

Material Handling Guide for HDPE Pipe & Fittings

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Foreword

MATERIAL HANDLING GUIDE FOR HDPE PIPE & FITTINGS

This guide was developed and published with the technical help and financial support of the members of PPI (the Plastics Pipe Institute). The members have shown their interest in quality products by assisting independent standards-making and user organizations in the development of standards, and also by developing reports and guides on an industry-wide basis to help engineers, code officials, specifying groups, contractors and end-users.

The purpose of this guide is to provide important safety information on handling, lifting, loading, storing and installing polyethylene pipe and fittings. As in almost all industries, the handling, transportation and installation of polyethylene pipe and fittings present the potential for serious injury or even death. This guide seeks to raise awareness of the potential hazards involved in the polyethylene piping industry. By adhering to these and other safety guidelines, it is the sincere hope of PPI and its members that the number and frequency of serious accidents and injuries can be kept to a minimum.

This report has been prepared by PPI as a service to the industry. The information in this report is offered in good faith and believed to be accurate at the time of its preparation, but is offered “as is” without any express or implied warranty, including WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. It does not purport to address all of the product applications or construction practices that could be used, nor all of the safety practices necessary to protect persons and property. It is the responsibility of the users of this guide and the installers of polyethylene piping systems to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before any use or installation. The information in this report is offered for consideration by industry members in fulfilling their own compliance responsibilities. PPI assumes no responsibility for compliance with applicable laws and regulations. Consult the manufacturer for additional safety information regarding the use of its specific piping products.

PPI intends to revise this report from time to time in response to comments and suggestions from users of this report. Please send suggestions to the address below. Information on other publications can be obtained by contacting PPI directly or visiting the web site.

The Plastics Pipe Institute, Inc.
<https://plasticpipe.org/>

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MATERIAL HANDLING GUIDE

1.0 INTRODUCTION

Polyethylene pipe and fittings have been used safely in thousands of applications. Still, there are precautions that should be adhered to when handling and transporting any product, and polyethylene pipe and fittings are no exception.

This Material Handling Guide covers a wide range of safety issues regarding the handling, loading, transportation and installation of polyethylene pipe and fittings. Job site safety, storage guidelines, unloading guidelines, heat fusion joining and installation guidelines are just a few of the important topics covered in this guide.

As valuable as this guide may be, it does not purport to address all of the product applications or construction practices that could be used, nor all of the safety practices necessary to protect persons and property. It is the responsibility of the users of this guide and the installers of polyethylene piping systems to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before any use or installation.

2.0 PERSONAL SAFETY

Field working conditions can be dangerous. Each worker should take responsibility for his or her own personal safety. This includes wearing personal protective equipment and being aware of the potential hazards involved with a given task, and work environment. Potential hazards of the operation, materials, equipment and environment should be defined before work begins, and plans should be made to minimize these hazards.

2.1. Personal Protective Equipment

When handling pipe and other materials, wear adequate personal protective equipment. Personal protective equipment such as hard hats and steel-toed safety shoes, gloves and safety glasses helps to prevent injuries during product handling.

Hard hats shall always be worn when loading, unloading or handling PE pipe and fittings. Hard hats not only protect your head, but also give motorists and equipment operators an eye-level warning of your presence. As a general rule, steel-toed safety shoes should be worn at all times. They are especially important if there is any possibility that falling objects could land on your feet.

Eye protection shall be worn at all times, especially when operating cutting and joining equipment. Protective eyewear shall meet minimum requirements of ANSI Z87.1.

Work gloves help prevent cuts and bruises from sharp or rough edges on pipe, fusion equipment and other objects. When moving or lifting boxes, pipe drums and other heavy items, place your hands carefully to avoid getting them pinched or caught. Never place your hands inside of the pipe during handling. Tag lines and pipe handling tools allow workers to control the attitude of pipe during handling in a “hands off” handling procedure.

Long-sleeved shirts and trousers or coveralls minimize cuts, bruises and abrasions while also protecting against sunburn and/or poison ivy. Wear high-visibility vests when working at or near a public street or highway or when working at night. This reduces your chance of being hit by a vehicle, or equipment while on the job site.

2.2. Job Site Safety

Numerous hazards exist on every job site. While no summary of safe working practices can cover all aspects of safety, there are a number of important guidelines that should always be followed.

Before work begins potential hazards should be identified. Check the work site for hazards created by unguarded machinery, chemicals fumes or gases, fuels, heat sources, excessive noise, nearby equipment, buried pipes and /or power lines. Many hazards are difficult to identify. Materials, equipment, and the work environment should all be considered. Specific plans should be made to minimize such hazards. Documenting these plans and posting them in a public place may be beneficial to those involved in the operations.

Field personnel should avoid working alone or arrange for periodic safety contacts. So that if you are injured, a co-worker can assist you or call for emergency medical service.

Polyethylene piping systems commonly require the use of heat fusion equipment. Before the first fusion, the work crew should establish safety procedures for working around the fusion machine. The procedures may include proper hand signals to be used when hauling, lifting or moving pipe and machinery. Heater plates can reach temperatures in excess of 400°F. Caution should be used to prevent burns. Clothing made of synthetic materials should be avoided when working near any fusion machine. These materials will melt if contact is made with the heater plate and will stick to the skin, potentially causing severe burns. Around the fusion machine, watch out for pinch points on rotating machinery and sharp edges on the trimmer blades. Remove any loose clothing or dangling straps that may get caught in the equipment. Never remove guards from the fusion machines as they are designed to protect the operator and others on the job site.

Before entering a confined area of trench, make sure that proper shoring and timbering is in place in compliance to OSHA and industry standards. Proper entry procedures should be followed and a confined space permit may be required. Monitor trench environment for presence of harmful gases before entry and while working.

Establish the location of fire equipment. When using a portable heater in a joining shelter, have an adequately sized Class ABC fire extinguisher on hand. Always keep flammable liquids such as gasoline and isopropyl alcohol stored in approved containers and away from any open flames and other hot surfaces such as heater plates. Most fusion equipment is not explosion proof and sparks may be generated in motors or during machinery operations.

Preparation and training are essential to any job. Each worker should know what steps to take in the event of an emergency. Field personnel should have an understanding of basic first aid and CPR. Each worker should know the location of the nearest phone as well as the phone numbers for the local police, fire and EMS departments. If a worker is injured, medical attention and first aid should be sought immediately.

