

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment or protective system intended for use in potentially explosive atmospheres – Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 01ATEX2200 X**

(4) Equipment or protective system: **Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx**

(5) Manufacturer: **Krohne Altometer**

(6) Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 2011064.


(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

<b>EN 50014 : 1997</b>	<b>EN 50018 : 2000</b>	<b>EN 50019 : 2000</b>
<b>EN 50020 : 1994</b>	<b>EN 50281-1-1 : 1998</b>	

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

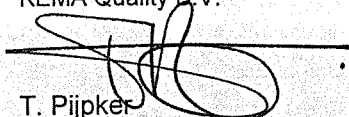
(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance with the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

 II 2 GD EEx d [ib] IIC T6...T3 or EEx de [ib] IIC T6...T3 or  
EEx d [ia] [ib] IIC T6...T3 or EEx de [ia] [ib] IIC T6...T3  
T 85...180 °C

Arnhem, 28 March 2002

KEMA Quality B.V.



T. Pijpker  
Certification Manager

° This Certificate may only be reproduced in its entirety and without any change

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## SCHEDULE

(14)

to EC-Type Examination Certificate KEMA 01ATEX2200 X

(15) **Description**

The Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx is used for measuring, counting and displaying the linear flow of an electrical conductive liquid.

The flowmeter consists of a signal converter housing in type of explosion protection flameproof enclosure "d" with a terminal compartment in type of explosion protection flameproof enclosure "d" or increased safety "e". The integral primary heads are in type of explosion protection flameproof enclosure "d" (sizes DN25 - DN150) or increased safety "e" (DN200 - DN3000) and are provided with measuring electrodes in type of explosion protection intrinsic safety EEx ib IIC.

Ambient temperature range -20 °C ... +60 °C (for flowmeter with electronics unit type IFC 090i).

Ambient temperature range -40 °C ... +60 °C (for flowmeter with electronics unit types IFC 040 and IFC 090).

The maximum surface temperature T 85...180 °C is based on a maximum ambient temperature of 60 °C.

### Electrical data

#### IFM4080 K/...-EEx / MGM 4090 K/...-EEx with IFC 090-EEx electronics

Power supply ..... 100/200 Vac, 115/230 Vac -15/+10 %, 10 VA  
24 Vdc -25/+30 %, 24 Vac -15/+10 %, 8 W  
 $U_m = 253 \text{ V}$

Signal I/O's .....  $\leq 36 \text{ Vdc}$

#### IFM4080 K/...-EEx / MGM 4090 K/...-EEx with IFC 090i-EEx electronics

Power supply ..... 100...230 Vac -15/+10 %, 15 VA  
24 Vdc -25/+30 %, 24 Vac -15/+10 %, 10 W  
 $U_m = 253 \text{ V}$

#### Signal circuit

Modules P-SA and FA-ST ..... in type of explosion protection intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe circuit in type of explosion protection intrinsic safety

EEx ia IIC or EEx ia IIB or

EEx ib IIC or EEx ib IIB,

with the following maximum values:

$U_i$	=	30	V
$I_i$	=	250	mA
$P_i$	=	1,0	W

The effective internal capacitance  $C_i = 5 \text{ nF}$ ,  
the effective internal inductance,  $L_i$  is negligibly small.

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#### Electrical data (continued)

##### Signal circuit

Modules F-PA and F-FF ..... in type of explosion protection intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe circuit (for instance a Supply of the FISCO Model in accordance with document CLC/SC31-3(SEC)155 of Dec. 2000) in type of explosion protection intrinsic safety  
EEx ia IIC or EEx ia IIB or  
EEx ib IIC or EEx ib IIB,  
with the following maximum values:

$$\begin{aligned} U_i &= 30 && \text{V} \\ I_i &= 300 && \text{mA} \\ P_i &= 4,2 && \text{W} \end{aligned}$$

The effective internal capacitance  $C_i = 5 \text{ nF}$ ,  
the effective internal inductance  $L_i$  is negligibly small.

##### Signal/supply circuit

Module DC-I ..... in type of explosion protection intrinsic safety EEx ia IIC,  
(24 Vac/dc version only) with the following maximum values:

$$\begin{aligned} U_o &= 23,5 && \text{V} \\ I_o &= 98 && \text{mA} \\ P_o &= 0,6 && \text{W} \end{aligned}$$

Maximum allowed external capacitance  $C_o = 127 \text{ nF}$ ,  
maximum allowed external inductance  $L_o = 4 \text{ mH}$ .

