Editorial

“Innovative visions and latest technologies are implemented quickly and efficiently.”

For more than 45 years the Zehntner brand has been standing for Swiss made high quality electronic and physical measuring and testing instruments.

We believe in attention to detail: in our long-standing company we don’t do things by halves.

Our experience of many years combined with the consistent and fast implementation of suggestions from our customers result in instruments meeting all our clients’ requirements. We are committed to responding to your individual needs and are only satisfied if you are too.

Active membership in various standardisation committees as well as our in-house development and manufacturing departments play a crucial role: innovative visions and latest technologies are implemented quickly and efficiently.

Our approach has stood the test of time and we take pride in the loyalty of our customers: once a Zehntner customer, always a Zehntner customer. We strive to extend our product range continuously and look forward to developing our business relationship.

1966
Foundation „G. Zehntner Electronic“, Reigoldswil. The company was active in the fields consumer and industrial electronics, medical technics including development and production of measuring and testing instruments.

1992
Hand over to second generation. Peter Zehntner, the current owner and Managing Director, runs the business initially under „P. Zehntner Testing Instruments“. Concentration on measuring and testing instruments.

1997
Change of the legal form into „Zehntner GmbH Testing Instruments“ and move to Hoelstein in more spacious manufacturing premises.

1999
„Seven in one go“: significant extension of physical test equipment range. Launch of the worldwide very first retroreflectometer for the combined determination of the night and day visibility with one handy unit.

2001

2004
Human reinforcement of the development department for a continuous enlargement of the product range.

2005
Introduction of the first gloss measuring sensor transmitting the measuring data directly to the PC/laptop via USB-interface.

2006
40th anniversary and move to more spacious premises in Sissach.

2007
Launch of a dynamic retroreflectometer R, for continuous measurement of the night visibility of road markings at normal traffic speed.

2008
Introduction of a new 3-angle-glossmeter with integrated OLED display, 128 MB memory card, USB-interface and many more.

2010
Launch of the very first retroreflectometer R/Qd with colour touch-screen and automatic calibration standard recognition and with unique options such as camera.

2011
Launch of the first budget priced retroreflectometer for fast and precise R/Qd measurements and introduction of a new scratching tool as well as our improved hardness testers and mar resistance tester.

2012
Launch of the first retroreflectometer for traffic signs and safety garments with LED illumination system and measurement of three different observation angles at the same time, colour recognition and colour touchscreen with adjustable display inclination.

Peter Zehntner
Standards

<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>ZRM 1011</td>
<td>15 m</td>
</tr>
<tr>
<td>1987</td>
<td>ZRM 1012</td>
<td>15 m</td>
</tr>
<tr>
<td>1998</td>
<td>ZRM 1012</td>
<td>30 m</td>
</tr>
</tbody>
</table>

new generation:
- the very first combined instrument for $R_L$ and $Q_d$
- only 1 standard for calibration

additionally with:
- wet-timer
- detailed test report on A4/letter size paper
- Measuring system with high long-term stability; automatic self-diagnosis avoids mismeasurements.

additionally with:
- ambient temperature [°C/°F]
- relative humidity [rH %]
- LED illumination

additionally with:
- 5.7" colour touch-screen
- fold-away telescopic handle
- fixed mounted wheels
- automatic calibration standard recognition with unique options such as:
  - a camera for pictures in the same geometry
  - level-meter & compass

- budget priced basic retroreflectometer focussed on the core functions to keep it simple and inexpensive
ZDR 6020

- Dynamic retroreflectometer \( R_L \)
  - Getting the best value - for efficient and safe continuous measurements of the night visibility \( (R_L) \) of all types of road markings at normal traffic speed without obstructing the traffic.
  - Handheld precision at up to 150 km/h (93 mph).
  - For all lighting conditions also bright sunlight.
  - All important data are recorded at the same time: \( R_L \), day contrast ratio, GPS coordinates, ambient temperature \( ^\circ C/\circ F \), relative humidity \( rH \%)\), speed, picture, voice recording, as well as date and time.
  - Double and even triple lines are being recognized automatically and stored separately.
  - 10Hz GPS with DR for improved precision also in tunnels.
  - In accordance with true CEN geometry of EN 1436 (\( R_L \)).

Equivalent observation distance: 30 m, according to CEN-geometry
Observation angle: EN 1436: 2.29°, ASTM E 1710: 1.05°
Illumination angle: \( R_L \): EN 1436: 1.24°, \( R_L \): ASTM E 1710: 88.76°
Measuring area (WxL): 1’000 mm x 1’000 mm [39.4” x 39.4”], 6 m [19.7 ft] in front of the measuring head
Speed while measuring: max. 150 km/h (93.21 mph)
Measuring range: \( R_L \): 0 - 4’000 mcd•m\(^{-2}\)•lx\(^{-1}\), profiled markings: up to 10 mm [0.39”]
Driver display: 8” touch-screen
Picture interval: 10 m (32.81 ft)
Light source: halogen lamp, life cycle approx. 1’500 operating hours
Ambient conditions: humidity: non condensing, operating: 0°C to +55°C (32°F-131°F), storage: -15°C to +60°C (5°F-140°F)
Dimensions (LxWxH): measuring head: 270 mm x 207 mm x 310 mm (10.6” x 8.2” x 12.2”)
Weight: measuring head: 10.5 kg (23.1 lbs)
Standards: EN 1436 [\( R_L \)], ASTM E 1710 [\( R_L \)], ASTM E 2177 [\( R_L \) wet], ASTM E 2176 [\( R_L \) continuous wetting]
Approval: StrAus-Zert, Germany (test No.: 0913-2009-05)