2.3. OSHA Guidelines for Marking Hazards

When marking objects, machinery, or areas which present a danger, OSHA has prescribed certain color codes: red shall designate fire protection equipment and danger. Emergency stop bars and stop buttons on hazardous machines shall be red. Yellow shall designate caution and for marking physical hazards such as striking against, stumbling, falling and tripping hazards, which may be relevant near stacks of pipes or fittings. 29 C.F.R. §1910.144. OSHA also regulates the shape and design of danger signs, caution signs, slow-moving vehicle signs, and safety instruction signs. 29 C.F.R. §1910.145.

3.0 DELIVERY INSPECTION

- 3.1. Packing List shall be checked to confirm product being received matches the product ordered. MSDS shall be furnished and reviewed.
- 3.2. The sequence of taking away or removal of loading straps must be fully understood. The positioning of chocks or dunnage boards along with their purpose should be identified before any unloading procedures are started.
- 3.3. Recommended items to check are pipe or fitting diameter, DR, resin type, pressure rating, cell classification, manufacturers name and required labeling or markings such as PW/AWWA, FM or similar project requirements.
- 3.4. Evaluate load for evidence of shifting during transportation, along with any damage that may have occurred during transportation or previous handling.
- 3.5. If damage is observed the supplier/shipper and the carrier should be notified immediately upon receipt of shipment. Pipe or fittings should be repaired or replaced as necessary to maintain quality control and quality assurance.

4.0 LIFTING AND HANDLING PE PIPE AND FITTINGS

4.1. Manual Lifting and Handling

OSHA Guidelines

OSHA standards for personal protective equipment suggest that protective footwear should be considered for pipe fitters. Safety shoes or boots with impact protection are required any time an employee is engaged in lifting or carrying heavy objects which, if dropped, might fall onto the feet, or when handling objects like pipes, which may roll over an employee's feet. 29 C.F.R. § 1915 Subpt. I, App. A (10).

OSHA requires that employers of pipe fitters should routinely consider eye and face protection when working with pipe. 29 C.F.R. § 1915 Subpt. I, App. B (8). Such eye and face protective equipment should fit properly, be kept clean and well maintained. 29 C.F.R. § 1915 Subpt. I, App. B (10)

Where an employee is handling long dimensional objects such as ducts and pipes in areas near exposed live electrical parts, OSHA requires employers to institute work practices such as the use of insulation, guarding, and material handling techniques which will minimize the electrical hazard. 29 C.F.R. § 1910.333(c)(6)

Where employees are handling objects manually, OSHA has taken the position that the employer must analyze and apply the principles of ergonomics in an effort to reduce musculoskeletal complaints by employees. 29 U.S.C.A. § 654(a)(1) et seq.

Lifting with Your Legs

When lifting or lowering pipe by hand, the knees and the back should be as straight as possible. Squatting places the weight on your leg and thigh muscles, instead of your abdominal and back muscles. Remember to squat whether you work alone or as part of a team, and whether or not you use a mechanical aid, such as a carrying bar.

Lifting Fittings

Handling fittings can be as individual pieces or multiple fittings ie; boxed, stacked in wire bins, gaylords, or on pallets.

Think about the load, can you lift it alone? Is it awkward and require a team lift or does it require mechanical assist from a forklift.

If you can lift fitting by yourself - Remember:

1. Plan your lift.
2. Keep a shoulder-width stance.
3. Squat-bend at the knees.
4. Tighten stomach muscles.
5. Maintain your back's natural curves.
6. Lift with your legs.
7. Minimize the weight you must lift.

Don't:

1. Bend at the waist or lift with your back.
2. Twist while lifting or carrying.
3. Try to lift more than you can handle.
4. Reach over your shoulder for a load.
5. Try to recover a falling load.

If the fitting is awkward and requires team lifting then:

1. Designate one person to direct the lift.
2. Lift at the same time.
3. Keep the load level while carrying.
4. Move smoothly together and unload at the same time.

If the fitting is in a bin and requires lifting out of the bin then:

1. Stand with feet at shoulder distance apart.
2. Slightly bend your knees.
3. Start to squat, bending with your legs at hip joints (not at the waist).
4. Slide the load close to the body.
5. Slowly raise the body using the leg/hip muscles.
6. Tighten the abdominal muscles as you begin lifting the article out of the container.
7. Rest the knees against the side of the bin.

If load is a bin, or pallet of fittings or the fitting/structure is large and requires a forklift or crane to lift then:

1. Load should be lifted utilizing equipment with sufficient capacity to handle safely.
2. Forks on forklift need to enter the pallet squarely before lifting, forks should be spread as wide apart as practical. Forks should extend completely under the load and the load should be as far back as possible on the forks.
3. Large fittings/structure should be lifted with web style slings. Do not use chains, wire rope or other devices that may damage the fitting.
4. Do not stand under or around the load while it is being lifted.

Short Lengths – One Person

Six general pointers should be considered when lifting loose joints:

1. Inspect materials for slivers, jagged edges, burrs and rough or slippery surfaces.
2. Get a firm grip on the objects.
3. Keep fingers away from pinch points, especially when setting materials down.
4. Keep hands away from the ends to prevent them from being pinched.
5. Wipe off greasy, wet, slippery or dirty objects before trying to handle them
6. Keep hands free of oil and grease.

Because of the physical differences that exist among individual workers, it is not practical to establish weight-lifting limits for loose joints. Emphasis should be given to correct lifting techniques. Workers should never lift more than can be handled comfortably and safely.

Long Lengths – Two People

When lifting pipe, take a firm grip. Don't lift until you are sure that your hold will not slip. If you are using carrying tongs or other similar devices, make certain that they grip the pipe securely.

When moving objects as a team, everyone must lift and turn together. Someone could get hurt if one member begins to lift or lower a load before the other crew members are ready.

To make it easier to work together, choose one crewmember to lead. This person gives the signals for lifting and lowering. At the signal, everyone moves together, avoiding sudden starts and stops.

Large or heavy pipe should be handled with a mechanical aid. If U-shaped carrying bars, carrying tongs, or pipe sticks are used, make sure that they are adequate for the pipe's size and weight. Do not use makeshift tools.

Extremely slippery when wet

Polyethylene pipe is extremely slippery when wet, frosty or covered in snow. Use caution at all times, especially in rainy or snowy weather.

Hot When Stored Outside

Black pipe will absorb light and convert this energy into heat. The heat will be retained in the pipe wall. This will cause the pipe to be hot to the touch. Always use caution before handling pipe that has been exposed to direct sunshine. Measure the pipe temperature with a thermometer or carefully ensure that the pipe temperature is cool enough to pick up.

