

Australian/New Zealand Standard™

Built-in components for masonry construction

Part 3: Lintels and shelf angles (durability requirements)



AS/NZS 2699.3:2002

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD-028, Masonry Wall Ties and Accessories. It was approved on behalf of the Council of Standards Australia on 10 October 2002 and on behalf of the Council of Standards New Zealand on 17 September 2002. It was published on 7 November 2002.

The following are represented on Committee BD-028:

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Part 3: Lintels and shelf angles (durability requirements)

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD/28, Masonry Wall Ties and Accessories, to supersede AS/NZS 2699.3:2000.

The objective of this Standard is to provide manufacturers of lintels and shelf angles with specifications to achieve these durability requirements, and with methods for testing their corrosion resistance.

This Standard is the third part of a series on masonry wall ties, connectors and accessories, and lintels and shelf angles. The series comprises the following:

AS/NZS

2699 Built-in components for masonry construction

2699.1 Part 1: Wall ties

2699.2 Part 2: Connectors and accessories

2699.3 Part 3: Lintels and shelf angles (durability requirements)

Durability requirements for lintels and shelf angles are specified in AS 3700, *Masonry structures* and NZS 4210, *Code of practice for masonry construction: materials and workmanship*, and NZS 4230, *Code of practice for the design of masonry structures*, which also includes specification and testing for impact resistance during storage, handling, transport and installation of organic and inorganic zinc-silicate coatings.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendices to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Notes to clauses in this Standard are for information and guidance only and compliance with them is not a requirement of the Standard.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE AND APPLICATION**1.1.1 Scope**

This Standard specifies requirements and methods of test for durability performance of steel lintels and shelf angles to be built into masonry.

NOTES:

- 1 This Standard does not cover requirements for structural design or the method of its determination. Details for these are given by NZS 3404, AS 3700, AS 4100, NZS 4210 or AS/NZS 4600.
- 2 The design and installation requirements for lintels and shelf angles are specified in AS 3700 and NZS 4203.
- 3 Throughout this Standard, lintel signifies lintel or shelf angle, unless stated otherwise.
- 4 Lintels with a high durability classification may be used for less severe corrosion conditions.
- 5 The durability performance categories employed in this Standard are compatible with the environments specified in AS 3700, NZS 3604 and AS/NZS 2312.

1.1.2 Application

This Standard applies to lintels and shelf angles used in masonry construction as described in AS 3700 and NZS 4210.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1199	Sampling procedures and tables for inspection by attributes
1399	Guide to AS 1199—Sampling procedures and tables for inspection by attributes
1580	Paints and related materials—Methods of test
1580.406.1	Method 406.1: Resistance to impact—Falling weight test (Gardner-type test)
1580.481	Coatings
1580.481.1.9	Method 481.1.9: Exposed to weathering—Degree of blistering
1580.481.1.10	Method 481.1.10: Exposed to weathering—Degree of flaking and peeling
1580.481.3	Method 481.3: Exposed to weathering—Degree of corrosion of coated metal substrates
1627	Metal finishing—Preparation and pre-treatment of surfaces
1627.4	Part 4: Abrasive blast cleaning
2331	Methods of test for metallic and related coatings

2331.2.1	Method 2.1:	Tests for average coating mass per unit area or for thickness dissolution methods—Strip and weigh, and analytical
2331.3.1	Method 3.1:	Corrosion and related property tests—Neutral salt spray (NSS) test
3700	Masonry structures	
3750	Paints for steel structures	
3750.1	Part 1:	Epoxy mastic (two-pack)—For rusted steel
3894	Site testing of protective coatings	
3894.3	Method 3:	Determination of dry film thickness
3942	Quality control — Variables charts — Guide	
4100	Steel structures	
AS/NZS		
2312	Guide to the protection of iron and steel against exterior atmospheric corrosion	
3750	Paints for steel structures	
3750.13	Part 13:	Epoxy primer (two pack)
3750.14	Part 14:	High-build epoxy (two-pack)
3750.15	Part 15:	Inorganic zinc silicate paint
4600	Cold-formed steel structures	
4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles	
4791	Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process	
ISO		
ISO 9001	Quality management systems—Requirements	
ISO 9004	Quality management and quality system elements	
NZS		
3404	Steel structures Standard	
3404.1	Part 1:	Steel structures Standard
3404.2	Part 2:	Steel structures Standard—Commentary to the steel structure Standard
3604	Timber Framed Buildings	
4203	General structural design and design loadings for buildings	
4210	Masonry construction: Materials and workmanship	
SAA		
HB 18	Guidelines for third-party certification and accreditation	
HB 18.28	Guide 28:	General rules for a model third-party certification scheme for products
HB 73	Handbook of Australian Paint Standards	
HB 73.1	Part 1:	General
ASTM		
G1	Standard Practice for Preparing, Cleaning and Evaluating Corrosion Test Specimens	

1.3 NEW TECHNOLOGIES

This Standard shall not be interpreted as preventing the use of materials or methods of manufacture not specifically referred to herein, provided the specified performance criteria are met.

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Duplex coating

A coating system that provides corrosion protection through the addition of an organic barrier coating applied over galvanized steel.

1.4.2 Durability classification (R)

Identifies the level of corrosion protection provided to a lintel or shelf angle to meet the performance condition for the design life of a structure.

NOTE: Classifications R0 to R5 are individually defined by reference to exposure conditions given in AS 3700.

1.4.3 Galvanized coating

A protective zinc coating, applied by hot-dip immersion in molten zinc of at least 98% purity.