ZRM 6014

- Retroreflectometer \( R_L/Qd \)
  - For the determination of night visibility \( (R_L) \) and/or day visibility \( (Qd) \) of all types of road markings as well as ambient temperature \( ^\circ C/^\circ F \) and relative humidity \( rH \%)\) combined in one compact instrument.
  - 5.7” high resolution colour touchscreen with excellent visibility under all lighting conditions.
  - Fold-away telescopic handle and wheels for the first time included in the standard delivery for easy field and laboratory operation.
  - Ultrafast measurement of \( R_L \) and \( Qd \) in about 2 seconds.
  - Innovative options to customize the instrument to personal requirements. World first camera in the perspective of the measuring geometry, compass and level-meter, GPS unit and various printer versions.
  - Easy to use menu navigation.

Equivalent observation distance: 30 m, according to CEN-geometry
Observation angle: EN 1436: 2.29°, ASTM E 1710: 1.05°
Illumination angle: \( R_L \): EN 1436: 1.24°, \( R_L \): ASTM E 1710: 88.76°, \( Qd \): diffuse
Measuring area (WxL): 52 mm x 218 mm (2.05” x 8.6”)
Measuring sensor: adapted to \( V(L) \)
Measuring range: \( R_L \): 0 to 4 000 mcd•m\(^{-2}\)•lx\(^{-1}\), \( Qd \): 0 to 400 mcd•m\(^{-2}\)•lx\(^{-1}\), profiled markings: 5 mm [0.2”], up to 12 mm (0.5”) with instruction
Measuring time: about 2 s [\( R_L \) and \( Qd \)], single about 1 s, each without pictures
Memory: 1 GB SD flash memory, about 50 000 measurements without pictures or about 25 000 with pictures;
  - a bigger flash memory card is available as an option
Interfaces: host USB [type A], client Mini USB [type B], optional: Bluetooth®
Display: VGA 5.7” colour touch-screen
Battery: Li-Ion-Mn 14.8 V / 6.3 Ah
Ambient conditions: humidity: non condensing, operating: -10°C to +50°C [14°F-122°F], storage: -20°C to +60°C [5°F-140°F]
Calibration: traceable to the independent accreditation body METAS Switzerland [No. 116-00405]
Dimensions (LxWxH): 560 mm x 190 mm x 280 mm [22” x 7.5” x 11”]
Weight: 7.5 kg (16.5 lbs)
Standards: EN 1436 [for \( R_L \) and \( Qd \)], ASTM E 1710 [for \( R_L \)], ASTM E 2302 [for \( Qd \)], ASTM E 2177 [for \( R_L \) wet]
Software for ZDR 6020, ZRM 6014 and ZRS 6060

- Free versatile mapping and data analysis software for the models ZDR 6020 Dynamic retroreflectometer \( R_L \), ZRM 6014 Retroreflectometer \( R_L/Qd \) and ZRS 6060 Retroreflectometer.
- Makes your administration and analysis of road markings, traffic signs and/or safety garments measurements simple and easy.
- Measurements containing GPS coordinates can be displayed on a Bing™ map in different colours using adjustable profiles as well as alternatively exported to Google Earth™.
- Generating of measuring reports as PDF or XLS files.
- Menu-guided in several languages: English, French, German, Italian, Portuguese, Romanian, Spanish and Thai (at the time of printing, further languages are continuously implemented).

Can be used with

- ZDR 6020, ZRM 6014 and ZRS 6060

Operating system
- Windows® 7, Windows Vista®, Windows® XP SP2

System requirement memory (RAM)
- min. 512 MB, 1 GB recommended

System requirement hard disc space
- min. 20 MB plus space for measurements

Retroreflectometer \( R_L/Qd \)

- Budget priced entry level instrument for the determination of night visibility \( R_L \) and day visibility \( Qd \) of road markings as well as ambient temperature \( °C/°F \) and relative humidity \( % \) combined in one compact instrument.
- Focussed on the core functions to keep it simple and inexpensive.
- Ultrafast measurement of \( R_L \) and \( Qd \) in about 2 seconds.
- For all types of road markings.
- In accordance with EN 1436 \( (R_L/Qd) \), ASTM E 1710 \( (R_L) \), ASTM E 2302 \( (Qd) \), ASTM E 2177 \( (R_L \text{ wet}) \).
- Factory calibration traceable to the independent accreditation body METAS, Switzerland.
- Approved by the accredited association StrAus-Zert, Germany (test No.: 0913-2011-03).