Using Hand trucks, Dollies or Wheelbarrows

Many types of hand trucks and dollies such as two-wheeled, flat, platform, box and lift trucks can aid in material handling. No one truck is suitable for handling all types of materials found in the industry. Therefore, it is important to select the right equipment for the job.

Personnel using hand trucks and dollies should be trained to handle them safely, and should consider the following:

- Keep the center of gravity of the load as low as possible; place heavy objects at the bottom of the load.
- Place the load well forward so that the weight will be carried by the axle and not by the handles of the truck.
- Place the load so that it will not shift, slip or fall off. Load only to a height that will allow a clear view ahead.
- Let the truck carry the load. The operator should only maintain its balance and provide the motive power.
- Never walk backwards with a hand truck or pallet jack.
- When going down an incline, keep the hand truck ahead of you. When going up an incline, keep the hand truck behind you.
- Move trucks at a safe speed. Do not run; keep the truck constantly under control.

To decrease hazards to toes and feet, wheels should be as far under the truck as possible and employees should wear safety shoes.

In lifting a wheelbarrow or two-wheeled truck to operating position, the worker should follow safe lifting practices, using the power of the leg muscles and keeping the back straight. The same principal should be observed when setting a loaded truck or wheelbarrow down.

When pushing trucks, workers must use constant vigilance to avoid running a wheel off docks or platforms and to prevent collisions with other workers, trucks or obstructions.

4.2. Power Lifting Equipment

The use of power equipment is often required to lift and handle pipes greater than 8" in diameter. There is a wide variety of power lifting equipment available such as forklifts, cherry pickers, backhoes, front-end loaders and cranes. Their proper use will be discussed more fully in the next section. Excessive lengths, heavy loads or even specific site conditions can require the use of multiple pieces of lifting equipment.

Compared to manual lifting, the use of power equipment is more likely to result in pipe damage. Only trained and qualified operators should be allowed to utilize power equipment.

Refer also to the OSHA Guidelines for cranes and forklifts in 4.1.

5.0 LOADING, UNLOADING AND TRANSPORTING PE PIPE AND FITTINGS

Smoke tarps or pipe caps may be required to protect the interior of the pipe from exhaust fumes or road grime. This may be of particular importance if the pipe is to be used for potable water applications, as it is difficult to remove tastes and odors from the interior of the pipe.

The truck must be parked on level ground. The parking brake (hand brake) should be set and the wheels chocked. It is preferred that the truck be shut off and left in gear. The location of the driver should be known at all times. Persons who are not directly involved in loading, unloading, or material handling should stay out of restricted handling area and clear of any operations.

Procedures for transporting pipe and fittings around on the job site are just as important as the ones used for transportation, unloading and storage. A written and well understood program should be established and utilized by all construction personnel.

5.1. Power Lifting Equipment

General

When operated properly, Power Lifting Equipment can be used safely to load, unload and transport pipe. The selection of the right type of equipment will depend on a number of factors including project requirements, availability, preference, cost and terrain. Most pipe producers use large and small forklifts in their yards. Smaller forklifts accommodate the tight corners encountered around stacked piles. Most distribution yards also use forklifts to load and offload pipe. However, job site requirements are extremely variable, and equipment selection will vary as well.

Although there are differences in their design, there are fundamental similarities that exists with all Power Lifting Equipment. These similarities are centered around safety and damage prevention. As required by law all power lifting equipment should be equipped with flashing amber lights and an operating horn.

For lifting loose pipe off rail cars with side stakes, a minimum 15-foot lift is required. For lifting pipe off trucks with side rails, a minimum lift of 11 feet is required. Lifting equipment must be selected to meet these requirements.

Operators of power lifting equipment should be trained and competent in the operation of their equipment. Special courses are available for both beginners and experienced operators. Before operators gain experience, they must go through

field training. An experienced operator must supervise this field training until such time as the trainee becomes comfortable and the trainer feels that they have received the necessary experience. No worker shall be allowed to operate equipment until they are trained and qualified as an operator on the specific piece of machinery they are utilizing.

The use of hand signals is recommended when working with power lifting equipment. The noise generated by the equipment and the distance that workers are set apart makes verbal communication very difficult. Standard hand signals allow both the operator and workers to go through the lifting, loading, unloading, and moving procedure step by step at a controlled pace. This avoids potential misunderstandings and accidents. Signals need to be simple, easily seen and easily understood. Operators and ground personnel should review their hand signals on a regularly scheduled basis. If any situation arises in which there is a misunderstanding, discuss the signals before proceeding. The most important signal is the stop signal. The stop signal tells the operator that something is wrong or misunderstood. When the stop signal is used, the operator must stop and verbally clarify further actions.

When moving pipe, equipment operators must keep their feet and hands on the controls at all times. When working on inclines, the wheels of the Delivery Vehicle should be properly chocked. If the view forward from the Power Lifting Equipment is blocked as a result of a lifted load, it is advisable to drive in reverse.

Inspection and Maintenance

For power equipment to be used safely, it must be cared for and properly maintained. Regular inspection and maintenance is mandatory and may be required by law. Regular inspection is to be done by the operator and starts by what is called the "walk-around". This is similar to the requirements of truck drivers before they drive their vehicles. During the walk-around, the operator physically walks around the machine and looks for anything out of the ordinary. This could be something as simple as an under inflated tire or as major as a hydraulic oil leak. This will give the operator a quick idea of any obvious problems. It will also show the operator if anyone is working near the equipment. Regular inspection of fluid levels and parking brakes is also required. In some cases, pivot joints will require greasing. Inspection and maintenance logs must be kept on all equipment and may be subject to record keeping requirements under OSHA or CFR standards.

Regular maintenance will vary by equipment type. All maintenance should be recorded and documented. Up-to-date inspection stickers are required on the equipment to verify proper maintenance. Forklifts should be regularly checked to measure the deterioration of parts, such as fork extensions and chains.

Before Getting Started

Before operating power equipment, adequate operating space is required. This is called the staging area. The staging area must be clear of workers and obstacles and must provide the operator with a clear line-of-sight. The size of the staging area will depend on the length of pipes being loaded or unloaded, the quantity to be unloaded and the size of the truck, trailers and lifting equipment. The staging area needs to be marked off to alert other workers that lifting equipment is being used. This can be done by the use of orange pylons or orange colored stakes. It isn't necessary for the staging area to be a permanent one. However, when it is used, it must be treated as a secure area.

When loading and unloading trucks and rail cars, small pipes that are bundled together will become heavy and long. Never exceed the rated lifting capacity of the equipment. All equipment specifically designed for lifting will be marked with a safe lifting capacity.

