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<i>Handling, Storage and Shipping of Line Pipe</i>	C3.0511	05/05/2021

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Engineering Standard

Volume 3 – Materials and Equipment

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1 SCOPE AND APPLICABILITY

This engineering standard (ES) establishes the general requirements for handling, storing, and shipping of steel line pipe, either bare or with a corrosion-protective coating. It is the responsibility of the pipe manufacturer, distributor, COMPANY surplus storage personnel and construction contractors to handle, store and ship line pipe in accordance with this standard.

In addition to specifying the minimum requirements for the handling, storage and shipment of steel pipe by a contractor on behalf of the COMPANY.

This standard applies to line pipe being used in 49CFR 192 and 49CFR 195 service, and may be applied for other services.

In the event of a conflict, requirements identified in the Purchase Order supersede those noted in this standard.

2 REFERENCES

API RP 5L1 - Recommended Practice for Railroad Transportation of Line Pipe

API RP 5LW - Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels

API RP 5LT - Recommended Practice for Truck Transportation of Line Pipe

3.1602 / HL3.1602 - Inspection of Line Pipe at Receiving Yards

4.0103 / HL4.0103 - Pipeline Construction

6.0300 / HL6.0300 - Coating Manual

3 TERMS AND DEFINITIONS

COMPANY - refers to the combined entities of Energy Transfer (ET), and subsidiaries of ET and to authorized and designated COMPANY ET Representatives.

ES – Engineering Standard

Manufacturer / Distributor / Contractor - As used in this ES, the manufacturer of the pipe at the pipe mill, the coating facility, the distributor, or the Company's contracted third party that is responsible for the pipe's handling, storage, loading for shipment, or coating.

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Should - As used herein, means that a stated practice is to be considered a COMPANY Best Practice and is an expectation of the COMPANY unless otherwise approved by the Project Manager in consultation with COMPANY Subject Matter Experts.

4 GENERAL

Activities associated with the handling, storage, and shipping of all pipe, regardless of the Diameter/Thickness (D/T) ratio, must conform to the referenced API (RP) standards.

The following are general requirements for the handling, storage, and shipping of pipe:

- The manufacturer, coater, distributor or contractor bears the cost of replacement or repair, at the COMPANY’s option, of any of the pipe, end bevels, or pipe coating that is damaged due to the manufacturer’s, coater’s, distributor’s or contractor’s operations or negligence.
- The COMPANY has the right to inspect all activities related to the handling, storage, or shipping of pipe as covered by this ES.
- Pipe is to be protected during loading, transit, and storage in order to prevent contamination by oil, grease, saltwater, or other chemicals that could adversely affect coating adhesion.
- If the coater or the COMPANY’s designated third-party inspection finds contaminated pipe prior to blasting operations, the pipe shall be segregated at the coater’s facility. All affected pipe shall be cleaned by detergent washing or rejected. The COMPANY’s designated third-party inspection shall determine acceptability of pipe after it has been washed.
- Pipe with filler metal weld seams shall be positioned in such a manner that the weld does not come into contact with adjacent pipes, bearing strips, or wood blocking.
- Rope spacers are required on all pipe including bare pipe.

4.1 Handling

Pipe must be handled according to the following requirements:

- Pipe shall be handled at all times in a manner that will not cause dents, nicks, gouges, permanent bends, ovality, disbondment of coating, or other damage to the pipe, end bevels, or pipe coating.
- Equipment used in handling pipe shall meet the requirements of the COMPANY. The COMPANY Inspector shall inspect equipment prior to use and confirm acceptability.