<table>
<thead>
<tr>
<th>Equivalent observation distance</th>
<th>30 m, according to CEN-geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation angle</td>
<td>EN 1436: 2.29°, ASTM E 1710: 1.05°</td>
</tr>
<tr>
<td>Illumination angle</td>
<td>( R_L ) \text{ EN 1436: 1.24°, } \text{ASTM E 1710: 88.76°, } Qd \text{: diffuse}</td>
</tr>
<tr>
<td>Measuring sensor</td>
<td>adapted to ( V(\lambda) )</td>
</tr>
<tr>
<td>Measuring area (WxL)</td>
<td>52 mm x 218 mm (2.05&quot; x 8.6&quot;)</td>
</tr>
<tr>
<td>Measuring ranges</td>
<td>( R_L ): 0 to 4'000 mcd( \cdot )m(^{-2} \cdot )lx(^{-1} ), ( Qd ): 0 to 400 mcd( \cdot )m(^{-2} \cdot )lx(^{-1} ), profiled markings: up to 5 mm (0.2&quot;); up to 12 mm (0.5&quot;) with instruction</td>
</tr>
<tr>
<td>Measuring time</td>
<td>about 2 s ( R_L ) and ( Qd )</td>
</tr>
<tr>
<td>Memory</td>
<td>none</td>
</tr>
<tr>
<td>Display</td>
<td>transflective luminous graphical display</td>
</tr>
<tr>
<td>Battery</td>
<td>Li-Ion-Mn 14.8 V / 6.3 Ah</td>
</tr>
</tbody>
</table>
| Ambient conditions              | humidity: non condensing, operating: \(-10°C \text{ to } +50°C \text{ (14°F to 122°F)},
storage: \(-20°C \text{ to } +60°C \text{ (-4°F to 140°F)}\) |
| Dimensions [LxWxH]              | 560 mm x 190 mm x 280 mm (22\" x 7.5\" x 11\") |
| Weight                          | 6.4 kg (14.1 lbs) |
| Standards                       | EN 1436 (for \( R_L \) and \( Qd \)), ASTM E 1710 (for \( R_L \)), ASTM E 2302 (for \( Qd \)), ASTM E 2177 (for \( R_L \text{ wet} \)) |
**ZVR 6000**

- Mobile, user-friendly testing instrument for the visual determination of the night visibility of road markings using comparison standards.
- Multifunctional, sturdy arm for operation with carrying handle; wheels.
- Splash-proof for testing in wet condition.
- Easy to handle.
- Sturdy construction.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Observation angle</td>
<td>EN 1436: 2.29°, ASTM E 1710: 1.05°</td>
</tr>
<tr>
<td>Illumination angle</td>
<td>EN 1436: 1.24°, ASTM E 1710: 88.76°</td>
</tr>
<tr>
<td>Test area</td>
<td>50 mm x 160 mm (2” x 6.3”)</td>
</tr>
<tr>
<td>Comparison standards</td>
<td>50 mm x 150 mm (2” x 5.9”)</td>
</tr>
<tr>
<td>Testing principle</td>
<td>according to Muench</td>
</tr>
<tr>
<td>Dimensions (LxWxH)</td>
<td>550 mm x 165 mm x 730 mm (21.7” x 6.5” x 28.8”)</td>
</tr>
<tr>
<td>Battery</td>
<td>4 Alkaline type AA</td>
</tr>
<tr>
<td>Weight</td>
<td>3.6 kg (7.9 lbs)</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 1436, ASTM E 1710</td>
</tr>
</tbody>
</table>

**Reflectometer 45/0°**

- Portable, battery-powered and sturdy precision reflectometer for the determination of whiteness, lightness, opacity and hiding power of paints, inks and coatings.
- For the determination of the luminance factor $\beta$ for dry road markings.
- Easy to handle.
- Reliable measuring values.

<table>
<thead>
<tr>
<th>Geometry</th>
<th>45/0°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring accuracy</td>
<td>± 1 %</td>
</tr>
<tr>
<td>Measuring sensor</td>
<td>adapted to V(λ)</td>
</tr>
<tr>
<td>Display</td>
<td>LCD, 3½ digits</td>
</tr>
<tr>
<td>Light source</td>
<td>halogen lamp, standard illuminant C</td>
</tr>
<tr>
<td>Power supply</td>
<td>integrated, rechargeable battery</td>
</tr>
<tr>
<td>Dimensions (LxWxH)</td>
<td>190 mm x 53 mm x 110 mm (7.48” x 2.09” x 4.33”)</td>
</tr>
<tr>
<td>Weight</td>
<td>1 kg (2.205 lbs)</td>
</tr>
<tr>
<td>Standards</td>
<td>EN ISO 2814, DIN 55984, EN 1436</td>
</tr>
</tbody>
</table>

**Zehntner App**

- Digital picture analysis software for determination of the degree of surface coverage of agglomerate road markings at vertical observation.
- The Zehntner App can take new pictures and carry out an analysis of the surface cover ratio on the spot as well as analyse existing pictures.
- For easy access all test results are stored in the separate Zehntner App gallery.
- Easy to handle.
- Reliable test results.

<table>
<thead>
<tr>
<th>Can be used with</th>
<th>iPhone® and iPad®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>ZTV M 02, FGSV code of practice No. 387 2006</td>
</tr>
</tbody>
</table>
Determination of the retroreflection value \( R \), the ambient temperature \( (°C/°F) \) as well as relative humidity \( (rH \%) \) combined in one compact instrument.

For all types of road studs - depressible, bonded, self-adhesive, anchored, permanent or temporary - at any time of the day or night.

With intelligent memory, interfaces for PC and printer.

