ANSI/ADA Specification No. 5
Approval date: October 31, 1997

American National Standard/
American Dental Association
Specification No. 5

Dental Casting Alloys

Modified adoption of ISO 1562:1993, Dental casting gold alloys; and ISO 8891:1998, Dental casting alloys with noble metal content of 25% up to but not including 75%.

American Dental Association
Council on Scientific Affairs 1997

AMERICAN NATIONAL STANDARD AMERICAN DENTAL ASSOCIATION SPECIFICATION N0. 5 FOR DENTAL CASTING ALLOYS

The Council on Scientific Affairs of the American Dental Association has approved revised American Dental Association Specification No. 5 for Dental Casting Alloys. This and other specifications for dental materials, instruments and equipment are being formulated by working groups of the ADA Standards Committee on Dental Products (formerly Accredited Standards Committee MD156 for Dental Materials, Instruments and Equipment). The Committee has representation from all interests in the United States in the standardization of materials, instruments and equipment in dentistry. The Council has adopted the specifications, showing professional recognition of their usefulness in dentistry, and has forwarded them to the American National Standards Institute with a recommendation that the specifications be approved as American National Standards. The American National Standards Institute granted approval of ADA Specification No. 5 as an American National Standard on October 31, 1997.

The Council thanks the working group members and the organizations with which they were affiliated at the time the specification was developed:

Clyde Ingersoll (Chairman), Tonawanda, NY; D.P. Agarwall, Leach and Garner, N. Attleboro, MA; Thomas Cameron, Ney Dental International, Bloomfield, CT; Ronald Dudek, Austenal, Inc., Chicago, IL; Lawrence Gettleman, University of Louisville, KY; Abdul Khan, CMP Industries, Albany, NY; Herbert Mueller, ADA Health Foundation, Gaithersburg, MD; Arun Prasad, Jeneric Pentron, Inc., Wallingford, CT; Nihkil Sarkar, Louisiana State University, New Orleans; and Stephen P. Schaffer, Ivoclar NA, Amherst, NY.

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION SPECIFICATION NO. 5 FOR DENTAL CASTING ALLOYS

FOREWORD

(This Foreword does not form a part of the Specification.)

The ASC MD156 Working Group reviewed ISO 1562 and ISO 8891 for acceptance as ANSI/ADA Specification No. 5. The majority of the working group could not accept the split of Specification No. 5 into two parts on a purely composition basis. When ANSI/ADA Specification No. 5-1989 was developed, it was considered that composition was a design factor and, thus, had no place in a standard.

ANSI/ADA Specification No. 5 was then reviewed with the aim of incorporating all those features of ISO 1562 and ISO 8891 that could be accepted. In addition, interested party review comments included problems with modulus of elasticity. Those elements that could be accepted by the working group include the following:

- Change to 0.2% offset yield strength, including table of properties
- Change to arabic numerals for types
- Deletion of requirement to test and report modulus of elasticity
- Deletion of suggested specimen casting design (Figure 5-3)
- Appendix change to include the immersion and tarnish tests, as in the proposed ISO 10271

Rationale

Although there was some evidence to indicate that, for one alloy, the 0.2% yield strength was not a sufficient safeguard for use in a partial denture, no new evidence has come to light, and the 0.2% yield strength (proof stress) of the ISO standard has not, to our knowledge, been challenged. The 0.2% has been accepted with its limiting values by the subcommittee almost unanimously. The 0.1% has been changed to 0.2% wherever indicated.

Section 3 Classification: The roman numerals have been replaced by arabic numerals and the definitions have been reworded to more nearly use the ISO definitions of types.

(Probably) due to increased instrument sensitivity, the values reported for modulus of elasticity (**E**) are difficult to read with adequate reproducibility on cast specimens. The ISO WGs for 1562 and 8891 have decided to eliminate this requirement until such time as the difficulties can be overcome. The ASC MD156 Working Group concurs.

Table 5-1: has been changed to ISO 1562 values.

Figure 5-3: the spruing design of this figure for casting tensile bars has been eliminated; this design assures porosity in the gauge section.

Figure 5-4: melting crucible design for taking melting range values has been eliminated. Anyone skilled in the art will use the design most convenient.

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION SPECIFICATION NO. 5 FOR DENTAL CASTING ALLOYS

1. SCOPE

1.1 This Specification provides a classification and specifies requirements and test methods for dental casting alloys.

1.2 Paragraphs 4.5.1 and 4.5.2 address the safety of these alloys to the patient.

1.3 Paragraphs 4.2.1, 4.2.3 and 4.4 address the effectiveness of these alloys for their prescribed use.

1.4 This specification is applicable to dental casting alloys used in the fabrication of dental restorations and appliances.

1.4.1 Exclusions: base metal alloys described in ANSI/ADA Specification No. 14 and alloys used for porcelain fused to metal restorations described in ANSI/ADA Specification No. 38.

2. REFERENCES

2.1 ANSI/ASTM E8-Current; Tension Testing of Metallic Materials.

2.2 ANSI/ASTM E92-Current; Vickers Hardness of Metallic Materials.

2.3 ANSI/ADA Specification No. 2 Current; Casting Investment for Dental Gold Alloys.

2.4 ANSI/ADA Document No. 41 Current; Recommended Standard Practices for Biological Evaluation of Dental Materials.

2.5 Eick, J.D. et al. Analysis of gold and platinum group alloys for x-ray emission with corrections for interelement effects. *Applied Spectroscopy* Oct 1967;21(Sp.):324.

2.6 Gilchrist, R. Wet chemical analysis of dental alloys. *Journal of Research* NBS, 1938;20.

3. CLASSIFICATION

3.1 Dental casting alloys shall be of the following types:

3.1.1 Type 1: low strength—for castings subject to very slight stress, e.g., inlays.

3.1.2 Type 2: medium strength—for castings subject to moderate stress, e.g., inlays and onlays.

3.1.3 Type 3: high strength—for castings subject to high stress, e.g., onlays, thin cast backings, pontics, full crowns, saddles, thick veneer crowns and short-span fixed partial dentures.

3.1.4 Type 4: extra high strength—for castings subject to very high stress and thin cross section, e.g., saddles, bars, clasps, thimbles, unit castings, thin veneer crowns, long-span fixed partial dentures and removable partial denture frameworks.