Only for connection to certified intrinsically safe circuits  
in type of explosion protection EEx ia IIC or EEx ia IIB or  
EEx ib IIC or EEx ib IIB without supply (passive).

The applicable type of explosion protection of the aforementioned intrinsically safe circuits EEx ia IIC is determined by the type of protection of the intrinsically safe circuit which is connected to it, respectively EEx ia IIB or EEx ib IIC or EEx ib IIB.

The aforementioned intrinsically safe circuits shall, from the safety point of view, be considered to be connected to ground.

#### IFM 4042 K-EEx / MGM 4042 K-EEx with IFC 040-EEx electronics

The signal/supply circuits may all be connected either intrinsically safe or non-intrinsically safe. A combination of intrinsic and non-intrinsic safe connections however is not allowed.

##### a) Connection to a non-intrinsically safe circuit

Signal/supply circuit 1 ..... 14 - 36 Vdc, 4 - 20 mA

Signal/supply circuit 2 ..... 14 - 36 Vdc, 22 mA

Signal/supply circuit 3 ..... max. 36 Vdc, 100 mA

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### Electrical data (continued)

b) Connection to an intrinsically safe circuit

Signal/supply circuits 1 and 2 ... in type of explosion protection intrinsic safety EEx ib IIC with the following maximum values (each circuit):

$$\begin{array}{rcll} U_i & = & 30 & \text{V} \\ I_i & = & 100 & \text{mA} \\ P_i & = & 1,0 & \text{W} \end{array}$$

The effective internal capacitance  $C_i = 20 \text{ nF}$ ,  
the effective internal inductance  $L_i$  is negligibly small.

Signal/supply circuit 3 ..... in type of explosion protection intrinsic safety EEx ib IIC with the following maximum values:

$$\begin{array}{rcll} U_i & = & 30 & \text{V} \\ I_i & = & 100 & \text{mA} \\ P_i & = & 1,0 & \text{W} \end{array}$$

The effective internal capacitance  $C_i$  is negligibly small,  
the effective internal inductance  $L_i$  is negligibly small.

The applicable type of explosion protection of the aforementioned intrinsically safe circuits EEx ib IIC is determined by the type of protection of the intrinsically safe circuit which is connected to it, respectively EEx ib IIB.

The aforementioned intrinsically safe circuits are safely galvanically separated from the non-intrinsically safe circuits up to a peak value  $U_m = 60 \text{ V}$ .

### Installation instructions

For use in potentially explosive atmospheres of flammable gases, fluids or vapours:  
The cable entry device shall be in type of protection flameproof enclosure "d" for the terminal compartment in type of protection flameproof enclosure "d" or increased safety "e" for the terminal compartment in type of protection increased safety "e", suitable for the conditions of use and correctly installed.

For use in the presence of combustible dust:  
The cable entry device shall be in type of equipment Category II 2 D, suitable for the conditions of use and correctly installed.

Unused openings shall be closed with suitable certified closing elements.

With the use of conduit, a suitable certified sealing device such as a stopping box with setting compound shall be provided immediately at the entrance to the flameproof enclosure.

### Routine tests

- Each welded primary head of size DN25 - DN150 must be submitted to the routine overpressure test according to EN 50018, Clause 16 at a test pressure of 14 bar during one minute.

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### Routine tests (continued)

- Routine tests according to EN 50018, Clause 16 are not required for the electronics enclosure since the type test has been made at a static pressure of four times the reference pressure.

Each primary head of size DN200 - DN3000 shall withstand a test voltage according to EN 50019, Clause 6.1, of 500 V during one minute without breakdown between the field coils circuit and the enclosure and a test voltage of 1500 Vrms during one minute without breakdown between the field coils circuit and the intrinsically safe sensor circuit.

(16) **Report**

KEMA No. 2011064.

