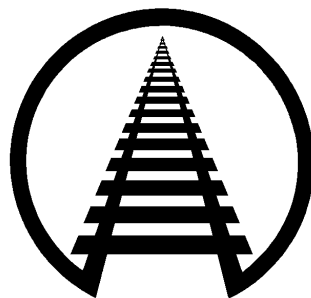


General Information Bulletin No. 9

Product Performance Profile for Pneumatic Dunnage

Approved by
DAMAGE PREVENTION & FREIGHT CLAIM COMMITTEE
Association of American Railroads



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1.0 INTRODUCTION

The Product Performance Profile for Pneumatic Dunnage (PPPPD) was developed with input from the pneumatic dunnage bag manufacturers and provides an acceptable confidence level regarding the use of pneumatic dunnage bags for shippers, vendors and transportation carriers alike. The performance profile is a North American rail industry standard effective July 1, 2005.

AAR loading publications have been revised to specify the applicable airbag level per the PPPPD for each application utilizing a pneumatic dunnage bag. For example: Level 1 pneumatic dunnage will apply to usage as lateral void fillers and/or load securement in certain intermodal applications; Levels 2-5 will apply when used as lengthwise load securement between flat surfaces such as canned goods or flat panel products; and Levels 4 and 5 will apply when used in a horizontal application as lengthwise securement for rolls of paper.

The Damage Prevention and Freight Claim Committee of the Association of American Railroads endorses the concept of a verification program for pneumatic dunnage. In order for a pneumatic dunnage product to be verified as meeting the requirements of the PPPPD, the product must be successfully tested by AAR/TTCI and documented as successfully completing the requirements of the Product Performance Profile that is applicable to the performance level(s) being sought for verification. While this product performance profile is a rail industry standard, participation in the verification program is *voluntary*. Airbags successfully meeting these requirements should be prominently labelled by the manufacturer indicating the level and date of their most recent verification.

A listing of verified pneumatic dunnage products by manufacturer is published separately and made available for reference via the AAR/TTCI website at:

http://www.aar.com/standards/dpls/pfds/PPPPD_Verification_List.pdf.

Beginning in 2014, suppliers, vendors and distributors have the opportunity to have pneumatic dunnage products that have been verified by a manufacturer listed in this Product Verification List under a separate trade or brand name. To qualify, a supplier must provide written confirmation from the manufacturer identifying their company as an authorized representative of that manufacturer's products, and that the product is the same in both material and method of manufacture as the product verified. Contact DPLS@aar.com for details.

The General Rules relating to personal safety and the safe operation of trains, contained in AAR Circular No's. 42-N and 43-G or supplements thereto, issued by the Association of American Railroads, **must be observed**.

*Loading and bracing methods not presently approved may receive consideration for approval and publication under Section II - Evaluation of New Loading and Bracing Methods and Materials for Closed Cars, Trailers or Containers of **General Information Bulletin No. 2, "Rules and Procedures for Testing of New Loading and Bracing Methods or Materials"**. Submit requests to Director Damage Prevention & Loading Services, AAR/TTCI, 55500 DOT Road, Pueblo, CO 81001.*

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2.0 PRODUCT PERFORMANCE PROFILES FOR PNEUMATIC DUNNAGE

Pneumatic dunnage has two principal applications in rail shipments: 1) as lateral void fillers, primarily in intermodal shipments and, 2) as lengthwise void fillers in boxcar shipments.

1) Attributes for pneumatic dunnage as lateral void fillers are:

- Must be capable of maintaining 0.5 to 3.0 psig in voids from 4 in. (10 cm) to 12 in. (30.5 cm).
- Must not leak or lose significant air pressure.
- Must meet minimum burst strength requirement of 8 psig.

2) Attributes for pneumatic dunnage as lengthwise void fillers are:

- Must be capable of maintaining 2.5 to 8.0 psig in voids from 4 in. (10 cm) to 12 in. (30.5 cm)
- Must not leak or lose significant air pressure.
- Must meet minimum burst strength requirement of 17 to 30 psig, dependent on test level.

2.1 Performance Levels

Five levels of performance are defined: Level 1 for pneumatic dunnage as lateral void fillers (and load securement in certain intermodal applications); Levels 2-4 for pneumatic dunnage as lengthwise void fillers in flat platen type applications with varied performance requirements; and Levels 4 and 5 for pneumatic dunnage used as lengthwise void fillers in horizontal application between cylindrical surfaces.

