

## 2.1 EUROPEAN QUALITY STANDARDS

|                   |  | Extruded Ceramic Tiles  |                  |  |                  | Dry-pressed Ceramic Tiles                                     |                        |                     |
|-------------------|--|---|------------------|--|------------------|---|------------------------|---------------------|
| Product Standards |  | DIN EN 14411  |                  |  |                  | DIN EN 14411  |                        | Test Standards      |
|                   |  | Group A <sub>I<sub>a</sub></sub> + A <sub>I<sub>b</sub></sub> |                  | Group A <sub>II<sub>a</sub></sub>   Part 1 |                  | Group B <sub>I<sub>a</sub></sub> + B <sub>I<sub>b</sub></sub> | Group B <sub>III</sub> |                     |
|                   | (simplified and based on 20 x 20 cm (B <sub>III</sub> ) or 30 x 30 cm (B <sub>I</sub> )) | "Nature"  | "Pre-<br>cision" | "Nature"                                   | "Pre-<br>cision" |   |                        |                     |
| <b>A</b>          | <b>Dimensions and Surfaces</b>   |   |                  |  |                  |   |                        |                     |
| 1.                | Length and Width   | ± 2%  | ± 1,0%           | ± 2%                                       | ± 1,25%          | ± 0,6%  | ± 0,5%                 | DIN EN ISO 10545-2  |
| 2.                | Thickness  | ± 10%   | ± 10%            | ± 10%                                      | ± 10%            | ± 5%  | ± 10%                  | DIN EN ISO 10545-2  |
| 3.                | Straightness of Edges  | ± 0,6%  | ± 0,5%           | ± 0,6%                                     | ± 0,5%           | ± 0,5%  | ± 0,3%                 | DIN EN ISO 10545-2  |
| 4.                | Rectangularity   | ± 1,0%  | ± 1,0%           | ± 1,0%                                     | ± 1,0%           | ± 0,5%  | ± 0,5%                 | DIN EN ISO 10545-2  |
| 5.                | Surface Flatness   |   |                  |  |                  |   |                        | DIN EN ISO 10545-2  |
|                   | 5.1 Curvature at Centre  | ± 1,5%  | ± 0,5%           | ± 1,5%                                     | ± 0,5%           | ± 0,5%  | + 0,5 / - 0,3%         | DIN EN ISO 10545-2  |
|                   | 5.2 Curvature at the Edges   | ± 1,5%  | ± 0,5%           | ± 1,5%                                     | ± 0,5%           | ± 0,5%  | + 0,5 / - 0,3%         | DIN EN ISO 10545-2  |
|                   | 5.3 Skewness   | ± 1,5%  | ± 0,8%           | ± 1,5%                                     | ± 0,8%           | ± 0,5%  | ± 0,5%                 | DIN EN ISO 10545-2  |
| 6.                | Surface Quality  | at least 95%  |                  | at least 95%                               |                  | at least 95%  | at least 95%           | DIN EN ISO 10545-2  |
| 7.                | Color Deviations   | ■   |                  | ■  |                  | ■   | ■                      | DIN EN ISO 10545-16 |
|                   | 7.1 Color Shade Grading  | ■   |                  | ■  |                  | ■   | ■                      | Deutsche Steinzeug  |
| 8.                | Size Grading <sup>1)</sup>   | ■   |                  | ■  |                  | ■   | ■                      | Deutsche Steinzeug  |

| <b>B</b> | <b>Physical Properties</b>   |  |                                | <b>glazed</b>  |  |                    |
|----------|--|--|--------------------------------|--|--|--------------------|
| 1.       | Water Absorption<br>(on average/ max. individual value)              | A <sub>I<sub>a</sub></sub> E ≤ 0,5% / 0,6%<br>A <sub>I<sub>b</sub></sub> 0,5% < E ≤ 3% / 3,3%                              | ≤ 6/6,5%                       | B <sub>I<sub>a</sub></sub> ≤ 0,5%<br>B <sub>I<sub>b</sub></sub> ≤ 3%   | < 10%  | DIN EN ISO 10545-3 |
| 2.       | Modulus of Rupture<br>(Value in brackets =<br>min. individual value) | A <sub>I<sub>a</sub></sub> min. 28 (21) N/mm <sup>2</sup><br><br>A <sub>I<sub>b</sub></sub> min. 23 (18) N/mm <sup>2</sup> | min. 20 (18) N/mm <sup>2</sup> | B <sub>I<sub>a</sub></sub> min. 35 (32) N/mm <sup>2</sup><br><br>B <sub>I<sub>b</sub></sub> min. 30 (27) N/mm <sup>2</sup> | Thickness < 7,5mm:<br>15 N/mm <sup>2</sup><br><br>Thickness < 7,5mm:<br>12 N/mm <sup>2</sup> | DIN EN ISO 10545-4 |
|          | 2.1 Breaking Strength<br>(≥ 7,5mm thickness)                         | A <sub>I<sub>a</sub></sub> min. 1300 N<br>A <sub>I<sub>b</sub></sub> min. 1100 N   | at least 950 N                 | B <sub>I<sub>a</sub></sub> min. 1300 N<br>B <sub>I<sub>b</sub></sub> min. 1100 N   | at least 600 N   | DIN EN ISO 10545-4 |
|          | 2.2 Breaking Strength<br>(< 7,5mm thickness)                         | at least 600 N   | at least 600 N                 | at least 700 N   | at least 200 N   | DIN EN ISO 10545-4 |
| 3.       | Resistance to Shock  | ■  | ■                              | ■  | ■  | DIN EN ISO 10545-5 |
| 4.       | Resistance to Deep Abrasion  | ≤ 275mm <sup>3</sup>   | ≤ 393 mm <sup>3</sup>          | ≤ 175 mm <sup>3</sup>  | -  | DIN EN ISO 10545-6 |
| 5.       | Resistance to Glaze Abrasion   | 0 – 5  | 0 – 5                          | 0 – 5  | 0 – 5  | DIN EN ISO 10545-7 |
| 6.       | Max. Coefficient of Expansion  | ■  | ■                              | ■  | ■  | DIN EN ISO 10545-8 |

