General Information Bulletin No. 2

Rules and Procedures for Testing of New Loading and Bracing Methods or Materials

Revised
February 2014

Approved by
DAMAGE PREVENTION & FREIGHT CLAIM COMMITTEE

Published by
Association of American Railroads/TTCI
Damage Prevention and Loading Services
55500 DOT Road
Pueblo, CO 81001

(Printed in U.S.A.)
© 2014
Rules and Procedures for Testing of New Loading and Bracing Methods or Materials

I. Introduction ........................................................................................................................................... 3
II. Procedure for Evaluation of New Loading and Bracing Methods and Materials ......................... 4
III. AAR Impact Test Procedures ........................................................................................................... 5
IV. AAR Procedures for Simulation Testing ............................................................................................. 7
V. AAR Test Request Form .................................................................................................................... 9
SECTION I - INTRODUCTION

This publication contains rules and test procedures utilized by AAR Damage Prevention & Loading Services for evaluation of new closed car, trailer or container loading, blocking and bracing methods and materials.

The purpose of this publication is to provide necessary information for any proponent wishing to gain AAR approval of a loading and bracing concept. Approved loading and bracing concepts are published in appropriate AAR pamphlets. The Loading Standards afford a means of providing uniform consent of member railroads for interchange of approved methods unless restricted by individual carrier rules.

In order to gain approval, evaluation of a new loading and bracing concept’s performance in the railroad environment is necessary. This may be accomplished through impact testing, rail environment simulation testing and/or field shipment testing. Generally impact tests are conducted prior to simulation tests or test shipments. See Section III for more information on impact tests. Simulation testing subjects a specimen load to controlled vertical and lateral vibration inputs creating the dynamic effects of the railroad environment. See Section IV for more information on simulation tests. Laboratory testing may also be required to document the performance of bracing system components.

Tests of new loading and bracing methods and materials are conducted for the benefit of shippers and the railroad industry. Results of testing are published and available to any interested party unless deemed proprietary by the proponent(s). The costs of this testing may be underwritten by the AAR members.

AAR costs for testing of new loading and bracing methods and/or materials may be covered by the AAR budget when successful testing will result in new approved methods published and available for use by all railroads, shippers and suppliers.

Proponents may be charged for laboratory testing, impact testing (in the field or at TTC), field shipment testing and/or simulation testing (at TTC) conducted by the AAR when the testing falls into one of the following categories.

- Retesting of concepts which failed prior testing due to deficiencies in the original concept or load.
- Testing for the purpose of approving a loading, packaging or securement concept or a dunnage product of a specialized nature which will have application to a limited number of shippers and/or carriers.
- The testing is “proprietary” in nature (i.e. evaluation of a proprietary concept), the proponent is not seeking AAR approval and/or the results of the testing will be the property of the proponent.

All test requests are reviewed by the AAR Damage Prevention and Loading Services staff. Determination of the funding status of test requests is on a case by case basis. If the AAR determines a test request falls into one of the categories requiring proponent funding, the Damage Prevention and Freight Claim Committee will be advised and asked to concur.

The success or failure of a proposed loading and bracing concept is determined by the AAR's Damage Prevention and Freight Claim Committee or the Damage Prevention & Loading Services staff acting on their behalf. The following general criteria must be met for a test to be successful.

1. The loading and securement system performs successfully.
2. There is no excessive load movement which could lead to the total breakdown of the load.
3. There is no damage to lading or rail equipment.
4. No condition develops which could lead to lading or equipment damage.
5. Nothing develops wherein the safety of the load is in question.

Other additional criteria which might be critical to a specific concept or commodity involved in testing may also be considered.

SECTION II defines the procedures to be followed in testing new loading and bracing methods or materials.
SECTION III contains the AAR Standard Procedures for Impact Tests. This test is intended only to evaluate whether or not proposed loading and bracing concepts can withstand longitudinal shocks of the type which might be experienced in rail transportation.

