Prüfbericht-Nr.: *Test Report No.:*	**60161915-002**	**Auftrags-Nr.:** *Order No.:*	3245701-70	Seite 1 von 9 *Page 1 of 9*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	18.07.2018	
Auftraggeber: *Client:*	tesa SE Hugo-Kirchberg-Str. 1; D-22848 Norderstedt			
Prüfgegenstand: *Test item:*	double sided adhesive tape			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	62510 PV 0FB 08			
Auftrags-Inhalt: *Order content:*	Translation of test report 60161915-001			
Prüfgrundlage: *Test specification:*	2 PfG Q 2441: 2016-07 Spiegelklebebänder im Möbelbau - Anforderungen und Prüfverfahren zur Ermittlung der Zeitstandsfestigkeit *double sided adhesive tapes for furniture - Requirements and test methods for determination of creep stregth*			
Wareneingangsdatum: *Date of receipt:*	14.02.2018			
Prüfmuster-Nr.: *Test sample No.:*	A000189129-001			
Prüfzeitraum: *Testing period:*	17.04.2018 - 09.07.2018			
Ort der Prüfung: *Place of testing:*	Furniture testing laboratory Nuremberg			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland LGA Products GmbH			
Prüfergebnis*: *Test result*:*	Siehe Sonstiges / See Other			

geprüft von / *tested by*:

25.09.2018	A. Kumm / Expert	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by*:

25.09.2018	F. Scharnagl / Head of Laboratory	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: Translation of test report 60161915-001 dated 13.07.2018; The translation is only valid in combination with the original document.
After evaluation of the test results, taking into account a safety factor of 10, this gives a usage recommendation for the mirror tape of 50 cm² minimum adhesive tape area per kg of mirror glass.
for details see next pages

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

V04

Prüfbericht-Nr.: 60161915-002
Test Report No.:

Liste der verwendeten Prüfmittel
List of used test equipment

Prüfmittel *Test equipment*	**Prüfmittel-Nr. / ID-Nr.** *Equipment No. / ID-No.*	**Nächste Kalibrierung** *Next calibration*
calliper	04843 / 2726824	07.2019
Zwick tension and compression testing machine	02793 / 2725013	10.2018
scale	07856 / 2732115	01.2019

Produktbeschreibung
Product description

Product details: double sided adhesive tape with polyethylene foam backing

Information of the manufacturer: designation/batch number 62510 PV 0FB 08

measurement / weight:

width: 19mm
thickness: 1000µm

adhesive: modified acrylate

backing material: polyethylene foam, white

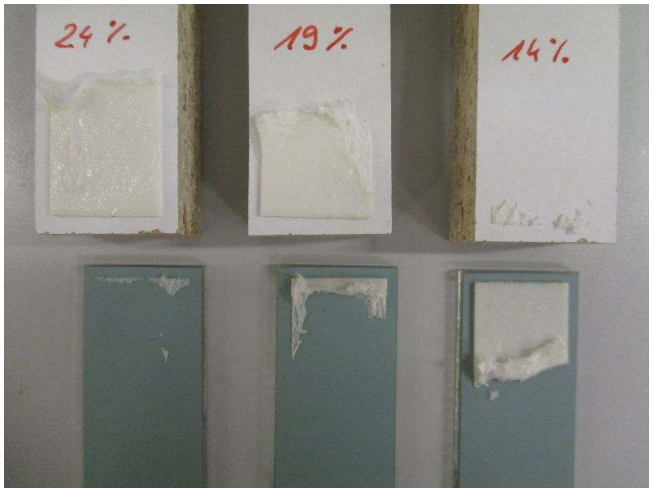
covering: paper separating foil, brown, 70µm

