Technical Data Sheet

Preliminary 3M™ Dual Lock™ Reclosable Fasteners SJ3590

Product Description

3M™ Dual Lock™ Reclosable Fasteners are positive locking, hidden fasteners designed for use in a variety of attachment solutions. They consist of continuous strips of polyolefin stems with a mushroom shaped top protruding up from the backing. When snapped together the mushroom shaped caps interlock producing a strong reliable Fastener.

The standard Dual Lock™ fasteners are available in three different stem densities (170, 250 and 400) referring to the approximate number of stems per square inch. (26, 39, 62 stems per square centimeter) By inter-locking different stem density combinations you can create the strength that suits your application; more total stems give higher strength. The Dual Lock™ Reclosable fasteners can be mated in the following combinations of increasing closure strength: Type 170 to Type 250, Type 170 to Type 400, Type 250 to Type 250 and Type 250 to Type 400. We do not recommend using the Type 170 to 170 because it does not have enough strength for a good connection. We do not recommend using the Type 400 to 400 because it is too strong and may cause stems and heads to rip out rendering the fastener no longer reclosable.

There are a variety of pressure sensitive adhesives available with Dual Lock™ to cover most application needs. The pressure sensitive adhesive makes the Dual Lock™ easy to use, simply remove the liner, place the Dual Lock™ and apply firm consistent pressure to assure good contact with the substrate you are adhering. We also offer non-adhesive backed Dual Lock™ for applications where the PSA does not meet your needs.

Product Features

• Low Odor when tested to VDA 270.
• Low Volatile Organic Compounds (VOC's) compared to standard Dual Lock™ products tested to VDA 278.
• 84% reduced Volatile Organic Compounds (VOC's) compared to standard Dual Lock™ products, through 3rd party tested, VDA 278 methods
• Easy Alignment: Dual Lock™ fasteners engage in any direction or position. The mushroom stems slide into position until they are engaged by snapping together applying firm pressure, this eliminates concerns about misalignment or spontaneous engagement.
• Positive Locking: Dual Lock™ fasteners engage/fasten with an audible snap and detectable movement assuring complete and secure closure.
• Reclosability: Dual Lock™ fasteners can be opened and closed for multiple closure applications (high cycle life).
• Blind Attachment: Dual Lock™ fasteners can be attached on the backside of substrate (i.e. trim piece) where it will not interrupt the show surface.
• Ease of Assembly: Dual Lock™ fasteners can be used to attach components before they enter the final assembly plant, reducing the number of parts and the assembly time. No tools are required.
• Adjustable Strength: By selecting different combinations of the various stem densities of the Dual Lock™ the fastener can be designed to meet the strength needs of the designer.
• Product Forms: Dual Lock™ fasteners come in a variety of forms: Backed with Pressure Sensitive adhesive, Non-woven, Rigid backed, Die Cut Shapes, and low profile.

General Information

Pressure Sensitive Adhesive backed product
Product Family: Acrylic PSA 3M™ VHB™ conformable type backing ideal for low surface energy materials, while also working on medium and high surface energy substrate attachment

Technical Information Note

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

Note: The following data is taken from tests conducted on a limited number of production runs. 3M will continue to test samples from additional manufacturing lots and issue a new Technical Data Sheet if the results change.

Typical Physical Properties

Attribute Name	Value
Color	Black
Adhesive Type	Very Conformable Acrylic Foam (Black)
Stems	39 Stems/cm² (250 Stems/in²)
Thickness	3.67 mm (144 mil)
Engaged Thickness	5.70 mm (224 mil) [1]
Liner	PE Film
Primary Liner Color	Red
Liner Thickness	0.13 mm (5 mil)

[1] Thickness depends upon the amount of compression load on the pieces.