This test, if required, is generally conducted before any other test procedures are begun.

SECTION IV contains the Procedures for Conducting Simulation Testing of new loading and bracing concepts. Simulation testing is the preferred method of evaluating new concepts whenever possible because of the advantages of this test process over the alternative field test. Field test shipments conducted in accordance with Sections 6 through 11 of Rule of Order X may be used as an alternate to simulation testing.

SECTION V contains a test request form which can be used for requesting testing of a new loading and bracing concept.

LABORATORY TESTING

The AAR also has the capabilities to perform laboratory testing on loading and bracing system components, shipping containers and packaging materials at the facilities in Pueblo, Colorado. Both static and dynamic testing can be performed.

Testing on shipping containers and related packaging material is done in accordance with ASTM Standard D4169-Practice for Performance Testing of Shipping Containers or other applicable ASTM test standards.

Product Performance Testing for Pneumatic Dunnage is conducted following procedures in General Information Bulletin No. 9, Product Performance Profile for Pneumatic Dunnage.

Testing on loading and bracing system components, such as strapping, is conducted using ASTM standards or other appropriate test procedures. These tests are generally considered proprietary in nature and, as such, their costs would be borne by the proponent.

SECTION II

EVALUATION OF NEW LOADING AND BRACING METHODS AND MATERIALS FOR CLOSED CARS, TRAILERS OR CONTAINERS

The following procedures govern the evaluation and acceptance of new closed car loading and bracing methods or materials not currently recognized in AAR publications.

1 - Requests for evaluation shall be in writing to the Director Damage Prevention and Loading Services and may originate with a shipper or supplier, a railroad damage prevention representative, or the Damage Prevention and Freight Claim Committee.

2 - The written request shall fully define the proposed loading or bracing method or material, including an illustration; a statement of purpose; the approximate lading weight of proposed test shipments; description of the type of commodity to be shipped; description of the type of rail equipment to be used; origin point; origin railroad; routes; and intermediate and destination carriers. Documentation on the performance of the subject method or material may be submitted for consideration with the written test request. Responding to the request, the Director Damage Prevention and Loading Services shall make recommendations to all involved railroads regarding the required testing and arrangements to progress the test request.

If, at the request of one of the member railroads, there is a need for Damage Prevention and Freight Claim Committee consideration, before further progression of the request, the Director Damage Prevention and Loading Services shall so advise the Chairman, Damage Prevention and Freight Claim Committee in order to solicit input from Committee members.

3 - The proponent will be advised of one of four likely possibilities: 1) the loading and bracing method is sufficiently similar to one already approved and/or the Committee already has sufficient information by which to make a decision; 2) the method will require impact and either simulation testing or field testing; 3) the method will require simulation testing or field testing only; or, 4) the request requires further information for committee consideration.

4 - In the event of a positive recommendation for an impact test, the Director Damage Prevention and Loading Services shall notify the proponent and the origin railroad to determine the most appropriate means to conduct the test.

5 - In the event of a positive recommendation for simulation testing, the Director Damage Prevention and Loading Services shall notify the proponent that it will be necessary for the proponent to arrange for a
specimen load to be tested in accordance with the “Procedures for Simulation Testing of New Closed Car Loading and Bracing Methods or Materials” as approved by the Damage Prevention and Freight Claim Committee.

6 - As an alternative to simulation testing or in conjunction with simulation testing, the Director Damage Prevention and Loading Services may request that field test shipments be initiated.

7 - If field test shipments are requested, the Director Damage Prevention and Loading Services shall notify the Chief Prevention Officers of the origin railroad and the intermediate and delivering railroads that are expected to be actively involved in the majority of routes and seek their consent for the test shipments.

8 - Prior to commencing a field test, the Director Damage Prevention and Loading Services will supply the proponent with a numbered envelope for each test shipment. The envelopes will contain standard inspection forms to be completed at origin and destination and instructions for both origin and destination inspectors. As an option, and where appropriate, this information may be completed and submitted in an electronic format.

