inspect the anchor points of the Malta Dynamics Mobile Grabber for free rotation and corrosion. Make sure the bolt holding the anchor point to the mast is tight. If any deformation, rust, or defect is found in the anchor point, immediately remove from service and only replace with anchor points provided by the manufacturer.

Cleaning periodically will prolong the life and proper functioning of the anchor point. The frequency of cleaning should be determined by inspection and by severity of the environment. Clean with compressed air and/or a stiff brush using plain water or a mild soap and water solution. Do not use any corrosive chemicals that could damage the anchor point. Wipe all surfaces with a clean, dry cloth and allow to dry, or use compressed air.

**BOLTS**

The Malta Dynamics Mobile Grabber has several bolts and nuts used for securing pins, brackets, etc. Check the units bolts and nuts regularly for correct tightness. Torque specs are listed below and should be checked using a torque wrench or other properly calibrated measuring device.

- 1/4” (6.35mm) – 6ft/lbs. (8.13Nm)
- 5/16” (7.937mm) – 13ft/lbs. (17.63Nm)
- 3/8” (9.525mm) – 23ft/lbs. (31.18Nm)
- 7/16” (11.1125mm) – 37ft/lbs. (50.18Nm)
- 1/2” (12.7mm) – 57ft/lbs. (77.28Nm)
- 9/16” (14.2875mm) – 82ft/lbs. (111.18Nm)
- 5/8” (15.875mm) – 112ft/lbs. (151.85Nm)
- 3/4” (19.05mm) – 200ft/lbs. (271.16Nm)
- 7/8” (22.225mm) – 322ft/lbs. (436.57Nm)
- 1” (25.4mm) – 488ft/lbs. (661.64Nm)

Failing to check the fasteners of the unit can lead to undo stress to key components and lead to premature failure of critical members of the unit. If fasteners are found to be missing, immediately remove from service until replaced.
DEEP CYCLE BATTERY CARE & MAINTENANCE

• New batteries should be given a full charge before use.
• New deep cycle batteries need to be cycled several times before reaching full capacity (25-100 cycles, depending on type). Capacity will be limited during this period.
• Battery cables should be intact, and the connectors kept tight at all times. Always use insulated tools to avoid shorting battery terminals. Regular inspection is recommended.
• Vent caps should be correctly installed and tight during operation and charging.
• Batteries should be kept clean and free of dirt and corrosion at all times.
• Batteries should always be watered after charging unless plates are exposed before charging. If exposed, plates should be covered by approximately 1/8” (3.175mm) of electrolyte (add distilled water only). Check electrolyte level after charge. The electrolyte level should be kept 1/4” (6.35mm) below the bottom of the fill well in the cell cover.
• Water used to replenish batteries should be distilled or treated not to exceed 200 T.D.S. (Total Dissolved Solids... parts per million). Particular care should be taken to avoid metallic contamination (iron).
• For best battery life, batteries should not be discharged below 80% of their rated capacity.
• Avoid charging at temperatures above 120°F (49°C) or ambient, whichever is higher. Deep cycle batteries need to be equalized periodically. Equalizing is an extended, low current charge performed after the normal charge cycle. This extra charge helps keep all cells in balance. The onboard charger does this automatically. Plugging the charger in at a minimum of monthly will ensure proper battery equalization.
• Periodic battery testing is an important preventative maintenance procedure. Hydrometer readings of each cell (fully charged) gives an indication of balance and true charge level. Imbalance could mean the need for equalizing, and often is a sign of improper charging or a bad cell. Voltage checks (open circuit, charged and discharged) can locate a bad battery or weak battery. Load testing will pick out a bad battery when other methods fail. A weak battery will cause premature failure of companion batteries.
• As batteries age, their maintenance requirements change. This means longer charging time and/or higher finish rate (higher amperage at
the end of the charge). Usually older batteries need to be watered more often...and their capacity decreases.

• Lead acid batteries should be brought up to full charge at the earliest opportunity. Avoid continuously operating batteries in a partially charged condition. This will shorten their life and reduce their capacity.

• Extreme temperatures can substantially affect battery performance and charging. Cold reduces battery capacity and retards charging. Heat increases water usage and can result in overcharging. Very high temperatures can cause “thermal run-away” which may lead to an explosion or fire. If extreme temperature is an unavoidable part of an application, consult a battery/charger specialist about ways to deal with the problem.

• Inactivity can be extremely harmful to all lead acid batteries. If season use is anticipated, we recommend the following:

  • Completely charge the battery before storing.
  • Remove all electrical connections from the battery.
  • Store the battery in as cool a place as possible. However, do not store in a location which will consistently be below 32 degrees F. Batteries will discharge when stored, the lower the temperature the lower the self-discharge.
  • When not in use, boost every two months.

BATTERY CHARGER

The battery charger in the Malta Dynamics Mobile Grabber requires no normal maintenance. It should be kept clean and dry. If you do experience an issue, below is a trouble shooting guide.
## BATTERY TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>When plugged into AC power the LED flashes red/green.</td>
<td>Connected reverse to battery, or not connected to battery.</td>
<td>Correct polarity or connect to battery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Have a qualified person make repair.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace.</td>
</tr>
<tr>
<td>When plugged into AC power the LED does not come on.</td>
<td>No AC power.</td>
<td>Check circuit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check extension cord for breaks or damage.</td>
</tr>
<tr>
<td>When I put a volt meter across the output of the charger there is no</td>
<td>Battery too dead to charge.</td>
<td></td>
</tr>
<tr>
<td>power coming out when I plug it in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The batteries don’t receive a full charge. On wet cells, the specific</td>
<td>The charger must be connected to a battery to turn on.</td>
<td></td>
</tr>
<tr>
<td>gravity will not rise to a full reading after the charge has completed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When switched on, the LED flashes red/yellow.</td>
<td>The charger is too small for the battery.</td>
<td>Connect the charger to a battery(s) with the same voltage rating.</td>
</tr>
<tr>
<td></td>
<td>The charger profile is not set correctly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The cycle needs more time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The battery is defective.</td>
<td></td>
</tr>
<tr>
<td>When powered up the LED is solid red with a yellow flash.</td>
<td>Charger and battery voltage mismatch.</td>
<td>Leave connected, it may take hours, but if the voltage rises even a little bit, it should recover, and turn the charger full on. (Do not allow your batteries to deep discharge, it is the number one cause of premature battery failure.)</td>
</tr>
<tr>
<td>The charger blows its fuse, or branch circuit fuse/circuit breaker as</td>
<td>The battery is very low, and the charger is in a slow charge phase until the voltage rises to a safe level before full turn on.</td>
<td>Contact factory.</td>
</tr>
<tr>
<td>soon as it’s switched on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The charger blows the branch circuit fuse/circuit breaker a short</td>
<td>The branch circuit is too small.</td>
<td>Relocate charger to a branch circuit with a heavier rating, or remove other loads on the circuit</td>
</tr>
<tr>
<td>while after being switched on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batteries use water, get hot, or smell.</td>
<td>One or more dead cells</td>
<td>Replace batteries. If charging in a series string, it is best to replace all the batteries rather than mix new with old. If shallow discharging, check that the dip switch is not set to standard, or extended cycle.</td>
</tr>
<tr>
<td></td>
<td>Dip switch not set correctly.</td>
<td></td>
</tr>
<tr>
<td>After a full charge, the batteries die quickly.</td>
<td>The batteries are sulfated.</td>
<td>Sometimes batteries can be recovered. Leave the charger on for some hours, if the voltage falls and the current begins to rise, it is a good sign they can recover under normal charging.</td>
</tr>
<tr>
<td>After a full charge, the LED is green with a yellow flash.</td>
<td>The batteries did not reach 80% charge in 12 hours, or did not reach minimum voltage, and the charger timed out.</td>
<td>The charger is too small for the batteries. Batteries are beginning to age.</td>
</tr>
</tbody>
</table>
**MAIN POWER SWITCH**

The main power switch is a fast, effective way to disengage power from the hydraulics that power the unit. To test, simply interrupt an operation of the unit and turn the switch to off. This should immediately disengage the power. If it does not, immediately remove from service and replace the main power switch.

**REMOTE CONTROL**

Visually inspect the remote for broken switches, cracked case, or cut or frayed wires. Turn the main power switch to “ON” position and operate all buttons on the remote. While using one of the buttons, depress the Emergency switch to ensure it is functioning. If there is any failure, do not attempt to repair. Immediately replace the control by contacting the manufacturer.

**GREASE FITTINGS**

There are Zerk style grease fittings located at the mast pivot points as well as on the leveling jacks. Using a grease gun, apply grease until it just begins to seep from around the pivot points. Remove any excess grease as this may collect dust and cause unwanted wear. Properly greasing these points are key to years of service from the unit.

