

NMT Technical Data

[1] Tensile shear fracture test

1. The material

- ◇ Aluminum ... A5052/H34
- ◇ PBT (UL94HB, GF20% + filler 20%)
- ◇ PBT (UL94VO, GF30%)
- ◇ PPS (UL94VO, GF30%)

2. Test conditions

The test pieces were exposed to the full range of temperatures between -30°C and 70°C for two hours and after carrying out 20 cycles in which the temperature was raised or lowered every two hours (8 hours/cycle), and after leaving the test pieces in a 50% RH constant temperature bath at 23°C for four hours, the strength was measured with a tensile testing machine. (Measured with a tensile strength of 5mm/min.)

3. Test piece shape, bonding area

$$\text{Bonding area: } 10.2 \times 5.2 \times = 53.04 \text{mm}^2$$

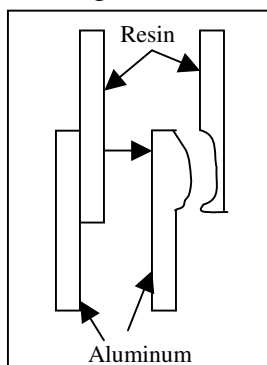


4. Measurement results

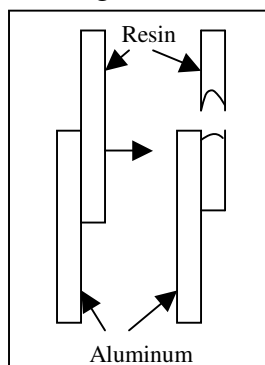
Unit: kg f/cm²

		1) PBT (UL94HB)		2) PBT (UL94VO)		3) PPS (UL94VO)	
		Shear stress	Breaking condition	Shear stress	Breaking condition	Shear stress	Breaking condition
Strength after heat cycle testing	n=1	192.9	B	205.5	A	246.4	A
	2	196.5	A	210.8	A	280.7	A
	3	212.3	A	202.1	A	247.7	A
	4	221.5	A	193.8	A	215.5	A
	5	234.0	A	224.0	A	289.0	A
	6	221.3	B	190.8	A	254.0	A

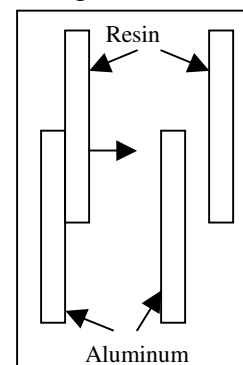
Breaking Condition A



Breaking Condition B



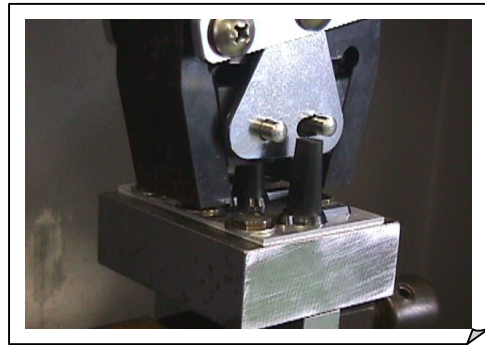
Breaking Condition C



[2] Pull breaking tests

A thick boss (height: 2cm) with a bottom surface area of 1cm² is injection bonded to the top of a 1.6mm thick aluminum plate, the aluminum plate is fastened to a flat plate using five screws, and the boss is pulled out vertically and fractured.

(Aluminum plate = A5052/H34)
(PBT/UL94B)



Resin series	Pull breaking strength (kgf/cm ²)
	Pull breaking Pressed aluminum material
PBT/HB	120 - 140
PBT/VO	100 - 120
PPS/VO	140 - 160

[3] Life time of T-processed aluminum material

It is ideal to do the injection bonding within a few days of completion of the T process but even if the injection bonding is done as late as two weeks after completion of the T process, the results will still be within the data range given above. (However, the T-processed aluminum material must be stored in a hermetically-sealed plastic bag.)

[4] Temperature shock tests for the integrated object

With the test piece made by PBT, there was no effect over 200 cycles at -40°C to +85°C. With PPS test piece, results are shown as below.

The experiment condition is **1,000 cycles at -55°C to +150°C (130 minutes / cycle)**.

Unit: kg f/cm²

		1) PPS (A5052)		2) PPS (A1100)		3) PPS (A6061)	
		Shear stress	Breaking condition	Shear stress	Breaking condition	Shear stress	Breaking condition
Strength after heat cycle	n=1	232.2	A	226.2	A	213.0	A
	2	297.2	A	264.2	A	209.3	A
	3	264.7	A	245.2	A	235.4	A

[5] Vibration tests

The results of the vibration tests for integrated object (PBT) were conducted at an acceleration rate of 37m/s^2 , 20-200 Hg, for 36 hours for each of the xyz directions. The results show no effect on the bonding surface but the resin itself became brittle. In extreme experiments, PBT appeared to struggle. We are now working with manufacturers to improve the resins in this regard.

[6] Pull breaking tests at high temperatures

Shear breaking strength at 100°C was around 100 kgf/cm^2 for A5052 and PBT/HB, and 120 kgf/cm^2 for PPS/VO. Because the bonding is a non-adhesive type, its strength is proportionate with the thermal resistance of resin.

[7] Alumite treatment

If the integrated object is given the normal alumite treatment without any special preparation, it corrodes from the boundary line and the bonding strength declines. To solve this problem, Taiseiplas has developed a modified alumite treatment method. Using this modified alumite treatment, the bonding strength does not change from its initial value.

[8] Coating

There are coating materials that can be burnt onto the integrated object without any special preparation. "Rain and sunshine tests" have also been completed. (After 400 hours at 62°C , there are no abnormalities in the Grid Adhesion Test.)

Test Results provided by:

Taiseiplas Co., Ltd.

Head office:

9th Floor, Nissan Edobashi Building

1-10-5 Nihonbashi Honcho

Chuo Ward

Tokyo 103-0023

TEL: + 81 (0)3 3243 1851 or 1805 FAX: +81 (0)3 3243 1847 or 1807

<http://www.taiseiplas.com> E-mail: taisei@taiseiplas.com