All tests at our Institute are conducted by experts. Our employees include specialists from the fields of physics, chemistry, and mineralogy as well as material testing and technology.

Further testing methods are:

- Gas Corrosion Tests for Reducing Media
- Rotary Kiln Test
- Gas Permeability of Refractories at Elevated Temperature
- Induction Melting Aggregates
- Wedge-Splitting Test
- Quantitative Oxidation Test
- Friction Wear
- Blast Wear
- Computer-Aided Thermochemistry
- Thermal Conductivity

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DIFK Deutsches Institut für Feuerfest und Keramik GmbH

We are a central institute with more than 50 years of experience in all areas of refractories technology. We are absolutely committed to neutrality and are therefore a partner to all companies working in refractories technology.

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Wedge-Splitting Test

to asses thermo-mechanical specific values and to quantify the thermal shock resistance

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Through the wedge-splitting test according to E.K. Tschegg fracture-mechanical characteristic values for refractories can be obtained. A sample (100 x 100 x 75 mm³) is prepared from the refractory brick and provides with a starter notches and two guide notches. During the test the vertical force F_M applied by a press originates two horizontal forces F_H by means of a prismatic wedge and the transmission pieces, and causes the sample to open.

$$F_H = \frac{F_M}{2 \tan(\alpha/2)} \quad [N]$$

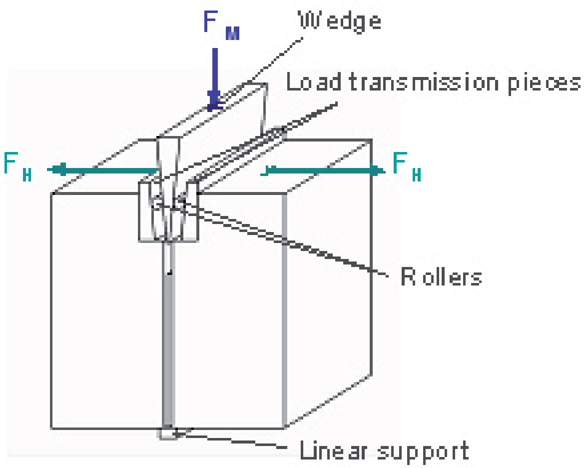

Fig. 1: Schematic representation of the method

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During the whole fracture process, the applied force and the opening of the sample δ are recorded and compiled in a load-crack opening diagram. The measurement occurs contact-free and with a high precision.
From the load-crack opening diagram, the notch tensile strength σ_{NT} and the fracture energy G_F can directly be assessed:

$$G_F = \frac{1}{A} \cdot \int_0^{\delta} F_H \, d\delta \quad [N/m]$$

With a numerical curve fitting the Young's Model E and the tensile strength σ_z is determined.
From the obtained values the following thermal stress damage resistance parameter according to Hasselman can be calculated:

$$R'''' = \frac{G_F \cdot E}{2 \cdot \sigma_{NT}^2} \quad [mm]$$

which depict the damage resistance on initiation of thermal stress fracture

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$$R_{st} = \sqrt{\frac{G_F}{2 \cdot \alpha^2 \cdot E}} \quad [K/mm^{1/2}]$$

which depict the damage resistance against quasi-static crack propagation

High values of R'''' and R_{st} are expected to reflect a high thermal shock resistance for a material.

Measurements up to 1500°C, also under inert atmosphere, are possible.

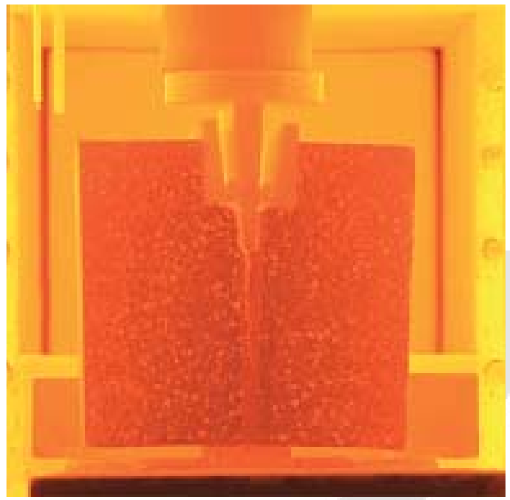

Fig. 2: Refractory sample during testing.