further documents: product information vers. 21/06/18

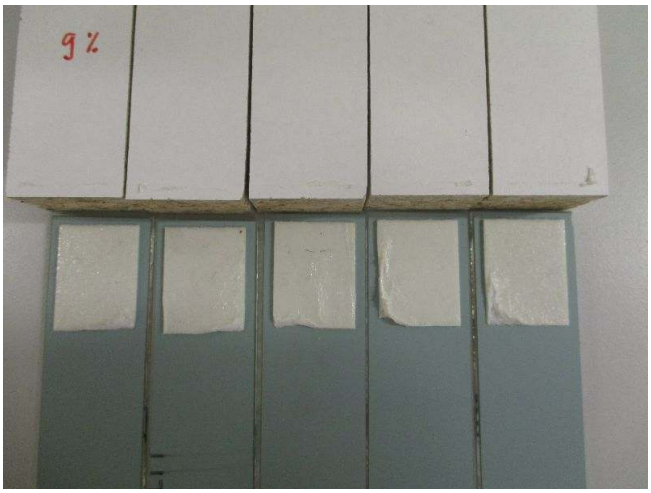
foto documentation of rupture pattern (pic. 1 - 4) – additions to A3 remarks for offset and rupture pattern

Pic. 1: rupture pattern after shear rupture strength test

Pic. 2: examples for rupture pattern, load stages 24%, 19%, 14%

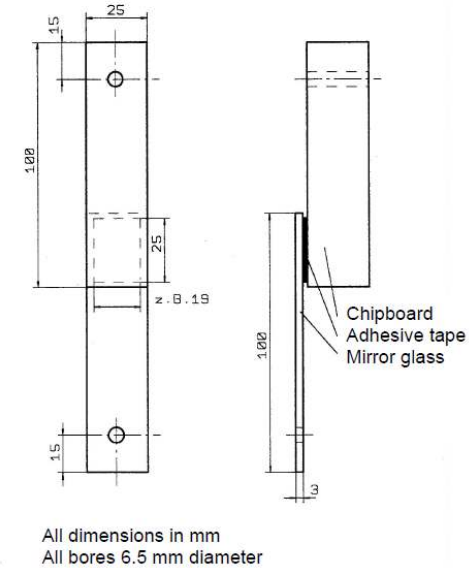


Pic. 3: rupture pattern after loading with 4.2 N/cm² (load stage 9%)



Pic. 4: rupture pattern after loading with 2.1 N/cm² (load stage 5%)

Absatz	**2 PfG Q 2441: 2016-07**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

1	**Preparation of the laboratory test samples**		
	The test specimens shall be made analogously to figure 1 with below mentioned parameters and in compliance with the available processing instructions. Laboratory climate: 23 ± 1 °C/ 50 ± 2 % r.h. Mirror glass — size: 100 mm x 25 mm; thickness: 3 mm; bores: Ø 7 mm joints / support — material: melamine faced chipboard; surface tension: ~38 mN/m; size: 100 mm x 25 mm; thickness: 19 mm; bores: Ø 6 mm adhesive tape — sample width: 19 mm; sample length: 25 mm ± 0,5 mm; adhesive area: 4,75 ± 0,1 cm² figure 1: **Test sample for testing of mirror adhesive tapes**  All dimensions in mm All bores 6.5 mm diameter		

Absatz *Clause*	**2 PfG Q 2441: 2016-07** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Application: Preliminary cleaning of the joint areas with isopropanol, removal of the covering, pressing of the sample onto the joint areas within a gauge, connection of the mirror glass sample to the joint area (support) in the common symmetrical axis Pressing: Weight load of the test specimen at the centre point of the adhesive area Pressure: 10 N/cm² Pressing time: 5 s Storage of test specimen: 72-storage of the laboratory samples before the start of examination (Laboratory climate: 23 ± 1 °C, 50 ± 2 % r.h.)	There were no separate mounting instructions or product information concerning the application given by the manufacturer.	
2	**Determination of the shear rupture strength**		
	The test specimens are loaded with a vertical tensile strength under following conditions/parameters till the rupture of the application: Application: see point 1 Number of samples: min. 5 Climate in test room: 23 ± 2 °C / 50 ± 2 % r.h. Test speed: 20 mm/min Sample mounting: Attached suspended in the bores Force induction: Acting vertically in the mirror glass symmetry axis The determination of the shear rupture strength is basis for the grading of the load stages (necessary for the determination of the creep strength)	Results see point A 1 on page 8	

