



PERFORMANCE REQUIREMENTS FOR INNER PACKAGINGS

Guidance



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Important
<p>The information contained in this guideline is intended to be general in nature and is not a substitute for specific technical or legal advice. Readers should check their specific circumstances against the requirements of the ADG Code as they relate to the dangerous goods to be transported. The information in this guideline is applicable to the transport of dangerous goods by road and rail only. Other requirements will apply to the transport of dangerous goods by sea or air and users should refer to the relevant competent authorities.</p> <p>This guideline deals only with the provisions of the ADG code as they relate to the transport of dangerous goods by road or rail. Other laws relating to these activities will impose other duties or obligations not dealt with in this guideline.</p> <p>The NTC would like to thank the Competent Authorities Panel and the many organisations and individuals who contributed to the development of this guidance document.</p>

1 Purpose

The purpose of this guideline is to assist duty holders such as packaging manufacturers, packers and consignors to interpret and apply the Australian Code for the Transport of Dangerous Goods by Road and Rail (the **ADG Code**) requirements for inner packagings.

2 Scope

This guideline describes how inner packagings must be packed for transport, and the testing and approval requirements that apply to the assembled package. It explains the limited variations in inner packagings that are permitted without additional approval.

This guideline does not provide information about single packagings such as drums and jerricans, or the packaging of specific dangerous goods. No information is provided about the packaging of dangerous goods in limited quantities, which is described in a separate NTC publication titled [Consigning and transporting dangerous goods packed in limited quantities](#).

This guideline does not provide information about transport modes other than road and rail.

3 Terminology

Inner packagings are packagings for which an outer packaging is required for transport. Inner packagings are usually the primary receptacle in contact with the dangerous goods, such as a bottle, a tube or a small jerrican. By definition, inner packagings must not be transported unless they are contained within an outer packaging.

Outer packagings are external packagings necessary to contain and protect inner packagings. The most common example of an outer packaging is a fibreboard box.

Intermediate packagings are packagings placed between inner packagings and an outer packaging. Examples may include dividers, wrappers and cushioning.

When an inner packaging is assembled into an outer packaging, that unique pair is known as a **combination packaging**.

4 Requirements for inner packagings

4.1 General requirements

Inner packagings must be fit for the purpose of safely containing dangerous goods during transport. Among other requirements, **Chapter 4.1** of the ADG Code requires that inner packagings:

- Are compatible with the dangerous goods, and are not adversely affected, weakened, or liable to react with the dangerous goods.

- Are constructed and closed to prevent any loss of the dangerous goods.
- Are secured and cushioned such that they cannot break, be punctured or leak
- When containing liquids, have an appropriate resistance to internal pressure that might develop under normal conditions of transport.
- When containing liquids, have sufficient ullage (airspace) to ensure there is no leakage or permanent distortion of the packaging due to expansion caused by changes in temperature.
- When made of plastics, are not re-used to transport dangerous goods more than five years after the date of manufacture of the inner packaging.

4.2 Performance testing

Prior to Edition 7.7 of the ADG Code, every inner packaging filled in Australia required testing and approval. This requirement was removed in Edition 7.7 to make the ADG Code consistent with the United Nations Model Regulations and ensure the same requirements are applied to inner packagings filled in Australia and overseas. The full text of the former test requirements is reproduced at Appendix 2 for information only. They are no longer mandatory.

The inner packaging tests in previous editions may yet be useful to companies who wish to test and verify that their inner packagings offer suitable protection from accidental drops or mishandling by consumers after the inner packagings are removed from the outer packaging. The tests may also be useful to provide assurance that inner packagings meet the pressure requirements of Chapter 4.1 or that inner packagings are safe for use in combination packagings which are not subject to testing (see the note to Section 5 of this guideline).

4.3 Quality assurance programme

Section 6.1.1.4 of the ADG Code requires that all packagings are manufactured, reconditioned and tested under a quality assurance programme in order to ensure that each packaging meets construction and performance requirements.

The ADG Code identifies international standard *ISO 16106* as acceptable guidance for a quality assurance programme. The standard addresses issues such as organisational policies, defining and achieving quality standards, and performance monitoring through methods such as periodic testing of manufactured packagings.

