



European Technical Assessment

**ETA-09/0024
of 16/09/2019**

(English language translation, the original version is in French language)

GENERAL PART

**Technical Assessment Body issuing
the European Technical Assessment**

Full name or acronym (if full name
included in the header)

Centre Scientifique et Technique du Bâtiment

Trade name of the construction product

3M™ VHB™ Structural Glazing Tape G/B 23F

**Product family to which the
construction product belongs**

Bonding acrylic foam tape

Manufacturer

3M DEUTSCHLAND GmbH
Werk Hilden
Düsseldorfer Straße 121-125
DE-40721 Hilden

Manufacturing plant(s)

3M DEUTSCHLAND GmbH
DE-40721 Hilden

**This European Technical Assessment
contains**

13 pages including 2 Annexes which form an
integral part of this assessment

**This European Technical Assessment
is issued in accordance with
Regulation (EU) No 305/2011, on the
basis of**

EAD 250006-00-0404 Bonding acrylic foam tape

This version replaces

ETA 09/0024, with validity from 30/06/2013 to
30/06/2018

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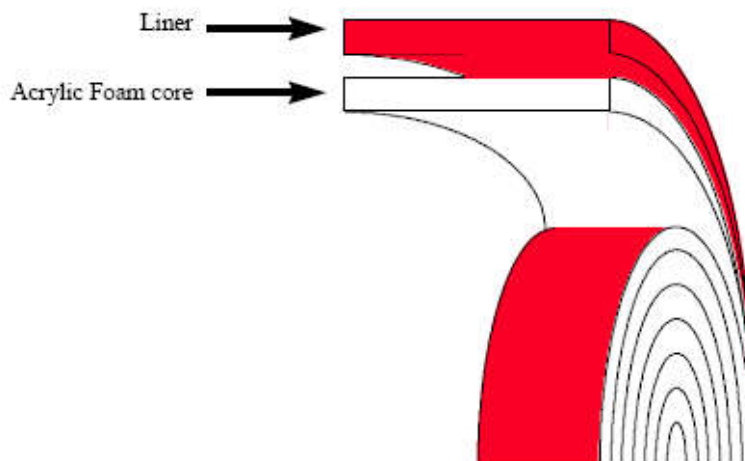
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SPECIFIC PART

1. Technical description of the product

1.1. Bonding tape

3M™ VHB™ Structural Glazing Tape G23F and B23F are an acrylic foam tape used to bond glazing products on a support frame. This is an acrylic double coated adhesive foam tape which is 2.3 mm thick, and 10 to 50 mm wide. It is covered with a moisture stable liner for transport and storage.



Characteristics of the product are:

- Dimension.

3M™ VHB™ Structural Glazing Tape G23F and B23F: 2,3 mm ± 10% (thickness) and 10 to 50 mm (width).

- Colour.

3M™ VHB™ Structural Glazing Tape G23F – grey core and transparent surface.

3M™ VHB™ Structural Glazing Tape B23F – grey core and black surface.

- Chemical Nature.

Acrylic.

- Density.

3M™ VHB™ Structural Glazing Tape G23F – approximately 680 kg/m³.

3M™ VHB™ Structural Glazing Tape B23F – approximately 725 kg/m³.

- Commercial Designation.

3M™ VHB™ Structural Glazing Tape G/B 23F.

- Thermo gravimetric analysis according to EN ISO 11358-1 (the curve is kept in the Evaluation Report).

1.2. Substrates

- Glazing substrate is float glass conform to EN 572-2 Glass in Building – Basic Products – Part 1, 2, 4, 5 and the thermally treated glass made from, conform to:
 - EN 1863 Glass in building – Heat strengthened glass.
 - EN 12150 Glass in building – Thermally toughened safety glass.

Coatings must be totally removed from the adhesion surface.

- Metallic substrate is made in aluminium according to table 1 and 2.

