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OPERATION MANUAL

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HYDRA-SLIDE

OPERATION & MAINTENANCE MANUAL

HEAVY TRACK SKIDDING SYSTEM

Model:

HT500

Revision: October 2020

Hydra-Slide Ltd.
84 Royal Road
Guelph, ON
Canada N1H 1G3
hydra-slide.com

PLEASE READ OPERATING MANUAL BEFORE USING THIS EQUIPMENT AND ADHERE TO ALL SAFETY INSTRUCTIONS. FOR QUESTIONS, CONTACT HYDRA-SLIDE LTD. AT +1-519-900-1450

HYDRA-SLIDE

Table of Contents

HYDRA-SLIDE

ORIGINAL INSTRUCTIONS
HYDRA-SLIDE HT500 SKIDDING SYSTEM

1 - GENERAL INFORMATION

1.1 Original Instructions

The English version of this manual is the Original Instructions for the **Hydra-Slide HT500 Skidding System**. All other language versions are translations of the Original Instructions.

1.2 Manufacturer Details

Hydra-Slide Ltd.
84 Royal Road
Guelph, Ontario, Canada
N1H 1G3
(519)-900-1450
info@hydra-slide.com

1.3 Machinery Description

Machinery Designation: **HT500 Heavy Track Skidding System**

Hydra-Slide's **HT500 Heavy Track Skidding System** has been designed to move loads with a maximum capacity of 500 tons (454 tonnes). The system uses specially designed skid shoes and hydraulically operated push cylinders to move loads horizontally along guiding tracks over a friction surface. The hydraulic push cylinders are modified double acting cylinders which operate at 10,000 psi (700 bar). The friction surface is a dry graphite lubricant film. The height of the load support section is 8" (203mm).

The standard system consists of the following main components:

- 6 x HT500 Track Section Assemblies (various lengths)
- 4 x HT500 Skid Shoe Assemblies
- 2 x HT500 Push Cylinder Assembly
- 12 x Track Connector Bars
- 24 x Track Connector Pins
- 2 x Safety Stop Blocks

- 4 x Skid Shoe Push Pins
- 1 x Storage Box
- 1 x Skid Shoe Storage Rack

The **HT500 Skidding System** is designed to work with most 10,000 psi (700 bar) hydraulic power units; however, it is recommended to be used with Hydra-Slide's synchronous HYDRA-PAC power units.

1.3.1 The Workstation

The **HT500 Skidding System** is remotely operated. It is suggested that the operator set up his/her workstation in a safe location, clear of the load to be skidded, and with as much visibility of the load and skidding system as possible.

1.3.2 Intended Use

The **HT500 Skidding System** is used to move heavy equipment up to 500 tons (454 tonne) safely and in a controlled manner.

1.4 Safety Precautions

Set up and operate the **HT500 Skidding System** only under the direction and supervision of experienced and qualified personnel.

This section contains information required for the safe operation of the **HT500 Skidding System**. Please read and understand the instructions and safety warnings that come with the equipment. Failure to comply with these safe operating recommendations could result in property damage or personal injury. Always follow safe work practices.

The **HT500** has been designed and manufactured for a maximum load capacity of 500 tons (454 tonne). The maximum operating pressure of the push cylinders is 10,000 psi (700 bar). Do not exceed these values at any time when using the system.

Use in any other manner or for any other purpose is not intended and is not recommended by the manufacturer. The operational safety of the system is only assured if used as intended.

1.4.1 General Safety Precautions and Potential Misuse

- Only qualified operators should install, operate, adjust, maintain, clean, repair or transport this equipment.
- Only use this equipment in accordance with its intended use and follow all instructions.
- Never exceed recommended maximum pressure and stroke ratings. Good practice recommends not exceeding 80% of these ratings.
- Always wear appropriate Personal Protective Equipment.
- Protect all equipment from potential hazards such as fire, explosion, sharp surfaces, extreme heat/cold, corrosives, and heavy impact.
- Anticipate possible problems and take steps to avoid them. If in doubt, ask.
- Never operate any equipment without all provided guards and safety devices in place and in good working condition.
- Lift and move slowly and check often. Control the load at all times.
- Double-check track connections before loading the track.
- Avoid standing in the line of force of hoses or any hydraulic components.
- Lift or move equipment and components using only the provided lift lugs or handles, etc. and only employ proper lifting equipment and techniques. Never lift by the hoses or hydraulic fittings.
- Never place any part of your body under the load unless the load is on a solid support.
- Never place any part of your body between a moving load and a solid obstacle where there is danger of crushing.
- Take steps to keep all equipment clean and free from possible damage. This is particularly important for hoses and couplers.
- Don’t allow hoses to kink, twist, crush, cut or bend tightly. Bending radius should be at least 4½ inches (11.5cm). Inspect hoses and couplers before each use and remove from service if any signs of damage are noted. Never attempt to repair a hose.
- Never handle hoses or couplers while they are under pressure, even when wearing Personal Protective Equipment. There is risk of serious personal injury from hose leaks, faulty or improperly connected couplers.
- Never use unsafe practices to bleed a pressurized hose or coupler. Use only a specially-designed coupler bleed tool such as a CT-604 Safety Tool available through Hydra-Slide Ltd.
- Always ensure that jacks and cylinders are used parallel and in line with their axis. Never use a jack or cylinder at an angle or to “kick” or move a load sideways. Use only Hydra-Slide’s AS500 Alignment Shoes for these types of operations.

- Do not apply any external forces to the load or track other than those from proper use of the supplied hydraulic cylinder(s), i.e. do not use come-alongs, winches, etc. to push or pull the load
- If jacking a load, always use appropriate blocking or cribbing to guard against a falling or out of control load.
- Do not use any lubricants on the system other than those provided and/or specified for use.

1.4.2 Operator Training

The operator should be experienced in the safe operation of high pressure hydraulic jacking systems. The operator should also read and understand these Instructions in full prior to operating the system.

1.4.3 Residual Risks and Protective Measures

Observing the safety precautions indicated in these Instructions minimizes the risks associated with using the **HT500 Skidding System**, however residual risks remain in the event of loss of control of the load while skidding. It is recommended to always use the provided stop blocks as described in Section 3.3.

1.4.4 In Case of Breakdown

In case of equipment breakdown or other operational problems, cease operation immediately and take any necessary steps to secure equipment and protect surroundings and personnel. Depressurize hoses and all hydraulic components (use coupler bleed tool as required). Identify the problem. Jack up the load to remove weight from skid system and secure it with blocking or other support. Correct the problem and/or replace any broken or defective components. Jack down load onto skid system and continue operations in accordance with these Instructions.

1.4.5. Airborne Noise Emissions

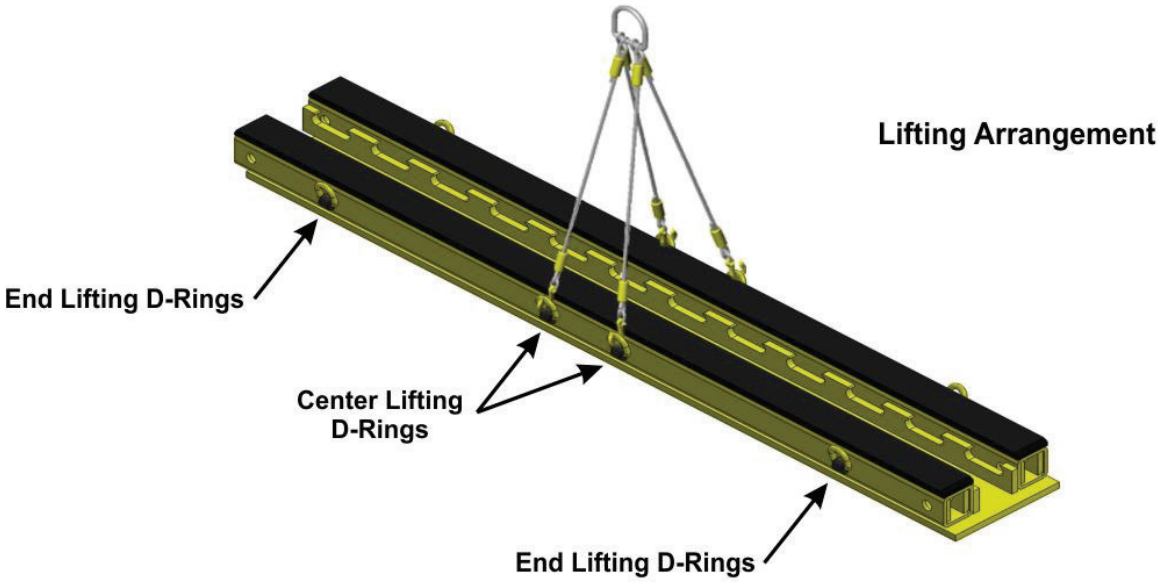
Operation of the **HT500 Skidding System** does not produce airborne noise exceeding 70 dB(A).

1.4.6 Non-Ionizing Radiation

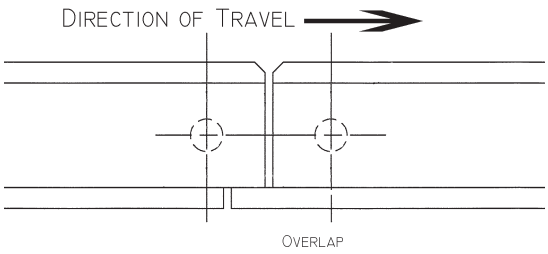
Operation of the **HT500 Skidding System** does not produce non-ionising radiation.

2 - ASSEMBLY AND SETUP

- Establish a clear path for the load to be moved.
- Raise load (using other means) to a sufficient height to place skid system under.
- Place track under load.
- Lift track sections only with the provided D-rings- ensure that D-rings are in the 'down' position after lifting; otherwise they may interfere with the skid shoes or moving load.



- The track sections are bi-directional, but the preferred orientation is as shown below. This arrangement will help to align the joint when skidding.



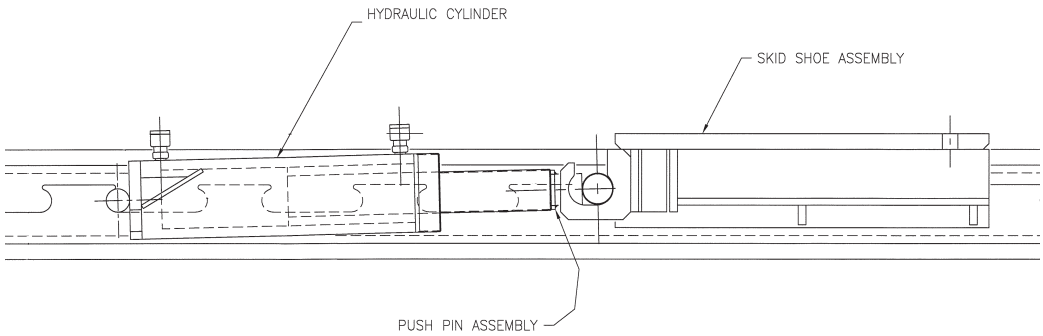
- Track sections must be set up and kept level (± 2%) and parallel (± ¼") at all times. It may be advantageous to have a slight incline in the direction of travel, but avoid setting up or operating the system on a decline without an adequate external holdback.

- Track must be oriented so the load will move in a straight line to the desired location.
- Track must be positioned such that the ratchet slots are equidistant from the edge of the load so the push cylinders will be able to extend in synchronization.
- Connect any additional track sections as required using the supplied connector lugs and pins
- Support track at each connection point and in accordance with the Track Capacity Chart supplied.
- Track supports must be stable and capable of fully supporting the load without significant compaction or deflection.
- Ensure that the area on the bottom of the load where it will contact the skid shoe is clear and is a suitable supporting surface.
- Position skid shoes under the load and ensure that the weight of the load will be evenly distributed over the surface of the skid shoe. Do not point load. It is good practice to use a friction/softener material such as wood or rubber between the skid shoe and the load.
- Use the reinforced 1 5/8” hole in the top of each skid shoe to place the skid shoe pin that will contact the side of the load. This pin is useful in the event that the skid shoe becomes unloaded as it will not push under the load and get out of position. These skid shoe pins should be placed on the outside edges of all four support points.
- Check to make sure that the track has been set up properly and is adequately supported.
- Lower the load (by other means) onto the skid shoes.
- Check again to make sure that the track has been set up properly and is adequately supported and make any necessary corrections.

3 – OPERATION

3.1 Push Cylinder Setup

- Insert the push cylinder assemblies into the track sections and place the rod end into the skid shoe slots. Ensure that the base end will engage into the ratchet slots.



