

**Dentistry - Dental furnace - Test method for temperature measurement with separate thermocouple (ISO 13078:2013)**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 13078:2013 sisaldab Euroopa standardi EN ISO 13078:2013 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 13078:2013 consists of the English text of the European standard EN ISO 13078:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 13.02.2013.	Date of Availability of the European standard is 13.02.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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English Version

## Dentistry - Dental furnace - Test method for temperature measurement with separate thermocouple (ISO 13078:2013)

Médecine bucco-dentaire - Four dentaire - Méthode d'essai pour le mesurage de la température au moyen d'un thermocouple (ISO 13078:2013)

Zahnheilkunde - Brennofen - Prüfverfahren für die Temperaturmessung mit separatem Thermoelement (ISO 13078:2013)

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## Foreword

This document (EN ISO 13078:2013) has been prepared by Technical Committee ISO/TC 106 "Dentistry" in collaboration with Technical Committee CEN/TC 55 "Dentistry" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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### Endorsement notice

The text of ISO 13078:2013 has been approved by CEN as EN ISO 13078:2013 without any modification.

## Introduction

Dental furnaces are suitable for the manufacturing of metal-ceramic and all-ceramic restorations for use in dentistry. Dental furnaces are particularly used for firing or sintering, respectively, of dental opaques, dentine and enamel materials to the respective compatible substructure materials. Dental furnaces are also used for other applications such as oxidizing metallic substructures in preparation for porcelain firing, for melting pressable ceramics, for stain and glaze firing, etc. According to the current state of the art, the temperature of this process lies between 600 °C and 1 050 °C.

The firing result obtained is influenced by the accuracy of the actual temperature, which may be influenced by the different calibration processes applied by the manufacturers of dental furnaces as well as by the varying construction types of the dental furnaces currently on the market.

Despite the fact that different dental furnaces can have identical digital external displays, different results regarding the degree of firing can be identified when processing the same ceramics under otherwise similar conditions.

A different degree of firing does not only cause differences that can be judged directly by the human eye (e. g. colour and transparency), but also deviations that cannot be detected by eye. These are for instance the coefficient of thermal expansion, strength, and solubility of the dental opaque, dentine or enamel materials, and the bonding strength to its substructure. Such changes may result in clinical failures (e. g. fractures) as well as discoloration and changed aesthetics of the dental ceramic restoration.

This International Standard levels the currently existing differences between the final calibration of the dental furnaces based on the factory of origin through a final adjustment (that has to be carried out by all manufacturers in an identical way) of the temperature control in the firing chamber by means of a thermocouple at e.g. 800 °C.

Alternatively, the verification of the process can be carried out using the thermocouple at 700 °C or 900 °C.

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## 1 Scope

This International Standard specifies a test method for the calibration of dental furnaces that are suitable for the heat treatment of silica-based dental ceramic restorations in the temperature range between 600 °C and 1 050 °C. This International Standard does not include furnaces intended to sinter zirconium oxide-frameworks (in the temperature range of 1 350 °C or higher).

## 2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 1942, *Dentistry — Vocabulary*

ISO 6872, *Dentistry — Ceramic materials*

IEC 60584-1, *Thermocouples — Part 1: Reference tables*

IEC 60584-2, *Thermocouples — Part 2: Tolerances*

IEC 60584-3, *Thermocouples — Part 3: Extension and compensating cables — Tolerances and identification system*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1942, ISO 6872 and IEC 60584-1 and the following apply.

### 3.1

#### **dental furnace**

furnace in the firing chamber in which dental materials are treated thermally (i.e. fired or sintered, oxidized)

### 3.2

#### **heating rate**

rate of temperature increase

NOTE The heating rate is expressed in degrees Celsius per minute (°C/min).

### 3.3

#### **holding time**

period of time over which the desired temperature of the dental furnace is maintained until the time prescribed by the manufacturer, starting when the display of the dental furnace shows that the set test temperature has been achieved and the furnace temperature has stabilized

## 4 Test method

### 4.1 Test equipment and test products

**4.1.1 Test fixture** that positions the thermocouple in accordance with Figure 1. An example is:

- 1) type: honeycomb tray of cordierite; colour: light;