5 Packaging approval

Except as described in the note to this section, all dangerous goods must be transported in packaging that has been **tested** to the performance requirements of the ADG Code and subsequently **approved** by a Competent Authority. Each unique combination packaging requires its own approval and each approval is identified by a packaging approval number.

Inner packagings do not require testing or approval as of Edition 7.7 of the ADG Code. The ability of inner packagings to effectively contain dangerous goods is examined through the testing and approval of the combination packaging in which they are used.

An approved combination packaging must display the UN packaging marks and the packaging approval number on the exterior surface of the combination. The ADG Code requires no specific marking requirements for inner packagings, although plastics inner packagings may benefit from a mark indicating the date of manufacture (for example in the MM YY format) to prevent the packagings being re-used more than five years after their date of manufacture.

NOTE: *The ADG Code provides some circumstances in which combination packagings do not require testing or approval:*

- *Dangerous goods packed in limited quantities according to Chapter 3.4 of the ADG Code*
- *Dangerous goods packed in excepted quantities according to Chapter 3.5 of the ADG Code*
- *Variations to approved inner packagings as described in Sections 6 and 7 of this guideline.*

Where a packaging is exempt from performance testing, Section 6.1.3.14 of the ADG Code requires the packaging to be marked in a manner that enables its origins to be traced.

6 Minor variations to inner packagings

In general, an approval for a combination packaging applies only to the unique pairing of the inner packaging and the outer packaging that were tested. The use of different inner or outer packagings is usually considered a new combination packaging which requires a separate approval.

Section 4.1.1.5.1 of the ADG Code describes limited circumstances where alternative inner packagings may be used without being considered a new combination packaging and needing a new approval.

Alternative inner packagings may be used where:

- The alternative inner packagings are of equivalent or smaller size to the approved inner packagings. For example, a 750 mL inner bottle may be replaced with a 500 mL inner bottle but it cannot be replaced with a 1 L inner bottle.
- The alternative inner packagings are of similar design to the approved inner packagings. For example, substitution is permitted when the approved inner packaging and the alternative inner packaging are both round bottles, or both rectangular jerricans. A round bottle may not be replaced with a square box. A tall narrow bottle may not be replaced with a short squat bottle.
- The material of construction of the alternative inner packagings offers equal or better resistance to impact and stacking forces as the approved inner packaging. For example, an approved inner packaging constructed of metal could not be replaced with an alternative inner packaging constructed of glass. The reverse substitution is acceptable.
- The alternative inner packagings have the same or smaller openings and the closure is of similar design. For example, a bottle with a 50 mm opening could be replaced with one with a 30 mm opening but it could not be replaced with one that uses a 75 mm opening. A screw closure could not be replaced with a push-fit closure because they are of different design and performance.
- Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings. For example, replacing a 750 mL bottle with

an alternative 500 mL bottle would likely require additional cushioning material to occupy the increased empty space.

- Inner packagings are oriented within the outer packaging in the same manner as in the tested package. For example, inner bottles positioned vertically with closures facing up may not be replaced with bottles that are positioned with closures facing horizontally.

The use of alternative inner packagings is only permitted where an equivalent level of performance is maintained. Where there is any doubt that an equivalent level of performance has been maintained, the new combination packaging should be submitted for testing and approval.

7 'V' type packagings

The ADG Code also provides for different inner packagings to be used through 'V' type combination packagings.

Section 6.1.5.1.12 of the ADG Code sets out a more stringent performance testing program for 'V' type combination packagings, whereby outer packagings are assembled with fragile inner packagings and subjected to a drop test from the Packing Group I height. They are also subjected to a stacking test while empty. A margin of safety is applied to the maximum permitted mass of the combination packaging, and detailed rules set out how inner packagings must be packed and cushioned.

A 'V' type combination packaging does require testing and approval, but it may then be packed with a range of different inner packagings that have not been individually tested or approved.

Appendix 1: Combination packaging terminology

Figure 1 depicts an example combination packaging, which consists of:

- an inner packaging that is a plastic bottle
- intermediate packagings including fibreboard dividers and cushioning
- an outer packaging that is a fibreboard box.