- Attach suitable 10,000 psi-rated hydraulic hoses to the cylinder quick coupler fittings. Unless otherwise ordered, the couplers are standard CR400 female couplers.
- Connect the other end of the hoses to a suitable hydraulic pump unit ensuring that the bottom of each cylinder is connected to the pressure port (**ADV** port if using a Hydra-Pac power unit) and that the top of each cylinder is connected to the return port (**RET** port if using a Hydra-Pac power unit). These systems will function with most 10,000 psi double-acting hydraulic pumps, however we recommend use of a synchronous pump unit.
- Ensure that all couplers are fully engaged and hand tight, otherwise the hose check valves will not open up and the cylinders will not function properly.
- Ensure a clear path for the hydraulic hoses and monitor continuously to make sure they will not get caught up or entangled during the move.
- The pump unit should be placed in a location which gives the operator an unobstructed view of the push cylinders during operation. Personnel should be positioned to monitor any area of operation that is not visible to the operator, and should be in continuous visual or radio contact with the operator.
- Apply hydraulic pressure and extend the push cylinders until they come into contact with the load.
- Check the complete system setup and ensure that the push cylinders are properly engaged and that there are no hydraulic leaks.

3.2 Operation

- Continue to extend the push cylinders to full stroke making sure that they extend in unison so they do not jam in the track which could result in damage.
- Retract the push cylinders until they rise up over the ratchet cogs and drop into the next slot.
- Continue to extend and retract the push cylinders as above until the load reached its' desired new position.
- For skidding longer distances, the track sections can be leapfrogged ahead. Ensure that track sections added in this way are placed level, parallel and well-supported, as in the initial setup.
- If the load has been moved too far, simply take the push cylinders and position them into the track at the back side of the load and, as detailed above, push the load backwards as required.
- When the load reaches its desired position, raise the load (using other means) to a sufficient height to remove the skid system from under and then lower the load into position.

3.3 Safety Stop Blocks

- Safety stop blocks have been provided to prevent any unexpected or unanticipated uncontrolled movement of the load. These stop block should be manually placed in the track approximately two stroke lengths ahead of the load's intended movement and firmly positioned in a ratchet notch. As the load advances, the stop blocks should be continually repositioned so as to remain approximately two stroke lengths ahead.
- If the loaded skid shoe contacts the stop block, the stop block will lock into place in the ratchet track and the loaded skid shoe will be prevented from advancing further.
- To release the stop block, position the push cylinder in the track in advance of the load, then push the stop block forward to disengage it from the ratchet notch. The stop block can then be lifted out and repositioned.

HYDRA-SLIDE

4 - MAINTENANCE AND ADJUSTMENTS

4.1 Preventive Maintenance

- When not in use, store the skid system in a covered, dry location, protected from damage. Take special care of all hydraulic components and fittings.
- Maintain skidding surfaces clean, dry and completely covered with graphite. Reapply graphite frequently depending on usage and storage conditions.
- Repair or replace any broken, worn or damaged components. Contact Hydra-Slide Ltd. For replacement parts.

4.2 Troubleshooting

Symptom	Probable Cause	Recommended Action
Push cylinder will not extend	Coupler is not fully engaged Load exceeds capacity Skid shoe is jamming in track	Check and tighten all couplers Reduce load Realign track
Push cylinder will not extend and oil is coming from pressure relief valve or top of cylinder	Coupler is not fully engaged	Check and tighten all couplers
Push cylinder will not retract	Coupler is not fully engaged	Check and tighten all couplers
Load does not move straight	Track is not set up equidistant from edge of load Cylinders are not extending in unison	Reposition track Use a synchronous pump unit or some other means to provide equal oil flow.

5 - TRANSPORTATION, HANDLING, AND STORAGE

- Individual components should be handled separately and with care. Weights are indicated on the nameplates of each component part.
- Lift track sections only with the provided D-rings. Lift all other components using the lifting lugs or recommended lifting locations.
- Transport and handle in a safe manner and always ensure that parts are properly secured and prevented from unexpected movement.
- When not in use, store the skidding system in a covered, dry location, protected from damage. Take special care of all hydraulic components, hoses, and fittings.
- Wipe clean the inside and outside of all hose couplers using a clean, non-fibrous cloth before connecting; always replace protective caps when couplers are not in use.

APPENDIX 1 – EC DECLARATION OF CONFORMITY

Manufacturer

Hydra-Slide Ltd.
84 Royal Road
Guelph, Ontario, Canada
N1H 1G3

We declare that the **Hydra-Slide HT500 Skidding System** is in accordance with the following Harmonized Standards:

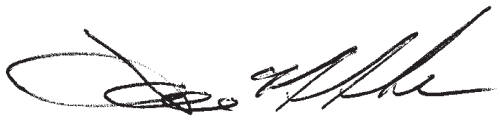
EN ISO 12100:2010	Safety of machinery – General principles for design - Risk assessment and risk reduction
EN 4413:2010	Hydraulic fluid power – General rules and safety requirements for systems and their components

And in accordance with the EC Guidelines of:

2006/42/EC –	Machinery Directive

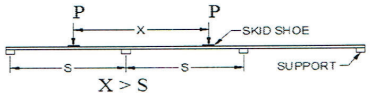
Documentation supporting this declaration is kept on file at the address listed above.

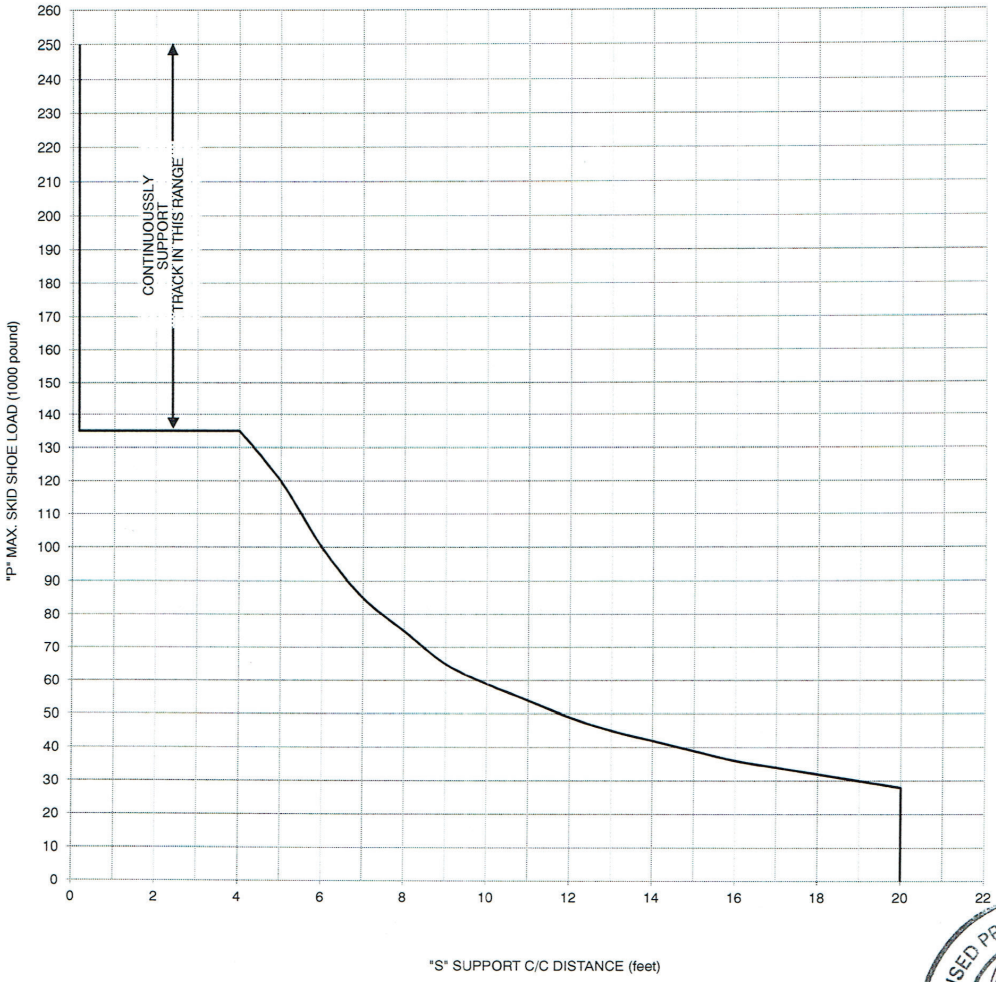
Hydra-Slide Ltd. February 18, 2017

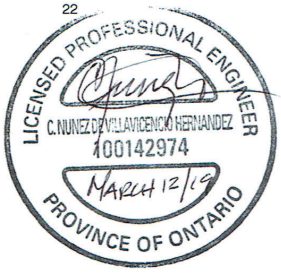


Don Mahnke P. Eng
President

Hydra-Slide HT500 Track Capacity Chart (Imperial Units)



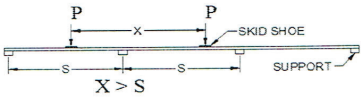


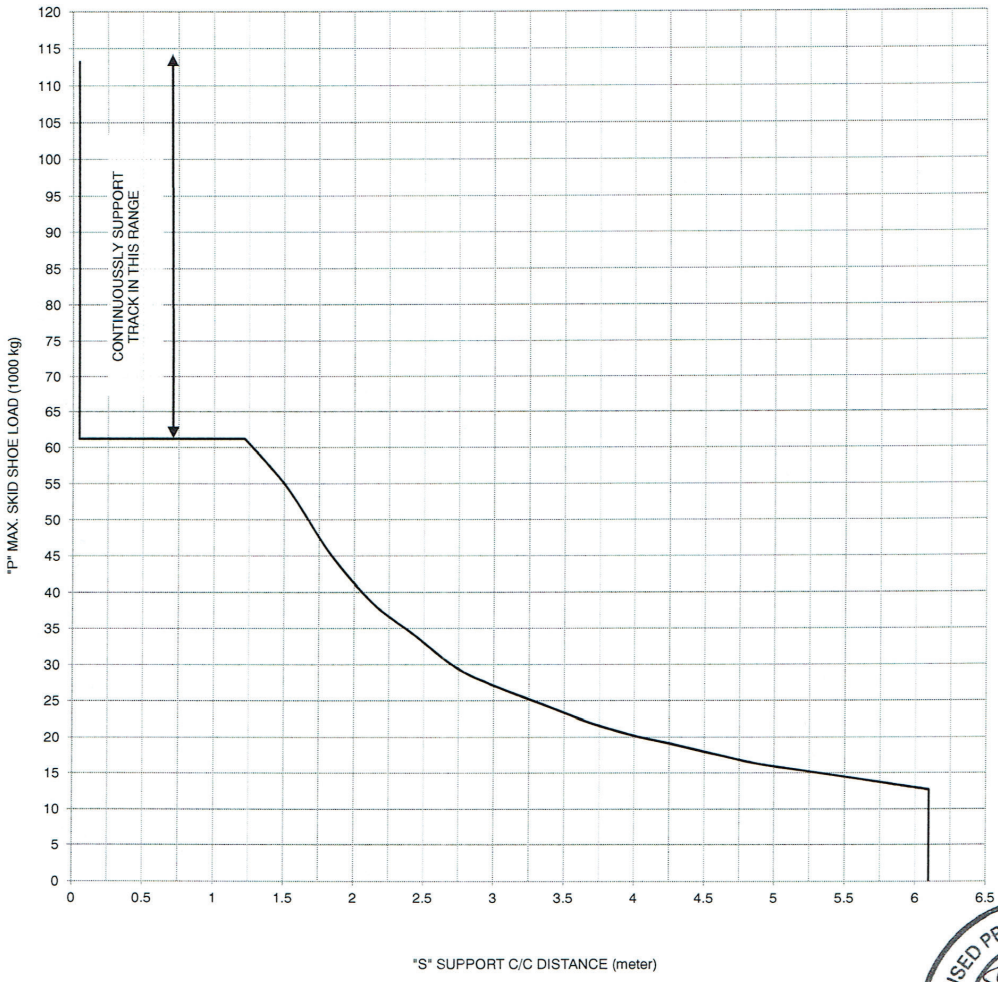


Recommendations

1. Set up and operate only under the direction and supervision of qualified personnel.
2. Operator should be experienced in the safe operation and handling of high pressure jacking systems.
3. Ensure track is setup and remains level and parallel at all times.
4. Track supports must be stable and capable of supporting the loads imposed.
5. Load must be uniformly distributed over the surface of the skid shoe. Do not point load. Do not exceed capacity (see capacity chart).
6. Use only a proper hydraulic pump unit, fluids and hoses. Do not exceed 10,000psi.
7. Ensure push cylinders extend in unison otherwise the shoes may jam and result in possible damage.
8. Maintain skidding surfaces clean, dry and completely covered with graphite. Reapply graphite frequently depending on use and storage conditions.
9. Repair or replace any broken, worn or damaged components.

