M5216 – D05 – E 03/91

NITTO HEAT – BONDING FILM M-5216R

1. Outline

NITTO Heat – bonding Film M-5216R has a neoprene rubber heat – active adhesive face. When it is applied under pressure and heat, this film provides high adhesive strength in a short time and a black matte surface by expansion.

2. Features

1) This film provides high bond strength and a black matte surface by heat – and pressure – bonding.
2) High bond strength even to irregular faces, porous faces and faces with rectification strain by expansion.
3) High durability.

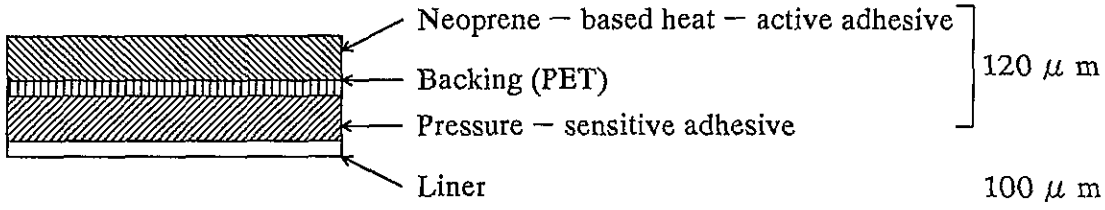
3. Applications

1) When the matte surface is required.
2) For bonding the irregular or porous faces or faces with rectification strain.

4. Size and Construction

Table 1

Thickness (mm)	Width (mm)	Length (m)
0.122	400	50



5. General Properties

Table 2

Face	Adhesion (g/20mm)	Holding Strength (mm)	Glossiness (%)
Heat – active adhesive side	2000 *1	0.1 *3	Below 1 *5
Pressure – sensitive adhesive side	1400 *2	0.4 *4	–

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Test Method:

* 1. To aluminum plate. A sample was bonded to the aluminum plate by applying a 2kg roller once in each direction, then, by hot – pressing at 90 ℃ and 2 kg/c m^2 for 15 sec. After aging for 30min. at normal condition, the adhesion was measured by 180° peeling method at a pulling rate of 300 mm/min. The sample was lined with #25 PET film.
* 2. To stainless steel plate. A sample was bonded to the stainless steel plate by applying a 2kg roller once in each direciton. After aging for 30min. at normal condition, the adhesion was measured by 180° peeling method at a pulling rate of 300 mm/min. The sample was lined with #25 PET film.
* 3. To stainless steel plate. A sample was bonded by hot – pressing at 90 ℃ and 2 kg/c m^2 for 15 sec. with a bond area of 10mm x 20mm. After aged at 40 ℃ for 30min., in that atmosphere, the sample was loaded with a weight of 500g for 2hrs., the deviation was measured.
* 4. To stainless steel plate. A sample was bonded with a bond area of 10mm x 20mm. After aged at 40 ℃ for 30min., in that atmosphere, the sample was loaded with a weight of 500g for 2hrs., the deviation was measured.
* 5. In accordance with JIS Z 8741 "Measuring Method for Glossiness of the Polished Surface", Method 2. The sample was heated by contacting the back face of the heat active adhesive with the metal roll heated to 98 ℃ for 15sec.

6. Adhesive Properties

Test piece: a PVC punching sheet was bonded to the heat active adhesive face and an acrylic enamelled plate was bonded to the pressure – sensitive adhesive face.

6.1 Adhesive Properties of the Heat Active Adhesive

Table 3 (unit: g/20mm)

Bonding Time (sec.)	Bonding Temperature (℃)		
	80	90	100
5	–	–	1240
10	985	1220	1500
15	1155	1500	1820
30	1305	1890	–
45	1390	2025	–
60	1660	–	–
90	1720	–	–

A sample was heated at 120℃ for 1min. in the hot air circulating oven and bonded to a PVC punching sheet by applying a 2kg roller once in each direction, then, by hot press at 2 kg/c m². After aging for 30min. at normal condition, the test was conducted by 180° peeling method at a pulling rate of 300 mm/min. The other side of the sample was lined with #25 PET film.

