



THE CRANE CORNER

Weight Handling Equipment Technical Bulletin
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A WORD FROM TOPSIDE

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A safe and reliable Navy shore weight handling program is essential for fleet readiness. As I have reported to you in the past, we continue to see positive trends in improved safety of Navy shore weight handling operations and reliability of the equipment. Every member of the Navy shore weight handling community should take well-deserved pride in knowing that they personally contributed to these positive achievements in the safety and reliability of shore weight handling operations. I strongly encourage everyone to maintain a personal goal of ZERO accidents.

While we must continue our efforts to drive further improvement in these positive trends, we also need to intensify our focus on improving the efficiency and effectiveness of weight handling equipment and operations. The ultimate objectives being further improvements in safety and reliability coupled with reduced overall cost of managing shore weight handling programs.

I urge every Navy shore activity to carefully examine your local processes to identify opportunities for improvement. A prudent dissatisfaction with the status quo can drive constructive change. Each of us should demonstrate a philosophy of continuous incremental improvement in all our day-to-day work processes while avoiding change for change's sake. We should seek and actively listen to suggestions for improvement - and facilitate the prompt implementation of appropriate improvements. Each person's efforts directly and significantly contribute to fleet readiness. By using best practices and effective work processes involved in the maintenance, inspection, testing, and operations of weight handling equipment; we can further improve our responsiveness to fleet readiness.

I welcome and invite each of you to submit any ideas or recommendations for improving the overall Navy shore weight handling program. ■

SAFETY VIDEOS - REMINDER

NCC distributed seven crane accident prevention lessons learned videos to assist activities in raising the level of safety awareness among their personnel involved in weight handling operations. The target audience for these videos is the crane operations and rigging personnel and their supervisors. These videos provide a very useful mechanism for emphasizing the impact that the human element can have on safe weight handling operations. In addition, NCC recently provided a mobile crane load test video to help activities ensure mobile cranes are properly and safely load tested and certified. ■

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HAVE YOU HEARD ABOUT?

Correction - June 2002 Have You Heard About referred to ANSI B30.5. Strap hoists are not addressed in the B30 standards.

Radially expanding bolt assemblies are available for installation as "body bound" or "interference fitted" bolts, but without the need for precise bolt machining and hole reaming. The bolt assembly is shown in figure 1 and consists of:

- Expandable sleeve (split and internally tapered)
- Tapered stud, threaded on both ends
- Two thrust plates (washers)
- Two multi-jackbolt type nuts, each with a ring of threaded holes and a set of jackbolts

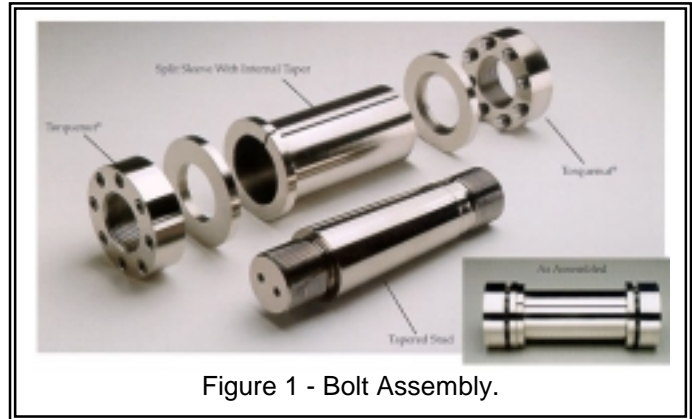


Figure 1 - Bolt Assembly.

The bolt holes of the components to be bolted must be matched drilled. Ideally, the holes should be 0.005 to 0.010-inch oversize, but the expansion bolts can accommodate holes as large as 0.020-inch oversize. Slight variations in hole-to-hole diameters can be accommodated. Expansion bolts can also be used as alignment tools for free shifting components.

For installation, the sleeve is positioned in the component through hole with its flange against the component face; the stud is inserted and tightened with the multi-jackbolt nut and jackbolts bearing on the thrust plate. (Multi-jackbolt nuts are installed hand-tight and the jackbolts tightened with the prescribed torque for the size of bolt assembly, under 100 pound-feet for many applications.) A radial force is exerted as the sleeve expands uniformly against the component through hole. The remaining nut assembly and thrust plate are installed on the other end of the stud in the same manner to provide component clamping force.

