



Designation: A700 – 05

Standard Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 These practices cover the packaging, marking, and loading of steel products for shipment. Assuming proper handling in transit, the practices are intended to deliver the products to their destination in good condition. It is also intended that these recommendations be used as guides for attaining uniformity, simplicity, adequacy, and economy in the shipment of steel products.

1.2 These practices cover semi-finished steel products, bars, bar-size shapes and sheet piling, rods, wire and wire products, tubular products, plates, sheets, and strips, tin mill products, and castings. A glossary of packaging, marking, and loading terms is also included.

1.3 The practices are presented in the following sequence:

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1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical

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conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D245 Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber
D774/D774M Test Method for Bursting Strength of Paper
(Withdrawn 2010)³

D828 Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus
(Withdrawn 2009)³

D2555 Practice for Establishing Clear Wood Strength Values
D3953 Specification for Strapping, Flat Steel and Seals

2.2 Association of American Railroads:⁴

Rules Governing the Loading of Commodities on Open Top Cars

Pamphlet 23 —The Rules Governing the Loading of Steel Products in Closed Cars and Protection of Equipment

2.3 American Society of Agricultural Engineers:⁵

ASAE Standard S 229, Baling Wire for Automatic Balers

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 The following glossary defines packaging, marking, and loading terms:

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Association of American Railroads, American Railroads Bldg., 1920 L St., NW, Washington, DC 20036.

⁵ Available from American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, MI 49085.

*A Summary of Changes section appears at the end of this standard

- 3.1.2 *AAR*—Association of American Railroads.
- 3.1.3 “*A*” *end of car*—arbitrary definition used to describe the end of a freight car opposite the end on which the manual brake control is located. In the event there is a manual brake control on both ends, the ends are designated by stenciling the letters “A” and “B” respectively on both sides near the ends.
- 3.1.4 *air tool*—tool operated by air pressure used for strap tensioning, sealing, nailing, and so forth
- 3.1.5 *anchor plate*—a plate that is nailed to side or floor of car used to attach steel strapping for load securement.
- 3.1.6 *anchor tie*—a coil eye-tie that is applied in a special manner to resistant movement on bar or rod coils. A typical method is to wrap the tie around several strands, then around the complete coil.
- 3.1.7 *anti-skid plate*—a device with sharp projections placed under the package to retard shifting of the load in transit.
- 3.1.8 “*A*” *rack*—a rack built in the form of the letter “A” for storing steel bars.
- 3.1.9 *asphalt-laminated paper*—paper used for packaging or shrouding, or both, composed of two or more sheets of paper bonded by asphalt.
- 3.1.10 *back-up cleat*—wood strip nailed to floor or side of car to strengthen or prevent displacement of the primary blocking.
- 3.1.11 *banding, band*—See *strapping*.
- 3.1.12 *band protector*—material used under package or load ties to protect product from damage and to prevent shearing of the package ties.
- 3.1.13 *bare*—any product that has not been protectively wrapped or covered when packaged.
- 3.1.14 *barrel, slack*—wooden barrel, not watertight by construction, used for solid materials.
- 3.1.15 *basis weight*—standard weight accepted by trade customs, based upon standard size for the given class of material. The weights of all other standard sizes are proportionate to the size and weight established for the given class of material.
- 3.1.16 *batten strips*—strips of wood used to protect machined surface or projections on castings from damage by the securing tie or contact with other objects. Their location is optional but must be so located to afford maximum protection.
- 3.1.17 *bearing pieces*—supports beneath but not secured to lift, package, or load.
- 3.1.18 *belt rails*—perforated angle or channel, running length-wise at various levels along wall of vehicle, used to affix load-securement devices such as cross members or bulkheads.
- 3.1.19 “*B*” *end of car*—the end of a freight car on which the manual brake control is located. In the event there is a manual brake control on both ends, the ends are designated by stenciling the letters “A” and “B” respectively, on both sides near the ends.
- 3.1.20 *beveled*—usually refers to a packaging or loading member with ends or edges cut at an angle other than 90 deg.
- 3.1.21 *binder*—a clamping device used to secure chains or cables.
- 3.1.22 *blocking*—material used to prevent or control movement of the unit or load or to facilitate handling.
- 3.1.23 *box*—a fully enclosed rigid container having length, width, and depth.
- 3.1.24 *box car*—a freight car completely enclosed by ends, sides, and roof equipped with doors to permit entry of loading equipment and lading.
- 3.1.25 *bracing*—material used to make the unit or load firm or rigid.
- 3.1.26 *brand*—producer’s or consumer’s identification marks.
- 3.1.27 *bulkhead*—fabricated and affixed barrier used to prevent lengthwise movements of a unit or load.
- 3.1.28 *bulkhead, movable*—bulkhead, part of railroad equipment, that is capable of being adjusted for load securement.
- 3.1.29 *bumper block*—material affixed to ends or sides of a unit or load to prevent damaging contact.
- 3.1.30 *bundle*—two or more pieces secured together.
- 3.1.31 *cleat*—a piece of material, such as wood or metal, attached to a structural body to strengthen, secure, or furnish a grip.
- 3.1.32 *clinched tie*—a coil eye-tie (round wire) that is tensioned after manual twisting. Normally done with special twisting tool or a bar.
- 3.1.33 *coil*—a continuous length of wire, bar, rod, strip, sheet, and so forth, cylindrically wound.
- 3.1.34 *coil car*—railroad car specially equipped for the transportation of sheet or strip coils.
- 3.1.35 *coil carrier*—a carrying and dispensing device primarily for wire coils.
- 3.1.36 *coil group*—two or more coils secured into a unit that can be handled as a single package.
- 3.1.37 *coil skid*—See (coil) *platform*.
- 3.1.38 *core*—a cylinder on which coiled products are wound and which remains in the inside diameter after winding.
- 3.1.39 *corrosion inhibitor*—any material used by the steel industry to inhibit corrosion. This includes chemicals, oils, treated packaging materials, and so forth.
- 3.1.40 *corrugated box*—shipping container made of corrugated fiber board.
- 3.1.41 *covered*—top, sides, and ends of package covered with paper under the ties.
- 3.1.42 *crate*—a container of open-frame construction.
- 3.1.43 *cross member “DF”*—a wood or metal support of rated strength that is attached to the belt rails of a vehicle and that may be used with or without a bulkhead to contain the load.

3.1.44 *cushion underframe*—a device affixed to the underframe of a railroad car to absorb longitudinal shocks caused by impacts.

3.1.45 *damage-free box car*—box car equipped with load securement.

3.1.46 *deck*—top surface of a platform or pallet.

3.1.47 *desiccant*—chemical used to absorb moisture.

3.1.48 *double deck*—two-level stacking.

