

**AD1/CS Series**
**THERMOLAST® K**

The AD1/CS Series is your material solution for applications with excellent adhesion to polar thermoplastics such as ABS, PC and PC/ABS as well as excellent compression set. The compounds are available in natural and black colors.

**Typical applications**

- Fastenings
- Grommets
- Membranes
- Seals

**Material advantages**

- Easy coloring (compounds in natural colors)
- Excellent compression set
- Insert molding possible
- UL 94 HB listed

**Processing Method:** Extrusion, Injection Molding

|        | Color / RAL DESIGN | Hardness<br>DIN ISO 7619-1<br>ShoreA | Density<br>DIN EN ISO 1183-1<br>g/cm <sup>3</sup> | Tensile Strength <sup>1</sup><br>DIN 53504/ISO 37<br>MPa | Elongation at Break <sup>1</sup><br>DIN 53504/ISO 37<br>% | Tear Resistance<br>ISO 34-1 Methode B (b)(Graves)<br>N/mm | CS 72 h/23 °C<br>DIN ISO 815-1 Method A<br>% | CS 24 h/70 °C<br>DIN ISO 815-1 Method A<br>% | CS 24 h/100 °C<br>DIN ISO 815-1 Method A<br>% | Adhesion to ABS <sup>2</sup><br>VDI 2019 two-component injection<br>molding N/mm | Adhesion to PC <sup>2</sup><br>VDI 2019 two-component injection<br>molding N/mm | Adhesion to PC/ABS<br>VDI 2019 two-component injection<br>molding N/mm |
|--------|--------------------|--------------------------------------|---------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------|
| TP5VCN | natural            | 47                                   | 1.100                                             | 3.5                                                      | 500                                                       | 11.0                                                      | 13                                           | 43                                           | 76                                            | 3.0 (B)                                                                          | 3.5 (B/D)                                                                       | 3.5 (B/D)                                                              |
| TP5VCZ | black              | 50                                   | 1.100                                             | 3.5                                                      | 500                                                       | 11.0                                                      | 14                                           | 43                                           | 65                                            | 3.0 (B)                                                                          | 2.0 (B)                                                                         | 3.5 (B)                                                                |
| TP6VCN | natural            | 60                                   | 1.100                                             | 5.5                                                      | 550                                                       | 14.0                                                      | 14                                           | 45                                           | 60                                            | 5.0 (D)                                                                          | 5.5 (D)                                                                         | 6.0 (D)                                                                |
| TP6VCZ | black              | 60                                   | 1.100                                             | 5.5                                                      | 550                                                       | 15.0                                                      | 16                                           | 45                                           | 64                                            | 5.0 (D)                                                                          | 5.0 (D)                                                                         | 6.0 (D)                                                                |
| TP7VCN | natural            | 66                                   | 1.100                                             | 7.0                                                      | 550                                                       | 16.0                                                      | 17                                           | 44                                           | 61                                            | 6.0 (D)                                                                          | 6.5 (D)                                                                         | 6.5 (D)                                                                |
| TP7VCZ | black              | 68                                   | 1.100                                             | 7.5                                                      | 600                                                       | 16.0                                                      | 18                                           | 45                                           | 71                                            | 6.0 (D)                                                                          | 7.0 (D)                                                                         | 7.0 (D)                                                                |
| TP8VCN | natural            | 75                                   | 1.100                                             | 10.0                                                     | 600                                                       | 24.5                                                      | 18                                           | 47                                           | 60                                            | 5.5 (A)                                                                          | 9.5 (D)                                                                         | 9.5 (D)                                                                |
| TP8VCZ | black              | 80                                   | 1.100                                             | 10.0                                                     | 600                                                       | 24.0                                                      | 23                                           | 47                                           | 60                                            | 6.0 (B)                                                                          | 10.0 (D)                                                                        | 9.5 (D)                                                                |

<sup>1</sup> Deviating from ISO 37 standard test piece S2 is tested with a traverse speed of 200 mm/min.

<sup>2</sup> The adhesion quality depends on mold design, product geometry and process parameters.



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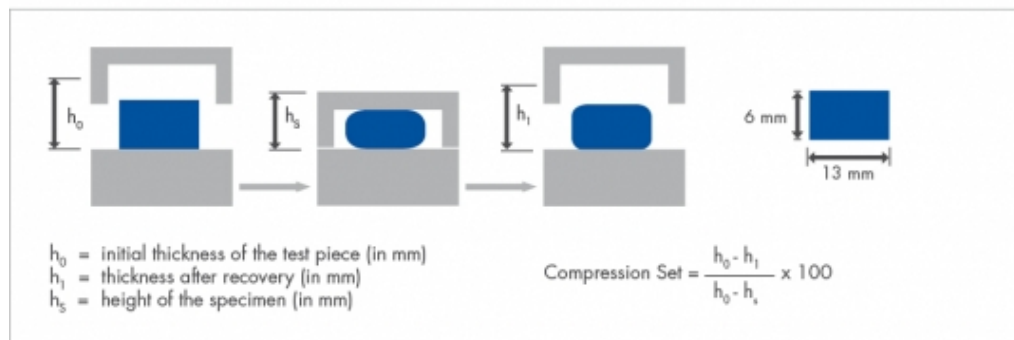
All values published in this data sheet are rounded average values.