9 - Sufficient cars or trailers shall be shipped using the proposed method to ensure a minimum of twenty-five (25) origin and matching destination reports. The twenty-five (25) reports must be complete in detail to permit an accurate evaluation of performance. The proponent will be responsible for obtaining the origin and destination reports. If field test shipments are being progressed in conjunction with a simulation test, the Director Damage Prevention and Loading Services may reduce the number of reports required. The number of test shipments will be limited to those required to produce sufficient data to determine a valid conclusion.

10 - Test shipments shall be prepared as uniformly as possible and be made in types of equipment normally utilized by the shipper. The distance of each test shipment must be more than 500 miles (800 kilometers).

11 - The shipper is required to notify the AAR of test shipments, allowing enough lead time to permit the AAR to notify the origin carrier and delivering carriers so carrier inspections can be arranged when possible.

12 - The Director Damage Prevention and Loading Services shall arrange for a staff observation of test shipments at the destinations, when necessary, to provide a base for engineering analysis.

13 - When a test is concluded, the Director Damage Prevention and Loading Services shall prepare a test report for the Damage Prevention and Freight Claim Committee, for consideration by that Committee. The Damage Prevention and Freight Claim Committee shall approve, by a two-thirds vote of its members, or disapprove the proposal within 30 calendar days of report and ballot mailing or facsimile transmission.

14 - Concurrently with the Director's submission of the report to the Damage Prevention and Freight Claim Committee, a copy will be furnished to the proponent.

15 – If the Request for Approval is for hazardous materials securement methods, following successful completion of an impact test as defined in Section III, proposed loading methods are required to undergo simulation testing and a minimum of 15 field test shipments in order to be considered for approval.

16 – Hazardous material securement methods that successfully complete impact, simulation and field testing, and are approved for non-hazardous shipments by the Damage Prevention and Freight Claim Committee, will be submitted to the AAR Bureau of Explosives (BOE) for consideration of approval for hazardous materials securement. The AAR Hazardous Materials (BOE) Committee shall approve or disapprove the proposal within 30 calendar days of report and ballot mailing, which can occur by electronic means.

SECTION III - RECOMMENDED PROCEDURES FOR CONDUCTING IMPACT TESTS OF LOADED FREIGHT CARS, TRAILERS OR CONTAINERS

1. SCOPE

This method is intended to evaluate whether or not proposed loading and bracing concepts can withstand longitudinal shocks of the type which might be experienced in rail transportation.

2. EQUIPMENT

(a) Empty cars are preferred for use as the buffer or struck cars. Loaded cars may also be used with prior AAR approval. In either case, the total weight of the buffer cars is to be approximately 250,000 lbs. (minimum). The first buffer car must be a standard
draft gear car. The remaining buffer cars should have standard draft gears, if possible.

(b) One locomotive.

(c) A minimum of 200 ft. length of reasonably level tangent track is required between the buffer cars and test car to allow acceleration of locomotive and test car to specified impact speeds.

(d) If alternate procedure (Section 6) is being used to conduct the test, a tangent track with a slight grade is required.

(e) A means of determining the speed of the test car at the time of impact is required.

3. PREPARATION

The test load or loads must be prepared specimens representative of the intended loading and bracing method. If safety or other reasons preclude the use of actual commodity, the specimen must be equal in weight and general character to the materials to be shipped.

4. ARRANGEMENT OF TEST EQUIPMENT

(a) Buffer cars must have air brakes set on all cars and hand brakes set on the first and last cars of the anvil string. If cushioned cars are included in the buffer consist, cars must be bunched, by applying the hand brake to the last car and compressing the string of cars with a locomotive. The struck end of first buffer car must have standard draft gear.

(b) Locate the test car between the buffer cars and the locomotive.

(c) Electric timer, radar, or other means of measuring impact speed. Use in accordance with manufacturers instructions. Speed measuring device must have a current and verifiable calibration certificate.