**HYDRAULICS**

When adding or replacing fluid, use Mobil Nuto H32 or equivalent fluid.

Start by checking the tank for cracks or signs of leaks. Excess fluid inside the motor box can hint at this. Make sure the fluid levels are maintained at the correct level. Inspect the connection point of the tank and the hydraulic pump. Make sure all bolts and fittings are tight, including the electrical connections. Check the manifold for leaks and be sure that all lines and fittings are tight. Check hoses and lines for cracks, burns, bulges, or potential leaks. Inspect the cylinder casing for dings, dents, or punctures. Inspect the cylinder rod for dings, unusual scrapes, and bends.

Your Malta Dynamics Mobile Grabber is equipped with a hydraulic filter inside the motor box. This filter is available from the manufacturer and should be replaced every 6 months.
The following points should be kept in mind when working on the hydraulic system or any components:

1. Any structure has limits of strength and durability. To prevent failure of structural parts of hydraulic components, relief valves which limit pressure to safe operating values are included in the hydraulic circuits.

2. Tolerance of working parts in the hydraulic system is very close. Even small amounts of dirt or foreign materials in the system can cause wear or damage to components, as well as general faulty operation of the hydraulic system. Every precaution must be taken to assure absolute cleanliness of the hydraulic oil.

3. Whenever there is a hydraulic system failure which gives reason to believe that there are metal particles or foreign materials in the system, drain and flush the entire system and replace the filter cartridges. A complete change of oil must be made under these circumstances.

4. Whenever the hydraulic system is drained, check the magnets in the hydraulic reservoir for metal particles. If metal particles are present, flush the entire system and add a new change of oil. The presence of metal particles also may indicate the possibility of imminent component failure. A very small amount of fine particles is normal.

5. All containers and funnels used in handling hydraulic oil must be absolutely clean. Use a funnel when necessary for filling the hydraulic oil reservoir, and fill the reservoir only through the filter opening. The use of cloth to strain the oil should be avoided to prevent lint from getting into the system.

6. When removing any hydraulic component, be sure to cap and tag all hydraulic lines involved. Also, plug the ports of the removed components.
NOTE:

Samples of hydraulic oil should be drawn from the reservoir and tested annually. These samples should be taken when the oil is warmed through normal operation of the system. The sample should be analyzed by a qualified lubrication specialist to determine if it is suitable for continued use.

MANUAL

Check the Manual tube and make sure the most recent copy of the Malta Dynamics Mobile Grabber manual is inside. Copies are available online at www.MaltaDynamics.com and from the manufacturer.

LABELS & DECALS

It is important that all labels and decals on the XSeries are both present and legible. Inspect the unit labels for this regularly. If you find a label is damaged or missing, contact the manufacturer for replacement decal kits.

When installing new labels and decals, be sure to first clean away any residue from the old label as well as any grease, grime or dirt. This can be done by denatured alcohol. Be sure the surface is completely dry before applying the label.

TOWING COUPLER

To insure the Malta Dynamics Mobile Grabber coupler gives you years of uninterrupted service, check to make sure that the latching mechanism moves into the locked and unlocked position freely. If you should find that the latch mechanism is not operating properly, IMMEDIATELY remove from service and contact the manufacturer.

The receiver latch mechanism should be greased with a light oil lubricant and be kept free of rust and dirt. Make sure that all moving components are lubricated. Be sure to check for cracks both in the components of the receiver as well as the weld or attachment points to the frame. Again, if any cracks or breaks are detected, IMMEDIATELY remove from service and contact manufacturer.
WHEELS & TIRES

Before towing, always check the pressure recommended by the manufacturer. You can find this printed on the sidewall of the tire.

Tire pressures are always given for COLD tires. Check tires in the morning or after they have been sitting for a long period. Driving heats up the tires and causes the air inside to expand, which makes readings several pounds higher.

Use an accurate tire gauge. The built-in gauge on an air hose or compressor at gas stations is often wrong.

You can add or release air from the valve stem until your tire’s pressure matches the recommended pressure.

To let air out, press down on the needle in the middle of the valve. Most gauges have a small knob for this, but you can use a pen or nail as well.

When replacing tires, be sure to use tires of the same size and load rating. The tires are selected specifically for the load requirements of the unit and should not be deviated from.

TORQUE REQUIREMENTS

It is extremely important to apply and maintain proper wheel mounting torque on your trailer axle. Torque wrenches assure the proper amount of torque is being applied to a fastener. Use no other method to torque fasteners.

⚠️ WARNING ⚠️

Proper and accurate torque must be maintained to prevent wheels from loosening, studs from cracking and/or breaking or other possible hazardous breakage resulting in death or serious injury.
Be sure to use only the fasteners matched to the cone angle of your wheel (usually 60°F (15.56°C) or 90°F (32.22°C)). The proper procedure for attaching your wheels is as follows:

1. Start all bolts or nuts by hand to prevent cross threading.
2. Tighten bolts or nuts in the following sequence (see Wheel Torque Requirement Chart below).
3. Tightening fasteners should be done in stages. Follow the recommended sequence, tighten fasteners per wheel torque requirements chart below.
4. Wheel nuts/bolts should be torqued before first road use after each wheel removal. Check and re-torque after the 10 miles (16km) and 25 miles (40km) and again at 50 miles (80.5km). A periodic check during regular service is recommended.

### Wheel Torque Requirement Chart

<table>
<thead>
<tr>
<th>Wheel Size</th>
<th>Stud Size</th>
<th>Torque Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>15” (381mm)</td>
<td>1/2” (12.7mm)</td>
<td>20-25 ft.-lbs. (27.1Nm - 33.9Nm), 50-60 ft.-lbs. (67.8Nm - 81.35Nm), 90-120 ft.-lbs. (122Nm - 162.7Nm)</td>
</tr>
<tr>
<td>16” (406.4mm)</td>
<td>1/2” (12.7mm)</td>
<td>20-25 ft.-lbs. (27.1Nm - 33.9Nm), 50-60 ft.-lbs. (67.8Nm - 81.35Nm), 90-120 ft.-lbs. (122Nm - 162.7Nm)</td>
</tr>
<tr>
<td>16.5”x6.75” (419.1mm x 171.45mm)</td>
<td>1/2” (12.7mm)</td>
<td>20-25 ft.-lbs. (27.1Nm - 33.9Nm), 50-60 ft.-lbs. (67.8Nm - 81.35Nm), 90-120 ft.-lbs. (122Nm - 162.7Nm)</td>
</tr>
<tr>
<td>16” (406.4mm)</td>
<td>9/16” (14.3mm)</td>
<td>20-25 ft.-lbs. (27.1Nm - 33.9Nm), 60-70 ft.-lbs. (81.35Nm - 94.9Nm), 120-130 ft.-lbs. (162.7Nm - 176.3Nm)</td>
</tr>
</tbody>
</table>
AXLE

BREAK-IN PERIOD FOR ELECTRIC DRUM BRAKES

The break in period is a typical phenomenon with drum brakes and especially electric drum brakes. Electric drum brakes will require a break-in period to achieve full performance. This break-in period applies for new axles and any time new brake shoes and/or magnets are installed as part of regular maintenance. Lippert Components has found through extensive brake testing that the break-in period for our drum brakes can range from 20 to 50 brake applications. Brakes can be seated in by applying approximately 8-10 volts to the trailer brakes at an initial speed of 40 mph (64.45mm) and allowing the truck/trailer combination to slow down to 20 or 25 mph (32 or 40kmph). For best results do not use truck brakes during this procedure. The trailer brakes will seat in faster by using them to stop both the truck and trailer. The easiest method is to apply the trailer brakes using the manual activation lever located on the in-cab brake controller. Care must be taken to not overheat the lining material, therefore brake applications conducted at one mile intervals will suffice. The driver should feel a noticeable difference in the brake performance during this period, sometimes in as few as 10 applications. After 50 applications, the brake lining material will be fully cured from the heat and develop close to 100% contact with the brake drum surface.

This break-in period not only seats the shoe lining material but also seats in the brake electromagnets. During the break-in period, the linings will wear at a faster rate than they do after they are seated in.

NOTE: Brake should be manually adjusted after the first 200 miles (322km) of operation and periodically thereafter, approx. 3,000-mile (4828km) intervals.
HUB REMOVAL
To remove the hub assembly for inspection, maintenance or service, follow the six (6) steps below:

**WARNING**
Lift unit by the frame and never the axle or suspension. Do not go under the unit unless it is properly supported by jack stands. Unsupported units can fall causing death or serious injury.