Forklifts

The use of forklift trucks necessitates observing a number of OSHA standards. Defective forklifts must be taken out of service until they have been repaired to a safe operating condition. 29 C.F.R. § 178(p)(1). When a load of pipe presents a hazard to the operator, forklift trucks shall be equipped with vertical-load backrest extensions. While loading pipes or fittings, the brakes of forklift trucks shall be set and wheel chocks placed under the rear wheels to prevent truck movement while loading or unloading. 29 C.F.R. § 178(m)(7). OSHA governs the periodic training and retraining of forklift operators, and the certification process for establishing that training was performed. 29 C.F.R. § 178(1)(4)(i).

The proper and safe use of forklifts is the responsibility of the operator. As with all power lifting equipment, the manufacturer provides a complete set of instructions relating to the operation of its equipment. Those operating instructions must be observed at all times. The following list represents some instructions that must also be followed:

- Check the forks for jagged edges or burrs. If the forks are marred, cover them with a suitable protective covering to prevent gouging of the pipe.
- Use the forks in the widest possible position.
- Always lift from the center of the pipe at the center of the forks.
- Be aware of and never exceed the rated capacity of the forklift.
- Always slowly enter the forks underneath the pipe; never jerk or ram them in.
- Tilt back the load only enough to stabilize the load.
- All forklifts have a maximum lift height. Never exceed these heights or the forklift can become unstable
- Forklifts are made for only one driver. No riders.

- Never allow workers to be lifted on the forks without the use of a safety pallet, along with appropriate and approved fall protection equipment or devices.
- Operate as close to the ground as possible when moving pipe from one location to the other. Do not, however, allow the pipe to drag or scrape along the ground.
- Use salt on the forks when winter weather makes them icy or slippery. Also use salt and sand around the lifting area to prevent sliding of lifting equipment.
- When not in use, the forks should be completely lowered to the ground, the control put into neutral, the power turned off and the brakes set.
- Use extreme caution if it becomes necessary to carry loads over existing equipment or structures. Never transport a load over any worker or individual who happens to be on job site.

Front End Loaders

When equipped with forks, front-end loaders can be operated as forklifts and the same procedures must be followed as indicated above. Typically, front-end loaders are used to lift and move large diameter pipe.

Mobile Cranes

OSHA requires that all functioning operating mechanisms be visually inspected frequently, and that complete inspection be performed periodically, including an inspection for deformed, cracked, corroded, worn, or loose parts, the brake system, limit indicators for winding and load, the power plant, and electrical apparatus. Unsafe conditions must be corrected before the crane is used again. Crane operation triggers a number of requirements by OSHA including use of bridge and trolley bumpers, stops at the limit of travel of the trolley, tail sweeps for bridge trucks, plainly marked load limits, and clearly marked control functions. Traveling and hoisting is prohibited while an employee is on the load or on the crane hook. 29 C.F.R. § 179.

When lifting pipe from overhead some additional requirements must be observed. The saying "look before you lift" applies here. Overhead obstructions such as wires and trees must be identified. A minimum of 10-foot clearance must be kept at all times. Obstacles in the trench, meter pit or vault must also be avoided.

As with other power equipment, cranes must also be inspected regularly. The condition of the rigging is critical, and it must be inspected regularly for damage.

Never swing a load of pipe or fittings over workers or in areas that are used as pathways for traveling. Operate the crane at constant speed. Avoid jerking and sudden movements.

Backhoes

Backhoes are often operated as cranes. The hook on the underside of the bucket is used to lift and transport pipe. The use of backhoes is common since they are almost always available on the job site. The same precautions used for cranes must be followed to ensure their safe operation.

5.2. Pipe Handling Accessories

There are many different types of pipe handling accessories used to lift and handle pipe. Most of them are used in combination with power lifting equipment. Of these accessories, slings and ropes are the most common.

As with power lifting equipment, accessories must also be inspected regularly for signs of damage. Discard and replace or repair faulty accessories. Chains, steel cables, wire ropes and hooks must not be used directly on polyethylene pipe or fittings.

Slings

OSHA requires that drafts of pipe must be safely slung before being hoisted by a crane. Drafts of pipe must be slung in such a way that prevents sliding pipes, particularly at the top layer. Double slings must be used on unstrapped pipes unless impracticable. 29 C.F.R. § 1918.81(a)-(c).

Hooks, chains, cables, and ropes shall be inspected daily before each use. 29 C.F.R. § 179(j)(z), 29 C.F.R. § 179(m)(l), 29 C.F.R. § 179(h)(2)(z), 29 C.F.R. § 184(d). Damaged slings shall be immediately removed from service. 29 C.F.R. § 1910.184(d). Hooks that have been opened more than 15 percent of the normal throat opening or twisted more than 10 degrees shall be immediately removed from service. 29 C.F.R. § 184(f) (5) (vi).

Wide band slings are the most common types of sling. They are typically made from manila or synthetic fiber. They distribute the lifting load over a large area and prevent point loading or pipe gouging. They can be used as chokers or with spreader bars. Chokers prevent the pipe or fitting from slipping during lifting. Spreader bars are recommended for lifting long lengths of fused pipe.

Nylon Rope

Thick nylon rope can also be used to lift pipe. It provides support similar to slings. They can be used as chokers or with spreader bars.

Tongs

Specially designed pipe tongs can also be used to lift pipe. They provide lifting support as the pipe weight increases. Do not exceed their design capacity.

Ramps

Ramps can sometimes be used to lower smaller diameter pipe. Ramps require the operator to stand to the side and slowly release the pipe down the ramp. Care must be exercised to avoid losing control during the lowering procedure.

Lifting Requirements

The lifting capacity of a sling or rope is determined by several factors including the type of sling or rope, the kind of hitch used, and how fittings are fastened to them. Typically, accessories should be rated at a minimum of 1.5 times the weight of the heaviest load to be lifted.

The angle between each leg of the sling or rope should not exceed 45 degrees. Avoid kinking or twisting any part of the lifting accessory.

5.3. Guidelines for Palletized/Non-palletized Coils

Trailer must be level before straps or bands are removed and the coils unloaded. Do not push, pull or roll coils off of the truck. Never stand behind, under or around the load as it is being unloaded. Do not remove straps until sling is secured. If coils are in silos do not push or pull the silo pack off the end of the truck with a lift truck. Chocks should never be removed before unloading the truck.

