Tuesday, May 27, 2014

ABSA
9410 - 20th Avenue NW
Edmonton, AB
T6N 0A4

ATTENTION: Cynthia Formaniuk

With reference to your submission respecting the registration of the item below, for legal use in the province, please note we have surveyed, approved and registered this design as noted.

MANUFACTURER: Krohne Limited

CATALOG OR DRAWING: OPTIMASS 6000 - Doc. No. 7961089989 Rev. 07 As Noted

ITEM: OPTIMASS 6000 Series Flowmeters CRN: OH14014.23

We wish to point out that every fitting must be constructed strictly in accordance with the registered design. Fitting registrations are required to be resubmitted for validation after ten (10) years from the registration date in accordance with CSA B51, Clause 4.2.1. The date of expiry for this registration is December 17, 2023.

Sincerely,

[Signature]

Athan Syrgiannis, Engineer-in-Training
Codes and Standards Compliance

REMARKS: CRN registered under reciprocal agreement and conditional upon compliance with the notes on the ABSA registration dated December 17, 2013.
STATUTORY DECLARATION
Registration of Fittings

I, Dr. Yousif Hussain, Technical Director
(Name & Position, e.g. President, Plant Manager, Chief Engineer)
of Krohne Ltd
(Name of Manufacturer)
Located at Rother Pool Drive, Park Farm, Portlands, N10 2AF, UK
(Plant Address) (Telephone Number) 020 8934-0540
(Fax Number) 020 8934-0858

do solemnly declare that the fittings listed hereunder, which are subject to the Technical Standards and Safety Act, 2000, and Regulations for Boilers and Pressure Vessels comply with all of the requirements of

(Title of recognized North American Standard) which specifies the dimensions, materials of construction, pressure/temperature ratings, identification marking the fittings and service;

or are not covered by the provisions of a recognized North American standard and are therefore manufactured to comply with ASME B31.3 or ASME VIII as supported by the attached data which identifies the dimensions, material of construction, pressure/temperature ratings and the basis for such ratings, the marking of the fitting for identification and service.

I further declare that the manufacture of these fittings is controlled by a quality system meeting the requirements of ISO 9001-2000 which has been verified by the following authority, TUV-UK

The items covered by this declaration, for which I seek registration, are category E type fittings. In support of this application, the following information and/or test data are attached as follows:

OptiMass 6000
(drawings, calculations, test reports, etc.)

Declared before me at Wellwyn Garden City in the county of Hertfordshire in the

24th day of March 2012

Michael Orten-Jones
Commissioner for Oaths: Solicitor & Notary Public
The Close
59 High Street
Harpole, Northampton
England NN7 4BS

(Signature) (Signature of Declarer)

FOR OFFICE USE ONLY

To the best of my knowledge and belief, the application meets the requirements of the Technical Standards and Safety Act, 2000, and Regulations for Boilers and Pressure Vessels and CSA Standard B51 and is accepted for registration in Category H.

CRN Number Issued: 0H14-014-25 NOTE: SEE ATTACHED 4 PAGE
Registered by: Cheryl Yong
Date Registered: MAR. 19, 2014
This registration expires on: DEC. 17, 2023

Document Name: TSSA Statutory Declaration Form, Jan 17, 2007, Rev. 4.doc
The design submission, tracking number 2013-00838, originally received on February 08, 2013 was surveyed and accepted for registration as follows:

**CRN:** 0H14014.2  
**Reg Type:** New Design  
**Drawing No.:** 7961089989 OPTIMASS 6000 PER NOTES BELOW Rev 07 As Noted  
**Fitting type:** FLOWMETERS

**Description**  
MAWP Design Temperature  
PER NOTES BELOW

The registration is conditional on your compliance with the following notes:

This registration is valid only for fittings fabricated at the location(s) covered by the QC certificate attached to the accepted AB-41 Statutory Declaration form. This registration is valid only until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of the quality management system lapse before the expiry date indicated above, this registration shall become void.

- MAWPs are as per the above referenced document.
- With the exception of heating coils, all models referred to on the above document are included with this registration.
- The heating tubes / coils for the following models are included, with conditions, for this registration: S100, S150, S200, D100, D150, D200. The conditions are as follows:
  * per your indication by telephone, welds attaching the box section to connection pipes / threaded connections shall be full groove with fillet.
  * per your indication by telephone, all longitudinal welds, and circumferential welds are full groove.
  * per your indication by telephone, material for the box sections shall be A182-316/316L or A240-316/316L, and connection pipes shall be A312-316/316L.

- The heating tubes / coils for models S08, S10, S15, S25, S50, S80, S250, H08, H10, H15, H25, H50, and H80 are excluded from this registration.
- Some 600# flange attachment configurations are not rated to match ASME B16.5 ratings. Per the above document, some 900# and all 1500# flanges are not rated to match ASME B16.5 ratings.
- When the assembly is incapable of meeting ASME B16.5 ratings, the ASME B16.5 markings shall be removed from the flanges.
- External 0.5 inch BSPP threads for the half inch schedule 40 pipe shall have a minimum diameter of at least 18.63 mm.
- The drawings included with this application shall be revised in accordance with the above notes.
- The document entitled "Optimass 6000 CRN application Rev 04" is part of this application.
December 17, 2013

The registration is conditional on your compliance with the following notes:

- The FEA report dated September 17, 2013, depicts the spiggot and formed tube from drawings 3969002089 and 3969112089, and this report represents the worst case of all design conditions, model numbers and configurations proposed.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

Enclosed are stamped prints for your reference.

Sincerely,

Sterling, Cameron, P. Eng.

This is part of CRN 0H14014.25
Technical Standards & Safety Authority
Boilers & Pressure Vessels Safety Division
SCOPE of OPTIMASS 6000 Series
CRN application

MODEL NUMBERS:
OPTIMASS 6000 series, this includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x= 0-9)

DESCRIPTION:
OPTIMASS 6000 series of 10 sizes and 3 materials (S08, H08, S10, H10, S15, H15, S25, H25, S50, H50, S80, H80, S100, D100, S150, D150, S200, D200, S250) represents a Mass Flow Meter "tube" with a welded "flange" on each side (S denotes 316 stainless steel, H Hastelloy and D Duplex stainless steel full material specifications are given below). One of the following signal converters can be directly mounted on top of each Mass Flow Meter or be remotely connected by electrical cable: MFC02xC, MFC04xC, MFC400C, MFC400F, MFC400W. OPTIMASS 602xC and 604xC do not have a signal converter attached, instead are only remotely connected to customer's PLC or other non-KROHNE converter equipment. The Optimass 6000 can also be fitted with optional heating jackets.