3.1.49 *double-door box car*—box car equipped with two doors on each side. The doors may be staggered or directly opposite.

3.1.50 *drums*—fiber or metal cylindrical containers.

3.1.51 *eye (of coil)*—center opening of coil.

3.1.52 *eye vertical*—placement of coil with eye of coil vertical.

3.1.53 *filler block*—wood block used to fill voids when necessary for effective packaging or loading.

3.1.54 *fixed bulkhead*—immovable bulkhead permanently attached to car.

3.1.55 *floating load*—a rail load that is permitted to move in a longitudinal direction so that impact shocks are dissipated through movement of the load.

3.1.56 *gondola*—a freight car with sides and ends but without a top covering. May be equipped with high or low sides, drop or fixed ends, solid or drop bottoms, and is used for shipment of any commodity not requiring protection from the weather.

3.1.57 *gondola, covered*—a gondola with a movable or removable cover. Used for the shipment of any commodity that requires protection from the weather.

3.1.58 *gondola, drop-end*—a gondola with ends in the form of doors which can be lowered to facilitate loading and unloading, or for transporting long material that extends beyond the ends of the car.

3.1.59 *gondola, fixed-end*—a gondola with fixed ends and sides but without top covering.

3.1.60 *gondola, low-side*—a gondola with car sides under 45 in. (1.14 m).

3.1.61 *greaseproof paper*—paper treated to inhibit absorption of grease or oil.

3.1.62 *gross weight*—See definitions under *weights*.

3.1.63 *guide strips*—lumber secured to car floor to prevent lateral movement of lading.

3.1.64 *hand bundle*—a secured or unsecured unit that can be handled manually.

3.1.65 *headerboard*—bulkhead on the front end of a trailer to protect the cab from shifting of the load.

3.1.66 *ID*—inside diameter or inside dimension.

3.1.67 *idler car*—flat car or drop-end gondola placed adjacent to a car carrying an overhanging load.

3.1.68 *insert*—a support used in the inside diameter of a coil placed in position after the coil is formed to prevent collapse.

3.1.69 *integral cover*—a retractable permanently affixed cover on a gondola or flat car.

3.1.70 *interleaving*—placing paper between sheets in a lift or between coil wraps for protection against abrasion.

3.1.71 *interlocking*—procedure for stacking small channels and shapes.

3.1.72 *joint strength*—the tension measured in pounds that a tied joint can withstand before the joint slips or breaks.

3.1.73 *keg*—a small barrel.

3.1.74 *knee brace*—a triangular brace against the load consisting of a vertical and a diagonal member used to prevent shifting of the load. It is frequently supplemented with cleats.

3.1.75 *kraft paper*—wood pulp paper made by the sulfate process.

3.1.76 *label*—paper or other material affixed to the package containing identification of product, consignee, producer, and so forth

3.1.77 *lagging*—narrow strips of protective material, usually wood, spaced at intervals around a cylindrical object as protection against mechanical damage.

3.1.78 *laminant*—the bonding agent used to combine two or more sheeted materials such as films, foils, paper, and so forth. Often selected to improve barrier qualities of the laminated product.

3.1.79 *lift*—a unit prepared for handling by mechanical equipment. It may be either secured or loose.

3.1.80 *lift truck*—a wheeled device used to lift and to transport material. May be a fork lift, ram lift, platform, or straddle truck.

3.1.81 *light weight*—See definition under *weights*.

3.1.82 *load limit*—the maximum load in pounds that the conveyance is designed to carry.

3.1.83 *loose*—often used to mean shipping unsecured.

3.1.84 *LTL*—less truck load; quantities shipped in amounts less than truck load.

3.1.85 *marking*—term applied to any of several methods of identifying steel products such as stenciling, stamping, free handwriting, printing, or bar coding.

3.1.86 *metal package*—a paper-wrapped package enclosed with metal intended for overseas shipment.

3.1.87 *multiple lift*—usually refers to unsecured individual lifts of sheets combined one on top of another to make a package.

3.1.88 *MVT*—moisture vapor transmission.

3.1.89 *nailable steel floor*—steel floor designed with slots or perforations to permit nailing of lumber blocking.

3.1.90 *nestable steel products*—rolled or formed steel products or containers that can be fitted into each other when packaged or loaded.

3.1.91 *net weight*—See definition under *weights*.

3.1.92 *OD*—outside diameter or outside dimension.

3.1.93 *oilproof*—a term used to describe packaging materials that are oil resistant.

3.1.94 *package*—one or more articles or pieces contained or secured into a single unit.

3.1.95 *pallet*—a structure of wood, metal, or other materials having two faces separated by stringers. Either or both faces may be solid or skeleton construction.

3.1.96 *piggy back*—highway trailers transported on freight cars.

3.1.97 *platform*—a structure of wood, metal, or other materials consisting of a deck supported by runners used to facilitate mechanical handling. The deck may be solid or skeleton.

3.1.98 *pneumatic tool*—a tool operated by air pressure for purpose of tensioning, sealing, nailing, and so forth.

3.1.99 *polyethylene*—a synthetic material used as a free film or in combination with other materials (usually paper) as a protective wrap, cover, or shroud.

3.1.100 *port mark*—marking that identifies the port of discharge.

3.1.101 *racks, storage*—a structure on which material is stored.

3.1.102 *reel*—any device with a flange on each end of which material may be wound, having a flange diameter of 12 in. (305 mm) or over.

3.1.103 *retarder plates*—formed metal plates secured to the floor through which unit securement bands are threaded. They are used to retard movement of loads.

3.1.104 *rub rail*:—

a rail extending around the perimeter of a flat-bed trailer.

a buffer strip used in a conveyance between the side and the lading.

a guide on flat cars used in TOFC service.

3.1.105 *runner*—member supporting platform deck.

3.1.106 *rust inhibitor*—a chemical agent used to retard oxidation.

3.1.107 *seal*:—

means of effecting strapping joints.

protective device used to provide evidence that closure has not been disturbed.

3.1.108 *seal protector*—a protector to prevent strapping seal indentation damage to the product.

3.1.109 *secured lift*—See *lift*.

3.1.110 *separator*—any material placed between units of the package or load to provide clearance.

3.1.111 *shroud*—a protective cover placed over the load, unit, or package, covering the top and four sides.

3.1.112 *skeleton platform*—See *platform*.

3.1.113 *skid protector (stain protector)*—any of various practices followed to prevent corrosion damage from packaging lumber.

3.1.114 *skids*—supporting members placed either lengthwise or crosswise beneath and secured to the material to facilitate handling.

3.1.115 *solid platform*—See *platform*.

3.1.116 *spool*—a device with a flange at each end on which material may be wound, having flange diameters up to 12 in. (305 mm).

3.1.117 *stack*—placement of materials or package in tiers.