Before lifting, load should be centered and forks positioned at the widest position under the load for correct stability. When carrying loads large enough to block view, travel in reverse with load close to the ground. Carry all loads close to the ground. When traveling on grade with a load, travel with counterweight in the direction of travel. Use extra caution in uneven areas of pavement and reduce speed to cross the areas safely.

Forklift safety rules are to be observed during all phases of the unloading process. Never leave forklift running or an overhead load suspended if the lift is unattended.

5.4. Guidelines for Straight Lengths

Loading Bundles to a Flatbed Trailer

Hard-side bundles should be offset "wood-on-pipe" during transportation. A transport strapping policy should establish minimum requirements regarding the number of truckers' straps used by all transportation providers to secure bundles. The policy should also contain conditions regarding the tightening of straps after a carrier leaves a manufacturing facility.

Soft-side bundles should be aligned "wood-on-Corrulite" and stacked plumb to prevent leaning. The transport strapping policy applies to soft-side bundles during shipment.

Unloading Bundles from a Flatbed Trailer

People not involved in the unloading process should remain clear of the unloading area. There should be adequate space on both sides of the trailer.

The truck must be parked on level ground. The parking brake (hand brake) should be set and the wheels chocked.

Only after checking that the load has not shifted should the truck driver remove the nylon straps securing the load to the trailer. Caution should be taken when straightening shifted loads before unloading.

Bundles should be unloaded with fork trucks or cranes equipped with spreader bars with at least three wide web slings. The equipment should be sufficiently rated to safely handle the load.

Bundles may be stacked and individually strapped to the truck. In such a case, the bulk packs should be unloaded one at a time from the top, taking care to remove only the straps over the pack being unloaded.

When using fork trucks, the bundles should be picked up one at a time under their midpoint. For load stability, the forks should be as far apart as possible. Forks should have sufficient length to safely support the bundles.

The forks should enter the load slowly to reduce the possibility of pipe damage caused by scraping or gouging. The potential for damage can be further reduced if steel forks are covered by protective material.

If a crane with a single sling is used to unload the bundles, the lengths should be handled at their midpoints using wide web slings. If multiple slings or a spreader bar equipped with wide web slings are used, the equipment manufacturer's recommended capabilities, methods, and procedures should be used.

Steel bands used on bundles should not be removed until the bundles have been transported to the storage area and secured in a stable and safe manner.

Finally, never stand on a load of pipe. Standing on the load is extremely dangerous. Do not roll or drop pipe off the truck. Do not use backhoes, endloaders, or other material handling equipment to push or pull the load off the trailer. This is dangerous to unloading personnel and may damage pipe.

Transporting Bundles on a Flatbed Trailer

As a minimum requirement, carriers shall provide one strap for every 5 feet of trailer length. Given that trailers and pipe vary in length, this works out to eight (8) or nine (9) straps on flatbed trailers. See table below.

Table 1: Strapping Guide for Bundles

No. of Bundles	Min # of Straps	Min # of Tier Straps	Min # of Top Straps	Placement of Belly Straps
1 to 4	8	Not Req.	8	Not Req.
5 to 6	8	Not Req.	8	Not Req.
7 to 8	8	3	5	Between 2 & 3
9 to 12	8	4	4	Between 3 & 4
14 & over	8	4	4	between 3 & 4

An effort must be made to place straps either equidistant between bottom boards or directly over bottom boards. In addition, strap ratchets should alternate between trailer sides on equipment that facilitates this procedure. A half-twist is recommended in each strap on both sides of the load. This prevents wind resistance from loosening straps and damaging pipe during transport.

Belly straps must be tightened very firmly before tightening top straps. Top straps must be tightly secured. Drivers must inspect and tighten straps within 50 miles of origin and during each stop, especially after sitting overnight. A drop in temperature caused by rainstorms or an elevation change may also cause straps to loosen.

Loading Strip Loads to a Flatbed Trailer

“Strip Loading” is a method of packaging truckload quantities of pipe in combination with lumber between each layer. Individual boards called “saddles” or “row boards” separate each pipe layer. The use of pipe stakes is not required on strip loads. It is recognized however that there may be a request that pipe stakes be used on the sides of a strip load.

If pipe stakes are used, they should be cut from 2” OD steel or iron pipe. Crimp one end to fit into a standard trailer stake pocket. The stake should rest no higher than 8’6” once firmly in the stake pocket. The stake should be free of excessive corrosion and rust that will affect its strength.

If the load does not utilize stakes, band a minimum of two pipes on at least three equal-distant locations. Banding facilitates the unloading and prevents the rolling of pipe.

Unloading Strip Loads from a Flatbed Trailer

People not involved in the unloading of the trailer should remain clear of the unloading area. The operator must have adequate room on both sides of the trailer.

When unloading with a forklift, a second truck (or some other means) should be placed on the opposite side to the unloading equipment to prevent pipe from being pushed from the truck.

Strip Loads Using Strip Packs

Only after checking that all steel bands are secure and in place should the truck driver remove the nylon straps securing the load to the trailer. Caution should be taken when straightening shifted loads before unloading.

It is recommended to unload pipe with fork trucks, cranes equipped with wide web slings, or cranes equipped with spreader bars with wide web slings. The equipment should be sufficiently rated for the given load, and should be inspected for good condition prior to use.

If a fork truck is used, the forks should have sufficient length to safely support the strip pack. The pack should be approached slowly at the midpoint of the pipe lengths. To improve the pack stability during transportation, the forks should be as far apart as possible.

If a crane with a single sling is used to unload the strip pack, the lengths should be handled at their midpoints using wide web slings. If multiple slings or a spreader bar equipped with wide web slings are used, the equipment manufacturer's recommended methods and procedures should be used.

If the pipe is being unloaded in full rows, do not cut the bands until the row is lowered to the ground. The bands prevent the pipe from rolling.

If the pipe is being unloaded in less than full rows, the bands should be cut and removed only from the length(s) being unloaded. Any loose pipe in the row should be secured with suitable wedges, and / or temporary strapping.

After each layer is off the trailer, remove dunnage from the top of pipe.

Strip Loads Using Chocks

Check the load to assure that all chocks are securely in place on both ends of the timbers. If not, nail a chock or other suitable wedge into position.

At no time or under any circumstances should the chocks on timbers be removed. The chocks prevent pipe from rolling.

Only after checking that all chocks are in place should the truck driver remove the nylon trucker straps securing the load to the trailer. Do not remove "belly" straps until unloading is to take place on that layer. Use caution when straightening shifted loads before unloading.

Pipe should be unloaded with fork trucks or cranes using at least three slings or end hooks. The unloading equipment, slings, and/or cables with end hoods should be inspected for condition and lifting capacity prior to use.