Typical Performance Characteristics

90° Peel Adhesion

Temperature: 23 °C (73 °F)
Test Method: ASTM D3330

Dwell Time	Substrate	Backing	Value
72 h	Stainless Steel		32.4 N/cm (18.5 lb/in width) [1]
72 h	Polypropylene (PP)		34 N/cm (19.4 lb/in width) [1]
72 h	Polystyrene		34.3 N/cm (19.6 lb/in width) [1]
	Type 170 to 250	Flexible from Rigid	3.3 N/cm (1.9 lb/in width) [1]
	Type 250 to 250	Flexible from Rigid	4.2 N/cm (2.4 lb/in width) [1]
	Type 170 to 400	Flexible from Rigid	6.8 N/cm (3.9 lb/in width) [1]
	Type 250 to 400	Flexible from Rigid	8.4 N/cm (4.8 lb/in width) [1]

[1] 300 mm/min (12 in/min)

Overlap Shear Strength

Temperature: 23 °C (73 °F)
Test Method: ASTM D1002

Substrate	Value
Type 170 to 250	14.4 N/cm² (20.9 lb/in²) [1]
Type 170 to 400	20.3 N/cm² (29.4 lb/in²) [1]
Type 250 to 250	30.1 N/cm² (43.6 lb/in²) [1]
Type 250 to 400	34.7 N/cm² (50.4 lb/in²) [1]

[1] 300 mm/min (12 in/min)

Attribute Name	Test Method	Temperature	Substrate	Value
Static Shear	ASTM D3654	23 °C (73 °F)	Stainless Steel	1,000 g [1]
Static Shear	ASTM D3654	93 °C (200 °F)	Stainless Steel	1,000 g [1]
Static Shear	ASTM D3654	93 °C (200 °F)	Polypropylene (PP)	500 g [1]
T-Peel Adhesion	ASTM D1876		Type 170 to 250	.7 N/cm (.4 lb/in width) [2]

Attribute Name	Test Method	Temperature	Substrate	Value
T-Peel Adhesion	ASTM D1876		Type 170 to 400	1.4 N/cm (.8 lb/in width) [2]
T-Peel Adhesion	ASTM D1876		Type 250 to 250	1.2 N/cm (.7 lb/in width) [2]
T-Peel Adhesion	ASTM D1876		Type 250 to 400	2.5 N/cm (1.4 lb/in width) [2]

[1] 25 x 25 mm (1 in x 1 in) sample area, test terminated after 10,000 minutes

[2] Flexible from Flexible

Test Method: ASTM D897

Attribute Name	Substrate	Value
Dynamic Tensile (Disengage)	Type 170 to 250	15.1 N/cm² (21.9 lb/in²)
Dynamic Tensile (Disengage)	Type 170 to 400	26.9 N/cm² (39.1 lb/in²)
Dynamic Tensile (Disengage)	Type 250 to 250	32.9 N/cm² (47.7 lb/in²)
Dynamic Tensile (Disengage)	Type 250 to 400	49.1 N/cm² (71.2 lb/in²)
Dynamic Tensile (Engage)	Type 170 to 250	7.52 N/cm² (10.9 lb/in²)
Dynamic Tensile (Engage)	Type 170 to 400	13.1 N/cm² (19 lb/in²)
Dynamic Tensile (Engage)	Type 250 to 250	13.9 N/cm² (20.1 lb/in²)
Dynamic Tensile (Engage)	Type 250 to 400	21.7 N/cm² (31.4 lb/in²)

Attribute Name	Value
Long Term Temperature Resistance	93 °C (200 °F) [1]

[1] Long Term (day, weeks)

Attribute Name	Test Method	Substrate	Value
Cleavage Strength	ASTM D3330	Type 170 to 250	11 N/cm (6.3 lb/in width) [1]
Cleavage Strength	ASTM D3330	Type 170 to 400	26.1 N/cm (14.9 lb/in width) [1]
Cleavage Strength	ASTM D3330	Type 250 to 250	20.6 N/cm (11.8 lb/in width) [1]
Cleavage Strength	ASTM D3330	Type 250 to 400	41.1 N/cm (23.5 lb/in width) [1]
Cycle Life	ASTM D897	Type 170 to 250	1,000 [2]
Cycle Life	ASTM D897	Type 170 to 400	1,000 [2]
Cycle Life	ASTM D897	Type 250 to 250	1,000 [2]
Cycle Life	ASTM D897	Type 250 to 400	1,000 [2]