(please note the Optimass 6000 is an extended range of flow meters replacing the Optimass 8000k already registered under CRN OF07838.2, the 6000 range has additional sizes and materials and extended temperature range. From a pressure retaining point of view the Optimass 8000k and 6000 are the same except for some differences in the size designations; S15, S25, S80 and S100 are the same in both ranges. However Optimass 8000k S40 is equivalent to Optimass 6000 S50).

DESIGN STANDARD FOR TUBE: ASME B31.3
DESIGN STANDARD FOR FLANGE: ASME B16.5-2003; table 2-2.2 and 2-2.8
DESIGN STANDARD FOR HEATING JACKET: ASME B31.3, ASME Section VIII, Division 1 paragraph UG-101

MATERIAL OF TUBES: Stainless Steel 316/316L Dual certified to ASTM A269, mechanical properties to ASTM A213.
- Hastelloy C22 NO6022 to ASTM B622, B619 or B626
- Duplex Stainless Steel UNS S31803 to ASTM A789 or A790

MATERIAL OF FLANGES:
Meters with 316 stainless steel or hastelloy tubes: ASME B16.5-2003; table 2-2.2 16Cr-12Ni-2Mo (316/316L stainless steel dual certified.)
Meters with Duplex stainless steel tubes: ASME B16.5-2003; table 2-2.8 22Cr-5Ni-3Mo-N (Gr. F51 or S31803)

MAXIMUM TEMPERATURE OF TUBE / FLANGE: 316 stainless steel and HC22 400 °C (752 °F), Duplex 230 °C (446 °F)

Maximum Working pressures are given on the following page.
**OPTIMASS 6000 SERIES 316/316L TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (&quot;”)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100 °F</td>
<td>0.5 -16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
<td></td>
</tr>
<tr>
<td>200 °F</td>
<td>0.5 -16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1860</td>
<td>2580</td>
</tr>
<tr>
<td>300 °F</td>
<td>0.5 -16 inclusive</td>
<td>215</td>
<td>560</td>
<td></td>
<td>1120</td>
<td>1680</td>
</tr>
<tr>
<td>400 °F</td>
<td>0.5 -16 inclusive</td>
<td>195</td>
<td>515</td>
<td></td>
<td></td>
<td>1491</td>
</tr>
<tr>
<td>446 °F</td>
<td>0.5 -16 inclusive</td>
<td>184</td>
<td>497</td>
<td></td>
<td></td>
<td>1435</td>
</tr>
<tr>
<td>500 °F</td>
<td>0.5 -16 inclusive</td>
<td>170</td>
<td>480</td>
<td></td>
<td></td>
<td>1355</td>
</tr>
<tr>
<td>600 °F</td>
<td>0.5 -16 inclusive</td>
<td>140</td>
<td>450</td>
<td></td>
<td></td>
<td>1305</td>
</tr>
<tr>
<td>700 °F</td>
<td>0.5 -16 inclusive</td>
<td>110</td>
<td>435</td>
<td></td>
<td></td>
<td>1280</td>
</tr>
<tr>
<td>752 °F</td>
<td>0.5 -16 inclusive</td>
<td>94</td>
<td>424</td>
<td></td>
<td></td>
<td>1200</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES HC22 TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (&quot;”)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100 °F</td>
<td>0.5 -16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
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<tr>
<td>200 °F</td>
<td>0.5 -16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1860</td>
<td>2580</td>
</tr>
<tr>
<td>300 °F</td>
<td>0.5 -16 inclusive</td>
<td>215</td>
<td>560</td>
<td></td>
<td>1120</td>
<td>1680</td>
</tr>
<tr>
<td>400 °F</td>
<td>0.5 -16 inclusive</td>
<td>195</td>
<td>515</td>
<td></td>
<td></td>
<td>1491</td>
</tr>
<tr>
<td>446 °F</td>
<td>0.5 -16 inclusive</td>
<td>184</td>
<td>497</td>
<td></td>
<td></td>
<td>1435</td>
</tr>
<tr>
<td>500 °F</td>
<td>0.5 -16 inclusive</td>
<td>170</td>
<td>480</td>
<td></td>
<td></td>
<td>1355</td>
</tr>
<tr>
<td>600 °F</td>
<td>0.5 -16 inclusive</td>
<td>140</td>
<td>450</td>
<td></td>
<td></td>
<td>1305</td>
</tr>
<tr>
<td>700 °F</td>
<td>0.5 -16 inclusive</td>
<td>110</td>
<td>435</td>
<td></td>
<td></td>
<td>1280</td>
</tr>
<tr>
<td>752 °F</td>
<td>0.5 -16 inclusive</td>
<td>94</td>
<td>424</td>
<td></td>
<td></td>
<td>1200</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES Duplex TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (&quot;”)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
<th>Class 1500 (D08-D100)</th>
<th>Class 1500 (D150/200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-58 to 100 °F</td>
<td>0.5 -16 inclusive</td>
<td>290</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
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</tr>
<tr>
<td>200 °F</td>
<td>0.5 -16 inclusive</td>
<td>260</td>
<td>745</td>
<td>1490</td>
<td>2230</td>
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<tr>
<td>300 °F</td>
<td>0.5 -16 inclusive</td>
<td>230</td>
<td>665</td>
<td>1335</td>
<td>2000</td>
<td>2600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 °F</td>
<td>0.5 -16 inclusive</td>
<td>200</td>
<td>615</td>
<td>1230</td>
<td>1845</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>446 °F</td>
<td>0.5 -16 inclusive</td>
<td>186</td>
<td>599</td>
<td>1198</td>
<td>1797</td>
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<td></td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES OPTIONAL HEATING JACkETS MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp</th>
<th>Meter Sizes</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 446 °F</td>
<td>All Sizes and materials</td>
<td>145</td>
</tr>
<tr>
<td>-319 to 752 °F</td>
<td>All Sizes and materials</td>
<td>72.5</td>
</tr>
</tbody>
</table>
Subject: Request for Design Registration

Dear Ms. Francis,

CSA has received the documentation submitted by KROHNE Ltd. These fittings has been registered by CSA for the Province of Québec in accordance with an agreement between CSA and the Province of Québec.