## Compression Set

### Compression Set (acc. DIN ISO 815)

For the compression set testing the following specimen is used:

The specimen is a cylindrical disk shaped 6 mm thick and 13 mm in diameter.



The specimen is compressed by 25%. The compressed specimen is heated to the test temperature. DIN ISO 815 describes two methods.

**Method A:** The specimen is allowed to recover immediately after its aging in the oven and then cooled down to room temperature. After 30 minutes the thickness of the specimen is measured and the compression set calculated.

**Method B:** The specimen is cooled down to room temperature after its aging in the oven and then allowed to recover.

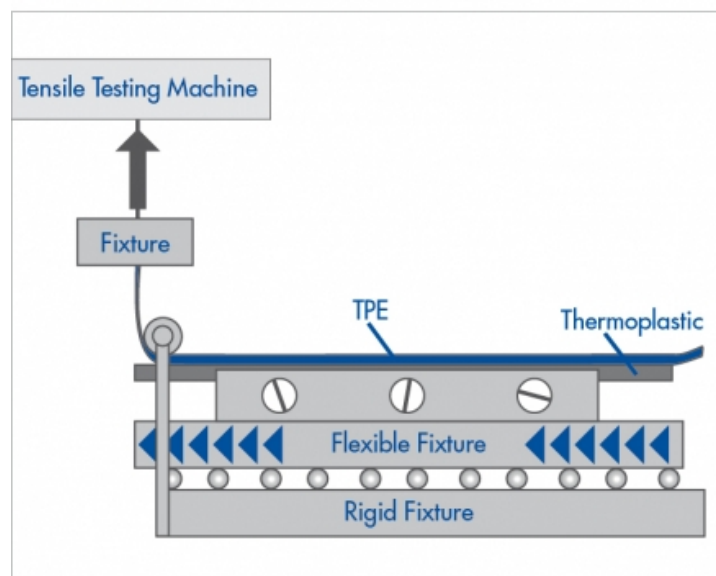
Test results gained from method B are in general higher than from method A.



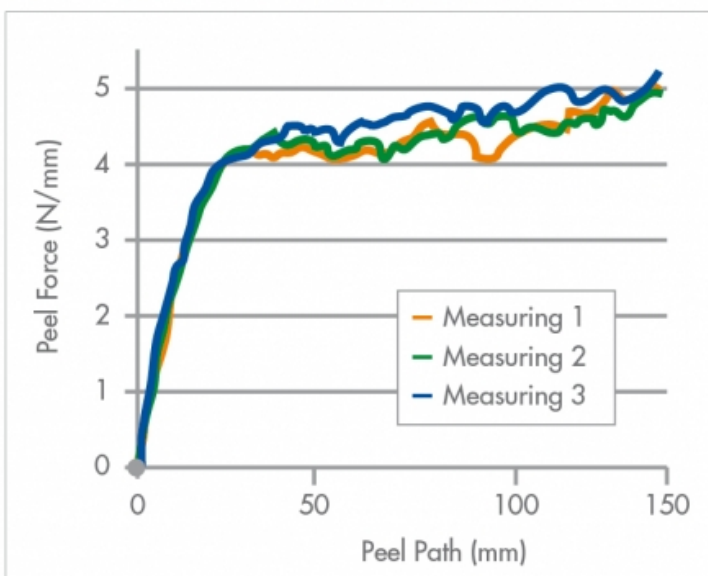
## Description peel test

# Peel test according to VDI guide line 2019

## Test Setup



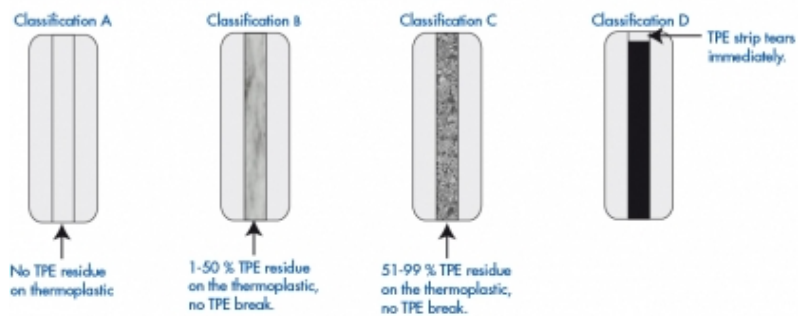
## Example diagram for results of a peel test



