Job: Container Lashing
Description: Securing and releasing containers to/from the decks of ships.

ESSENTIAL DUTIES

1. Lashing and Unlashing Containers
   A. Boarding and Disembarking Ship
   B. Preparing Lashing Gear
   C. Lashing/Unlashing Containers/Unlocking Stackers
   D. Plugging in “Reefers”

2. Inserting/Removing Stackers Dockside

Non Essential Duties:
- None

Shift Schedule:
There are two 8 hr shifts from 8am-4:30pm and 4:30pm-1am with a 30 minute scheduled lunch break and two 10 minute coffee breaks. There is also a graveyard shift of 6.5 hrs from 1am-8am with a 1/2 hr lunch break.

Staffing:
Container lashing crews consist of 4 person teams that work in pairs. Typically one pair is on one side of a row of containers and the other pair is on the other side. Stacker persons work in teams of 2 on the dockside, inserting or removing stackers into/from the containers.

DESCRIPTION OF ESSENTIAL DUTIES

1. LASHING AND UNLASHING CONTAINERS

Frequency
- Varies depending on how quickly containers are loaded or unloaded from the ship. There are frequent periods of down time, but lashing could also occur for most of an 8 hr shift. On average 26-28 containers can be lashed in an hour of consecutive work.

Equipment
- Lashing bars, turnbuckles, pipe poles, marlin spikes, fittings and stackers (Russian and self-locking).

Task Description
- Container lashing on board ship requires workers to attach lashing bars to the bottom 2 or 3 tiers of containers on deck and then attach those bars to turnbuckles in order to secure the
containers to the ship’s deck. In the case of the outer containers they are lashed 3 high, but inner containers may only be lashed 2 high.

- Unlashing containers involves unlocking the stackers and removing lashing bars so that the gantry can unload the containers from the ship.

<table>
<thead>
<tr>
<th>A</th>
<th>BOARDING AND DISEMBARKING SHIP</th>
<th>Equipment</th>
<th>none</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>&lt; 1 minute</td>
<td>Frequency</td>
<td>Up to 8 x per shift</td>
</tr>
</tbody>
</table>

**Task Overview**
- The lasher must step onto the gangway and walk up or down the gangway stairs to get on and off the ship.
- Stairs may be slippery in inclement weather.
- The gangway may be positioned on the dock or may be hanging ship side requiring a step off the dock to access the bottom step.

<table>
<thead>
<tr>
<th>B</th>
<th>PREPARING AND CLEARING LASHING GEAR</th>
<th>Equipment</th>
<th>Lashing bars turnbuckles, pipe pole, marlin spikes and fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>up to 8 hours</td>
<td>Frequency</td>
<td>Constant</td>
</tr>
</tbody>
</table>

**Task Overview**
- When preparing for container lashing, workers will move lashing bars, fittings and turnbuckles up onto the deck from storage bins or racks in lower walkways.
- Crews work in pairs with one person lifting and carrying equipment and passing it up to their partner on deck through hatches.
- The equipment is then positioned on the walkways or deck so that it is ready and accessible to lash containers once the containers are loaded.
- Turnbuckles may be installed onto pad eyes prior to container loading.
- Depending on the ship, once unloading is complete, lashing equipment may be removed and stored back in the bins and racks along the walkways below the main deck. In some cases turnbuckles may be left in place but laid down out of the way when not in use.

<table>
<thead>
<tr>
<th>C</th>
<th>LASHING/UNLASHING CONTAINERS/UNLOCKING STACKERS</th>
<th>Equipment</th>
<th>Lashing bars turnbuckles, pipe pole, marlin spikes and fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>up to 8 hours</td>
<td>Frequency</td>
<td>Constant</td>
</tr>
</tbody>
</table>

**Task Overview**
- Crews install lashing bars on the lower 2 or 3 tiers of containers once they are loaded on ship’s deck. Two lashing bars are installed in an X configuration on the end of each container. The lashing bars are each attached to a turnbuckle which is in turn attached to the pad eye with a pin type fitting. A total of 4 or 6 turnbuckles are attached to each pad eye, depending on whether a 2 or 3-high stack of containers is lashed on that portion of the deck.
- Lashing crews work in pairs with one pair on one side of a row of containers and a second pair of lashers on the other side of the row.
- Crews uninstall and remove lashing bars from lower 2 or 3 tiers of containers prior to unloading.
- Crews also release self locking stackers on all 4 corners of each container using a pipe pole, or by hand for lower rows, prior to unloading of containers.
PLUGGING IN ‘REEFERS’ (REFRIGERATION UNITS)