The CRN is 0H14014.26.
The cost for this service is $ 760.00 plus HST.

A copy of the Statutory Declaration with an original stamp affixed will be forwarded to you along with our invoice by regular mail.

Yours truly

Janet Townsend
Account Manager
CSA Group
janet.townsend@csagroup.org
www.csagroup.org
I, Dr Yousif Hosain, Technical Director of KROHNE Limited, located at Rutherglen Mill, Park Road, Fellingborough, Northants, NN8 6AE, UK, do solemnly declare that the fittings, which are subject to the Safety Codes Act, comply with the requirements of ASME B31.3, as supported by the attached data which identifies the dimensions, materials of construction, pressure/temperature ratings and the basis for such ratings, and the marking of the fittings for identification.

I further declare that the manufacture of these fittings is controlled by a quality control program which has been verified by the following authority, TUV-UK as being suitable for the manufacture of these fittings to the stated standard. The fittings covered by this declaration, for which I seek registration, are Category F.

In support of this application, the following information, calculations and/or test data are attached:

Optimass 6000

DECLARED before me at in the county of

day of

(print)

(sign)
(A Commissioner for Oaths)

For Office Use Only

To the best of my knowledge and belief, the application meets the requirements of the Safety Codes Act and CSA Standard B31, Clause 4.2, and is accepted for registration in Category

Registration Number: OH14014.26
Date Registered: APRIL 9, 2014

The information you provide is necessary only for the administration of the programs as required by the Alberta Safety Codes Act and Regulations in the Boiler Discipline.
SCOPE of OPTIMASS 6000 Series
CRN application

MODEL NUMBERS:
OPTIMASS 6000 series, this includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x= 0-9)

DESCRIPTION:
OPTIMASS 6000 series of 10 sizes and 3 materials (S08, H08, S10, H10, S15, H15, S25, H25, S50, H50, S80, H80, S100, D100, S150, D150, S200, D200, S250) represents a Mass Flow Meter "tube" with a welded "flange" on each side (S denotes 316 stainless steel, H Hastelloy and D Duplex stainless steel, full material specifications are given below). One of the following signal converters can be directly mounted on top of each Mass Flow Meter or be remotely connected by electrical cable: MFC02xC, MFC04xC, MFC400C, MFC400F, MFC400W. OPTIMASS 602xC and 604xC do not have a signal converter attached, instead are only remotely connected to customer's PLC or other non-KROHNE converter equipment. The Optimass 6000 can also be fitted with optional heating jackets. (Please note the Optimass 6000 is an extended range of flow meters replacing the Optimass 8000k already registered under CRN OF07838.2, the 6000 range has additional sizes and materials and extended temperature range. From a pressure retaining point of view the Optimass 8000k and 6000 are the same except for some differences in the size designations; S15, S25, S80 and S100 are the same in both ranges. However Optimass 8000k S40 is equivalent to Optimass 6000 S50).

DESIGN STANDARD FOR TUBE: ASME B31.3
DESIGN STANDARD FOR FLANGE: ASME B16.5-2003; table 2-2.2 and 2-2.8
DESIGN STANDARD FOR HEATING JACKET: ASME B31.3, ASME Section VIII, Division 1 paragraph UG-101

MATERIAL OF TUBES: Stainless Steel 316/316L Dual certified to ASTM A269, mechanical properties to ASTM A213.
   Hastelloy C22 NO6022 to ASTM B622, B619 or B626
   Duplex Stainless Steel UNS S31803 to ASTM A789 or A790

MATERIAL OF FLANGES:
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Meters with Duplex stainless steel tubes: ASME B16.5-2003; table 2-2.8 22Cr-5Ni-3Mo-N (Gr. F51 or S31803)

MAXIMUM TEMPERATURE OF TUBE / FLANGE: 316 stainless steel and HC22 400 °C (752 °F), Duplex 230 °C (446 °F)

Maximum Working pressures are given on the following page.
**Note:** Maximum Working Pressures for each Class is based upon the lower of the design calculation rating of the OPTIMASS 6000 flowmeter and the Flange limits as described in ASME B16.5-2003; table 2-2.2. Pressures for some Class 900 and 1500 flanges are lower than those given in B16.5 and are highlighted below in **green**.

### OPTIMASS 6000 SERIES 316/316L TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100</td>
<td>0.5 - 16 inclusive</td>
<td>275</td>
<td>720</td>
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<tr>
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<tr>
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<tr>
<td>500</td>
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<td>600</td>
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<tr>
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<td>0.5 - 16 inclusive</td>
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<tr>
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<td>94</td>
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</table>

### OPTIMASS 6000 SERIES HC22 TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100</td>
<td>0.5 - 16 inclusive</td>
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<td>2422</td>
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<td>500</td>
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<td>600</td>
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<td>752</td>
<td>0.5 - 16 inclusive</td>
<td>94</td>
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<td>854</td>
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<td>1986</td>
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</tbody>
</table>

### OPTIMASS 6000 SERIES Duplex TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
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</tr>
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<tbody>
<tr>
<td>-58 to 100</td>
<td>0.5 - 16 inclusive</td>
<td>290</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
<td>2900</td>
</tr>
<tr>
<td>200</td>
<td>0.5 - 16 inclusive</td>
<td>260</td>
<td>745</td>
<td>1490</td>
<td>2230</td>
<td>2669</td>
</tr>
<tr>
<td>300</td>
<td>0.5 - 16 inclusive</td>
<td>230</td>
<td>665</td>
<td>1335</td>
<td>2000</td>
<td>2439</td>
</tr>
<tr>
<td>400</td>
<td>0.5 - 16 inclusive</td>
<td>200</td>
<td>615</td>
<td>1230</td>
<td>1845</td>
<td>2209</td>
</tr>
<tr>
<td>446</td>
<td>0.5 - 16 inclusive</td>
<td>186</td>
<td>599</td>
<td>1198</td>
<td>1797</td>
<td>2103</td>
</tr>
</tbody>
</table>