If a fork truck is used, the forks should have sufficient length to safely support the strip load. The load should be approached slowly at the midpoint of the pipe lengths. To improve the load stability during transportation, the forks should be as far apart as possible.

If a crane with a single sling is used to unload the strip load, the lengths should be handled at their midpoints using wide web slings. If multiple slings or a spreader bar equipped with wide web slings are used, the equipment manufacturer's recommended capabilities, methods, and procedures should be used.

When banded pipe is being unloaded in full or partial rows, do not cut the band until the pipe is lowered to the ground. Do not cut bands by gouging them with an ax, chisel or hammer.

After each layer is off the trailer, remove dunnage from the top of pipe.

The following rules apply to all strip loads:

- Do not roll or drop pipe off the truck.
- Never stand on load of pipe. Standing on the load and cutting bands is extremely dangerous.
- Do not use backhoes, end loaders, or other material handling equipment to push or pull the load off the trailer. This is dangerous to unloading personnel and may damage pipe.
- Unload one layer at a time. Truck straps securing a layer should never be released until that layer is specifically ready to be unloaded.

Transporting Strip Loads using a Flatbed Trailer

As a minimum requirement, carriers shall provide nine (9) straps to secure strip loads. A minimum of five (5) straps shall secure the load over the top layer of pipe. Four (4) belly straps shall be used as close to the middle layer as possible.

Strap ratchets should alternate between trailer sides on equipment that facilitates this procedure. A half-twist in each strap is recommended on both sides of the load. This will prevent wind resistance from loosening the straps during transport.

Belly straps must be tightened very firmly before tightening top straps. Top straps must be tightly secured. Drivers must inspect and tighten straps within 50 miles of origin, during each stop, and especially after the load has been sitting overnight.

Loading Loose Loads on a Flatbed Trailer

"Loose Loading" is a method of packaging truckload quantities of pipe without the use of any row boards or saddles. Pipe is loaded into flatbed trailers fitted with metal stakes on the side. The use of pipe stakes is required on all loose loads. Pipe

stakes should be cut from 2" OD steel or iron pipe. Crimp one end to fit into a standard trailer stake pocket. The stake should be no longer than 8'-6" once firmly in the stake pocket. The stake should be free of excessive corrosion and rust.

Loose loaded pipe shall be loaded in layers according to specified quantities and patterns, based on pipe manufacturers loading charts. After loading no more than two layers of pipe, tie at least ½" diameter rope between each opposing set of pipe stakes. Use rope between every two layers of pipe. Repeat all steps until truckload quantity is loaded. The height of the load should not exceed 13' 6" from the ground.

Unloading Loose Loads from a Flatbed Trailer

People not involved in the unloading of the trailer must remain clear of the unloading area.

Only after checking that the pipe is secured on the trailer by combinations of side pipe stakes and ½" rope or steel banding, should the truck driver remove the nylon straps securing the load to the trailer.

Be sure equipment is rated to handle the weight of the pipe. Only untie rope that is over the top layer of pipe. As always, never stand on a layer of pipe.

Work the forks between the top layers of pipe, tilting forks back while moving them slightly forward. Lift the pipe over the pipe stakes on the side of the trailer. Repeat the above steps until unloading is complete.

Minimize pipe handling and movement by using detailed advance planning of the construction scheme.

Transporting Loose Loads using a Flatbed Trailer

As a minimum requirement, five (5) straps shall be used over the top of the load. Each strap should be tight. No tier straps shall be used on a loose load. The use of rope or steel banding in combination with pipe stakes is required on all loose loads.

Strap ratchets should alternate between trailer sides on equipment that facilitates this procedure. A half-twist placed in each strap is recommended on both sides of the load. This prevents wind resistance from loosening straps during transport. Driver must tighten straps within 50 miles of origin. Straps must be inspected at each stop, especially after sitting overnight.

5.5. Guidelines for Fittings

Transporting fittings using enclosed van or trailer

Fittings should be packaged in a gaylord box or fitting boxes may be palletized. Palletized fittings may be stretch wrapped for strength and preservation of the unit during shipping.

Transportation Fittings/Structures using a flatbed trailer

Fittings should be packaged in gaylord boxes or securely banded to a pallet. Strap rackets should be used to secure the load to the flat trailer. Driver should check and re-tighten straps if necessary within 50 miles of origin. Load should be tarped to prevent weather damage to fittings cartons or gaylord packaging.

6.0 PIPE AND FITTING STORAGE

Before pipe and/or fittings are placed into storage, they should be visually inspected for scratches, gouges, discoloration and other defects. Damaged or questionable materials should not be put into storage. Cuts and gouges that reduce the wall thickness by more than 10% may impair long-term service life and should be discarded.

6.1. Off-Site Storage Guidelines

Adequate storage space should be available at all receiving, processing and shipping areas. The storage areas should be arranged so that materials may be placed and removed in the most orderly manner possible. Access to storage and handling area shall be controlled so as to protect workers and individuals who are not directly involved with product storage, loading, unloading or transportation of materials.

Store small pipe in racks according to the length and size of the pipe. Block or strap the pipe to prevent it from rolling or falling off the rack. Pipe larger than two inches in diameter should be stacked with spacing strips between each row. Arrange and block each row of stacked pipe to prevent it from rolling off the pile. If pipe is stored outdoors, make sure all blocks are made of material that won't deteriorate as it weathers.

Material that cannot be stacked because of its size, shape or fragility should be stored on shelves. Make sure the shelves are capable of supporting the combined weight of the materials.

6.2. Job Site Storage Guidelines

The size and complexity of the project will determine pre-installation storage requirements. For some projects, several storage or staging sites along the right of way may be appropriate, while a single storage location may be suitable for another job.

The storage area should provide adequate protection against physical damage to components. It should be large enough to accommodate piping components as well as allow handling equipment to move about freely. The storage area should have a relatively smooth, level surface free of stones, debris or other materials that could damage the pipe or fittings.

Where adequate ground conditions do not exist or when a bed cannot be prepared, the pipe may be placed on planking. The planking should be evenly spaced along the pipe length.

When pipes of variable wall thickness are received, it is recommended that the pipe be segregated into piles, each pile containing a single size and pressure rating to minimize confusion at a later date. The thickest pipe should always be stored at the bottom of the pile. Furthermore, the pile should be constructed in a pyramidal, freestanding manner, with each successive layer having one less pipe than the layer below. The bottom layer should be braced to prevent movement.