3.1.118 *stake pocket*—a metal receptacle that is part of the vehicle and that is designed for the acceptance of stakes.

3.1.119 *stakes*—metal or lumber placed vertically along sides of vehicle to prevent movement of the lading beyond the side of the vehicle. Also used to provide clearance between the lading and the side of the vehicle.

3.1.120 *stamp*—to identify with either metal or rubber die.

3.1.121 *stencil*—to provide identification through the use of a precut stencil.

3.1.122 *strapping*—flexible material used as a medium to fasten, hold, or reinforce, for example, steel strapping; flat steel band designed for application with tensioning tools.

3.1.123 *strapping joint*—location or method of providing a strapping closure.

3.1.124 *stringers*—supporting members that separate the two faces of a pallet.

3.1.125 *tag*—material, such as paper, plastic, or metal, on which product or shipping data are furnished and which is fastened to a package or container by wires, staples, tacks, and so forth.

3.1.126 *tally*—a recapitulation of items comprising a load.

3.1.127 *tare weight*—weight of container or packaging materials.

3.1.128 *tarps*—water-resistant material used to protect load or materials from the elements.

3.1.129 *tension tie*—strapping applied with mechanical tools.

3.1.130 *theoretical weight*—a calculated weight based on nominal dimensions and the density of material.

3.1.131 *tier*—one of two or more rows placed one above the other.

3.1.132 *TOFC*—trailer on flat car. See *piggy back*.

3.1.133 *truck*—a rubber-tired highway vehicle in the form of a straight truck, semi-trailer, full trailer, or any combination thereof.

3.1.133.1 *flat bed*—a truck whose cargo-carrying area is a flat surface without sides, ends, or tops.

3.1.133.2 *low side*—a truck whose cargo-carrying area is a flat surface equipped with side and ends and approximately 2 ft 6 in. to 4 ft (0.76 to 1.22 m) in height.

3.1.133.3 *removable side*—a truck whose cargo-carrying area is a flat surface equipped with removable sides and rear door approximately 2 ft 6 in. to 8 ft (0.76 to 2.44 m) in height.

TABLE 1 Protective Coatings Used to Protect Steel Mill Products

Type	Method of Application	Purpose
Type A—Thin soft film preservative consisting of a rust inhibitor in petroleum oil	cold; spray, dip or brush	to provide protection against corrosion and staining of steel mill products for short-term preservation periods (up to 3 months indoor storage)
Type C—Hard drying varnish resinous or plastic coating	cold; spray, dip or brush	to provide protection against corrosion of steel mill products for intermediate-term preservation periods (up to 6 months outdoor storage)
Type D—Medium soft film preservative in a solvent	cold; spray, dip or brush	to provide protection for edges of coils or cut lengths

3.1.133.4 *open top high side*—a truck whose cargo-carrying area is a flat surface equipped with high sides and ends but no permanent top. The end at rear of vehicle opens to facilitate loading.

3.1.133.5 *pole trailer*—highway trailer with a pole-like connection between the front and back wheels for transporting long material.

3.1.133.6 *expandable trailer*—a flat trailer of more than one section which may be extended for long product.

3.1.133.7 *van*—a truck or trailer with nonremovable top.

3.1.134 *twist ties*—round or oval ties in which the joint is made by twisting the two ends together.

3.1.135 *unitized*—segments of the load secured into one unit.

3.1.136 *unsecured lifts*—See *lift*.

3.1.137 *VCI*—volatile corrosion inhibitor. One type of rust inhibitor.

3.1.138 *waster sheet*—a secondary grade sheet, sometimes used in packaging to increase resistance to mechanical damage.

3.1.139 *waterproof paper*—paper constructed or treated to resist penetration of water in liquid form for specific lengths of time.

3.1.140 *weights (package)*:—

3.1.140.1 *gross weight*—total weight of commodity and all packaging.

3.1.140.2 *lift weight*—the weight of the material in a lift.

3.1.140.3 *net weight*—the weight of the commodity alone excluding the weight of all packaging material or containers.

3.1.140.4 *tare weight*—weight of packaging components.

3.1.141 *weights (transportation)*:—

3.1.141.1 *gross weight*—total weight of lading and transporting vehicle.

3.1.141.2 *light weight*—the weight of the empty transporting vehicle. On rail cars, the light weight is stenciled on car sides.

3.1.141.3 *tare weight*—same as *light weight*.

3.1.142 *wrapped*—a package or shipping unit completely enclosed with protective material.

4. General Provisions

4.1 *General*—It is recommended that producers and users follow the packaging, marking, and loading methods for individual steel products so described and illustrated herein. It

is the responsibility of the purchaser to provide the producer with his requirements concerning protective wrapping materials. When unusual or special conditions require packaging, marking, and loading methods not covered herein, the purchaser should consult with the supplier. Each load involves variables in lading and equipment which cannot be precisely covered by loading rules. Therefore, it is essential that the receiver supply the shipper with pertinent information on his unloading methods and equipment.

4.2 *Railcar Loading*—All domestic rail shipments of steel products are loaded in accordance with the latest rules governing the loading of either open top cars or closed cars as published by the Association of American Railroads. These publications are entitled “Rules Governing the Loading of Commodities on Open Top Cars” and “Pamphlet 23—The Rules Governing the Loading of Steel Products in Closed Cars and Protection of Equipment.”

4.3 *Truck Loading*—The trucker is responsible for the arrangement and securing of the load for safe transit, the protection of the lading from damage by binders, and the prevention of damage to the lading from the elements. These loads shall be in accordance with applicable state and federal or provincial, national, and international regulations.⁶

4.4 *Barge Loading*—There are no formal rules covering barge loading. Steel products are suitably packaged and the barge is loaded to provide ample clearance or blocking, or both, for subsequent handling and unloading. Covered or open-top barges may be used depending upon the nature of the product.

4.5 *Air Shipment*:

4.5.1 When metal plates, strips, sheets, bars, rods, angle stock, tubes, and pipe are to be shipped by air, they shall be packed as follows:

4.5.1.1 Plate, sheet, and strip shall be packed in snug-fitting boxes reinforced with steel straps or in metal packs.

4.5.1.2 Bar, rod, angle stock, pipe, and tube shall be packed in snug-fitting crates with solid wood ends or in boxes, as required for protection.

4.5.1.3 Single pieces or bundles of steel stock shall have a snug-fitting wood cap secured over each end. End caps shall be

⁶ Code of Federal Regulations Title 49—Transportation, Chapter III—Federal Highway Administration, Department of Transportation, Subchapter B—Motor Carrier Safety Regulations, Part 393, Parts and Accessories Necessary for Safe Operation, Safe Loading of Motor Vehicles. This footnote applies only to U.S. domestic shipments.

