Materials Testing and Certification

Technology and expertise for speed to market

Empowering Trust™

Advanced technology. Extensive capabilities.

Being one of the leading global providers of testing and certification of thermoplasts, elastomers, thermosets and composites, our testing facilities offer a broad range of services: from compounding and test specimen production to testing and certification of high-performance plastics and components.

Let us apply our experience, resources and creativity to solve your unique challenges.

When choosing UL, you are opting for the proven performance of an independent and accredited testing partner. Benefit from our highly experienced team of experts and long history of expertise in plastics testing.

UL offers all-inclusive services and competitive turnaround times.

Faster, more efficient market launch thanks to:

- Advanced production systems
- Electronic processing from receipt of order to delivery of results
- „One-stop“ service ensures speedy processing of complex orders and consistently high quality

Compounding

Twin screw extrusion

- Small quantity compounds up to 200 kg*
- The main thermoplastics processed are:
  - Polycarbonates (PC, PC-HT)
  - Polyamides and polyesters (PA 6, PA 6.6, Co-PA, PET, PBT)
  - Styrenics (ABS, ASA and SAN)
  - Blends of the above-mentioned plastics
- Weighing in of formulations
- Mixing of raw materials in high speed mixer

* Other quantity on request

Production of Test Specimens

ISO TEST SPECIMENS

Rectangular sheet	60 x 60 x 1,0
Rectangular sheet	60 x 60 x 2,0
Flat test specimen	80 x 10 x 4,0
Dumbbell test specimen	170 x 10 x 4,0
Flat test specimen	125 x 13 x 0,75 / 1,5 / 3

UL TEST SPECIMENS, FLAT TEST SPECIMENS

125 x 13 x 0,75	125 x 13 x 2,0
125 x 13 x 0,80	125 x 13 x 2,2
125 x 13 x 0,85	125 x 13 x 2,4
125 x 13 x 0,90	125 x 13 x 2,6
125 x 13 x 1,0	125 x 13 x 2,8
125 x 13 x 1,2	125 x 13 x 3,0
125 x 13 x 1,4	125 x 13 x 3,2
125 x 13 x 1,5	125 x 13 x 3,8
125 x 13 x 1,6	125 x 13 x 6,4
125 x 13 x 1,8	

Other wall thicknesses on request

THIN WALL TEST SPECIMENS

60 x 60 x 0,4	125 x 13 x 0,4
60 x 60 x 0,5	125 x 13 x 0,5
60 x 60 x 0,6	125 x 13 x 0,6
60 x 60 x 0,7	125 x 13 x 0,7
60 x 60 x 0,8	125 x 13 x 0,8
60 x 60 x 0,9	
60 x 60 x 1,0	

DETERMINATION OF PROCESSING PROPERTIES

- Injection pressure
- Gate open time
- Plasticising performance
- Demolding properties / Friction coefficient
- Shrinkage

TEST SPECIMENS FROM SEMI-FINISHED AND FINISHED PARTS

- Produced by high-speed cutting, sawing and punching

SHEET PRODUCTION

Sheets with optical quality

(only unreinforced materials)

150 x 105 x 1,5	150 x 105 x 4,0	250 x 105 x 3,2
150 x 105 x 1,6	150 x 105 x 6,0	250 x 105 x 6,4
150 x 105 x 2,0	150 x 105 x 6,4	220 x 140 x 4,0
150 x 105 x 3,0	250 x 105 x 1,6	
150 x 105 x 3,2	250 x 105 x 2,3	

Sheets with grained surfaces

150 x 105 x 3,0	150 x 105 x 4,0
150 x 105 x 3,2	220 x 140 x 4,0

Sheets 150 x 105 x d

d = 1,0 / 1,2 / 1,5 / 2,0 / 2,2 / 2,4 / 2,5 / 2,7 / 3,0 / 3,2 / 4,0 / 6,0 / 10,0

(shrinkage marks on one side)