<table>
<thead>
<tr>
<th>Duration</th>
<th>Frequency</th>
<th>Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 minute</td>
<td>Occasional</td>
<td>Minimal</td>
</tr>
</tbody>
</table>

**Task Overview**

- Depending on the dock and the type of containers being loaded, lashers may be required to plug in refrigeration units (reefers) to keep refrigerated containers cold.
- The task has some inherent electrical safety concerns but from an ergonomic standpoint it is light work.
- The lasher takes the plug from the end of the container and walks to a nearby outlet and plugs in the plug.
- This work does not happen daily but a lasher may need to plug in a number of units on any given shift if there are refrigerated containers being loaded.
- Stairs may be required to access reefers that are stacked several high.

**FUNCTIONAL DEMANDS with MSI POTENTIAL**

**Lashing and Unlashing Containers**

**Neck**

- Frequent neck flexion and rotation when working with turnbuckles and fittings at deck level
- Frequent neck extension looking up to attach/detach lashing bars or unlock stackers
- Awkward neck and upper back postures associated with moving turnbuckles, lashing equipment and maneuvering pipe poles

**Back**

- Bent and twisted back postures to tighten and install turnbuckles, fittings and lower end of lashing bars
- Frequent lifting of lashing bars, turnbuckles and other equipment to get it into position
- Heavy force may be required to maneuver 3 high lashing bars or pipe poles overhead, particularly during windy weather
- Bending down to plug in ‘reefers’ if plug is down low can put stress on the low back

**Shoulder**

- Reaching above shoulder height with significant force requirements when attaching or removing lashing bars (especially 3-high) or when unlocking stackers with pipe pole.
- Significant stabilization forces required when working with 3-high bars and pipe poles in overhead reach postures.
- Significant push/pull force, including rotating and across body shoulder forces, when tightening turnbuckles by hand or with marlin spike.
- Windy or poor weather conditions increases stresses to the shoulders when attempting to stabilize or use lashing equipment.
- Pulling body weight upwards when climbing ladders can put stress on the shoulder joint

**Elbow/Wrist**
- Repetitive wrist and forearm rotation to tighten or loosen turnbuckles can stress structures in the wrist and forearm.
- Repetitive wrist flexion and extension sometimes with force to insert or remove fittings can stress structures in the wrist.
- High sustained grip force on marlin spike, lashing bars or pipe pole can fatigue wrist and forearm musculature.
- High force wrist flexion and extension to knock locking nut loose on turnbuckle can stress tissues in the forearm and elbow.
- Sustained grip force combined with twisting and bending wrist and forearm postures when pulling plug and cable to outlet for plugging in reefers is also stressful for the forearm and wrist.

**Hips/Knees/Ankles**
- Sustained squatting with knee flexion greater than 90° when working on turnbuckle can stress the knees.
- Repetitive climbing of ladders to access hatches and upper walkways puts stress on the hips and knees.
- Jumping down from bottom steps puts impact stress on the hips, knees and ankles.
- Walkways may be cluttered with lashing equipment and may be wet or greasy which increases slip and trip hazards and results in increased stresses to the lower extremities to maintain footing.

### STRATEGIES TO MINIMIZE MSI

**Lashing and Unlashing Containers**

**Neck**
- Perform neck stretches after sustained periods of looking up or looking down.
- Minimize twisted or flexed neck postures by turning body rather than neck where possible.
- Minimize sustained awkward postures by looking up or down, then returning gaze to neutral briefly before looking up/down again (where safe to do so).