Expansion bolt assemblies have been made in various bolting materials and can be adapted to a variety of applications. The nuts may be designed to have the setscrew style jackbolts recessed, as shown in figure 1, or jackbolts protruding for securing with optional lockwire.

These bolt assemblies provide true metal-to-metal fit in the hole and high clamping forces are achieved simply with hand tools. They are easily removed and are reusable. The modest price of the expansion bolt is very attractive as compared to what is involved in manufacturing, machining, installing and removing a conventional "body bound" or "interference fitted" type bolt. ■

CRANE SAFETY ADVISORIES AND EQUIPMENT DEFICIENCY MEMORANDA

We receive reports of equipment deficiencies, component failures, crane accidents, and other potentially unsafe conditions and practices. When applicable to other activities, we issue a Crane Safety Advisory (CSA) or an Equipment Deficiency Memorandum (EDM). A CSA is a directive and often requires feedback from the activities receiving the advisory. An EDM is provided for information and can include deficiencies to non-load bearing or non-load controlling parts. The following CSA's and EDM were issued since the June 2002 Crane Corner.

CSA-106: Potential Noncompliance with Nondestructive Testing Acceptance Requirements for Crosby Hooks.

CSA-107: Terex Mobile Crane Deficiencies.

CSA-108: Crosby Group Inc. Master Link Failure.

CSA-109: Crosby Group Inc. 85-Ton Shackle Deformation.

CSA-110: Uncontrolled Lowering of Whip Hoist Drive.

EDM-052: Terex RT450 Outrigger Cylinders, Low Voltage Supply to the Diverter Valve. ■

THIRD QUARTER FY02 ACCIDENT REPORT

The Navy Crane Center (NCC) disseminates crane accident lessons learned to prevent repeat accidents and improve overall crane safety. NAVFAC P-307 requires commands to submit to the Navy Crane Center (NCC) a final, complete accident report (including corrective/preventive actions) within 30 days of an accident involving Navy-owned weight handling equipment, regardless of severity or type. In addition, contracting officers are required to forward to NCC and the host activity reports of all contractor accidents regardless of severity.

For the third quarter of FY02, 43 Navy and 2 contractor weight handling equipment accidents were reported. Serious accidents this quarter included four dropped loads, four overloads, and four two-blockings.

DROPPED LOADS

- Accident: A portal crane was hoisting a sandblast hose covered with a 4-inch plastic protective covering from a submarine. As the hose was being hoisted, a 20-foot section of the protective covering came loose and slid down approximately 20 feet, striking a rigger. The rigger was not injured.
- Lesson Learned: Prior to each lift, the rigger-in-charge must verify that all load components are properly secured.
- Accident: A category 3 crane operator was loading a rapid securing device (RSD) weighing 2000 pounds onto a truck to be transported to the sandblast shop when two of the four eyebolts pulled out of the RSD, causing one end to drop back down to the transfer table. The operator failed to inspect the condition of the threaded lifting holes and check the holes with a go/no-go gage as required by the activity's procedure.
- Lessons Learned: Operators and riggers must follow proper procedures prior to making lifts. Prior to lifting, inspect the integrity of all points of attachment.
- Accident: A portal crane was lowering an empty food module into a logistics escape trunk when a securing bar fell from the module and landed on the deck. The rigger failed to tape the bar ends, as required, to prevent the bars from loosening during the lift.
- Accident: A portal crane's whip and main hoist were being used to rotate a snorkel mast fairing from horizontal to a vertical position. The whip hoist was being used to hold the load as the main hoist was lowered to rotate the load. When the bottom of the fairing was suspended approximately six inches above the pavement, the rigger-in-charge and crane rigger disconnected the rigging gear from the fairing. When they turned their backs to disconnect the rigging gear from the main hook, the load descended contacting the ground. The probable cause was unintentional lowering of the whip hoist.
- Lessons Learned: When using two hoists on the same crane, the operator must be particularly alert to the proper hoist function. For loads suspended close to the ground or to another object, release of the deadman control, if provided, provides added assurance against inadvertent lowering.

