

Thickness Measurement of Refractory Bricks in Industrial Furnaces, Kilns and Ovens



StratoTest 4100 C
Hőálló téglák vastagság mérése
ipari kohókban,
égetőkemencékben, kemencékben

Measures all kinds of refractory linings of industrial furnaces

- suitable for cement, Dolomite, Magnesite and other refractory bricks
- non-destructive measurement through eddy currents principle
- immediate display of brick thickness
- measuring range 0...30 cm
- special measuring technique to eliminate influences of metal inclusions or microstructural changes

**Quick and easy brick measurement
without time-consuming preparations!**

StratoTest 4100 C vastagságmérő műszer

Application

Refractory bricks undergo premature degradation through thermal cycling with a significant decrease in mechanical properties. Designed to measure the thickness of such bricks, StratoTest 4100 C proofed to be a most useful tool to determine the state of lining in industrial furnaces, rotary kilns etc. Unlike the destructive, time-consuming and expensive coring method, StratoTest measures brick thickness quick, easy and non-destructively. Down times of industrial furnaces and ovens are considerably reduced.

Measuring principle

Working on the eddy currents principle, StratoTest measures all kinds of bricks used for linings of industrial ovens, kilns and furnaces. It is also suitable for unreinforced refractory concrete. The disc-shaped eddy currents probe of the gauge measures against the metal furnace shell.

When approaching the furnace shell, the magnetic field changes according to the brick thickness and thickness is digitally displayed in cm.

Measuring procedure

Before measurement, a trial drilling is performed in the furnace section to be measured in order to determine the actual brick thickness. At the same spot, the StratoTest 4100 C probe is placed down and the gauge is calibrated to the brick thickness as determined through the trial drilling. This calibration procedure serves to eliminate influences through the nature of lining, metal inclusions etc. and the brick thickness of the whole area lined with this brick type can now be determined non-destructively, quickly and precisely without the need of further drilling. Thanks to this individual calibration procedure, the brick lining of cement rotary kilns can be measured with as few as 10 drill holes (according to



StratoTest 4100 C

size) whereas the mechanical measuring procedure would need as much as 200 drill holes!

Increasing productivity and saving cost

Using StratoTest for measuring brick thickness helps to reduce down-times of industrial furnaces to a minimum and thus to increase their productivity. Thanks to the non-destructive method, the lifetime of brickwork will increase considerably. As drilling is not necessary any more, dust and noise pollution as involved with the coring method will be completely avoided. In addition, there is no need for expensive drilling equipment.

Technical specifications

Measuring principle	eddy currents principle
Material to be tested	electrically non-conducting refractory bricks (not suitable for sheet metal construction or reinforced refractory concrete)
Measuring range	0...30 cm
Resolution	0.1 cm
Measuring uncertainty	0.5 cm + 3 % of reading
Display	4-digits display
Power supply	1 x 9 V AA alkaline battery
Battery life	20 hours
Ambient temperature	Gauge: 0...50°C/32...123°F, probe 0...70°C/32...158°F
Dimension	Gauge: 150 mm x 82 mm x 35 mm/5.9" x 3.2" x 1.4" Probe: Ø 335 mm x 40 mm/Ø 13.2" x 1.6"
Weight	Gauge: 270 g/9.5 oz, probe with handle 1860 g/65.6 ozs

Supply schedule

- StratoTest 4100 C gauge with probe
- connecting cable
- anti-dust cover
- carrying case
- plastic case
- instruction manual

Road layer thickness measurement
Aszfalt rétegvastagságmérő műszer



StratoTest 4100

Thickness gauge for asphalt, slag
and concrete materials

- Non-destructive measurement
- Immediate display of readings
- Thickness range up to 40 cm/15"
- Measurements repeatable at the same spot
- Complete print-out of all site measurements

New: Special probe for up to 80 cm/31"
thickness range

StratoTest 4100 the precise electronic measuring gauge

On-site testing of pavement thickness

Designed for on-site testing of pavement thickness, this most accurate electronic gauge provides immediate thickness readings of road layers during construction work. As a result, road layers can be paved more accurately and economically avoiding increased factor of safety for pavement thickness. At the same time, the risk of invoice deductions can be prevented when it comes to cost settlement.

For road inspection

The easy to operate StratoTest provides quick and accurate readings without the need of extended set-up

times. With real-time test reports being immediately at hand, the StratoTest proved to be the ideal gauge for road inspection. Readings are provided in correlation with their relevant measuring spots and stations.

