



American National Standard/
American Dental Association
Standard No. 111

Adhesion Test Methods to Tooth Structure

Identical adoption of ISO/TS 11405:2015, *Dentistry—Testing of adhesion to tooth structure*

ADA American
Dental
Association®

Standards Committee on Dental Products

2019

© ISO 2015 – All rights reserved
© ADA 2019

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 111 FOR ADHESION TEST METHODS TO TOOTH STRUCTURE

The ADA Standards Committee on Dental Products (SCDP) has approved ANSI/ADA Standard No. 111, Adhesion Test Methods to Tooth Structure. 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. 111 as an American National Standard on September 9, 2019.

The ADA Standards Committee on Dental Products thanks the members of Working Group 1.3 on Composite Resins and the organizations with which they were affiliated at the time the standard was developed:

Spiro Megremis (chairman), American Dental Association, Chicago, IL;
Michael Adjodha, U.S. Food and Drug Administration, Rockville, MD;
Willie Beasley, Federal Bureau of Prisons, Vienna, VA;
Martin Chiang, National Institute of Standards and Technology, Gaithersburg, MD;
Matt Cowen, The Dental Advisor, Ann Arbor, MI;
Franklin Garcia-Godoy, University of Tennessee, Memphis;
Bernard Koltisko, Dentsply Caulk, Milford, DE;
Matthew Nejad, Meridian Dental, West Hollywood, CA;
Sheldon Newman, University of Colorado, Denver, CO;
Henry Rawls, University of Texas Health Science Center, San Antonio, TX; and
Howard Roberts, University of Kentucky, Louisville, KY.

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 111 FOR ADHESION TEST METHODS TO TOOTH STRUCTURE

FOREWORD

(This Foreword does not form a part of ANSI/ADA Standard No. 111, Adhesion Test Methods to Tooth Structure).

This standard is an identical adoption of ISO/TS 11405:2015, Dentistry – Testing of adhesion to tooth structure. ADA SCDP Working Group No. 1.3 on Composite Resins examined the international standard and found it acceptable for identical adoption as ANSI/ADA Standard No. 111.

This standard refers to the shear bond strength test published in ISO 29022:2013, Dentistry – Adhesion – Notched-edge shear bond strength test. This test is intended as a general, simple and easy-to-use method for determining that a dental adhesive material adheres to tooth substance. Though it has been established that the test does not measure shear bond strength, it has been shown to be useful in evaluations of adhesion of dental adhesive materials. However, its applicability is limited and researchers should evaluate the usefulness of this method for their particular application and the intended purpose of the material in the mouth.

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 111 FOR ADHESION TEST METHODS TO TOOTH STRUCTURE

Contents	Page
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Sampling	6
5 Test methods	6
5.1 Bond strength tests	6
5.1.1 General	6
5.1.2 Tooth substrate and storage	7
5.1.3 Treatment of results	8
5.1.4 Tensile bond strength	9
5.2 Gap measurement test for adhesion to dentine	10
5.2.1 General	10
5.2.2 Tooth substrate and storage	11
5.2.3 Cavity preparation	11
5.2.4 Filling procedure	11
5.2.5 Storage of specimen	11
5.2.6 Gap measurement	11
5.3 Microleakage test	12
5.3.1 General	12
5.3.2 Tooth substrate and storage	12
5.3.3 Cavity preparation	12
5.3.4 Filling procedure	12
5.3.5 Storage of specimens	12
5.3.6 Measurement of microleakage	13
5.3.7 Treatment of results	13
5.4 Clinical usage tests	13
5.4.1 Introduction	13
5.4.2 Method	13
5.4.3 Restorations	13
5.4.4 Study duration	13
5.4.5 Sample size	14
5.4.6 Clinical procedures	14
5.4.7 Evaluation	14
5.4.8 Treatment of results	14
Annex A (informative) Examples of test methods for measurement of bond strength	15
A.1 General	15
A.2 Tensile tests	15
A.2.1 Kemper and Killian test	15
A.2.2 Bencor test	15
A.2.3 Dumb-bell test	15
A.2.4 Micro tensile test	15
A.3 Other bond strength tests	15
A.3.1 Fracture toughness test	15
Bibliography	16

AMERICAN NATIONAL STANDARD/AMERICAN DENTAL ASSOCIATION STANDARD NO. 111 FOR ADHESION TEST METHODS TO TOOTH STRUCTURE

Introduction

Adhesion in restorative dentistry is an important topic. It is the intention of this standard to describe different laboratory and clinical procedures whereby the effect or quality of a bond between a dental material and tooth structure may be substantiated. By gaining experience with different testing methods, a correlation between laboratory and clinical performance of the materials may be sought.

Adhesive materials are used in many types of restorative and preventive work. Even if the stress on the bond in most circumstances may be defined as either tensile, shear, or a combination of these, there are no specific laboratory or clinical tests which may be valid for all the various clinical applications of adhesive materials.

The relative performance of materials that are claimed to bond to tooth structure has been examined by laboratory assessment of bond strength. While bond strengths may not predict exact clinical behavior, they could be useful for comparing adhesive materials.

ISO 29022^[1] describes the notched-edge shear bond strength test which is an important publication in the subject.

Annex A lists several published laboratory methods for tensile bond strength measurement.

Adhesion testing is also common in general materials in science and a publication listing where many systems have been provided with information.^[2]