Measuring system with high long-term stability ensures constant measuring accuracy and thus reliable measuring results; automatic self-diagnosis avoids mismeasurements.

### Retroreflectometer R

<table>
<thead>
<tr>
<th>Version</th>
<th>Observation angle</th>
<th>Illumination angle</th>
<th>Standard</th>
<th>Measuring range</th>
<th>Measuring area (WxH)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZRP 6030.2</td>
<td>0.2°</td>
<td>1°</td>
<td>ASTM E 1696-02</td>
<td>0 to 2'000 mcd•lx(^{-1})</td>
<td>130 mm x 30 mm (5.12” x 1.18”)</td>
<td>7.1 kg (15.7 lbs) / 8.4 kg incl. remote control</td>
</tr>
<tr>
<td>ZRP 6030.3</td>
<td>0.3°</td>
<td>1°</td>
<td>EN 1463-2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Retroreflectometer

The precision instrument for the determination of night visibility (coefficient of retroreflection \( R_A \) and \( R' \)) of traffic signs and safety garments with measurement of three different observation angles at the same time.

The very first retroreflectometer with LED illumination system and with a 3.5” high resolution colour touchscreen with adjustable display inclination for excellent visibility under all lighting conditions also in bright sunlight.

For all kinds of retroreflective materials and colours, with automatic colour indication.

Continuously updated average value; additionally each single measurement is stored.

Measurements can be evaluated with the included mapping and data analysis software “MappingTools”.

Easy to operate with polyglot menu navigation.

Sturdy construction and ergonomic design.

Factory calibration traceable to the independent accreditation body BAST (Federal Highway Research Institute), Germany. The calibration certificate is included.

### Retroreflectometer ZRP 6030

<table>
<thead>
<tr>
<th>Version</th>
<th>Observation angle</th>
<th>Illumination angle</th>
<th>Standard</th>
<th>Measuring range</th>
<th>Measuring area (WxH)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZRP 6030.2</td>
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<td>1°</td>
<td>EN 1463-2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Retroreflectometer ZRS 6060

<table>
<thead>
<tr>
<th>Version</th>
<th>Illumination angle</th>
<th>Observation angle</th>
<th>Application</th>
<th>Standards</th>
<th>Measuring range</th>
<th>Measuring area</th>
</tr>
</thead>
<tbody>
<tr>
<td>6060.ASTM</td>
<td>-4°</td>
<td>0.20°, 0.5°, 1°</td>
<td>ASTM E 1709</td>
<td></td>
<td>0 - 2'000 cd•lx•m(^{-2})</td>
<td>Ø 25 mm (0.98”)</td>
</tr>
<tr>
<td>6060.CEN</td>
<td>5°</td>
<td>0.33°, 0.5°, 1°</td>
<td>DIN 67 520, ECE 104, EN 12899-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6060.CD</td>
<td>5°</td>
<td>0.2°, 0.33°, 0.5°</td>
<td>DIN 67 520, ECE 104, EN 12899-1, EN DIN 471</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6060.A,S*</td>
<td>-4°</td>
<td>0.20°, 0.33°, 0.5°, 1°, 1.5° or 2°*</td>
<td>depending on chosen specifications * (please choose 3 observation angles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6060.C,S*</td>
<td>5°</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Retroreflectometer

<table>
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<tr>
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<td>ASTM E 1709</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6060.C,S*</td>
<td>5°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Measuring sensor
adapted to \( V(\lambda) \)

### Memory
over 1’000 single or average values

### Display
luminous graphical display

### Battery
Li-Ion-Mn 14.8 V / 6.3 Ah

### Dimensions (LxWxH), Weight
560 mm x 190 mm x 280 mm (22”x7.5”x11”), max. road studs: 140 mm x 160 mm x 60 mm (5.5”x6.3”x2.4”)
**HELΜΕΝ®-Chalking tester**

- Unique measuring instrument for quantitative determination of the degree of chalking resulting from natural or artificial weathering of coatings using a specimen holder as well as direct measurement of the light-transmitting properties (luminous transmittance) of samples.
- The very first chalking tester with a touchscreen.
- Superior sensitivity in the most crucial initial chalking stages and increased accuracy also with regard to coloured pigments.
- Easy to handle.
- Reliable and objective measuring results.
- Reproducible results independent of the individual person.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0 % to 100 % chalking [relative]</td>
</tr>
<tr>
<td>Measuring area</td>
<td>14 mm [0.55&quot;] in diameter</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 1%</td>
</tr>
<tr>
<td>Display</td>
<td>Monochrome touchscreen, 128 x 64 pixel white luminous graphical display</td>
</tr>
<tr>
<td>Power supply</td>
<td>2 batteries AA or USB-powered</td>
</tr>
<tr>
<td>Dimensions [LxWxH]</td>
<td>154 mm x 105 mm x 33.2 mm [6.06” x 4.13” x 1.31”], samples: min 25 x max 25 x max 3 mm [0.98” x 0.98” x 0.12”]</td>
</tr>
<tr>
<td>Weight</td>
<td>590 g [1.3 lbs]</td>
</tr>
<tr>
<td>Standards</td>
<td>EN DIN 13523-14, EN ISO DIN 4628-6, ECCA-T14</td>
</tr>
</tbody>
</table>