1. Lift trailer and support it per manufacturer’s requirements.
2. Remove the wheel.
3. Remove the grease cap by prying the edge out of the hub. If equipped with oil lubrication, unscrew oil cap using a 2 1/2” (63.5mm) socket. Let oil drain into the pan.
4. Pull the cotter pin from the castle nut and remove the outer spindle nut.
5. Remove the spindle washer.
6. Pull the hub off the spindle. Do not let the outer bearing cone fall free of the assembly. The inner bearing cone will be contained by the seal and will not fall out.

NOTE: Brakes may need to be adjusted or backed off to remove drum from spindle.

NOTE: A gear puller may be necessary to remove hub from spindle.

BRAKE DRUM INSPECTION

The brake shoes contact the drum surface and the magnet contacts the armature. These surfaces are subject to wear and should be inspected periodically. The drum surface should be re-machined if wear is more than .030” (7.62mm) or out of round by more than .015” (.381mm). The drum should be replaced if scoring or wear is greater than .090” (2.286mm). The inner surface of the brake drum that contacts the brake magnet is the armature surface. If the armature surface is scored or worn unevenly, it should not be machined more than 0.30” (7.62mm). The magnets should be replaced whenever the armature surface is refaced and vice versa.

NOTE: Ensure that the wheel bearing cavities are clean and free of contamination before reinstalling bearing and seals. Resurfacing procedures can produce metal chips and dust that can contaminate the wheel bearings and
cause failure.

<table>
<thead>
<tr>
<th>Drum</th>
<th>Maximum Re-bore Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>7&quot; (177.8mm)</td>
<td>7.09&quot; (180.086mm)</td>
</tr>
<tr>
<td>10&quot; (255mm)</td>
<td>10.09&quot; (256.286mm)</td>
</tr>
<tr>
<td>12&quot; (304.8)</td>
<td>12.09&quot; (307.086mm)</td>
</tr>
</tbody>
</table>
Description:
A. Primary Shoe
B. Actuating Lever
C. Adjuster
D. Magnet
E. Adjusting Spring
F. Secondary Shoe
G. Retracting Spring
Wash all grease and oil from the bearing cone using a suitable solvent. Dry the bearing with a clean, lint-free cloth and inspect each roller completely. If any pitting, spalling, or corrosion is present, then the bearing must be replaced. The bearing cup inside the hub must be inspected.

NOTE: Bearings must always be replaced in sets of one cone and one cup.

**WARNING**

Always wear eye protection when servicing the axle, brakes, hubs, springs and wheels. Failure to wear eye protection may result in serious injury.

Follow the procedure below to replace the bearing cup:

1. Place hub on a flat surface with bearing cup on the bottom.
2. With brass drift punch, lightly tap around the small end of the cup to push it out.
3. Clean the hub bore. Replace the cup by tapping it back in with the brass drift punch. Cup should be seated against the retaining shoulder in the hub.

Consult Bearing Replacement Chart for proper replacement bearings.

**NOTE:** Replacing the bearing cup is a very precise process. The cup must be perfectly seated when replaced. If the cup is not seated correctly, damage to the assembly may not be covered by the warranty. Consult Lippert Components, Inc. prior to replacing bearing and bearing cup. The trailer should be taken to a certified service center for this work to be done.

### Recommended Wheel Bearing Grease Specifications

<table>
<thead>
<tr>
<th>Thickener Type</th>
<th>Lithium Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropping Point</td>
<td>230°C (446°F) Minimum</td>
</tr>
<tr>
<td>Consistency</td>
<td>NLGI No. 2</td>
</tr>
<tr>
<td>Additives</td>
<td>EP, Corrosion, &amp; Oxidation Inhibitors</td>
</tr>
<tr>
<td>Base Oil</td>
<td>Solvent Refined Petroleum Oil</td>
</tr>
<tr>
<td>Base Oil Viscosity</td>
<td>@40°C (104°F) 150cSt (695 SUS) Minimum</td>
</tr>
<tr>
<td>Viscosity Index</td>
<td>80 Minimum</td>
</tr>
<tr>
<td>Pour Point</td>
<td>-10°C (14°F) Minimum</td>
</tr>
</tbody>
</table>

**Approved Sources**

- Mobil Oil: Mobilgrease HP
- Exxon/Standard: Ronex MP
- Kendal Refining Co.: Kendall L-427
- Ashland Oil Co.: Valvoline Val-plex EP Grease
- Pennzoil Prod. Co.: Premium Wheel Bearing Grease 707L
BEARING LUBRICATION - GREASE

Bearing grease should be replaced every 12,000 miles (19312km) or 12 months, whichever comes first. Remove all old grease from wheel hub and bearings first. Bearings should be packed by machine if possible. Packing bearings by machine is preferable; however, packing by hand is a viable alternative.

Follow these procedures to repack bearings by hand:

1. Place grease into the palm of your hand.
2. Press widest end of bearing into the outer edge of the grease pile, forcing grease into the inner area of the bearing between two adjacent rollers.
3. Repeat this process while turning bearing from roller to roller until all rollers are coated.
4. Apply a light coat of grease into the bearing cup surface.
5. Reassemble bearing into cup.
RECOMMENDED WHEEL BEARING GREASE

SPECIFICATIONS

Seal Inspection and Replacement

Always check the seal to make sure that it is not damaged, nicked, cracked or torn and is in good working order. If there is any question of condition, replace the seal.

Procedure to replace seal:

1. Pull seal from the hub with a seal puller. Never push the seal out with the bearing. The bearing may get damaged.
2. Apply a PERMATEX sealant to the outside of the new seal.
   NOTE: Do not use PERMATEX on rubber encased seals.
3. Tap the new seal into place using a clean, hardwood block.

NOTE: When installing a new oil seal, be sure the side marked “AIR SIDE” is away from bearing cone.

BEARING ADJUSTMENT/HUB REPLACEMENT

To adjust bearings or replace removed hub, follow procedure below

1. Place hub, bearing, washers and castle nut back on axle spindle in the reverse order from which they were removed. Castle nut should be torqued to 50 ft.-lb (67.79Nm). Hub will rotate during this process.
2. Loosen castle nut to back off the torque.
3. Tighten castle nut finger tight until snug.
4. Insert cotter pin. If cotter pin does not line up with the hole, back the castle nut up slightly until the pin can be inserted.
5. Bend cotter pin over to lock nut in place. Nut should be free to move with only the cotter pin keeping it in place.
GENERAL MAINTENANCE - ELECTRIC BRAKES

BRAKE ADJUSTMENT

WARNING

Prior to testing or adjusting brakes, be sure area is clear of any persons and vehicles. Failure to perform test in a clear area may result in death or serious injury.

Lippert Components, Inc. Electric Brakes are automatic adjust only. If manual adjusting is needed, the following 6-step procedure can be utilized. The brakes should be adjusted in the following manner:

Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturer’s recommendations for lifting and supporting the unit. Make sure the wheel and drum rotate freely.

WARNING

Lift unit by frame and never the axle or suspension. Do not go under unit unless it is properly supported by jack stands. Unsupported units can fall causing death or serious injury.

2. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.
3. With a screwdriver or standard adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.
4. Then rotate the star wheel in the opposite direction until the wheel turns freely with a slight lining drag.

NOTE: A second screwdriver will be needed to push the auto adjusting lever away from the adjuster star wheel so that the star wheel can be rotated backwards.

5. Replace the adjusting hole cover and lower the wheel to the ground.
6. Repeat the above procedure on all brakes. For best results, the brakes should all be set at the same clearance.

**LUBRICATE BRAKES**

Prior to reassembling the brake drum assembly, remember to apply a light film of white grease or an anti-seize compound on the brake anchor pin, the actuating arm bushing and pin, and the areas on the backing plate that are in contact with the brake shoes and magnet lever arm. In addition, apply a light film of grease on the actuating block mounted on the actuating arm.

**CLEAN AND INSPECT BRAKES**

In the event the braking system encounters symptoms of improper application or failure, immediate inspection and service must be implemented. During normal use, servicing the braking system once a year is considered normal. Increased usage will require service on a regulated schedule based on 3000-6000-mile (4828km-9656km) increments. As magnets and shoes become worn, they need to be changed to maintain maximum braking capability.

Be sure, when disassembling brakes for cleaning, to clean the backing plate, magnet arm, magnet and shoes. Also, make sure that any and all parts removed for cleaning are placed back into the same brake drum assembly. This is also an excellent time to check for parts that have become loose or worn.