Sheets 150 x 150 x d

d = 2,0 / 2,5 / 3,0

Other Wall Thicknesses on request

Sheets for shrinkage measurement

Rectangular sheet	60 x 60 x 2,0
Rectangular sheet	150 x 105 x 3,0

Rectangular sheets; also with optical quality

Sample sheet	60 x 40 x 2,0
Sample sheet	60 x 40 x 4,0
Sample sheet with step	60 x 40 x 4/2-step
Rectangular sheet	150 x 38 x 2,0*
Rectangular sheet	155 x 75 x 2,3
Rectangular sheet with hole	155 x 75 x 2,3
Rectangular sheet with hole and ribs	155 x 75 x 2,3
Rectangular sheet	60 x 60 x 1,0
Rectangular sheet	60 x 60 x 2,0
Rectangular sheet	60 x 60 x 3,0
Rectangular sheet	75 x 50 x 2,0
Rectangular sheet	75 x 50 x 4,0
Sample sheet with step	75 x 50 x 4/1-step
Sample sheet with step	75 x 50 x 3/2-step

Round test specimen; also with optical quality

D25 x 1,7*	D80 x 0,8	D80 x 2,5
D60 x 1,0	D80 x 1,0	D80 x 3,0
D60 x 2,0	D80 x 1,2	D80 x 3,2
D60 x 3,0	D80 x 1,5	D80 x 4,0
D60 x 4,0	D80 x 1,6	D100 x 0,75*
D80 x 0,5	D80 x 2,0	

* not with optical quality

SPECIAL TEST SPECIMENS

Flat test specimens

50 x 6 x 4,0
60 x 10 x 1,0
63,5 x 12,7 x 3,2
80 x 10 x 1,0
80 x 10 x 3,0
80 x 10 x 4,0 (with weld line)
120 x 10 x 4,0
120 x 15 x 4,0

Dumbbell test specimens

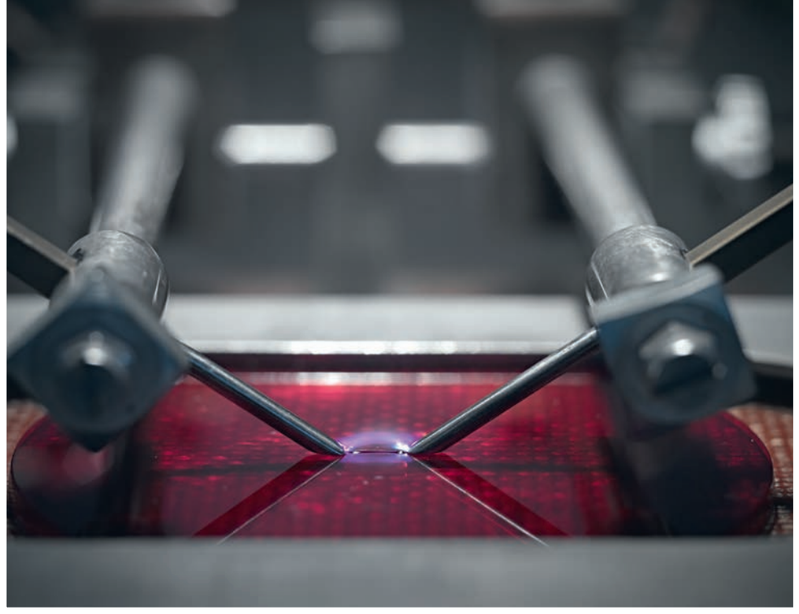
63,5 x 3,2 x 0,8 (Type L)
63,5 x 3,2 x 0,8 (Type S)
63,5 x 3,2 x 1,5 (Type L)
63,5 x 3,2 x 1,5 (Type S)
63,5 x 3,2 x 3,0 (Type L)
63,5 x 3,2 x 3,0 (Type S)
85 x 5,0 x 1,5 (ISO 527-2 Typ 1BA)
105 x 6 x 1,5
105 x 6 x 2,0
105 x 6 x 3,0
105 x 6 x 4,0
105 x 10 x 0,75
105 x 10 x 1,5
105 x 10 x 3,0
120 x 7 x 2,0
130 x 10 x 1,5
130 x 10 x 2,0
130 x 10 x 3,0
130 x 10 x 4,0
170 x 10 x 1,0
170 x 10 x 1,5
170 x 10 x 2,0
170 x 10 x 3,0 (according to ISO 527-2 Typ 1A)
170 x 10 x 3,2 (according to ISO 527-2 Typ 1B)
170 x 10 x 4,0
170 x 10 x 4,0 with weld line
170 x 13 x 3,2 (ASTM D638 Typ 1)