**Back**
- As much as possible avoid bending and twisting the back when accessing lashing gear.
- Face directly to work to minimize twisting.
- Stand as close as possible to work to reduce forward bending or leaning to access bars, turnbuckles and other gear
- Maintain inward curve in low back when lifting, and avoid forward hunching to lift
- Where working across railings, lean body against the railing to help support weight
- Perform back stretches or take a short walk during breaks to relieve stress

**Shoulders**
- Stand as close as possible to the turnbuckle when attaching lashing bars to reduce forward reaching
- Keep arms as close as possible to side of body when working to reduce stress the shoulders
- Face work directly so reaching is forwards rather than sideways
- Minimize overhead reaching by using a longer pipe pole or other reach tool and resting it on the deck, then holding it mid-shaft with arms below shoulder height
- Work with a partner to stabilize 3-high lashing bars, or other heavy/awkward gear

**Elbow/Wrist**
- Avoid wrist extension, flexion and rotation as much as possible.
- Knock locking nut loose with arm movement rather than wrist ‘flick’
- Try to keep wrists straight and use arm movements rather than wrist movements to tighten turnbuckle

**Hips/Knees/Ankles**
- Avoid jumping down from ladders to reduce stress to the lower extremities.
- Avoid extreme knee flexion with squatting, instead aim for 90° knee flexion or kneel down on 1 knee to avoid a sustained squat.

### 2. **INSERTING AND REMOVING STACKERS DOCKSIDE**

**Frequency**
- Varies depending on how quickly containers are loaded or unloaded from the ship. There are frequent periods of down time, but inserting and removing stackers could also occur for most of an 8 hr shift. On average stackers can be inserted/removed from 30 containers each hour when work is performed continuously

**Equipment**
- Self locking and Russian stackers
Task Description

- One member of the two-man stacker person crew checks the load sheet to determine which containers need stackers installed or removed. As the bombcart brings the appropriate containers past, the stacker persons install or remove stackers as needed to all 4 corners of the container.
- One stacker person stands on one side of the truck and installs or removes from the 2 corner castings on that side of the container and the other stacker person stands on the other side of the truck and installs/removes stackers on that side.
- Stackers are kept in bins adjacent to where the bombcart pulls up. Russian stackers weigh 3kg and self locking stackers weigh 7-8kg.
- All above deck containers need self locking stackers installed and if two 20ft containers are installed into a single 40ft cell below decks then Russian stackers are used to secure those 2 containers together. No other stackers are used for below deck containers.

<table>
<thead>
<tr>
<th>INSERTING AND REMOVING STACKERS</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>&lt; 10 seconds</td>
</tr>
<tr>
<td>Frequency</td>
<td>varies</td>
</tr>
<tr>
<td>Force</td>
<td>Light to Moderate</td>
</tr>
</tbody>
</table>

FUNCTIONAL DEMANDS WITH MSI POTENTIAL

Inserting and Removing Stackers

- **Neck**
  - Repetitive neck flexion and rotation looking into bins to get stackers can stress structures in the neck and upper back.

- **Back**
  - Repetitive bending over side of bin to reach stackers can put stress on the low back.
  - Repetitive twisting of back when turning from stacker bin to container to install stacker can put rotational stresses on the structures in the spine.

- **Shoulders**
  - Repetitive lifting of stackers out of bins with arm away from the side of the body puts increased stress on the shoulder.
  - Repetitive lifting or lowering of stackers up to/down from corner casting with installation or removal is fatiguing to the arms and shoulders.

- **Forearm/Wrist**
  - Repetitive gripping with moderately high force when handling stackers can fatigue the muscles of the wrist and forearm.
  - Wrist rotation, flexion and extension with moderately high force when installing/removing stackers, or when handling stackers with 1 hand can stress the structures in the wrist and forearm.
STRATEGIES TO MINIMIZE MSI
Inserting and Removing Stackers

Neck
- Minimize twisted or flexed neck postures by moving or turning body where possible
- Glance into the bin before removing a stacker rather than looking in the bin through the whole lift.

Back
- Brace body against edge of stacker bin for support when lifting out stackers
- Turn feet rather than twisting body when turning towards the container

Shoulder
- Use underhand grip to lift stackers out of bin and to lift/lower stackers up to/from corner postings
- Keep arm close to side of body when handling stackers to reduce shoulder stress
- Bend elbows and stand close to container when installing stackers to reduce force requirements at the shoulder

Forearm/Wrist
- As much as possible, keep wrists straight when installing and removing stackers. Use larger arm muscles to manipulate the stackers.
- Use power grip when pulling stacker release and move arm backward rather than bending wrist to pull the release cable.