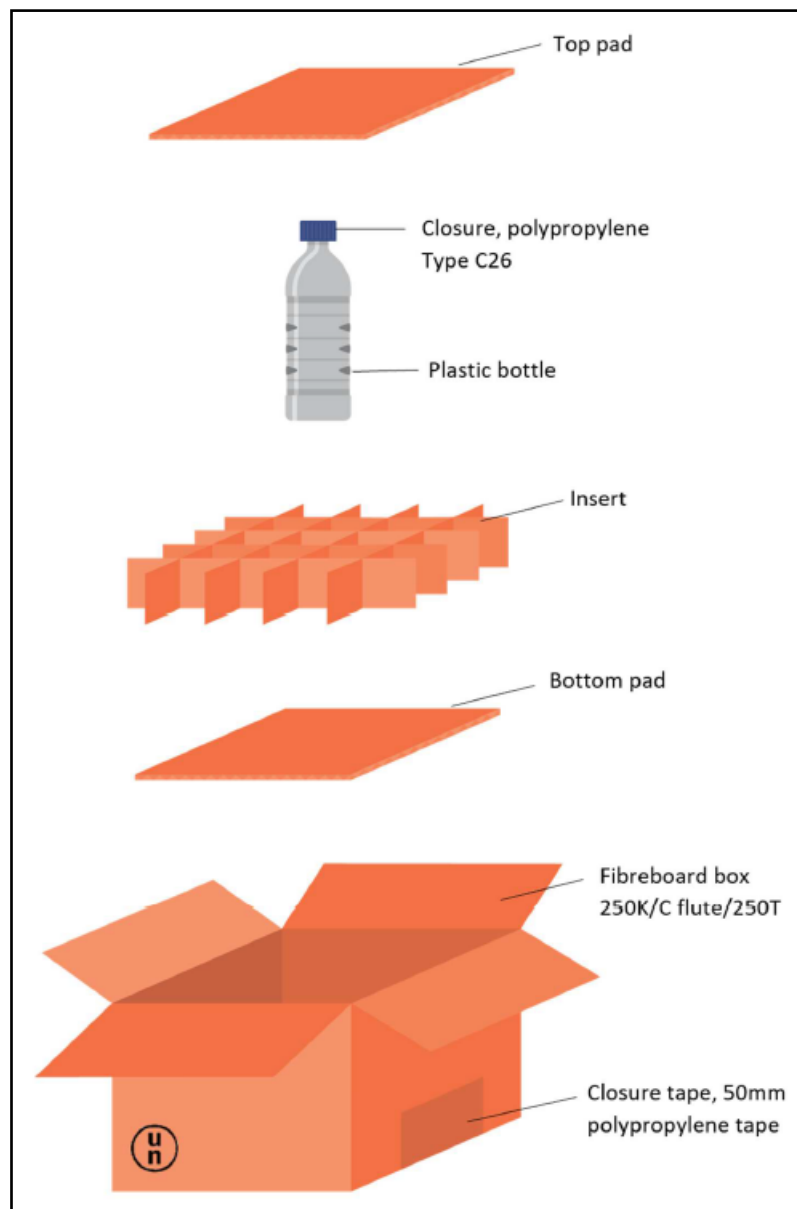


Figure 1. Example of a combination packaging.

Figure 2 depicts a change of the inner plastics bottle to an inner glass bottle with a different type of closure. This variation is not of a type permitted by the ADG Code, as described in Section 6 of this guideline. The combination packaging in Figure 2 is therefore considered a new combination packaging which must be separately tested and subsequently approved by a Competent Authority. The combination packaging in Figure 2 will receive a different approval number to the combination packaging in Figure 1.