Level 1 reusable dunnage bags intended for use only in filling crosswise (lateral) voids must be prominently marked by the manufacturer to indicate proper application. Never use bags marked for this application to fill lengthwise voids.

Pneumatic dunnage meeting Level 2-5 requirements fulfill all Level 1 requirements. Verified air bags shall be prominently marked identifying the size and performance level.

Performance Level Application Guide

- | | |
|----------|---|
| Level 1: | For filling lateral voids, primarily in intermodal loads. |
| Level 2: | For filling lengthwise voids in loads weighing up to 75,000 lbs. (34,000 kg) |
| Level 3: | For filling lengthwise voids in loads weighing up to 160,000 lbs. (72,575 kg) |
| Level 4: | For filling lengthwise voids in loads weighing up to 216,000 lbs., and horizontal applications in approved roll paper loading methods weighing up to 190,000 lbs. (86,183 kg) |
| Level 5: | For filling lengthwise voids in loads weighing up to 216,000 lbs. (97,976 kg), and horizontal applications in approved roll paper loading methods. |

Level 1 Square air bags are designed to fill lateral voids greater than 12 in. (30.5 cm) wide but not more than 24 in. (61 cm) wide.

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The manufacturer of the pneumatic dunnage submitted for testing and subsequently applying for Association of American Railroads verification will supply all material specifications of the dunnage. If specifications are of a proprietary nature, indicate such at the time of submission. Any change of material specification(s) and/or method of manufacture will require reverification.

The outermost ply of pneumatic dunnage bags must be moisture resistant with a minimum Moisture Vapor Transmission Rate (MVTR) of 1.4 grams/100 square inch/24 hours.

The location of the inflation valve on pneumatic dunnage can have a significant influence on performance. Valve location and type shall be identified by the manufacturer and identified on published AAR Pneumatic Dunnage Verification listings.

Valve locations are defined as follows:

Corner (standard): a valve located within 12 in. of both the end seam and side edge on the face of an air bag.

Edge: a valve located within 12 in. of the end seam on the side edge of the air bag.

Mid: a valve located anywhere mid-length of the air bag (more than 12 in. from either end seam) on a face, within 6 in. of a side edge.

2.2 Sample Pre-Conditioning Requirements - All Levels

Uninflated sample dunnage shall be held in the same environment as the test fixtures for a minimum 48 hours prior to testing. Samples must be separated for full exposure. Sample air bag size must be: **Level 1** – 48 in.(+/- 2 in.) x 96 in. (122 cm \pm 5 cm x 244 cm); **Levels 2 through 5** – Ranging between 48 in.(+/- 2 in.) x 102 in. (122 cm \pm 5 cm x 260 cm) and 48 in.(+/- 2 in.) x 108 in. (122 cm \pm 5 cm x 274 cm).

2.3 Testing Fixtures

Test fixtures for levels 1 - 4 must be able to accommodate all samples with 12 in. void between flat platens. Test fixture for level 5 must be able to accommodate samples in a horizontal orientation which will simulate horizontal installation between four 50 in. diameter rolls of paper loaded on the centerline of a boxcar with an 18 in. center void.

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2.4 Performance Measures

2.4.1 Level 1, Pneumatic Dunnage as Lateral Void Fillers and/or Load Securement in Certain Intermodal Applications

Part A, Leak Test:

Ten samples shall be inflated to 2.5 psig in a 12 in. (30.5 cm) void and remain thus for 19 days. Record the temperature, relative humidity and barometric pressure at the start and end of the test.

After 19 days pneumatic dunnage must retain a minimum of 1.5 psig, and the gauge pressure standard deviation of the 10 samples must not be greater than 0.15.

Part B, Burst Test:

Five random samples from Part A shall be inflated to 8 psig in a 12 in. (30.5 cm) void. All five sample air bags must maintain 8 psig for one minute.

The report must include initial and final gauge pressure measurements for the entire 19-day period for *Part A* and also the results of testing for *Part B*. The report must also include the temperature, relative humidity and barometric pressure at the start and end of the test.

