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# Union Pacific Railroad Intermodal General Loading Guidelines

Dear Intermodal Partner,

At Union Pacific our goal is to deliver our customers' products damage free and in factory fresh condition. As your transportation provider, we need your assistance with properly preparing all intermodal shipments to prevent damage and costly claims.

This pamphlet outlines the general guidelines for proper blocking and bracing procedures for intermodal shipments and provides a listing of those commodities which are prohibited from intermodal services on Union Pacific.

As it is impossible to address every commodity or individual loading plan in this pamphlet, we have included a "Who to Call" listing of our Intermodal Shipment Quality offices, where a representative can provide additional product-specific assistance.

I look forward to your assistance, as we work together to provide damage-free transportation for the intermodal industry.

Keith Lee  
General Director - Shipment Quality

Union Pacific Railroad  
**Intermodal General  
Loading Guidelines**

# INTERMODAL LOADING GUIDE

*Products in Closed Trailers and Containers*

References:     **Circular No. 43-D**  
                      **Pamphlet No. 45**  
                      **BOE Pamphlet No. 6C**

The loading methods, as described are minimum standards, it may be necessary to supplement these methods in some instances. If loading procedures or principles contained in this publication appear not to cover a specific shipment, contact a **Union Pacific Shipment Quality Representative** for assistance and/or instructions.

**All rules apply both to trailers and containers regardless of shipping plan used.** It must be understood that trailers or containers may move in a backwards or reverse direction for all or a portion of their journey. During its journey, normal transportation forces will shift an unsecured load or cause lading to exert excessive pressure against the nose, rear doors, or side walls. It is imperative that trailers or containers moving in rail service be loaded by the shipper in strict compliance with the General Rules in Circular 43-D.

All packages intended for TOFC and COFC shipments of hazardous materials in the United States must meet appropriate US DOT hazardous material regulations concerning packaging specifications, labeling, and marking as specified in CFR Title 49.

*Please Note: The loading illustrations in this document are to be used as general guidelines only. For Loading diagrams specific to your unique shipment, contact Union Pacific's Shipment Quality Team at [ShipmentQuality@up.com](mailto:ShipmentQuality@up.com).*

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# GENERAL RULES

## 1. Inspection and Selection of Equipment:

A. The equipment supplier has a responsibility to furnish trailers/containers which are clean, have sound roofs, sides, end walls, smooth floors, and snug fitting doors. Any exception is cause for rejection. The shipper also has a responsibility to inspect the trailer/container to see that it is suitable to carry lading safely to destination.

B. If the trailer/container furnished is not suitable for loading but the shipper elects to load it, then the shipper is responsible to properly prepare the trailer/container prior to loading (ie. cover holes in walls).

## 2. Load Planning

A. Plan your load to prevent damage to lading and equipment. Lading which is forbidden or restricted by MITA Item-520 is not to be loaded without prior approval by Union Pacific. Lading that is already damaged is not to be loaded.

B. Plan your load so that crosswise void space is minimized. Use appropriate bracing or filler material to maintain vertical alignment and prevent crosswise movement.

C. Secure incomplete layers of lading to prevent movement.

D. Fill lengthwise space with lading, approved filler material, or appropriate blocking and bracing. Do not use void filler material or pallets as a bulkhead.

E. Weight must be evenly distributed side-to-side and end-to-end.

## 3. Maximum Weights and Weight Distribution:

A. Trailer (TOFC): The load weight **MUST NOT** exceed the limit as stated on the manufacturer's plate. Combined weight of trailer and lading may not exceed 65,000 lbs.\*

*\*Maximum weights as defined in current AAR Specifications M931-99 for trailers (effective 5/1/99 and subject to revisions thereto.*

B. Container (COFC): Combined weight of container and lading may not exceed the weight specified below for the length of container being loaded:

Nominal Length (ft.)	Maximum Gross Weight (lbs.)** (Lading Plus Tare)
53'	67,200
48'	67,200
45'	67,200
40'	67,200
20'	52,900

*\*\*Maximum weights as defined in current AAR Specification M930-98 for containers (effective 11/1/98) and subject to revisions thereto.*

C. Lading weight in trailers/containers must be evenly distributed both crosswise and lengthwise and combined weight of lading and trailer/containers must conform to all Federal, State, Provincial and Local regulations and transportation service requirements used at origin and to final destination.