(17) **Special conditions for safe use**

The relation between temperature class, maximum surface temperature, maximum process temperature and ambient temperature is shown in the following tables:

a) Meter size DN25 - DN150

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤ 40 °C	Ta ≤ 50 °C	Ta ≤ 60 °C
T6	T 85 °C	70 °C	70 °C	70 °C
T5	T 100 °C	85 °C	85 °C	85 °C
T4	T 135 °C	120 °C	120 °C	115 °C
T3	T 180 °C	180 °C	180 °C	115 °C

For Ta > 50 °C and a process temperature ≤ 115 °C, heat resistant cables with a continuous operating temperature of at least 120 °C must be used.

b) Meter size DN200 - DN3000

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤ 40 °C	Ta ≤ 50 °C	Ta ≤ 60 °C
T6	T 85 °C	75 °C	70 °C	70 °C
T5	T 100 °C	95 °C	90 °C	75 °C
T4	T 135 °C	130 °C	115 °C	75 °C
T3	T 180 °C	150 °C	115 °C	75 °C

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

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to EC-Type Examination Certificate KEMA 01ATEX2200 X

(19) **Test documentation**

1. Component Certificate KEMA No. Ex-99.E.8128 U  
KEMA No. Ex-01.E.2036 U  
Certificate of Conformity KEMA No. Ex-97.D.2886 X  
PTB No. Ex-90.C.2003 X  
PTB No. Ex-95.D.2209  
EC-Type Examination Certificate KEMA 01ATEX2263 X  
PTB 98 ATEX 2012 U  
PTB 00 ATEX 2213 U

dated

2. Description (22 pages) 04.03.2002
3. Drawings index sheet 04.03.2002

## AMENDMENT 1

### to EC-Type Examination Certificate KEMA 01ATEX2200 X


Manufacturer: **Krohne Altometer**


Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

#### Description

In future the Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx may also be provided with integral primary heads with sizes DN10 - DN20 and DN200 - DN300. The primary heads are in type of explosion protection encapsulation "m" (DN10 - DN20) or powder filling "q" (DN200 - DN300), and are provided with measuring electrodes in type of explosion protection intrinsic safety EEx ib IIC.

The flowmeters shall be marked with the following code:

DN10 - DN20:  II 2 GD EEx dme [ib] IIC T6...T3 or EEx dme [ia] [ib] IIC T6...T3, T 85...150 °C

DN200 - DN300:  II 2 GD EEx dqe [ib] IIC T6...T3 or EEx dqe [ia] [ib] IIC T6...T3, T 85...150 °C

#### Routine tests

The following routine tests of EN 50028 must be carried out on the primary heads with sizes DN10 - DN20:

- Clause 7.1: Visual check.
- Clause 7.2: Each primary head shall withstand a test voltage of 1500 V during one minute without breakdown between the field coils circuit and the enclosure and between the field coils circuit and the intrinsically safe sensor circuit.
- Clause 7.3: Checking the electrical data.

The following routine test of EN 50017 must be carried out on the primary heads with sizes DN200 - DN300:

- Clause 13.2: Electric strength test of the filling material.

#### Special conditions for safe use

The relation between temperature class, maximum surface temperature, maximum process temperature and ambient temperature is shown in the following table:

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤ 40 °C	Ta ≤ 50 °C	Ta ≤ 60 °C
T6	T 85 °C	75 °C	70 °C	70 °C
T5	T 100 °C	95 °C	90 °C	75 °C
T4	T 135 °C	130 °C	115 °C	75 °C
T3	T 150 °C	150 °C	115 °C	75 °C

The maximum surface temperature T 85...150 °C is based on a maximum ambient temperature of 60 °C.

All other data remain unchanged.

## AMENDMENT 1

to EC-Type Examination Certificate KEMA 01ATEX2200 X

### Test documentation

	<u>dated</u>
1. Description (11 pages), rev. 2	10.09.2002
2. Drawing List	10.09.2002

Arnhem, 7 October 2002  
KEMA Quality B.V.



T. Pijpker  
Certification Manager



## AMENDMENT 2

### to EC-Type Examination Certificate KEMA 01ATEX2200 X


Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

#### Description

In future the Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4080 K/i-EEx and IFM 4042 K-EEx sizes DN 25 to DN 150 may also be constructed in type of explosion protection powder filling "q".

The flowmeters shall be marked with the following code:

 II 2 GD EEx dqe [ib] IIC T5...T3 or EEx dqe [ia] [ib] IIC T5...T3, T 50 ...150 °C

#### Routine tests

The filling material shall be tested in accordance with EN 50017 clause 13.2.

#### Special conditions for safe use

The relation between temperature class, maximum surface temperature, maximum process temperature and ambient temperature is shown in the following table:

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤40 °C	Ta ≤50 °C	Ta ≤60 °C
T5	T 50 °C	50 °C	not possible	not possible
T4	T 100 °C	100 °C	95 °C	90 °C
T3	T 150 °C	150 °C	150 °C	120 °C

At an ambient temperature exceeding 50 °C heat resistant cable shall be used when the process temperatures exceeds 75 °C.