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- The use of wire slings is prohibited unless special handling techniques are used to avoid cable marks on the pipe. Approval must be made by the Inspector.
- The bearing surfaces of end hooks shall have a shape and width sufficient to prevent permanent deformation of the pipe and bevels, including the land. The surfaces of end hooks that come in contact with the pipe shall:
 - Be covered with a protective cover (e.g., aluminum, Teflon, micarta, rubber inserts or ultra-high-molecular-weight polyethylene).
 - Be changed as required to prevent wearing to the base metal.
 - Not be lined with a copper alloy.
- A cable spreader bar should be used between the crane boom and end hooks, if necessary, to prevent pipe from deforming or being damaged.
- Forks for handling pipe shall:
 - Be free of burrs or projections that can gouge or scratch the pipe.
 - Have dense rubber or polyurethane padding at least 3/16 in. thick for handling coated pipe.
 - Have padded fork (including top, bottom and tips) when handling any portion of the pipe load that is nested.

4.2 Storage

Pipe must be stored according to the following requirements:

- Pipe of different specifications (i.e., size, wall, grade, manufacturer, and coating) shall be segregated and stored, separately in a manner that permits clear identification at all times.
- Stored pipe should be stacked on one of the following materials:
 - Earthen berms covered with 10 mil polyethylene and shall be constructed so that the pipe coating is not abraded (refer to *ES 4.0103 / HL4.0103 Pipeline Construction, Racking*).
 - Wooden timbers, which have the following requirements:
 - A minimum of 8 inches wide.

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- Three, equally spaced timbers are required to support a 40-foot length of pipe.
- An additional support timber is required for each additional 10 feet of pipe.
- The timbers or berms are sufficiently high to prevent groundwater or mud from contaminating the pipe and constructed / sloped to allow water to drain from each piece of stacked pipe.
- The pipe storage area has adequate drainage to prevent standing water under the pipe.
- The number or tiers of stacked pipe is limited to five (5) high to prevent deformation or other damage to the pipe or its coating due to the weight of the pipe. For pipe with OD greater than 30 in, consult with E&C Integrity to determine the acceptable number of tiers.
- Pipe with a fusion-bond epoxy coating is to be stacked in a manner and with materials of a type, thickness, and width necessary to maintain a minimum spacing of 3/4 inches between pipe ODs. The use of high-density polypropylene rope separators between each pipe, as recommended in Section 4.3.1 (Separators) is acceptable. Pipe coated with other materials may be nested unless the COMPANY specifies otherwise.

4.3 Shipping

The following subsections identify the requirements for the shipping of pipe by different transportation methods. Shipping of pipe shall meet the requirements covered in *API RP 5L1*, *API RP 5LT* or *API RP 5LW* to prevent damage to the pipe and coating. Special requirements are identified to minimize the potential of critical stresses and fatigue cracks caused by cold working during transit. Where there are conflicts, the more stringent of the requirements shall be met.

4.3.1 General

The general requirements for shipping of pipe are as follows:

- A loading diagram shall be provided to the COMPANY.
- When stacking pipe, the short lengths of pipe shall be placed on the top tier.
- Pipe being transported can experience transit fatigue, which can result in cracks that are generally found along the edge of submerged-arc welds, areas with dents, areas that have had metal-to-metal contact, or pipe ends. Cracks of this nature are usually found both on the ID and OD surfaces. The COMPANY is to be notified immediately if such defects are identified during inspection of pipe.

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- **Inspection of pipe:**

- Inspectors shall be given adequate notice prior to loading and unloading so that inspection of pipe can be completed.
- Bare pipe surface should be inspected for contamination by oil, grease, saltwater, or other chemicals that could adversely affect coating adhesion.
- If damage or contamination is identified on pipe or coating prior to loading, it shall be set aside and repaired. Repairs shall meet the requirements and acceptance criteria as provided to the manufacturer, coater, and/or distributor.
- If damage or contamination is identified after loading of pipe and where impractical to offload pipe to repair, the pipe shall be noted as requiring repair on BOL and communicated to the COMPANY. Photographs of damage shall be taken and submitted to the COMPANY.
- If damage or contamination is identified on pipe during or after offloading, it shall be set aside and repaired. Repairs shall meet the requirements of *ES 3.1602 Inspection of Line Pipe at Receiving Yards*.
- Pipe interiors are free of debris (e.g., cables, dunnage pads) at unloading.

