

DATE: January 8, 2007

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BULLETIN NO.: _____ CSB0033

SECTION: _____ Operation & Service

MODEL(S): _____ All

Subject: Inspection, Testing, Preventive Maintenance and Special Operating Instructions For Braden /Gearmatic Planetary Hoists



WARNING

READ AND UNDERSTAND THESE ENTIRE INSTRUCTIONS BEFORE OPERATING OR SERVICING YOUR BRADEN/GEARMATIC HOIST. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE. FAILURE TO PROPERLY OPERATE, MAINTAIN AND SERVICE A HOIST MAY LEAD TO LOSS OF LOAD CONTROL AND RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

These instructions apply to the following planetary hoists:

PD5/GH5/BG6 (any design series)

PD7/BG8 (any design series, Equal Speed only)

PD12 (any design series)

PD15B ("B" design series only)

PD17A

CH150A, CH175A, CH185A, CH210A

CH230A, CH240A, CH330A, CH400A

CH500A, CH600A, CH640

CH22B ("B" design series only)

GH30, GH50 (with external motor & brake valve)



WARNING

ANY TIME A HOIST EXHIBITS ERRATIC OPERATION AND/OR UNUSUAL NOISE, THE HOIST MUST BE TAKEN OUT OF SERVICE UNTIL IT IS INSPECTED AND SERVICED BY A QUALIFIED TECHNICIAN. CONTINUED OPERATION OF A HOIST WITH A DEFECT IN A CRITICAL COMPONENT MAY LEAD TO LOSS OF LOAD CONTROL, PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

Record Retention:

A log of written, dated and signed records of ALL inspections, load tests, maintenance, repairs or modifications must be kept readily available in an appropriate location for a minimum of four (4) years. To provide customers with qualified outlets for hoist service and repairs, BRADEN has established authorized Service Centers. These Service Centers have factory trained service technicians, up-to-date service information, extensive parts inventories, complete testing facilities and are audited by BRADEN on a regular basis for compliance. BRADEN strongly recommends the use of BRADEN authorized Service for maintenance, repair and inspection of BRADEN/Gearmatic products. Contact the Braden Technical Support Department at 918- 251-8511 for the names of current authorized Service Centers.

Usage and Inspection:

Inspection procedures for hoists are divided into five general categories based upon their usage or duty cycle, which in turn determines different, appropriate intervals for inspections. The usage categories must be assigned by the crane user on a consistent crane-by-crane basis. The five crane/hoist usage categories are as follows:

Idled - The crane/hoist has not been used for three months.

Infrequent Usage - The crane/hoist is used less than ten hours per month based on a three month average.

Moderate Usage - Crane/hoist used 10 - 50 hours per month based on a three month average.

Heavy Usage - Crane/hoist used 50 - 200 hours per month.

Severe Duty - Crane/hoist is operated more than 200 hours per month OR where 50% of the lifts exceed 75% of the Braden rated capacity for the hoist.

The following chart lists the inspections that are required for each type of usage category.

INSPECTION USAGE CATEGORY	PRE-USE DAILY INSPECTION	QUARTERLY INSPECTION	SEMI-ANNUAL INSPECTION	ANNUAL INSPECTION	TEAR-DOWN INSPECTION
IDLED Not used for 3 months or longer	REQUIRED BEFORE PLACED IN SERVICE QO / QI	REQUIRED BEFORE PLACED IN SERVICE QO / QI	REQUIRED BEFORE PLACED IN SERVICE QO / QI	---	REFER TO NOTE 1
INFREQUENT USAGE less than ten hours per month	REQUIRED QO / QI	REQUIRED QO / QI	REQUIRED QO / QI	REQUIRED QI	5 YEARS 3 YEARS IF NOT SUBJECT TO FULL INSPECTION PROGRAM
MODERATE USAGE 10-50 hours per month	REQUIRED QO / QI	REQUIRED QI	REQUIRED QI	REQUIRED QI	4 YEARS 2 YEARS IF NOT SUBJECT TO FULL INSPECTION PROGRAM
HEAVY USAGE 50-200 hours per month	REQUIRED QO / QI	REQUIRED MONTHLY QO / QI	REQUIRED QUARTERLY (3 months) QI	REQUIRED SEMI-ANNUALLY (6 months) QI	3 YEARS 1.5 YEARS IF NOT SUBJECT TO FULL INSPECTION PROGRAM
SEVERE USAGE 200+ hours per month or 50% of lifts exceed 75% rated capacity	REQUIRED QO / QI	REQUIRED QI	REQUIRED QUARTERLY (3 months) QI	REQUIRED SEMI-ANNUALLY (6 months) QI	1 YEAR