Hydra-Slide HT500 Track Capacity Chart (Metric Units)





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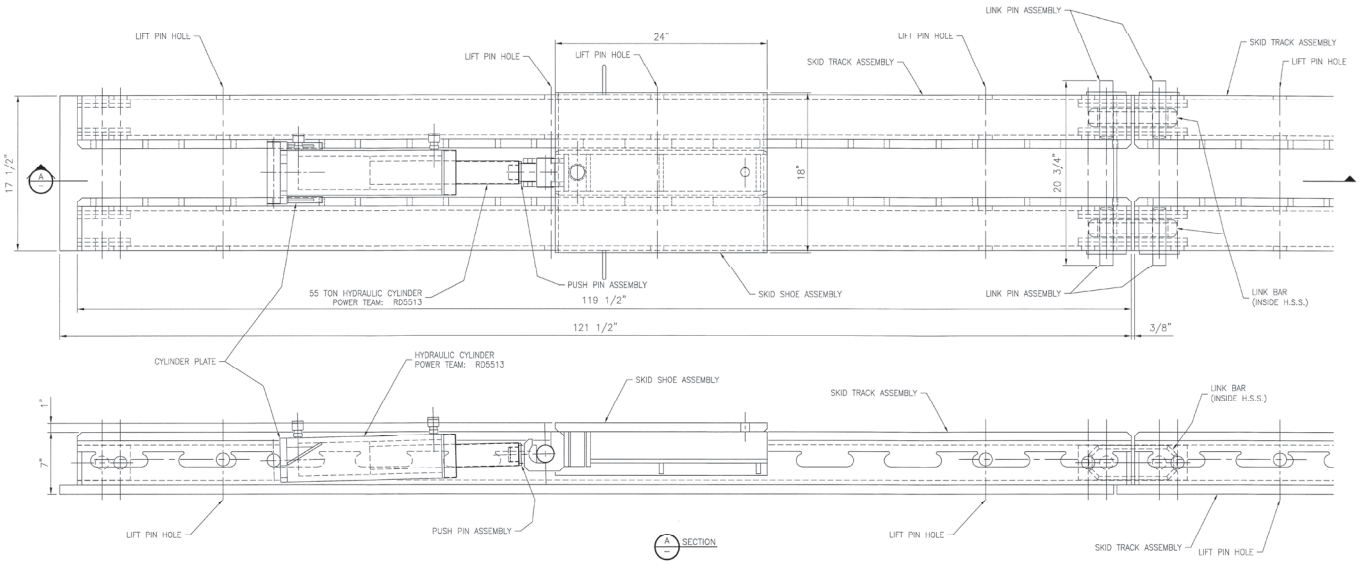
8. Maintain skidding surfaces clean, dry and completely covered with graphite. Reapply graphite frequently depending on use and storage conditions.
9. Repair or replace any broken, worn or damaged components.

NOTE:

1. TRACKS SHALL TO BE SET UP ON LEVEL SURFACE CAPABLE OF SUPPORTING THE LOAD WHICH IS BEING APPLIED.
2. SUPPORTS SHALL BE PLACED IN A MANNER THAT PROPERLY SUPPORTS THE LOAD APPLIED TO THE SKID SYSTEM.
3. THE SKID SYSTEM EQUIPMENT SHALL BE INSPECTED FOR WEAR AND DAMAGE PRIOR TO EACH USE AND WORN OR DAMAGED PARTS REPAIRED OR REPLACED BEFORE USE.
4. IT IS THE RESPONSIBILITY OF THE USER TO PROPERLY SET UP AND INSTALL THIS EQUIPMENT.
5. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE IT IS NOT OVERLOADED AND IS USED IN A SAFE MANNER.



A STANDARD SYSTEM CONSISTS OF THE FOLLOWING:

4 – 20' TRACK SECTIONS
2 – 10' TRACK SECTIONS
8 – TRACK CONNECTOR LINK BARS
16 – TRACK CONNECTOR LINK PINS
4 – SKID SHOES
2 – PUSH CYLINDERS
2 – LIFTING BARS WITH LUGS

Designed By: LICENSED PROFESSIONAL ENGINEER R. D. MUIR 33487011 PROVINCE OF ONTARIO
Approved By:

No.	Revisions	Date	By	Appr'd
1	BEVEL ADDED	JULY 29, 2012	IG	RM
0	UPDATED AND REISSUED	JULY 23, 2011	RM	RM

Title: HT–500 HYDRA–SLIDE SKID SYSTEM

Location: VARIES
Owner/Client: HYDRA–SLIDE LTD.
Project: HT–500 HYDRA–SLIDE SKID SYSTEM

MuirTec Inc.
PROFESSIONAL ENGINEERS
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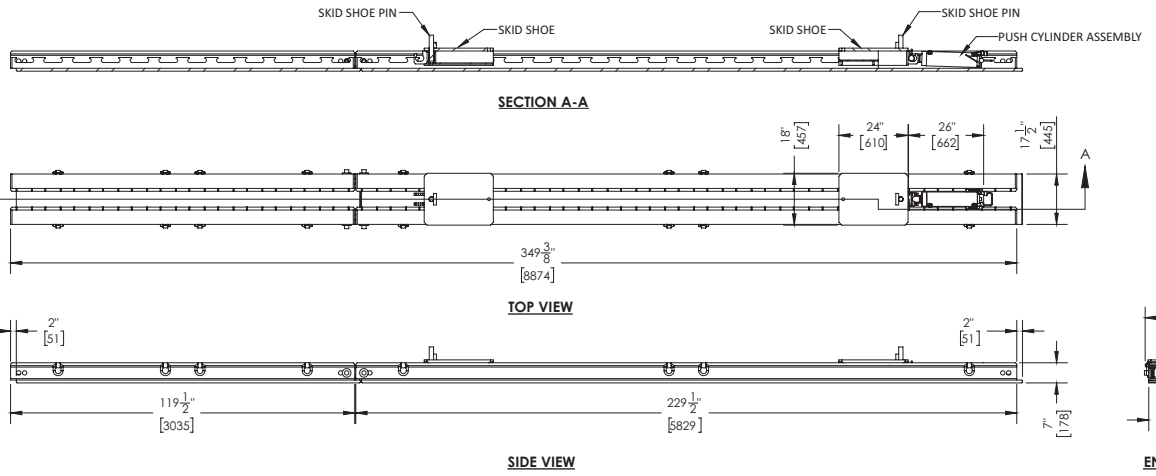
Drawn by: DB | Checked by: DM | Project No.: MT–823
Designed by: RM | Date: FEB. 2009 | Scale: N.T.S.

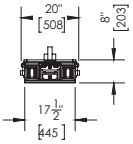
Dwg. No.: GA
Sheet No.: 500–GA



SECTION A-A

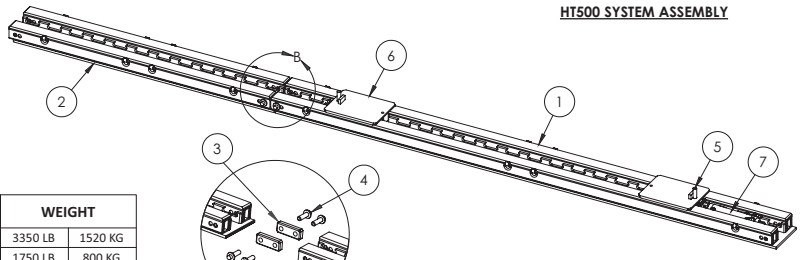
TOP VIEW

SIDE VIEW



END VIEW

HT500 SYSTEM ASSEMBLY



DETAIL B
TRACK CONNECTION DETAIL

ITEM NO.	PART No.	DESCRIPTION	WEIGHT	
1	HT500-01-19	19'-2" TRACK ASSEMBLY	3350 LB	1520 KG
2	HT500-01-10	10' TRACK ASSEMBLY	1750 LB	800 KG
3	HTX00-02	TRACK CONNECTOR BAR	20 LB	9 KG
4	HTX00-03	TRACK CONNECTOR PIN	5 LB	2.3 KG
5	HTX00-04	SKID SHOE PIN	10 LB	4.5 KG
6	HT500-04	SKID SHOE ASSEMBLY	180 LB	82 KG
7	HT500-05	PUSH CYLINDER ASSEMBLY	100 LB	45 KG

HYDRA-SLIDE
SKIDDING | RIGGING | HYDRAULICS

TITLE:
HT500 SYSTEM GENERAL ASSEMBLY DRAWING

SIZE	DWG. NO.	REV
B	HT500-GA	01
DRAWN BY:	R.Y.	SHEET 1 OF 1

POWER TEAM®
SPX Hydraulic Technologies
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Rockford, IL 61109-3699 USA

powerteam.com
hytec.com

HYTEC®
Tech. Services: (800) 477-8326
Fax: (800) 765-8326
Order Entry: (800) 541-1418
Fax: (800) 288-7031

Form No. 102397

Operating Instructions for:

CE

Single-acting and Double-acting Rams and Cylinders (Various Capacities)

HYDRAULIC CYLINDERS

All cylinders are marked with maximum pressure setting

NOTE: For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.

DEFINITIONS

Authorized - appointed by a duly constituted administrative or regulatory authority.
Authorized Service Center - independent service facility designated by the manufacturer to repair and test products.
Cylinders, Rams, and Jacks - used to apply force in a linear motion through the use of hydraulic fluid under pressure confined in a pressure vessel (body) with moveable pressure vessel (piston).
Designated - selected by the employer or employer's representative as being qualified to perform specific duties.
Extension - a device to increase the cylinder's, ram's or jack's retracted length.
Load - the total weight or force to be overcome by the cylinder, ram or jack.
Qualified - a person who, by possession of a recognized degree, certificate, professional standing or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter or work, or who is filled or suited for a given purpose or function. Competent.
Operator - a person qualified to operate or use a device or machine.
Rated Capacity - the maximum load for which the cylinder, ram, or jack is designed and built.
Service, Normal - cylinders, rams or jacks used under controlled or known consistent loads at less than 85% of rated capacity except for isolated instances.
Service, Severe - cylinders, rams or jacks used under conditions not rated as normal service.
Travel - linear extending or retracting movement of the cylinder, ram or jack.

SAFETY EXPLANATIONS

Two safety symbols are used to identify any action or lack of action that can cause personal injury. Your reading and understanding of these safety symbols is very important.

DANGER - Danger is used only when your action or lack of action will cause serious human injury or death.

WARNING - Warning is used to describe any action or lack of action where a serious injury can occur.

IMPORTANT - Important is used when action or lack of action can cause equipment failure, either immediate or over a long period of time.

WARNING: It is the operator's responsibility to read and understand the following safety statements,

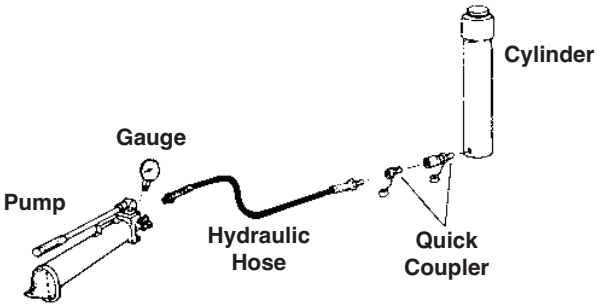
- **Only qualified operators should install, operate, adjust, maintain, clean, repair, or transport this machinery.**
- **These components are designed for general use in normal environments. These components are not specifically designed for lifting and moving people, agri-food machinery, certain types of mobile machinery or special work environments such as: explosive, flammable or corrosive. Only the user can decide the suitability of this machinery in these conditions or extreme environments. Power Team will supply information necessary to help make these decisions.**

Rev. 4 Date: 10 April 2009

SINGLE-ACTING HYDRAULIC SYSTEMS

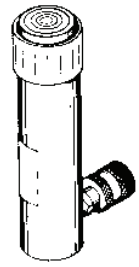
A basic single-acting hydraulic system consists of a manual or power pump that moves the hydraulic fluid, a hydraulic hose that carries the fluid, and a cylinder or ram that the fluid moves to do a job.

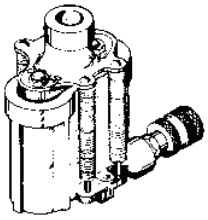
TYPICAL INSTALLATION

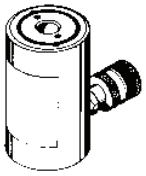


Since the single-acting cylinders have only one hose going to the cylinder, the cylinder can only apply force to extend (pull cylinders retract) its rod. The return stroke is accomplished by gravity or spring force.

