SNAPSHOOT
ENGINEERED FOR A SAFER TOMORROW

# 현장을 이해하고, 필요한 솔루션을 연결합니다.

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제품 제안부터 공급·시공·설치·교육까지




COMPANY INFORMATION

**스냅슛 (SNAPSHOOT)**

ADDRESS (15431) 경기도 안산시 단원구 풍전로 37-9 트리플렉스 301동 118호
TEL 0507-1374-9229
FAX 0504-481-6749
E-MAIL bkkim@snapshoot.co.kr

TECHNICAL DOCUMENTS

## 인증서 · 데이터시트 · 기술자료

제품의 규격과 성능, 인증 및 적용 조건을 확인하기 위한 자료입니다.

ABOUT SNAPSHOOT

### 제품 공급을 넘어, 현장에 맞는 해결책으로

스냅슛은 산업현장의 작업 환경과 요구 조건을 바탕으로
적합한 제품과 시스템을 제안합니다. 현장 실사를 통해 설치 조건을 확인하고,
공급부터 시공·설치 및 사용 교육까지 필요한 과정을 함께합니다.

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홈페이지 바로가기 →
문서 라이브러리 바로가기 →
시공사례 바로가기 →
문의하기 →

본 페이지는 스냅슛의 자료 제공 안내용 표지입니다. 첨부된 인증서 및 기술자료의 발행 주체, 인증 대상과 적용 범위는 해당 원문을 기준으로 확인해 주세요.



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# Technical Data Sheet

3M™ VHB™ Tape 4941F

English-US

**Last Revision Date:** September, 2024

**Supersedes:** August, 2024

Product Details

## Product Description

**Finite Element Analysis (FEA)**data is available for this product at: **3m.com/FEA**

3M™ VHB™ Tape 4941F is a 0.045 inch (1.1 mm) thick gray double-sided acrylic foam tape with PE film liner. The multi-purpose acrylic adhesive on both sides bonds to a broad range of high and medium surface energy substrates including metals, glass and a wide variety of paints and plastics as well asPlasticized Vinyl. The conformable foam provides good contact between substrates even when they are slightly mismatched. 3M™ VHB™ Tape 4941F is part of the 4941 tape family. Each product in this family has multi-purpose acrylic adhesive and conformable foam but varies in thickness, color and liner type.

## Product Features

• Fast and easy-to-use permanent bonding method provides high strength and long-term durability
• Virtually invisible fastening keeps surfaces smooth
• Can replace mechanical fasteners (rivets, welds, screws) or liquid adhesives
• Gray, 0.045 in (1.1 mm), multi-purpose adhesive and conformable acrylic foam core offers a good balance of strength and conformability
• Eliminate drilling, grinding, refinishing, screwing, welding and associated clean-up
• Creates a permanent seal against water, moisture and more
• Pressure sensitive adhesive bonds on contact to provide immediate handling strength
• Allows the use of thinner, lighter weight and dissimilar materials
• UL GREENGUARD and UL GREENGUARD Gold Certified, contributing to LEED Credit

## Technical Information Note

The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

## Typical Physical Properties

| Attribute Name | Test Method | Value |
|---|---|---|
| Color | | Gray |
| Adhesive Type | | Multi-Purpose Acrylic |
| Foam Type | | Conformable Acrylic Foam |
| Density | ASTM D3574 | 720 kg/m³ (45 lb/ft³) [1] |
| Total Tape Thickness | ASTM D3652 | 1.1 mm (0.045 in) (45 mil) |
| Thickness Tolerance | | ±10 % |

[1] Foam with adhesive

| Attribute Name | Value |
|---|---|
| Liner | PE Film |
| Liner Thickness | 0.13 mm (5 mil) (0.005 in) |
| Primary Liner Color | Red |

## Typical Performance Characteristics

Temperature: 23 °C (73 °F)
Dwell Time: 72 h

| Attribute Name | Test Method | Substrate | Backing | Value |
|---|---|---|---|---|
| 90° Peel Adhesion | ASTM D3330 | Stainless Steel | 5 mil Aluminum Foil | 39 N/cm (22 lb/in) [1] |
| Normal Tensile | ASTM D897 | Aluminum | | 590 kPa (85 lb/in²) [2] |
| Overlap Shear Strength | ASTM D1002, ISO 4587 | Stainless Steel | | 480 kPa (70 lb/in²) [3] |

[1] 304 mm/min (12 in/min)

[2] 6.45 cm² (1 in²), Jaw Speed 51 mm/min (2 in/min)

[3] 6.45 cm² (1 in²), Jaw Speed 12.7 mm/min (0.5 in/min)

### Static Shear

Substrate: Stainless Steel
Test Method: ASTM D3654

| Temperature | Value |
|---|---|
| 23 °C (73 °F) | 1,000 g [1] |
| 66 °C (150 °F) | 500 g [1] |
| 93 °C (200 °F) | 500 g [1] |

[1] Tested at various temperatures and gram loadings. 3.23 cm² (0.5 in²). Will hold listed weight for 10,000 minutes (approximately 7 day).

| Attribute Name | Value |
|---|---|
| Minimum Application Temperature | 15 °C (60 °F) |
| Short Term Temperature Resistance | 149 °C (300 °F) [1] |
| Long Term Temperature Resistance | 93 °C (200 °F) [2] |

[1] No change in room temperature dynamic shear properties following 4 hour conditioning at indicated temperature with 100 g/static load. (Represents minutes, hour in a process type temperature exposure).