![WARNING]

Potential Asbestos Dust Hazard

Older brake linings have the potential to contain asbestos dust, which has been linked to serious or fatal illnesses. Certain precautions must be taken when servicing brakes:

1. Avoid creating and/or breathing any brake dust.
2. Do not machine, file, or grind the brake linings.
3. Remove with a damp brush or cloth. Dry brushing or compressed air will cause the dust particles to become airborne.
## MANUFACTURER SAFETY DATA SHEETS

**Exide Technologies**

13000 Deerfield Parkway, Bldg. 200
Milano, GA 30004

**FOR FURTHER INFORMATION**

**Primary Contact:**
Exide SDS Support (770) 421-3485

**Secondary Contact:**
Joe Holca (612) 989-6377
Joe Kamper (612) 989-9380
Fred Gansler (612) 921-4052

**FOR EMERGENCY**

CHEMTREC (800) 424-9300
(703) 527-3887 — Collect

24-hour Emergency Response Contact
Ask for Environmental Coordinator

---

### I. PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>MANUFACTURER/SUPPLIER</th>
<th>CHEMICAL/TRADE NAME</th>
<th>PRODUCT ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exide Technologies</td>
<td><em>Lead-Acid Battery Non-spillable</em></td>
<td>Electric Storage Battery</td>
</tr>
<tr>
<td>(*) as used on label)</td>
<td>Valve Regulated Lead-Acid Battery (VRLA)</td>
<td>UN2800</td>
</tr>
<tr>
<td></td>
<td>Absorbed Electrolyte Battery</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MANUFACTURER SAFETY DATA SHEETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Storage Battery</td>
</tr>
</tbody>
</table>

---

### II. HAZARD IDENTIFICATION

#### Signal Word: Danger

<table>
<thead>
<tr>
<th>Category</th>
<th>GHS Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health:</td>
<td>H102/H112/H1332</td>
<td>Harmful if swallowed, inhaled, or in contact with skin.</td>
</tr>
<tr>
<td>Acute Tox. 2</td>
<td>H314</td>
<td>Acid causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>Repr. 1A</td>
<td>H315/H318</td>
<td>Causes skin irritation, serious eye damage.</td>
</tr>
<tr>
<td>Skin Corr. 1A</td>
<td>H335</td>
<td>Contact with internal components may cause irritation or severe burns.</td>
</tr>
<tr>
<td>Flamm Gas 1</td>
<td>H360</td>
<td>May cause cancer if ingested or inhaled.</td>
</tr>
<tr>
<td>Aquatic Acute 1</td>
<td>H373</td>
<td>Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure if ingested or inhaled.</td>
</tr>
<tr>
<td>Aquatic Chronic 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STOT RE 2**

**Acute Tox. 4**

**Repr. 1A**

**Skin Corr. 1A**

**Flamm Gas 1**

**Aquatic Acute 1**

**Aquatic Chronic 1**

**Health:**

**Acute Tox. 4**

**Repr. 1A**

**Skin Corr. 1A**

**Flamm Gas 1**

**Aquatic Acute 1**

**Aquatic Chronic 1**

**Health:**

**Acute Tox. 4**

**Repr. 1A**

**Skin Corr. 1A**

**Flamm Gas 1**

**Aquatic Acute 1**

**Aquatic Chronic 1**

---

### Handling:

**P201**

**P202**

**P210**

**P263**

**P264**

**P270**

**P280**

**P403/P405**

**P271**

**P501**

**P201**

---

**WARNING:** Batteries subjected to abusive charging at excessively high currents for prolonged periods of time without vent caps in place may create a surrounding atmosphere of an offensive, strong inorganic acid mist containing sulfuric acid.

**Reactivity:** highly reactive with water and alkalis
III. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>% by Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic compounds of Lead</td>
<td>7439-92-1</td>
<td>65-69</td>
</tr>
<tr>
<td>Electrolyte (no fluid/completely absorbed)</td>
<td>7664-93-9</td>
<td>17-30</td>
</tr>
<tr>
<td>sulfuric acid/water/solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Material:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polypropylene</td>
<td>9003-07-0</td>
<td>3-8</td>
</tr>
<tr>
<td>Separator:</td>
<td>N/A</td>
<td>1-3</td>
</tr>
</tbody>
</table>

Note: Inorganic lead and electrolyte (water and sulfuric acid solution) are the primary components of every battery manufactured by Exide Technologies or its subsidiaries. Other ingredients may be present depending upon battery type. Polypropylene is the principal case material of automotive and commercial batteries.

IV. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting to rescue a victim and provide first aid.

Inhalation: Electrolyte: Remove to fresh air immediately. If breathing is difficult, give oxygen.

Lead compounds: Remove from exposure, gargle, wash nose and lips; consult physician.

Skin Contact: Electrolyte: Flush with large amounts of water for at least 15 minutes; remove contaminated clothing completely, including shoes.

Lead compounds: Wash immediately with soap and water.

Eye Contact: Electrolyte and Lead compounds: Flush immediately with large amounts of water for at least 15 minutes; consult physician immediately.

Ingestion: Electrolyte: Give large quantities of water; do not induce vomiting; consult physician.

Lead compounds: Consult physician immediately.

V. FIRE FIGHTING MEASURES

Flash Point: Not Applicable

Flammable Limits: LEL = 4.1% (hydrogen gas in air); UEL = 74.2%

Extinguishing media: CO₂; foam; dry chemical

Fire Fighting Procedures:
Use positive pressure, self-contained breathing apparatus. Beware of acid splatter during water application and wear acid-resistant clothing, gloves, face and eye protection. If batteries are on charge, shut off power to the charging equipment, but note that strings of series connected batteries may still pose risk of electric shock even when charging equipment is shut down.

Hazardous Combustion Products:
In operation, batteries generate and release flammable hydrogen gas. They must always be assumed to contain this gas which, if ignited by burning cigarette, naked flame or spark, may cause battery explosion with dispersion of casing fragments and corrosive liquid electrolyte. Carefully follow manufacturer’s instructions for installation and service. Keep away all sources of gas ignition and do not allow metallic articles to simultaneously contact the negative and positive terminals of a battery.

VI. ACCIDENTAL RELEASE MEASURES

Remove combustible materials and all sources of ignition. Stop flow of material and contain spill by digging with soda ash, etc. Carefully neutralize spill with soda ash, etc. Make certain mixture is neutral then collect residue and place in a drum or other suitable container with a label specifying "contains hazardous waste" or (if uncertain call distributor regarding proper labeling procedures). Dispose of as hazardous waste. If battery is leaking, place battery in a heavy duty plastic bag. Wear acid resistant boots, face shield, chemical splash goggles and acid resistant gloves. Do not allow discharge of acid to sewers. Acid must be managed in accordance with approved local, state, and federal requirements. Consult state environmental agency and/or federal EPA.

VII. HANDLING AND STORAGE

Handling:
Single batteries pose no risk of electric shock but there may be increasing risk of electric shock from strings of connected batteries exceeding three 12-volt units. Batteries are non-spillable - potential for exposure to contents only during recycling or if outer casing is cracked or damaged.

Storage:
Store batteries under roof in cool, dry, well-ventilated areas that are separated from incompatible materials and from activities which may create flames, sparks, or heat. Keep away from metallic objects that could bridge the terminals on a battery and create a dangerous short-circuit.

Charging:
There is a possible risk of electric shock from charging equipment and from strings of series connected batteries, whether or not being charged. Shut-off power to chargers whenever not in use and before detachment of any circuit connections. Batteries being charged
will generate and release flammable hydrogen gas. Charging space should be ventilated. Keep battery vent caps in position. Prohibit smoking and avoid creation of flames and sparks nearby. Wear face and eye protection when near batteries being charged.

### VIII. EXPOSURE CONTROLS AND PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Ingredient:</th>
<th>US OSHA</th>
<th>US ACGIH</th>
<th>US NIOSH</th>
<th>Quebec PEV</th>
<th>Ontario OEL</th>
<th>EU OEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic Lead</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.15(a)</td>
</tr>
<tr>
<td>Electrolyte (sulfuric acid/water solution)</td>
<td>1</td>
<td>0.2</td>
<td>1</td>
<td>1</td>
<td>0.2</td>
<td>0.05(b)</td>
</tr>
</tbody>
</table>

**NOTES:**
- (a) as inhalable aerosol
- (b) thoracic fraction

**Engineering Controls (Ventilation):**
Store and handle in well-ventilated area. If mechanical ventilation is used, components must be acid-resistant. Handle batteries cautiously. Make certain vent caps are on securely. If battery case is damaged, avoid bodily contact with internal components. Wear protective clothing, eye and face protection, when charging or handling batteries.