Absatz *Clause*	**2 PfG Q 2441: 2016-07** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
3	**Determination of the creep strength at shear after vertical load**		
	Creep test in a test frame with variable loads Application: see point 1 Number of samples: min. 5 for each load stage Climate in test room: 23 ± 2 °C / 50 ± 2 % r.h. Sample mounting: Attached suspended in the bores Force induction: Acting vertically in the mirror glass symmetry axis Load stages: Minimum 4 load stages are necessary for determination of the load-time-function; should be between approx. 30% and 5% of the shear rupture stregth Description of test setup The assembled test samples were placed in a test frame, put on bolts, freely suspended. The attachment of connecting pieces to the mirror part for the absorption of the tensile forces by means of weight loading was also freely suspended. The shear stress was applied by variable weight forces by means of tension springs, guided threaded rods, adjusting nuts and eye-bolts. The loadings with the required weight forces were replaced by the spring forces after removal of the weights. The flow characteristics of the adhesive connections were taken into account with this system by continual readjustment during the course of testing. The load duration (loading time) till breakage of each load stage, the rupture pattern and the offset between mirror glass and joint partner will be recorded. The limit for vertical creep strength (y) can be calculated on the basis of test results determined exponential function of the following type and should be expressed in N / cm². $y = a * e^{-k*t} + b$ a,b and k – experimental constants t - time	Results see point A 2 on page 8 determined limit for vertical creep stregth: 2,0 N/cm²	

Absatz *Clause*	**2 PfG Q 2441: 2016-07** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
4	**Calculation and requirement of minimum adhesive tape area concerning vertical creep stregth**		
	With the determined vertical creep stregth (y) and a safety factor of 10 the minimum adhesive tape area (A) per 1kg of mirror glass (ms) could be calculated with following function: $A = \frac{m_s * 10}{y}$ ms – weigth force of mirror glass (10N) 10 – safety factor y – determined vertical creep stregth in N/cm² A – minimum adhesive tape area in cm² Requirement: An information about the calculated minimum adhesive area for a permanent connection of 1kg mirror glass and the support material shall be included in the product information.	minimum adhesive tape area per 1kg mirror glass: 50 cm² * that is only a requirement concerning product certification	P ☐ F ☐ N/A ☒ N/T ☐

Absatz	**2 PfG Q 2441: 2016-07**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

A 1. Determination of the shear rupture strength - results

Shear rupture strength:

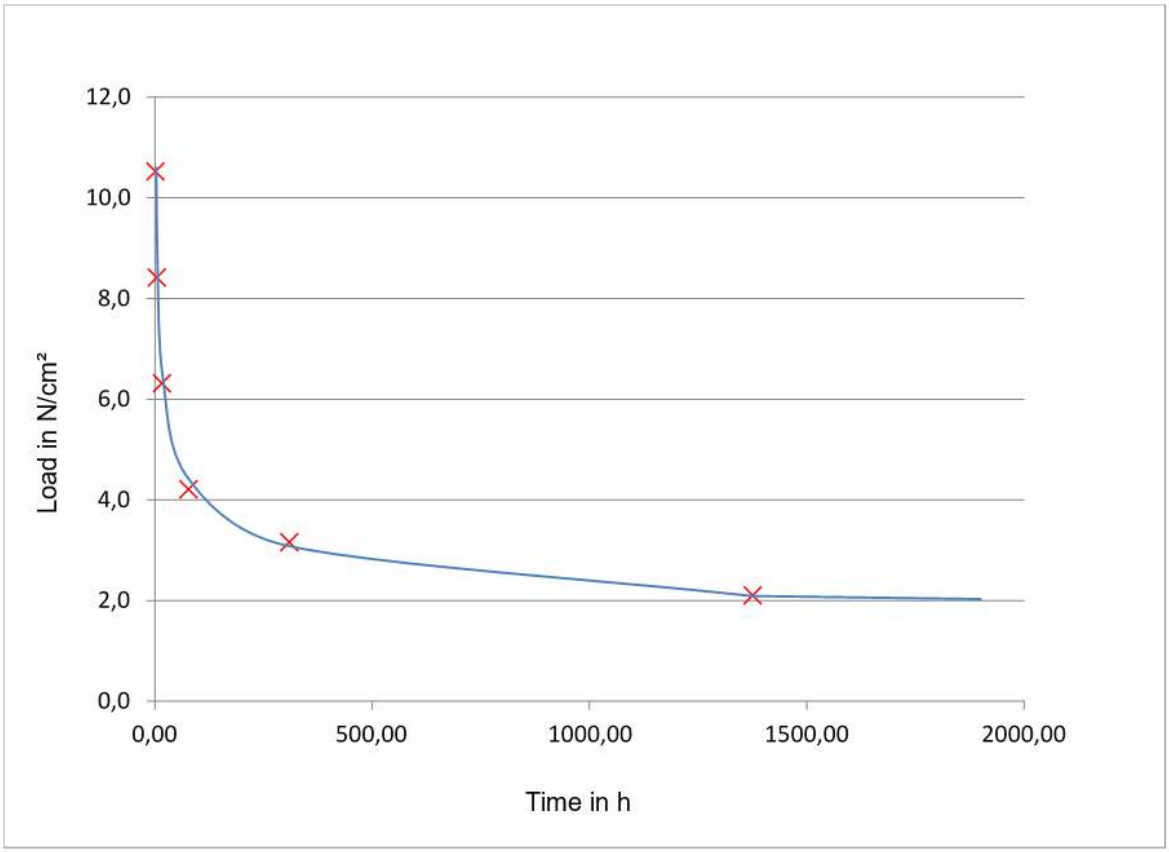
sample	1	2	3	4	5	Mean value in N	Shear rupture strength N/cm²
Breaking force in N	318,6	322,9	313,4	315,6	314,0	316,9	66,7