### OPTIMASS 6000 SERIES OPTIONAL HEATING JACkETS MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp</th>
<th>Meter Sizes</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 446 F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>145</td>
</tr>
<tr>
<td>-319 to 752 F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>72.5</td>
</tr>
</tbody>
</table>
December 17, 2013

Attention:  C N Rolph
KROHNE LIMITED
RUTHERFORD DRIVE
NORTHANTS
WELLINGBOROUGH, NN8 6AE

The design submission, tracking number 2013-00838, originally received on February 08, 2013 was
surveyed and accepted for registration as follows:

CRN : 0H14014.2  Accepted on: December 17, 2013
Reg Type: New Design  Expiry Date: December 17, 2023
Drawing No.: 7961089989 OPTIMASS 6000 PER NOTES BELOW Rev 07 As Noted
Fitting type: FLOWMETERS

<table>
<thead>
<tr>
<th>Description</th>
<th>MAWP</th>
<th>Design Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER NOTES BELOW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The registration is conditional on your compliance with the following notes:

This registration is valid only for fittings fabricated at the location(s) covered by the QC certificate attached to
the accepted AB-41 Statutory Declaration form. This registration is valid only until the indicated expiry date only
if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency
until that date. Should the approval of the quality management system lapse before the expiry date indicated
above, this registration shall become void.

- MAWP's are as per the above referenced document.
- With the exception of heating coils, all models referred to on the above document are included with this
  registration.
- The heating tubes / coils for the following models are included, with conditions, for this registration: S100,
  S150, S200, D100, D150, D200. The conditions are as follows:
  - per your indication by telephone, welds attaching the box section to connection pipes / threaded
    connections shall be full groove with fillet.
  - per your indication by telephone, all longitudinal welds, and circumferential welds are full groove.
  - per your indication by telephone, material for the box sections shall be A182-316/316L or A240-316/316L,
    and connection pipes shall be A312-316/316L.

- The heating tubes / coils for models S08, S10, S15, S25, S50, S80, S250, H08, H10, H15, H25, H50, and H80
  are excluded from this registration.
- Some 600# flange attachment configurations are not rated to match ASME B16.5 ratings. Per the above
  document, some 900# and all 1500# flanges are not rated to match ASME B16.5 ratings.
- When the assembly is incapable of meeting ASME B16.5 ratings, the ASME B16.5 markings shall be removed
  from the flanges.
- External 0.5 inch BSPP threads for the half inch schedule 40 pipe shall have a minimum diameter of at least
  18.63 mm.
- The drawings included with this application shall be revised in accordance with the above notes.
- The document entitled "Optimass 6000 CRN application Rev 04" is part of this application.
December 17, 2013

The registration is conditional on your compliance with the following notes:

- The FEA report dated September 17, 2013, depicts the spiggot and formed tube from drawings 3969002089 and 3969112089, and this report represents the worst case of all design conditions, model numbers and configurations proposed.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 3356 or fax (780) 437-7787 or e-mail sterling@absa.ca.

Sincerely,

[Signature]

STERLING, CAMERON, P. Eng.
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK NOVA SCOTIA PRINCE EDWARD ISLAND NEWFOUNDLAND AND LABRADOR
NUNAVUT YUKON NORTHWEST TERRITORIES

MANUFACTURERS NAME: KROHNE LTD
MANUFACTURERS ADDRESS: RUTHERFORD DRIVE, PARKFARM, WELLINGTON, ON, CANADA, N1J 1M6
PLANT LOCATIONS: WELLINGTON, ONTARIO, CANADA, N1J 1M6
DUSSELDORF, GERMANY

CATEGORY OF FITTINGS TO BE REGISTERED, CIRCLE ONE CATEGORY ONLY
A. Pipe fittings, including couplings, tees, elbows, flanges, pipe caps, or reducers
B. Flanges: all flanges
C. Valves: all valves
D. Expansion joints, flexible connections, and hose assemblies: all types
E. Strainers, filters, separators, and steam traps
F. Measuring devices, including pressure gauges, level gauges, sight glasses, levels, or pressure transmitters
G. Certified capacity-rated pressure relief devices acceptable as primary over pressure protection on boilers, pressure vessels, piping and fusible plugs
H. Pressure retaining components that do not fall into one of the above categories
N. Nuclear components: Class 1, Class 2, Class 3 (Meeting CNSC or ASME requirements)

TITLE OF THE STANDARD OF CONSTRUCTION
ASME B31.3
OR
ASME Sec VIII

SHOW NO. KROHNE
WILL APPEAR ON THE PRODUCT

LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEM TO BE REGISTERED:
OPTIMASS 6000

DECLARATION:
I, T. P. FAULKERTT, being employed by KROHNE LTD, and being the person having full authority and responsibility for the quality of the end product do hereby declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by TUV-VE as being suitable for that purpose and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Signature of Declarer:

Deemed before me at:

This 25th day of , 2013

Commissioner of Oaths or Notary Public (sign)

(Official seal to the right)

This space for Regulatory Authority use:

CRN: 0114014.2
FIND: 1618

Notes:
1. All fittings shall be registered in the name of the Manufacturer.
2. Each category shall be supported with two Statutory Declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be resubmitted for validation at a maximum interval of five (5) years.