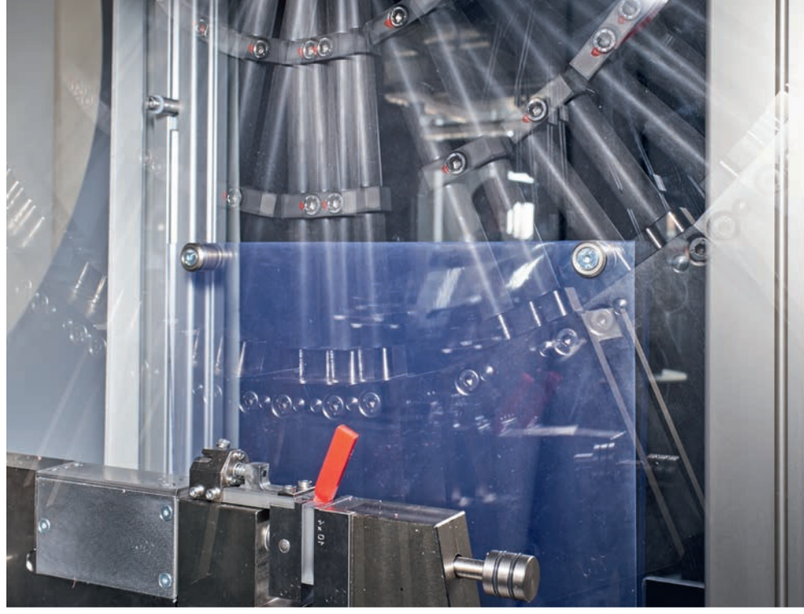
Others

Flow strip 440 x 50 x 0,5
Flow strip 440 x 50 x 0,7
Flow strip 440 x 50 x 1,0
Flow strip 440 x 50 x 1,5
Flow strip 440 x 50 x 2,0
Flow strip 440 x 50 x 3,0
Flow Spiral – flat 1150 x 5 x 2,0
Flow Spiral – flat 1170 x 8 x 2,0

Other test specimens on request. All dimensions listed in mm.

Test Procedures





MECHANICAL TEST PROCEDURES

Tensile test
-40 °C to +230 °C
• ISO 37
• ISO 527
• ASTM D638

High speed tensile test
optical deformation measurement by ultra high speed camera
-40 °C to +200 °C
0,1 m/s to 20 m/s
• in-house standard

Flexural test with modulus of elasticity
-40 °C to +230°C
• ISO 178
• ASTM D790

Izod & Charpy flexural impact tests (notched and unnotched)
-60 °C to +80°C
• ISO 179-1
• ISO 180
• ASTM D256
• DIN 53453 *

Penetration test
-40°C to +80°C
• ISO 6603-2

Determination of hardness
Ball indentation hardness
• ISO 2039-1
Micro hardness IRHD
• ISO 48
Rockwell hardness
• ISO 2039-2
• ASTM D785
Shore A/Shore D
• ISO 868
• DIN 53505*
• ASTM D2240

Tensile impact test
• ISO 8256
• ASTM D1822

Tear propagation/separation/ peeling tests
• ISO 34-1
• DIN 53507*
• DIN 53515*
• DIN 53363
• ASTM D1004
• ASTM D624
• ASTM D1938

Compression test
(to max. 10 kN)
• ISO 604
• ASTM D695
• DIN 53454/53457*

Shear test
• ASTM D732

Tensile creep test
Room temperature to 250 °C
• ISO 899-1
• DIN 53444*

Compression Set
• ISO 815
• ASTM D395

RHEOLOGICAL TEST PROCEDURES

Melt index
Melt volume flow rate (MVR)
Melt mass flow rate (MFR)
Time dependent melt volume rate (IMVR)
Time dependent melt flow rate (IMFR)
• ISO 1133-1
• ASTM D1238
• ISO 1133-2
• JIS K7210