(d) Radar Equipment: Operator of radar must be positioned in line with the direction of impact in order to obtain an accurate speed. Follow the instructions of the equipment manufacturer and carrier or company conducting the test regarding location of radar operator. For safety, the radar operator should be positioned so as to aim at the test car moving away from their position.

5. PROCEDURE

(a) Brief the train crew on the procedure. Delegate one person to advise the appropriate member of the train crew when moves are to be made. Instruct all participants and observers to take precautions for their personal safety and observe safety practices of the carrier and/or company conducting the test. If desired, test runs can be made without impacting the test load to establish accuracy of speed.

(b) There are four impacts of the test load. The first three impacts are in the same direction. On all TOFC/COFC loads, including those for hazardous materials, the first three impacts are conducted with the rear of the test trailers/containers facing the direction of impact.

(i) On open top rail car load tests, boxcar load tests for hazardous materials other than explosives and all hazardous materials load tests involving explosives the first three impacts are at 4, 6 and 8 mph (+/- 0.5 mph).

(ii) On boxcar load tests for non-hazardous materials and on TOFC/COFC load tests for non-hazardous materials or hazardous materials other than explosives the first three impacts are 4, 6 and 6 mph (+/- 0.5 mph).

(c) The fourth impact is at the opposite end of the test car from the first three impacts. If it is not possible to turn test car, place the test car at the opposite end of the buffer cars and conduct the fourth impact. In this instance, the last car at the opposite end of the buffer cars must also be a standard draft gear car.

(i) On open top rail car load tests, boxcar load tests for hazardous materials other than explosives and all hazardous materials load tests involving explosives the fourth impact is at 8 mph (+/- 0.5 mph).

(ii) On boxcar load tests for non-hazardous materials and on TOFC/COFC load tests for non-hazardous materials or hazardous materials other than explosives the fourth impact is at 6 mph (+/- 0.5 mph).

(d) No readjustment of lading or reconditioning of bracing or items of securement will be permitted during the test.

(e) The specimen car carrying the test load is pulled a sufficient distance from the buffer cars to allow...
acceleration to the required impact speed. The test load
car is then pushed toward the buffer cars until the
required speed is attained. It is then released and
allowed to roll freely into the buffer cars. Knuckles
should be open and positioned for coupling. This
process is repeated for each impact.

6. ALTERNATE PROCEDURE

(a) A section of inclined track can be calibrated using a
test car and radar. The test car is released from the
designated starting point and allowed to roll free down
the inclined track. A crew member riding the test car is
in radio contact with radar operator who reads off the
car speed to the rider. The rider drops markers at track
side to indicate locations at which the desired speeds
are obtained. After the final speed mark is determined,
the test car is stopped by use of the hand brake. No
other cars are present on the test track during the
 calibration process. The process is repeated at least two
times to ensure the accuracy of speed locations. If it is
difficult for the rider to safely drop the markers and
stop the car using the hand brake, a free rolling
locomotive can be used for the initial calibration when
markers are dropped with the locomotive's brakes
applied after reaching final speed as indicated by radar.
The test car can then be released from the
same starting
point and adjustments in markers made if needed prior
to impacting.

(b) After determining speed locations, impacts are
performed by locating the buffer cars at the proper
location for desired impact speed and releasing the test
car from the designated starting point. This requires
moving the buffer cars every time a different speed is
required, or measuring back from the end of the anvil
string to the appropriate release points.

(c) Speeds and the direction of impacts shall be the
same as outlined in Sections 5(b) and 5(c) above.

(d) No readjustment of lading or reconditioning of
bracing or items of securement will be permitted during
the test.

7. RECORD OF TESTS

An accurate record of the tests is to be maintained,
tabulating the number and speed of impacts and
observations of blocking and lading after each impact.