D. Lading weight shall not exceed more than 25,000 lbs. per 10 linear feet or 2,500 lbs. per linear foot.

#### **4. Securement**

A. Secure lading to prevent lengthwise and lateral movement.

B. Fill voids, apply blocking and bracing to maintain proper lengthwise and crosswise weight distribution during transit; and to prevent lading from damaging doors, nose, walls or from falling out when doors are opened.

C. Use lumber which is of sound material and free of defects which impair its strength or interferes with proper nailing.

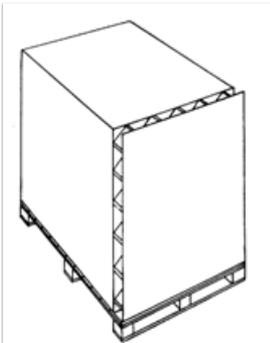
D. Use adequate size and number of nails in the construction and securement of blocking and bracing.

E. Strapping used for load securement must be of sufficient strength, amount, and be properly applied so as to secure the load from crosswise or lengthwise movement.

## 5. **Unitization**

A. On wooden pallets:

- (1) Provide palletized units with unit to unit contact with no overhang of product.
- (2) Fill any lengthwise underhang on pallets.



Make height and width dimensions of the faces of the filler material as near as possible the same as the dimensions of the faces of the units they will be separating.

Filler Construction: Lengthwise void fillers are to be of uniform strength over the face of the void filler and capable of withstanding a load of 1500 lbs./sq. ft.

B. On slip sheets:

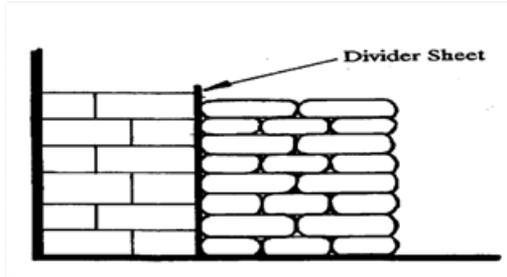
- (1) Provide units with unit to unit contact lengthwise in trailer/container. Fill any lengthwise void to provide a solid face for applying securement.
- (2) Minimize crosswise void and maintain vertical alignment.

C. Incomplete layers:

- (1) Avoid incomplete layers whenever possible. When incomplete layers have to be loaded, use full face and height bulkhead for light weight commodities. For heavier commodities unitize the rear portion of the incomplete layer to the bottom layer. Unitize with appropriate bulkheads and protection between straps and the lading.

## **6. Fillers, Dividers and Separators**

A. Separate different type packaging lengthwise by use of plywood or fibreboard sheets of sufficient height to protect the tallest stack of product.



B. Use fillers to take up crosswise space in trailer/container to prevent movement in the load.

C. Use separators when commodities are loaded in more than one layer. Use separator material to provide an even base for the upper layer. Generally 1½" plywood sheets or other suitable material may be used. Use fibreboard protection between separator material if units consist of bags or bales.

## **7. Wood**

A. Use properly seasoned lumber.

B. Do not use rotted or decayed lumber. Do not use lumber with knots or knotholes. Check for splits that will affect holding strength or interfere with nailing.

C. Select the size of lumber appropriate for the weight, size, and nature of the commodity to be secured.

## 8. **Nails and Nailing**

- A. Do not nail into the walls of trailer/container. **Toe nailing is not permitted.**
- B. Drive nails into side grain of lumber. Drive all nails straight at 90 degree angle to floor.
- C. Stagger nails to prevent wood from splitting. Position nails 4 to 5 inches apart.
- D. Use nails of such length to develop the necessary holding power through penetration into trailer/container floor and other blocking and bracing members.

**Table A**

Size of Common Nail (d)					
size	8	10	12	16	20
lbs/resistance*	344	733	916	956	1043

\* lateral resistance of nails (in pounds) when nailed through 2" thick floor blocking and into trailer/container floor.