2.4.2 Level 1, Square Pneumatic Dunnage

Verification of Level 1 Square Air Bags requires prior verification of Level 1, 12 in. (standard) air bags. Additionally, an impact test must be successfully completed per General Information Bulletin No. 2, Rules and Procedures for Testing of New Loading and Bracing Methods or Materials. The test load shall consist of palletized cased goods weighing 43,000 lbs. (minimum) in an intermodal trailer or container per Method F-2 of the AAR Intermodal Loading Guide (2016 edition). Success is defined as limiting load movement in either lengthwise direction to not more than 24 in. (60.96 cm).

2.4.3 Levels 2-5, Pneumatic Dunnage as Lengthwise Void Fillers and/or Load Securement

Part A, Leak Test:

Ten samples shall be inflated to the pressure specified for the desired Test Level in the table below, in a 12 in. (30.5 cm) void for Test Levels 2 - 4 and in an 18 in. (45.7 cm) void for Test Level 5 and remain thus for 19 days. Record the temperature and barometric pressure at the start and end of the test.

After 19 days pneumatic dunnage must lose no more than 1.0 psig for Test Levels 2 - 4, and no more than 2.0 psig for Test Level 5. The gauge pressure standard deviation of the ten samples must not be greater than 0.15.

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Part B, Burst Test:

Five randomly selected samples tested in Part A shall be further inflated, in appropriate test fixture as outlined in 2.3 Testing Fixtures, in a 12 in. (30.5 cm) void for Levels 2 - 4 and in an 18 in. (45.7 cm) void for Level 5. Samples are to be inflated to the maximum pressure specified for the desired level in following table.

Performance Requirements for Levels 2 - 5

	Inflation Pressure Part A	Maximum Inflation Pressure Part B
Level 2	5 psig	17 psig
Level 3	8 psig	25 psig
Level 4	10 psig	30 psig
Level 5 (18 in. void)	10 psig	21 psig

All five sample air bags must maintain the specified pressure for one minute.

The report must include initial and final gauge pressure measurements for the entire 19-day period for **Part A** and also the results of testing for **Part B**. The report must also include the temperature, relative humidity and barometric pressure at the start and end of the test.

3.0 PROCESS SUMMARY

- 1) Manufacturers of pneumatic dunnage request verification testing from the AAR Damage Prevention & Loading Services.
- 2) Manufacturer submits a minimum of 12 samples for each level that verification is requested plus 2 inflator nozzles for each different valve type. Samples must be new samples and not preconditioned or pretested samples.
- 3) Manufacturers' request will be placed in a queue based on date of receipt and manufacturer will be notified by the AAR of the anticipated test commencement and completion date. (Leak testing requires 19 days to complete; burst testing requires 1 day; the entire process requires a minimum of 3 to 4 weeks to complete.)
- 4) Sample air bags will be leak tested.
- 5) If samples fail to meet the leak test requirements, new samples must be submitted to continue leak test verification.
- 6) Sample air bags that successfully complete leak testing will then be burst tested.
- 7) A report of the results will be written and sent to the manufacturer and the AAR Damage Prevention & Freight Claim Committee.

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- 8) An invoice for testing will be issued by TTCI to the manufacturer.
- 9) Once payment is received, verified pneumatic dunnage will be added to the on-line PPPPD Verification at: <https://aar.com/standards/damage-publications.php>

4.0 PERFORMANCE RE-VERIFICATION

All pneumatic dunnage that has successfully completed testing, as outlined in this document, will require Association of American Railroads re-verification every three years. Failure to re-verify will result in revocation of existing verification. Pneumatic dunnage may remain listed on the PPPPD Verification List after the expiration date only if the pneumatic dunnage is in the process of being re-verified. In the event that the re-verification process takes more than three attempts for a verification, the pneumatic dunnage will then be removed from the PPPPD list until verification requirements have been met.