- **Inspection of rail cars, trailers, barges and marine vessels:**

- Inspectors shall be given adequate notice prior to loading so that inspection of railcars, trailers, barges, and cargo compartment of vessels can be completed.
- Areas where pipe will be laid shall be clean and free of foreign materials and debris.
- No metal projections that may come in contact with pipe during loading or transporting shall be permitted.
- Inspectors shall be allowed to inspect pipe once pipe has been loaded, if practical, and again during unloading.

- **Dunnage shall:**

- Be of hard wood or dense fir.
- Have nail heads adequately countersunk to avoid damage to the pipe during transit.
- Be arranged to avoid contact between pipe and nails and/or staples when nesting pipe, see Separators below in this section.

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- **Bearing strips** shall:
 - Be made of wood with appropriate strength to handle the load. Metallic bearing strips are prohibited.
 - Not have metallic protrusions that could come in contact with the pipe.
 - Not have rounded corners, splits, or signs of rotting.
 - Be of sufficient width and thickness to ensure there is no contact between the pipe and the bottom or sides of the railcar, truck bed or vessel.
 - Concrete coated pipe shall be transported directly on the bed of the trailer to avoid any stress cracks from the timbers. Refer to 6.0300 / HL6.0300 for additional requirements specific to concrete coated pipe.
 - Be evenly spaced along the full length of the pipe.
 - Additional requirements specific to the mode of transportation shall be listed in the applicable sections of this ES.

- **Separators**, such as ropes or sleeves used to keep pipe from making full contact with another pipe, shall:
 - Be put in front of the bearing / separator strips or in contact with nested joints, in order to prevent loss of the ropes / sleeves during transit. Alternative methods (e.g., taping) may be used with the approval of the COMPANY's Inspector.
 - Be attached to each joint before handling.
 - Be loop type or be attached to the pipe by nonmetallic strapping. Nonmetallic straps that become brittle at cold temperatures shall not be used. Crimps used to bind strapping shall be of such a material or effectively positioned to avoid damage to coating on adjacent pipe when stored or loaded.
 - Comply with Table 1 for the types of separators that are permitted.
 - Comply with Table 2 on the number and spacing of separators required on each pipe as determined by the incremental length (or fraction thereof) of the longest pipe to be coated.
 - Pipe shall not have fewer than 3 separators.
 - HSAW pipe shall not have fewer than 4 separators
 - Be evenly spaced along the pipe and shall be applied to pipe before interim storage load-out. Outermost separators shall be within 2 ft. (0.6 m) of pipe ends.
 - Not be placed at approximately mid-length of pipe for a distance of 15 feet for Double Random Lengths (DRLs) and 20 feet for Triple Random Lengths (TRLs) and Quadruple Random Lengths (QRLs) to accommodate vacuum lifting.
 - Become the COMPANY's property.

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- Be pre-approved by the COMPANY if alternative types of separators will be used.
- **End caps** are not required, unless specified by the COMPANY.

Table 1 Separator Types

Separator Type	Description
A Cardboard Sleeves	Single piece, waterproofed, 1/8 in. minimum
B Dense Rubber	1/4 inch minimum thickness, 1 1/2 inch minimum
C Dense Rubber	1/4 inch minimum thickness, 3 inch minimum width
D Dense Rubber	0.6 inch minimum thickness, 3 inch minimum width
E Rope	polypropylene, tight weave, 3/8-inch diameter
F Rope	polypropylene, tight weave, 1/2-inch diameter
G Rope	polypropylene, tight weave, 5/8-inch diameter
H Rope	polypropylene, tight weave, 3/4-inch diameter
I Rope	polypropylene, tight weave, 1-inch diameter

Table 2 Separator Requirements

Pipe Diameter	Weight per Foot	Separator	Max. Incremental Spacing Length
Up to 4 5/8	All	A,B,C, or	15
All	Up to 30 lb/ft	B	15
		C	14
		E	13
		F	15
		G	15
All	31 lb/ft to 70 lb/ft	B	12
		C	6
		F	8
		G	15
		H	15
		B	8
		C	4