Melt shear viscosity
• ISO 11443
• DIN 54811*

Solution viscosity
of Polycarbonate with/without film
• ISO 1628-1/-4
• DIN 51562-3

Oscillatory shearing
(rotational rheometer) e.g. zero shear viscosity, frequency sweep, time sweep/thermal stability
• ISO 6721-10
• ASTM D4440

Special rheological tests
• Capillary and rotational rheometer

pvT-Behavior
• ISO 17744

HEAT RESISTANCE

Vicat
to 300 °C
• ISO 306
• ASTM D1525

HDT Heat distortion
Temperature to 290°C
• ISO 75-1,-2,-3
• ASTM D648
• JIS K7207

Ball pressure
• IEC 60695-10-2 (IEC 60335-1)

ELECTRICAL TEST PROCEDURES

Dielectrical measurement
Dielectric constant εr/ dissipation factor tan δ)
• IEC 62631-2

Electrostatic charging
• on the basis of IEC 61340
• in-house standard

Electrical Resistance
Surface resistivity of insulating material
• IEC 62631-3
• UL 746 A
• ASTM D257
Volume resistivity of insulating material
• IEC 62631-3
• UL 746 A
• ASTM D257
Volume resistivity of conductive material
• ISO 3915

Dielectric strength
• IEC 60243-1
• ASTM D149
• VDE 0303 Part 21
• UL 746 A 9

Comparative Tracking Index/CTI
• IEC 60112
• ASTM D3638

Arc resistance
• IEC 61621
• ASTM D495
• VDE 0303 Part 70

Electrolytic Corrosion
• IEC 60426
• VDE 0303 Part 6

Inclined plane tracking (IPT)
• IEC 60587
• ASTM D2303

FLAMMABILITY

Flame Tests UL94
• HB (Horizontal Burning)
• V (50Watt-20mm Vertical)
• 5V (500Watt-125mm Vertical)
• VTM (Vertical Thin Materials)
• HBF (Horizontal Burning Foamed Material)

Oxygen Index LOI (Low Oxygen Index)
• ISO 4589-2

Test with Electrical Ignition Source
• IEC 60695-2-11 GWEPT (Glow Wire End Product Testing)
• IEC 60695-2-12 GWFI (Glow Wire Flammibility Index)
• IEC 60695-2-13 GWIT (Glow Wire Ignition Temperature)
• ASTM D3874 HWI (Hot Wire Ignition)

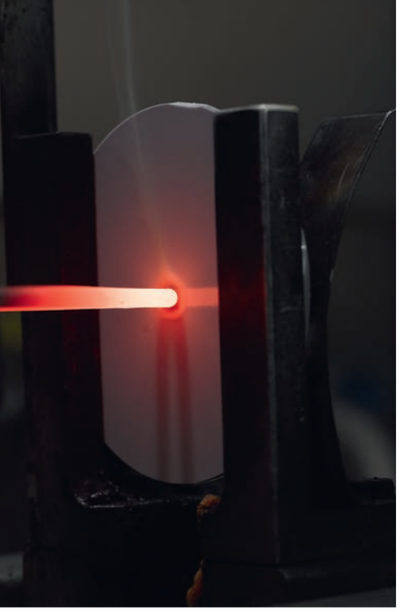
Needle Flame Test
• IEC 60695-11-5

Ash Content
• ISO 3451-1 Verfahren A
• In-House standard (rapid ash)

Automotive
• US-FMVSS 302 (KFZ-Interior)
• DIN 75200 (KFZ-Interior)
• ISO 3795 (KFZ-Interior)
• TL 1010 (KFZ-Interior)
• PV 3343 (Fuel Pipe)
• PV 3357 (Insulation Material)

* These Standards are withdrawn but are still feasible at UL

Additional standards and tests (as well automotive- and electrical test-regulations) on request




Test Procedures (continued)

THERMAL AGING

Hot air aging in no-load conditions
- DIN 53497
- ISO 188

Determination of Relative Temperature Index (RTI)
- IEC 60216
- UL 746 B
- VDE 0304

