

CERTIFICATE

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

Manufacturer: Maihak AG

Measuring System: Oxor P (paramagnetisch)

Components: O2

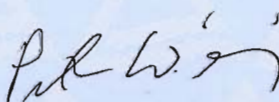
Test Report: TÜV Nord 04CU035 / 8000607710 2006-06-30

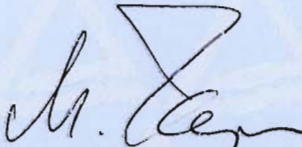
The measurement system fulfils
the requirements of

QAL 1

according to EN 14181 and EN ISO 14956.

Köln, 2007-05-07


Dr. rer. nat. Peter Wilbring


Dipl.-Chem. Martin Kerpa

www.umwelt-tuv.de / www.eco-tuv.com
tie@umwelt-tuv.de
Tel. +49 - 221 - 806 - 2275

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Am Grauen Stein,
51105 Köln

The company is accredited to DIN EN ISO/IEC 17025.

DIN EN ISO 14956 and prEN 15267-3 calculation for QAL 1 in DIN EN 14181

Manufacturer data
 Manufacturer
 Measurement System
 Name
 Serial Number
 Measuring Principle

Maihak AG
 Oxygen Measuring Device
 Oxor P
 760 111, 460 118
 paramagnetic

TÜV Data

Approval Report
 Date
 Editor

TÜV Nord 04CU035 / 8000607710 - 2006-06-30
 2007-05-07
 Dipl.Chem. M. Kerpa

Measurement Component

O₂ 25 mg/m³

Evaluation of the cross sensitivity (CS)

to 3 Vol.-% Oxygen
 to 21 Vol.-% Oxygen
 to 30 Vol.-% Humidity
 to 300 mg/m³ Carbon monoxide
 to 15 Vol.-% Carbon dioxide
 to 50 mg/m³ Methane
 to 20 mg/m³ Dinitrogen monoxide
 to 300 mg/m³ Nitrogen monoxide
 to 30 mg/m³ Nitrogen dioxide
 to 20 mg/m³ Ammonia
 to 1000 mg/m³ Sulphur dioxide
 to 200 mg/m³ Hydrogen chloride

CS $X_{max,j}$
 0,00 mg/m³
 0,00 mg/m³
 -0,05 mg/m³
 0,00 mg/m³
 -0,10 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 -0,05 mg/m³
 0,00 mg/m³
 0,00 mg/m³

Sum of positive cross sensitivities
 Sum of negative cross sensitivities

0,00 mg/m³
 -0,20 mg/m³

Calculation of the combined standard uncertainty
Test Value

Lack of fit
 Biggest interference (positiv or negativ)
 Span shift in the field test
 Zero shift in the field test
 Sensitivity to sample volume flow
 Sensitivity to sample pressure
 Sensitivity to sample temperature
 Sensitivity to ambient temperature
 Dependence on supply voltage
 Repeatability at span
 Field reproducibility
 Uncertainty of the test gas at the reference point

u_L
 u_I
 $u_{d,s}$
 $u_{d,z}$
 u_v
 u_{sp}
 u_{st}
 u_t
 u_{sv}
 u_s
 u_D
 u_{t0}

$\Delta X_{max,j}$

$$u(\Delta X_{max,j}) = \frac{\Delta X}{\sqrt{3}}$$

$u(\Delta X_{max,j})^2$

0,08 mg/m³ 0,04 mg/m³ 0,002
 -0,20 mg/m³ -0,12 mg/m³ 0,013
 0,15 mg/m³ 0,09 mg/m³ 0,008
 0,15 mg/m³ 0,09 mg/m³ 0,008
 0,20 mg/m³ 0,12 mg/m³ 0,013
 0,00 mg/m³ 0,00 mg/m³ 0,000
 0,00 mg/m³ 0,00 mg/m³ 0,000
 0,05 mg/m³ 0,03 mg/m³ 0,001
 0,08 mg/m³ 0,04 mg/m³ 0,002
 0,15 mg/m³ 0,09 mg/m³ 0,008
 0,05 mg/m³ 0,03 mg/m³ 0,001
 0,50 mg/m³ 0,29 mg/m³ 0,083

Combined standard uncertainty (u_c)

u_c

$$u_c = \sqrt{\sum(u_{max,j})^2}$$

0,371

Total expanded uncertainty

($u_c \cdot k$)

$$U_c = u_c \cdot 1,96$$

0,728

Relative total expanded uncertainty

Uc in % of the limit 21 mg/m³

3,4

Requirement

Uc in % of the limit 21 mg/m³

6,0

Result: Requirements keep to QAL 1 of EN 14181

Attention: For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.