[2] Maximum temperature where tape supports at least 78g/cm² (500 g/in²) in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

## Converting

In addition to standard and custom roll sizes available from 3M through the distribution network, 3M™ VHB™ Tapes are also available in limitless shapes and sizes through the 3M Converter network. For additional information, contact 3M Converter Markets at 1-800-223-7427 or on the web at www.3M.com/converter.

## Special Considerations

Plasticized Vinyl – Plasticizers compounded in soft vinyl can migrate into adhesives and significantly change their performance characteristics. 3M™ VHB™ Tapes 4941 family has very good plasticizer resistance and adhesion to many vinyl formulations. Because of the wide variation in vinyl formulations, however, evaluation by the user must be conducted with the specific vinyl used to ensure that performance will be satisfactory over time. Problems related to plasticizer migration can often be predicted by accelerated aging of assembled parts at 150°F (66°C) for one week).

## Handling/Application Information

### Surface Preparation

**Clean**: Most substrates should be cleaned with a 70/30 mixture of (IPA*)/Water prior to applying 3M™ VHB™ Tape.

Exceptions that may require additional surface preparation include:
• Heavy Oils: A degreaser or solvent-based cleaner may be required to remove heavy oil or grease from a surface and should be followed by cleaning with IPA/water.
• Abrasion: Abrading a surface, followed by cleaning with IPA/water, can remove heavy dirt or oxidation and can increase surface area to improve adhesion.
• Adhesion Promoters: Priming a surface can significantly improve initial and ultimate adhesion to many materials such as plastics and paints.
• Porous surfaces: Most porous and fibered materials such as wood, particleboard, concrete, etc. need to be sealed to provide a unified surface.
• Unique Materials: Special surface preparation may be needed for glass and glass-like materials, copper and copper containing metals, and plastics or rubber that contain components that migrate (e.g. plasticizers).

Refer to 3M Technical Bulletin “Surface Preparation for 3M™ VHB™ Tape Applications” for additional details and suggestions. (70-0704-8701-5)
*__Note__: Please consult with your local Air Quality District to ensure compliance. When using solvents, be sure to follow the manufacturer’s precautions and directions for use.

### Application Techniques

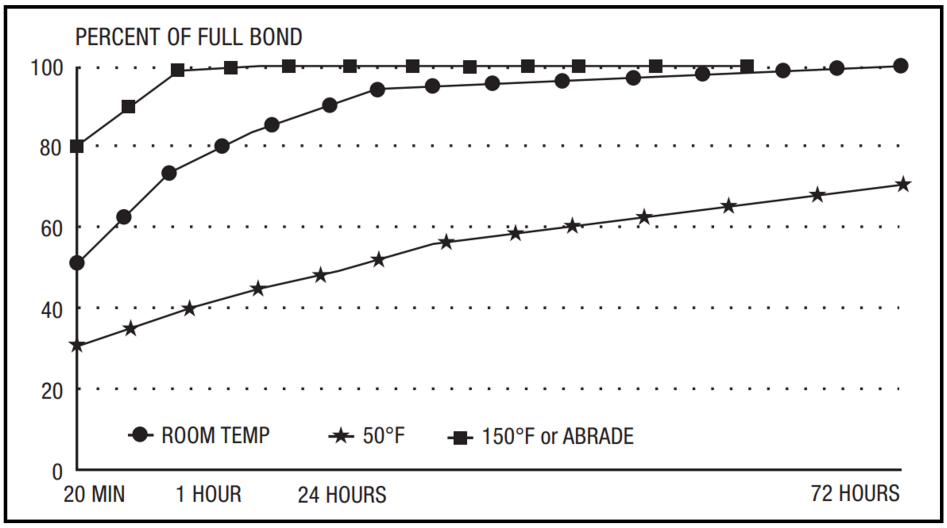
**Initial and Final Pressure Application:**
Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength. Typically, good surface contact can be attained by applying enough pressure to ensure that the tape experiences approximately 100 kPa (15 psi) of pressure. Either roller or platen pressure can be used. When bonding two rigid parts, additional final pressure is often required to ensure that the bond line experiences 100 kPa (15 psi).