Table 1 – Aluminium alloy - Characteristics

Alloy and tempering	Mechanical characteristics
Designation	
EN 573-3 and EN 515 EN AW-6060 T4-T5-T6	EN 755-2

Table 2 – Anodising characteristics

Characteristics	Method	Criteria
Thickness	EAD 250006-010-0404 § 2.2.2.2.1.	Mean minimum thickness: 15 µm
Sealing degree Weight lost	EAD 250006-010-0404 § 2.2.2.2.1.	EN ISO 3210: <30 mg/dm ²
Stain test	EAD 250006-010-0404 § 2.2.2.2.1.	EN ISO 2143: < 2

- PVC substrate is a U-profile made in PVC according to table 3.

Table 3 – PVC characteristics

Method	Results
Characteristics according to EN 12608-1	Profil polychlorure de vinyle no plastified
Supplier – material reference	Tryba Profile ref. 213
Density according to ISO 1183-1	1,45 g/cm ² ± 0,02
Ash according to ISO 3451-5	7,12 % ± 7 %
Vicat softening temperature according to EN ISO 306	82,1 °C ± 2
Emanation of acidic products according to EN ISO 182-2	90 min ±15 %
Coulour	L = 93,52 ±1 a = -0,80 ± 0,5 b = 1,70 ± 0,8

1.3. Substrate preparation products

Table 4 – 3M™ primers

Trade Name	Appearance	Designated Substrates
3M™ Silane Primer AP 115	Clear Liquid	Float glass
3M™ Silane Primer	Clear Liquid	Float glass
3M™ Primer 94	Clear Liquid	Anodized Aluminium
3M™ Primer 4297	Clear Liquid	U-PVC

Table 5 – 3M™ surface cleaner

Trade Name	Appearance	Designated Substrates
3M™ IPA Cleaner 08986	Clear Liquid	<ul style="list-style-type: none"> • Float glass • Anodized Aluminium • U-PVC
3M™ Heptane Cleaner	Clear Liquid	<ul style="list-style-type: none"> • Float glass, finger prints • Anodized Aluminium
3M™ Adhesive Remover 08984	Clear Liquid	<ul style="list-style-type: none"> • Float glass

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)¹

3M™ VHB™ Structural Glazing Tape G23F and B23F are primarily for the following applications:

- To bond glazing products or anodised aluminium panels on structural support frame (aluminium or U-PVC profile) to design a bonded glazing frame for EBK (External Bonded Glazing Kits) application.
- To bond anodised aluminium stiffeners profiles on the back side of anodised aluminium panels for cladding or curtain wall application.

For the whole kit, which includes the tape, another ETA should be required.

The temperature for the intended use is limited to 80°C.

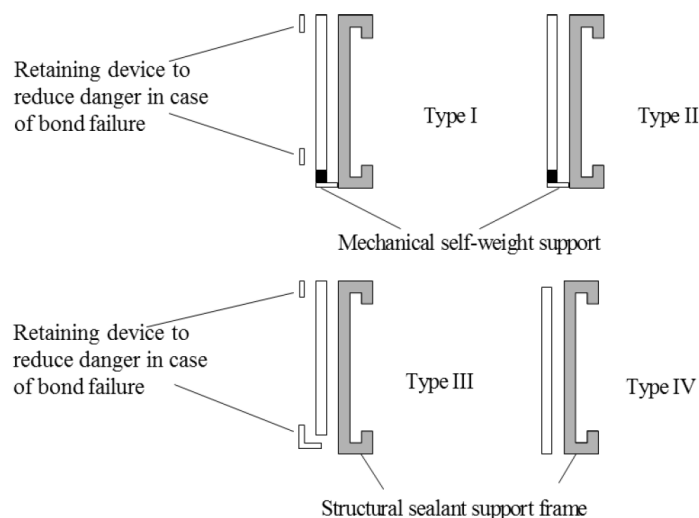
This ETA covers the following intended uses and (assembled) systems, for EBK application:

Type I: Mechanical transfer of the self-weight of the infill to the sealant-support frame and thence to the structure. The bonding tape transfers all other actions. Devices are used to reduce danger in the event of a bond failure.

Type II: Mechanical transfer of the self-weight of the infill to the tape-support frame and thence to the structure. The bonding tape transfers all other actions and no devices are used to reduce danger in the event of bond failure.