SECTION IV - PROCEDURES FOR
SIMULATION TESTING OF NEW
CLOSED CAR, TRAILER OR
CONTAINER LOADING
AND BRACING METHODS OR
MATERIALS

Simulation testing is conducted using the Vibration Test
Unit at the Transportation Technology Center (TTC), a
test facility in Pueblo, Colorado operated by the
Transportation Technology Center, Inc., a subsidiary of
the Association of American Railroads.

The Vibration Test Unit (VTU) is an electro-hydraulic
unit capable of subjecting a full-size loaded rail car to
controlled vertical and lateral vibration inputs at the
wheels, creating the dynamic effects of the track being
simulated. Use of the VTU allows damage prevention
testing in a controlled environment with known inputs.
Observation of loads during testing and use of
electronic instrumentation allows for study and analysis
of lading and bracing, and bracing failure modes. The
result is improved loading and bracing systems.

There are two standard simulation test procedures, one
for railcar loading methods and the second for
trailer/container loading methods. The test procedures
consist of two test cycles as shown below. Each cycle
begins with two impacts performed to provide
longitudinal shocks of the type a car may experience in
transit. The impacts are followed by a series of runs on
the Vibration Test Unit using track input data which
simulates the effects of various types of track.
Additional test cycles simulating specific rail input
conditions can also be provided.

The actual testing requires two to three days, however,
the test load would be at the TTC a minimum of two
weeks to allow time for inspection of the loads and any
preparation or load adjustment required. Every attempt
is made to minimize the time loads are at the TTC if
this would be a problem.

For tests funded by the AAR, the AAR arranges for free
rail movement of the test load to the Transportation
Technology Center and back to origin after testing is
completed. If the proponent wishes to have the test car
moved to another destination after testing, the
proponent is responsible for arranging movement of the
test car at the completion of testing.
General information Bulletin No. 2

Procedures for Simulation Testing of New Closed Car Loading and Bracing Methods or Materials

**Cycle 1**

A) 2 Impacts - One at each end of the test car at 5 m.p.h. (± 0.5 m.p.h.).
B) Track data on VTU;
   Total Simulated Mileage – Cycle 1: 149.1

**Cycle 2**

A) 2 Impacts - One at each end of the test car at 6 m.p.h. (± 0.5 m.p.h.).
B) Track data on VTU;
   Total Simulated Mileage – Cycle 2: 119.7

**Total Simulated Mileage – Cycles 1 & 2: 268.8**

Procedures for Simulation Testing of New Intermodal Loading and Bracing Methods or Materials

**Cycle 1**

A) 2 Impacts - Both at 5 m.p.h. (± 0.5 m.p.h.)
   The first impact is toward the nose of the trailer,
   the second impact towards the doors.
B) Track data on VTU;
   Total Simulated Mileage – Cycle 1: 149.1

**Cycle 2**

A) 2 Impacts - Both at 6 m.p.h. (± 0.5 m.p.h.)
   The first impact is toward the doors of the trailer,
   the second impact towards the nose.
B) Track data on VTU;
   Total Simulated Mileage – Cycle 2: 119.7

**Total Simulated Mileage – Cycles 1 & 2: 268.8**
Request for AAR Testing
AAR/TTCI Damage Prevention and Loading Services*

Name of Person Requesting Test: ________________________________________________

Title: _______________________________________________________________________

Company: ___________________________________________________________________

Address: ___________________________________________________________________

Telephone No.: ___________ Fax No.: ___________ E-mail: __________________________

Commodity: __________________________________________________________________

Origin Location: __________________________________________________________________

Individual in Charge of Origin Loading: ___________________________________________

Title: _______________________________________________________________________

Telephone No.: ___________ Fax No.: ___________ E-mail: __________________________

Origin Railroad: __________________________________________________________________

Local Railroad Representative: __________________________________________________________________

Telephone No.: ___________ Fax No.: ___________ E-mail: __________________________

Proposed Destinations: __________________________________________________________________

Intermediate and Destination Railroads: _____________________________________________