Service NL
Registered: 2014010700
Date: 10/03/2015
Engineering and this record:
Reg. No.: 0114014.2
THE BOILER, PRESSURE VESSELS AND COMpressed GAS REGULATIONS
Sec. 1.5 - Fillings Rev. 1 06/2003
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK
NUNAVUT
NOVA SCOTIA
YUKON
PRINCE EDWARD ISLAND
NORTHWEST TERRITORIES
NEWFOUNDLAND AND LABRADOR

MANUFACTURERS NAME: KROHNE LTD
MANUFACTURERS ADDRESS: RUTHERFORD DRIVE, PARKFARM, WELLSBORO USA, ASME 831.3, 02, ASME Sec VIII
PLANT LOCATIONS: WELLSBORO USA, ASME 831.3, 02, ASME Sec VIII

CATEGORY OF FITTINGS TO BE REGISTERED. CIRCLE ONE CATEGORY ONLY
A: Pipe fittings, including couplings, tees, elbows, Ys, plugs, unions, pipe caps, or reducers
B: Flanges: all flanges
C: Valves: all line valves
D: Expansion joints, flexible connections, and hose assemblies: all types
E: Strainers, filters, separators, and steam traps
F: Measuring devices, including pressure gauges, level gauges, sight glasses, levels, or pressure transmitters
G: Certified capacity-rated pressure relief devices acceptable as primary over pressure protection on boilers, pressure vessels, piping and fusible plugs
H: Pressure retaining components that do not fall into one of the above categories
N: Nuclear components: Class 1 □ Class 2 □ Class 3 □ (Meeting CNSC or ASME requirements)

SHOW M2

APPEAR ON THE PRODUCT

KROHNE

LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEMS TO BE REGISTERED:

OPTIMASS 6000

DECLARATION:

I, [full name], [position] employed by [company name], and being the person having full authority and responsibility for the quality of the end product do solemnly declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by [TUV-UK] as being suitable for that purpose and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Signature of Declarer:

[Signature]

Declared before me at

[Location]

This ___ day of ___ 20___

Commissioner of Oaths or Notary Public: (sign)

(Attach Official seal to the right)

This space for Regulatory Authority use

This registration must be revalidated after ten (10) years from the date of registration.

CRN: ___

FID#: 1818

Notes:
1. All fittings shall be registered in the name of the Manufacturer.
2. Each category shall be supported with two Statutory Declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be resubmitted for validation at a maximum interval of five (5) years.

REGISTRATION ONLY

CRN: ___

EXAMINER: ___

DATE: ___

BLRs PVs

Sec. 1.0 - Fittings Rev. 1 06/2003

FITTINGS COMPONENTS
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK
NOVA SCOTIA
PRINCE EDWARD ISLAND
YUKON
NORTHWEST TERRITORIES
NEWFOUNDLAND AND LABRADOR

MANUFACTURERS NAME: KROHNE LTD
MANUFACTURERS ADDRESS: RUTHERFORD DRIVE PARKFARM, WELLINGBOROUGH NN10 6AF, UK

PLANT LOCATIONS: WELLINGBOROUGH, UK; PEABODY USA; DUSSELDORF GERMANY

CATEGORY OF FITTINGS TO BE REGISTERED, CIRCLE ONE CATEGORY ONLY
A. Pipe fittings, including couplings, tees, elbows, Ys, plugs, unions, pipe caps, or reducers
B. Flanges: all flanges
C. Valves: all line valves
D. Expansion joints, flexible connections, and hose assemblies: all types
E. Steam, filters, separators, and steam traps
F. Measuring devices, including pressure gauges, level gauges, sight glasses, levelers, or pressure transmitters
G. Certified capacity-rated pressure relief devices acceptable as primary or pressure protection on boilers, pressure vessels, piping and fusible plugs
H. Pressure retaining components that do not fall into one of the above categories
I. Nuclear components: Class I ☐ Class II ☐ Class III ☑ (Meeting CANC or ASME requirements)

LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEMS TO BE REGISTERED:

KROHNE

CRNI: OH14014.2
FICK: 1818

DECLARATION:

I, [Name], employed by KROHNE LTD and being the person having full authority and responsibility for the quality of the end product do solemnly declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by [Company name] as being suitable for that purpose and make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Signature of Declarer:

[Signature]

Declared before me at [Location]

This 21st day of March 2013

Commissioner of Oaths or Notary Public (sign)

[Signature]

After Official seal to be the right)

This space for Regulatory Authority use

This registration must be revalidated after ten (10) years from the date of acceptance.

C.R.N.: OH14014.2

F.I.D.: 1818

Notes:
1. All fittings shall be registered in the name of the Manufacturer.
2. Each category shall be supported with two Statutory Declaration Forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be revalidated at a maximum interval of five (5) years.

C.R.N.: OH14014.2 B

Dwg. as described

Signed

[Signature]

[Stamp]
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK  NOVA SCOTIA  PRINCE EDWARD ISLAND  NEWFOUNDLAND AND LABRADOR
NUNAVUT  YUKON  NORTHWEST TERRITORIES

MANUFACTURER'S NAME: KROHNE LTD
MANUFACTURER'S ADDRESS: RUTHERFORD DRIVE PEARL ISLAND, NEW YORK, USA;
PLANT LOCATIONS: WELLING BOROUGH, NEW YORK, USA; DUNKBURG, GERMANY

CATEGORY OF FITTINGS TO BE REGISTERED. CIRCLE ONE CATEGORY ONLY
A. Pipe fittings, including couplings, flanges, elbows, etc., etc., pipes, union, pipe caps, or reducers
B. Flanges: all flanges
C. Valves: all the valves
D. Expansion joints, flexible couplings, and hose assemblies: all types
E. Dimmers, filters, separations, and steam traps
F. Valves, including pressure gauges, level gauges, sight glasses, valves, or pressure transmitters
G. Certified capacity-rated pressure relief devices acceptable as primary over pressure protection
H. Pressure retaining components that do not fall into any of the above categories

 SIZE OF CONSTRUCTION

FORMED OF WROUGHT OR CAST STEEL OR OTHER

DECLARATION:

(As per Act) employed by KROHNE LTD and being the person having full authority and responsibility for the quality of the end product do solemnly declare that the information contained in this form is true and to the best of my knowledge and experience, represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by

Signature of Declarer: [Signature]
Declared before me at WELLINGBOROUGH, ENGLAND on this 26th day of AD 2012
Commissioner of Oaths or Notary Public (sign)

[Official seal to the right]

This space for Regulatory Approval.

PROVINCE OF PRINCE EDWARD ISLAND
ENVIRONMENT, LABOUR & JUSTICE

CRN: 09140014-2
FID:

Note:
1. All fittings shall be registered in the name of the Manufacturer.
2. Each category shall be supported with two Statutory Declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be revalidated for validation at a maximum interval of five (5) years.