QO = Qualified Operator

QI = Qualified Inspector

NOTE: FOR IDLED UNITS WITH UNKNOWN MAINTENANCE AND REPAIR HISTORY, IT IS HIGHLY RECOMMENDED THAT THE HOIST UNDERGO A TEAR DOWN INSPECTION PRIOR TO BEING PLACED INTO SERVICE. IF PERSONNEL LIFTING IS EXPECTED WITH SUCH A HOIST, A TEAR DOWN INSPECTION IS REQUIRED BEFORE USE.

Pre-Use or Daily Inspection:

Must include but is not limited to the following inspections that will be performed prior to placing the crane into service and then as necessary during extended operation. This inspection must be performed by a qualified crane operator or qualified crane inspector.

1. Check for external oil leaks and repair as necessary.

This is extremely important due to the accelerated wear that will result from insufficient lubricating oil in the hoist. Hoists with a sight glass; check oil level daily. Hoists without a sight glass; check oil level monthly if no external oil leaks are detected. Lubricant level must be maintained between the minimum and maximum levels; midway up sight glass or at

bottom of level plug port as equipped. Use only the recommended type of lubricant. Refer to the specific hoist service manual and/or the latest revision Braden Service Bulletin 503.

2. Check the ratchet and pawl mechanism (if equipped) for proper operation and full, spring force engagement of the pawl with the ratchet wheel. Adjust or repair as necessary.
3. Check hydraulic fittings and hoses for chaffing, deterioration or corrosion and repair as necessary.
4. Visually inspect for corroded, loose or missing bolts, pins or other fasteners and replace or tighten as necessary.
5. Visually inspect rotation indicator transmitters, anti-two-blocking switches and other safety equipment and repair as necessary.

Quarterly Inspection (every three months):

Must include but is not limited to the following inspections that must be performed by a qualified crane operator or qualified crane inspector. A qualified crane inspector shall perform inspections on cranes assigned a moderate, heavy or severe usage category.

1. Perform the pre-use inspection.
2. On hoists used for personnel handling, the internal spring-applied brake shall be tested in accordance with the procedure on page 6 of these instructions.
3. Inspect for corrosion of fasteners, hoist base, drum, etc. and repair/replace as required to maintain the structural integrity of the hoist.

Semi-Annual Inspection (every six months):

Must include but is not limited to the following inspections that must be performed by a qualified crane operator or qualified crane inspector. A qualified crane inspector shall perform inspections on cranes assigned a moderate, heavy or severe usage category.

1. Perform the Pre-Use and Quarterly inspections.
2. Take a sample of the lubricant from the hoist gear cavity as described on page 5 and analyze it for wear metals content, correct viscosity, lubricant deterioration, moisture and other contaminants. If the oil sample contains an high amount of metallic particles, the hoist must be taken out of service to undergo a tear down inspection.

NOTE: OIL ANALYSIS CANNOT DETECT NOR WARN AGAINST A FATIGUE FAILURE.

Annual Inspection:

This inspection must be carried out by a qualified crane inspector. The annual inspection MUST include, but not be limited, to the following:

1. Perform the Pre-Use/Daily Inspection, Quarterly inspection and Semi-Annual Inspection.
2. Change the lubricating oil in the hoist gear cavity after an oil sample has been taken as described on page 5. Refill the hoist to the proper level with recommended lubricant. Refer to Braden Service Bulletin 503 Rev. 3.



