ANSI/ADA Standard No. 122/ISO 15854
Approved by ANSI: January 31, 2022

Revised American National Standard/
American Dental Association

Standard No. 122

Dentistry- Casting and Baseplate Waxes

Identical adoption of ISO 15854:2021, *Dentistry– Casting and baseplate waxes*

ADA American Dental Association®

Standards Committee on Dental Products

2022

REVISED AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 122 FOR DENTISTRY – CASTING AND BASEPLATE WAXES

The ADA Standards Committee on Dental Products (SCDP) has approved Revised ANSI/ADA Standard No. 122 for Dentistry – Casting and Baseplate Waxes. This and other standards for dental materials, instruments and equipment are being formulated by working groups of the ADA SCDP. The Committee has representation from all interests in the United States in the standardization of materials, instruments and equipment in dentistry. The Committee has adopted the standards, showing professional recognition of their usefulness in dentistry, and has forwarded them to the American National Standards Institute with a recommendation that the standards be approved as American National Standards. The American National Standards Institute granted approval of ADA Standard No. 122 as an American National Standard on January 31, 2022.

The officers of ADA SCDP Subcommittee 2 Prosthodontic Materials thank Spiro Megremis, ADA Science Research Institute, LLC., Chicago, IL, for his contributions to the development of this standard.

REVISED AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 122 FOR DENTISTRY – CASTING AND BASEPLATE WAXES

Foreword

(This Foreword does not form a part of revised ANSI/ADA Standard No. 122 for Dentistry – Casting and Baseplate Waxes).

This standard is an identical adoption of ISO 15854:2021, Dentistry – Casting and baseplate waxes. ADA SCDP Subcommittee 2 on Prosthodontic Materials examined the international standard and found it acceptable for identical adoption as revised ANSI/ADA Standard No. 122.

This standard cancels and replaces ANSI/ADA Standard No. 122:2007 (R2019), which was an identical adoption of ISO 15854:2005.

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Introduction

This document does not include specific and quantitative requirements for freedom from biological hazards. It is recommended that, in assessing possible biological or toxicological hazards, reference be made to ANSI/ADA Standard No. 41, ISO 7405 and ISO 10993-1.

REVISED AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 122 FOR DENTISTRY – CASTING AND BASEPLATE WAXES

1 Scope

This document specifies the classification of and requirements for dental casting and dental baseplate waxes together with the test methods to be employed to determine compliance with these requirements.

This document does not apply to waxes supplied for additive manufacturing or CAD/CAM-based procedures.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/ADA Standard No. 15, *Artificial Teeth for Dental Prostheses*

ANSI/ADA Standard No. 25, *Dental Gypsum Products*

ANSI/ADA Standard No. 33, *Vocabulary Used in Dental Standards Development*

(ANSI/ADA Standards are available from the American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611; http://ebusiness.ada.org)

ISO 1942, *Dentistry — Vocabulary*

ISO 6873, *Dentistry — Gypsum products*

ISO 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO 8601-2, *Date and time — Representations for information interchange — Part 2: Extensions*

ISO 22112, *Dentistry — Artificial teeth for dental prostheses*

(ISO standards are available from the American National Standards Institute, 25 W. 43rd St., New York, NY 10036; www.ansi.org)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ANSI/ADA Standard No. 33/ ISO 1942 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
casting wax
moldable material with minimal residue on ignition suitable primarily for shaping patterns in the production of cast restorations using the "lost-wax" technique

3.2
baseplate wax
moldable material primarily for forming occlusion rims, positioning and retaining artificial teeth therein, and shaping patterns that are duplicated in the denture base polymer

3.3
melting point
temperature above which no solid material exists at equilibrium

Note 1 to entry: For the practical purposes of this document, the melting point and the freezing point shall be considered as being the same.

4 Classification

Dental waxes covered by this document are classified according to the flow characteristics that represent their hardness, as follows:

a) **Type 1** (casting wax):

   1) **Class 1** Soft;

   2) **Class 2** Hard;

b) **Type 2** (baseplate wax):

   1) **Class 1** Soft;

   2) **Class 2** Hard;

   3) **Class 3** Extra hard.

5 Requirements

5.1 Appearance

The wax shall be uniform in color, supplied in pieces of uniform size, of smooth texture and free of foreign materials. Test in accordance with 8.1.

5.2 Flow

The wax when tested in accordance with 8.2 shall have flow values conforming with the appropriate requirements in Table 1.