| Product Standards | Extruded Ceramic Tiles                  |                  |                                |                  | Dry-pressed Ceramic Tiles               |            | Test Standards |
|-------------------|---|------------------|--------------------------------|------------------|---|------------|----------------|
|                   | DIN EN 14411                            |                  |                                |                  | DIN EN 14411                            |            |                |
|                   | Group AI <sub>a</sub> + AI <sub>b</sub> |                  | Group AI <sub>a</sub>   Part 1 |                  | Group BI <sub>a</sub> + BI <sub>b</sub> | Group BIII |                |
|                   | "Nature"                                | "Pre-<br>cision" | "Nature"                       | "Pre-<br>cision" |   |            |                |

| B   | Physical Properties           | glazed                              |   |                                |                                |                     |
|-----|-------------------------------|-------------------------------------|---|--------------------------------|--------------------------------|---------------------|
| 7.  | Thermal Shock Resistance      | ■                                   | ■   | ■                              | ■                              | DIN EN ISO 10545-9  |
| 8.  | Moisture Expansion            | < 0,001 mm/m                        | < 0,001 mm/m                              | app. 0,001 mm/m                | app. 0,01 mm/m                 | DIN EN ISO 10545-10 |
| 9.  | Resistance to Glaze Cracking  | required                            | required                                  | required                       | required                       | DIN EN ISO 10545-11 |
| 10. | Thermal Conductivity          | app. 1 W/mk                         | app. 1 W/mk                               | app. 1 W/mk                    | app. 0,8 W/mk                  | Deutsche Steinzeug  |
| 11. | Electrical Leakage Resistance | >10 <sup>10</sup> Ohm <sup>4)</sup> | >10 <sup>10</sup> Ohm <sup>4)</sup>       | 10 <sup>10</sup> Ohm           | 10 <sup>10</sup> Ohm           | DIN EN 1081         |
| 12. | Steam Diffusion Resistance    | app. μ 120.000                      | app. μ 120.000                            | app. μ 120.000                 | app. μ 100.000                 | DIN EN ISO 12572    |
| 13. | Resistance to Frost           | required                            | not required, but met by<br>AGROB BUCHTAL | required                       | -                              | DIN EN ISO 10545-12 |
| 14. | Light and Color Fastness      | ■                                   | ■   | ■                              | ■                              | DIN 51094           |
| 15. | Luminance                     | according to<br>specifications      | according to<br>specifications            | according to<br>specifications | according to<br>specifications | Deutsche Steinzeug  |
| 16. | Behaviour in Fire             | A1/A1 <sub>fl</sub>                 | A1/A1 <sub>fl</sub>                       | A1/A1 <sub>fl</sub>            | A1/A1 <sub>fl</sub>            | DIN 4102            |

| C  | Chemical Properties <sup>2)</sup>                                 |                     |                     |                     |                     |                     |
|----|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1. | Resistance to Chemicals   | see the certificate | see the certificate | see the certificate | see the certificate | DIN EN ISO 10545-13 |
| 2. | Resistance to Household<br>Chemicals and Bath Water<br>Activities | min. GB or UB       | min. GB or UB       | min. GB<br>or UB    | -                   |                     |
| 3. | Stain Resistance (glazed)   | min. Cl. 3          | min. Cl. 3          | min. Cl. 3          | min. Cl. 3          | DIN EN ISO 10545-14 |
| 4. | Lead and Cadmium Delivery   | ■                   | ■                   | ■                   | ■                   | DIN EN ISO 10545-15 |
| 5. | Hytect  | see the certificate | see the certificate | see the certificate | see the certificate | Deutsche Steinzeug  |

| D  | Slip resistance  |                         |                         |                         |   |                         |
|----|--|-------------------------|-------------------------|-------------------------|---|-------------------------|
| 1. | Coefficient of Friction  | ■                       | ■                       | ■                       | - | E-DIN EN ISO 10545-17   |
|    | 1.1 Industrial Areas (BG)<br>Trade Associations  | Groups<br>R9-13 / V4-10 | Groups<br>R9-13 / V4-10 | Groups<br>R9-13 / V4-10 | - | DIN 51130<br>BGR 181    |
|    | 1.2 Barefoot Areas (BUK)<br>German National Association<br>of Accident Insurance Companies | Groups<br>A / B / C     | Groups<br>A / B / C     | Groups<br>A / B / C     | - | DIN 51097<br>GUV-I 8527 |

1) Boxes marked according to size and color shade. | 2) Hydrofluoric acid and its compounds excluded.  
3) Exceptions: KerAion ELA 10.6: Electrical Leakage Resistance 106 Ohm (DIN EN 1081)

**Deutsche Steinzeug tiles present better values than required by the standards.** In addition, they are construction biologically, ecologically, hygienically and bacteriologically safe; this is guaranteed through the choice of raw materials, method of processing and firing technique.