WARNING

FAILURE TO USE THE PROPER TYPE AND VISCOSITY OF PLANETARY GEAR OIL MAY CONTRIBUTE TO INTERMITTENT BRAKE CLUTCH SLIPPAGE WHICH COULD RESULT IN PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH. SOME GEAR LUBRICANTS CONTAIN LARGE AMOUNTS OF EP (EXTREME PRESSURE) AND ANTI-FRICTION ADDITIVES WHICH MAY CONTRIBUTE TO BRAKE CLUTCH SLIPPAGE OR DAMAGE TO BRAKE FRICTION DISCS OR SEALS. OIL VISCOSITY WITH REGARD TO AMBIENT TEMPERATURE IS ALSO CRITICAL TO RELIABLE BRAKE CLUTCH OPERATION. OUR TESTS INDICATE THAT EXCESSIVELY HEAVY OR THICK GEAR OIL MAY CONTRIBUTE TO INTERMITTENT BRAKE CLUTCH SLIPPAGE. MAKE CERTAIN THAT THE GEAR OIL VISCOSITY USED IN YOUR HOIST IS CORRECT FOR YOUR PREVAILING AMBIENT TEMPERATURE.

Tear-down Inspection:

Tear down inspections of BRADEN hoists should be completed per the usage schedule defined below. Magnetic Particle Inspection (MPI) of the internal ring gear and reduction gears must be performed during tear down inspections to aid in the detection of cracks in the ring gears due to fatigue. The preferred inspection method is the Fluorescent Wet Magnetic Particle Inspection using ultraviolet light consistent with ASTM E709. For further information related to this inspection, and for testing of the older CH150 ring gears, P/N 24446, refer to BRADEN Service Bulletin LIT2162.

Severe Duty - Perform tear down inspection/MPI annually.

Heavy Usage - Perform tear down inspection/MPI at least every (3) years.

Moderate Usage - Perform tear down inspection/ MPI at least every (4) years.

Infrequent Usage - Perform tear down inspection/MPI at least every (5) years.

It is strongly recommended that any moderate or infrequent usage hoist that is also used for personnel lifting undergo tear down inspections on a maximum basis of once every (3) years.

Any hoist that has NOT been subject to regular oil sample analysis must undergo a tear down inspection on an annual (12 month) basis. Also, if a hoist has an unknown history of repair and/or maintenance, it is highly recommended that the hoist undergo a tear down inspection prior to being placed into service.

NOTE: OIL ANALYSIS ALONE CANNOT DETECT NOR WARN AGAINST COMPONENT FATIGUE FAILURE.

A tear down inspection includes the hoist being completely disassembled, cleaned, inspected and repaired as required. Replacement of all worn, cracked, corroded or distorted parts, such as pins, bearings, shafts, gears, brake rotors, brake plates, drum and base should occur as required. All seals and O-rings should be replaced at this time. **Any deficiencies, including but not limited to those above, shall be corrected immediately.** All of the following operations **MUST** be performed

BEFORE the hoist is placed back into service.

1. The rebuilt hoist **MUST** be line pull tested to the rated load of the hoist (hoist rating will vary with motor, gear ratio and drum options) with a dynamometer or equivalent load measuring device. This test load shall be the maximum rating of the hoist for the specific application (at the normal relief valve setting for the hoist) - **NOT** the reduced rating used for personnel lifts.
2. The hoist must be dynamically tested by rotating the drum several times, in both the hoisting and lowering directions, while under a load of at least 30% of the hoist lifting capacity. Check for smooth operation during this procedure.
3. The hoist internal friction brake shall be tested per the procedures on page 6 of this manual.
4. After inspection or rebuild and testing, a new certificate for personnel handling shall be issued by the inspector / service technician, effective on the date the hoist is placed back in service. A sample certificate is shown below, and shall include, at a minimum, all of the information depicted here.

Name of Service Company

Approved by BRADEN for handling personnel
if used and maintained in accordance with BRADEN
Recommendations For Personnel Handling Hoists

Hoist Model No.: _____

Hoist Serial No.: _____

Date of Inspection: _____

Work Order/Job No.: _____

Inspector's Name: _____

For a copy of recommendations call or write: BRADEN
PO Box 547, Broken Arrow, OK, 74012, USA (918) 251-8511

Oil Change

The hoist gear oil must be changed after the first 100 operating hours then on an annual basis, at a minimum thereafter. In severe duty applications, the gear oil should be changed every six months. Use the recommended lubricants. Refer to the applicable hoist service manual or Braden Service Bulletin 503 Rev. 3 or later for the recommended lubricants.