Type III: The bonding tape transfers all actions, including the self-weight of the infill to the tape support frame and thence to the structure. Devices are used to reduce danger in the event of a bond failure.

Type IV: The bonding tape transfers all actions, including self-weight of the infill to the tape-support frame and thence to the structure. No devices are used to reduce danger in the event of bond failure.



¹ Note: All undated references to standards in this chapter are to be understood as references to the dated versions listed in clause 4 in EAD 250006-010-0404.

The provisions and the verification and assessment methods included or referred to in this European Technical Assessment have been written based upon the assumed working life of the bonding tape for the intended use of 25 years when installed in the works (provided that the 3M™ VHB™ Structural Glazing Tape G23F / B23F is subject to appropriate installation, use and maintenance). These provisions are based upon the current state of the art and the available knowledge and experience.

Assumptions under which the fitness for the intended use is assessed are described in Annex 1.

3. Performance of the product and references to the methods used for its assessment

Table 6 shows how the performance of 3M™ VHB™ Bonding Tape is assessed in relation to the essential characteristics listed in the EAD 250006-010-0404.

Table 6 – Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.3.1	Class E
Basic Works Requirement 3: Hygiene, health and the environment			
2	Vapour permeability	2.2.4.1	No performance assessed
3	Content and/or release of dangerous substances	2.2.4.2	No performance assessed
Basic Works Requirement 4: Safety and accessibility in use			
4	Initial mechanical strength		
4.1	Initial mechanical strength Tensile at 23°C Tensile speed V= 5, 50, and 300 mm/min	2.2.5.3.1	Level: see Table 7 and Table 8 Rupture ≥ 90 % cohesive
4.2	Initial mechanical strength Tensile speed V= 5 mm/min T=-20°C, +80°C, +100°C	2.2.5.3.1	Level: see Table 7 and Table 8
4.3	Initial mechanical strength Shear speed V= 5 mm/min T=-20°C, +23°C, +80°C	2.2.5.3.2	Level: see Table 7 and Table 8
5	Residual strength after artificial ageing		
5.1	Immersion in hot water	2.2.5.4.1	Level: see Table 7 and Table 8
5.2	Humidity and NaCl	2.2.5.4.2	Level: see Table 7 and Table 8
5.3	Façade cleaning products	2.2.5.4.3	No performance assessed
5.4	Material in contact	2.2.5.4.4	No performance assessed
5.5	UV exposure (1000, 2000, 3000, 4000 hr)	2.2.5.4.5	Level: see Table 7 and Table 8
5.6	Mechanical fatigue	2.2.5.4.6	Level: see Table 7 and Table 8
5.9	Characteristic values	Annex A	Level: see Table 7 and Table 8
Basic Works Requirement 6: Energy economy and heat retention			
6	Thermal conductivity	2.2.5.5	Description: see Table 7 and Table 8