All other data remain unchanged.

#### Test documentation

	<u>dated</u>
1. Description (7 pages)	11.03.2003, 04.04.2003
2. Drawing List	04.04.2003

Arnhem, 13 May 2003  
KEMA Quality B.V.



T. Pijpker  
Certification Manager

## AMENDMENT 3

to EC-Type Examination Certificate KEMA 01ATEX2200 X

Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

### Description

The range of Compact Magnetic Inductive Flowmeters, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx is extended with type Optiflux 4040 C-EEx.

Type Optiflux 4040 C-EEx is equal to type IFM 4042 K-EEx with some minor changes according to the documentation stated below. The changes concern the mechanical and electrical assembly.

All other data remain unchanged.

### Test documentation

	<u>signed</u>
1. Description (5 pages)	14.04.2004
2. Drawing list	08.06.2004
3. Appendix list	14.04.2004

Arnhem, 29 June 2004  
KEMA Quality B.V.



C. van Es  
Certification Manager

## AMENDMENT 4

### to EC-Type Examination Certificate KEMA 01ATEX2200 X

Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

#### Description

In the future, in accordance with the documentation as stated below, the Compact Magnetic Inductive Flowmeter type IFM 4080 K/...-EEx may also be manufactured with electronics unit type IFC090 i/.../S-EEx.

The ambient temperature range of the Flowmeter with this electronics unit is -40 °C ... +60 °C.

#### Electrical data

Unchanged.

#### Installation instructions

Unchanged.

#### Routine tests

Unchanged.

#### Report

KEMA No. 2083925.

#### Special conditions for safe use

Unchanged.

#### Essential Health and Safety requirements

Unchanged.

#### Test documentation

1. EG-Type Examination Certificate PTB 98 ATEX 2012 U

signed

2. Description (3 pages)

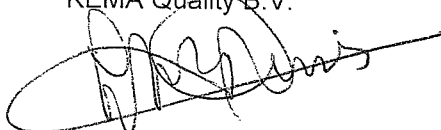
24.05.2005

3. Drawing No. 8.30638.12, rev. H  
8.30638.21

24.05.2005

24.05.2005

Arnhem, 11 July 2005  
KEMA Quality B.V.



L.M.J. Vries  
Certification Manager

## AMENDMENT 1

to EC-Type Examination Certificate KEMA 01ATEX2200 X


Manufacturer: Krohne Altometer


Address: Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands

### Description

In future the Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx may also be provided with integral primary heads with sizes DN10 - DN20 and DN200 - DN300. The primary heads are in type of explosion protection encapsulation "m" (DN10 - DN20) or powder filling "q" (DN200 - DN300), and are provided with measuring electrodes in type of explosion protection intrinsic safety EEx ib IIC.

The flowmeters shall be marked with the following code:

DN10 - DN20:  II 2 GD EEx dme [ib] IIC T6...T3 or EEx dme [ia] [ib] IIC T6...T3, T 85...150 °C

DN200 - DN300:  II 2 GD EEx dqe [ib] IIC T6...T3 or EEx dqe [ia] [ib] IIC T6...T3, T 85...150 °C

### Routine tests

The following routine tests of EN 50028 must be carried out on the primary heads with sizes DN10 - DN20:

- Clause 7.1: Visual check.
- Clause 7.2: Each primary head shall withstand a test voltage of 1500 V during one minute without breakdown between the field coils circuit and the enclosure and between the field coils circuit and the intrinsically safe sensor circuit.
- Clause 7.3: Checking the electrical data.

The following routine test of EN 50017 must be carried out on the primary heads with sizes DN200 - DN300:

- Clause 13.2: Electric strength test of the filling material.

### Special conditions for safe use

The relation between temperature class, maximum surface temperature, maximum process temperature and ambient temperature is shown in the following table:

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤ 40 °C	Ta ≤ 50 °C	Ta ≤ 60 °C
T6	T 85 °C	75 °C	70 °C	70 °C
T5	T 100 °C	95 °C	90 °C	75 °C
T4	T 135 °C	130 °C	115 °C	75 °C
T3	T 150 °C	150 °C	115 °C	75 °C

The maximum surface temperature T 85...150 °C is based on a maximum ambient temperature of 60 °C.