Table 1 — Flow requirements percentages

Temperature °C	Type 1				Type 2					
	Class 1		Class 2		Class 1		Class 2		Class 3	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
23.0 ± 0.2	—	—	—	—	—	1.0	—	0.6	—	0.2
30.0 ± 0.2	—	1.0	—	—	—	—	—	—	—	—
37.0 ± 0.1	—	—	—	1.0	5.0	90.0	—	10.0	—	1.2
40.0 ± 0.1	50.0	—	—	20.0	—	—	—	—	—	—
45.0 ± 0.1	70.0	90.0	70.0	90.0	—	—	50.0	90.0	5.0	50.0
— not required										

5.3 Behavior on trimming

The wax shall be capable of being trimmed without chipping, flaking, or other undesirable behavior when tested in accordance with 8.3.

5.4 Behavior on softening (Type 1)

The wax shall soften without flaking or crumbling and shall cohere readily when tested in accordance with 8.4.

5.5 Appearance after flaming (Type 2)

The wax shall present a smooth glossy surface when tested in accordance with 8.5.

5.6 Behavior on softening (Type 2)

The wax shall soften without becoming sticky or crumbly and shall be moldable without breaking or delaminating when tested in accordance with 8.6.

This requirement shall not apply to baseplate preforms where a suitable square test piece cannot be cut.

5.7 Residue on artificial teeth (Type 2)

The wax shall not leave a visible residue on either ceramic or synthetic polymer teeth when tested in accordance with 8.7.

5.8 Behavior of coloring material (Type 2)

The coloring material shall neither separate from the wax nor impregnate the gypsum mold when tested in accordance with 8.7.

5.9 Adhesion on storage (Type 2)

Adhesion due to storage of the wax shall be such that, when tested in accordance with 8.8, there shall be no evidence of damage to wax surfaces. Wax and separating paper surfaces shall separate cleanly and readily.

NOTE: The separating paper might not cover the whole area of the wax sheet.

5.10 Residue on ignition (Type 1)

If the manufacturer does not state a value for the residue on ignition, the value as determined in accordance with 8.9 shall be no greater than 0.10 % by mass.

If the residue on ignition is greater than 0.10 % by mass, this value shall be stated by the manufacturer and the value as determined in accordance with 8.9 shall be not more than 20 % greater than that stated value.

5.11 Biocompatibility

See ANSI/ADA Standard No. 41, ISO 7405 and ISO 10993-1 for guidance on compatibility in respect of waxes that are offered for use in the mouth or that are not specifically excluded from that application.

6 Sampling

The amount of material procured for testing shall be at least 250 g for Type 1, or 500 g for Type 2, and from one batch, and one packet where possible. This material shall be obtained on the open market unannounced and thus taken randomly from stock.

7 Test methods — General

7.1 Ambient temperature

Unless otherwise specified in this document, all test piece preparation and testing shall be conducted at an ambient temperature of (23 ± 2) °C. Where necessary and appropriate, all material shall be allowed to equilibrate at this ambient temperature before testing for at least 24 h.

7.2 Apparatus function verification

All accessories, instruments and equipment shall be examined before use to ensure that they are in acceptable working order, appropriately calibrated, and complying with specifications stated for them in this document, as appropriate.

8 Test methods — Specific

8.1 Visual inspection

Carry out the inspection at an illuminance of at least 1000 lux and at a distance not exceeding 250 mm. A person making the inspection shall have nominally normal visual acuity. Corrective (non-magnifying) untinted lenses may be worn.

8.2 Flow

8.2.1 Principle

The relative change in length of the test piece under a given load in a specified time is taken as a proxy for the inverse of viscosity.

8.2.2 Apparatus

8.2.2.1 Micrometer screw gauge

Micrometer screw gauge with a range of at least 10 mm, being readable and accurate to 0.005 mm or better, equipped with flat, parallel anvils at least 6.5 mm in diameter and a non-rotating spindle.

NOTE Avoidance of indentation of the wax test piece is essential.

8.2.2.2 Flow-testing instrument

A flow-testing instrument, such as the one shown in Figure 1, consisting of the following components:

— weight (see Figure 1, Key 1);

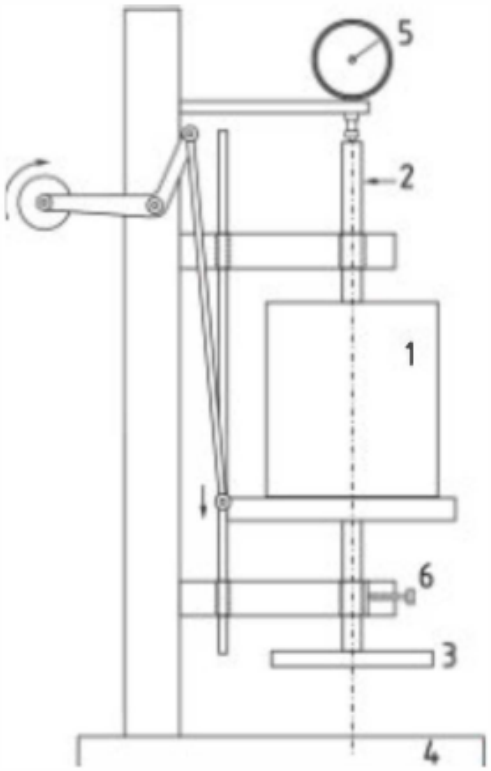
— shaft, which can move freely in its supports, lubricated as necessary (see Figure 1, Key 2);