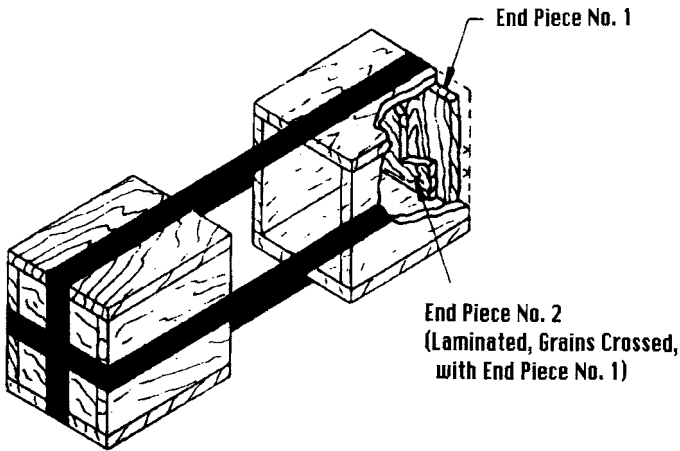


FIG. 1 End Caps for Air Shipment

fabricated as shown in Fig. 1. Lumber and construction of end caps shall be as specified in 4.6.2. End cap shall be secured to each other by flat or round wire steel strapping. Straps should be secured to end caps with staples. Caps shall be a minimum of 18 in. (450 mm) in length and a minimum of 2½ in. (60 mm) square at the end.

4.5.1.4 Castings, forgings, and other large or irregular shapes shall be preserved, packed, and marked as agreed between purchaser and seller.

4.6 Packaging Materials:

4.6.1 General—Materials not covered by specifications or which are not specifically described herein shall be of a quality suitable for the intended purpose. Specifications described are intended as the minimum requirements for packaging of steel products. After the product has been delivered, purchasers are faced with the problems of disposal of the packaging materials. For this reason the simplest effective packaging is the most desirable. The packaging materials described are subject to change in accordance with the rapidly developing technology and the changing regulations affecting ecology.

4.6.2 Lumber—The proper selection of lumber for use in the packaging of steel products depends upon many factors, such as end use, compressive strength, beam strength, hardness, moisture content, nail-holding power, condition, and so forth. Detailed information is contained in Specifications D245 and Test Methods D2555.

4.6.3 Protective Wrapping Material—Protective wrappings are used in packaging to (1) retard moisture penetration, (2) minimize loss of oil, and (3) provide protection from dirt.

4.6.3.1 Paper—The basis weight is determined by the number of pounds per 500 sheets of 24 by 36 in. For example, 50-lb kraft paper will equal 50 lb per 500 sheets of 24 by 36 in. The following tests may be used to determine the physical properties of paper:

Test	ASTM Method
Bursting strength	D774/D774M
Tensile strength	D828

4.6.3.2 Oil-Resistant Paper—Paper treated, laminated, or constructed to resist absorption of oil from the packaged product.

4.6.3.3 Waterproof Paper—These papers are laminated, coated, or impregnated with a moisture-barrier material.

4.6.4 Protective Coatings—In selecting corrosion-preventive materials to protect steel mill products during shipment and storage, consideration should be given to ease and method of application, coverage desired, severity of conditions expected, and ease of removal. The material and method of application determined to be the best suited for protection of a product are based on experience. Therefore, selection of protective coatings should be left to the discretion of the steel supplier whenever possible. The protective coatings used on steel products are listed in Table 1.

4.6.5 Package Ties—Tying of packages shall be accomplished by tension-tying with bands or wire; or by hand tying and twisting heavy-gage wire or rods. Either bands or wire may be used for package ties, regardless of which type of tie is shown in illustrations in the individual product sections of this practice.

4.6.5.1 Breaking Strength Ties—used in packaging steel mill products shall have the minimum breaking strengths of Specification D3953.

4.6.6 Protectors—Protectors are used with certain products to protect them from damage and to prevent shearing of the ties. Various materials, such as lumber, metal, plastic, fiber, or other suitable materials, are used under the package ties as required.

4.7 Package Identification:

4.7.1 All marking shall be legible and of a size consistent with the space available to be marked. All tags shall be securely affixed to the package to prevent loss in transit. Tags shall be of a size to show clearly all of the information required, and shall be able to withstand reasonable exposure to the elements.

4.7.2 Marking Metal Surfaces—Unless otherwise specified, metal surfaces shall be marked with either permanent ink or paint.

4.7.3 Marking Containers—All materials used for marking containers shall be resistant to the elements.

4.8 Weight and Count—When steel products are invoiced on mill scale weights and such weights are checked after shipment, variations from invoice weights up to 1% are normally expected due to differences in the kind, type, and location of the scales. When invoiced on mill scale weights, where there are large quantities of one size or thickness, or where the number of pieces in a lift or bundle is required to be shown on the identification tags and shipping papers, the count is considered approximate and the weight is the more accurate. When steel products are invoiced on theoretical weights, the invoice weights are based on the number of pieces or lineal feet shipped.

4.9 Packaging Lists or Tally—Furnished as required. Such lists are compiled as accurately as practicable, subject to confirmation by the official shipping notice or invoice.

4.10 Loss or Damage—If upon delivery there is any evidence of loss or damage, exception should be taken by notation on the freight bill, and the carrier's representative should be called in to inspect the lading before unloading.

5. Semifinished Steel Products

5.1 Semifinished steel products are generally produced for further processing and, because of their nature, only the simple methods of packaging and loading described below are recommended.

5.2 Product Grades:

5.2.1 Carbon, alloy, and stainless steel ingots, blooms, billets, and slabs.

5.2.2 Carbon steel skelp in coils.

5.3 Marking:

5.3.1 It is normal practice to stamp or paint the heat number on each piece shipped loose and to show the heat number on a tag attached to each secured lift of smaller size billets. The ordered size and weight may be painted on at least one piece of each size when shipped loose or on at least one piece of each secured lift. Each skelp coil is tagged or marked with the heat number and the size.

5.3.2 *Color Marking*—There is no generally recognized color code for identification of steel grades. When specified, color marking to denote grade is applied. In such cases a dash of color on one end of loose pieces is sufficient. In the case of secured lifts of smaller sizes, the grade is shown on a tag attached to the lift or by a dash of one color on one end of the lift.

5.4 Packaging:

5.4.1 Semifinished steel products are usually shipped loose. When specified, lifts of billets 9 in.⁷ (58 cm⁷) and under in cross section may be secured into lifts of 5 tons (4.5 Mg) or heavier. The securing of this type of package consists of ties of soft wire rod or tensioned flat bands. The number of ties to be used on any specific lift can best be determined by the shipper's experience.