Table 7 – G/B 23F PVC/GLASS

<p>Initial mechanical strength (tension speed) T = 23°C</p> <p>V = 5mm/min</p> <p>V = 50mm/min</p> <p>V = 300mm/min</p>	<p>$R_{t,V5} = 0.322\text{MPa}$ $E_{t,V5} = 9.75\text{mm}$</p> <p>$R_{t,V50} = 0.558\text{MPa}$ $E_{t,V50} = 10.26\text{mm}$</p> <p>$R_{t,V300} = 0.899\text{MPa}$ $E_{t,V300} = 6.7\text{mm}$</p>
<p>Initial mechanical strength (tension speed) V = 5mm/min</p> <p>T = -20°C</p> <p>T = +80°C</p>	<p>$K_{t,T-20^\circ\text{C}} = 8.901$</p> <p>$K_{t,T+80^\circ\text{C}} = 0.504$</p>
<p>Initial mechanical strength (shear speed) V = 5mm/min</p> <p>T = -20°C</p> <p>T = +23°C</p> <p>T = +80°C</p>	<p>$R_{s,V5} = 0.408\text{MPa}$</p> <p>$E_{s,T+23^\circ\text{C}} = 17.20\text{mm}$</p> <p>$E_{s,T-20^\circ\text{C}} = 13.27\text{mm}$</p> <p>$E_{s,T+80^\circ\text{C}} = 17.51\text{mm}$</p> <p>$K_{s,T-20^\circ\text{C}} = 1.367$</p> <p>$K_{s,T+80^\circ\text{C}} = 0.693$</p>
<p>Immersion in hot water</p>	<p>$K_{t,hw504} = 1.094$</p> <p>$K_{t,hw1008} = 0.855$</p>
<p>Humidity and NaCl</p>	<p>$K_{t,NaCl} = 1.070$</p>
<p>UV exposure</p>	<p>$K_{t,UV1000} = 1.01$</p> <p>$K_{t,UV2000} = 1.08$</p> <p>$K_{t,UV3000} = 1.17$</p> <p>$K_{t,UV4000} = 1.31$</p>
<p>Mechanical fatigue</p>	<p>$K_{t,MF} = 0.754$</p>
<p>Characteristic values</p>	<p>$\sigma_k = 0.491 t^{0.2303}$ (t in sec)</p> <p>For the wind load, the recommended value is given in Annex1 (method of calculation)</p> <p>$\tau_k = 0.965 t^{0.2303}$ (t in sec)</p> <p>For the long length action (dead load), the recommended value is given in Annex1 (method of calculation)</p> <p>$E_k = 13.27\text{mm}$</p> <p>$T_k = 100^\circ\text{C}$</p>
<p>Thermal conductivity</p>	<p>K=0.0767 W/m.K</p>

Table 8 – G/B 23F ALU/GLASS

<p>Initial mechanical strength (tension speed) T =23°C</p> <p>V = 5mm/min V = 50mm/min V = 300mm/min</p>	<p>$R_{t,V5} = 0.350\text{MPa}$ $E_{t,V5} = 14.05\text{mm}$</p> <p>$R_{t,V50} = 0.625\text{MPa}$ $E_{t,V50} = 10.62\text{mm}$</p> <p>$R_{t,V300} = 0.844\text{MPa}$ $E_{t,V300} = 7.52\text{mm}$</p>
<p>Initial mechanical strength (tension speed) V = 5mm/min</p> <p>T = -20°C T = +80°C</p>	<p>$K_{t,T-20^\circ\text{C}} = 7.602$</p> <p>$K_{t,T+80^\circ\text{C}} = 0.449$</p>
<p>Initial mechanical strength (shear speed) V = 5mm/min</p> <p>T = -20°C T = +23°C T = +80°C</p>	<p>$R_{s,V5} = 0.495\text{MPa}$</p> <p>$E_{s,T+23^\circ\text{C}} = 17.60\text{mm}$</p> <p>$E_{s,T-20^\circ\text{C}} = 12.76\text{mm}$</p> <p>$E_{s,T+80^\circ\text{C}} = 17.29\text{mm}$</p> <p>$K_{s,T-20^\circ\text{C}} = 1.256$</p> <p>$K_{s,T+80^\circ\text{C}} = 0.728$</p>
<p>Immersion in hot water</p>	<p>$K_{t,hw504} = 0.971$</p> <p>$K_{t,hw1008} = 0.789$</p>
<p>Humidity and NaCl</p>	<p>$K_{t,NaCl} = 1.010$</p>
<p>UV exposure</p>	<p>$K_{t,UV1000} = 0.939$</p> <p>$K_{t,UV2000} = 0.956$</p> <p>$K_{t,UV3000} = 1.024$</p> <p>$K_{t,UV4000} = 1.099$</p>
<p>Mechanical fatigue</p>	<p>$K_{t,MF} = 0.754$</p>
<p>Characteristic values</p>	<p>$\sigma_k = 0.424 t^{0.1878}$ (t en sec)</p> <p>For the wind load, the recommended value is given in Annex 1 (method of calculation)</p> <p>$\tau_k = 0.984 t^{0.1878}$ (t en sec)</p> <p>For the long length action (dead load), the recommended value is given in Annex 1 (method of calculation)</p> <p>$E_k = 12.76\text{mm}$</p> <p>$T_k = 100^\circ\text{C}$</p>
<p>Thermal conductivity</p>	<p>K=0.0767 W/m.K</p>

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document No. 250006-010-0404, the applicable European legal act is 96/582/EC. The AVCP system to be applied is 1.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD 250006-010-0404

Technical details necessary for the implementation of the AVCP system are laid down in the Control Plan detailed in Table 9.