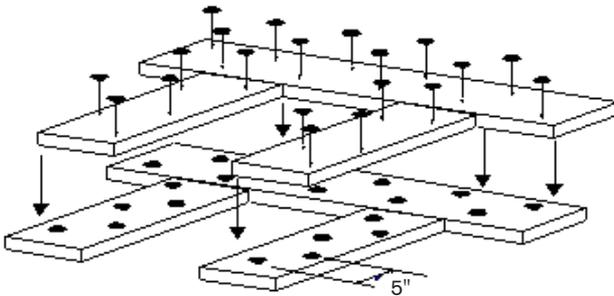
Size Penny Weight	Common Nails		Power Driven Nails	
	Length in inches	Wire diameter inches	Length in inches	Wire diameter inches
8d	2-1/2	.131	2-3/8	.113
10d	3	.148	3	.120
12d	3-1/4	.148	3-1/4	.131
16d	3-1/2	.162	3-1/2	.131
20d	4	.192	4	.145

# LOAD RESTRAINT METHODS

## 1. Floor Blocking

A. Securely nail to trailer/container floor all blocking to prevent lengthwise movement. Reinforce with backup cleats, at least 18" in length. A minimum of 2" x 4" lumber should be used to secure loads of non hazardous materials and 2" x 6" for hazardous materials.

B. Lamination is required with longitudinal blocking to achieve additional holding power.



C. Dimensions of lateral bracing must be of sufficient length to properly hold the load in place.

## 2. “E” Type Floor Blocking

A. This loading method is for use with roll paper or pulpboard loaded on end in a 1-1 offset pattern.

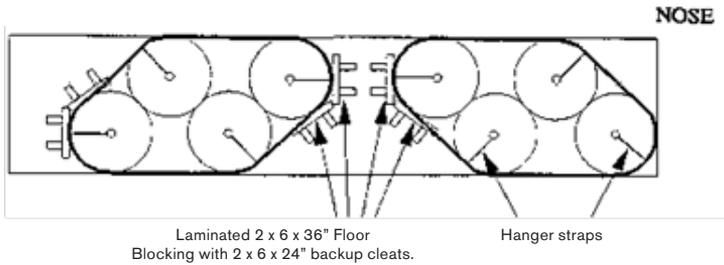
B. Construction is laminated pieces of 2" x 6" x 36" lumber using 16d nails.

C. The load is divided into two sections, each containing approximately half of the load.

D. One block is adjacent to the roll with the cross brace perpendicular to the side wall. The second is installed adjacent to the roll at a 30-45 degree angle to the first.

E. Tilting of rolls can occur during normal transit. When width of roll exceeds 1-1/2 times the diameter, unitizing straps must be used to prevent rolls from turning over.

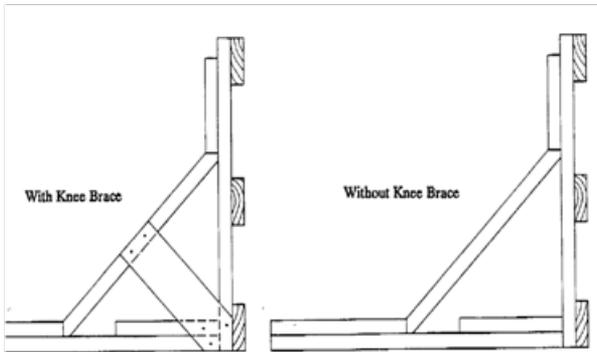
F. Hanger straps must be used with unitizing bands to maintain positioning.



### 3. Rear Gates / Bulkheads

A. Pallets can not be used for construction of rear gates.

B. Rear gates should be braced into corner posts of containers whenever possible.



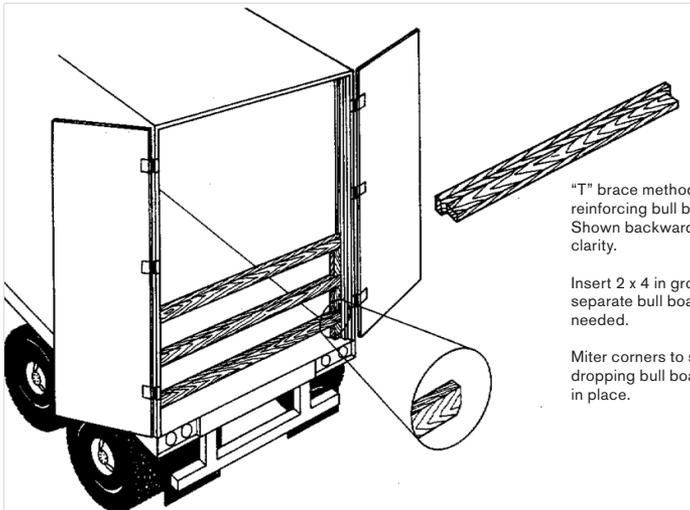
C. Knee braces used with rear gates are applied at an angle no greater than 45 degrees from the floor.

