SNAPSHOOT
ENGINEERED FOR A SAFER TOMORROW

# 현장을 이해하고, 필요한 솔루션을 연결합니다.

산업안전 · 추락방지 시스템
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제품 제안부터 공급·시공·설치·교육까지




COMPANY INFORMATION

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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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구조용 스크류 · 목조건축 자재

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# Technical Data Sheet

3M™ VHB™ Tape - Specialty Tape 4655

English-US

**Last Revision Date:** September, 2024

**Supersedes:** June, 2024

Product Details

Regulatory Info/SDS

## Product Description

3M™ VHB™ Tape 4655 is a 0.062 inch (1.6 mm) thick dark gray double-sided acrylic foam tape with PE film liner. The general purpose acrylic adhesive on both sides bonds to a broad range of high surface energy substrates including metals, glass and easier to bond paints and plastics. The firm foam provides high foam strength and has high temperature resistance. 3M™ VHB™ Tape 4655 is part of the 4611 tape family. Each product in this family has general purpose acrylic adhesive but varies in thickness.

## 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
- Dark gray, 0.062 in (1.6 mm), general purpose adhesive with firm foam has added feature of high temperature resistance
- 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

## 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 | | Dark Gray |
| Adhesive Type | | General Purpose Acrylic |
| Foam Type | | Firm Acrylic |
| Density | ASTM D3574 | 840 kg/m³ (52 lb/ft³) [1] |
| Total Tape Thickness | ASTM D3652 | 1.6 mm (62 mil) (0.062 in) |
| Thickness Tolerance | | ±10 % |

[1] Foam with adhesive

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

## 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 | 32 N/cm (18 lb/in) [1] |
| Normal Tensile | ASTM D897 | Aluminum | | 550 kPa (80 lb/in²) [2] |
| Overlap Shear Strength | ASTM D1002, ISO 4587 | Stainless Steel | | 410 kPa (60 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) | 1,500 g [1] |
| 66 °C (150 °F) | 500 g [1] |
| 93 °C (200 °F) | 500 g [1] |
| 121 °C (250 °F) | 500 g [1] |
| 177 °C (350 °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 |
|---|---|
| Short Term Temperature Resistance | 232 °C (450 °F) [1] |
| Long Term Temperature Resistance | 149 °C (300 °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.

## 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.

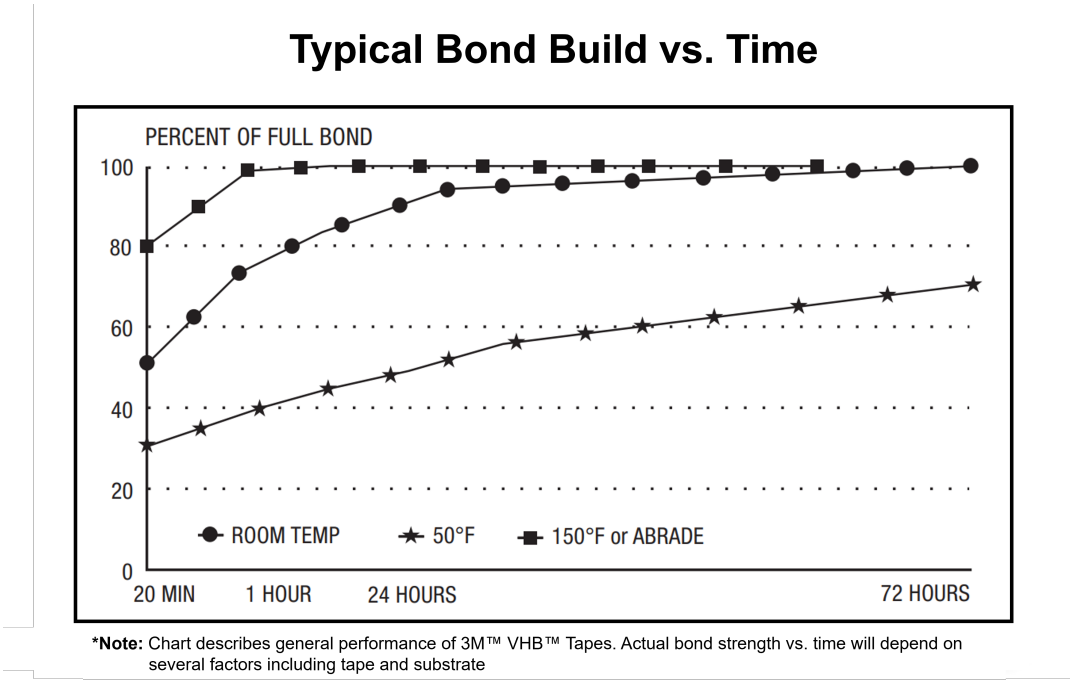
**Application Techniques**

**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.




***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 879 (File E65361)

**UL 746C Listings**

**3M™ VHB™ Tapes**
**UL746C Listings - File MH 17478**
**Category QQQW2 Component - Polymeric Adhesive Systems, Electrical Equipment**

| 3M™ VHB™ Tapes/ Product Families | Substrates | Temperature Rating Minimum | Maximum |
|---|---|---|---|
| 4914, 4920, 4930, 4950 | Aluminum, Galvanized Steel, Enameled Steel, Stainless Steel, Ceramic, Glass/Epoxy | -35°C | 110°C |
| | PBT | -35°C | 90°C |
| | ABS, Polycarbonate, Rigid PVC | -35°C | 75°C |
| 4920, 4930, 4950, | Acrylic | -35°C | 90°C |
| 4955, 4959, 4959F | Glass / Galvanized Steel*, Glass / Glass*, Galvanized Steel / Aluminum*, Aluminum / Aluminum* | -35°C | 120°C |
| 4945 | Phenolic, Aluminum, Galvanized Steel, Alkyd Enamel, Enameled Steel | -35°C | 110°C |
| | ABS, Polycarbonate, Polyamide, Stainless Steel, Acrylic/Polyurethane Paint, Polyester Paint | -35°C | 90°C |
| | Unplasticized PVC | -35°C | 75°C |
| 4905, 4910 | Polycarbonate, Aluminum, Acrylic/Polyurethane Paint | -35°C | 90°C |
| 4611, 4646, 4655 | Stainless Steel, Aluminum, Galvanized Steel, Glass, Glass/Epoxy, Phenolic | -35°C | 110°C |
| | Nylon, Polycarbonate | -35°C | 90°C |
| | ABS, Rigid PVC | -35°C | 75°C |

*Substrates can be used with or without primer(s)/Coating. 3M Silane Coating, 3M Adhesion Promoter 4298UV and 3M Tape Primer 94 are used with glass substrate. 3M Primer AP111, 3M Adhesion Promoter 4298UV and 3M Tape Primer 94 are used with aluminum and galvanized steel substrates.

## Storage and Shelf Life

Store in original cartons at 4-38°C (40-100°F) and 0-95% relative humidity. Optimum storage conditions are 22°C (72°F) and 50% relative humidity. When stored under proper conditions, product retains its performance and properties for 24 months from date of manufacture.

## 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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