5.4.2 Skelp in coils is secured with a minimum of two ties per coil.

5.4.3 Semifinished steel products are usually shipped in open-top equipment and require no further protection from the elements.

5.5 *Loading*—Semifinished steel products are usually shipped loose with different sizes or weights segregated. Unitizing requires additional labor and material.

6. Hot-Rolled Bars and Bar-Size Shapes

6.1 Hot-rolled bars and bar-size shapes are usually further processed by the purchaser. Simple methods of packaging and loading are recommended. The major consideration is the prevention of physical damage in transit, such as bending or twisting.

6.2 Product Grades:

6.2.1 Carbon, alloy, and stainless steel bars, and bar-size shapes.

6.2.2 Concrete reinforcing bars.

6.3 Marking:

6.3.1 *Carbon, Alloy, and Stainless Steel Bars, and Bar-Size Shapes:*

6.3.1.1 It is normal practice to identify each lift or coil with a tag containing the following information:

- (1) Producer's name, brand, or trademark,
- (2) Size,
- (3) ASTM designation (year date is not required),
- (4) Heat number,
- (5) Weight (except coils),
- (6) Customer's name, and
- (7) Customer's order number.

6.3.1.2 *Die Stamping of Carbon Steel Bars*—The ultimate uses of the products do not usually require die stamping. Therefore, this method of marking for other than mill identification requires additional labor and handling.

6.3.1.3 *Die Stamping of Alloy and Stainless Steel Bars*—When specified, heat numbers or symbols are stamped on one end or on the surface near the end of rounds, squares, hexagons, and octagons 2 in. (51 mm) and larger, and on flats 2 in. in width or 2 in. or over in thickness.

6.3.1.4 The above described marking is practicable on smaller sizes down to a minimum of 1 in. (25 mm) in thickness and 1 in. in width for flats, and not less than 1 in. in thickness or diameter for other bars, but because of its precise nature, such marking delays normal production.

6.3.1.5 Stamping of sizes under 1 in. is not practicable. These sizes are secured in lifts and tagged to show heat numbers or symbols.

6.3.1.6 *Color Marking*—There is no standard color code for identification of steel grades. When marking of bars with identification colors is required, the following practices are regularly employed:

- (1) Sizes 2 in. (51 mm) and over are marked on one end with not more than two colors.
- (2) Sizes 1½ in. (38 mm) up to 2 in. (51 mm) are marked on one end with not more than one color.
- (3) Sizes smaller than 1½ in. (38 mm) are not marked individually; but the bundle, lift, or pile (any size bar or flats) is marked on one end with a dab of paint of one color or not more than two different colored stripes.
- (4) Bars are regularly painted after assembly into lifts, and due to the nonuniformity of ends, it is not expected that paint will be on every bar in the lift. Any other paint marking slows normal production. Superimposed color marking requires additional labor and time for drying.

(5) When the back of the tag is color marked, one or two colors are used or the names of the colors are given.

6.3.2 Concrete Reinforcing Bars:

6.3.2.1 It is normal practice to identify each lift with a tag containing the following information:

- (1) Producer's name, brand, or trademark,
- (2) Size or bar designation number, and
- (3) Grade and specification.

6.3.2.2 *Color Marking*—When specified, a dab of paint, one color only for each grade, is placed on one end of each lift to distinguish grades. Such marking augments but does not replace the marking requirements contained in the product specification.

⁷ A revision of Simplified Practice Recommendation R 247-62, formerly published by the U. S. Department of Commerce.

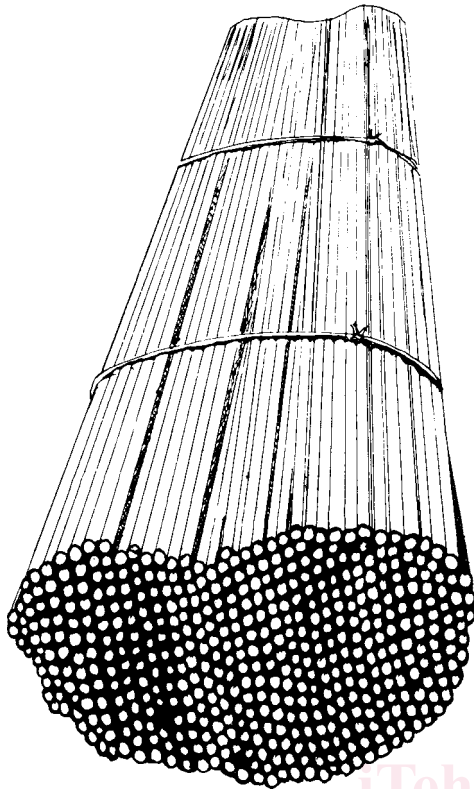


FIG. 2 Suitable Secured Lift—Hot-Rolled and Cold-Finished Bars and Bar-Size Shapes

6.4 Packaging:

6.4.1 Carbon, Alloy, and Stainless Steel Bars, and Bar-Size Shapes:

6.4.1.1 Secured Lifts—Bars are generally packaged into secured lifts (see Fig. 2 and Fig. 3). The recommended weight of hot-rolled bars in a secured lift is 10 000 lb (4.5 Mg). Lifts under 10 000 lb require additional material and handling. Producers recommend that purchasers specify the maximum possible weight for lifts because heavier units withstand transportation hazards better and result in greater economy to both the purchaser and the producer. The securement of this type of package consists of ties of soft wire rod or tensioned flat bands. The number of ties to be used on any specific lift can best be determined by the shipper’s experience. This recommended securement is adequate for normal handling and transit requirements. Handling by means of the package ties or by magnet is considered an unsafe practice and is not recommended.

6.4.1.2 Loose Bars—The term “loose” means single pieces that can be handled individually. This method of loading is sometimes used when shipping to purchasers who unload by hand or magnet or for shipping large bars.

6.4.1.3 Stack Piling—This method of piling is regularly used for straightened flats and certain shapes and consists of arranging pieces in order and securing into lifts of 10 000 lb (4.5 Mg) minimum weight. Stack piling of bars under 1 in. (25 mm) in width is impractical. When stack piling is specified for other than straightened flats or shapes, additional handling is generally required. Fig. 4 illustrates a suitable lift of stack-piled straightened flats.

6.4.1.4 Bar Coils—Hot-rolled bar coils are regularly secured with two ties of soft wire or flat steel bands and loaded loose, unprotected, in open-top equipment. Bar coils that have had special treatment, such as cleaned and coated or cleaned and oiled, are loaded in closed or covered equipment and require additional labor and material. Securing two or more bar coils into a coil group requires additional labor and material.

6.4.1.5 Protective Coatings—The nature of hot-rolled bars or bar-size shapes is such that protective coatings are not regularly applied.