**Hygiene Practices:**
Wash hands thoroughly before eating, drinking or smoking after handling batteries.

**Respiratory Protection (NIOSH/MSHA approved):**
None required under normal conditions. When concentrations of sulfuric acid mist are known to exceed PEL, use NIOSH or MSHA approved respiratory protection.

**Skin Protection:**
None required under normal conditions. If battery case is damaged, use rubber or plastic acid-resistant gloves with elbow-length gauntlet, acid-resistant apron, clothing, and boots.

**Eye Protection:**
None required under normal conditions. If battery case is damaged, chemical goggles or face shield.

**Other Protection:**
In areas where water and sulfuric acid solutions are handled in concentrations greater than 1%, emergency eyewash stations and showers should be provided, with unlimited water supply.

### IX. PHYSICAL AND CHEMICAL PROPERTIES - ELECTROLYTE

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point @ 760 mm Hg</td>
<td>226 to 237° F</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>% Solubility in Water</td>
<td>100</td>
</tr>
<tr>
<td>Evaporation Rate (Butyl acetate - 1)</td>
<td>Less Than 1</td>
</tr>
<tr>
<td>Appearance and Odor Threshold</td>
<td>Sulfuric Acid. Clear liquid with a sharp, penetrating, pungent odor. A battery is a manufactured article; no apparent odor.</td>
</tr>
<tr>
<td>Octanol Water Partition Coefficient (K&lt;sub&gt;ow&lt;/sub&gt;)</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Specific Gravity @ 77°F (H<sub>2</sub>O = 1) | 1.2185 to 1.3028 |

Vapor Pressure (mm Hg) | Less than 1 |
| pH | Less than 1 |
| Vapor Density (AIR - 1) | Viscosity | Greater than 1 |
| % Volatiles by Volume @ 70°F | Not applicable |

Note: The properties above reflect 30-40% Sulfuric acid

### X. STABILITY & REACTIVITY DATA

**Stability:**
- Stable \( \times \)
- Unstable \( - \)

**Conditions to Avoid:**
Prolonged overcharging and overheating current; sparks and other sources of ignition.

**Incompatibilities:** (materials to avoid)
Electrolyte: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas. No further concern for mechanical impact.
Lead compounds: Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen, and reducing agents.

**Hazardous Decomposition Products:**
- Electrolyte: Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, hydrogen sulfide.
- Lead compounds: Temperatures above the melting point are likely to produce toxic metal fume, vapor, or dust; contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsenic gas.

**Hazardous Polymerization:** Will Not Occur

### XI. TOXICOLOGICAL DATA

**Routes of Entry:**
- Electrolyte: Harmful by all routes of entry. Lead compounds: Hazardous exposure can occur only when product is heated above the melting point, oxidized or otherwise processed or damaged to create dust, vapor, or fume.

**Acute Toxicity:**
- **Inhalation L.D.$$50$$**
  - Electrolyte: L.C.$$50$$ rat: 375 mg/m$$^3$$; L.C.$$50$$ guinea pig: 510 mg/m$$^3$$
  - Elemental Lead: Acute Toxicity Point Estimate = 4500 ppm V (based on lead bullion)
- **Oral L.D.$$50$$**
  - Electrolyte: rat: 2140 mg/kg
  - Elemental lead: Acute Toxicity Estimate (ATH) = 500 mg/kg body weight (based on lead bullion)

**Inhalation:**
- Electrolyte: Breathing of sulfuric acid vapors or mists may cause severe respiratory irritation.
- Lead compounds: Inhalation of lead dust or fumes may cause irritation of upper respiratory tract and lungs.

**Ingestion:**
- Electrolyte: May cause severe irritation of mouth, throat, esophagus, and stomach.
- Lead compounds: Acute ingestion may cause abdominal pain, nausea, vomiting, diarrhea, and severe cramping. This may lead rapidly to systemic toxicity.

**Skin Contact:**
- Electrolyte: Severe irritation, burns, and ulceration. Sulfuric acid is not readily absorbed through the skin and is not a dermal sensitizer.
- Lead compounds: Not absorbed through the skin and not a dermal sensitizer.

**Eye Contact:**
- Electrolyte: Severe irritation, burns, corneal damage, blindness.
- Lead compounds: May cause eye irritation.

**Synergistic Products:**
- Electrolyte: No known synergistic products
- Lead compounds: Synergistic effects have been noted with heavy metals (arsenic, cadmium, mercury), N-nitroso-N-(hydroxyethyl)ethylenimine, N-(4-fluoro-4-biphenyl)acetamide, 2-(nitratesoethylamino)ethanol, and benz[a]pyrene.

**Additional Information:**

**Medical Conditions Generally Aggravated by Exposure:**
- Overexposure to sulfuric acid mist may cause lung damage and aggravate pulmonary conditions. Contact of electrolyte (water and sulfuric acid solution) with skin may aggravate skin diseases such as eczema and contact dermatitis. Contact of electrolyte (water and sulfuric acid solution) with eyes may damage corneas and/or cause blindness. Lead and its compounds can aggravate some forms of kidney, liver, and neurologic diseases.

**Environmental Fate:** Lead is very persistent in soil and sediments. No data on environmental degradation. Mobility of metallic lead between ecological compartments is slow. Bioaccumulation of lead occurs in aquatic and terrestrial animals and plants but little bioaccumulation occurs through the food chain. Most studies indicate lead compounds and not elemental lead.

---

**XII. ECOLOGICAL INFORMATION**

Environmental Fate: Lead is very persistent in soil and sediments. No data on environmental degradation. Mobility of metallic lead between ecological compartments is slow. Bioaccumulation of lead occurs in aquatic and terrestrial animals and plants but little bioaccumulation occurs through the food chain. Most studies indicate lead compounds and not elemental lead.
Environmental Toxicity: Aquatic Toxicity:
Sulfuric acid: 24-hr LC50, freshwater fish (Brachydanioc rario): 82 mg/L
96 hr- LOEC, freshwater fish (Cyprinus carpio): 22 mg/L
Lead: 48 hr LC50 (modeled for aquatic invertebrates): <1 mg/L, based on lead bullion

XIII. DISPOSAL INFORMATION

US
Sulfuric Acid: Neutralize as described above for a spill, collect residue and place in a container labeled as containing hazardous waste. Dispose of as a hazardous waste. If uncertain about labeling procedures, call your local battery distributor or listed contact. DO NOT FLUSH LEAD CONTAMINATED ACID TO SEWER.
Spent batteries: Send to secondary lead smelter for recycling. Follow applicable federal, state and local regulations. Neutralize as in preceding step. Collect neutralized material in sealed container and handle as hazardous waste as applicable. A copy of this MSDS must be supplied to any scrap dealer or secondary lead smelter with the battery.

XIV. TRANSPORT INFORMATION

GROUND – US-DOT/CAN-TDG/EU-ADR/APEC-ADR:
Batteries, Wet, Non-Spillable
UN 2800, 8, PG III
Label: “NON-SPILLABLE” or “NON-SPILLABLE BATTERY”
For US, refer to 49 CFR 173.159 for details.

AIRCRAFT – ICAO-IATA:
For air shipments, reference IATA Dangerous Goods Regulations Special Provision A67 and Packing Instruction 872.

VESSEL – IMO-IMDG:
For shipments by water, reference IMDG Special Provision 238 and Packing Instruction P003.

ADDITIONAL INFORMATION:
- Non-Spillable Battery complies with the provisions listed in 49 CFR 173.159. Does not require marking with an identification number or hazardous label and is not subject to hazardous shipping paper requirements.
- Each battery and the outer packaging must be plainly and durably marked “NON-SPILLABLE” or “NON-SPILLABLE BATTERY”.
- Batteries must be kept upright at all times and packaged as required to prevent short circuits.
- Transport may require packaging and paperwork, including the Nature and Quantity of goods, per applicable origin/destination/customs points as-shipped.

XV. REGULATORY INFORMATION

United States:
EPA SARA Title III
Section 302 EPCRA Extremely Hazardous Substances (EHS):
Sulfuric acid is a listed “Extremely Hazardous Substance” under EPCRA, with a Threshold Planning Quantity (TPQ) of 1,000 lbs.

EPCRA Section 302 notification is required if 500 lbs or more of sulfuric acid is present at one site (40 CFR 370.10). An average automotive/commercial battery contains approximately 5 lbs of sulfuric acid. Contact your GNB representative for additional information.

Section 304 CERCLA Hazardous Substances:
Reportable Quantity (RQ) for spilled 100% sulfuric acid under CERCLA (Superfund) and EPCRA (Emergency Planning and Community Right to Know Act) is 1,000 lbs. State and local reportable quantities for spilled sulfuric acid may vary.