5.0 LABELING AND MARKING

1. All approved pneumatic dunnage bags should be marked with the letters “AAR” followed by the AAR-assigned identification mark.
2. Only the pneumatic dunnage bags that have been specifically granted approval by the AAR may be marked with the AAR identification number.
3. Markings shall be clearly legible with markings printed on either the label or printed on the bag itself, preferably near or around the inflation valve.
4. After being approved and assigned an identification number or mark, the approved company may apply this mark only to pneumatic dunnage bags meeting the following conditions:
 - a) Bags must be produced by and/or under the control of an approved manufacturer.
 - b) It must be of an approved level and consistent with the listings in GIB 9.
5. Markings applied to pneumatic dunnage bags manufactured to metric dimensions must be followed by the letter “M” of the same size as the original marking.
6. The Committee, at its discretion, shall have the authority to require retesting of any AAR-approved pneumatic dunnage bag if and when it is considered necessary.
7. For the most current “Product Performance Profile for Pneumatic Dunnage Product Verification List, go to: http://www.aar.com/standards/dpls/pfds/PPPPD_Verification_List.pdf. This table also lists each manufacturer’s assigned AAR identification number.

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6.0 IN THE EVENT OF FAILURE

The following procedures are intended for pneumatic dunnage that successfully completes testing as outlined in this document and subsequently fails during field use. These procedures will be followed in evaluating pneumatic dunnage that is submitted for testing due to failure.

1. The submission of pneumatic dunnage for evaluation will only be accepted from shippers, consignees, railroads, or the dunnage manufacturer.
2. The pneumatic dunnage submitted for evaluation will be the actual pneumatic dunnage that has failed due to leakage, or in the case of a failure due to a rupture, pneumatic dunnage from the same manufacturing lot.
3. The pneumatic dunnage will be evaluated and tested by material specifications. The test results will be compared to those specifications submitted at the time of the most recent verification by the Association of American Railroads.
4. The pneumatic dunnage manufacturer will be notified that their product is being evaluated, the reason(s) for testing and that a copy of the final report will be provided to them.
5. A copy of the final report will be submitted to the requesting party.
6. The final report will state whether the pneumatic dunnage as evaluated and tested met or failed to meet the specifications submitted at the time of the most recent verification by the Association of American Railroads.
7. If evaluation and testing show that a pneumatic dunnage fails to meet the specifications of the most recent verification, the manufacturer will be advised. If two subsequent failures and retests within a 90-day period show the pneumatic dunnage does not meet the specifications of the most recent verification, the existing verification will be revoked.

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CLOSED CAR LOADING GUIDES

- 1** Minimum Loading Standards for Freight in General Purpose Boxcars (01/2014)
- 2** Best Practices for Loading Roll Paper in Railcars (12/2019)
- 3** Minimum Loading Standards for Plywood and Similar Building Products in Closed Cars (06/2014)
- 4** Minimum Loading Standards for Lumber in Closed Cars (03/2014)
- 5** Minimum Loading Standards for Building Brick in Closed Cars (06/2014)
- 6** Minimum Loading Standards for Prepared Food and Similarly Packaged Products in Closed Cars (03/2014)
- 7** Minimum Loading Standards for Intermediate Bulk Containers in Closed Cars (03/2014)
- 8** Minimum Loading Standards for Bagged and Baled Commodities in Closed Cars (07/2014)
- 9** Minimum Loading Standards for Coiled Metal Products in Closed Cars (08/2014)
- 10** Minimum Loading Standards for Primary Metal Products in Closed Cars (10/2014)

See Also:

Intermodal Loading Guide for Products in Closed Trailers and Containers (01/2016)
Open Top Loading Rules Manual, Sections 1-7

GENERAL RULES CIRCULARS

- 42-N** General Rules Covering Loading of Carload Shipments of Commodities in Closed Cars (10/2019)
- 43-G** Rules Governing the Loading, Blocking, and Bracing of Freight in Closed Trailers and Containers for TOFC/COFC Service (05/2017)

GENERAL INFORMATION BULLETINS (G.I.B)

- 1** Handling and Shipping Fresh Fruits and Vegetables by Rail (05/1976)
- 2** Rules and Procedures for Testing of New Loading and Bracing Methods of Materials (10/2019)
- 3** Instructions for Applying Polyethylene Sheets as Weather Protection in Boxcars (11/1991) \
- 4** Weather Protection for Open Top Wallboard Shipments (05/1993)
- 5** Overloaded or Unbalanced Hopper Cars are Unsafe (08/1993)
- 6** Measurement Requirements for Remote Ride Quality Monitoring (11/1996)
- 7** Evaluating and Loading Auto Parts Racks in Railcars for Transportation via the North American Rail System (02/1999)
- 9** Product Performance Profile for Pneumatic Dunnage (02/2020)