6.4.2 Concrete Reinforcing Bars—Concrete reinforcing bars are secured in lifts as illustrated in Fig. 2. The recommended weight of bars in the secured lift is 10 000 lb (4.5 Mg) or more. Lifts under 10 000 lb require additional labor and materials. The securement of this type of package consists of ties of soft wire rods or tensioned flat bands. The number of ties to be used on any specific lift can best be determined by the shipper’s experience. Secured lifts in the smaller sizes may contain individually tied bundles within the lift. Bundling of the smaller sizes requires additional material and handling. Packaging of concrete reinforcing bars into units of specified count, weight, or dimensions requires additional handling and material.

6.5 Loading:

6.5.1 Carbon, alloy, and stainless steel bars, bar-size shapes, and concrete reinforcing bars are regularly shipped unprotected in open-top equipment. Loading of closed equipment and flatcars requires additional handling and materials.

6.5.2 When separation of lifts is required to allow sufficient clearances needed for unloading equipment, separators or bearing pieces are furnished up to a maximum of commercial 4-in. lumber.

6.5.3 Weather Protection—Hot-rolled bars, hot-rolled heat-treated bars, bar-size shapes, and concrete reinforcing bars generally require further processing or fabrication and, therefore, are regularly shipped in open-top equipment, unprotected. When the bars are scale-free or have been processed beyond the as-rolled or heat-treated condition, such as by pickling and oiling or by pickling and liming, producers usually recommend protection by shipment in covered equipment or by wrapping or shrouding when loaded in open-top equipment. In covered rail equipment, shrouding may be required. Fig. 5 illustrates a suitable method of wrapping lifts for loading in open-top equipment. Fig. 6 illustrates a suitable method of shrouding the carload. The material is a waterproof paper or plastic sheet placed over a number of lifts or over the entire carload and suitably secured.

7. Cold-Finished Bars

7.1 Cold-finished carbon, alloy, and stainless steel bars are among the most highly finished products of the steel industry. Because of their high finish and the exacting uses to which such products are put, packaging and loading methods are very important.

7.2 Product Grades—Carbon, alloy, and stainless steel bars.

7.3 Marking:

7.3.1 Carbon, Alloy, and Stainless Steel Bars:

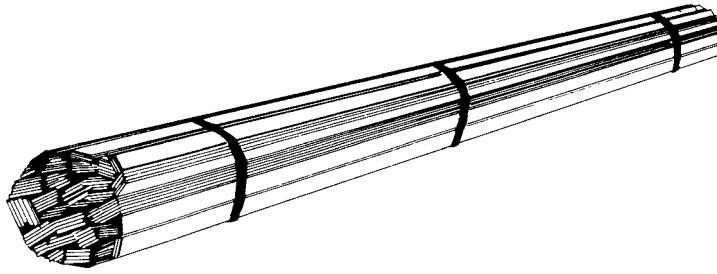


FIG. 3 Suitable Secured Lift-Flats

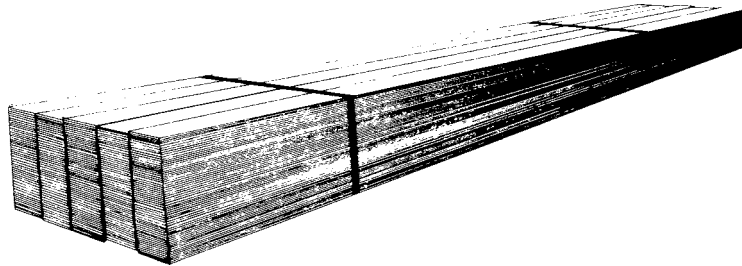


FIG. 4 Suitable Lift of Stack-Piled Straightened Flats

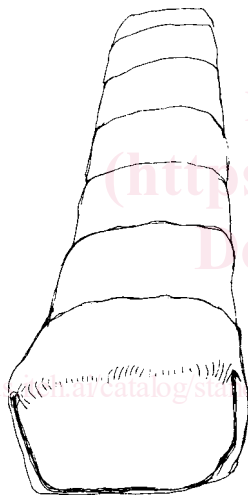


FIG. 5 Suitable Method of Wrapping Lifts for Loading in Open-Top Equipment

(2) Sizes smaller than 1½ in. are not marked individually, but the bundle, lift, or pile is marked on one end with a dab of paint of one color or not more than two different colored stripes.

(3) Any other paint marking slows normal production.

(4) Superimposed color marking also requires additional labor and time for drying.

(5) When the back of the tag is marked, one or two colors are used or the names of the colors are spelled out.

7.4 Packaging:

7.4.1 Carbon, Alloy, and Stainless Steel Bars:

7.4.1.1 Secured Lifts (Fig. 2)—The recommended minimum quantity of cold-finished bars in the secured lift is 6000 lb (2.7 Mg). Producers recommend that purchasers specify the maximum possible weight for lifts because heavier lifts withstand transportation hazards better and result in greater economy to both the purchaser and the producer. The packaging of bars into lifts for closed-car loading requires additional handling. The securing of this type of package consists of ties of soft wire or flat steel bands. Ties are regularly applied as follows:

Up to 15 ft (4.57 m), incl	3 ties
Over 15 ft to 22 ft (4.57 to 6.71 m), incl	4 ties
Over 22 ft to 33 ft (6.71 to 10.06 m), incl	5 ties
Over 33 ft (10.06 m)	6 ties

The recommended securing is adequate for normal handling and transportation requirements. Handling by means of the package ties or by magnet is considered an unsafe practice and is not recommended.

7.4.1.2 Loose Bars—The term “loose” means single pieces that can be handled individually. This method of loading is used by producers in the loading of large sizes.

7.4.1.3 Stack Piling—This method of piling is regularly used for straightened flats and certain shapes and consists of arranging pieces in order, in one or more piles, into secured lifts of 6000 lb (2.7 Mg) minimum weight. Stack piling of bars under 1 in. (25 mm) in width is impractical. When stack piling

7.3.1.1 It is normal practice to identify each lift with a tag containing the following information:

- (1) Producer’s name, brand, or trademark,
- (2) Size,
- (3) ASTM designation (year date is not required),
- (4) Heat number,
- (5) Weight,
- (6) Customer’s name, and
- (7) Customer’s order number.

7.3.1.2 Die Stamping—It is not regular practice to die-stamp cold-finished bars. Therefore, when specified, this method of marking retards the normal flow of materials.

7.3.1.3 Color Marking—When the marking of bars with identification colors is required, the following practices are employed:

(1) Sizes 1½ in. (38 mm) and over are marked on one end with not more than two colors.