3. ENVIRONMENTAL CONSIDERATIONS

Exposure to Elements
- The lasher is outside for the duration of the shift and is exposed to the elements both lashing on the ship and performing stacker person duties on the dock.

Uneven Surfaces
- On board ship the walkways may be wet and slippery. As well, there may be uneven surfaces, obstacles to step over as well as lashing gear and other equipment laying on the walkways.
- Stacker persons on the dock are working on a paved surface.

Vibration
- If the ships engines are running the lasher may be exposed to low level, whole body vibration when on board ship.
4. **Physical Demands Summary Table**

<table>
<thead>
<tr>
<th>Job Demands</th>
<th>Max. Weight/Avg. Weight (kg)</th>
<th>Duration per exposure h=hrs m=mins</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strength</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifting/Carry</td>
<td>16/11</td>
<td>&lt;1m</td>
<td>F</td>
<td>Lifting and installing 3-high lashing bars overhead is most difficult work</td>
</tr>
<tr>
<td>Push/Pull</td>
<td>45/12.5</td>
<td>&lt;5s</td>
<td>F</td>
<td>Tightening/releasing turnbuckles requires maximum forces (45kg +) but releasing stackers is 12.5kg</td>
</tr>
<tr>
<td>Supporting Body Weight</td>
<td>&lt;30s</td>
<td></td>
<td>O</td>
<td>Climbing ladders on ship or gangway up to ship</td>
</tr>
<tr>
<td>Gripping / Handling</td>
<td>&lt;1m</td>
<td></td>
<td>C</td>
<td>Stackers, turnbuckles, lashing bars, pipe poles, etc</td>
</tr>
<tr>
<td>Fine Motor Skills</td>
<td></td>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td><strong>Posture &amp; Mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting</td>
<td></td>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Driving</td>
<td></td>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Standing</td>
<td></td>
<td></td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td></td>
<td></td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Bending/ Stooping</td>
<td>&lt;5m</td>
<td></td>
<td>O</td>
<td>Attaching lashing bars to turnbuckles, tightening turnbuckles</td>
</tr>
<tr>
<td>Sustained Crouching/ Kneeling</td>
<td>&lt;5m</td>
<td></td>
<td>O</td>
<td>Installing/removing turnbuckles</td>
</tr>
<tr>
<td>Climbing Stairs</td>
<td>&lt;30s</td>
<td></td>
<td>O</td>
<td>Gangway to board ship</td>
</tr>
<tr>
<td>Climbing Ladders</td>
<td>&lt;30s</td>
<td></td>
<td>O</td>
<td>Up to walkways, between levels on ship</td>
</tr>
<tr>
<td>Crawling</td>
<td></td>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Balancing</td>
<td>V</td>
<td>O</td>
<td></td>
<td>On ladders and narrow walkways (may be for a few secs on ladder or many mins lashing containers</td>
</tr>
<tr>
<td>Throwing</td>
<td></td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead Reach</td>
<td>V</td>
<td>O</td>
<td></td>
<td>Installing and removing lashing bars, unlocking stackers (varies from few seconds to several mins)</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure to Elements</td>
<td>8h</td>
<td>C</td>
<td></td>
<td>Equipment and obstacles on walkways on ship</td>
</tr>
<tr>
<td>Uneven Surfaces</td>
<td></td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to moving objects</td>
<td>&lt;10s</td>
<td>F</td>
<td></td>
<td>Tractor trailers passing frequently for stacker men gantry passing back and forth when lashing/unlashing on ship</td>
</tr>
<tr>
<td>Vibration (upper extremity)</td>
<td></td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration (whole body)</td>
<td></td>
<td>F</td>
<td></td>
<td>If ship’s engines are on when on board (lashing only)</td>
</tr>
</tbody>
</table>

**Frequency Ratings:**
- **V:** varies (see comments)
- **N:** Never
- **R:** Rare - Not daily or up to 1% of shift (<5mins/day)
- **O:** Occasional - 1%-33% of shift (up to 2.5hrs)
- **F:** Frequent - 34%-67% of shift (2.5-5hrs)
- **C:** Constant ->67% of shift (>5hrs)