All other data remain unchanged.

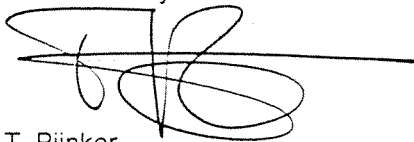
## AMENDMENT 1

to EC-Type Examination Certificate KEMA 01ATEX2200 X

### Test documentation

	<u>dated</u>
1. Description (11 pages), rev. 2	10.09.2002
2. Drawing List	10.09.2002

Arnhem, 7 October 2002  
KEMA Quality B.V.



T. Pijpker  
Certification Manager

## AMENDMENT 2

### to EC-Type Examination Certificate KEMA 01ATEX2200 X


Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

#### Description

In future the Compact Magnetic Inductive Flowmeter, types IFM 4080 K/...-EEx, IFM 4080 K/i-EEx and IFM 4042 K-EEx sizes DN 25 to DN 150 may also be constructed in type of explosion protection powder filling "q".

The flowmeters shall be marked with the following code:

 II 2 GD EEx dqe [ib] IIC T5...T3 or EEx dqe [ia] [ib] IIC T5...T3, T 50 ...150 °C

#### Routine tests

The filling material shall be tested in accordance with EN 50017 clause 13.2.

#### Special conditions for safe use

The relation between temperature class, maximum surface temperature, maximum process temperature and ambient temperature is shown in the following table:

Temperature class	Max. surface temperature	Max. process temperature		
		Ta ≤40 °C	Ta ≤50 °C	Ta ≤60 °C
T5	T 50 °C	50 °C	not possible	not possible
T4	T 100 °C	100 °C	95 °C	90 °C
T3	T 150 °C	150 °C	150 °C	120 °C

At an ambient temperature exceeding 50 °C heat resistant cable shall be used when the process temperatures exceeds 75 °C.

All other data remain unchanged.

#### Test documentation

	<u>dated</u>
1. Description (7 pages)	11.03.2003, 04.04.2003
2. Drawing List	04.04.2003

Arnhem, 13 May 2003  
KEMA Quality B.V.



T. Pijpker  
Certification Manager

## AMENDMENT 3

to EC-Type Examination Certificate KEMA 01ATEX2200 X

Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

### Description

The range of Compact Magnetic Inductive Flowmeters, types IFM 4080 K/...-EEx, IFM 4042 K-EEx, MGM 4090 K/...-EEx and MGM 4042 K-EEx is extended with type Optiflux 4040 C-EEx.

Type Optiflux 4040 C-EEx is equal to type IFM 4042 K-EEx with some minor changes according to the documentation stated below. The changes concern the mechanical and electrical assembly.

All other data remain unchanged.

### Test documentation

	<u>signed</u>
1. Description (5 pages)	14.04.2004
2. Drawing list	08.06.2004
3. Appendix list	14.04.2004

Arnhem, 29 June 2004  
KEMA Quality B.V.



C.G. van Es  
Certification Manager

## AMENDMENT 4

to EC-Type Examination Certificate KEMA 01ATEX2200 X

Manufacturer: **Krohne Altometer**

Address: **Kerkeplaat 12, 3313 LC Dordrecht, The Netherlands**

### Description

In the future, in accordance with the documentation as stated below, the Compact Magnetic Inductive Flowmeter type IFM 4080 K/...-EEx may also be manufactured with electronics unit type IFC090 i/.../S-EEx.

The ambient temperature range of the Flowmeter with this electronics unit is -40 °C ... +60 °C.

### Electrical data

Unchanged.

### Installation instructions

Unchanged.

### Routine tests

Unchanged.

### Report

KEMA No. 2083925.

### Special conditions for safe use

Unchanged.

### Essential Health and Safety requirements

Unchanged.

### Test documentation

1. EG-Type Examination Certificate PTB 98 ATEX 2012 U

signed

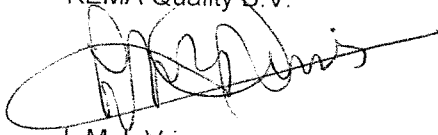
2. Description (3 pages)

24.05.2005

3. Drawing No. 8.30638.12, rev. H  
8.30638.21

24.05.2005  
24.05.2005

Arnhem, 11 July 2005  
KEMA Quality-B.V.



L.M.J. Vries  
Certification Manager