Section 311/312 Hazard Categorization:
EPCRA Section 312 Tier Two reporting is required for non-automotive batteries if sulfuric acid is present in quantities of 500 lbs or more and/or if lead is present in quantities of 10,000 lbs or more.

Section 313 EPCRA Toxic Substances:
Supplier Notification: This product contains a toxic chemical or chemicals subject to the reporting requirements of section 313 of (Title) III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (Pb)</td>
<td>7439-92-1</td>
<td>65-69</td>
</tr>
<tr>
<td>Electrolyte: Sulfuric Acid (H2SO4)</td>
<td>7664-93-9</td>
<td>17-30</td>
</tr>
</tbody>
</table>

If you distribute this product to other manufacturers in SIC Codes 20 through 39, this information must be provided with the first shipment of each calendar year. Note: The Section 313 supplier notification requirement does not apply to batteries that are "consumer products".

Page 5 of 7
TSCA: Each ingredient chemical listed in Section III of this SDS is also listed on the TSCA Registry.

OSHA: Considered hazardous under Hazard Communication Act (29CFR1910.1200)

RCRA: Spent lead-acid batteries are not regulated as hazardous waste when recycled.

CAA: Exide Technologies supports preventative actions concerning ozone depletion in the atmosphere due to emissions of CFC's and other ozone depleting chemicals (ODC's), defined by the USEPA as Class I substances. Pursuant to Section 611 of the Clean Air Act Amendments (CAA) of 1990, finalized on January 19, 1993, Exide established a policy to eliminate the use of Class I ODC's prior to the May 15, 1993 deadline.

NFPA Hazard Rating for sulfuric acid:
Flammability (Red) = 0
Health (Blue) = 3
Reactivity (Yellow) = 2

<table>
<thead>
<tr>
<th>US State</th>
<th>Identification</th>
<th>Notifications/Warning</th>
</tr>
</thead>
</table>
| California | California Proposition 65 | "WARNING: This product contains lead, a chemical known to the State of California to cause cancer, or birth defects or other reproductive harm."
Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Batteries also contain other chemicals known to the State of California to cause cancer.
The following chemicals identified in the finished product as distributed into commerce are known to the State of California to cause cancer, birth defects or to cause reproductive harm:
1. Strong inorganic acid mixtures including sulfuric acid; CAS #: NA; 17-30% wt
2. Lead – CAS No. 7439-92-1; 65-69% wt
Consumer Product Volatile Organic Compound Emissions
This product is not regulated as a consumer product for purposes of CARB/OTC VOC Regulations, as sold for the intended purpose and into the industrial/commercial supply chain.

<table>
<thead>
<tr>
<th>Country/Organization</th>
<th>Identification</th>
<th>Notifications/Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>All chemical substances in this product are listed on the CEPA DSL/NDSL or are exempt from list requirements.</td>
<td>This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. Refer to the Controlled Products Regulation for product labeling requirements.</td>
</tr>
<tr>
<td>NPRI and Ontario Regulation 127/01</td>
<td>This product contains the following chemicals subject to the reporting requirements of Canada NPRI and/or Ont. Reg. 127/01: Lead CAS # 7439-92-1 65-69 Sulfuric acid 7664-93-9 17-30</td>
<td></td>
</tr>
<tr>
<td>Toxic Substances List</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>EU</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS):</td>
<td>All ingredients remaining in the finished product as distributed into commerce are exempt from, or included on, the European Inventory of Existing Commercial Chemical Substances.</td>
</tr>
</tbody>
</table>

XVI. OTHER INFORMATION

DATE ISSUED: November 20, 2015

OTHER INFORMATION:
Distribution into Quebec to follow Canadian Controlled Product Regulations (CPR) 24(1) and 24(2).
Distribution into the EU to follow applicable Directives to the Use, Import/Export of the product as-sold.

SOURCES OF INFORMATION:
Ontario Ministry of Labor Regulation 654/86, Regulations
Respecting Exposure to Chemical or Biological Agents.

PREPARED BY: ENVIRONMENTAL, SAFETY AND HEALTH DEPARTMENT
EXIDE TECHNOLOGIES
13000 DEERFIELD PKWY., BLDG. 200
MILTON, GA 30004

VENDEE AND THIRD PERSONS ASSUME THE RISK OF INJURY PROXIMATELY CAUSED BY THE MATERIAL IF REASONABLE SAFETY PROCEDURES ARE NOT FOLLOWED AS PROVIDED FOR IN THE DATA SHEET, AND VENDOR SHALL NOT BE LIABLE FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY ABNORMAL USE OF THE MATERIAL EVEN IF REASONABLE PROCEDURES ARE FOLLOWED.

ALL PERSONS USING THIS PRODUCT, ALL PERSONS WORKING IN AN AREA WHERE THIS PRODUCT IS USED, AND ALL PERSONS HANDLING THIS PRODUCT SHOULD BE FAMILIAR WITH THE CONTENTS OF THIS DATA SHEET. THIS INFORMATION SHOULD BE EFFECTIVELY COMMUNICATED TO EMPLOYEES AND OTHERS WHO MIGHT COME IN CONTACT WITH THE PRODUCT.

WHILE THE INFORMATION ACCUMULATED AND SET FORTH HEREIN IS BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, EXIDE TECHNOLOGIES MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE FOR THEIR PARTICULAR CIRCUMSTANCES.

ANY PHOTOCOPY MUST BE OF THIS ENTIRE DOCUMENT
SAFETY DATA SHEET

SECTION 1  PRODUCT AND COMPANY IDENTIFICATION

PRODUCT
Product Name: NUTO H 32
Product Description: Base Oil and Additives
Product Code: 20156010H520, 583195-00, 97N580
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION
Supplier: EXXON MOBIL CORPORATION
22777 Springwoods Village Parkway
Spring, TX 77253 USA

24 Hour Health Emergency: 609-737-4411
Transportation Emergency Phone: 800-424-9300 or 703-527-3887 CHEMTREC
Product Technical Information: 800-662-4525

SECTION 2  HAZARDS IDENTIFICATION

This material is not hazardous according to regulatory guidelines (see (M)SDS Section 15).

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200.

PHYSICAL / CHEMICAL HAZARDS
No significant hazards.

HEALTH HAZARDS
High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS
No significant hazards.

NFPA Hazard ID: Health: 0 Flammability: 1 Reactivity: 0
HMIS Hazard ID: Health: 0 Flammability: 1 Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary
from person to person.

SECTION 3  COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS#</th>
<th>Concentration*</th>
<th>GHS Hazard Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,6-DI TERT BUTYL PHENOL</td>
<td>128-39-2</td>
<td>&lt; 0.25%</td>
<td>H315, H400(M factor 1), H410(M factor 1)</td>
</tr>
<tr>
<td>ZINC ALKYL DI THIOPHOSPHATE</td>
<td>68649-42-3</td>
<td>0.1 - &lt; 1%</td>
<td>H318, H401, H411</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4  FIRST AID MEASURES

INHALATION
Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT
Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION
First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5  FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water
FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Aldehydes, incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides

FLAMMABILITY PROPERTIES

Flash Point [Method]: >200°C (392°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6  ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.
ENVIRONMENTAL PRECAUTIONS
Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING
Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE
The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

ENGINEERING CONTROLS
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION
Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a
level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS
Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION
Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION
Relative Density (at 15 °C): 0.873
Flammability (Solid, Gas): N/A
Flash Point [Method]: >200°C (392°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F)
Product Name: NUTO H32
Revision Date: 30 Oct 2015
Page 6 of 10

Decomposition Temperature: N/D
Vapor Density (Air = 1): > 2 at 101 kPa
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 32 cSt (32 mm2/sec) at 40 °C | 5.4 cSt (5.4 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION
Freezing Point: N/D
Melting Point: N/A
Pour Point: -18°C (0°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10  STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11  TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Conclusion / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td></td>
</tr>
<tr>
<td>Acute Toxicity: No end point data for material.</td>
<td>Minimally Toxic. Based on assessment of the components.</td>
</tr>
<tr>
<td>Irritation: No end point data for material.</td>
<td>Negligible hazard at ambient/normal handling temperatures.</td>
</tr>
<tr>
<td>Ingestion</td>
<td></td>
</tr>
<tr>
<td>Acute Toxicity: No end point data for material.</td>
<td>Minimally Toxic. Based on assessment of the components.</td>
</tr>
<tr>
<td>Skin</td>
<td></td>
</tr>
<tr>
<td>Acute Toxicity: No end point data for material.</td>
<td>Minimally Toxic. Based on assessment of the components.</td>
</tr>
<tr>
<td>Skin Corrosion/Irritation: No end point data for material.</td>
<td>Negligible irritation to skin at ambient temperatures. Based on assessment of the components.</td>
</tr>
<tr>
<td>Eyes</td>
<td></td>
</tr>
<tr>
<td>Serious Eye Damage/Irritation: No end point data for material.</td>
<td>May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.</td>
</tr>
<tr>
<td>Sensitization: No end point data</td>
<td>Not expected to be a respiratory sensitizer.</td>
</tr>
</tbody>
</table>
for material