— upper platen, metallic, minimum diameter 50 mm, lower surface flat and smooth, rigidly attached and normal to the axis of the shaft (see Figure 1, Key 3);

— base plate, metallic, flat smooth and parallel to the lower surface of the upper platen (Figure 1, Key 4);

— measuring dial gauge or similarly functional instrument, with a range of at least 10 mm, readable and accurate to 0,005 mm or better, and rigidly supported (optional) (see Figure 1, Key 5);

— locking screw or equivalent device (required if the dial gauge is used) (see Figure 1, Key 6).



Key

1 weight
2 shaft
3 upper platen
4 base plate
5 dial gauge (optional)
6 locking screw

NOTE This figure is not to scale.

Figure 1 — Conceptual diagram of a suitable flow-testing instrument

The total mass of the components of items 1, 2 and 3 shall be such as to provide an axial compressive force of (19.6 ± 0.1) N. The weight (1) shall be separated from the surface of the water in the bath by at least 20 mm. The upper platen (3) shall be at least 5 mm thick for rigidity. The optional dial gauge (5) and locking screw (6) may replace the micrometer screw gauge for direct measurement of displacement (see 8.2.3).

The axial force calculation shall take into account the buoyancy of the immersed parts of the shaft and upper platen (using the value of 0.01 N/mL) and the force exerted by the dial gauge or other measuring device (5), which force may be about 1 N and vary with its displacement if (as is usual) a spring is present. Appropriate control of the water level in the water bath (8.2.2.9) is required.

The locking screw or equivalent device shall not cause damage to the shaft (2) and thereby impede its free movement.

The base plate (4) may conveniently be marked with a crosshair target, ⌖, avoiding affecting the surface of the central region, to enable the correct location of the test piece.

8.2.2.3 Pouring pan

For melting the wax, use a metal, glass or ceramic vessel, which may have a handle for convenience, similar in functionality to the example shown in Figure 2.

NOTE: A volume of 10 ~ 20 mL can be adequate.

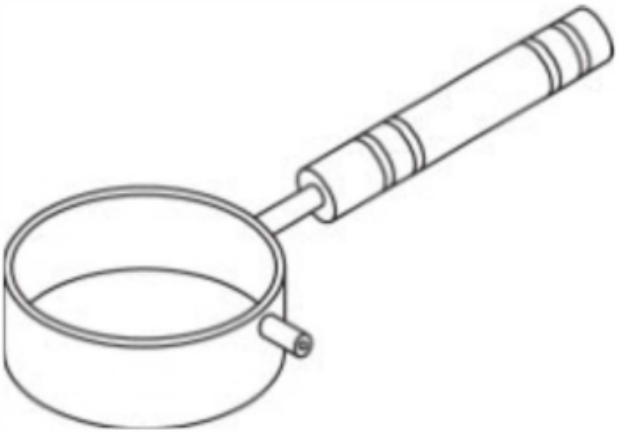


Figure 2 — Example of a suitable pouring pan

8.2.2.4 Heat source

For melting the wax, any convenient low-power or low-temperature system can be used. For example,

— an infrared lamp with nominal power of (250 ± 50) W using a bulb of type R40 or similar;

— a hot plate giving good thermal contact with the base of the pouring pan (8.2.2.3);

— a hot-air oven allowing the wax to be observed.

For preheating the mold (8.2.2.6), slab (8.2.2.7) and glass plate (8.2.2.8) an oven shall be used.

8.2.2.5 Thermometer

To measure the temperature of the molten wax, use an electronic thermometer with an accuracy of ±0.2 °C and a reading resolution of ±0.1 K or better over the temperature range 20 °C to 100 °C, and having a 95 % 10 K step change response time of less than 1 min.

8.2.2.6 Mold

For forming the flow test pieces, a metallic mold shall be used, for example made from stainless steel or brass. This shall consist of a flat plate, (6.00 ± 0.01) mm thick, with parallel top and bottom surfaces. The plate shall have one or more holes (10.00 ± 0.01) mm in diameter, with the axis of each hole perpendicular to the surface of the plate. The upper and lower faces of the plate shall be finished to roughness $R_a \leq 6.3$ µm, and the hole wall shall be finished to roughness $R_a \leq 0{,}3$ µm.

NOTE It can be convenient to use a multiple mold such that several test pieces can be prepared at a time, for example as shown in Figure 3.