ACCEPTED

PROVINCE OF PRINCE EDWARD ISLAND
ENVIRONMENT, LABOUR & JUSTICE

C.R.N. 09140014-2
DATE: [Signature]

INSPECTION SERVICES SECTION
BOILER/PRESSURE VESSELS BOARD

Sec. 1.0 - Pringle Rev. 1 06/2003
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

MANUFACTURERS NAME: KROHNE LTD
MANUFACTURERS ADDRESS: 235 E. BROADWAY, SELANGOR, MALAYSIA
PLANT LOCATIONS: WELLING, BOLTON, UK, WASHINGTON, USA, DUISBURG, GERMANY

CATEGORY OF FITTINGS TO BE REGISTERED, COMPARE ONE CATEGORY ONLY
A. Pipe fittings, including couplings, tees, elbows, Ys, plugs, unions, pipe caps, or reducers
B. Flanges: all flanges
C. Valves: all line valves
D. Expansion joints, flexible connectors, and flange assemblies: all types
E. Strainers, filters, expansion, and drain traps
F. Measuring devices, including pressure gauges, level gauges, sight glasses, levels, or pressure transmitters
G. Certified quality rejects pressure relief devices acceptable as primary over pressure protection on boilers, pressure vessels, piping and fluid plugs
H. Pressure retaining components that do not fall within one of the above categories
N. Nuclear components: Class 1 I, Class 2 I, Class 2 II, (Nuclear UNSC or ASME requirements)

MARK AS
A. ASME B31.3
B. ASME Sec. VIII

APPEAR ON THE PRODUCT

LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEMS TO BE REGISTERED:

OPTIMASS 6000

DECLARATION:

I, P. PAWSEY, am employed by, KROHNE LTD., being the person having full authority and responsibility for the quality of the end product do solemnly declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the hereby named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by TUV-VS as being suitable for that purpose and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Signature of Declarant:

[Signature]

This registration must be revalidated after ten (10) years from the date of registration.

CMR: DH14014.2

Notes:
1. All fittings shall be registered in the name of the manufacturer.
2. Each category shall be supported with two statutory declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be submitted for validation at a maximum interval of five (5) years.

Territorial Registration Fee
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK
KROHNE LTD
MANUFACTURERS NAME
MANUFACTURERS ADDRESS: RUTHFORD DRIVE PARKFARM WELLENGROUHGN119, 0
PLANT LOCATIONS: WELLENGROUH KENOSHA USA, B BURG GERMANY
LUK

CATEGORIES OF FITTINGS TO BE REGISTERED: SINGLE ONE CATEGORY ONLY
A. Pipe fittings, including couplings, tees, elbows, Y's, plugs, unions, pipe caps, or reducers
B. Flanges of flanges
C. Valves: all valves
D. Expansion joints, flexible connections, and hose assemblies: all types
E. Strainers, filters, separators, and steam traps
F. Measuring devices, including pressure gauges, level gauges, sight glasses, levellers, or pressure transmitters
G. Certified capacity-rated pressure relief devices acceptable as primary over pressure protection on boilers, pressure vessels, piping and fusible plugs
H. Pressure retaining components that do not fall into one of the above categories

N. Nuclear components: Class 1, Class 2, Class 3 (meeting CAN or ASME requirements)

I. APPEAR ON THE PRODUCT

KROHNE
LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEMS TO BE REGISTERED:

OPTIMASS 6000

DECLARATION:

I, F. PAULGUTT, am employed by KROHNE LTD, and being the person having full authority and responsibility for the quality of the end product do hereby declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each plant where fabrication occurs in whole or in part and has been verified by TUV-UK.

Signature of Declarer: H. D. DACRE
Declared before me at WELLENGROUH, KENOSHA, USA on this 2nd day of December, 2012
Commissioner of Oaths or Notary Public (sign)
(Please official seal to the right)

This space for Regulatory Authority use

This registration must be revalidated after ten (10) years from the date of registration.

CRN: 0H14014.2
FIDS: 1818

Notes:
1. All things shall be registered in the name of the Manufacturer.
2. Each category shall be supported with three Statutory Declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be substantiated for validation at a minimum interval of five (5) years.

Northwest Territory
REGISTERED
UNDER THE AUTHORITY OF THE BOILER AND PRESSURE VESSEL ACT
C.R.N. 0H14014.2T
SIGNATURE: 
SIGNATURE: 
DATE: 08/07/2003

M29, 09.14.12 AM PMS ELECTROCARDIOMGRAPHIC
UNIFORM STATUTORY DECLARATION FORM FOR THE REGISTRATION OF FITTING DESIGNS

NEW BRUNSWICK
NOVA SCOTIA
PRINCE EDWARD ISLAND
YUKON
NUNAVUT
NORTHWEST TERRITORIES
NEWFOUNDLAND AND LABRADOR

MANUFACTURERS NAME: KROHNE LTD

MANUFACTURERS ADDRESS: 69 High Street, Harvard, England NN7 4BS

PLANT LOCATIONS: WELLINGTON, UK, PARADOX USA, DUISBURG GERMANY

CATEGORY OF FITTINGS TO BE REGISTERED: SINGLE ONE CATEGORY ONLY

A. Pipe fittings, including couplings, tees, elbows, Ys, plugs, unions, pipe caps, or reducers
B. Flanges: all flanges
C. Valves: all valves
D. Expansion joints, flexible connections, and hose assemblies: all types
E. Strainers, filters, separators, and steam traps
F. Measuring devices, including pressure gauges, level gauges, sight glasses, levels, or pressure transmitters
G. Certified capacity-rated pressure relief devices acceptable as primary over pressure protection on boilers, pressure vessels, piping and fusible plugs
H. Pressure-retaining components that do not fall into one of the above categories
I. Nuclear components: Class 1, Class 2, Class 3 (Meeting CNR or ASME requirements)

