



**Designation: D4896 – 01 (Reapproved 2024)**

## **Standard Guide for Use of Adhesive-Bonded Single Lap-Joint Specimen Test Results<sup>1</sup>**

This standard is issued under the fixed designation D4896; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### **INTRODUCTION**

The true strength of an adhesive is a material property independent of the joint geometry, adherend properties, and load, and is a good starting point for determining an allowable design stress. Allowable stresses in shear and tension are needed to design safe, efficient, adhesively bonded joints and structures. The true shear strength, however, cannot be easily determined using single-lap specimens.

Many factors affect the apparent shear strength of an adhesive when measured with a small laboratory specimen, and in particular, with a single-lap specimen. For example, the failure of a typical single-lap specimen, is usually controlled by the tensile stress in the adhesive, and not by the shear stress. The factors that control the tensile stress in lap-joint specimen, and thus, the apparent shear strength are the size and shape of the specimen, the properties of the adherends, the presence of internal stresses or flaws, and the changes that take place in the specimen due to adhesive cure and the environment. Similarly these factors affect the apparent tensile strength of an adhesive in butt-joint test specimens.

Due to the effects of these factors, the apparent shear strength obtained through measurements on small laboratory specimens may vary widely from the true shear- or tensile-strength values needed to determine allowable shear and tension design stresses.

The objectives of this guide are: to develop an appreciation of the factors that influence strength and other stress measurements that are made with small laboratory test specimens; to foster the acceptable uses of the widely used thin-adherend single-lap-joint test; and, specifically, to prevent misuse of the test results.

### **1. Scope**

1.1 This guide is directed toward the safe and appropriate use of strength values obtained from test methods using single-lap adhesive joint specimens.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The discussion focuses on shear strength as measured with small thin-adherend, single-lap specimens. Many factors, however, apply to shear modulus, tensile strength, and tensile modulus measured by small laboratory specimens in general.

This discussion is limited to single-lap specimens and shear strength only for simplification.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### **2. Referenced Documents**

#### **2.1 ASTM Standards:<sup>2</sup>**

D896 [Practice for Resistance of Adhesive Bonds to Chemical Reagents](#)  
D906 [Test Method for Strength Properties of Adhesives in](#)

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.80 on Metal Bonding Adhesives. Current edition approved Sept. 1, 2024. Published September 2024. Originally approved in 1989. Last previous edition approved in 2016 as D4896 – 01 (2016). DOI: 10.1520/D4896-01R24.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [www.astm.org/contact](http://www.astm.org/contact). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.