Table 9 – Control Plan for the manufacturer

Nr	Subject/type of control	Test or control method	Criteria (if any)	Minimum #of samples	Minimum frequency of control
Factory Production Control (FPC)					
1	Check on incoming material	Compliance of the raw materials.			
2	Check during fabrication	Conformity of composition: process control system; each run			
		Viscosity syrup (mPas) TM-88	According to internal criteria	N=1	Each batch
		Density syrup (kg/m ³) TM-1491	According to internal criteria	N=1	Each batch
3	Check on final product	Thickness (mm) TM-405	Min.= 2.16 Max.= 2.41	N=2	1/each 2 nd jumbo
		Width tolerance (mm) TMG-5581	+/- 0.4 mm	N=1 1 st cut/each roll	1/ shift 1/ width
		Density tape (kg/m ³) TM-441	Min.= 593 Max.= 753	N=2	1/each 2 nd jumbo
		Peel adhesion 90°, 23°C, 72 hr dwell Stainless Steel (N/100mm) TM-1637LS EN 1939	Min.= 278	N=2	1/each 2 nd jumbo
		Peel adhesion 90°, 23°C, 72 hr dwell Stainless Steel (N/100mm) TM-1637NLS	Min.= 278	N=2	1/each 2 nd jumbo
		Static shear 500g 70°C (hours) TM-1266	Min.= 167	N=1	1/each 4 th jumbo
	Aspect (visual) Color & cleanness	Pass or Fail	N=1	1/roll	
4	Check EBK, project, system related surface testing	Peel adhesión 90°, 23°C, 72 hr 300mm/min (N/100mm) AFERA 5001 EN 1939	Min.= 500 Target= na Max.= na 100% cohesive failure	1/profile-lot/jumbo	1 test/sample
5	Surface energy check	Surface energy test pencil	> 38 mN/m	Every frame and glass	1 test/frame and glass

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for bonding tape are laid down in Table 10.

Table 10 – Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	The notified body shall ascertain that, in accordance with the prescribed test plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the bonding tape according to the specification given in the ETA.	According to control plan			At the beginning of the production
Continuous surveillance, assessment and evaluation of factory production control					
2	The notified body shall visit the factory to assess the continuing conformity to the ETA, taking into account the prescribed test plan.	According to control plan			Twice a year

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Annex 1 - Load duration (t)

Without required value by national authorities, we recommend the following value:

PVC/GLASS:

σ_K	γ_{Mt}	σ_K/γ_{Mt}	$\sigma_{assessed}$	σ_{des}
0.113	1.3	86kPa	85kPa	85kPa
τ_k	γ_{Ms}	τ_k/γ_{Ms}	$\tau_{assessed}$	τ_{des}
8.6	3	2.87kPa	1.7kPa	1.7kPa
E_k	γ_{MA}	E_k/γ_{MA}	$E_{assessed}$	E_{des}
13.27	1.8	7.37mm	6.9mm	6.9mm

ALU/GLASS:

σ_K	γ_{Mt}	σ_K/γ_{Mt}	$\sigma_{assessed}$	σ_{des}
0.128	1.3	98kPa	85kPa	85kPa
τ_k	γ_{Ms}	τ_k/γ_{Ms}	$\tau_{assessed}$	τ_{des}
21	3	7kPa	1.7kPa	1.7kPa
E_k	γ_{MA}	E_k/γ_{MA}	$E_{assessed}$	E_{des}
12.76	1.8	7.09mm	6.9mm	6.9mm

Note: these values are determined according to Annexe B of EAD 250006-010-0404.