VARIOUS TYPES OF SINGLE-ACTING CYLINDERS


Spring Return, Gravity Return


Center Hole, Twin Cylinder Spring Return


Center Hole Spring Return


Spring Return

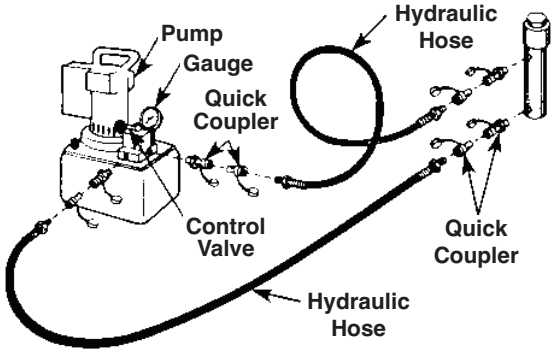
Locking Collar


Pull Cylinder

DOUBLE-ACTING HYDRAULIC SYSTEMS

A basic double-acting hydraulic system consists of a pump (which moves the hydraulic fluid), a double-acting cylinder or ram (to do the work), a hydraulic hose (which routes the fluid to the advance cylinder or ram port), a second hydraulic hose (which routes the fluid to the retract cylinder or ram port), and a control valve which can change the direction of the hydraulic fluid.

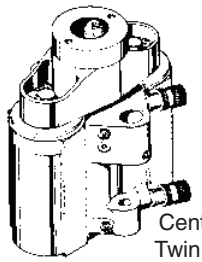
TYPICAL INSTALLATION



A double-acting cylinder or ram can be either extended or retracted hydraulically.

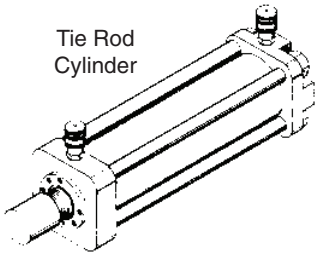
Most double-acting cylinders or rams are classed as “differential cylinders” because of the different sized areas that the hydraulic fluid pushes against during the extend and retract strokes. Because of this difference, the extend stroke can exert more force than the retract stroke.

VARIOUS TYPES OF DOUBLE-ACTING CYLINDERS


Center Hole, Twin Cylinder


Center Hole Cylinder


Basic Double-acting Cylinder

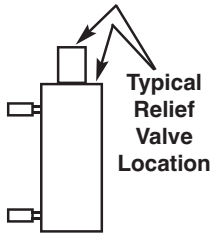

Tie Rod Cylinder

NOTE: The capacity of a hydraulic system is determined by the effective area of the cylinder and the system pressure.

SAFETY PRECAUTIONS

⚠ DANGER

- **A double-acting cylinder or ram must have both hoses and all couplers securely connected to both ports. If one of the two ports is restricted or becomes disconnected, pressure will build and the cylinder, hose or coupler can burst, possibly causing serious injury or death.**
- **<u>When extending double-acting cylinders or rams, the retract port must not be restricted</u>. A restricted retract port will prevent pressure from being released and the cylinder can burst, possibly causing serious injury or death.**
- **DO NOT attempt to adjust or service the rod end relief valve on a double-acting cylinder or ram. If oil leakage is detected from this relief valve, discontinue use of the cylinder or ram immediately and contact your nearest Authorized Hydraulic Service Center. If improperly adjusted, the cylinder or ram could develop excessive pressure and cause the cylinder, hose or couplers to burst which could cause serious injury or death.**



- **When extending a cylinder or ram under load, always insure that the coupler(s) or port thread(s) has (have) not been damaged or do(es) not come in contact with any rigid obstruction. If this condition does occur, the coupler's attaching threads may become stripped or pulled from the cylinder or ram resulting in the instantaneous release of high pressure hydraulic fluid, flying objects, and loss of the load. All of these possible results could cause serious injury or death.**
- **When using a center-hole cylinder or ram, always support the base against a rigid, flat surface at least 75% as large as the cylinder or ram base. Failure to do so can damage the center standpipe resulting in the instantaneous release of high pressure hydraulic fluid and loss of load which can possibly cause serious injury or death.**
- **Avoid off-center loads which could damage the cylinder or ram and/or cause loss of the load, possibly causing serious injury or death.**
- **Control the load at all times. Do not drop the load. Especially on locking collar cylinders or rams because the threads may shear and cause loss of the load.**
- **Properly rated adapters must be installed and used correctly for each application.**
- **Cylinders with weep hole stroke limiters will expel high pressure oil through the bleed hole to the atmosphere if extended beyond the visual maximum stroke indication. If this occurs, seals must be replaced.**

⚠ WARNING

- **All WARNING statements must be carefully observed to help prevent personal injury.**

Hydraulic Hoses and Fluid Transmission Lines

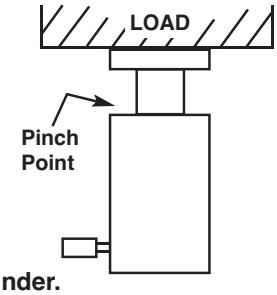
- **Avoid straight line tubing connections in short runs. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes. See diagrams in Set-up section of this form.**
- **Eliminate stress in the tube lines. Long tubing runs should be supported by brackets or clips. Tubes through bulkheads must have bulkhead fittings. This makes easy removal possible and helps support the tubing.**
- **Before operating the pump, all hose connections must be tightened with the proper tools. Do not overtighten. Connections should only be tightened securely and leak-free. Overtightening can cause premature thread failure or high pressure fittings to split at pressures lower than their rated capacities.**

SAFETY PRECAUTIONS (CONTINUED)

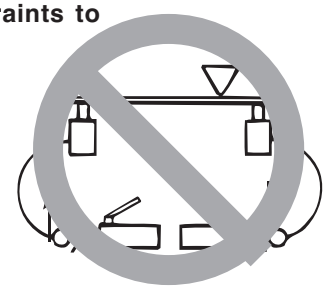
- **Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.**
- **Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold, or heavy impact. Do not allow the hose to kink, twist, curl, crush, cut, or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear, because any of these conditions can damage the hose and possibly result in personal injury.**
- **Carefully inspect all hoses and fittings prior to use. Before each use, check entire hose for cuts, leaks, abrasion or bulging of cover, or damage or movement of couplings. If any of these conditions exist, replace the hose immediately. NEVER attempt to repair the hose.**
- **Do not use the hose to move attached equipment. Stress can damage the hose and possibly cause personal injury.**
- **Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as creosote-impregnated objects and some paints. Hose deterioration due to corrosive materials can result in personal injury. Consult the manufacturer before painting a hose. Never paint a coupler.**

Cylinder

- **The user must be a qualified operator familiar with the correct operation, maintenance, and use of the cylinder(s). Lack of knowledge in any of these areas can lead to personal injury.**
- **Read and understand all safety and warning decals and instructions.**
- **Use only approved accessories and approved hydraulic fluid. Hoses, seals and all components used in a system must be compatible with the hydraulic fluid used.**
- **Do not exceed the rated capacities of the cylinders. Excess pressure can result in personal injury.**
- **Inspect each cylinder and coupler before each shift or usage to prevent unsafe conditions from developing.**
- **Do not use cylinders if they are damaged, altered or in poor condition.**
- **Do not use cylinders with bent or damaged couplers or damaged port threads.**
- **Under certain conditions, the use of an extension with a hydraulic cylinder may not be advisable and could present a dangerous condition.**



- **Avoid pinch points or crush points that can be created by the load or parts of the cylinder.**
- **To help prevent material fatigue if the cylinder is to be used in a continuous application, the load should not exceed 85% of the rated capacity or stroke.**
- **The RT1004 cylinder has an internal stroke limiting device which may be damaged by sudden movement of the piston rods. If damage is suspected, have the stroke limiting plunger and spring inspected/replaced by a qualified person.**
- **Cylinder must be on a stable base which is able to support the load while pushing or lifting.**
- **To help prevent personal injury, use shims, friction material or constraints to prevent slippage of the base or load.**



- **Do not create an uneven fulcrum and lever condition or overload condition where force exerted by one cylinder on a lever will intensify downward force on a pressure-checked cylinder at the other end of the lever. *For example: If straightening an axle as illustrated, when cylinder A extends, and uneven fulcrum and lever condition will intensify force downward on pressure-checked cylinder B. The pressure created in cylinder B will be increased to dangerously high levels.***
- **Do not set poorly-balanced or off-center loads on a cylinder. The load can tip or the cylinder can "kick out" and cause personal injury.**
- **Do not use the locking collar on a threaded piston as a stop. The threads may shear resulting in loss of the load.**
- **If this component is used to lift or lower loads, be certain that the load is under operator control at all times and that others are clear of the load. Do not drop the load.**
- **As the load is lifted, use blocking and cribbing to guard against a falling load.**

SAFETY PRECAUTIONS (CONTINUED)

- **To help prevent personal injury, do not allow personnel to go under or work on a load before it is properly cribbed or blocked. All personnel must be clear of the load before lowering.**
- **Never use extreme heat to disassemble a hydraulic cylinder or ram. Metal fatigue and/or seal damage will result and can lead to unsafe operating conditions.**
- **Use extreme caution when disassembling a spring return cylinder. All springs can store energy which can be released suddenly and cause personal injury. Mechanically restrain the gland nut or end cap when disassembling any compressed or extended cylinders which have an internally compressed spring. Consult the parts list to determine the type of spring loading. Observe all warnings and cautions.**
- **The guide cannot cover every hazard or situation so always do the job with SAFETY FIRST.**

IMPORTANT:

- **Keep the cylinder clean at all times.**
- **While at a job site, when the cylinder is not in use, keep the piston rod fully retracted and upside down.**
- **Use an approved, high-grade pipe thread sealant to seal all hydraulic connections. Teflon tape can be used if only one layer of tape is used and it is applied carefully (two threads back) to prevent the tape from being pinched by the coupler and broken off inside the pipe end. Any loose pieces of tape could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.**
- **Always use protective covers on disconnected quick couplers.**
- **When mounting cylinders or rams using the internal piston rod threads, collar threads, threaded tie rods or base mounting holes, the threads must be fully engaged. Always use SAE grade 8 or better fasteners when attaching components to cylinders or rams and tighten securely.**
- **Limiting the stroke on spring return cylinders will prolong spring life.**
- **Limiting the stroke and pressure on all cylinders will prolong their life.**

INTRODUCTION

These instructions are written to help you, the user, more effectively use and maintain your single-acting or double-acting cylinders and rams. If any questions, please call your nearest Power Team facility (see listing).

NOTE: For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.

Some of the information included in these instructions was selected from A.N.S.I. B30.1 and applies to the construction, installation, operation, inspection and maintenance of hydraulic cylinders. It is strongly recommended that you read A.N.S.I. B30.1 to answer any questions not covered in these instructions. The complete A.N.S.I. B30.1 standard which contains additional information can be obtained at a nominal cost from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th, New York, New York 10017.

An inspection checklist (Form No. 105503) is available on request from your nearest Power Team facility.

SYSTEM EVALUATION

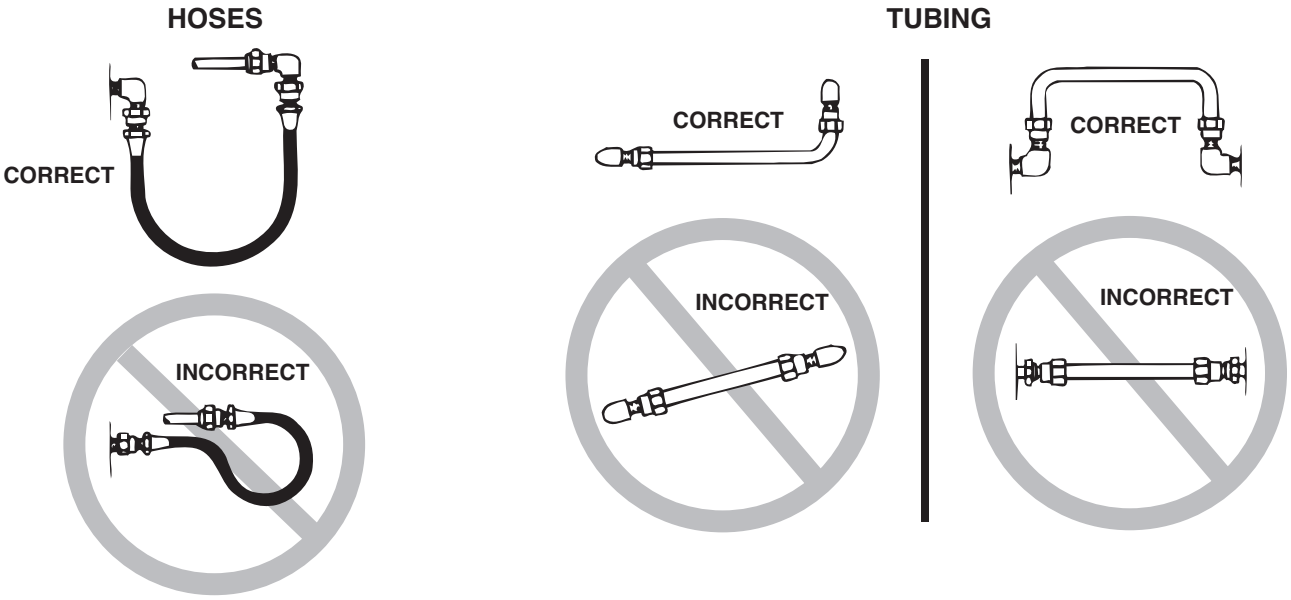
Your cylinder, hose(s), couplings and pump all must be rated for the same maximum operating pressure, correctly connected and compatible with the hydraulic fluid used. An improperly matched system can cause the system to fail and possibly cause serious injury. If you are in doubt, consult your nearest Power Team facility.