The maximum allowable stacking heights for polyethylene pipe should not exceed those in Table 2. Pipe coils should be stored securely fastened on skids on a level surface.

Table 2: Suggested Loose Storage Stacking Heights for HDPE Pipe

Nominal PE Pipe Size	Suggested Stacking Height – Rows	
	Above DR 17	DR 17 & Below
4	15	12
5	12	10
6	10	8
8	8	6
10	6	5
12	5	4
14	4	3
18	4	3
20	3	3
22	3	2
24	3	2
26	3	2
28	2	2
30	2	2
32	2	2
36	2	1
42	1	1
48	1	1
54	1	1
63	1	1

6.3. Indoor/Outdoor Storage

ASTM D2513 “Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing and Fittings” contains the latest outdoor storage time limits for polyethylene pipe intended for gas distribution systems.

Since black HDPE pipe generally contains greater than 2% carbon black, it will resist damage from sunlight. Colored products are compounded with antioxidants, thermal stabilizers and UV stabilizers. These UV stabilizers will eventually be depleted; therefore, non-black products should remain in unprotected outdoor storage for no more than two years. Black products with stripes are generally suitable for unprotected outdoor storage and service.

Expansion and contraction caused by uneven heating in the sun may cause the pipe to bow if not restrained by racks. This does not damage the pipe but may be inconvenient when the pipe is taken out of storage for installation.

7.0 INSTALLATION SAFETY GUIDELINES

Job site safety begins with personal safety as outlined in section 2 of this guide. Personal protective equipment, hazard identification, and emergency preparation are essential safety elements at the installation site.

Follow the guidelines of OSHA and other state and local regulatory agencies on trench construction requirements. The trench should be dug to the required alignment and depth shown on the contract drawings or as directed by the supervising engineer. Excessive runs of open trench should be avoided to minimize such problems as trench flooding, caving of trench walls and the freezing of the trench bottom and backfill material. Principal considerations in trench construction are trench width, stability of the native soil, stability of trench walls and water accumulation in the trench. Refer to *Underground Installation of Polyethylene Pipe in PPI Handbook*, and *ASTM D2321* for more detailed information on trench construction.

Ice, snow and rain are not harmful to polyethylene components but may make the job site more troublesome for handling equipment and personnel. Unsure footing and traction require greater care and caution to prevent damage or injury. Inclement weather can make pipe surfaces slippery. It is generally a good idea not to walk on PE pipe, but this is especially true when your footing is unsure.

7.1. Cutting PE Pipe

When cutting the pipe with chain saws or other power equipment, keep your feet in the clear and block the pipe so it will not move during cutting. Wear protective equipment and never leave tools lying about. Cutting shears or guillotines blades are available for nominal pipe diameters 12 inches and smaller. Hand-held tubing cutters are also available for pipe and tubing less than or equal to four inch nominal.

7.2. Joining PE Pipe and Fittings

For detailed joining information, refer to "Polyethylene Joining Procedures" a chapter of the PPI "Handbook of Polyethylene Pipe" and/or ASTM F2620.

Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings. Reference also TR-33 "Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe" and TN-11 "General Guidelines for the Heat Fusion of unlike Materials" may be available in individual chapters. ASTM D2657 can be utilized for socket fusion, sidewall saddle fusion and electrofusion guidance. Guidance can also be obtained from recommendations by fusion machine manufacturer or approved use of an internationally recognized standard.

A detailed safety guide should be obtained from the fusion equipment manufacturer. Operators should read this document carefully before fusing pipe or fittings. If not used properly, blades, pinch points, heaters and moving parts on the fusion equipment can cause injury. As mentioned earlier, caution should be taken with heater plates as temperatures may exceed 400°F.

APPENDIX

Table A- 1: Coils-IPS

Nominal Pipe Size	Feet Per Coil	Coils Per Silo Pack	Feet per Silo Pack	No. Of Silo Packs/Truck	Total Footage per Truck
1-1/4" IPS	500	12	6,000	7	42,000
1-1/2" IPS	500	8	4,000	7	28,000
2" IPS	500	7	3,500	7	24,500
	1,500	2	3,000	7	21,000
3" IPS	500	4	2,000	6	12,000
	1,000	2	2,000	6	12,000
4" IPS	500	2	1,000	6	6,000
	1,000	1	1,000	8	8,000
6" IPS	500	1	500	8	4,000

NOTE: Drop deck trailers required for 4" X 1,000' & 6" coils

Table A- 2: Soft Sided Bundles-IPS

Nominal Pipe Size	Feet Per length	Lengths per Bulk Pack	Feet per Bulk Pack	No. Of Bulk Packs/Truck	Total Footage per Truck
2" IPS	40	99	3,960	12	47,520
3" IPS	40	46	1,840	14	25,760
4" IPS	40	29	1,160	14	16,240
5" IPS	40	45	1,800	6	10,800
6" IPS	40	13	520	14	7,280
8" IPS	40	9	360	10	3,600
10" IPS	40	11	440	6	2,640

NOTE: Bulk Packs utilize 2-5/8" thick bottom boards

Table A- 3: Soft Sided Bundles-DIPS

Nominal Pipe Size	Feet Per length	Lengths per Bulk Pack	Feet per Bulk Pack	No. Of Bulk Packs/Truck	Total Footage per Truck
3" DIPS	40	42	1,680	12	20,160
4" DIPS	40	26	1,040	12	12,480
6" DIPS	40	11	440	12	5,280
8" DIPS	40	9	360	10	3,600

NOTE: Bulk Packs utilize 2-5/8" thick bottom boards

Table A- 4: Hard Sided Bundles-DIPS

Nominal Pipe Size	Feet Per length	Lengths per Bulk	Feet per Bundle	No. Of Bulk Packs/Truck	Total Footage per Truck
1.5" DIPS	40	245	9,800	10	98,000
2" DIPS	40	156	6,240	10	62,400
3" DIPS	40	63	2,520	10	25,200
4" DIPS	40	38	1,520	10	15,200
6" DIPS	40	20	800	10	8,000
8" DIPS	40	14	560	8	4,480
10" DIPS	40	11	440	6	2,640

NOTE: Bundles use 2X4 Frame Construction

Table A- 5: Strip Load Joints-IPS

Nominal Pipe Size	Feet Per Length	Lengths Per Truck	Total Footage Per Truck
8" IPS	40	110	4,400
10" IPS	40	72	2,880
12" IPS	40	56	2,240
14" IPS	40	42	1,680
16" IPS	40	30	1,200
18" IPS	40	25	1,000
20" IPS	40	20	800
22" IPS	40	16	720
24" IPS	40	16	720
26" IPS	40	9	360
28" IPS	40	9	360
30" IPS	40	9	360
32" IPS (800mm)	40	9	360
34" IPS	40	6	240
36" IPS	40	4	160
40" IPS (1000mm)	40	4	160
42" IPS	40	4	160
48" IPS (1200mm)	40	4	160
54" IPS	40	2	80
63" IPS (1600mm)	40	1	40

NOTE: Truckload quantities based on 102" trailer width. Truckload weight maximums must be considered when shipping heavier wall or longer length product.