## Classification

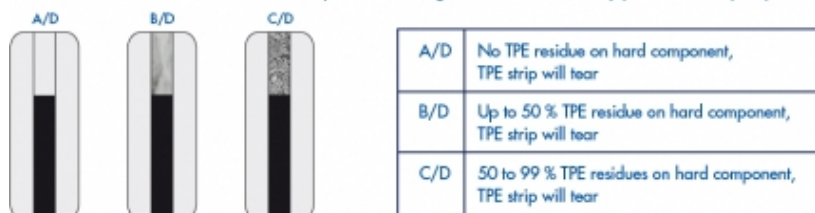
### Peel test according to VDI Guideline 2019

For the VDI peel test we add two characters to the peel force value.  
The first character describes the TPE residue on the hard component.



|   |                                          |
|---|------------------------------------------|
| A | No TPE residue on hard component         |
| B | Up to 50 % TPE residue on hard component |
| C | 50 to 99 % TPE residue on hard component |
| D | TPE strip tears immediately              |

The second character describes if the TPE strip will tear during the measurement at any position on the peel path.



|     |                                                                |
|-----|----------------------------------------------------------------|
| A/D | No TPE residue on hard component, TPE strip will tear          |
| B/D | Up to 50 % TPE residue on hard component, TPE strip will tear  |
| C/D | 50 to 99 % TPE residues on hard component, TPE strip will tear |



**AD1/CS Series**
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**Processing Guideline Injection Molding**

|                         |                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cylinder temperature    | 180 - 210 - 240 °C, max. 250 °C (360 - 410 - 460 °F, max. 480 °F)                                                                                                  |
| Hotrunner               | Hot runner temperatures: 200 -250 °C (390 - 480 °F). The runner should be empty after a maximum of 2 - 3 shots.                                                    |
| Injection pressure      | 200 - 1000 bar (2900 - 14504 psi) (depending on the size and weight of the part).                                                                                  |
| Injection rate          | In general, the fill time should not be more than 1–2 seconds.                                                                                                     |
| Hold pressure           | We recommend to derive the optimum hold pressure from determining the solidification point, starting with 40 % - 60 % of the required injection pressure.          |
| Back pressure           | 20 - 100 bar; if color batches are used, higher back pressure is necessary.                                                                                        |
| Screw retraction        | If an open nozzle is used processing with screw retraction is advisable.                                                                                           |
| Mold temperature        | The mold temperature depends on the hard component. A temperature exceeding 80 °C (175 °F) should be avoided. The common temperature is 40 - 60 °C (105 - 140° F). |
| Predrying               | To achieve optimum mechanical values, drying the material for 2 - 4 hours at 60 - 80 °C (140 - 175 °F) is recommended.                                             |
| Needle valve            | With materials < 50 Shore A the use of a needle valve is advisable.                                                                                                |
| Screw geometry          | Standard 3-zone polyolefine screw.                                                                                                                                 |
| Residence time          | The residence time is to be set as short as possible with a maximum of 10 minutes.                                                                                 |
| Cleaning recommendation | For cleaning and purging of the machine it is appropriate to use polypropylene or polyethylene. Machine must be PVC-free.                                          |



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Processing Guideline Extrusion

|                         |                                                                                                                                                                                                                              |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cylinder temperature    | 160 - 180 - 200 °C (320 - 360 - 390 °F). For Coextrusion with engineering thermoplastics temperature profile should be increased up to 30 °C (85 °F); maximum 230 °C (440 °F)                                                |
| Screw geometry          | Standard three-zone screw (e.g. polyolefin screw). The screw must be able to provide sufficient shearing.                                                                                                                    |
| L/D ratio               | At least 25                                                                                                                                                                                                                  |
| Compression ratio       | At least 3 : 1                                                                                                                                                                                                               |
| Screens / breaker plate | A breaker plate and a screen pack are generally recommended in the extruder configuration in order to increase pressure.                                                                                                     |
| Die land                | <= 3 mm ( <= 0,12 in.)                                                                                                                                                                                                       |
| Extruder Head           | Ca. 220 °C (430 °F)                                                                                                                                                                                                          |
| Die temperature         | Ca. 220 °C (430 °F)                                                                                                                                                                                                          |
| Predrying               | Drying of the material for at least four hours at 80°C (175°F) is recommended. The moisture level of material has to be below 0.02 %. To avoid porosity in the profile a pre drying is recommended for wall thickness > 3mm. |
| Calibration             | Generally not necessary; support elements may be required when extruding THERMOLAST® compounds with high hardness or when coextruding with standard thermoplastics.                                                          |
| Cleaning recommendation | For cleaning and purging of the machine it is appropriate to use polypropylene or polyethylene. Machine must be PVC-free.                                                                                                    |

