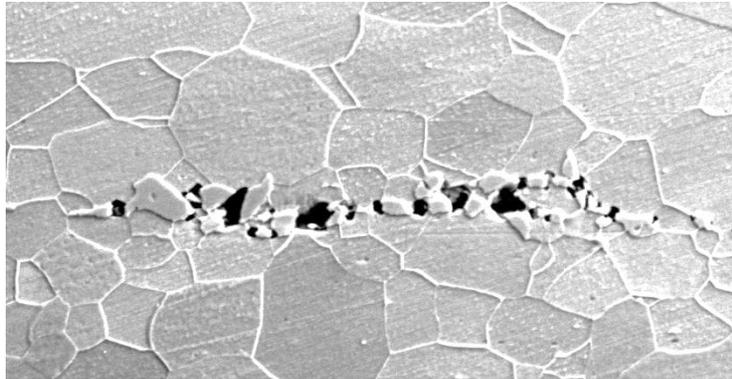# DIPERMET

Unit to determine the sensitivity of steel plates to be enameled to scaling – Hydrogen Diffusion Test as per European Norm EN 10209

Scaling on an enamelled steel plate, picture taken with SEM, scale 1:1000

DIPERMET determines the t_0-value of steel plates to be enamelled. The t_0-value is the time required for the diffusion of hydrogen, generated on one side of a steel plate, to the other side of the plate. The t_0-value is in direct relation to the effective diffusion coefficient (D_{eff}) of the atomic hydrogen solved in the steel sheet. The t_0-values determined for plates of various thicknesses will be normalized to a conventional plate thickness of one mm in proportion to the quadrates of the individual plate thicknesses. The t_0-limit value to be used as qualification basis will be recorded experimentally.

Advantages of DIPERMET

- ✓ Parallel measurements made by two sensors guarantee the reliability of the measuring results
- ✓ No need to fill the closed space on the other side of the plate with water
- ✓ Possibility of a second measurement on the surface of the plate, providing further information to judge the sensitivity to scaling
- ✓ The entire process of emission of hydrogen is recorded
- ✓ Use of various evaluation procedures as per the **DIPERMET** software supplied

Construction of DIPERMET

DIPERMET unit consists of three main parts:

1. Sample holder with electrolysis cell and sensors
2. Electronic unit with power supply, measuring amplifiers and displays
3. Software, suitable to operate on an optional PC with operating system Windows

Following evaluation procedures can be effected:

- ✓ Simultaneous measuring of two different steel plates
- ✓ Simultaneous double determination on one plate

Description of the measurement carried out by DIPERMET

The plate to be examined of a size of 50 x 150 mm is fixed into the sample holder of the electrolysis cell. The cell will be filled with sulphuric acid electrolyte of 6% concentration, adding As_2O_3 and $HgCl_2$. After five minutes of waiting, hydrogen will be generated on the surface of the sample plate by applying 150 mA/cm^2 current density.

The measurement starts at the beginning of the electrolysis. The hydrogen concentration diffused through the sample plate will be measured by two detectors in the closed space on the opposite side of the plate. The t_0-value is determined by the **DIPERMET** software, based on the measuring results recorded versus time. The measuring results can be printed out as well.

Specifications of DIPERMET

Size of the sample plate:	50 x 100 up to 150 mm
Diameter of the tested area:	28 mm
Thickness of the sample plate:	0.5 – 3.0 mm
Electrolyte:	Sulphuric acid solution of 6% concentration with 0.5g/l As_2O_3 and 0.2g/l $HgCl_2$
Volume of electrolyte required per measurement:	200 ml
Measuring accuracy of the temperature of the electrolyte:	0.1°C
Thermal sensor:	Semiconductor
Type of counter electrode:	Pt
Density of current during electrolyte:	max. 125 mA/cm^2

Options

- ✓ Cooling unit
- ✓ PC, keyboard, mouse
- ✓ Monitor