**Marking-wedge gauge**

- Inexpensive testing instrument for quick determination of the dry film thickness of road markings and similar coatings.
- Test results are easily readable.
- Easy to operate.
- Sturdy construction.
- Made of red anodised aluminium.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0 mm to 10 mm [0” to 0.4”]</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mm [0.004”]</td>
</tr>
<tr>
<td>Dimension</td>
<td>Length of the wedge: 220 mm [8.7”], length of the gauge: 200 mm [7.9”]</td>
</tr>
<tr>
<td>Weight</td>
<td>0.4 kg [0.88 lbs]</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 13197</td>
</tr>
</tbody>
</table>

**Digital marking gauge**

- Unique precision measuring instrument for quick determination of the dry film thickness of road markings and similar coatings.
- Digital display providing reliable measuring results within seconds.
- Measurements relative to the substrate or to the marking itself are possible.
- Optional measuring bridge for measurements over the whole width of the marking for representative measurements on wide road markings as well as for drawing up cross-sections.
- Made of red anodised aluminium.

<table>
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<tbody>
<tr>
<td>Measuring range</td>
<td>-12.5 mm to +12.5 mm, optional: -0.5” to +0.5”</td>
</tr>
<tr>
<td>Resolution</td>
<td>10 µm [0.4 mil]</td>
</tr>
<tr>
<td>Bearing area</td>
<td>min. 50 mm x 80 mm [2” x 3.2”]</td>
</tr>
<tr>
<td>Display</td>
<td>Digital</td>
</tr>
<tr>
<td>Dimensions [LxWxH]</td>
<td>180 mm x 70 mm x 76 mm [7.1” x 2.8” x 3.0”]</td>
</tr>
<tr>
<td>Weight</td>
<td>880 g [1.9 lbs]</td>
</tr>
<tr>
<td>Standards</td>
<td>EN 13197</td>
</tr>
<tr>
<td>Warranty</td>
<td>2 years, digimatic indicator: 1 year</td>
</tr>
</tbody>
</table>
**ZAA 2300 Automatic film applicator coater**

- Automatic laboratory equipment for accurate and reproducible application of coating materials, adhesives and similar products, independent of the operator.
- Multifunctional use with reversible, double sided glass plate [glass/printing blanket], easy to change or turn over.
- Adjustable application area with moveable start and stop positions.
- Optional versions equipped with isolation plate for use with heatable vacuum plates or heating plates.
- Made of red anodised aluminium (housing), glass (glass surface of glass plate) and rubber coated cotton (printing blanket).

<table>
<thead>
<tr>
<th>Version</th>
<th>Drawing speed</th>
<th>Resolution</th>
<th>Dimensions (LxWxH)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZAA 2300</td>
<td>0-99 mm/s</td>
<td>1 mm/s</td>
<td>unit: 565 x 382 x 190 mm (22.2” x 15” x 7.5”); glass plate: 535 x 300 x 15 mm (21.1” x 11.8” x 0.6”); application length: 1 mm - 400 mm (0.04” - 15.7”); application width: 1 mm - 300 mm (0.04” - 11.8”); substrate thickness up to 11 mm (0.43”)</td>
<td>complete: 20 kg (44.1 lbs)</td>
</tr>
<tr>
<td>ZAA 2300.H for heatable plates</td>
<td>0-247.5 mm/s (0-9.7”/s)</td>
<td>2.5 mm/s</td>
<td>glass plate: 535 x 300 x 15 mm (21.1” x 11.8” x 0.6”); application length: 1 mm - 400 mm (0.04” - 15.7”); application width: 1 mm - 300 mm (0.04” - 11.8”); substrate thickness up to 11 mm (0.43”)</td>
<td>glass plate: 6.4 kg (14.1 lbs)</td>
</tr>
<tr>
<td>ZAA 2300.F</td>
<td>0-495 mm/s</td>
<td>5 mm/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAA 2300.FH for heatable plates</td>
<td>0-19.5”/s</td>
<td>0.2”/s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Tolerance of drawing speed**
0 - 90 mm/s (0-3.54”/s); ± 1 %, > 90 mm/s (>3.54”/s): ± 3 %

**Power supply**
100V - 230V, 50Hz - 60Hz

**Standards**
ASTM D 823
Applicator for the preparation of uniform films of coating materials, adhesives and similar products on plane substrates.

The 4-sided applicator frame has the big advantage that the coating material filled in cannot get below the guide surfaces. So there is no risk of falsified results.

Made of stainless steel.

Easy to handle.

Test charts are a perfect substrate for the preparation of uniform films or wedge-shaped layers of coating materials, adhesives and similar products on plane substrates.

Determination of hiding power by visual inspection or with a reflectometer 45/0°.

High quality test charts in various sizes and designs, laminated or unlaminated, with or without optical brightener.

Easy to handle.

### Universal applicator

- Applicator for universal use, with gap heights adjustable from 0 µm - 3'000 µm (0 mil - 118.1 mil), for the preparation of uniform films or wedge-shaped layers of coating materials, adhesives and similar products on plane substrates.
- Easy to handle.
- Easy to disassemble and reassemble for cleaning.
- Made of red anodised aluminium.