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All	71 lb/ft to 100 lb/ft	D	15
		F	5
		G	10
		H	15
		I	15
All	101 lb/ft to 150 lb/ft	B	5
		D	15
		G	7
		H	15
		I	15

4.3.2 Shipping by Railroad

When shipping pipe by railroad, the following requirements apply:

- The pipe is to be loaded on or in rail cars in accordance with all provisions of the latest edition of *API RP 5L1* regardless of the D/T ratio.
- End gates, that are lined with wood to a minimum nominal thickness of 1 inch, are to be provided in bulkhead flat cars.
- Bearing strips shall:
 - Be placed so that an even number of strips are utilized (a minimum of 4 bearing strips are required).
 - Be a minimum of 4 inch, thick and 4 inch, wide.
- **Skids** shall :
 - Be placed directly on the bottom / bed of the car. (Remove any residual debris).
 - Be at least 1 inch higher than any foreign material or integral projections on the car bottom / bed.
 - Not be stacked so that the skid height exceeds the skid width.
- Humping of cars is strongly discouraged as it may cause loads to shift damaging pipe. In the event that humping of cars occurs or is suspected to have occurred, the COMPANY shall be notified immediately. Additional inspection of pipe ends will be required. Damage to bevels or pipe body identified shall be repaired prior to acceptance.
- Shifting of loads should be minimized by the use of steel bands of at least one (1) inch in width. The bands shall be of sufficient number, properly spaced and tensioned.

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4.3.3 Shipping by Truck

When shipping pipe by truck, the following requirements apply:

- The pipe is loaded on a trailer in accordance with all provisions of the latest edition of API 5LT.
- The COMPANY (ET Logistics group) approves the type of truck or trailer that the manufacturer, distributor, or contractor proposes to use to transport the pipe.
- Metallic uprights on trucks / trailers shall:
 - Be padded the full length, 360 degrees around the pole with PVC, hard rubber or equivalent to a minimum thickness of 1/8 inch.
 - Have snug padding without sags or folds.
 - Not be of wood uprights or bare pipe stakes.
- Dunnage is arranged to avoid contact between pipes and nails and/or staples when nesting pipe, see Separators in section above.
- Skids are not stacked, and the skid height does not exceed the skid width.
- Nonmetallic hold-down straps are required. The use of chains is prohibited. The number and placement of hold-down straps shall be adequate to ensure pipes are secured to trailer in accordance with government regulations and to prevent shifting of load during transit.
- Pipe end overhang shall not exceed 4 feet beyond the end of the trailer and not to exceed 6 feet from the last supporting separator.
- Trucks shall be equipped with mud guards to prevent stones or other debris from impacting the pipe.
- **Bearing strips** shall:
 - Be at a minimum 4 inches thick and 4 inches wide. Wider and thicker bearing strips may be required to ensure the pipe is not touching the trailer bed or to accommodate space for forklifts. The thickness of bearing strips shall not exceed the width.
 - Meet the requirements of Table 3. If an odd number is specified, one bearing strip shall be placed approximately in the middle of the load with the rest spaced appropriately.
 - Be placed across the width of the trailer and be spaced to accommodate loading and unloading by forklift.
 - Not be placed more than 10 feet apart.

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Table 3 - Minimum Number of Bearing Strips By Random Length and Overhang

Overhang	Minimum Number of Bearing Strips		
	40 ft Random Lengths	60 ft Random Lengths	80 ft Random Lengths
Greater than 3 times nominal diameter	4 bearing strips	6 bearing strips	8 bearing strips
Less than or equal to 3 times nominal diameter	3 bearing strips	5 bearing strips	7 bearing strips

4.3.4 Shipping by Barge on Inland Waterways

When shipping pipe across inland waterways on a barge, the following requirements apply:

- The pipe is loaded into the cargo compartment in accordance with all provisions of the latest edition of API 5W.
- The bilge pumping system shall be in working order to remove standing water as necessary.
- A clearance of at least 1 foot must be left between the ends of the pipe and the vessel.
- Bearings strips shall be at a minimum 4 inches, thick and 4 inches, wide.
- When pipe is not nested horizontal separator strips may be used. Horizontal strips should be located directly above the bottom bearing strips.
- Coated pipe destined for barge load out is subject to special requirements dependent on loading arrangement.