A 2. Determination of creep strength – results

Load stage [%]	**Load** [N/cm²]	**Load duration** [min]					**Mean value** [h]
		No. 1	No. 2	No. 3	No. 4	No. 5	
24	10,5	183	185	195	178	180	3,07
19	8,4	370	358	375	384	371	6,19
14	6,3	1007	1103	972	1010	1325	18,06
9	4,2	3371	5159	5420	5148	3469	75,22
7	3,2	14660	26247	22298	13993	14961	307,20
5	2,1	103654*	88965	40612	103654*	75294	1373,93

*no disbonding of the connection till the above mentioned moment; the test was stopped; the mentioned value was assumed as final value

Graphic illustration of the trial results:



A 3. remarks for offset and rupture pattern during the creep strength test (informative)

The offset between the mirror glass and joint area was measured continuously throughout the trial. The size of the offset was measured before rupture of the connection. The offset is comprised of elongation of the backing material (elastic, viscoelastic, and permanently deformed component) and sliding of the adhesive connection.

Load stage [%]	**Load** [N/cm²]	**Offset till rupture of the bonding** [mm]					**Mean value** [mm]
		No. 1	No. 2	No. 3	No. 4	No. 5	
24	10,5	determination of offset not possible, because of the very short time till rupture *1)					-
19	8,4						-
14	6,3						-
9	4,2	1,8	1,9	1,7	1,7	1,9	1,80
7	3,2	2,2	1,6	1,7	2	2,0	1,90
5	2,1	*2)	1,7	1,6	*2)	1,6	1,63

* 1) Determination of offset possible > 24 hours till rupture
* 2) no rupture of the bonding-connection till the end of test; offset at the stop of test 1,6mm

Rupture pattern: for examples see picture 1 to 4 on page 3 of this report

3 kinds of ruptures could happen during test (cleavage rupture, adhesion rupture, combination of cleavage and adhesion rupture).

Following findings at the presented samples:
The determination of the shear strength necessarily caused a complete cleavage rupture (rupture in the foam layer).
During the creep strength test a slow sliding of the mirror adhesive tape from the support material occurred (adhesion rupture and combination of cleavage and adhesion rupture).
At the load stage 24% and 19% the rupture predominantly occurred between the adhesive tape and the mirror surface (back side). For lower loads (from load stage 9%) the connection disbonded between the adhesive tape and the furniture surface/melamine surface (nearly without residue).