SET-UP

HYDRAULIC CONNECTIONS

Remove the thread protectors or dust covers from the hydraulic ports if applicable. Clean the areas around the fluid ports of the pump and cylinder. Inspect all threads and fittings for signs of wear or damage, and replace as needed. Clean all hose ends, couplers and union ends. Connect all hose assemblies to the pump and cylinder. Use an approved, high-grade pipe sealant (such as Power Team HTS50) to seal all hydraulic connections. Tighten securely and leak-free but do not overtighten.

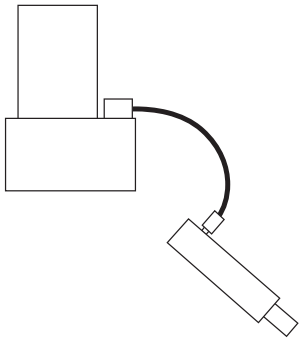
Hydraulic lines and fittings can act as restrictors as the cylinder or ram retracts. The restricting or slowing of the fluid flow causes back pressure that slows the cylinder's or ram's return. Return speed also varies because of the application, condition of the cylinder or ram, inside diameter of hose or fitting, length of the hose, and the temperature and viscosity of the hydraulic fluid.



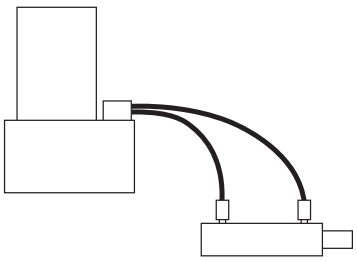
BLEEDING THE SYSTEM

After all connections are made, the hydraulic system must be bled of any trapped air. Refer to the diagrams below.

With no load on the system and the pump vented and positioned higher than the cylinder or ram, cycle the system several times. If you are in doubt about venting your pump, read the operating instructions for your pump. Check the reservoir for possible low fluid level and fill to proper level with approved, compatible hydraulic fluid as necessary.



System with a single-acting cylinder



System with a double-acting cylinder

IMPORTANT: Some spring return cylinders or rams have a cavity in the rod which forms an air pocket. This type of cylinder or ram should be bled when positioned upside down or lying on its side with the port facing upward.

SET-UP (CONTINUED)

INSPECTION

Before each use, visually inspect for the following items:

1. Cracked or damaged cylinder
2. Excessive wear, bending, damage, or insufficient thread engagement
3. Leaking hydraulic fluid
4. Scored or damaged piston rod
5. Improperly functioning swivel heads and caps
6. Loose bolts
7. Damaged or improperly assembled accessory equipment
8. Modified, welded, or altered equipment
9. Bent or damaged couplers or port threads

Preventive Maintenance (yearly or sooner, if the cylinder or ram condition suggests damage) - Visual examination by the operator or other designated personnel with a dated and signed equipment record.

RAM AND CYLINDER MAINTENANCE

- **Always use clean, approved hydraulic fluid and change as needed.**
- **Any exposed threads (male or female) must be cleaned and lubricated regularly, and protected from damage.**
- **If a cylinder or ram has been exposed to rain, snow, sand, grit-laden air, or any corrosive environment it must be cleaned, lubricated, and protected immediately after exposure.**

PERIODIC CLEANING

A routine should be established to keep the hydraulic system as free from dirt as possible. All unused couplers must be sealed with dust covers. All hose connections must be free of dirt and grime. Any equipment attached to the cylinder must be kept clean. Use only Power Team hydraulic fluid and change as recommended or sooner if the fluid becomes contaminated (never exceed 300 hours).

STORAGE

Single-acting and Center Hole Cylinders

Single-acting and center hole cylinders and rams should be stored in a vertical position with the rod end down in a ***dry***, well-protected area where they will not be exposed to corrosive vapors, dust or other harmful elements.

When a single-acting cylinder or ram has not been used for a period of three (3) months it should be connected to a pump and be fully extended and then retracted. This cycle will lubricate the cylinder walls thereby reducing the potential for rust formation on the cylinder walls.

Double-acting Cylinders

Double-acting cylinders and rams should be stored in a vertical position with the rod end down in a ***dry***, well-protected area where they will not be exposed to corrosive vapors, dust or other harmful elements.

If a double-acting cylinder or ram has been stored for a year or more, it must be thoroughly inspected before it is used.

TROUBLE-SHOOTING GUIDE

IMPORTANT:

- **The following trouble-shooting and repair procedures should be performed by qualified personnel familiar with this equipment. Use the proper equipment when trouble-shooting!**

NOTE:

- **All the following statements may not apply to your particular model of cylinder or ram. Use the guide as a general reference for trouble-shooting.**

PROBLEM	CAUSE	SOLUTION
Erratic action	1. Air in system or pump cavitation	1. Add fluid, bleed air and check for leaks
	2. Internal leakage in double-acting cylinders or external leakage in single-acting cylinders	2. Replace worn packings. Check for excessive contamination or wear. Replace contaminated fluid as necessary.
	3. Cylinder sticking or binding	3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings.
Cylinder/Ram does not move	1. Loose couplers	1. Tighten couplers
	2. Faulty coupler	2. Verify that female coupler is not locked up (ball wedged into seat). Replace both female and male couplers.
	3. Improper valve position	3. Close release valve or shift to new position
	4. Low or no hydraulic fluid in pump reservoir	4. Fill and bleed the system
	5. Air-locked pump	5. Prime pump per pump operating instructions
	6. Pump not operating	6. Check pump's operating instructions
	7. Load is above the capacity of the system	7. Use the correct equipment
	8. Fluid leaks out of rod end relief valve (double-acting cylinders only)	8. Make sure all couplers are fully coupled. Contact your nearest Authorized Hydraulic Service Center.
Cylinder/Ram extends only partially	1. Pump reservoir is low on hydraulic fluid	1. Fill and bleed the system
	2. Load is above the capacity of the system	2. Use the correct equipment
	3. Cylinder piston rod binding	3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings.
Cylinder/Ram moves slower than normal	1. Loose connection or coupler	1. Tighten
	2. Restricted hydraulic line or fitting	2. Clean and replace if damaged
	3. Pump not working correctly	3. Check pump operating instructions
	4. Cylinder seals leaking	4. Replace worn seals. Check for excessive contamination or wear

TROUBLE-SHOOTING GUIDE (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Cylinder/Ram moves but does not maintain pressure	1. Leaky connection	1. Clean, reseal with thread sealant and tighten connection
	2. Cylinder seals leaking	2. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary.
	3. Pump or valve malfunctioning	3. Check pump or valve operating instructions
Cylinder/Ram leaks hydraulic fluid	1. Worn or damaged seals	1. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary.
	2. Loose connections	2. Clean, reseal with thread sealant and tighten connection
	3. Rod end relief valve has activated (double-acting cylinders only)	3. Make sure all couplers are fully coupled. a. *If relief valve is still leaking,* do not attempt to service this component. Contact your nearest Authorized Hydraulic Service Center.
Cylinder/Ram will not retract or retracts slower than normal	1. Pump release valve closed	1. Open pump release valve
	2. Loose couplers	2. Tighten couplers
	3. Blocked hydraulic lines	3. Clean and flush
	4. Weak or broken retraction springs	4. Send to service center for repair
	5. Cylinder damaged internally	5. Send to service center for repair
	6. Pump reservoir too full	6. Drain hydraulic fluid to correct level

POWER TEAM / HYTEC FACILITIES

POWER TEAM®

HYTEC®

ISO 9001 CERTIFIED ***UNITED STATES***
SPX Hydraulic Technologies
5885 11th Street
Rockford, IL 61109-3699
USA
Telephone: 1-815-874-5556
FAX: 1-815-874-7853

Cust. Service/Order Entry
Tel: *1-800-541-1418*
FAX: *1-800-288-7031*
E-mail:
info@powerteam.com

Technical Services
Tel: *1-800-477-8326*
FAX: *1-800-765-8326*

ISO 9002 CERTIFIED ***CHINA***
No. 1568 Hua Shan Road
International Park Center
Shanghai 200041, China
Tel: *86 (21) 2208-5888*
FAX: *86 (21) 2208-5682*
E-mail
infochina@powerteam.com

ISO 9002 CERTIFIED ***FAR EAST***
7 Gul Circle
Singapore 629563
Singapore
Tel: *(65) 6265-3343*
FAX: *(65) 6265-6646*
E-mail:
infoasia@powerteam.com

ISO 9002 CERTIFIED ***EUROPE***
Albert Thijsstraat 12
6471 WX Eygelshoven
Netherlands
Tel: *31 (45) 5678877*
FAX: *31 (45) 5678878*
E-mail
infoeurope@powerteam.com

For more information, Internet address: http://www.powerteam.com (or) http://www.hytec.com

SPX POWER TEAM®

SPX Corporation
5885 11th Street
Rockford, IL 61109-3699 USA

Tech. Services: (800) 477-8326
Fax: (800) 765-8326
Order Entry: (800) 541-1418
Fax: (800) 288-7031

Internet Address:
http://www.powerteam.com

Form No. 101400

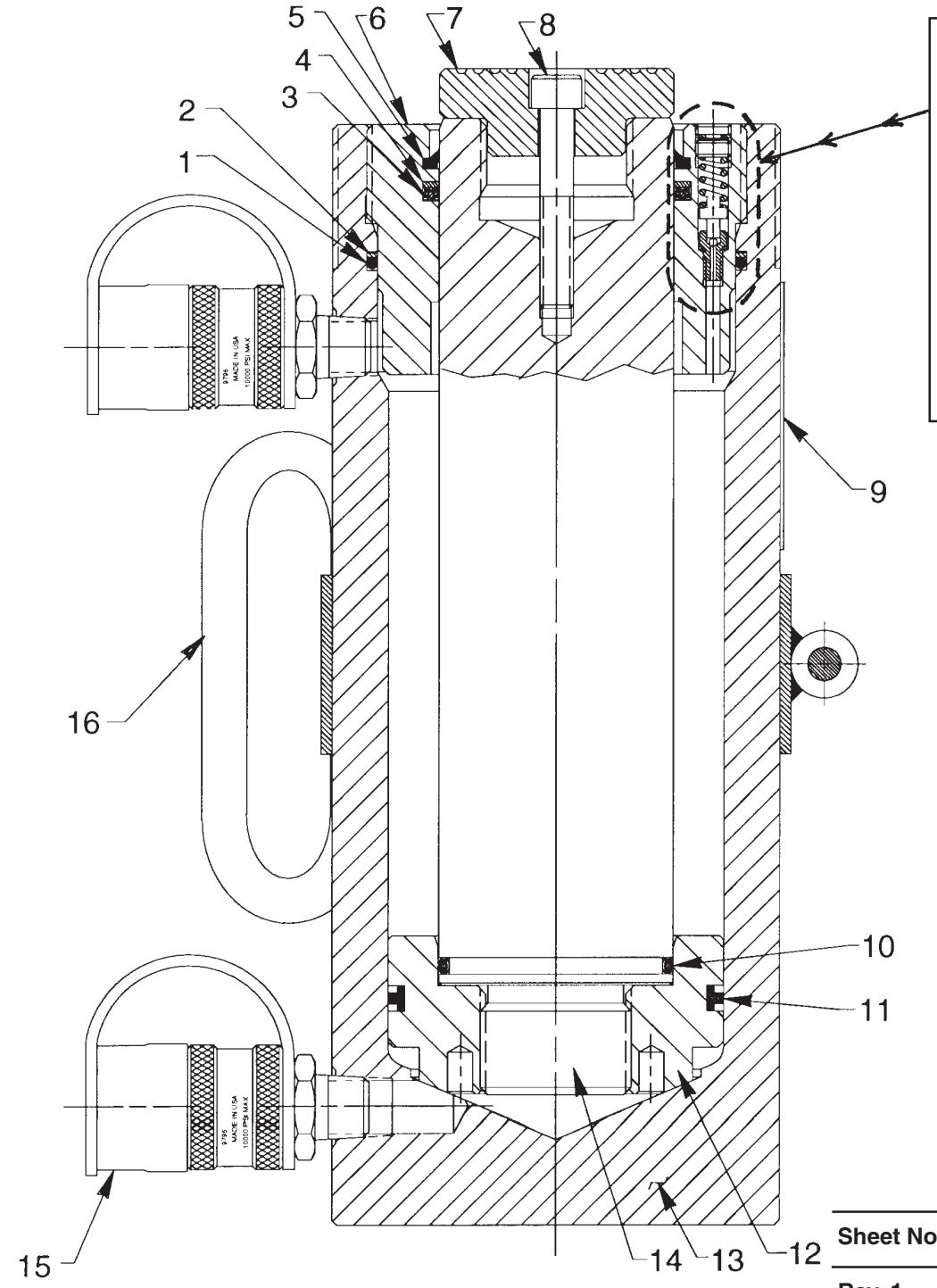
Parts List for:

