



Australian Compliance Laboratory

Specialising in performance testing of dangerous goods packaging

A mock guide to:

Stack testing fibreboard boxes

For those wanting to internally test their dangerous goods packagings before laboratory analysis

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1 Method 1: Mock stack testing procedures

1.1 Fibreboard boxes containing inners that contain liquids



1. Determine the stack load from Appendix A.
2. Fill 3 samples to their maximum capacity with water and seal tightly.
3. Apply the stack load to each of the samples. Refer to Appendices B and C.
4. Allow the samples to hold the test load for 24 hours.
5. The samples must not leak. They must support the test load and be in good condition.

1.2 Fibreboard boxes containing inners that contain solids



1. Determine the stack load from Appendix A.
2. Fill 3 samples to their maximum capacity with polygranules and seal tightly.
3. Apply the stack load to each of the samples. Refer to Appendices B and C.
4. Allow the samples to hold the test load for 24 hours.
5. The samples must not leak. They must support the test load and be in good condition.

2 Appendices

2.1 Appendix A: Calculate the test weight

$$\text{Test weight} = \left[\frac{3000}{\text{stack height (mm)}} - 1 \right]_{RU,1} \times \text{gross mass (kg)}$$

Where,

RU,1 means to round up to the nearest integer, and

Gross mass_{solid contents} = the packaging's rated gross mass (kg), or

Gross mass_{liquid contents}
= [maximum capacity (L) x specific gravity (kg/L)] + tare mass of all components (kg)

2.2 Appendix B: A note regarding conditioning fibre packages

For in-house testing, it's okay to test fibre packages at ambient conditions. This deduction is made after considering clause 6.1.5.1.3 of the ADG Code which waives fibre conditioning when samples are retested.

However, it should be said that actual laboratory conditions test fibre packages at 23°C and 50% relative humidity. This is done after a 'drying' period where the fibre is left to pre-condition at approximately 25°C and 30% relative humidity.

2.3 Appendix C: A note about scaling the test load

"The performance of corrugated fibreboard can dramatically reduce due to the hygroscopic nature of paper. For example, a change in relative humidity from 40% to 90% (warehouse conditions) can result in a loss of about 50% of the case stacking strength." This extract is taken from The Fundamentals of Packaging technology, Fourth Edition by Walter Soroka. This only refers to the stacking strength of the box and not the inners.

3 Document information

3.1 General guidance

1. Mock testing on one package means nothing as it may give an out-lying result. You need to test on many samples to create reliable data. The more samples you test, the more reliable your data.
2. It's prudent to over-test your package before submitting. This can be achieved by exceeding the test requirements and/or performing many tests on one package.
3. The more measurement, control, and repeatability of your tests, the better.
4. The closer to laboratory conditions of your tests, the better.

3.2 The codes

The mock test methods in this document are modelled on those in the [Australian Code for the Transport of Dangerous Goods by Road and Rail \(ADG Code\)](#) and the [United Nations Recommendations on the Transport of Dangerous Goods \(UNRDG\)](#), Chapter 6.1.5.

3.3 ACL contact information

If you need more information then please contact us. We'd love to share our insights.

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3.4 Revision

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3.5 Disclaimer

This article is subject to ACL's [Disclaimer of Published Materials](#). Mock testing equipment, methods, and procedures may not be the same as those used in the laboratory and may produce different results. A passing result using these procedures may not result in a passing result in the laboratory. ACL is not responsible for any of the reader's results, observations, or interpretations arising from this article. Each packaging design may have special clauses or extra testing requirements. Readers should refer to the [ADG Code](#) for complete information.