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# Australian Standard 2110—1983

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## DENTAL MATERIALS ALLOY FOR DENTAL AMALGAM

The Tariffs, Instruments, Materials and Equipment Committee of the Australian Dental Association has adopted this standard for use in connection with its program for accreditation of certified dental products, lists of which are published periodically. Enquiries regarding this program should be addressed direct to the Australian Dental Association. When used in connection with the program, the standard is known as Australian Dental Standard (ADS) 2110—1983.

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This Australian standard was prepared by Committee DN/10, Amalgam Alloys. It was approved on behalf of the Council of the Standards Association of Australia on 22 March 1983 and published on 4 July 1983.

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The following interests are represented on Committee DN/10:

Australian Dental Association  
Australian Dental Schools and Hospitals  
Australian Dental Standards Laboratory  
Australian Dental Trade Association  
Confederation of Australian Industry  
Department of Defence  
Victorian Employers Federation

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First published (as AS T2) .....	1949
AS 2110 first published !.....	1977 ✓
Second edition .....	1983

## PREFACE

This edition of this standard was prepared by the Association's Committee on Amalgam Alloys, under the direction of the Dental Materials and Equipment Standards Committee, to supersede AS 2110—1977. It is one of a series intended for use in assessing the quality of dental materials used in Australia.

This edition differs from the 1977 edition in the following areas:

- (a) The test for plastic deformation has been excluded because it is now not considered relevant to the quality of amalgam.
- (b) The static creep requirement has been reduced from 4 percent to 3 percent.
- (c) The alloy must now remain carvable for 10 min in keeping with ISO requirements.
- (d) Requirements for information supplied by the manufacturer, packaging and marking have been changed.

This standard is essentially the same as ISO/DIS 1559 with regard to mechanical test requirements, but differs from it with regard to detailed composition of the alloy and marking and packaging requirements. The dimensional change range is also different from the ISO draft standard.

The Australian Dental Standards Laboratory, 240 Langridge Street, Abbotsford, Victoria 3067, has facilities for the testing of materials for compliance with the standard.

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## STANDARDS ASSOCIATION OF AUSTRALIA

**Australian Standard**  
for  
**DENTAL MATERIALS—ALLOY FOR DENTAL AMALGAM**

**1 SCOPE.** This standard specifies requirements for alloy supplied in the form of powder, tablet or capsule intended for use in the preparation of dental amalgam.

**2 REFERENCED DOCUMENTS.** The following standards are referred to in this standard:

AS 1100	Drawing Practice Part 11—Indication of Surface Texture
AS 1581	Dental Mercury
AS 2193	Methods for Calibration and Grad- ing of Force-measuring Systems of Testing Machines

**3 COMPOSITION.** The alloy shall be composed essentially of silver, tin and copper and may also contain zinc. Other elements may be incorporated, provided that the manufacturer submits the composition of the alloy to the testing authority together with adequate clinical and biological evidence to show that the resulting amalgam is safe for use in the mouth.

Alloys claimed not to contain zinc shall contain not more than 0.01 percent zinc by mass, as determined by a recognized analytical technique.

**4 MATERIAL.**

**4.1 General.** The alloy shall be of uniform composition or uniformly blended throughout and be free from foreign materials.

When prepared in accordance with the manufacturer's instructions, amalgam formed from the alloy shall be suitable for preparing dental restorations.

**4.2 Alloy in Tablets or Capsules.** The mass of the alloy tablets, or, with predosed capsules both the alloy and the mercury, shall have a coefficient of variation not greater than 1.5 percent. The arithmetic mean for the mass of alloy shall be within 10 mg of the manufacturer's stated mass.

**4.3 Loss from Capsules During Mixing.** When supplied in capsules, the total loss in mass of material per capsule during mixing shall not exceed 0.5 mg.

**5 SAMPLING.** A representative sample of alloy of at least 30 g or an equivalent mass for capsules shall be taken for testing.

**6 TEST CONDITIONS.** Except where otherwise specified, all tests shall be carried out at the following ambient conditions:

- (a) Temperature .....  $23 \pm 2^\circ\text{C}$ .
- (b) Relative humidity .....  $50 \pm 5$  percent.

Specimens shall be maintained at a temperature of  $37 \pm 1^\circ\text{C}$  during storage and throughout the entire test when specified, except for those periods of time when the nature of the observations being made renders this impracticable.

**7 PREPARATION OF AMALGAM FOR TESTING.** All amalgam specimens for testing shall be prepared in accordance with Appendix A and in accordance with the manufacturer's proportions and instructions, using mercury complying with the requirements of AS 1581.

**8 COMPRESSIVE STRENGTH (RATE OF SETTING).** When determined in accordance with Appendix B, the compressive strength of the amalgam specimens shall be not less than 50 MPa for all alloys 60 min after the completion of mixing. Amalgam specimens formed from alloys labelled as 'fast-setting' shall have a compressive strength of not less than 50 MPa 30 min after the completion of mixing.

**9 DIMENSIONAL CHANGE.** When determined in accordance with Appendix C, the dimensional change of amalgam shall be not more than  $\pm 0.2$  percent.

**10 STATIC CREEP.** When determined in accordance with Appendix D, the static creep of amalgam shall be not more than 3.0 percent.

**11 CARVING PROPERTIES.** When prepared in accordance with Appendix A, amalgam shall be carvable immediately after condensation using dental carving instruments and shall remain so for at least 10 min after amalgamation.

**12 INFORMATION TO BE SUPPLIED BY THE MANUFACTURER.** Accurate and adequate instructions for proportioning and/or manipulation shall accompany each package.

If the alloy used in making the amalgam contains zinc in excess of 0.01 percent, the following precaution or words to that effect shall appear in bold type:

**THIS ALLOY CONTAINS ZINC AND THE  
AMALGAM MADE THEREFROM MAY SHOW  
EXCESSIVE CORROSION AND EXPANSION  
IF MOISTURE IS INTRODUCED DURING  
MIXING OR COMPACTING.**

Directions for mixing shall include the mercury/alloy ratio and a description of a method by which correct mixing may be determined, including a method using a mechanical amalgamator. Information should also be available regarding the chemical composition and particle type of the alloy.

**13 PACKAGING.** The containers shall be moisture-resistant and shall not be made, in whole or in part, of materials that will amalgamate with mercury.

Combination capsules containing free mercury shall show no evidence of leakage of mercury in the package, or when used in accordance with the manufacturer's instructions. There shall be no evidence of reaction between the mercury and alloy before amalgamation.