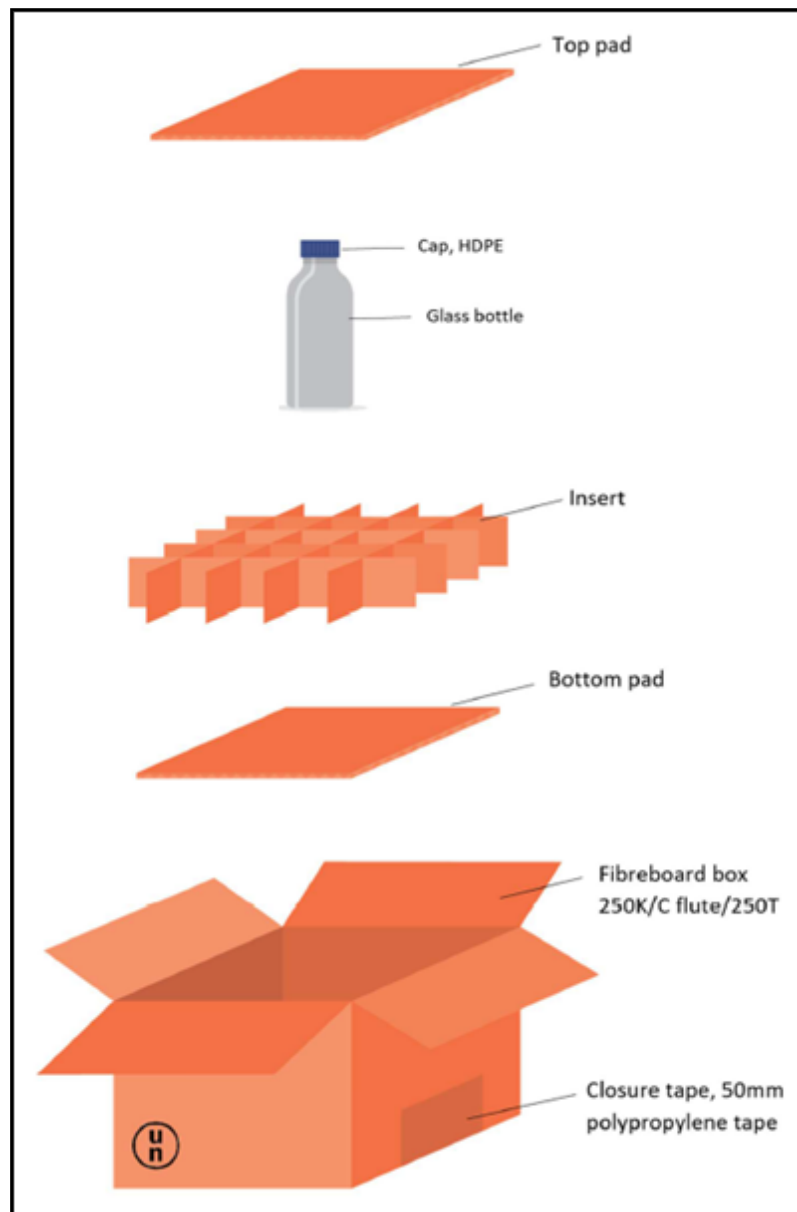


Figure 2. A variation to the inner packaging that represents a new combination packaging.

Appendix 2: Deprecated testing and construction requirements for inner packagings

Section 6.1.4.21 was removed from the ADG Code Edition 7.7 and inner packagings no longer require testing. The former requirements are reproduced here for persons who may wish to use them as a method to benchmark and verify the ongoing safety and suitability of inner packagings.

6.1.4.21	<p>Inner packagings</p> <p>NOTE: The requirements of 6.1.4.21 are additional to those of UN20 and are therefore applicable only to inner packagings that are filled in Australia.</p>
6.1.4.21.1	An inner packaging that is a cylindrical tinplate can with a friction closure must be manufactured in accordance with AS 2854.
6.1.4.21.2	An inner packaging that is a tinplate can with a threaded closure must be manufactured in accordance with AS 2854.
6.1.4.21.3	An inner packaging that is a glass packaging must be free from faults of a nature liable to impair their strength. In particular internal strains must have been suitably relieved. The thickness of wall must be at least 3 mm for receptacles that with their contents have a mass of more than 35 kg and a least 2 mm for other receptacles. Glass bottles and other glass receptacles must be capable of withstanding without permanent damage hydraulic pressure of 175 kPa for one minute.
6.1.4.21.4	<p>An inner packaging that is a plastics bottle used to transport a liquid must be capable of withstanding at ambient temperature, without leakage:</p> <ul style="list-style-type: none"> a. a hydraulic pressure of 175 kPa for one minute; and b. a drop test of 1 m, in all of the orientations illustrated in Figure 6.1, onto a hard, smooth and horizontal surface when full of fresh water. <p>No bottle need be used for more than one test.</p>
6.1.4.21.5	An inner packaging that is a plastics receptacle that is used to transport a solid must be capable of withstanding at ambient temperature, without leakage or rupture, a drop test of 1 m, in all of the orientations illustrated in Figure 6.1, onto a hard, smooth and horizontal surface, when filled to maximum gross lidded capacity with the goods to be packed or substituted with substances of the same density and other relevant physical properties. No receptacle need be used for more than one test.