Gear Oil Sampling and Analysis

Proper gear oil sampling and analysis is a vital part of a comprehensive preventive maintenance program. Information obtained from the oil analysis allows the maintenance technician to substitute preventive maintenance for more costly unscheduled down time or a far more dangerous failure. Early detection of accelerated component wear allows the scheduling of corrective maintenance. Prepare the hoist by cleaning the drain plug area and drain extension tube in order to obtain an uncontaminated sample. Operate the hoist in both directions for one or two minutes to thoroughly mix the gear oil then take the sample from the "midstream" flow of the oil to obtain an accurate representation of the oil condition. After taking the oil sample continue with the oil change or refill the hoist gear cavity to the proper level with recommended lubricant.

General guidelines for iron contaminant level:

100-500 ppm	Normal
500-800 ppm	Caution - Abnormal Sample. Change oil and retake sample after 50 hours of operation. If second sample is above 500 ppm, remove hoist from service and perform tear-down inspection to determine source of contamination.
800+ ppm	Unacceptable. Remove hoist from service and perform tear-down inspection to determine source of contamination.

Iron contaminant levels will be on the high side of "Normal" during break-in.

Equally important as the level of contamination is the change in level of contamination. An effective oil analysis program should provide the technician with a view of the progression of wear or a trend. If a sample shows a sudden rise in contaminant level action should be taken to determine "what has changed".

NOTE: OIL ANALYSIS CANNOT DETECT NOR WARN AGAINST A FATIGUE FAILURE.



WARNING

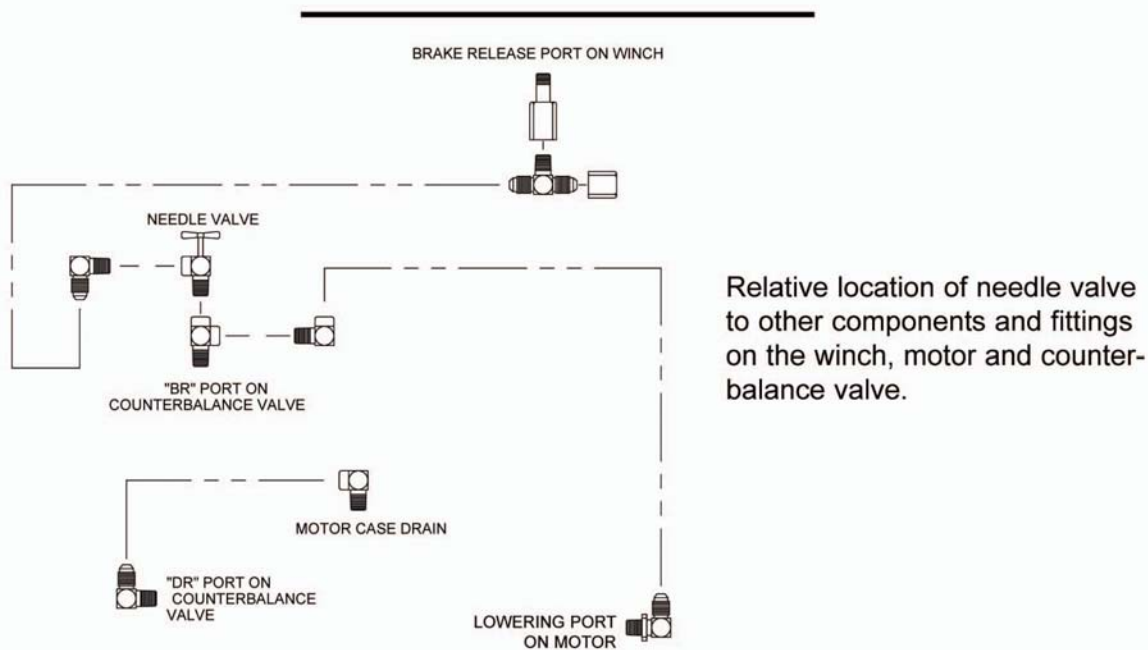
HOT OIL MAY CAUSE PERSONAL INJURY AND/OR BURNS TO UNPROTECTED SKIN. MAKE CERTAIN THE OIL HAS COOLED TO A SAFE TEMPERATURE (TYPICALLY LESS THAN 110°F OR 43°C) BEFORE TAKING AN OIL SAMPLE, CHANGING OIL OR SERVICING THE HOIST

BRAKE TEST PROCEDURE FOR BRADEN/Gearmatic HOISTS

All BRADEN planetary hoists have a spring applied, hydraulically released, multiple disc brake inside the hoist housing (Gearmatic hoists have a large single brake disc). This brake holds a suspended load when the directional control valve is in neutral, or when hydraulic power is lost. A brake clutch assembly permits the power train and drum to rotate in the direction to lift a load, while the brake remains fully applied. A load cannot be lowered, however, without applying hydraulic pressure to the release port and releasing the brake. Hoists ordered for personnel handling cranes will have a needle valve in the brake release line. They

will also have a tee in the brake release line between the needle valve and the brake release port on the hoist. One opening in the tee is capped. With the valve closed and the cap removed from the tee, the brake is isolated from system pressure and vented to atmosphere. The brake cannot be released under these conditions by actuating the directional control valve.