4.3.5 Shipping by Sea-going Vessels

When shipping pipe across inland waterways on a barge, the following requirements apply:

- The pipe is loaded in accordance with all provisions of the latest edition of *API RP 5LW* regardless of D/T ratio.
- Pipe in the hold shall be cantlined stowed.
- Pipe is not shipped on the deck.



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- Wood blocking shall be utilized on every other tier on both sides of the hull when nesting pipe.
- Bearing strips shall:
 - Be utilized to prevent pipe from making contact with the bottom of the vessel. Side wood bearing strips shall also be used to prevent contact with the side of the vessel.
 - Be at a minimum 4 inches, thick and 4 inches, wide.
 - Not be placed more than four (4) feet apart with a minimum of four (4) bearing strips used per stack.
- No pipe end shall overhang an underlying pipe end by more than 3.3 feet.
- No over-stowage is permitted.
- Steel-to-steel contact is prohibited except for full-length pipe-to-pipe contact.
- Lashing is padded to prevent metal-to-metal contact with the pipe.
- Additional inspection of the pipe may be requested by the COMPANY if excessive height of waves or speed of vessel was encountered during transit and concern of transit fatigue exists due to the addition of other variables such as the length of vessel, response of the vessel to the water surface, and/or location of the pipe along the axis of the vessel.

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4.4 Dropped Pipes

In the event that a pipe is dropped either from handling or during transit, the following requirements apply:

- Dropped pipe(s) and any impacted pipes shall be segregated immediately for further evaluation as approved by the COMPANY. Acceptance of pipe is at the sole discretion of the COMPANY.
- The COMPANY shall be notified immediately and be provided with the following information:
 - Pipe number, pipe grade, OD, wall thickness, and length of joint(s).
 - Detail on type of damage to coating and/or pipe.
 - Photographs of damage to the pipe(s).
- If the pipe is to be further evaluated, the following additional requirements apply:
 - The COMPANY shall be provided with the height the pipe was dropped from and whether pipe impacted at an angle, i.e. one pipe end hit first, or impacted ground horizontally.
 - Both the coating and the pipe shall be evaluated for type of damage.
 - Affected pipes shall be evaluated for ovality and flat spots. Ovality checks shall be completed along the entire length of the joints.
 - The COMPANY shall specify the acceptance criteria for and authorize repairs.
 - Repairs shall be completed prior to final acceptance of the pipe.
 - The joint or segment of joint that exceed the acceptance criteria shall be rejected.
 - Additional evaluations may be requested from the COMPANY.
 - The COMPANY shall provide the final disposition of the pipe.

5 DOCUMENTATION REQUIREMENTS

For mill direct orders reference Annex Q Final Data Book Requirements in ES 3.1501 Purchase of HFW Line Pipe, 3.1502 Purchase of LSAW Line Pipe, or 3.1503 Purchase of HSAW Line Pipe for documentation requirements. For documentation requirements related to Plant Applied (internal / external) epoxy coating, see 6.0300 / HL6.0300.

For distributor orders reference ES 3.0501 Purchase of Stock Line Pipe for documentation requirements.



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The following shipping documentation shall also be submitted by the manufacturer, distributor, or contractor:

- BOL
- Tally Sheets

Unless specified otherwise in the purchase order:

- Three electric data interface (EDI) formats with data packages sent to:
 - Project Manager
 - Purchasing agent, submitted with invoices
 - Engineering and Construction Pipeline Integrity.



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