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Sensitization: No end point data</td>
<td>Not expected to be a skin sensitizer. Based on assessment of the components.</td>
</tr>
<tr>
<td>for material</td>
<td></td>
</tr>
<tr>
<td>Aspiration: Data available.</td>
<td>Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity: No end point</td>
<td>Not expected to be a germ cell mutagen. Based on assessment of the components.</td>
</tr>
<tr>
<td>for material</td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity: No end point data</td>
<td>Not expected to cause cancer. Based on assessment of the components.</td>
</tr>
<tr>
<td>for material</td>
<td></td>
</tr>
<tr>
<td>Reproductive Toxicity: No end point</td>
<td>Not expected to be a reproductive toxicant. Based on assessment of the components.</td>
</tr>
<tr>
<td>for material</td>
<td></td>
</tr>
<tr>
<td>Lactation: No end point data for</td>
<td>Not expected to cause harm to breast-fed children.</td>
</tr>
<tr>
<td>material</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity (STOT)</td>
<td></td>
</tr>
<tr>
<td>Single Exposure: No end point data for</td>
<td>Not expected to cause organ damage from a single exposure.</td>
</tr>
<tr>
<td>material</td>
<td></td>
</tr>
<tr>
<td>Repeated Exposure: No end point data</td>
<td>Not expected to cause organ damage from prolonged or repeated exposure.</td>
</tr>
<tr>
<td>for material</td>
<td>Based on assessment of the components.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OTHER INFORMATION

Contains:
Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

REGULATORY LISTS SEARCHED:

1 = NTP CARC
2 = NTP SUS
3 = IARC 1
4 = IARC 2A
5 = IARC 2B
6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY
Material – Not expected to be harmful to aquatic organisms.

MOBILITY
Base oil component – Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY
Biodegradation:
Base oil component – Expected to be inherently biodegradable.
Product Name: NUTO H 32
Revision Date: 30 Oct 2015
Page 8 of 10

BIOACCUMULATION POTENTIAL
Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

OTHER ECOLOGICAL INFORMATION
VOC: 0 g/l [ASTM E1868-10]

SECTION 13 DISPOSAL CONSIDERATIONS
Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS
Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION
RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning
Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

Marine Pollutant: No
AIR (IATA): Not Regulated for Air Transport

SECTION 15  REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is not considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: AICS, DSL, IECSC, PICCS, TSCA

EPCRA SECTION 302: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>List Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZINC ALKYLDITHIOPHOSPHATE</td>
<td>68649-42-3</td>
<td>15, 19</td>
</tr>
</tbody>
</table>

---REGULATORY LISTS SEARCHED---

1 = ACGIH ALL  
2 = ACGIH A1  
3 = ACGIH A2  
4 = OSHA Z  
5 = TSCA 4

6 = TSCA 5a2  
7 = TSCA 5e  
8 = TSCA 6  
9 = TSCA 12b  
10 = CA P65 CARC

11 = CA P65 REPRO  
12 = CA RTK  
13 = IL RTK  
14 = LA RTK  
15 = MI 293

16 = MN RTK  
17 = NJ RTK  
18 = PA RTK  
19 = RI RTK

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16  OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2  
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1  
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 01: Company Mailing Address information was modified.
Section 05: Hazardous Combustion Products information was modified.
Section 14: Marine Pollutant information was modified.
Composition: Component Table information was modified.
Section 16: HCode Key information was modified.
Section 16: Revision Information - Implementation of GHS requirements phrase. information was deleted.

The information and recommendations contained herein are, to the best of ExxonMobil's knowledge and belief, accurate and reliable as of the date issued. You can contact ExxonMobil to insure that this document is the most current available from ExxonMobil. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. If buyer repackages this product, it is the user's responsibility to insure proper health, safety and other necessary information is included with and/or on the container. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, re-publication or retransmission of this document, in whole or in part, is not permitted. The term, "ExxonMobil" is used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobie Corporation, or any affiliates in which they directly or indirectly hold any interest.

Internal Use Only
MHC: 0B, 0B, 0, 0, 0
DGN: 2006856XUS (1015422)

Copyright 2002 Exxon Mobil Corporation, All rights reserved
SAFETY DATA SHEET

SECTION 1  PRODUCT AND COMPANY IDENTIFICATION

PRODUCT
Product Name: MOBIL DTE 10 EXCEL 22
Product Description: Base Oil and Additives
Product Code: 201560103620, 822613-00, 97AY98
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION
Supplier: EXXON MOBIL CORPORATION
22777 Springwoods Village Parkway
Spring, TX 77379 USA
24 Hour Health Emergency: 200-737-4411
Transportation Emergency Phone: 800-424-5300 or 710-527-3987 CHEMTREC
Product Technical Information: 800-863-4535
MSDS Internet Address: www.exxon.com, www.mobil.com

SECTION 2  HAZARDS IDENTIFICATION

This material is not hazardous according to regulatory guidelines (see (M)SDS Section 15).

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200

PHYSICAL / CHEMICAL HAZARDS
No significant hazards.

HEALTH HAZARDS
High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS
No significant hazards.

NFPA Hazard ID: Health: 0 Flammability: 1 Reactivity: 0
HMIS Hazard ID: Health: 0 Flammability: 1 Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary
from person to person.

SECTION 3  COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS#</th>
<th>Concentration</th>
<th>GHS Hazard Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,6-DI-TERT-BUTYLPHENOL</td>
<td>128-39-2</td>
<td>0.1 - &lt; 1%</td>
<td>H315, H410(M factor 1), H410(M factor 1)</td>
</tr>
<tr>
<td>ALKYL DITHIOPHOSPHATE</td>
<td>256881-04-8</td>
<td>0.1 - &lt; 1%</td>
<td>H310(2A), H410(M factor 1), H410(M factor 1)</td>
</tr>
<tr>
<td>DISTILLATES, HEAVY, C18-50 - BRANCHED, CYCLIC</td>
<td>640101-09-9</td>
<td>60 - &lt; 90%</td>
<td>H314</td>
</tr>
<tr>
<td>AND LINEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYDROTREATED LIGHT PARAFFINIC DISTILLATES,</td>
<td>64742-65-8</td>
<td>5 - &lt; 10%</td>
<td>H314</td>
</tr>
<tr>
<td>PETROLEUM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4  FIRST AID MEASURES

INHALATION
Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT
Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION
First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5  FIRE FIGHTING MEASURES
EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilition from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Aldehydes, incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides

FLAMMABILITY PROPERTIES

Flash Point [Method]: >175°C (347°F) [AST M D-92]
Flammable Limits (Approximate volume % by air): LEL 0.9 VEL 7.0
Autoignition Temperature: ND

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 6 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material, however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS
Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7  HANDLING AND STORAGE

HANDLING
Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CTC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE
The type of container used to store the material may affect static accumulation and dissipation. Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8  EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>Form</th>
<th>Limit / Standard</th>
<th>NOTE</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROTREATED LIGHT PARAFFIN DISTILLATES, PETROLEUM</td>
<td>Mist</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>NKA</td>
</tr>
<tr>
<td>HYDROTREATED LIGHT PARAFFIN DISTILLATES, PETROLEUM</td>
<td>Mist</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>NKA</td>
</tr>
</tbody>
</table>

Exposure limits/standards for materials that can be formed when handling this product: When mist or aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use with adequate ventilation.

PERSONAL PROTECTION

...
Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

- No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacitating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

- No protection is ordinarily required under normal conditions of use.

