DEUTSCHER KALIBRIERDIENST DKD

Kalibrierlaboratorium für Messgrößen der Radioaktivität
Calibration laboratory for measurements of radioactivity

Akkreditiert durch die / *accredited by the*
Akkreditierungsstelle des DKD bei der
PHYSIKALISCH-TECHNISCHEN BUNDESANSTALT (PTB)

QSA Global GmbH
Gieselweg 1
38110 Braunschweig, Germany
Phone +49 5307 932-0, fax +49 5307 932-194

Source No. OM 634

DKD-K-06501

017296
DKD-K-06501
06-09

Kalibrierschein
Calibration Certificate

Kalibrierzeichen
Calibration label

Gegenstand *Object*	**Beta Wide Area Reference Source**
Hersteller *Manufacturer*	**QSA Global GmbH**
Typ *Type*	**CIR06032**
Strahler-Nr. *Source number*	**OM 634**
Auftraggeber *Customer*	**QSA Global Inc.** **US MA 01803 Burlington**
Auftragsnummer *Order No.*	**103050**
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	**2**
Datum der Kalibrierung *Date of calibration*	**1 September 2006**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Der DKD ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DKD is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Stempel *Seal*	Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Stellvertreter *Deputy*	Bearbeiter *Person in charge*
Deutscher Kalibrierdienst DKD-K-06501	12 September 2006	Dr. Thieme	Schott	Lehmacher / Linke / Schott / Schüler

QSA GLOBAL

Beta Wide Area Reference Source

Source no.	OM 634
Drawing	VZ-0626/1
Nuclide	Chlorine-36
Activity	2.67 kBq
Beta surface emission rate	1.65E03 s^{-1} in 2 π steradian
Reference date	1 September 2006 at 12.00 GMT
Dimensions of active surface	100 mm x 100 mm
Overall dimensions	120 mm x 120 mm x 3 mm
Leakage and contamination test	The amount of the removable activity is less than 0.1 % of the total activity but does not exceed 200 Bq. (Wipe test according to ISO 9978, no. 5.3.1)
Date of wipe test	6 September 2006
Construction	Cl-36 is incorporated into the surface of an anodized aluminium foil of 0.3 mm thickness. The thickness of the activated layer is approximately 6 µm. The activated foil is mounted into a holder.
Measuring method	The activity was determined by comparison with a reference source of the same construction. The beta surface emission rate was measured using a windowless proportional counter.
Traceability	Additional to the direct traceability to the PTB through the DKD this product complies with the requirements for traceability to NIST specified in the American National Standard "Traceability of Radioactive Sources to the NIST and Associated Instrument Quality Control (ANSI N42.22-1995)". As a requirement of the ANSI N42.22-1995 QSA Global GmbH participates in the NEI/NIST Measurements Assurance Program of the Nuclear Power Industry.
Uncertainty	The relative uncertainty of the activity is 5 %, the relative uncertainty of the beta surface emission rate is 3 %. The reported uncertainty, determined according to the DKD-3 report is based on the standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of 95 %. (Ref. NIST Technical Note 1297/"Guide to the Expression of Uncertainty in Measurement" ISO Guide, 1995)
Radioactive impurities	Related to Cl-36 (equal 100 %) the following radioactive impurities were detected: none
Quality assurance system	The quality assurance system of QSA Global GmbH was certified by Lloyd's Register Quality Assurance (LRQA) according to ISO 9001, issue 2000. Isotrak products meet the requirements of 10CFR50 Appendix B in the USA.
Uniformity	The uniformity of the surface emission rate is better than 10 %.
Remark	According to ISO 8769 this is a Class 2 reference source.