OVERLOADS

- Accident: A mobile crane was overloaded when it hoisted a generator weighing approximately 16,300 pounds. Prior to making the lift, the team realized that the load would approach the crane's rated capacity and that the load moment indicator (LMI) would need to be by-passed to make the lift. The team requested that the rigger supervisor come to the site to review the plan and approve bypassing the LMI. The supervisor reviewed the plan and approved the lift but failed to realize that the operator forgot to include the weight of the fly assembly in his capacity deductions. In addition, the rigger supervisor approved bypassing the LMI even though he lacked such authority, which was reserved for operator supervisors.

- **Lessons Learned:** Lifting a load that approaches the capacity of a mobile crane is extremely hazardous. Alternatives, such as using a larger crane, should be investigated. Operators and operator supervisors must be thoroughly familiar with capacity charts and deduction requirements for each crane they operate.
- **Accident:** To determine its final ballasting configuration, a submarine test model was being lifted by two cranes. When the model was lifted off the floor, the load indicating device (LID) on the forward end indicated that the weight was 81,000 pounds, which exceeded the rated capacity of the forward lifting stand and spreader beam.
- **Lessons Learned:** When lifting near-capacity loads, load indicating devices must be closely monitored while rigging gear is strained to ensure pre-established limits will not be exceeded.
- **Accident:** A mobile crane's telescoping boom was damaged while the crane was used to extract piling. The crane was on a floating pier and was being used with an extractor that was clamped to the pile. The hydraulic clamp was leaking and was not fully clamped to the pile. An ocean swell caused the extractor to disengage from the pile, jump upward, and then drop approximately six feet. The resulting shock load damaged the boom.
- **Lesson Learned:** Below-the-hook lifting devices and attachments must be inspected for proper working condition before use. Operators of cranes on floating craft and structures must be alert to wave action, particularly when lifting submerged and partially submerged loads.
- **Accident:** While testing the emergency dynamic braking on the boom hoist of a portal crane, the boom lowered the test load beyond the allowable radius for the load. The test procedure incorrectly required this test to be performed with the hoist energized rather than de-energized.
- **Lesson Learned:** Test procedures for special tests should be reviewed by knowledgeable personnel.

TWO BLOCKED

- **Accident:** While a maintenance inspector was testing the controls of a bridge crane, the hook block did not stop when it contacted the upper limit switch. The block collided with the hoist frame and drum, causing damage to the hoist frame and wire rope.
- **Lesson Learned:** During normal operations, pre-use checks, or maintenance; the operator should always approach limit switches at a slow speed and be alert for any malfunction.
- **Accident:** During a pre-use inspection, a category 3 bridge crane was two blocked when the operator tried to test the upper limit switch. Inspection of the crane identified that the failure of an internal O-ring caused the malfunction of the pneumatic valve type limit switch. In addition, although the operator notified his supervisor immediately, the supervisor did not notify the safety office of a potential accident because he thought that since the crane was not being used for a lift at the time of the incident, it was not a reportable crane accident.
- **Lesson Learned:** Activities should ensure personnel are aware of the NAVFAC P-307 definition of WHE accidents and reporting requirements.
- **Accident:** The whip hoist on a new mobile crane was two blocked while the crane was being reconfigured for an on-rubber test. Overload testing of the whip hoist on outriggers (with the boom extended) required bypassing the computer for the multi-function load indicator/limiter. After this test, the operator who relieved the first operator was not told to reprogram the load indicator. As the operator was raising the main and whip hooks while simultaneously retracting the boom, the whip hook was two blocked. The crane team was not aware that a single function, e.g., overload, could be bypassed without bypassing other functions, e.g., anti-two block.
- **Lessons Learned:** Operators must be especially alert when operating multiple crane functions simultaneously. Operators must be thoroughly familiar with the operation of safety devices, particularly multi-function systems on mobile cranes. Test directors must ensure devices that are bypassed for one test

are reactivated when applicable. Test directors must ensure relief personnel are fully aware of the test sequence and necessary precautions.