TYPE OF CONSTRUCTION

FORGED "WELDED" (F), "WROUGHT OR CAST" (C), OTHER (O) DESCRIBE OTHER

LIST OF SUPPORTING DOCUMENTATION AND IDENTIFICATION OF THE ACTUAL ITEMS TO BE REGISTERED:

OPTIMASS 6000

DECLARATION:

I, T. FAUCETT, am employed by KROHNE LTD and being the person having full authority and responsibility for the quality of the end product do solemnly declare that the information contained in this form is true and to the best of my knowledge represents the product for which registration is sought. The dimensions, materials of construction, pressure temperature ratings, and identification markings are in accordance with the herein named standards. I further declare that the manufacture of these fittings is regulated by a Quality Control Program which extends to each product where fabrication occurs in whole or in part and has been verified by T.U.K. as being suitable for that purpose and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Signature of Declarer

Declared before me at

This 2ND day of May, 2013

Commissioner of Oaths or Notary Public (sign)

This space for Regulatory Authority use

This registration must be revalidated after ten (10) years from the date of acceptance.

CRN 0H14C14-2

FID: 1818

Notes:

1. All fittings shall be registered in the name of the Manufacturer.
2. Each category shall be supported with two Statutory Declaration forms and one copy of supporting documentation.
3. The declaration shall be made by the person having full authority and responsibility for the quality of the end product.
4. Quality control programs shall be revalidated for validation at a maximum interval of five (5) years.

Sect: 1.5 - Fittings Rev 1 05/2003
SCOPE of OPTIMASS 6000 Series
CRN application

MODEL NUMBERS:
OPTIMASS 6000 series, this includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x= 0-9)

DESCRIPTION:
OPTIMASS 6000 series of 10 sizes and 3 materials (S08, H08, S10, H10, S15, H15, S25, H25, S50, H50, S80, H80, S100, D100, S150, D150, S200, D200, S250) represents a Mass Flow Meter "tube" with a welded "flange" on each side (S denotes 316 stainless steel, H Hastelloy and D Duplex stainless steel full material specifications are given below). One of the following signal converters can be directly mounted on top of each Mass Flow Meter or be remotely connected by electrical cable: MFC02xC, MFC04xC, MFC400C, MFC400F, MFC400W. OPTIMASS 602xC and 604xC do not have a signal converter attached, instead are only remotely connected to customer's PLC or other non-KROHNE converter equipment. The Optimass 6000 can also be fitted with optional heating jackets.

(Please note the Optimass 6000 is an extended range of flow meters replacing the Optimass 8000k already registered under CRN OF07838.2, the 6000 range has additional sizes and materials and extended temperature range. From a pressure retaining point of view the Optimass 8000k and 6000 are the same except for some differences in the size designations; S15, S25, S80 and S100 are the same in both ranges. However Optimass 8000k S40 is equivalent to Optimass 6000 S50).

DESIGN STANDARD FOR TUBE: ASME B31.3
DESIGN STANDARD FOR FLANGE: ASME B16.5-2003; table 2-2.2 and 2-2.8
DESIGN STANDARD FOR HEATING JACKET: ASME B31.3, ASME Section VIII, Division 1 paragraph UG-101

MATERIAL OF TUBES: Stainless Steel 316/316L Dual certified to ASTM A269, mechanical properties to ASTM A213.
    Hastelloy C22 NO6022 to ASTM B622, B619 or B626
    Duplex Stainless Steel UNS S31803 to ASTM A789 or A790

MATERIAL OF FLANGES:
Meters with 316 stainless steel or hastelloy tubes: ASME B16.5-2003; table 2-2.2  16Cr-12Ni-2Mo (316/316L stainless steel dual certified.)
Meters with Duplex stainless steel tubes: ASME B16.5-2003; table 2-2.8 22Cr-5Ni-3Mo-N (Gr. F51 or S31803)

MAXIMUM TEMPERATURE OF TUBE / FLANGE: 316 stainless steel and HC22 400 °C (752 °F), Duplex 230 °C (446 °F)

Maximum Working pressures are given on the following page.
**OPTIMASS 6000 SERIES 316/316L TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (*)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>1450</td>
<td>1450</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1282</td>
<td>1282</td>
</tr>
<tr>
<td>300°F</td>
<td>0.5 - 16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1110</td>
<td>1114</td>
<td>1114</td>
</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>195</td>
<td>515</td>
<td>945</td>
<td>947</td>
<td>947</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>184</td>
<td>497</td>
<td>870</td>
<td>870</td>
<td>870</td>
</tr>
<tr>
<td>500°F</td>
<td>0.5 - 16 inclusive</td>
<td>170</td>
<td>480</td>
<td>818</td>
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<td>600°F</td>
<td>0.5 - 16 inclusive</td>
<td>140</td>
<td>450</td>
<td>725</td>
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</tr>
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<td>435</td>
<td>631</td>
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</tr>
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<td>752°F</td>
<td>0.5 - 16 inclusive</td>
<td>94</td>
<td>424</td>
<td>580</td>
<td>580</td>
<td>580</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES HC22 TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (*)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
<td>2900</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1860</td>
<td>2740</td>
</tr>
<tr>
<td>300°F</td>
<td>0.5 - 16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1120</td>
<td>1680</td>
<td>2581</td>
</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>195</td>
<td>515</td>
<td>1025</td>
<td>1540</td>
<td>2422</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>184</td>
<td>497</td>
<td>992</td>
<td>1491</td>
<td>2349</td>
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<td>500°F</td>
<td>0.5 - 16 inclusive</td>
<td>170</td>
<td>480</td>
<td>955</td>
<td>1435</td>
<td>2284</td>
</tr>
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<td>140</td>
<td>450</td>
<td>900</td>
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<td>700°F</td>
<td>0.5 - 16 inclusive</td>
<td>110</td>
<td>435</td>
<td>870</td>
<td>1305</td>
<td>2047</td>
</tr>
<tr>
<td>752°F</td>
<td>0.5 - 16 inclusive</td>
<td>94</td>
<td>424</td>
<td>854</td>
<td>1280</td>
<td>1986</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES Duplex TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp (ambient)</th>
<th>Sizes (*)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500 (D100)</th>
<th>Class 1500 (D150/200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-58 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>290</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
<td>2900</td>
<td>2900</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>260</td>
<td>745</td>
<td>1490</td>
<td>2230</td>
<td>2669</td>
<td>2564</td>
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<td>300°F</td>
<td>0.5 - 16 inclusive</td>
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<td>665</td>
<td>1335</td>
<td>2000</td>
<td>2439</td>
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</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>200</td>
<td>615</td>
<td>1230</td>
<td>1845</td>
<td>2209</td>
<td>1894</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>186</td>
<td>599</td>
<td>1198</td>
<td>1797</td>
<td>2103</td>
<td>1740</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES OPTIONAL HEATING JACkETS MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp</th>
<th>Meter Sizes</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 446°F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>145</td>
</tr>
<tr>
<td>-319 to 752°F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>72.5</td>
</tr>
</tbody>
</table>
December 17, 2013