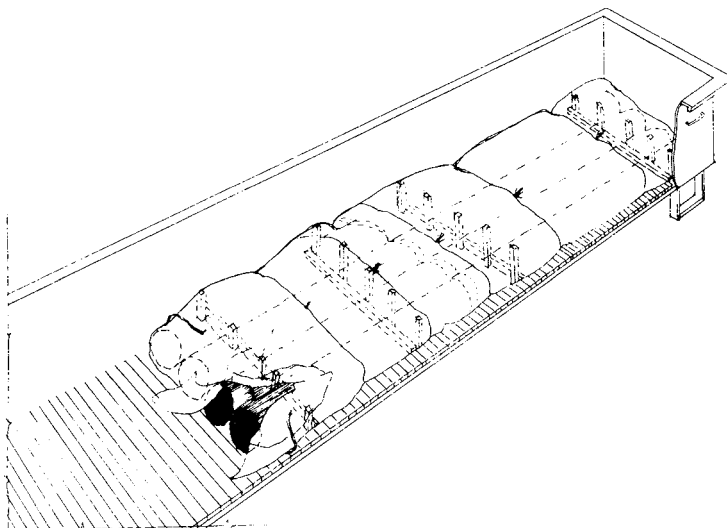


FIG. 6 Suitable Method of Shrouding Carload

is specified for other than straightened flats, additional handling is generally required. The stacking or piling of all bars or bar-size shapes, including straightened flats, into lifts of specified count or dimensions involves additional handling. Fig. 4 illustrates a suitable lift of stack-piled straightened flats.

7.4.1.4 *Bundling*—Cold-finished round, square, hexagon, or similar bar sections $\frac{5}{16}$ in. (7.9 mm) and under are put up in hand bundles because of the flexible nature of the material. Bundling of sizes over $\frac{5}{16}$ in. requires additional handling. Fig. 7 illustrates a suitable hand bundle. Such bundles regularly contain not less than three pieces, the package weighs from 150 to 200 lb (68 to 91 kg), and is tied with No. 14 gage (1.63-mm) wire or its equivalent as follows:

Up to 8 ft (2.44 m), incl	2 ties
Over 8 ft to 16 ft (2.44 to 4.88 m), incl	3 ties
Over 16 ft to 20 ft (4.88 to 6.10 m), incl	4 ties
Over 20 ft to 24 ft (6.10 to 7.32 m), incl	5 ties

Fig. 8 illustrates a bundle of bars banded to a board. Small quantity items unable to support their own weight without possible damage from bending or distortion are usually secured to boards or boxed.

7.4.1.5 *Containers*—Due to the special high finish and very close tolerances of some cold-finished bars, packaging in special containers for extra protection against damage is required. This type of packaging requires additional material and handling. Less than carload or less than truckload shipments of polished, turned ground and polished, cold-drawn ground and polished bars and shafting, or any bars produced to a high finish, are packaged in chipboard tubes, wood boxes, corrugated fiberboard boxes or other suitable containers. Fig. 9 illustrates a suitable chipboard container. Such containers are made of heavy spirally wound chipboard with various end closures. Fig. 10 illustrates a suitable wood box. Such boxes are made of seasoned lumber, lined with paper, and are reinforced with bands or wire at the ends and at intermediate points, as required.

7.4.1.6 *Protective Coatings*—Cold-finished bars are coated with corrosion preventatives or shipped without protective coating depending upon the use and the purchaser's specification.

7.5 Loading:

7.5.1 Cold-finished carbon, alloy, and stainless steel bars are normally shipped in closed or covered equipment. Loading in box cars requires additional handling.

7.5.2 When separation of lifts or piles in cars is required to allow sufficient clearances for unloading equipment, separators or bearing pieces are furnished up to a maximum of commercial 4-in. lumber. Loads are often shipped in bulkhead equipment or are rigidly braced for protection in transit.

7.5.3 Where additional protection is specified in covered gondolas, material may be wrapped or shrouded as illustrated in Fig. 9 or Fig. 10. Fig. 5 illustrates a suitable method for wrapping lifts of cold-finished bars. Fig. 6 illustrates a suitable method of shrouding the carload.

8. Structural Shapes and Steel Sheet Piling

8.1 Product Grades:

8.1.1 Carbon, high-strength low-alloy, and stainless steel structural shapes.

8.1.2 Steel sheet piling.

8.2 Marking:

8.2.1 *Carbon, High-Strength Low-Alloy, and Stainless Steel Structural Shapes:*

8.2.1.1 It is normal practice to mark each individual structural shape shipped loose or tag each secured lift with the following information:

- (1) Producer's name, brand, or trademark,
- (2) Section designation or size of section,
- (3) Heat number,
- (4) Length, and
- (5) Grade or type (stainless steel).

8.2.1.2 *Die Stamping*—When specified, the heat number is die-stamped in one location. Die stamping or hot rolling the heat number into structural shapes is not universally practiced. The standard sizes of steel die-stamps are $\frac{1}{4}$ in., $\frac{5}{16}$ in., and $\frac{3}{8}$ in. (6.4 mm, 7.9 mm, and 9.5 mm). Any additional or different marking other than as indicated above or specifying stamping with steel die-stamps of sizes other than indicated is negotiated between purchaser and manufacturer.

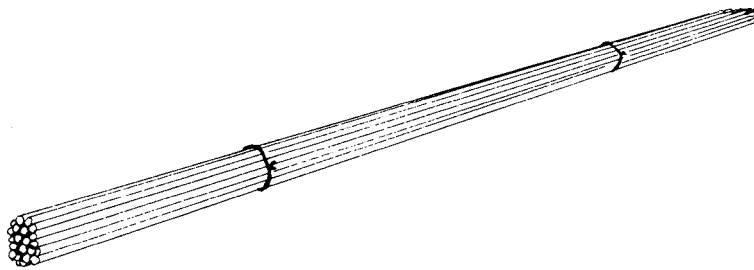


FIG. 7 Suitable Hand Bundle of Cold-Finished Bars

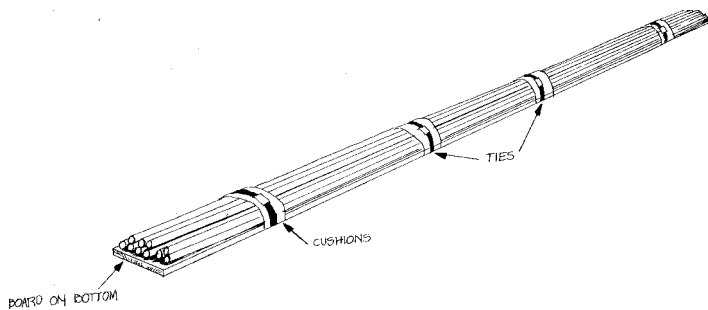


FIG. 8 Bundle of Cold-Finished Bars Secured to a Board

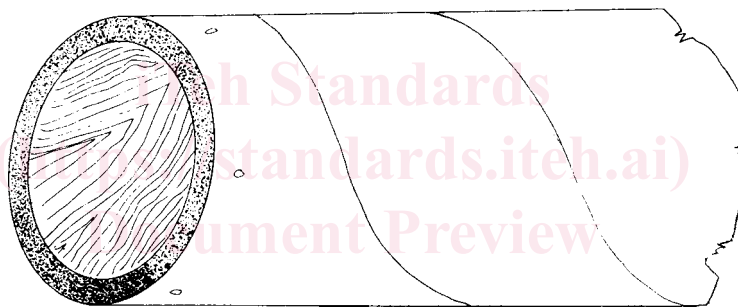


FIG. 9 Suitable Chipboard Container

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8.2.1.3 *Color Marking*—On structural shapes made to certain ASTM specifications, color marking is required. Each structural shape shipped loose is marked with one or two color stripes. When shipped in secured lifts, the lift is marked with a vertical stripe for the full height of the lift. Each piece in the lift shall be marked by this stripe.