#### 4. Bullboards and "T" Braces

A. Bull boards may be inserted into slotted doorpost at rear of containers to restrain lading. Use minimum 2" x 4" hardwood lumber with suitable length to fit snugly into corner posts.

##### **Load Restraining Capacity**

<u>Restraint Device</u>	<u>Capacity</u>
2" x 4" Bull Board	5,600 lbs.
2" x 6" Bull Board	8,000 lbs.
2" x 4" "T" Brace	7,000 lbs.



B. Use approved fibreboard dunnage or a plywood buffer sheet between product and bull boards to evenly distribute lading forces.

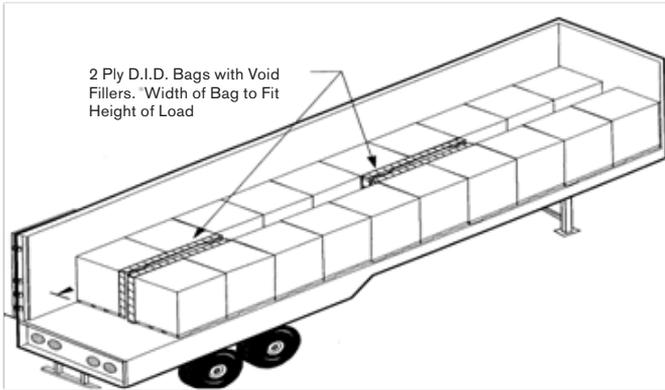
#### 5. Disposable Inflatable Dunnage

A. Width of bag should fit height of load. Length of bag should cover two units of lading.

B. Approved filler material must be used if crosswise void exceeds 12" after inflation of a standard bag, or 24" with an AAR approved "square" airbag.

C. Use buffer material between bag and lading to distribute outward pressure evenly against lading.

- D. Position D.I.D. bag 1" off the trailer/container floor and pallet to prevent chaffing.
- E. Inflate bags to 2.0 - 2.5 psi. Check pressure with an air gauge.



**6. Rubber Mats**

- A. Use general service equipment with hardwood floors.
- B. Mats should be in good condition (do not reuse mats that may be torn, or soiled).
- C. Brand, number and size of mats to be used are determined by the requirements of the AAR approved method being utilized.

**7. Ty-Gard Barriers**

- A. Ty-Gard is a 15 inch wide laminated fabric material that can be used as a bulkhead barrier.
- B. As a general guide, each Ty-Gard barrier can restrain up to 8,800 lbs. of lading.
- C. Ty-Gard strips bonded to walls are a minimum of 60" long and are located 36" back from the face of the load.
- D. When used in containers with corrugated side walls, follow contour of the corrugations.

## 8. Rear Doors

Trailer/container doors may not be used to secure loads containing hazardous materials.

A. Secure lading to prevent lengthwise movement. Doors may not be used for securement if lading is rigid, very dense, or shaped such that the area of door contact is minimal (ie. drums or roll paper).

B. Under certain conditions as outlined below, doors can be relied on to secure non hazardous materials lading: Doors of vehicles meeting **AAR M931** and **M930** specifications can be used to restrain lading under the following conditions:

1. The load consists of multi-unit lading such as boxes of food-stuff, tissue or soft paper products, furniture, appliances, etc., not exceeding 40,000 lbs covering a minimum of 60% of the door area and evenly distributed throughout the vehicle.
2. Lading must be loaded tight lengthwise and crosswise, flush to the rear doors of the vehicle, allowing no room for movement. If any void exists, fill space with approved dunnage.
3. The doors must fit squarely, the hinges must be tight, and locking bars must be in good condition while functioning properly.

# HAZARDOUS MATERIAL GUIDELINES

## 1. General Requirements

- A. All material must be properly classed, described, packaged, marked, labeled, and in condition for shipment according to DOT regulations.
- B. Packages must be blocked and braced to:
  - a. prevent them from changing position
  - b. falling to the floor
  - c. sliding into each other
- C. Paperwork must have proper description, classification, and weight.