[1] Rigid backed from Rigid backed

[2] Number of closures before losing 50% of original tensile strength

Attribute Name	Value

Attribute Name	Value
Note	The following technical information and data is intended as a guideline to assist customers in selecting 3M™ Reclosable Fasteners for further evaluation. This technical information is not product release specifications or standards. Unless stated differently, the typical system performance and product properties were obtained using specific test methods under controlled laboratory conditions of 72°F ± 5°F and 50% ± 10% relative humidity. The user is responsible for evaluating 3M reclosable fasteners under expected use conditions to ensure suitable performance for the intended application. These are typical values which were gathered from testing the PSA backed materials. Similar values can be expected when the Dual Lock is held securely in a rigid fashion. Tests were run at 12 inches per minute

Handling/Application Information

Surface Preparation

The Dual Lock™ reclosable fasteners and substrates should have equilibrated for a minimum of one hour at temperatures of 68° to 80°F (20° to 27°C) before application.

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

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 “Dual Lock™ Reclosable Fasteners with Acrylic Foam Tape ” for additional details and suggestions. (70-0709-4029-4)
*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

• Application Procedure: 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.
• For small pieces: The liner is removed from the Dual Lock™ reclosable fastener adhesive. Without touching the adhesive, the Dual Lock™ reclosable fastener is applied to the surface using light finger pressure. The Dual Lock™ reclosable fastener must then be rolled down with a rubber-covered hand roller, being careful not to crush the Dual Lock™ reclosable fastener stems. It is suggested to roll down the Dual Lock™ reclosable fastener at least once in each direction with a 4.5 lb. to 10 lb. roller to insure 100% adhesive contact, especially around the perimeter of the part.
• For long strips: The liner is removed from the Dual Lock™ reclosable fastener adhesive. Without touching the adhesive, the Dual Lock™ reclosable fastener is aligned on the substrate surface. One end of the Dual Lock™ reclosable fastener strip is pressed down (tabbed) to the substrate while holding the other end of the strip under light tension. The Dual Lock™ reclosable fastener strip is then slowly rolled down the entire length of the strip from the tabbed end with a rubber covered hand roller, taking care not to trap air bubbles under the adhesive and not to crush the Dual Lock™ reclosable fastener stems. It is suggested to roll down the reclosable fastener at least once in each direction with a 4.5 lb. to 10 lb. roller to insure 100% adhesive contact, especially around the perimeter of the part.
• The pressure-sensitive adhesive bonds to the substrate on contact and parts can be handled immediately. Adhesive bond strength increases with time, pressure andtemperature. A minimum of twenty four hours dwell time is recommended before applying a load or disengaging assembled parts.
• After application, the bond strength will increase as the adhesive flows onto the surface. At room temperature, approximately 50% of the ultimate strength will beachieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. In some cases, bond strength can be increased and ultimate bond strength can be achieved more quickly by exposure of the bond to elevated temperatures (e.g. 150°F [66°C] for 1 hour).

Design Considerations

• As a general rule, four square inches of fastener area per pound of static tensile or shear load to be supported is suggested as a starting point for evaluation. More or less area may be needed depending on specific conditions or end use applications. Type 250 Dual Lock Reclosable fasteners less than 0.75" (19 mm) width should not be engaged to other type 250 Dual Lock Reclosable fastener as low disengagement values may occur.
• Whenever possible design one side of the Dual Lock reclosable fasteners to be larger than the mating side. This will allow for variability or mismatch in Dual lock alignment positions, and ensure 100% fastening area contact. Another approach would be to design two rectangular shaped fastener pieces so that they can be engaged in a cross web/perpendicular pattern (crossed).
• Dual Lock strength is proportional to the fastening contact area, and the number of stems in combination used. More stems and more Dual Lock used gives you more strength, less stems combined and using less Dual Lock will give you less strength.
• Dual Lock disengagement strength/performance is strongest in direct tensile. Peel/cleavage mode is where it is most easily removed.
• Final product performance depends upon a combination of factors: the substrate and its surface characteristics, the fastener selected, the application method and conditions, the time and environmental conditions required for the application. Because these factors are unique to each application, the user must evaluate Dual Lock and do any testing required to determine Dual Lock’s suitability for the user’s desired end use.

Storage and Shelf Life

Store under normal conditions of 16° to 27°C (60° to 80°F) and 40 to 60% relative humidity in the original packaging, out of direct sunlight. For best performance, use this product within 24 months from date of manufacture.

Available Sizes

Attribute Name	Value
Standard Roll Length	45 m (50 yd)

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

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