8.2.2 *Steel Sheet Piling*—It is normal practice to mark each steel sheet piling with the following:

- (1) Producer's name, brand, or trademark,
- (2) Heat number, and
- (3) Length.

Additional or different marking requires additional handling and complicates the normal marking procedure.

8.3 Packaging:

8.3.1 *Carbon, High-Strength Low-Alloy and Stainless Steel Structural Shapes*—Structural shapes are normally shipped in unsecured lifts or units weighing approximately 10 000 to 20 000 lb (4.5 to 9.0 Mg). Various methods are used to maintain the unity of such lifts during transit. At manufacturer's option, small sizes may be secured to facilitate identification, handling, or transportation.

8.3.2 *Steel Sheet Piling*—Steel sheet piling is normally handled and loaded in lifts or units weighing approximately 10 000 to 20 000 lb (4.5 to 9.0 Mg), depending on the size of piling sections.

8.4 Loading:

8.4.1 *Carbon, High-Strength Low-Alloy, and Stainless Steel Structural Shapes:*

8.4.1.1 *Loading Practice*—Structural shapes are loaded unprotected in open-top equipment because of their nature and the universal use of mechanical unloading equipment. The method used to separate lifts in the car to facilitate unloading can best be determined at the time of loading. Wood blocking and endwise staggering are typical means of separating lifts. Segregation of sections by size, type, or item into separate cars requires additional handling.

8.4.1.2 *Weather Protection*—Structural shapes, due to their nature, are seldom protected from the weather in transit. Protection such as shrouding requires additional labor and material.

8.4.2 *Steel Sheet Piling*—Because of its nature and the universal use of mechanical unloading equipment, steel sheet

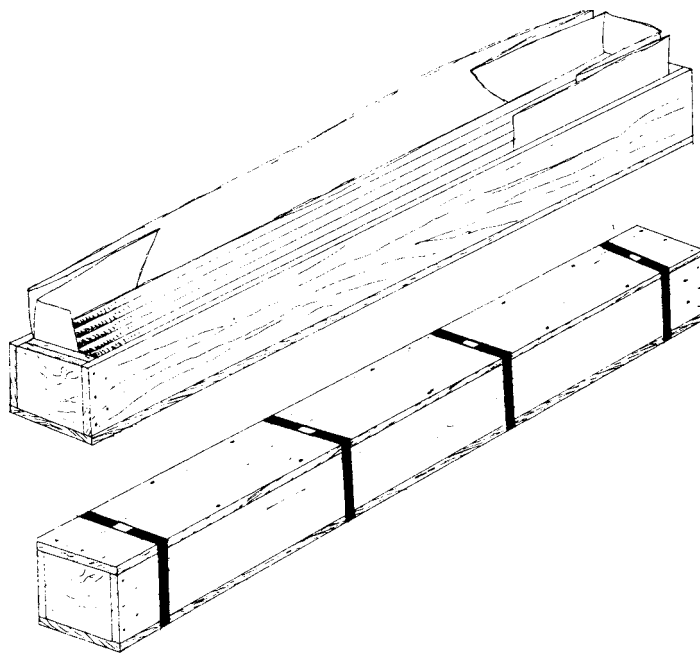


FIG. 10 Suitable Wood Box for Cold-Finished Bars

piling is loaded unprotected in open-top equipment. The method used to separate lifts in the car and thus facilitate unloading can best be determined at the time of unloading. Wood blocking and endwise staggering are typical means of separating lifts.

9. Rods, Wire, and Wire Products

9.1 Hot-rolled wire rods are regularly produced for further processing, and because of their nature only simple methods of marking, packaging, and loading are required.

9.1.1 The major consideration is the prevention of physical damage in transit, such as bending and twisting.

9.1.2 Other wire and wire products however, are among the most highly finished products of the steel industry, and marking, packaging, and loading methods are very important.

9.1.3 Because of the many specific combinations of size, grades, and types supplied in wire, no standard limits for types, diameters, weights, and coil sizes are established. Limitations for coil sizes are controlled by manufacturing practices and other factors.

9.1.4 The purchaser should give careful consideration to marking, packaging, and loading requirements when ordering, and if in question about a suitable method, should consult with the manufacturer. Consultation is usually essential to develop mutually satisfactory methods for packaging of specific products.

9.2 Product Grades:

9.2.1 Hot-rolled rods (all grades).

9.2.2 Merchant wire products.

9.2.3 Carbon, alloy, and stainless steel wire (in coils).

9.2.4 Carbon, alloy, and stainless steel wire (straightened and cut).

9.3 Marking:

9.3.1 *Hot-Rolled Rods in Coils*—It is normal practice to tag each coil with the following information:

9.3.1.1 Producer's name, brand, or trademark,

9.3.1.2 Grade, product identification or type (stainless steel only),

9.3.1.3 Size,

9.3.1.4 Heat number,

9.3.1.5 Customer's name, and

9.3.1.6 Customer's order number.

(1) When identification colors are specified, marking practice shall be limited to paint striping coil with one color.

9.3.2 *Merchant Wire Products*—It is normal practice to identify each package with the following information, as applicable:

9.3.2.1 Producer's name, brand, or trademark,

9.3.2.2 Product name:

(1) Design or construction

(2) Style

9.3.2.3 Size,

9.3.2.4 Type or class of coating,

9.3.2.5 Finish,

9.3.2.6 Length,

9.3.2.7 Width and mesh, and

9.3.2.8 Height.

9.3.3 *Carbon, Alloy, and Stainless Steel Wire*—It is normal practice to identify each coil or package with the following information:

9.3.3.1 Customer's name,

9.3.3.2 Customer's order number,

9.3.3.3 Producer's name, brand, or trademark,

9.3.3.4 Grade, product identification or type (stainless steel only),

9.3.3.5 Size,