RD556
RD5513
RD5513-POULAN

MODEL B
DOUBLE-ACTING

HYDRAULIC CYLINDER

Max. Capacity: 55.2 Tons at 10,000 PSI



Double-acting Cylinder Relief Valve

See important DANGER statement on back of sheet 1 of 1

Sheet No.	**1 of 1**
Rev. 1	**Date: 19 Dec. 1996**

DANGER: To help avoid possible serious personal injury or death,

- **In the event that the cylinder retract port is ever restricted or plugged, a double-acting cylinder relief valve will help prevent excessive pressure from building in the cylinder. DO NOT attempt to adjust or service this relief valve! If oil leakage is detected from this relief valve, discontinue use of the cylinder immediately and contact Power Team Technical Services. Only Power Team Authorized Hydraulic Service Centers should service this relief valve.**

Item No.	Part No.	No. Req'd	Description
1	***12599**	1	O-ring (4-1/4 X 4" X .048)
2	***19331**	1	Backup Washer (4-1/4 X 4" X .048)
3	***19333**	1	U-cup
4	***19152**	1	Backup Washer (3" X 2-5/8 X .070)
5	***207721**	1	Rod Wiper
6	**51332**	1	Retainer Nut (Torque to 100 ft. lbs.)
7	**38449**	1	Serrated Insert
8	**12866**	1	Cap Screw (3/8-16 UNC X 2-1/4 Lg.)
9	**350936**	1	Trade Name Decal (For RD556)
	350937	1	Trade Name Decal (For RD5513)
10	***19334**	1	O-ring (2-5/8 X 2-3/8 X 1/8)
11	***15381**	1	T-seal & Backup Rings (Smooth side of Backup Ring must be against seal.)
12	**43305**	1	Piston Head (Use Loctite No. 277 when assembling piston head to piston rod [Item #14]. Torque to 200 ft. lbs.)
13	**58516**	1	Cylinder Body (For RD556)
	58517	1	Cylinder Body (For RD5513 & RD5513-POULAN)
14	**51333**	1	Piston Rod (For RD556)
	51334	1	Piston Rod (For RD5513 & RD5513-POULAN)
15	**9796**	2	Ram Half Coupler w/ Plastic Dust Cap
16	**420396OR9**	1	Handle Assembly (For RD556 & RD5513)
	PARTS INCLUDED BUT NOT SHOWN		
	***37782**	1	Warning Decal
	11127	2	Pressure Plug (For RD5513-POULAN)
	421431	1	Thread Protector

Part numbers marked with an (*) asterisk are contained in Repair Kit No. 300005.

Note: Shaded areas reflect last revision(s) made to this form.

Refer to any operating instructions included with this product for detailed information about operation, testing, disassembly, reassembly, and preventive maintenance.

Items found in this parts list have been carefully tested and selected. **Therefore: Use only genuine Power Team replacement parts!**

Additional questions can be directed to our Technical Services Department.

Technical Data Sheet

SLIP Plate® No. 4

Water-Based, Graphite Dry Film Lubricant

Product Description:

SLIP Plate® No. 4 is a water-based alternative to our SLIP Plate® No. 3 product. The formulated product uses a proprietary binder system with Superior Graphite Signature® graphite powder that produces an excellent anti-friction coating. SLIP Plate No. 4 creates a dry graphite surface that does not attract and trap dust, dirt, mud, or grit, as compared with greases and oils. Naturally hydrophobic, it provides lasting protection from rain, snow and mud to help prevent rust and corrosion. This environmentally friendly formulation of SLIP Plate is excellent for reducing wear and extending the operating life of machinery.

Product Characteristics:

Physical Properties	Typical Range
Carrier:	Water
Color:	Dark Grey
Fluid Consistency	Medium to Thick
Measured Viscosity; cps	> 1,500
Bulk Density, LB/Gallon	9.3-10.0
Flash Point,	>200°F (>93.33°C)
Dry Time (tack-free), min	180-240 @ 70°F (21.1°C)
Dry Time (complete), hrs	24 @ 70°F (21.1°C)
Average Application Coverage, ft^2 /gallon	250
Effective Temperature Range, (Minimum)	-75°F (-59.4°C)
Effective Temperature Range, (Maximum)	450°F (232.2°C)
Suggested Application Ambient Temperature Range	50 - 100°F (10 – 37.8°C)
Suggested Dilution Ratio	Not Recommended
Suggested Dilutant/Cleaner:	None Recommended
Shelf Life under original seal	12 Months

Advantages:

- Reduced solvent product; low VOC (volatile organic compounds)
- Creates a slick, non-stick surface – ideal for build-up areas – that stays slippery regardless of temperature extremes
- Dry film technology creates a smooth, even surface
- Will not attract or trap dirt or grit, reducing wear and extending operating life
- Hydrophobic – Graphite coating is not attracted to rain and snow.
- Graphite is a natural mineral and environmentally safe lubricant

Preparation & Application:

- **Stir material prior to use.** It is important to properly stir the material with a hand stir stick or paint mixer. It is normal for the material to settle during transportation, and it may take some time to mix by hand. Paint mixers that are attached to a standard drill will speed up this process.
- **Prepare your surface.** The most important part of the coating process is proper surface preparation. Remove any loose debris, mud, paint, rust or grit with a high pressure water cleaner, scraper, or wire brush. Use a solvent such as an aerosol brake cleaner to remove any residual petroleum or grease from previous application.

- **Apply by brush, roller, dipping, or airless spray equipment.** Apply material as you would for any normal paint job. Material, when applied by brush, should have a film thickness of 2 to 6 mil. When applied by airless spray equipment, the film thickness should be 2 to 5 mil. When applied by roller the film thickness will be 3 to 6 mil.
- **Allow coated surface to dry a minimum of 24 hours between coats.** For extreme wear applications, apply two coats, but it is recommended that the first coating dry at least 24 hours.
- Surface temperature should be 50-100°F (10-37.8°C) at application. **Application of this product to very hot (>300°F) or cold surfaces (<20°F) is not recommended, as this will affect the bonding performance of the product. Once dry, the dry film coating will not be affected by temperature extremes.**

Clean-Up Instructions:

- **Clean up material with soap and water, or as you would with typical house-type paint.** Material once dry will be very difficult to remove from painting equipment. If removal is required after coating has dried, use of paint thinner, VM&P Naphtha, or similar solvent-based cleaner is advised. Note that these chemicals may damage underlying painted surfaces.

Storage and Handling Information:

- **DO NOT FREEZE**. Product must be stored above 32°F.
- Store away from excessive heat and keep in original packaging.
- Material is black, or silver-gray in some instances, and these color variations are normal. Keep away from light colored clothing.
- Graphite is electrically conductive and may lead to electrical shorts and damage. Please be careful working with this product around electricity or sensitive electrical equipment.

Please consult the SDS for additional information on disposal of unused materials, and safe handling practices.

ORDERING/SHIPPING INFORMATION	
AVAILABLE PACKAGING (product ordering code)	**Four–1 Gallon Cans**: Part #33615OS **Five (5) Gallon Pail:** Part #36008
SHIPPING WEIGHT (kilograms)	**Four–1 Gallon Cans**: 41 LB (18.6) **Five (5) Gallon Pail:** 48 LB (21.8)

Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name : **SLIP Plate No. 4**

Product Code :

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified use(s) : Dry film lubricant

1.3 Details of the supplier of the safety data sheet

Manufacturer : Superior Graphite

10 S. Riverside Plaza
Chicago, IL 60606
United States

Telephone (General) : 312-559-2999 - (8-5 CST, M-F)

1.4 Emergency telephone number

Manufacturer : 1-800-424-9300 - For Hazardous Materials [or Dangerous Goods] Incident Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night

Manufacturer : +1 703-527-3887 - Outside USA and Canada (collect calls accepted)

Section 2: Hazards Identification

EU/EEC

According to: Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to: EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP : Acute Toxicity Oral 4 - H302
Skin Irritation 2 - H315
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335
Specific Target Organ Toxicity Repeated Exposure 2 - H373

DSD/DPD : Irritant (Xi)
Harmful (Xn)
R36/37/38, R48/20

2.2 Label Elements

CLP

DANGER

Hazard statements : H302 - Harmful if swallowed
H315 - Causes skin irritation

H335 - May cause respiratory irritation
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary statements

Prevention | P260 - Do not breathe mist, vapours, or vspray.
P264 - Wash thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response | P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P362 - Take off contaminated clothing and wash before reuse.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P321 - Specific treatment, see supplemental first aid information.
P301+P312 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician if you feel unwell.
P330 - Rinse mouth.
P314 - Get medical advice/attention if you feel unwell.

Storage/Disposal | P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD

Risk phrases | R36/37/38 - Irritating to eyes, respiratory system and skin.
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Safety phrases | S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

2.3 Other Hazards

CLP | According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD | According to European Directive 1999/45/EC this material is considered dangerous.

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012 | Acute Toxicity Oral 4
Skin Irritation 2
Eye Irritation 2
Reproductive Toxicity 2
Specific Target Organ Toxicity Repeated Exposure 1

2.2 Label elements

OSHA HCS 2012

DANGER

Hazard statements | Harmful if swallowed
Causes skin irritation

Causes serious eye irritation
Suspected of damaging fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure

Precautionary statements

Prevention Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe mist/vapours/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.

Response If on skin: Wash with plenty of water.
Take off contaminated clothing and wash before reuse.
If skin irritation occurs: Get medical advice/attention.
Specific treatment, see supplemental first aid information.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician if you feel unwell.
Rinse mouth.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.

Storage/Disposal Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

OSHA HCS 2012 Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to: WHMIS

2.1 Classification of the substance or mixture

WHMIS Very Toxic - D1A
Other Toxic Effects - D2A

2.2 Label elements

WHMIS

Very Toxic - D1A
Other Toxic Effects - D2B

2.3 Other hazards

WHMIS In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

3.1 Substances

Material does not meet the criteria of a substance in accordance with Regulation (EC)

No 1272/2008.

3.2 Mixtures

Composition					
Chemical Name	**Identifiers**	**%**	**LD50/LC50**	**Classifications According to Regulation/Directive**	**Comments**
Graphite	**CAS:**7782-42-5 **EC Number:**231-955-3	< 40%	NDA	**EU DSD/DPD:** Not classified **EU CLP:** Not classified **OSHA HCS 2012:** Comb. Dust	NDA
Ethylene glycol monobutyl ether	**CAS:**111-76-2 **EC Number:**203-905-0 **EU Index:**603-014-00-0	< 10%	Inhalation-Rat LC50 • 450ppm4Hour(s) Skin-Rabbit LD50 • 220 mg/kg Ingestion/Oral-Rat LD50 • 250 mg/kg	**EU DSD/DPD:** Annex VI, Table 3.2: Xn R20/21/22 Xi R36/38 **EU CLP:** Annex VI, Table 3.1: Acute Tox. 3, H331; Acute Tox. 3, H311; Acute Tox. 4*, H302; Eye Irrit. 2, H319; Skin Irrit. 2, H315 **OSHA HCS 2012:** Eye Irrit. 2; Skin Irrit. 2; STOT SE 3: Resp. Irrit & Narc.; Acute Tox. 4 (oral); Acute Tox. 3 (skn); Acute Tox. 3 (inhl); Repr. 2;	NDA
Butyl alcohol	**CAS:**71-36-3 **EC Number:**200-751-6 **EU Index:**603-004-00-6	< 5%	Skin-Rabbit LD50 • 3400 mg/kg Inhalation-Rat LC50 • 24000 mg/m³ 4 Hour (s) Ingestion/Oral-Rat LD50 • 0.79 g/kg	**EU DSD/DPD:** Annex VI, Table 3.2: R10 Xn R22 Xi R37/38-41 R67 **EU CLP:** Annex VI, Table 3.1: Flam. Liq. 3, H226; Acute Tox. 4 *, H302; Skin Irrit. 2, H315; Eye Dam. 1, H318; STOT SE 3: Resp. Irrit., H335; STOT SE 3: Narc., H336 **OSHA HCS 2012:** Flam. Liq. 3; Eye Irrit. 2; Skin Irrit. 2; Acute Tox. 4 (Oral); STOT SE 3: Resp. Irrit.; STOT SE 3: Narc.	NDA
Triethylamine	**CAS:**121-44-8 **EC Number:**204-469-4 **EU Index:**612-004-00-5	< 3%	Ingestion/Oral-Rat LD50 • 460 mg/kg Skin-Rabbit LD50 • 570 µL/kg	**EU DSD/DPD:** Annex VI, Table 3.2: F R11 Xn R20/21/22 C R35 **EU CLP:** Annex VI, Table 3.1: Flam. Liq. 2, H225; Acute Tox. 4 *, H332; Acute Tox. 3*, H311; Acute Tox. 4 *, H302; Skin Corr. 1A, H314 **OSHA HCS 2012:** Flam. Liq. 2; Skin Corr. 1B; Eye Dam. 1; Acute Tox. 4 (oral); Acute Tox. 3 (skin)	NDA
Quartz	**CAS:**14808-60-7 **EC Number:**238-878-4	< 1%	NDA	**EU DSD/DPD:** Self Classified: T R48/20 Carc.Cat.1 R49 **EU CLP:** Self Classified: STOT RE 1 (Lungs, Inhl), H372; Carc. 1A, H350 **OSHA HCS 2012:** STOT RE 1 (Lungs, Inhl); Carc. 1A	<0.1% resprable

See Section 16 for full text of H-statements and R-phrases.