**Eye Protection:** If contact is likely, safety glasses with side shields are recommended.

**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

- No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

**ENVIRONMENTAL CONTROLS**

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

**Note:** Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

**GENERAL INFORMATION**

- **Physical State:** Liquid
- **Color:** Amber
- **Odor:** Characteristic
- **Odor Threshold:** N/C

**IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION**
Product Name: MOBIL DTE 10 EXCEL 22
Revision Date: 18 Jul 2017
Page 6 of 10

Relative Density (at 15 °C): 0.84 [ASTM D4062]
Flammability (Solid, Gas): N/A
Flash Point [Method]: >175 °C (347 °F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316 °C (600 °F) [Estimated]
Decomposition Temperature: N/D
Vapor Density (Air = 1): > 2 at 101 kPa [Estimated]
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-Butyl Acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 22.4 cSt (22.4 mm2/sec) at 40 °C | 5.1 cSt (5.1 mm2/sec) at 100 °C [ASTM D 445]
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION
Freezing Point: N/D
Melting Point: N/A
Pour Point: -48 °C (-54 °F) [ASTM D 97]
DMSO Extract (mineral oil only), IP-346: < 3 % wt

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Conclusion / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Acute Toxicity: No end point data for material. Minimally Toxic. Based on assessment of the components.</td>
</tr>
<tr>
<td></td>
<td>Irritation: No end point data for material. Negligible hazard at normal handling temperatures.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Acute Toxicity: No end point data for material. Minimally Toxic. Based on assessment of the components.</td>
</tr>
<tr>
<td></td>
<td>Skin: Acute Toxicity: No end point data for material. Minimally Toxic. Based on assessment of the components.</td>
</tr>
</tbody>
</table>
OTHER INFORMATION

Contains:
Base oil of severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

---REGULATORY LISTS SEARCHED---
1 = NTP CARC
2 = NTP SUS
3 = IARC 1
4 = IARC 2A
5 = IARC 2B
5 = OSHA CARC

SECTION 12  ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY
Material -- Not expected to be harmful to aquatic organisms.

MOBILITY
Base oil component -- Low solubility and floats and is expected to migrate from water to the land.
Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:
- Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL:
- Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability

OTHER ECOLOGICAL INFORMATION

VOC: 3 GAL [ASTM E1668-10]

SECTION 13  DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS
- Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oil with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION
- RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261.1), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning: Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14  TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport
SEA (IMDG): Not Regulated for Sea Transport according to IMDG Code

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is not considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: TSCA

Special Case:

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>AICS</td>
<td>Restrictions Apply</td>
</tr>
<tr>
<td>ENCS</td>
<td>Restrictions Apply</td>
</tr>
<tr>
<td>IECSC</td>
<td>Restrictions Apply</td>
</tr>
<tr>
<td>KECS</td>
<td>Restrictions Apply</td>
</tr>
<tr>
<td>MBIL</td>
<td>Restrictions Apply</td>
</tr>
</tbody>
</table>

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>List Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROTREATED LIGHT PARAFFINIC DISTILLATES, PETROLEUM</td>
<td>64742-05-8</td>
<td>1, 4</td>
</tr>
</tbody>
</table>

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL  6 = TSCA 5a2  11 = CA P65 REPRO  16 = MN RTK
2 = ACGIH AI  7 = TSCA 6e  12 = CA RTK  17 = NJ RTK
3 = ACGIH A2  8 = TSCA 6  13 = IL RTK  18 = PA RTK
4 = OSHA A  9 = TSCA 12b  14 = LA RTK  19 = RI RTK
5 = TSCA 4  10 = CA P55 CARC  15 = MI 209

Code key: CARC=Carcinogen; REPRO=Reproductive
SECTION 10 OTHER INFORMATION

N/D = Not determined; N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):

H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1
H315: Causes skin irritation; Skin Corros/irritant, Cat 2
H319(QA): Causes serious eye irritation; Serious Eye Damage/Blindness, Cat 2A
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Section 15: National Chemical Inventory Listing information was modified.
Section 16: Special Cases/ Table information was modified.

The information and recommendations contained herein are, to the best of ExxonMobil's knowledge and belief, accurate and reliable as of the date issued. You can contact ExxonMobil to ensure that this document is the most current available from ExxonMobil. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. If buyer repackages this product, it is the user's responsibility to ensure proper health, safety and other necessary information is included with and/or on the container. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, republication or retransmission of this document, in whole or in part, is not permitted. The term, "ExxonMobil" is used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates in which they directly or indirectly hold any interest.

Internal Use Only
MHC: GB, GB, 0, 0, 0, 0
PPEC: A
DGN: 706950XUS (1013680)

Copyright 2002 Exxon Mobil Corporation, All rights reserved
TROUBLESHOOTING GUIDE

Cylinders are not syncing/mast is not hitting both rest pads at the same time:

Sometimes when the XSERIES has not been used for some time, the hydraulic system needs to be synchronized. If you experience this, simply raise the mast 8-10 (2.5m-3m) feet, and then lower it down. When one part of the mast finds the rest, hold the button for 3 seconds, and then let off for 3 seconds. Repeat this until both sections of the mast are sitting on the rest pads. Raise the mast again 8-10 feet (2.5m-3m), the synchronizing may need to be repeated to sync completely.

HYDRAULIC FLUID LEAKS:

• Around the fluid filter housing; tightening the filter by hand has stopped leaking in that area

• A plug underneath the machine connected to the counterweight hydraulic cylinder may have intermittent delayed leaking/seeping. This can be remedied by tightening the plug, or removing the plug and re-applying sealant and then re-installing. Malta Dynamics would like to be informed of any issues of this kind so we can track them, and/or furnish a new plug if necessary.

• Any other fluid leaking can affect performance and safety of the XSERIES machine, please remove your XSERIES machine from service if any fluid leak is present, and call Malta Dynamics.

OUTRIGGER PINS BROKEN OR DAMAGED:

• In X1240 and X1250 models manufactured before July 2018 have spring-loaded pins which lock the sliding outriggers into place. These can be bent, broken, or otherwise not usable.

  Testing in spring 2018 by a 3rd party testing laboratory confirmed that the XSERIES Mobile Grabber no longer needs to have outriggers extended to provide fall protection to workers. Our recommendation is to keep the outriggers locked into the closest setting to the frame of the machine, and use the outrigger jacks from that position. If the pins become unsafe or broken, replace them with the appropriate bolt so that the outriggers no longer can be pulled out.
HYDRAULIC SYSTEM FAILURE IN COLD CLIMATES:

• The XSERIES machine operates with an on-demand electric motor hydraulic system. We also have spring pressure check valves to ensure a fluid loss does not pull the mast of the machine down if a fluid loss occurs while in use.

The way in which the hydraulic system operates, the fluid operates at the low end of the temperature range, so in situations where your XSERIES Mobile Grabber is stored and used in or below freezing temperatures, there is a possibility that the fluid won’t flow properly. This can lead to cylinders coming out of synchronization, or a machine that will not raise or lower.

o Malta Dynamics has identified alternate hydraulic fluids to use in extremely cold climates. Call with your climate details and we will advise of the best fluid for your needs.

MAST WILL NOT RAISE TO FULL HEIGHT

• If the mast or extension on your XSERIES Mobile Grabber does not extend all the way, giving the audible motor noise on full extension, then it is possible that more fluid needs to be added to your reservoir (located inside control box).

o Use a funnel and approved hydraulic fluid, and add ½ quart of fluid at a time until the machine operates properly.

• If the system is unusually noisy or gives a ‘gurgling’ sound, that is a sign to add hydraulic fluid. Add fluid using the steps above.

XSERIES GO! DOES NOT DRIVE STRAIGHT

• If your XSERIES Mobile Grabber is equipped with the Grabber GO! Option (M1000), and does not drive straight, or the friction drive spins without moving the tire, it may need adjusted.

o The friction drive motor is mounted to the frame with slotted holes for adjustment. Loosen (but do not remove) the fasteners, adjust to the direction needed, and tighten fastener. This may require several adjustments to both sides to correct.
USE & SYNCHRONIZATION OF WIRELESS CONTROLLER:

OPERATION:

• To turn on the wireless controller, press and hold the POWER button for at least 2 seconds and release
• To turn the wireless controller off, press and hold the POWER button until LEDs turn off
• The wireless controller is designed with a power saving feature which turns the wireless controller off after 15 minutes if no buttons are pressed
• There are red and green LEDs both on the keypad of the wireless controller and inside the receiver case. The green LED will blink rapidly when the wireless controller and receiver are communicating. It will slowly if there is no communication (i.e. - no power to the receiver)
• The red LED on the receiver will blink if there is a shorted or open output. Refer to the ERROR CODE CHART tables and count the number of blinks to determine the output with the fault.
• The wireless controller’s red LED blinks 1 time per second if the batteries are low and need to be replaced.

SYNCHRONIZING WIRELESS CONTROLLER AND RECEIVER:

Each wireless controller and receiver pair is synchronized together at the factory. If a new wireless controller is needed, synchronizing is required. Use the following procedure:

• Make sure both the wireless controller and receiver are off.
• Press and hold the POWER button on the wireless controller for more than 10 seconds. The red and green LED will start to blink.
• Apply power to the receiver
• Wait for a few seconds until only the green LED begins to blink on the wireless controller
• Sync complete