For road construction authorities

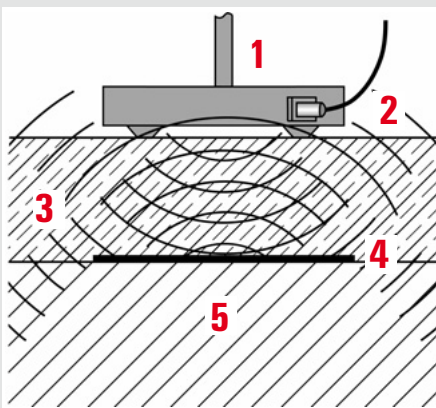
During pavement works, reflector foils are installed under the road layers at pre-selected measuring spots for later inspection through the road construction authorities. Mounted on a foldable dolly, the gauge fits into any car.

Science and research

High-precision readings through StratoTest represent the base for



statistical evaluation of material thickness variations caused by uneven pavements, wearing, deformation or other important factors impairing road layer material quality.



Probe and reflector

- 1 Probe
- 2 Electro-magnetic field
- 3 Layer to be measured
- 4 Reflector
- 5 Sub-base

Application

The core drill method of road surface testing is a destructive, time-consuming, costly and inaccurate procedure. The StratoTest has none of these drawbacks, combining completely non-destructive measurement with accurate and repeatable test results displayed within seconds. The newly developed gauge is based on 20 years experience particularly for experts in road construction. As with former models the new gauge measures the thickness of all materials used in road construction.

Initially developed for measuring bituminous wearing courses, the StratoTest nowadays is mainly used for road inspection and cost settlement according to the German standard TPD StB 89. Due to its versatility, it can also be used for wall thickness measurement or thickness measurement of unreinforced concrete linings.

Measurement with StratoTest is unaffected by humidity or temperature of the layer material. Furthermore, even strong variations in the magnetic or electrical properties of the layer material or variations in the ambient temperature do not impair the measuring results.

Measuring principle

Prior to road paving, measuring reflectors are installed on the sub-base at pre-selected spots. As reflectors, self-adhesive aluminium foils or sheets (generally 1 m x 0.3 m) are placed in direction of traffic. The reflectors serve as a reference for thickness measurement after the road has been paved over the measuring spot.

The new StratoTest not only allows the measurement over standard size reflectors but also over all typical reflector sizes, even on large steel parts (surfaces on bridges).

PRECIMER

The gauge probe takes the form of a disc-shaped coil assembly working on energised high frequency. As the probe approaches the aluminium sheet, the pick-up coil registers the field density, which in turn is directly related to layer thickness. The StratoTest evaluates the results immediately, displaying readings digitally in cm or inch.



A new searching mode now enables the simple, safe and quick location of the reflectors

- Acoustically via headphones (audible also during street noise)
- Optically by an analogue indication of the minimum
- Digitally by an indication of the lowest reading

The StratoTest can be used in two modes, in the DIRECT mode and in the SITE mode. The DIRECT mode is to be used for the immediate measurement:

Switch on – search – measure

The single readings and their calculated statistics are memorized and can be transferred immediately or later to the portable data printer MiniPrint or to a PC.

The SITE mode enables the operator to put in code numbers for a clear identification of the readings:

- to the site
- to the kind of layer material to be measured (surfacing, binder course, base course, etc.)
- to the measuring station and
- to the measuring position within the station

The stored data together with the readings and their calculated statistics can be transferred immediately or later to the portable printer MiniPrint or to a PC.

Every stored reading can be found under the relative position number. With the supplied calibration plate the gauge can be checked at any time for accuracy.

Reflectors

From both a technical and a cost-effective stand-point, we have found the ideal reflector to be a thin, self-adhesive strip of aluminium foil. The natural roughness of the asphalt surface and the pressure exerted by the grader roller result in an excellent bonding of the layers. The binder in the bituminous mixtures ensures additional bonding of layer and reflector foil. Although sharp particles in the sub-base may cause occasional flaws in the foil, this will not impair measurement.

If there is a very coarse sub-base in conjunction with unconsolidated layers (frost blanket gravel), it is preferable to use aluminium plates because of their greater stability.

The reflectors can be delivered as rolls or as cut foil in all typical sizes. They are self-adhesive and therefore can be placed accurately. Even heavy trucks cannot damage the foil. Please ask for more details and prices.