One purpose of the valve/tee combination is to provide a means to test the brake; the other is to provide a means to lower a load when hydraulic power is lost.



Brake Test Procedure (Hoists Equipped With Brake Valves)

(Test to be performed with no load on the hoist.)

Remove the lockwire on the needle valve handle and close the valve tightly.

Remove the plug or cap in the tee (in the brake release circuit).

With the hydraulic power unit running, move the directional control valve handle slowly to the full open, lowering position.

Increase the engine speed, if necessary, to bring system pressure up to the relief valve setting. The hoist drum should remain stationary.

If the drum rotates, the hoist should be disassembled

and the brake components should be examined for wear. In addition, the brake springs should be measured for correct free length in those hoists using helical compression springs.

Replace any parts showing excessive wear and any spring whose length is shorter than the minimum shown in the applicable hoist Service Manual. Reassemble the brake and hoist and repeat the above steps.

When testing is complete, be sure to reinstall the plug or cap in the tee, fully open the needle valve and install lockwire to secure the valve in position.

The above procedure utilizes the hoist hydraulic motor to test the brake's ability to resist approximately 115% of the rated hoist load.

Brake Test Procedure (For Standard Hoists Not Equipped With The Needle Valve)

(Test to be performed with no load on the hoist)

Remove and cap or plug the brake release line from fitting in the hoist brake release port.

With the hydraulic power unit running, move the directional control valve handle slowly to the full open, lowering position.

Increase the engine speed, if necessary, to bring system pressure up to the relief valve setting. The hoist drum should remain stationary.

If the hoist drum rotates, the hoist should be disassembled and the brake components should be examined for wear. In addition, the brake springs should be

measured for the correct free length in those hoists using helical compression springs.

Replace any parts showing excessive wear, and any spring whose free length is shorter than the minimum shown in the applicable hoist Service Manual.

Reassemble the brake and hoist and repeat the above steps.


When testing is complete, reattach the brake release line to the brake release port fitting.

The above procedure utilizes the hoist hydraulic motor to test the brake's ability to resist approximately 115% of the rated hoist load.

EMERGENCY LOWERING PROCEDURES FOR HOISTS WITH GEAR MOTORS

The following procedure releases the multiple disc brake while leaving the brake valve closed. Since gear type motors are not zero leakage devices, internal motor leakage permits the load to slowly rotate the motor although its outlet is blocked by the closed brake valve. This procedure will NOT work if there is little or no oil in the motor. Using properly rated pipe and fittings, the standpipe described below may be permanently installed in the hydraulic system to avoid installing one in an emergency.


1. Remove the lockwire on the needle valve handle and close the valve tightly.

 WARNING
THE STANDPIPE REFERRED TO IN STEP (3) BELOW MUST BE USED. ATTEMPTING THIS PROCEDURE WITH NO OIL IN THE MOTOR OR WITH THE BRAKE VALVE STUCK IN THE OPEN POSITION WILL CAUSE THE LOAD TO FREE FALL, WHICH COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

2. Remove the plug in the tee.
3. Remove both main hoses from the motor. Attach a standpipe to the lowering motor port (opposite side of the motor from the brake valve). Install a plug into the hoisting port in the brake valve. The standpipe is simply a length of pipe (approximately 12 inches (305 mm) long) attached to a 90° elbow. The other end of the elbow is attached to the lowering motor port or manifold. The standpipe is installed with the long, open end pointing up in a vertical position to serve as a small reservoir. While the load is being lowered, hydraulic oil MUST be added to the standpipe as necessary to prevent the motor from running dry.
4. Fill the standpipe with hydraulic oil, making certain that oil is not running out of the brake valve. If oil is running out of the brake valve, stop the emergency lowering procedure. Remove the spring retainer

and tap the main spool of the brake valve to the closed position. Replace the spring retainer. After completing the emergency lowering procedure, the brake valve MUST be serviced and repaired if the spool was stuck.