## 2. Placards

- A. The proper application of placards is the responsibility of the shipper. Refer to CFR 49 Section 172.500 for further information.
- B. Placards must be a minimum of 5' above the bottom rail of equipment. Recommended height is 6' above the bottom rail.
- C. *Recommended* that placards be placed at least five (5) feet from the ends of container.
- D. Placards are required for **any** quantity of the following classes:
  - a. explosives - (1.3)
  - b. reactive solids/liquids - (4.3)
  - c. organic peroxide - (5.2)
  - d. radioactive yellow III label - (7)
- E. Placards are required when transporting **1001 lbs. (454 kg.)** or more of the following:
  - a. explosives - (1.4)
  - b. very insensitive explosives - (1.5)
  - c. extremely insensitive explosives - (1.6)
  - d. flammable gas - (2.1)

- e. nonflammable, non poisonous gas - (2.2)
- f. corrosive gas - (2.4)
- g. flammable liquid - (3)
- h. flammable solid - (4.1)
- I. spontaneously combustible material - (4.2)
- j. oxidizer - (5.1)
- k. organic peroxide - (5.2)
- l. poisonous or toxic material - (6.1)
- m. PG III (harmful) - (6.1)
- n. corrosive material - (8)

F. Placards are **not** required for:

- a. class 6.2 (infectious substances)
- b. ORM-D
- c. division 1.4S
- d. limited quantity (LTD QTY) shipments when identified as such on shipping papers
- e. combustible liquids in non-bulk packaging
- f. intermodal tanks which have been cleaned of residue and purged of vapor to remove any hazard
- g. radioactive white I and yellow II labels
- h. cryogenic atmospheric gases, other than oxygen (example - argon)
- i. miscellaneous hazardous material - (9)

### **3. Securement Requirements**

A. Minimum 2 x 6 inch lumber required for:

- a. floor blocking
- b. lateral blocking
- c. rear gates

B. Nails and nailing:

- a. minimum 16d nails are required for all floor blocking
- b. stagger nails side to side, not in a straight line; not more than 5 inches apart
- c. drive nails straight at 90 degree angle to floor

- C. Separator between layers on double stack loads must be 1/2 inch plywood or other AAR approved layer separator.
  
- D. Bull boards and "T" braces are acceptable methods of securement:
  - a. must use quantity of boards to secure weight of lading
  - b. buffer material should be positioned between lading and boards (1/2" plywood)
  - c. do not cover outside view of bull boards
  
- E. Ty-Gard barriers are acceptable for securement of hazardous lading.
  - a. sufficient quantity of barriers must be used to secure weight of load
  - b. split load into two or three sections and apply two Ty-Gard barriers per section
  - c. apply tape to barriers to insure they maintain position against lading
  
- F. Methods that are not acceptable for securement of hazardous materials are:
  - a. disposable inflatable dunnage bags
  - b. doors used for securement
  - c. unsecured partial double layers

## RECOMMENDED SECUREMENT MATRIX

Package Type	"E" Block	Rear Gate	Bull-Board	Air Bag	Rubber Mats	Floor Block	Ty-Gard
55-gal drums		X	X		X <sub>4</sub>	X <sub>4</sub>	X
Bags on pallets <sup>1</sup>		X		X	X	X	X
Bags on slipsheets		X	X	X			X
Rolls (Paper)	X <sub>3</sub>				X <sub>3</sub>	X <sub>3</sub>	X
Bundles (plywood)		X	X			X <sub>1</sub>	X
Case Goods (pallets) <sup>1</sup>		X	X	X		X	X
Case Goods (hand stack)		X	X	X			X
Gaylords (pallets) <sup>1</sup>		X	X	X		X	X
Ingots/Steel (pallets) <sup>1</sup>		X			X	X	
Roofing (pallets) <sup>1</sup>		X			X	X	X
Supersaks (pallets)		X	X			X <sub>1</sub>	X
Metal Coils <sup>2</sup>						X	

### Footnotes

- 1 must be properly unitized to pallet
- 2 must have approval and contract
- 3 unitize when width exceeds 1-1/2 times diameter
- 4 must be properly unitized

## Understanding DOT Cargo Securement Rules

This section has been included as a reference to the Federal regulations that pertain to Intermodal shipments, from a trucking perspective. Refer to [www.fmcsa.dot.gov](http://www.fmcsa.dot.gov) for the most current and complete edition of these rules.