- Accident: After repairing the auxiliary hoist hook on a mobile crane, the inspector extended the boom while rewinding the auxiliary hoist wire rope when he two blocked the main hook, damaging 50 feet of wire rope and one sheave. The inspector used the bypass key, which was left in the crane cab by the crane and rigging supervisor. Leaving the bypass key in the crane violated the activity's standard operating procedure for crane safety devices. In addition, the crane inspector did not have a crane operator's license.
- Lessons Learned: Safety device bypass keys must be controlled. Unlicensed mechanics and inspectors cannot operate cranes that require a license to operate.

OTHER SIGNIFICANT ACCIDENTS

- Accident: There were three accidents in April involving the removal of hook tiebacks and securing devices on mobile cranes. In all cases, the operation involved raising the boom while simultaneously lowering the hook block (one case required operation of the boom hoist and two hook blocks). In two cases, the hook block was lowered too quickly resulting in paying out too much wire rope off the drum, which damaged the wire rope. In the other case, the boom hoist was raised too quickly and the hook was pulled out of its securing device.
- Lessons Learned: Simultaneous operation of multiple functions on telescoping boom mobile cranes requires heightened awareness by the operator. Operators should perform multiple functions slowly enough to maintain control and awareness of hook block locations at all times.
- Accident: A category 3 bridge crane was out of service for its annual maintenance, load test, and certification. The bridge drive gear case had been drained of oil for inspection. There were two tags on the pendant operating station, one indicating the gear case had no oil and the second indicating the crane was out of certification. While the crane was so tagged, maintenance personnel found that the crane had been moved from its stowed position and was left parked out in the shop with the hook block in the lowered position. (It was later determined that the crane was used by shop personnel to make several lifts.) The maintenance mechanic attempted to move the crane back to the stowed location with the hook still lowered. In the process, the wire rope struck a light fixture and broke the diffuser cover on the fixture.
- Lessons Learned: Shop personnel must be made aware that any crane with an expired certification is not to be operated. Cranes that are undergoing maintenance should be positively prevented from operation.

SIGNIFICANT NEAR MISS

- Near Miss: An activity reported a near miss where a rigger who was working on a ship demolition had attached his safety harness to a self-retracting lanyard (SRL). The SRL was suspended from the whip hook of a portal crane so that the rigger could examine a hull section about to be lifted. When satisfied the load was in the right position for the lift, he gave the operator the signal to lift. However, he forgot to disengage his harness from the SRL. He was raised about 15 feet off the deck before the rigger-in-charge stopped the lift.
- Lessons learned: This was an oversight that could have had serious consequences. Each crane team member should be alert to the actions (and potential errors) of other team members.

Serious crane accidents are still occurring as noted above, with human error (e.g., inattention to detail) as the primary cause. Weight handling program managers and safety officials are encouraged to consider the potential risk of accidents similar to those highlighted above occurring at your activity and apply the lessons learned to prevent similar accidents. OPNAVINST 3500.39, *Operational Risk Management*, prescribes methods for assessing hazards and controlling and minimizing risks in hazardous operations. Activities should incorporate these principles into both training and day-to-day weight handling operations.

E-mail submission of reports of accidents, unplanned occurrences, and near misses is encouraged. NCC's accident e-mail address is accident@ncc.navfac.navy.mil. Reports must include a complete and concise situation description, corrective and preventive actions, probable cause and contributing factors, and an assessment of damage. For equipment malfunction or failure, include a specific description of the component and the resulting effect or problem caused by malfunction or failure. ■

RIGGING GEAR REQUIREMENTS

NAVFAC P-307 does not permit the use of rigging gear that is not in an established test and inspection program. Any rigging gear used on Navy shore-based cranes must bear the required markings for the program covering its usage. All recognized programs require some type of inspection, test, or other certification markings on rigging gear. NAVFAC P-307 provides requirements for rigging gear used in general purpose weight handling operations.

These requirements do not apply to gear that is already in an established test and inspection program, such as NAVAIR's criteria for ground support equipment, NAVSEA's criteria for ordnance handling equipment, or DIRSSP's criteria for equipment under their cognizance. These programs are well established and governed by official written documentation. The gear in these programs may not meet all NAVFAC P-307 requirements. However, if it meets the requirements of the program covering its usage, it is satisfactory for use with shore-based cranes.