WEATHERING

Artificial Weathering
(Many Standards available on request for accelerated aging test with various customer specifications with different machines like Xenon-WOM, Xenotest, Flourescence (UVA-/UVB Licht 313nm, 340nm, 351nm))

- AATCC TM 16
- AATCC TM 169
- ASTM G154
- ASTM G155
- ASTM D7869
- ISO 4892-2,-3
- ISO 105-B 06
- DIN EN ISO 16474
- SAE J 2412 (SAE J1885)
- SAE J 2527 (SAE J1960)

Automotive
- PV 1303
- PV 1306
- PV 3929 (Kalahari-Test)
- PV 3930 (Florida-Test)
- FLTM BO 116-01
- D27 1389
- D27 1911
- NES M 0135
- GMW 14650
- VDA 75202

CLIMATE TESTING

Climate Tests
on request various standards for climate change tests and constant climate conditions

Autoclave storage
- up to +150°C

Automotive
- PV 1200
- PV 2005
- PR 303.5

OPTICAL TEST PROCEDURES

Color measurement Delta E
- ISO 13468
- ASTM E179
- ASTM E308
- DIN 5033
- DIN 5036
- DIN 6174

Gray scale determination
- ISO 105-A02

Gloss factor
- ISO 2813
- ASTM D523
- DIN 67530

Haze
- ASTM D1003
- ASTM D1044

Yellowness Index
- DIN 6167
- ASTM E313

SPECTROSCOPIC METHODS

UV-VIS-NIR Spectroscopy
- 175 nm to 3300 nm

THERMAL ANALYSES

Thermomechanical analysis (TMA)
Coefficient of linear thermal expansion
- 150 °C to 600 °C
- ISO 11359-1/-2
- DIN 53752*

Differential scanning calorimetry (DSC)
also temperature modulated method
- ISO 11357
- DIN 53765*

Thermogravimetric analysis (TGA)
- ISO 7111
- ISO 11358
- DIN 51006

Torsion pendulum test
(shear modulus determination)
- ISO 6721-7 forced vibration

CHEMICAL RESISTANCE

Environmental stress cracking (ESC), Bent strip test
- ISO 22088-3

Internal stresses
TnP-Test
- In-House Standard

Petrol test
(isooctane/toluene)

Fuel resistance
- DIN 51604-1
- DBL 5416

Media aging, no load
- ISO 175
- ISO 1817

PHYSICAL TEST PROCEDURES

Thermal conductivity
NanoFlash™-test method
- ISO 22007-4
- ASTM E1461

Determination of density
- ISO 1183
- ASTM D792

Density
- ISO 845

Apparent density
- ISO 60

Determination of water content
- ISO 760
- DIN 53715*
- ISO 15512

Water absorption
- ISO 62
- ISO 1110

SHRINKAGE

Production and measurement of shrinkage sheets on fully-automated shrinkage station
- ISO 294-4
- In-house standard

* These Standards are withdrawn but are still feasible at UL

Additional standards and tests (as well automotive- and electrical test-regulations) on request

Know-how.
Quality.
Dedication.

Reliable test data.

ISO/IEC 17025 accreditation

The ISO/IEC 17025 accreditation of our laboratory in Krefeld confirms the competence and high quality to conduct selected physical and technological tests on innovative plastics.

Dedicated to quality

Quality is the key to success – for customers, for UL and, not least, for the consumer using UL-tested products and components on a day-to-day basis. UL therefore ensures that plastic components, e.g. in electronic appliances or motor vehicles, function robustly and reliably.

The added value of experience.

UL employees make the difference

Constant „learning by doing" and a wealth of experience are the basis for the expertise of the specialists at UL. Staff at UL constantly advance their professional skills with regular training sessions conducted both externally and on site.

UL know-how worldwide

Our laboratory in Krefeld is known as the „Center of Excellence" for plastics testing within UL. By supporting the development of new laboratories and the further on-site training of colleagues in the regions, we are contributing to UL's ability to offer incomparable service quality and reliability to its customers around the world.

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