**Tape Application Temperature:**
The ideal tape application temperature range for 3M™ VHB™ Tapes is generally 21°C to 38°C (70°F to 100°F). Pressure sensitive adhesives use viscous flow to achieve substrate contact area. The minimum suggested application temperature for most 3M™ VHB™ Tapes is 10°C to 15°C (50°F to 60°F)

***Note:** Initial tape application to surfaces at temperatures below these suggested minimums is not suggested because the adhesive becomes too firm to adhere readily. Ideally, all substrates and tape should be conditioned above the minimum application temperature in covered, weatherproof conditions until it is verified the substrates are at or above the minimum temperature. Once properly applied, low temperature holding is generally satisfactory.

**Bond Build Rate:**
After application, the bond strength will gradually increase as the adhesive flows onto to the surface (also referred to as “wet out”). The bond build rate will depend on both tape and substrate, but generally, at room temperature, approximately 50% of ultimate bond strength will be achieved after 20 minutes, 90% after 24 hours, and 100% after 72 hours. Adhesive flow is faster at higher temperatures and slower at lower temperatures. Ultimate bond strength can be accelerated (and in some cases bond strength can be increased) by exposure to elevated temperature (e.g. 66°C [150°F] for 1 hour). This can provide better adhesive wet out onto the substrates. Abrasion (~180 grit), or the use of primers/adhesion promoters can also increase both bond strength as well as the bond build rate.

## Typical Bond Build vs. Time




***Note:** Chart describes general performance of 3M™ VHB™ Tapes. Actual bond strength vs. time will depend on several factors including tape and substrate

## Design Considerations

**Adhesion:**
Adhesion to the substrate is critical to achieving high bond strength. Adhesives must flow onto the substrate surfaces in order to achieve intimate contact area and allow the molecular force of attraction to develop. The degree of flow of the adhesive on the substrate is largely determined by the surface energy of the substrate.

**Tape Usage:**
Use the right amount of VHB™ Tape to handle the expected stresses. Because 3M™ VHB™ Tapes are viscoelastic by nature, their strength and stiffness is a function of the rate at which they are stressed. They behave stronger when experiencing a higher rate of stress load (dynamic stresses) and will tend to show creep behavior with stress loads that act over a long period of time (static stresses). As a general rule, for static loads, approximately four square inches of tape should be used for each pound (57 $cm^2$ of tape per kg) of weight to be supported in order to prevent excessive creep. For dynamic loads a useful design factor is 12 lb/in2 (85 kPa) for most dynamic stresses in general applications.

**Tape Thickness:**
Achieving good contact is also important. The necessary thickness of tape depends on the rigidity of substrates as well as their flatness and/or irregularity. While 3M™ VHB™ Tape will conform to a certain amount of irregularity, they will not flow to fill large gaps between the materials. When bonding rigid materials with normal flatness, consider use of tapes with thickness of 45 mils (1.1 mm) or greater. As substrate flexibility increases, thinner tapes may be considered.

**Thermal Expansion/Contraction:**
3M™ VHB™ Tapes perform well in applications where two bonded surfaces may expand and contract at different rates. Assuming good adhesion to both substrates, VHB™ Tape can typically tolerate differential movement in the shear plane up to 3 times (300%) of their thickness.

**Bond Flexibility:**
While an advantage for many applications where allowing differential movement is a benefit, the tape bonds are typically more flexible than alternative fastening methods. Suitable design modifications or periodic use of rigid fasteners/adhesives may be necessary if additional stiffness is required.

## Industry Specifications

UL 746C (File MH 17478)
UL GREENGUARD and UL GREENGUARD Gold Certified, contributing to LEED Credit
UL 879 (File E65361)
EN 45545 test report for details (ISO 5659-2, ISO 9239-1, ISO 5660-1, ISO 5658-2)

## Storage and Shelf Life

This product has a shelf life of 24 months from date of manufacture when stored at 4°C to 38°C (40°F to 100°F) and 0-95% relative humidity. The optimum storage conditions are 22°C (72°F) and 50% relative humidity. Performance of tapes is not projected to change even after shelf life expires; however, 3M does suggest that 3M™ VHB™ Tapes are used prior to the shelf life date whenever possible. The manufacturing date is available on all 3M™ VHB™ Tapes as the lot number, typically marked on the core or on a label on the outer roll lap. The lot number, typically a 4 digit code, is a Julian date (Y D D D). The first digit refers to the year of manufacture, the last 3 digits refer to the days after January 1. Example: A lot number of 7266 (or 17266) would translate to a date of manufacture of Sept. 23 (266th day of year) in 2017.

## Available Sizes

| Attribute Name | Value |
|---|---|
| Core Size (ID) | 76.2 mm (3 in) |
| Maximum Available Width | 1219 mm (48 in) |
| Minimum Available Width | 6.4 mm (0.25 in) |
| Normal Slitting Tolerance | ±0.79 mm (±1/32 in) |
| Standard Roll Length | 32.9 m (36 yd) [1] |

[1] Longer roll lengths are available for most 3M™ VHB™ Tapes. Exact length will depend on caliper and width.

## Automotive Disclaimer

**Select Automotive Applications:**
This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

## Information

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## ISO Statement

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

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3M Center, St. Paul, MN 55144-1000
3M.com/iatd

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