<table>
<thead>
<tr>
<th>Version</th>
<th>Gap heights</th>
<th>Film width</th>
<th>Dimensions (LxWxH)</th>
<th>Weight</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZAF 2010.6030</td>
<td>30/60/90/120 µm (1.18/2.36/3.54/4.72 mil)</td>
<td>60 mm (2.36”)</td>
<td>70 mm x 29 mm x 14 mm (2.7” x 1.1” x 0.6”)</td>
<td>174 g (0.38 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.6050</td>
<td>50/100/150/200 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>60 mm (2.36”)</td>
<td>90 mm x 29 mm x 14 mm (3.5” x 1.1” x 0.6”)</td>
<td>186 g (0.41 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.60S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>60 mm (2.36”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.8030</td>
<td>30/60/90/120 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>80 mm (3.15”)</td>
<td>100 mm x 29 mm x 14 mm (3.9” x 1.1” x 0.6”)</td>
<td>186 g (0.41 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.8050</td>
<td>50/100/150/200 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.80S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.2S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
</tbody>
</table>

### 4-sided applicator frame

- Applicator for the preparation of uniform films of coating materials, adhesives and similar products on plane substrates.
- The 4-sided applicator frame has the big advantage that the coating material filled in cannot get below the guide surfaces. So there is no risk of falsified results.
- Made of stainless steel.
- Easy to handle.

### Test charts

- Test charts are a perfect substrate for the preparation of uniform films or wedge-shaped layers of coating materials, adhesives and similar products on plane substrates.
- Determination of hiding power by visual inspection or with a reflectometer 45/0°.
- High quality test charts in various sizes and designs, laminated or unlaminated, with or without optical brightener.
- Easy to handle.

<table>
<thead>
<tr>
<th>Version</th>
<th>Gap heights</th>
<th>Film width</th>
<th>Dimensions (LxWxH)</th>
<th>Weight</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZAF 2010.6030</td>
<td>30/60/90/120 µm (1.18/2.36/3.54/4.72 mil)</td>
<td>60 mm (2.36”)</td>
<td>70 mm x 29 mm x 14 mm (2.7” x 1.1” x 0.6”)</td>
<td>174 g (0.38 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.6050</td>
<td>50/100/150/200 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>60 mm (2.36”)</td>
<td>90 mm x 29 mm x 14 mm (3.5” x 1.1” x 0.6”)</td>
<td>186 g (0.41 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.60S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>60 mm (2.36”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.8030</td>
<td>30/60/90/120 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>80 mm (3.15”)</td>
<td>100 mm x 29 mm x 14 mm (3.9” x 1.1” x 0.6”)</td>
<td>186 g (0.41 lbs)</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.8050</td>
<td>50/100/150/200 µm (1.97/3.94/5.91/7.87 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.80S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
<tr>
<td>ZAF 2010.2S</td>
<td>on request from 5 µm to 2'000 µm (0.197 - 78.74 mil)</td>
<td>80 mm (3.15”)</td>
<td>depending on film width</td>
<td>depending on film width</td>
<td>ASTM D 823</td>
</tr>
</tbody>
</table>
**ZND 2050 - 2054**

> Comb gauges for determining the thickness of all types of liquid coatings.
> The alternative to ZND 2055 Wet film thickness wheel and ZWW 2100 - 2108 Wet film wheels.
> Can be ordered with individual company logo for orders of 50 pieces or more.
> Easy to handle.
> Easy to clean.
> Made of stainless steel except ZND 2050.A which is made of aluminium.

### Wet film thickness gauges

<table>
<thead>
<tr>
<th>Versions</th>
<th>Test range</th>
<th>Resolution</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZND 2050</td>
<td>25 µm to 2,000 µm (1 mil to 80 mil)</td>
<td>25 - 300 µm (1 mil - 12 mil); 25 µm (1 mil); 300 - 1,000 µm (12 mil - 40 mil); 50 µm (2 mil); 1,000 - 2,000 µm (40 mil - 80 mil); 100 µm (4 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZND 2050.A</td>
<td>25 µm to 2,000 µm (1 mil to 80 mil)</td>
<td>25 - 300 µm (1 mil - 12 mil); 25 µm (1 mil); 300 - 1,000 µm (12 mil - 40 mil); 50 µm (2 mil); 1,000 - 2,000 µm (40 mil - 80 mil); 100 µm (4 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZND 2051</td>
<td>5 µm to 150 µm (0.2 mil to 5.9 mil)</td>
<td>5 µm - 45 µm (0.2 mil - 1.8 mil); 5 µm (0.2 mil); 50 µm - 110 µm (2.0 mil - 4.3 mil); 10 µm (0.4 mil); 110 µm - 150 µm (4.3 mil - 5.9 mil); 20 µm (0.8 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZND 2052</td>
<td>100 µm to 950 µm (3.9 mil to 37.4 mil)</td>
<td>25 µm (1 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZND 2053</td>
<td>2 mm to 10 mm (0.08” to 0.4”) (pentagonal)</td>
<td>2 mm - 6 mm (0.08” - 0.2”); 0.2 mm (0.008”)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZND 2054</td>
<td>on request</td>
<td>on request</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
</tbody>
</table>

**ZNW 2055**

> Thickness wheel for determining the thickness of all types of liquid coatings.
> The alternative to ZND 2050 - 2054 wet film thickness gauges and ZWW 2100 - 2108 wet film wheels.
> Suitable for convex and concave surfaces.
> Can be ordered with individual company logo for orders of 50 or more pieces.
> Easy to handle.
> Easy to clean.
> Made of stainless steel.