Technical characteristics

- Non-destructive measurement
- Direct thickness indication in cm or inches
- Measuring range from 0... 40 cm, resolution 0.01–0.4 cm
- Optional probes up to 80 cm
- Repeatable measurements
- Simple and safe location of the reflector: audible signal, with analogue and digital indication
- Quick and reliable accuracy check with calibration plate
- Calibration feature with certified calibration distance pieces
- Adjustment of an OFFSET value. This is automatically added to or subtracted from every reading. The adjusted OFFSET value is indicated with every print-out and with every data transfer
- Large display with operator advice
- DIRECT mode for immediate measurement
- SITE mode with correspondence between readings and site code numbers
- Storage of readings and statistical values for immediate or later print-out
- Data print-out on MiniPrint data printer
- Transfer to a PC in ASCII format
- Foldable dolly to fit in any car
- Weather protection box with Plexiglas cover mounted on dolly for storing gauge and printer. The Plexiglas cover may also be used as a writing pad.
- 10 cm and 80 cm probe with device for convenient handling

PRECIMER

StratoTest 4100

Technical data

Measuring principle:	eddy current testing		
Measurable layers:	all non-metallic road layer materials		
Reflectors*:	aluminium foils or sheets of different sizes		
Measuring ranges:	0...40 cm (N400ST standard probe); 0...10 cm (N100ST optional probe); 0...80 cm (N800ST optional probe)		
Resolution of standard probe:	0.1 cm from 0...30 cm 0.2 cm from 30...35 cm, 0.4 cm from 35...40 cm		
Tolerance of standard probe:	Reflector	Measuring range/(cm)	Tolerance
		0...30	± (0.1 cm + 2 % of reading)
	0.7 m x 0.3 m	30...35	± 2 % of reading
	1.0 m x 0.3 m	35...40	± 3 % of reading
		0...30	± (0.1 cm + 2 % of reading)
	0.6 m x 0.6 m	30...35	± 2 % of reading
	1.0 m x 1.0 m steel	35...40	± 2 % of reading
Display:	digital on LCD		
Data storage:	DIRECT mode: approx. 500 single readings and statistical values		
	SITE mode: approx. 6,000 single readings incl. statistics;		
	5 site memories available with 300 stations each; 4 measuring spots per station;		
	5 layer material types per measuring spot		
Power supply:	1 x 9 V alkaline battery		
Battery life:	approx. 20 hours		
Ambient temperature:	Gauge: 0°C...50°C, probe: 0°C...70°C		

* available at ElektroPhysik

Delivery schedule

Dolly with weather protection box and soft carrying case including

- StratoTest 4100 gauge incl. alkaline battery
- N400ST probe
- Connecting cable for probe and gauge
- Calibration plate
- Headphones
- Instruction manual

Optional probes

- N100ST probe, up to 10 cm
- N800ST probe, up to 80 cm

Recommended accessories

- Portable data printer MiniPrint with built-in storage battery, connecting cable and battery charger

- Foil dispenser for easy and accurate cutting of self-adhesive aluminium reflector foils
- Thickness standards according to TPD StB 89 incl. 6 distance pieces from 10 mm to 220 mm thickness and soft bag for transportation and storage
- 9 Volt storage battery incl. charger

Other gauges from our range of products

- Coating thickness & Wall thickness gauges
- Porosity detectors
- Gloss measuring gauges
- Hardness & Roughness testers
- On-line systems for continuous thickness measurement of films and sheets
- Continuous pinhole detectors

The following example shows the print-out with MiniPrint in SITE mode:

ElektroPhysik StratoTest			
16-Jan-01 15:30			date and time of print-out
Probe N400ST			type of probe in use
SITE 1234			no. of site
Coating 2			kind of layer 2 = binder
No. of pos. 3			3 measuring positions: left, middle, right
OFFSET 0.0 cm			constant value (here 0.0 cm) add or subtract
STAT POS COAT			station ¹ measuring position ² coating thickness ³
0.000 1 8.1 cm			¹ max. 300 stations/site
0.000 2 8.0 cm			² max. 4 positions/station
0.000 3 8.2 cm			
0.050 1 8.1 cm			
0.050 2 7.9 cm			
0.050 3 7.9 cm			³ relative readings (max. 500 readings/site) (max. 6,000 readings in total)
0.100 1 8.0 cm			
0.100 2 8.1 cm			
0.100 3 7.9 cm			
8.300 1 8.2 cm			
8.300 2 8.1 cm			
8.300 3 8.2 cm			
STATISTIC			
Number 498			
Mean	8.1 cm		
St. dev.	0.3 cm		statistics from all readings of one site
Kvar	3.7 %		
Max.	8.6 cm		
Min.	7.6 cm		

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