Annex 2 - Determination of Peel Adhesion Properties according to EN 1939:2003

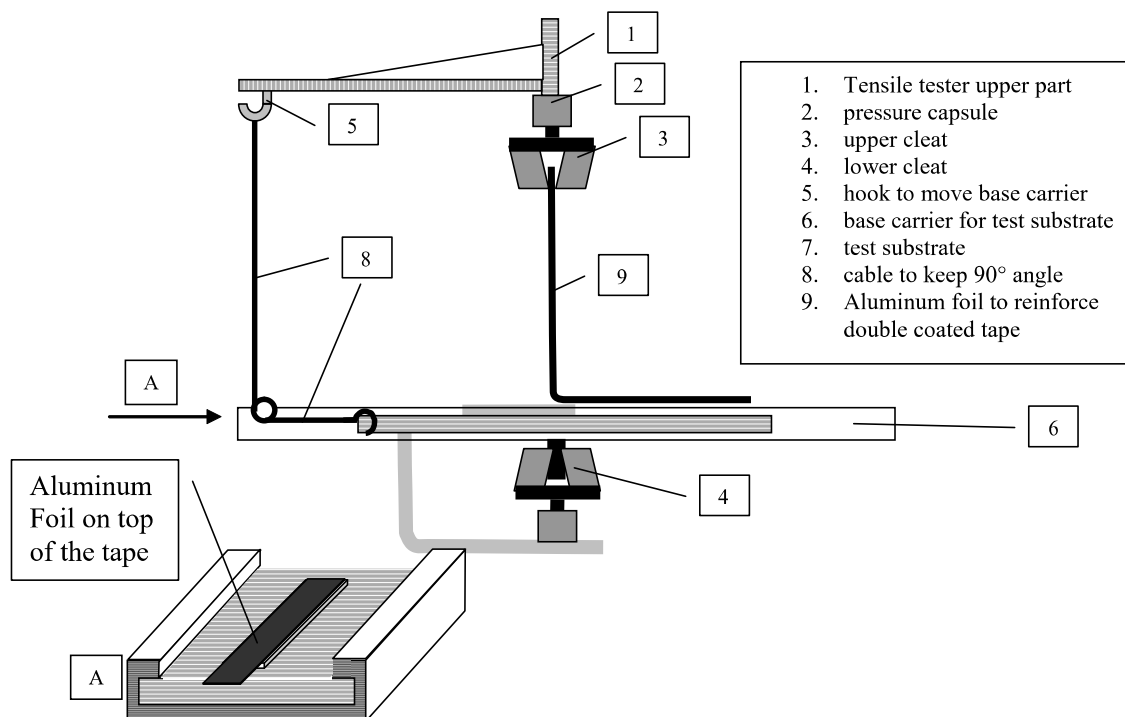
Please find below a summary of EN 1939:2003 which is made for testing of the adhesion properties of pressure sensitive tapes. This method is used to compare:

- a. different tapes on a reference substrate (stainless steel, 1.4301, Grade 2R acc. EN 10088-2, polished surface to $50 \text{ nm} \pm 25 \text{ nm}$) or
- b. the adhesion of one tape on different surfaces (main purpose when used with 3M™ VHB™ Structural Glazing Tape G/B 23F).

For the determination of the adhesion between 3M™ VHB™ Structural Glazing Tape G/B 23F and the selected substrates peel test gives significant data. Due to the thickness of the tape an angle of 90° is best to generate significant values. Main target is to achieve a specified peel force ($> 50 \text{ N/cm}$ at 23°C , 50% relative humidity) combined with a cohesive failure above 90%.

The substrates are prepared as described in section 4 or according to system specific requirements (Schedule A of 3M project/system specific application manual). The test routine is in accordance with EN 1939:2003 and the test speed is set at 300 mm/min (23°C , 50% relative humidity).

As a summary the substrates are cleaned and the tape is laminated onto the substrate (12mm width) and pressed by using a metal roller with a defined weight ($2 \text{ kg} \pm 0,1 \text{ kg}$). In the second step a metal backing foil is laminated on top of the tape and the pressure is applied with the same roller. After conditioning for 72 h at 23°C and 50% relative humidity the aluminium foil is peeled off and the resistance of the tape delivers the peel force.



The result is given in a peel force (N) per length (typically 10mm).