### Wet film thickness wheel

<table>
<thead>
<tr>
<th>Version</th>
<th>Test range</th>
<th>Resolution</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZNW 2055.05</td>
<td>5 µm to 180 µm (0.2 mil - 7.1 mil)</td>
<td>5 µm (0.2 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZNW 2055.25</td>
<td>25 µm to 900 µm (1.0 mil - 35.4 mil)</td>
<td>25 µm (1 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZNW 2055.50</td>
<td>25 µm to 2,000 µm (1 mil to 80 mil)</td>
<td>25 - 300 µm (1 mil - 12 mil); 25 µm (1 mil); 300 - 1,000 µm (12 mil - 40 mil); 50 µm (2 mil); 1,000 - 2,000 µm (40 mil - 80 mil); 100 µm (4 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZNW 2055.01</td>
<td>100 µm to 3,600 µm (3.9 mil to 141.7 mil)</td>
<td>100 µm (3.9 mil)</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
<tr>
<td>ZNW 2055.S</td>
<td>on request</td>
<td>on request</td>
<td>EN DIN ISO 2808, ASTM D 4414, ASTM D 713, ZND 2052; additional ZTV M 02</td>
</tr>
</tbody>
</table>

**ZTK 2060 - 2062**

> Gauge for testing coating materials and fillers for drying properties, shrinking, mud-crack, cracking and porosity.
> Easy to handle.
> Reliable results.
> Easy to clean.
> Made of red hard anodised aluminium (gauge) and hardened stainless steel (scraper).

### Drying gauges

<table>
<thead>
<tr>
<th>Versions</th>
<th>Test range</th>
<th>Graduation</th>
<th>Test area</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZTK 2060</td>
<td>0 mm to 3,0 mm (0” to 0.12”)</td>
<td>0.1 mm (0.004”)</td>
<td>300 mm x 60 mm (11.8” x 2.4”)</td>
</tr>
<tr>
<td>ZTK 2061</td>
<td>0 mm to 2,0 mm (0” to 0.08”)</td>
<td>0.1 mm (0.004”)</td>
<td>200 mm x 60 mm (7.9” x 2.4”)</td>
</tr>
<tr>
<td>ZTK 2062</td>
<td>on request</td>
<td>on request</td>
<td>on request</td>
</tr>
</tbody>
</table>
Laboratory test equipment for the determination of the drying time after application of road markings.

This laboratory test method determines the drying period required for no-pick-up by the tire of an automobile.

- Reliable results.
- Easy to assemble and to clean.
- Made of stainless steel (cylinder) and red anodised aluminium (ramp).

<table>
<thead>
<tr>
<th>Dimensions [ØxH] cylinder</th>
<th>160 mm x 95 mm (6.3” x 3.7”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions [LxWxH] ramp</td>
<td>152 mm x 90 mm x 25 mm (6&quot; x 3.5&quot; x 1.0&quot;)</td>
</tr>
<tr>
<td>Weight cylinder</td>
<td>5'386 g (11.87 lbs)</td>
</tr>
<tr>
<td>Weight ramp</td>
<td>445 g (0.98 lbs)</td>
</tr>
<tr>
<td>Slope of ramp</td>
<td>1:6</td>
</tr>
<tr>
<td>Standards</td>
<td>ASTM D 711, rings meeting the requirements of HK 715 spec. D2000</td>
</tr>
</tbody>
</table>

Cross-cut tester

- Sturdy test equipment for the determination of the adhesion of thin and thick single or multi-coat systems.
- Especially suitable for uneven substrates.
- Easy to handle.
- Made of red anodised aluminium (folding ruler), stainless steel (shims).

<table>
<thead>
<tr>
<th>Version</th>
<th>Shims</th>
<th>Standards</th>
<th>Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZCC 2080.1K</td>
<td>10 x 1 mm (0.04”)</td>
<td>ASTM D 3359, EN ISO 2409</td>
<td>with NT-cutter, adhesive tape</td>
</tr>
<tr>
<td>ZCC 2080.3K</td>
<td>6 x 3 mm (0.12”)</td>
<td>EN ISO 2409</td>
<td></td>
</tr>
<tr>
<td>ZCC 2080.1G</td>
<td>10 x 1 mm (0.04”)</td>
<td>ASTM D 3359, EN ISO 2409</td>
<td>with NT-cutter, adhesive tape, brush and magnifier</td>
</tr>
<tr>
<td>ZCC 2080.3G</td>
<td>6 x 3 mm (0.12”)</td>
<td>EN ISO 2409</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions [LxWxH] | 65 mm x 60 mm x 15 mm (2.6” x 2.4” x 0.6”) |
Weight                | 285 g (0.628 lbs) |

Cross-cut tester

- Sturdy test equipment for the determination of the adhesion of thin and thick single or multi-coat systems.
- The unit is equipped with shims for 1 mm, 2 mm and 3 mm cutting spaces and hence suitable for all film thicknesses.
- The alternative to our ZCC 2080 Cross-cut tester with an ergonomic handle for more comfortable and less tiring handling.
- Especially suitable for uneven substrates.
- Easy to handle.
- Made of red anodised aluminium (folding ruler), stainless steel (shims) and plastic (handle).