1.4.4 Inorganic zinc silicate

A coating consisting essentially of a dispersion of metallic zinc powder in an inorganic silicate medium.

1.4.5 Lintel

A loadbearing beam that provides structural support for the masonry and other loads above a window, door or other opening of a building.

1.4.6 Lot

A group of lintels or shelf angles of a single type with specific characteristics and dimensions, presented for sampling at the same time.

1.4.7 Masonry couplet

Two stack-bonded masonry units joined by a bed of mortar, or adhesive, as appropriate.

1.4.8 Organic coating

A protective coating, based on one or more organic resins, in liquid or powder form, applied to the substrate.

1.4.9 Shelf angle

A structural angle fixed to a supporting wall and used to support a vertical masonry veneer.

1.4.10 Specimen

A specially prepared item for testing, consisting of a lintel or shelf angle embedded in masonry, to simulate the appropriate service condition or, where more than one type of service condition applies, the most demanding.

SECTION 2 PERFORMANCE CRITERIA

2.1 SCOPE OF SECTION

This Section sets out specific requirements for the manufacture of lintels and shelf angels.

2.2 AIM

The performance criteria set out in this Section are designed to ensure that —

- (a) the lintels and shelf angles are durable and serviceable, and thus retain adequate strength; and
- (b) there is no loss of function of the lintels or shelf angles, or adverse effect on the masonry, over a design life of not less than 50 years, except for those lintels or shelf angles intended for durability classification R5, which requires the use of specifically designed lintels or shelf angles.

NOTE: It is essential that lintels and shelf angles attached to supporting walls be installed so that they do not permit water transfer across the cavity to the supporting frame. For example, flashing or a drip mechanism may be used to shed water into the cavity.

2.3 SAFETY

Features that present a safety hazard, e.g., sharp edges and burrs, shall be removed. In the case of coated lintels, these features shall be removed prior to coating.

2.4 DURABILITY

2.4.1 General

Materials for the manufacture of lintels shall be either inherently corrosion resistant or suitably treated to ensure sufficient durability to achieve design life.

2.4.2 Damage

Lintels shall be free from laminations, surface cracks, or surface imperfections, which would otherwise reduce the life of the lintel. Sharp edges and burrs may initiate corrosion and, therefore, they shall be removed. In the case of coated lintels, sharp edges and burrs shall be removed prior to coating.

All cut ends and any damaged areas on lintels shall be repaired to ensure that the appropriate durability criteria are met.

NOTE: It is important that repairs be effected, following complete removal of any contaminants from bare areas, by application of the renovation techniques specified in AS/NZS 4680, in the case of galvanized lintels, or the appropriate barrier-coating system for organic, inorganic zinc silicate or duplex-coated lintels, ensuring that the applied coating exceeds the surrounding original coating thickness by at least 15 microns.

2.4.3 Classification of materials

Lintels manufactured from any material shall be identified as durability classifications R0 to R5, by application of the acceptance criteria in Clause 2.4.4.

2.4.4 Durability criteria for lintels

Lintels shall not suffer loss of serviceability or performance over the design life of the structure (see Clause 2.2) when embedded in mortar and subjected to the following conditions:

- (a) Elevated temperatures with a maximum of 55°C, where the lintel is on the external leaf of the masonry, or 40°C, where the lintel is embedded into the internal leaf of the masonry.
- (b) A cyclic temperature variation of 40°C over any 24 h period.
- (c) The mortar bed having an initial alkalinity of pH up to 10, but carbonating over time to a pH of not less than 7.
- (d) Being wet and remaining wet for a total period of three months per year.
- (e) Exposure to UV radiation (global radiation of 20 MJ/m²) of up to four weeks (the construction period).
- (f) Aerosol penetration, with the highest level of airborne salt deposited at the exterior of the masonry, as follows:
 - (i) R0 nil g/m²/day.
 - (ii) R1 10 g/m²/day.
 - (iii) R2 20 g/m²/day.
 - (iv) R3 60 g/m²/day.
 - (v) R4 300 g/m²/day.
 - (vi) R5 See Note 2.

NOTES:

- 1 The extent of aerosol salt penetration depends largely on the distance from the coast; however, in practice, microclimatic effects may distort otherwise normal climatic patterns by many kilometres and should always be considered. The atmospheric salt deposition on the exterior face of the wall is double that normally experienced on the inner face. The values used in Appendix A reflect this situation.
- 2 The R5 durability classification refers to specific corrosive environments outside the above criteria. Where industrial fall-out, bacteria, chemicals or other environmental conditions exist, it is necessary for the manufacturer to test all unique coatings and materials to confirm their resistance to the particular environment for the expected life of the structure. Because such an environment cannot be specified in this document, suitable coating systems cannot be recommended.

2.4.5 Test methods

Lintels produced from materials not meeting the deemed-to-comply provisions (see Section 3) shall be tested and assessed for compliance in accordance with—

- (a) Appendix A, for bare lintels or lintels with a metallic coating; or
- (b) Appendix B, for steel lintels with organic, inorganic zinc silicate or duplex coating.

2.5 IMPACT RESISTANCE

Coatings on lintels shall have sufficient impact resistance to ensure that they remain intact under normal handling conditions expected during manufacture, transportation and installation.

Organic or inorganic zinc-silicate coatings and the organic component of duplex coatings, applied to lintels for corrosion protection, shall be tested for impact resistance and assessed for compliance in accordance with Appendix E.