Section4-FirstAidMeasures

4.1 Description of first aid measures

Inhalation IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. Get medical attention if symptoms occur.

Skin Wash skin with soap and water. Wash contaminated clothing before reuse. If irritation develops and persists, get medical attention.

Eye IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Ingestion Do NOT induce vomiting. Get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section5-FirefightingMeasures

5.1 Extinguishing media

Suitable Extinguishing Media LARGE FIRE: Water spray, fog or regular foam.
SMALL FIRES: Dry chemical, CO_2, water spray or regular foam.

Unsuitable Extinguishing Media No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards Containers may explode when heated.
Overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

Hazardous Combustion Products No data available

5.3 Advice for firefighters

Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
Wear positive pressure self-contained breathing apparatus (SCBA).
Move containers from fire area if you can do it without risk.
Water may be used to cool containers to prevent pressure build-up and explosion when exposed to extreme heat.

Section6-AccidentalReleaseMeasures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas.

6.2 Environmental precautions

Prevent entry into waterways and sewers.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures Stop leak if you can do it without risk.
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
LARGE SPILLS: Dike far ahead of liquid spill for later disposal.

6.4 Reference to other sections

Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section7-HandlingandStorage

7.1 Precautions for safe handling

Handling

Use only in well ventilated areas. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe mist, vapours, spray. Avoid contact with eyes, skin and clothing. Do not ingest. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Keep container tightly closed. Store in a cool, dry, well-ventilated place. Do not store above 120 F.

7.3 Specific end use(s)

Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines				
	Result	**ACGIH**	**NIOSH**	**OSHA**
Quartz (14808-60-7)	TWAs	0.025 mg/m3 TWA (respirable fraction)	0.05 mg/m3 TWA (respirable dust)	Not established
Triethylamine (121-44-8)	TWAs	1 ppm TWA	Not established	25 ppm TWA; 100 mg/m3 TWA
	STELs	3 ppm STEL	Not established	Not established
Butyl alcohol (71-36-3)	TWAs	20 ppm TWA	Not established	100 ppm TWA; 300 mg/m3 TWA
	Ceilings	Not established	50 ppm Ceiling; 150 mg/m3 Ceiling	Not established
Ethylene glycol monobutyl ether (111-76-2)	TWAs	20 ppm TWA	5 ppm TWA; 24 mg/m3 TWA	50 ppm TWA; 240 mg/m3 TWA
Graphite (7782-42-5)	TWAs	2 mg/m3 TWA (all forms except graphite fibers, respirable fraction)	2.5 mg/m3 TWA (natural, respirable dust)	15 mg/m3 TWA (synthetic, total dust); 5 mg/m3 TWA (synthetic, respirable fraction)

8.2 Exposure controls

Engineering Measures/Controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

Wear chemical splash safety goggles.

Skin/Body

Wear protective clothing and gloves.

Environmental Exposure Controls

Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures
STEL = Short Term Exposure Limits are based on 15-minute exposures

Section9-PhysicalandChemicalProperties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Dark gray liquid with no odor.
Color	Dark gray.	Odor	Odorless
Odor Threshold	Data lacking		
General Properties			
Boiling Point	212 F(100 C)	Melting Point	Data lacking
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	= 1.18	Water Solubility	Miscible
Viscosity	1700 Centipoise (cPs, cP) or mPas	Explosive Properties	Data lacking
Oxidizing Properties:	Data lacking		
Volatility			
Vapor Pressure	Of water	Vapor Density	0.6 Air=1
Evaporation Rate	< 1 n-Butyl Acetate = 1		
Flammability			
Flash Point	> 200 F(> 93.3333 C) STCC (Seta Test/Seta Flash Closed Cup)	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

No additional physical and chemical parameters noted.

Section10:StabilityandReactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4 Conditions to avoid

Heat,sparks,openflames.Excessheat.Incompatiblematerials.

10.5 Incompatible materials

Strong oxidizing agents, acids, and alkalis.

10.6 Hazardous decomposition products

On burning may release carbon dioxide and carbon monoxide.

Section11-ToxicologicalInformation

11.1 Information on toxicological effects

Components		
Quartz (< 1%)	14808-60-7	**Multi-dose Toxicity:** Inhalation-Hamster TCLo • 3 mg/m³ 6 Hour(s) 78 Week(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Fibrosis (interstitial)**; *Lungs, Thorax, or Respiration*:**Changes in lung weight**; Inhalation-Rat TCLo • 80 mg/m³ 26 Week(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Fibrosis, focal (pneumoconiosis)**; *Blood*:**Changes in spleen**; *Immunological Including Allergic*:**Decrease in cellular immune response**; **Tumorigen / Carcinogen:** Inhalation-Rat TCLo • 50 mg/m³ 6 Hour(s) 71 Week(s)-Intermittent; *Tumorigenic*:**Carcinogenic by RTECS criteria**; *Liver*:**Tumors**
Triethylamine (< 3%)	121-44-8	**Acute Toxicity:** Ingestion/Oral-Mouse LD50 • 546 mg/kg; *Behavioral*:**Somnolence (general depressed activity)**; *Behavioral*:**Excitement**; *Behavioral*:**Muscle weakness**; Ingestion/Oral-Rat LD50 • 460 mg/kg; Skin-Rabbit LD50 • 570 µL/kg; **Irritation:** Skin-Rabbit • 365 mg-Open • Mild irritation; **Multi-dose Toxicity:** Inhalation-Rat TCLo • 1 g/m³ 2 Week(s)-Intermittent; *Sense Organs and Special Senses:Eye*:**Conjunctive irritation**; *Lungs, Thorax, or Respiration*:**Structural or functional change in trachea or bronchi**; **Mutagen:** Cytogenetic analysis • Inhalation-Rat • 1 mg/m³
Butyl alcohol (< 5%)	71-36-3	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 790 mg/kg; *Liver*:**Fatty liver degeneration**; *Kidney, Ureter, and Bladder*:**Other changes**; *Blood*:**Other changes**; Inhalation-Rat LC50 • 24000 mg/m³ 4 Hour(s); Skin-Rabbit LD50 • 3400 mg/kg; **Irritation:** Eye-Rabbit • 1.62 mg • Severe irritation; Skin-Rabbit • 20 mg 24 Hour(s) • Moderate irritation; **Multi-dose Toxicity:** Ingestion/Oral-Rat TDLo • 45500 mg/kg 13 Week(s)-Intermittent; *Behavioral*:**Ataxia**; **Reproductive:** Inhalation-Rat TCLo • 6000 ppm 7 Hour(s)(1-19D preg); *Reproductive Effects:Effects on Embryo or Fetus*:**Fetotoxicity (except death, e.g., stunted fetus)**
Ethylene glycol monobutyl ether (< 10%)	111-76-2	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 250 mg/kg; Inhalation-Rat LC50 • 450 ppm 4 Hour(s); *Behavioral*:**Ataxia**; *Nutritional and Gross Metabolic:Gross Metabolite Changes*:**Weight loss or decreased weight gain**; **Irritation:** Eye-Rabbit • 100 mg • Severe irritation; Eye-Rabbit • 100 mg 24 Hour(s) • Moderate irritation; Skin-Rabbit • 500 mg-Open • Mild irritation; **Reproductive:** Ingestion/Oral-Rat TDLo • 600 mg/kg (9-11D preg); *Reproductive Effects:Effects on Embryo or Fetus*:**Fetal death**; Inhalation-Rat TCLo • 25 ppm 6 Hour(s)(6-15D preg); *Reproductive Effects:Specific Developmental Abnormalities*:**Musculoskeletal system**; **Tumorigen / Carcinogen:** Inhalation-Mouse TCLo • 250 ppm 6 Hour(s) 2 Year(s)-Intermittent; *Tumorigenic*:**Carcinogenic by RTECS criteria**; *Liver*:**Tumors**

GHS Properties	Classification
Acute toxicity	**EU/CLP** • Acute Toxicity - Oral 4 - ATEmix(oral) = 1919 mg/kg **OSHA HCS 2012** • Acute Toxicity - Oral 4 - ATEmix(oral) =1919 mg/kg
Aspiration Hazard	**EU/CLP** • Data lacking **OSHA HCS 2012** • Data lacking
Carcinogenicity	**EU/CLP** • Data lacking **OSHA HCS 2012** • Data lacking
Germ Cell Mutagenicity	**EU/CLP** • Data lacking **OSHA HCS 2012** • Data lacking
Skin corrosion/Irritation	**EU/CLP** • Skin Irritation 2 **OSHA HCS 2012** • Skin Irritation 2
Skin sensitization	**EU/CLP** • Data lacking **OSHA HCS 2012** • Data lacking
STOT-RE	**EU/CLP** • Specific Target Organ Toxicity Repeated Exposure 2 **OSHA HCS 2012** • Specific Target Organ Toxicity Repeated Exposure 1
STOT-SE	**EU/CLP** • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation **OSHA HCS 2012** • Data lacking
Toxicity for Reproduction	**EU/CLP** • Data lacking **OSHA HCS 2012** • Toxic to Reproduction 2

Respiratory sensitization	**EU/CLP** • Data lacking **OSHA HCS 2012** • Data lacking
Serious eye damage/Irritation	**EU/CLP** • Data lacking **OSHA HCS 2012** • Eye Irritation 2

Potential Health Effects

Inhalation

Acute (Immediate) | May cause respiratory irritation.

Chronic (Delayed) | No data available

Skin

Acute (Immediate) | Causes skin irritation.

Chronic (Delayed) | No data available

Eye

Acute (Immediate) | Causes serious eye damage.

Chronic (Delayed) | No data available

Ingestion

Acute (Immediate) | Harmful if swallowed. May cause cramps and diarrhea.

Chronic (Delayed) | No data available

Carcinogenic Effects | This material contains Quartz which is considered a carcinogen, however this material as a whole is not classified as a carcinogen.

Carcinogenic Effects			
	CAS	**IARC**	**NTP**
Quartz	14808-60-7	Group 1-Carcinogenic	Known Human Carcinogen

Reproductive Effects | Suspected of damaging fertility or the unborn child.

Key to abbreviations

LC = Lethal Concentration
LD = Lethal Dose
TC = Toxic Concentration
TD = Toxic Dose

Section12-EcologicalInformation

12.1 Toxicity

| Material data lacking.

12.2 Persistence and degradability

| Material data lacking.

12.3 Bioaccumulative potential

| Material data lacking.

12.4 Mobility in Soil

| Material data lacking.

12.5 Results of PBT and vPvB assessment

| PBT and vPvB assessment has not been conducted for this material.

12.6 Other adverse effects

No studies have been found.

Section13-DisposalConsiderations

13.1 Waste treatment methods

Product waste Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section14-TransportInformation

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	NDA	Not Regulated	NDA	NDA	NDA
TDG	NDA	Not Regulated	NDA	NDA	NDA
IMO/IMDG	NDA	Not Regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not Regulated	NDA	NDA	NDA

14.6 Special precautions for user None specified.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Data lacking.

Section15-RegulatoryInformation

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications Acute, Chronic

		Inventory			
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**EU EINECS**	**EU ELNICS**
Butyl alcohol	71-36-3	Yes	No	Yes	No
Ethylene glycol monobutyl ether	111-76-2	Yes	No	Yes	No
Graphite	7782-42-5	Yes	No	Yes	No
Quartz	14808-60-7	Yes	No	Yes	No
Triethylamine	121-44-8	Yes	No	Yes	No

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	B3, D1A, D2B
• Butyl alcohol	71-36-3	B2, D2B D2A (In certain cases, this classification does not apply.