An incident recently happened at a Navy shore activity that indicates a need for clarification of acceptable rigging gear for use with a Navy-owned, shore-based crane. The incident involved a special lifting fixture used for lifting a propeller blade. The lifting fixture was fabricated by an engineered drawing but there were no tags or other markings indicating it was in an established test and inspection program. Even though a trained and qualified crane team was making the lift, there was confusion over the need for the lifting fixture to have markings indicating it was in a test and inspection program. The crane team considered the lifting fixture to be part of the load to be lifted and continued with the lift. As soon as the lift began, the propeller blade slipped out of the lifting fixture and fell to the pier. If the crane team had refused (as they should have) to make the lift with unmarked rigging gear, the accident could have been avoided.

The other organizations involved with this lift were not trained to NAVFAC P-307's requirements for performing lifting and handling operations. It is the responsibility of the crane team to evaluate lifting and handling situations and ensure that program requirements are met.

User personnel must know what program covers the rigging gear being used and ensure it is marked correctly. ■

SHARE YOUR SUCCESS

We are always in need of articles from the field. Please share your sea stories with our editor, phone (610) 595-0905, fax (610) 595-0747. ■

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2002 NAVY WEIGHT HANDLING CONFERENCE
“Sharing Best Practices and Safety Initiatives”

The following questions and subsequent answers were generated based on discussion at the 2002 Navy Weight Handling Equipment (WHE) Conference held in Pensacola, Florida:

Question: Why are the NAVFAC P-307 requirements more stringent than OSHA Regulations?

Answer: OSHA regulations are minimum requirements established for the general industry. Because of the nature of the Navy mission and the high priority of safety within the Navy, we have chosen to raise the standards, where appropriate, to avoid catastrophic accidents and fatalities. As a result, both the accident rate and the severity of Navy WHE accidents continue to decline annually.

Question: Does NAVFAC P-307 apply to Marine Corps activities?

Answer: No.

Question: Is there a program such as the NAVFAC P-307 for shipboard cranes?

Answer: Naval Ships' Technical Manual S9086-T4-STM-010 Chapter 589, Cranes, is the current requirement for shipboard cranes

Question: Who enforces NAVFAC P-307 contractor crane requirements?

Answer: Activity commanding officers must promulgate NAVFAC P-307, paragraph 1.7.2, requirements to tenants and contracting officers for inclusion in contracts, statements of work, purchase orders, etc. However, the primary responsibility for enforcement of these requirements and oversight of contractor crane operations lies with the contracting officer.

Question: Are there standard tests for acceptance of new cranes?

Answer: There are ASME standards for testing of new cranes. Generally, acceptance testing requirements will be developed and included in the procurement specifications.

Question: Where can supplemental information on wind loads be found?

Answer: NAVFAC P-307, paragraph 10.9 outlines general requirements for operation of WHE in adverse operating conditions. Due to the different types and manufacturers of Navy equipment, contact the OEM for specific wind load restrictions for their equipment.

Question: Why does NAVFAC P-307 require a monthly inspection of bridge, wall, and gantry cranes?

Answer: OSHA Standard 29 CFR 1910.179 requires a documented monthly inspection of hooks and wire rope on these types of cranes. OSHA has indicated that the monthly inspection prescribed in NAVFAC P-307, paragraph 9.2.b, satisfies this requirement.

Question: Why are shore-based boat lifts not included in the NAVFAC P-307?

Answer: Consideration is being given to including them in NAVFAC P-307.

Question: When will the certifying official training course be available?

Answer: It is in final review and should be available in early FY03.

Question: When will the current NCC training programs be updated?

Answer: They are being updated and should be available in early FY03.

Question: Who may take challenge tests?

Answer: NCC allows DOD civilian, contractor, or military personnel to take challenge tests.

Question: When will ROICC training be available?

Answer: This training is currently being given at selected locations. Contact NCC for more information.

Question: Is there an NCC course on documentation techniques?

Answer: NCC does not currently have a documentation course, however, our audit teams perform hands-on inspection and load test training, which can include crane specific documentation training. Also, naval shipyards have developed a documentation course that may be available. ■