### General Rule

Cargo must be firmly immobilized or secured on or within a vehicle by structures of adequate strength, dunnage or air bags, shoring bars, tiedowns or a combination of these. This will prevent the cargo from leaking, spilling, blowing or falling as well as to prevent shifting within the vehicle to such an extent that the vehicles stability or maneuverability is adversely affected.

## **Cargo Placement and Restraint**

Articles of cargo that are likely to roll must be restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling. The means of preventing rolling must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. Articles of cargo placed beside each other and secured by transverse tiedowns must be:

1. Placed in direct contact with each other, or
2. Prevented from shifting towards each other while in transit.

## **What are the minimum performance criteria for cargo securement devices and systems (for over-the-road movements)?**

- a. Performance criteria. Cargo securement devices and systems must be capable of withstanding the following three forces, applied separately:
  1. 0.8 g deceleration in the forward direction;
  2. 0.5 g acceleration in the rearward direction; and
  3. 0.5 g acceleration in a lateral direction.
- b. Cargo securement devices must not exceed their working load limits.

## **What standards must cargo securement devices and systems meet in order to satisfy the requirements of this subpart?**

- a. All vehicle structures and components used to secure cargo must be in proper working order and must not have any cracks or cuts.
- b. Vehicle structures and anchor points must be strong enough to meet the performance criteria with no damaged or weakened components.
- c. Material used for blocking and bracing must not have damage or defects which would compromise the effectiveness of the securement system.
- d. Manufacturing standards must be adhered to, for tiedown assemblies.

## **What are the general requirements for securing articles of cargo?**

- a. Minimum strength of cargo securement devices and systems. The aggregate working load limit of any securement system used to secure an article or group of articles against movement must be at least one-half times the weight of the article or group of articles. The aggregate working load limit is the sum of:

1. One-half of the working load limit of each associated connector or attachment mechanism used to secure a part of the article of cargo to the vehicle; and
2. One-half of the working load limit for each end section of a tiedown that is attached to an anchor point.

### **Commodity-Specific Securement Requirements**

FMCSA has adopted detailed requirements for the securement of the following commodities. Refer to [www.fmcsa.dot.gov](http://www.fmcsa.dot.gov) for further information about each section.

**393.116 - Logs**

**393.118 - Dressed Lumber and Similar Building Products**

**393.120 - Metal Coils**

**393.122 - Paper Rolls**

**393.124 - Concrete Pipe**

**393.128 - Automobiles, Light Trucks and Vans**

**393.130 - Heavy Vehicles, Equipment and Machinery**

**393.132 - Flattened or Crushed Vehicles**

**393.136 - Large Boulders**

### **DAMAGE NOTIFICATION POLICY**

Notify Palestine Freight Claims

1. When damage exceeds \$5,000.
2. When salvage needs to be rejected to the carrier.
3. When damages are the result of defective equipment.
4. When repetitive loss or damage occurs which you feel corrective action is required.

Toll free number for notification

1-800-521-3253 Option 1-1

Union Pacific does not require notification on routine product loss or damage in most circumstances. Destination records including unloading reports, delivery receipts and photographs will serve as sufficient proof of loss or damage on any claim filed. This policy represents a waiver of our right to inspect the goods and guarantees that any claim filed will not be denied because of non notification.

# Shipment Quality Services

## Who To Call

### Field Locations:

Chicago	(402) 233-3564
Dallas	(972) 929-3410
Denver	(303) 405-5029
Kansas City	(816) 399-1740
Little Rock	(501) 373-2372
Los Angeles	(909) 685-2812
Oakland	(916) 789-6347
Portland	(503) 249-2741
Salt Lake City	(801) 212-5341
San Antonio	(210) 200-3543

### Omaha Office

Intermodal Shipment Quality Engineer	(402) 544-3791
Director of Field Operations	(402) 544-4622

### Palestine Freight Claims

Intermodal Claims Manager	(903) 731-7784
	(800) 521-3253, option 1-1
Director of Claims	(903) 731-7791

For the most current information and helpful tools please visit our website at: [up.com/customers/shipment\\_quality](http://up.com/customers/shipment_quality)



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