5. Connect a hand pump to the open port in the tee.
6. Slowly operate the hand pump up to no more than 1,000 psi (6,900 kPa). A suspended load will slowly come down when the static brake is released. Releasing the pressure on the hand pump will cause the load to stop. If a chattering noise is heard while the load is coming down, pump the hand pump to a slightly higher pressure until the

 WARNING
DO NOT TOUCH THE MOTOR, BRAKE VALVE, OR STANDPIPE WHILE LOWERING A LOAD. THEY MAY BECOME HOT ENOUGH TO CAUSE BURNS.

noise stops. Do not exceed 1,500 psi (10,350kPa) to the brake release port.

7. Always remove the hoist from service to inspect the brake components for signs of overheating and replace if necessary following this procedure. Refer to the applicable Braden or Gearmatic service manual for details.
8. If this procedure was performed due to a malfunction of the hoist, remove the hoist from service and perform a complete teardown and inspection to correct the cause of the malfunction before returning the hoist to service.

PERSONNEL HANDLING

BRADEN recognizes that most hoists and cranes are designed and intended for handling materials and not personnel. The crane or hoist is only to be used to handle personnel if it can be shown there is no less hazardous way of carrying out the job. In these situations, all safety precautions must be strictly adhered to. BRADEN recommends adherence to the latest revision of API 2C (RP 2D) and/or ANSI/ASME standard B30.5 and/or OSHA and/or other applicable standards for your application. It is important that you obtain a copy of all applicable safety standards, and that you read and understand them prior to using the hoist. In addition to, or in conjunction with, the applicable standards, BRADEN requires *:

- The hoist must be maintained in accordance with the recommendations in this document and the service procedures in the Installation, Maintenance and Service Manual for your specific hoist.
 - When handling personnel, the allowable line pull will be limited to 30% of the hoist rated line pull for the respective layer of wire rope on the drum. This reduction increases the hoist design factor from 3:1 to 10:1, approximately. Example: a hoist rated at 15,000 lbs. on the first layer will be rated at $15,000 \times 0.3 = 4,500$ lbs. on the first layer when handling personnel.
 - Personnel are only permitted to ride in an approved personnel platform as described in API, OSHA or ANSI/ASME standards.
 - The crane must be in good working order and equipped with all required safety equipment, including an anti two-blocking device or warning signal and a boom angle and length indicator. Two-blocking occurs when the load block or hook assembly comes in contact with the upper block or point sheave assembly and often results in damage to the wire rope, rigging, crane and/or hoist.
 - Personnel being lifted or supported shall wear safety belts with lanyards attached to designated points unless lifting over water. If lifting over water, provide approved personal flotation devices (PFD's).
 - The lift shall be made under controlled conditions and under the direction of an appointed qualified signal person.
 - The operator and signal person shall conduct a test lift, without personnel in the personnel platform, to verify adequacy of the crane footing or support. The crane outriggers, if so equipped, must be fully extended and properly set.
- Cranes shall not travel (move locations) while personnel are on the personnel platform.
 - The platform must be landed or tied off, and all brakes set before personnel enter or exit.
- * If there are any questions, concerns, or conflicts with other safety standards, contact the BRADEN Product Support Department, PO Box 547, Broken Arrow, OK, 74013, USA, Telephone 1-(918) 251- 8511, or via e-mail at winch.service@paccar.com. Additional information can be obtained from the following organizations:
- Booklet on "Hoisting Personnel", Crane Institute of America Inc.,
1063 Maitland Center Commons, Suite 100, Maitland, Florida, 32751 USA (800) 832-2726
 - OSHA Standard 29 CFR 1926.550 - Cranes, Derricks, Hoists, Elevators, and Conveyors, Occupational Safety and Health Administration (OSHA),
200 Constitution Ave. N.W., Washington D.C. 20210 USA (202) 219-4667
 - ANSI/ASME Standard B30.5, American National Standards Institute (ANSI),
11 W. 42nd Street, New York, New York 10036 USA (212) 642-4900
 - API Specification 2C and RP 2D, American Petroleum Institute (API) 1220 L Street, N.W., Washington, DC 20005 USA (202) 682-8375

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