<table>
<thead>
<tr>
<th>Version</th>
<th>Shims</th>
<th>Standards</th>
<th>Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZCF 2088.K</td>
<td>11 x 1 mm (0.04”), 6 x 2 mm (0.08”) and 6 x 3 mm (0.12”)</td>
<td>ASTM D 3359, EN ISO 2409</td>
<td>with NT-cutter and adhesive tape</td>
</tr>
<tr>
<td>ZCF 2088.G</td>
<td></td>
<td></td>
<td>with NT-cutter, adhesive tape, brush and magnifier</td>
</tr>
</tbody>
</table>

Dimensions [LxWxH] | 90 mm x 90 mm x 42 mm (3.54” x 3.54” x 1.65”) |
Weight                | 440 g (0.97 lbs) |
### Impact tester

- Determination of the impact resistance, deformability and elongation of coatings and substrates as well as adhesion of the coating.
- A quick clamping device facilitates insertion and fixing of the sample.
- The indenter can easily be lifted after the test in order to facilitate removal of the sample.
- Suitable for single- and multiple-layer systems.
- No maintenance necessary.
- Easy and safe to handle.
- Made of aluminium.

<table>
<thead>
<tr>
<th>Version</th>
<th>Dimensions</th>
<th>Weights</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic set ZIT 2440.G</td>
<td>adjustable falling height: max. 101.6 cm (40&quot;)</td>
<td>set: 4.9 kg (10.8 lbs)</td>
<td></td>
</tr>
<tr>
<td>Set ZIT 2440.A</td>
<td>indenter Ø: 15.9 mm (0.63&quot;)&lt;br&gt;die inside Ø: 16.3 mm (0.64&quot;)&lt;br&gt;die outside Ø: 44 mm (1.7&quot;)&lt;br&gt;thickness of test panel: max. 1 mm (0.04&quot;)</td>
<td>falling weight: 0.91 kg (2.0 lbs)&lt;br&gt;set: 1.95 kg (4.3 lbs)&lt;br&gt;total: 6.6 kg (14.55 lbs)</td>
<td>ASTM D 2794 (ISO 6272-2)</td>
</tr>
<tr>
<td>Set ZIT 2440.I</td>
<td>hemispherical head Ø: 20 mm (0.79&quot;)&lt;br&gt;die inside Ø: 27 mm (1.1&quot;)&lt;br&gt;die outside Ø: 44 mm (1.7&quot;)&lt;br&gt;thickness of test panel: max. 4 mm (0.16&quot;)</td>
<td>falling weight: 1.0 kg (2.2 lbs)&lt;br&gt;set: 1.95 kg (4.3 lbs)&lt;br&gt;total: 6.85 kg (15.1 lbs)</td>
<td>ISO 6272-1</td>
</tr>
</tbody>
</table>

### Portable Skid Resistance Tester

- Portable Skid Resistance Tester to determine the friction of asphalt and flooring materials. Also known as pendulum test value (PTV) of road markings.
- This reference instrument has been used all over the world for many years.

| Dimensions [LxWxH] | 830 mm x 750 mm x 350 mm (32.7" x 29.5" x 13.8") |
| Weight | 28 kg (61.7 lbs) |
| Standards | EN 1436, EN 13036-4 |
| Warranty | 1 year |

### Flow measuring unit acc. to Moore

- Flow measuring unit according to Moore for determination of the horizontal drainability of a pavement surface and for checking of the macro texture (roughness).
- The ideal addition to our SRT 5800 Portable Skid Resistance Tester.
- Easy to handle.
- Reliable results.
- Made of acrylic glass (cylinder), brass (carrier / weighting ring) and rubber (guide ring and seal).

| Production tolerance | ± 10 g (± 0.35 oz) |
| Dimensions [LxWxH] | flow measuring unit: Ø 160 mm x 410 mm (6.3" x 16.1")<br>with storage box: 500 mm x 250 mm x 250 mm (19.7" x 9.8" x 9.8") |
| Weight | flow measuring unit: 3.5 kg (7.7 lbs), with storage box: 5.0 kg (11 lbs) |
| Standards | EN 13036-3, SN 640 511-3a |
Graphical illustration of the measuring principle of $R_n$ and $Q_d$

**Night visibility $R_n$**
Measures the coefficient of retroreflected luminance (night visibility) of road markings. The observation angle of 2.29° corresponds to the viewing distance of a vehicle driver of 30 m under normal conditions. The illumination angle is 1.24°.

Sensor (Empfänger) = Fahrzeuglenker
Sensor (receiver) = vehicle driver

![Night visibility diagram](image)

**Day visibility $Q_d$**
Measures the luminance coefficient under diffuse illumination (day visibility) of road markings. The observation angle of 2.29° corresponds to the viewing distance of a vehicle driver of 30 m under normal conditions. The illumination must be diffused light.

Sensor (Empfänger) = Fahrzeuglenker
Sensor (receiver) = vehicle driver

![Day visibility diagram](image)

**Different illustration of $R_n$**
Different illustration of the same angles in the standards EN 1436 and ASTM E 1710.

![Different illustration diagram](image)
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C
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