Table A- 6: Strip Load joints-DIPS

Nominal Pipe Size	Feet Per Length	Lengths Per Truck	Total Footage Per Truck
10" DIPS	40	56	2,240
12" DIPS	40	42	1,680
14" DIPS	40	30	1,200
16" DIPS	40	20	800
18" DIPS	40	16	640
20" DIPS	40	16	640
24" DIPS	40	9	360

ADDITIONAL RESOURCE

PPI Handbook of Polyethylene Pipe,
Chapter 2: Inspection, Tests, and Safety Considerations
www.plasticpipe.org

UNLOADING INSTRUCTIONS FOR POLYETHYLENE PIPE

WARNING!

GIVE THESE INSTRUCTIONS TO UNLOADING PERSONNEL WHEN ARRIVING AT THE DELIVERY SITE!

UNLOADING GUIDELINES FOR POLYETHYLENE PIPE/DUCT FREE- STANDING COILS AND REELS

1. Make sure truck is **parked on level ground**. If not, have driver move truck to a level area. **Engage hand brakes and chock wheels.**
2. **People not involved in the unloading of the trailer and the truck driver should remain clear of the unloading area.**
3. The trucker's chains or straps should be removed from the load only after checking that the load has not shifted and will remain stable. Use caution straightening shifted loads.
4. It is suggested that silo packs be unloaded from the side of the trailer with a forklift **having a capacity rating sufficient to handle the load**. The equipment should be inspected for condition prior to use.
5. Most trailers have a natural downward slope from the front of the trailer to the rear. It is suggested to begin unloading from the front to allow the strapped reels or coils to stay in place.
6. **Chains should not be applied directly to pipe/duct** unless special precautions are used to prevent damage to duct. Chains should be properly rated for the loads being lifted.
7. When lifting reels with chains, **do not lift by the flange rings**. Thread the chain through the arbor holes. **Nylon straps should never be threaded through the arbor holes** because the strap may be cut by the arbor plate.
8. If using a forklift to unload free-standing coils or reels, raise the carriage until the forks will prevent the loaded pipe/duct from moving when the shipping straps are removed. For lifting coils, **place forks on the inside surface of the coil; for reels, cradle the reel flanges from below** between the forks. Tilt forks slightly upward before moving the load. If using an overhead crane with slings, chock coils or reels before they are unstrapped. After coils or reels are off the truck, place the load on level ground and chock them to prevent moving before removing forks or slings.
9. **Do not roll or drop reels or coils off the truck!**
10. **Do not use backhoes, end loaders, or other material handling equipment to push or pull the load off the trailer. This is dangerous to unloading personnel and may damage the pipe/duct.**

WARNING!

GIVE THESE INSTRUCTIONS TO UNLOADING PERSONNEL WHEN ARRIVING AT THE DELIVERY SITE!

UNLOADING GUIDELINES FOR STALK PACK POLYETHYLENE PIPE/DUCT

1. Make sure truck is **parked on level ground**. If not, have driver move truck to a level area. **Engage hand brakes and chock wheels.**
2. People not involved in the unloading of the trailer and the truck driver should remain clear of the unloading area.
3. It is suggested that a forklift with approved **spread bar attachment** or crane **with a capacity rating sufficient to handle the load be used with protective fork covers or wide web slings of proper load rating**. The equipment should be inspected for condition prior to use.
4. **Do not roll or drop pipe/duct off trucks!** This is dangerous to unloading personnel and may damage duct and equipment.
5. Determine if the load is a “**Strip**” (layers are separated by boards with chocks at each end) or a “**Loose**” load (layers of pipe secured on trailer by side stakes and rope bands).
6. **If strip loaded**, before moving, **assure that chocks are secured to both ends of the timbers**. If not, nail a chock or other suitable wedge into position.
7. **The trucker’s chains or straps should not be removed from the load until it is known that the load has not shifted and will remain stable**. Use caution straightening shifted loads. Do not remove layer banding until unloading is to take place on that layer. **Do not stand on a load of polyethylene pipe/duct**.
8. Pipe/Duct should be unloaded with fork trucks or cranes using at least three slings. Addition protection of the load from scraping or gouging can be established by covering steel forks with a protective material.
9. When banded pipe/duct is being unloaded in full or partial rows, do not cut bands until duct is lowered to the ground and transported to its storage area.
10. If a crane with multiple slings or a spreader bar equipped with wide web slings are used, the equipment manufacturer’s recommended capabilities, methods, and procedures should be used.
11. **If loose loaded**, only untie rope that is over the layer of pipe to be unloaded. Work forks between top layers, tilting forks back while moving slightly forward. Lift pipe over pipe stakes on the side of the trailer.

WARNING!

GIVE THESE INSTRUCTIONS TO UNLOADING PERSONNEL WHEN ARRIVING AT THE DELIVERY SITE!

UNLOADING GUIDELINES FOR SILO PACK POLYETHYLENE PIPE/DUCT

1. Make sure truck is **parked on level ground**. If not, have driver move truck to a level area. **Engage hand brakes and chock wheels.**
2. People not involved in the unloading of the trailer and the truck driver should remain clear of the unloading area.
3. The trucker's chains or straps should be removed from the load only after checking that the load has not shifted and will remain stable. Use caution straightening shifted loads.
4. It is suggested that silo packs be unloaded from the side of the trailer with a forklift **having a capacity rating sufficient to handle the load**. The equipment should be inspected for condition prior to use.
5. The forks should have sufficient length to safely support the silo pack during unloading and transportation to the storage area.
6. To prevent possible injury or damage, the forks should slowly enter the pack between the top and bottom boards of the pallet.
7. Steel bands used on silo packs should not be removed until the silo packs have been transported to the storage area and secured in a stable and safe manner.
8. Avoid unnecessary standing on the load. **Do not remain on the load during unloading operations!**
9. **Do not use backhoes, endloaders, or other material handling equipment to *push* or *pull* the load off the trailer. This is dangerous to unloading personnel and may damage the pipe/duct.**