Purpose of Test: __________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Continued
Description of Loading and Bracing Method (Attach diagram, list of materials and specifications of proposed loading and bracing method.):

_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________

Identify Equipment Type and Size Below -

Boxcar:
Type: __________Type Draft Gear/Cushioning: __________
Size: __________

Intermodal:
Trailer or Container: __________Size: __________

Other (Describe): __________

Load Weight: __________

Proposed Starting Date: __________

*Note: AAR/TTCI Damage Prevention and Loading Services staff will review any test proposal and advise the proponent what type of testing will be required. DP&LS staff will also advise the AAR Damage Prevention and Freight Claim Committee of the test request and the testing recommended. Scheduling of testing is dependent on availability of AAR/TTCI staff and facilities required.

Submit the completed request form to:

Director Damage Prevention and Loading Services
Association of American Railroads/TTCI
55500 DOT Road
Pueblo, CO 81001
Or online at: DPLS@aar.com
This page left blank intentionally.
General Information Bulletin No. 2

Closed Car/Trailer Loading Pamphlets

1. Freight Forwarder (2/80) Cancelled
2. Bags, Commodities in (10/93)
3. Barrels, Drums or Kegs (11/65), Includes Special Supplement (6/74)
4. Building Brick in Closed Cars (8/83)
5. Plywood in Closed Cars (11/85)
6. Minimum Loading Standards for Freight (12/84)
7. Furniture (7/79) Cancelled
8. Bags, Commodities in (10/93)
9. Barrels, Drums or Kegs (11/65), Includes Special Supplement (6/74)
10. Building Brick in Closed Cars (8/83)
11. Plywood in Closed Cars (11/85)
12. Minimum Loading Standards for Freight (12/84)
13. Furniture (7/79) Cancelled
14. Packaged Food Products (10/88)
15. Furniture (7/79) Cancelled
16. Lumber in Closed Cars (10/87)
17. Machinery (5/95) Cancelled
18. Steel Products in Closed Cars (4/95)
19. Flat Paper Stock in Closed Cars & Trailers & Containers for TOFC/COFC Service (5/93)
21. High Density Metallic Commodities (11/84)
22. Supplemental Loading Standards for Roll Paper/Pulpboard in Closed Cars (4/11)
23. Also see Best Practices for Loading of Roll Paper in Rail Cars for additional information.
24. Dictionary of Standard Terms (7/82)
25. Glass, Flat (6/94) Cancelled
27. Intermodal Loading Guide (ILG) for Products in Closed Trailers and Containers (7/11)
28. Intermodal Loading Guide (ILG) for Paper Products in Closed Trailers and Containers (8/01)
30. Includes Pamphlet No. 39, Supplemental Loading Standards for Roll Paper/Pulpboard in Closed Cars

General Rules Circulars

42-K General Rules Covering Loading of Carload Shipments of Commodities in Closed Cars (11/10)
42-J Reglas Generales Que Cubren El Cargado De Embarques Completos De Mercancías En Carros Cerrados (1/01)
43-E Rules Governing the Loading, Blocking and Bracing of Freight in Closed Trailers and Containers for TOFC/COFC Service (7/11)

General Information Bulletins (G.I.B.)

1. Handling and Shipping Fresh Fruits and Vegetables by Rail (5/76)
3. Instructions for Applying Polyethylene Sheets as Weather Protection in Boxcars (11/91)
4. Weather Protection for Open Top Wallboard Shipments (4/93)
5. Overloaded of Unbalanced Hopper Cars are Unsafe (8/93)
6. Measurement Requirements for Remote Ride Quality Monitoring (9/96)
7. Evaluating and Loading Auto Parts Racks in Railcars for Transportation via the North American Rail System (2/99)
8. Practical Guidelines for Stretch Film Roping of Steel Coils Shipped Eye Vertical in Boxcar and Intermodal Shipments (4/03)
9. Product Performance Profile for Pneumatic Dunnage (7/05)