• Quartz	14808-60-7	For more information, consult the section Substance Specific Issues - Silica, crystalline, encapsulated on Health Canada's WHMIS Division website.)
• Graphite	7782-42-5	D2A (natural); D2B (synthetic)

Canada - WHMIS - Ingredient Disclosure List

• Triethylamine	121-44-8	1 %
• Ethylene glycol monobutyl ether	111-76-2	1 %
• Butyl alcohol	71-36-3	1 %
• Quartz	14808-60-7	1 %
• Graphite	7782-42-5	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Priority Substance List 2 (substance considered toxic, added to CEPA's Schedule 1, List of Toxic Substances)
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Europe

Other

EU - Hazardous Substances Restricted or Prohibited in Electrical Equipment (2011/65/EU) (RoHS)

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Japan

Environment

Inventory - Japan - Industrial Safety and Health Law Substances (ISHL)

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	2-(8)-299
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Other

Japan - Chemical Substance Control Law (CSCL) - Monitoring Chemical Substances

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Japan - Poisonous and Deleterious Substances - Substances Not Considered Deleterious

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Japan - Poisonous and Deleterious Substances - Substances Not Considered Poisonous

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Triethylamine	121-44-8	
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Triethylamine	121-44-8	5000 lb final RQ; 2270 kg final RQ
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	5000 lb final RQ; 2270 kg final RQ
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Triethylamine	121-44-8	1.0 % de minimis concentration
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	1.0 % de minimis concentration
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	carcinogen, initial date 10/1/88 (airborne particles of respirable size)
• Graphite	7782-42-5	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
• Triethylamine	121-44-8	Not Listed
• Ethylene glycol monobutyl ether	111-76-2	Not Listed
• Butyl alcohol	71-36-3	Not Listed
• Quartz	14808-60-7	Not Listed
• Graphite	7782-42-5	Not Listed

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out.

15.3 Other Information

WARNING: This product contains a chemical known to the State of California to cause cancer.

Section16-OtherInformation

Relevant Phrases (code & full text)

H225 - Highly flammable liquid and vapour
H226 - Flammable liquid and vapour
H311 - Toxic in contact with skin
H314 - Causes severe skin burns and eye damage.
H319 - Causes serious eye irritation
H331 - Toxic if inhaled
H332 - Harmful if inhaled
H336 - May cause drowsiness or dizziness
H350 - May cause cancer.
H372 - Causes damage to organs through prolonged or repeated exposure.
R10 - Flammable.
R11 - Highly flammable.
R20/21/22 - Harmful by inhalation, in contact with skin and if swallowed.
R22 - Harmful if swallowed.
R35 - Causes severe burns.
R36/38 - Irritating to eyes and skin.
R37/38 - Irritating to respiratory system and skin.
R41 - Risk of serious damage to eyes.
R49 - May cause cancer by inhalation.
R67 - Vapours may cause drowsiness and dizziness.

Last Revision Date 12/September/2014

Preparation Date 12/September/2014

Disclaimer/Statement of Liability The information contained herein is based on data available. However, no warranty is expressed or implied regarding the accuracy of the data or the results obtained from the use thereof. Because the information contained herein may be applied under

conditions beyond our control, we assume no responsibility for its use.

Key to abbreviations
NDA = No data available

F-Series

Flush-faced couplers provide reduced pressure drop verses other types and are preferred in dirty, grimy construction and mining environments due to easy clean, non-dirt trapping faces.

Metal Dust Caps

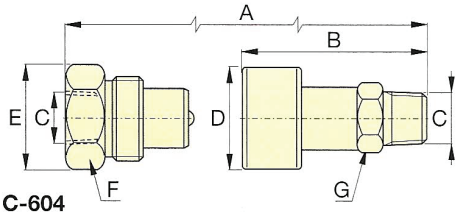
Steel dust caps are available for the C-604 series couplers.
Order model number:
CD-411M for female half
CD-415M for male half

A C F Series

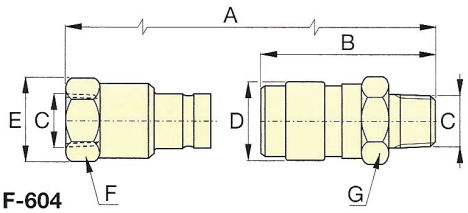
Maximum Flow Capacity:
2,500 in³/min.

Thread:
¼" and ⅜" NPTF

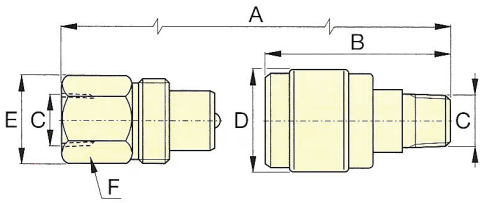
Maximum Operating Pressure:
10,000 psi



C-604



F-604

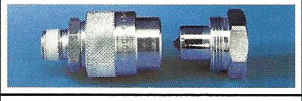
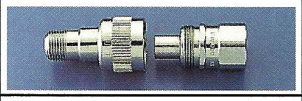


A-604, A-630

CT-604 Safety Tool

Use the Enerpac CT-604 to relieve hydraulic back pressure by safely bleeding the hydraulic coupler. Minimize injuries from projectile parts and under-skin hydraulic fluid injections by eliminating unsafe coupler bleeding practices. The CT-604 is Enerpac-engineering safe for use at 10,000 psi (700 bar).

NOTE: C-Series only.

Maximum Flow Capacity (in³/min)	Coupler Type	Model Numbers			Dimensions (in)							Dust Cap(s)
		Complete Set	Female Half	Male Half	A*	B	C	D	E	F	G	
2,500	**High Flow Coupler** 	C-604	CR-400	CH-604	3.26	2.87	⅜" NPTF	1.38	1.38	1.25	1.00	(2x) CD-411 Included
2,500	**Flush-face coupler** 	F-604	FR-400	FH-604	4.36	2.85	⅜" NPTF	1.23	1.23	1.06	1.12	–
462	**Regular Spee-D-Coupler®** 	A-604	AR-400	AH-604	3.09	2.53	⅜" NPTF	1.12	.94	.94	.73	Z-410 female only Included
462	**Regular Coupler** 	A-630	AR-630	AH-630	2.61	1.72	¼" NPTF	.87	.81	.75	.57	Z-640 female only Included

* Value A is total length when male and female halves are connected.

ENERPAC

English Metric

CT-604 Safety Tool

- Enerpac coupler bleed tool eliminates unsafe pressure relieving and bleeding activities such as:
  using a hammer and punch to unseat check balls, cones & poppets using a wrench to 'loosen' a coupler.
- Designed to connect to Enerpac C604, CH604 and CR400 High Flow couplers (male & female halves).
- Coupler Bleed Tool will also work with competitive equivalents.
- Comes in a convenient storage box that keeps the parts together.
- Enerpac engineered safe for use at 10,000 psi (700bar).

Coupler Bleed Tool Model Number	Fits on High Flow Couplers		Maximum Operating Pressure	
	Female Half	Male Half		
			psi	bar
CT-604	CR-400	CH-604	10000	700

ENERPAC
POWERFUL SOLUTIONS. GLOBAL FORCE.

Instruction Sheet

CT-604 Hydraulic Coupler Bleed Tool

L2755 Rev. C 02/11

Index:

1.0 IMPORTANT RECEIVING INSTRUCTIONS

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

2.0 INTENDED USE

The Enerpac CT-604 coupler bleed tool is designed to safely relieve pressure from hydraulically locked high-flow hydraulic couplers, Enerpac coupler models CH-604 (male half), CR-400 (female half) and C-604 (male and female set).

3.0 SAFETY ISSUES

Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Enerpac cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Enerpac when in doubt as to the safety precautions and operations. If you have never been trained on high-pressure hydraulic safety, consult your distribution or service center for a free Enerpac Hydraulic safety course.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.

WARNING: Wear proper personal protective gear when operating hydraulic equipment.

Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.

WARNING: The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.

CAUTION: Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.

Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.

DANGER: Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

IMPORTANT: Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Authorized ENERPAC Service Center in your area. To protect your warranty, use only ENERPAC oil.

WARNING: Immediately replace worn or damaged parts with genuine ENERPAC parts. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.

4.0 INSTRUCTIONS

DANGER: Never attempt to relieve hydraulic pressure by loosening a coupler. Trapped hydraulic pressure can cause a loosened coupler to dislodge unexpectedly with great force. Serious personal injury or death will result if the coupler becomes a projectile and strikes persons working in the area.

WARNING! Loosening a coupler may result in an escape of high pressure oil that can penetrate the skin. Serious personal injury or death can result. Always use coupler bleed tool to safely depressurize and remove couplers.

WARNING! Be sure that loads are supported with blocking and cribbing before using bleed tool. Actuator movement may occur when hydraulic pressure is relieved. Serious personal injury or death could occur if load shifts or drops.

WARNING! The CT-604 coupler bleed tool is designed for a maximum hydraulic pressure of 10,000 psi [700 bar]. Do not use the tool on systems and components operating at higher pressures.

Depressurize a hydraulically-locked coupler as described in the following steps:

1. If the hydraulic device is supporting a load, block and crib the load as required, so that the load will not shift or drop when hydraulic pressure is relieved.
2. Check that the threads on the coupler half to be depressurized are clean and in good condition. Do not attempt to bleed a coupler if threads are damaged.
3. Check that all threads on the bleed tool main body and cap/bolt assemblies are clean and in good condition. Do not use bleed tool if threads are damaged.

Note: Hand-tighten the bleed tool main body onto the coupler half as described in steps 4 and 5. See Figure 1, below.

Note: The bleed tool main body is marked “male coupler” on one end and “female coupler” on the other. Be sure to use the proper end.

4. If bleeding a male coupler half: Thread the bleed tool main body onto the male coupler half and tighten it hand-tight.
5. If bleeding a female coupler half: Thread the bleed tool main body into the retaining collar of the female coupler half. Tighten the retaining collar hand-tight.
6. The bleed tool includes two cap/bolt assemblies as shown in Figure 1, below. Be sure to use the correct one:

- For MALE coupler halves, use the cap/bolt assembly with the SHORT bolt.
- For FEMALE coupler halves, use the cap/bolt assembly with the LONG bolt.

Note: Before proceeding, ensure that the cap is tight on the bolt.

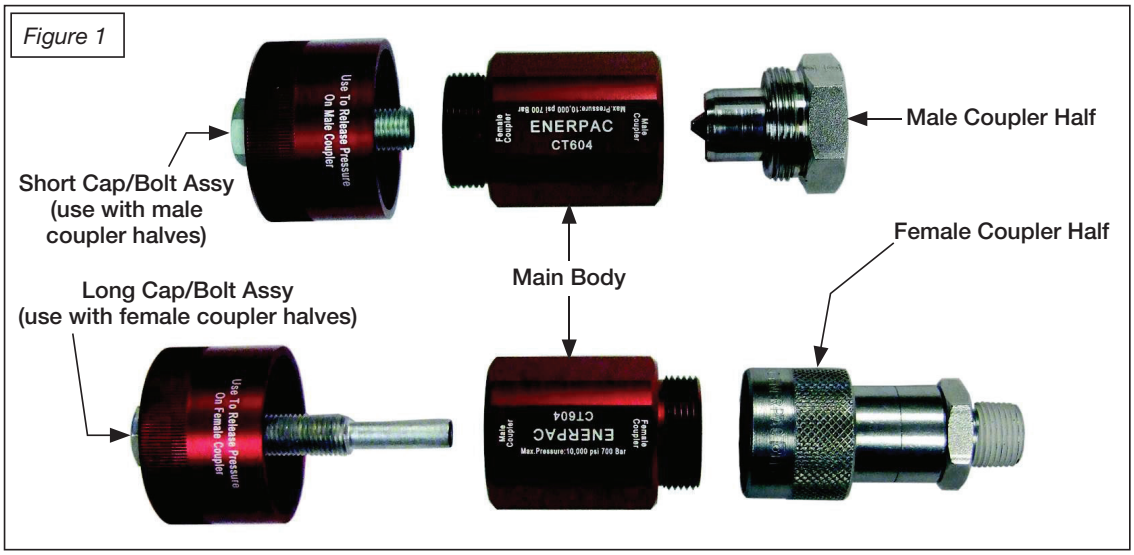
7. Thread the cap/bolt assembly into the bleed tool main body. Slowly turn the cap/bolt assembly clockwise until the coupler check ball opens and hydraulic pressure is relieved. If necessary, use an adjustable wrench on the bolt.

Note: When the cap/bolt assembly is tightened, pressurized hydraulic oil will flow through the bleed tool main body and into the cap. Allow any excess oil to drain into a suitable container.

8. Remove coupler half, main body and cap/bolt assembly from the hydraulic device (manifold, cylinder, etc.) as a complete unit. **Important:** Keep bleed tool parts installed on coupler while it is being loosened and removed.
9. Disassemble bleed tool components from the coupler half. Clean bleed tool components and store in provided container.

CAUTION: Discard the coupler half removed in the previous steps. Never attempt to repair or reuse a worn or damaged coupler!

Figure 1



Contact Us

For Technical Documentation:

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using the password **HYD123**

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email info@hydra-slide.com