6.2 Holding Properties of the Pressure – sensitive Adhesive

Table 4

Temperature in the Atmosphere (℃)	Holding Time (min.)
40	265
50	142
60	64
70	28
80	13

A sample was bonded to an acrylic enamelled plate with a bond area of 20mm x 10mm by applying a 2kg roller once in each direction, then, by hot press at 75℃ and 10 kg/c m² for 10sec. After aging for 30min. at normal condition, the test was conducted by peeling method at 30~60° at a pulling rate of 300mm/min. The other side of the sample was lined with PVC punching sheet.

6.3 Adhesive Properties vs. Storage Conditions

1) Adhesion after Exposure to the Atmosphere at – 30℃

Table 5 (unit: g/10mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Initial adhesion	750	540
Adhesion after 500hrs.	800	500

To PVC punching sheet: a sample lined with PET film was bonded at 90℃ and 2 kg/c m² for 15sec. and the 180° peel strength was measured at a rate of 300 mm/min.

To acrylic enamelled plate: a sample lined with PVC punching sheet was bonded at 75℃ and 10 kg/c m² for 10sec. and the peel strength was measured at 30~60° at a rate of 300 mm/min.

2) Heat Resistance Adhesion after Exposure to the Atmosphere at 60 ℃

Table 6 (unit: g/20mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Adhesion after 24hrs.	1090	1430
Adhesion after 120hrs.	1110	1640

To PVC punching sheet: a sample lined with PET film was bonded at 90 ℃ and 2 kg/c m² for 15sec. and the 180° peel strength was measured at a rate of 300 mm/min.

To acrylic enamelled plate: a sample lined with PET film was bonded by applying a 2kg roller once in each direction and the 180° peel strength was measured at a rate of 300 mm/min.

3) Humidity resistance Adhesion after Exposure to the Atmosphere at 60 ℃ and 92%RH

Table 7 (unit: g/20mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Adhesion after 24hrs.	1100	1500
Adhesion after 120hrs.	1100	1700

To PVC punching sheet: a sample lined with PET film was bonded at 90 ℃ and 2 kg/c m² for 15sec. and the 180° peel strength was measured at a rate of 300 mm/min.

To acrylic enamelled plate: a sample lined with PET film was bonded by applying a 2kg roller once in each direction and the 180° peel strength was measured at a rate of 300 mm/min.

4) Adhesion after Temperature Cycles

Table 8 (unit: g/10mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Initial adhesion	750	540
Adhesion after 15 cycles	750	540

To PVC punching sheet: a sample lined with PET film was bonded at 90 ℃ and 2 kg/c m² for 15sec. and the 180° peel strength was measured at a rate of 300 mm/min.

To acrylic enamelled plate: a sample lined with PVC punching sheet was bonded at 75 ℃ and 10 kg/c m² for 10sec. and the peel strength was measured at 30~60° at a rate of 300 mm/min.

After bonding, the test piece was exposed to 15 cycles. 1 cycle; 1hr. at normal condition, – 20 ℃ x 3hrs., 30min. at normal condition and 60 ℃ x 3hrs.

After temperature cycling, the test piece was aged for 1hr. at normal condition, then, tested.

6.4 Adhesion after Liquid Immersion

1) Adhesion after Immersion in Warm Water at 60℃ for 24hrs.

Table 9 (unit: g/10mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Initial adhesion	750	540
Adhesion after immersion	700	550

To PVC punching sheet: a sample lined with PET film was bonded at 90℃ and 2 kg/c㎡ for 15sec. and the 180° peel strength was measured at a rate of 300 mm/min.

To acrylic enamelled plate: a sample lined with PVC punching sheet was bonded at 75℃ and 10 kg/c㎡ for 10sec. and the peel strength was measured at 30~60° at a rate of 300 mm/min.

After the test piece was taken out, it was air – dried for 3hrs., then, tested.

2) Adhesion after Immersion in Neutral Detergent for 30min.

Table 10 (unit: g/10mm)

Bonding Face	Heat – active Adhesive	Pressure – sensitive Ad.
Substrate	PVC punching sheet	Acrylic enamelled plate
Initial adhesion	750	540
Adhesion after immersion	700	540

After bonding and aging for 60min., the test piece was immersed in neutral detergent for 30min. After it was taken out, it was dried by the drier at 110℃ for 5min. and aged for 60min. at normal condition, then, tested.

NOTE: Technical data figures herein presented are typical and should not be used for any specification purposes.