Attention: C N Rolph
KROHNE LIMITED
RUTHERFORD DRIVE
NORTHANTS
WELLINGBOROUGH, NN8 6AE

The design submission, tracking number 2013-00838, originally received on February 08, 2013 was surveyed and accepted for registration as follows:

CRN: 0H14014.2
Accepted on: December 17, 2013
Reg Type: New Design
Expiry Date: December 17, 2023
Drawing No.: 7961089989 OPTIMASS 6000 PER NOTES BELOW Rev 07 As Noted
Fitting type: FLOWMETERS

<table>
<thead>
<tr>
<th>Description</th>
<th>MAWP</th>
<th>Design Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER NOTES BELOW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The registration is conditional on your compliance with the following notes:

This registration is valid only for fittings fabricated at the location(s) covered by the QC certificate attached to the accepted AB-41 Statutory Declaration form. This registration is valid only until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of the quality management system lapse before the expiry date indicated above, this registration shall become void.

- MAWP's are as per the above referenced document.
- With the exception of heating coils, all models referred to on the above document are included with this registration.
- The heating tubes / coils for the following models are included, with conditions, for this registration: S100, S150, S200, D100, D150, D200. The conditions are as follows:
  - per your indication by telephone, welds attaching the box section to connection pipes / threaded connections shall be full groove with fillet.
  - per your indication by telephone, all longitudinal welds, and circumferential welds are full groove.
  - per your indication by telephone, material for the box sections shall be A182-316/316L or A240-316/316L, and connection pipes shall be A312-316/316L.

- The heating tubes / coils for models S08, S10, S15, S25, S50, S80, S250, H08, H10, H15, H25, H50, and H80 are excluded from this registration.
- Some 600# flange attachment configurations are not rated to match ASME B16.5 ratings. Per the above document, some 900# and all 1500# flanges are not rated to match ASME B16.5 ratings.
- When the assembly is incapable of meeting ASME B16.5 ratings, the ASME B16.5 markings shall be removed from the flanges.
- External 0.5 inch BSPP threads for the half inch schedule 40 pipe shall have a minimum diameter of at least 18.63 mm.
- The drawings included with this application shall be revised in accordance with the above notes.
- The document entitled "Optimass 6000 CRN application Rev 04" is part of this application.
December 17, 2013

The registration is conditional on your compliance with the following notes:

- The FEA report dated September 17, 2013, depicts the spigot and formed tube from drawings 3969002089 and 3969112089, and this report represents the worst case of all design conditions, model numbers and configurations proposed.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 3356 or fax (780) 437-7787 or e-mail sterling@absa.ca.

Sincerely,

[Signature]

STERLING, CAMERON, P. Eng.
I, Dr Yousif Hussain, Technical Director of KROHNE Limited located at Rutherford Drive, Park Farm, Wellingborough, Northants, NN8 6AE, UK, do solemnly declare that the fittings listed hereunder, which are subject to the Safety Codes Act (check one)

☐ comply with the requirements of ____________ which specifies the dimensions, materials of construction, pressure/temperature ratings and identification marking of the fittings, or

☒ are not covered by the provisions of a recognized North American standard and are therefore manufactured to comply with ASME B31.3 or ASME VIII as supported by the attached data which identifies the dimensions, materials of construction, pressure/temperature ratings and the basis for such ratings, and the marking of the fittings for identification.

I further declare that the manufacture of these fittings is controlled by a quality control program which has been verified by the following authority, TUV-UK as being suitable for the manufacture of these fittings to the stated standard. The fittings covered by this declaration, for which I seek registration, are Category F

In support of this application, the following information, calculations and/or test data are attached:
Optimass 6000

DECLARED before me at __________ in the __________ of __________, on __________ day of __________, 2012

(print) Michael Orton-Jones
Solicitor & Notary Public

(sign) __________
(A Commissioner for Oaths)

(Signature of Applicant)

For Office Use Only

To the best of my knowledge and belief, the application meets the requirements of the Safety Codes Act and CSA Standard B51, Clause 4.2, and is accepted for registration in Category __________

Registration Number: 0H140142
Date Registered: 19-DEC-2013

The information you provide is necessary only for the administration of the programs as required by the Alberta Safety Codes Act and Regulations in the Boiler Discipline.
ALBERTA BOILERS SAFETY ASSOCIATION
9410 20 AVENUE NW
EDMONTON AB T6N 0A4

Date: March 11, 2014
Account #: 34986
Journal #: 59220
Our File #: 5487811

Attn: CYNTHIA FORMANIUK
Re: Application for Design Registration

The design, as detailed in your, ABSA Tracking No: 2013-00838, for a Fitting is accepted for registration as follows:

Registered To: KROHNE LTD

CRN: 0H14014.21

Drawing #: 7961089989 OPTIMASS 6000
Drawing Revision: 07 (as noted by ABSA)

Conditions Of Registration:
Registration of Optimass 6000 Flowmeters per scope of registration sheets (2 pages).
This design was registered based on a technical review performed by the province of initial registration in accordance with the Association of Chief Inspectors policy on reciprocal recognition of design review.

Reviewer’s Notes:
ABSA's registration notes apply. As required by CSA B51 4.2.1, this registration expires on December 17, 2023. This CRN is valid until the expiry date as long as the Manufacturer maintains a valid quality control program verified by an acceptable third-party agency until that date. Should the certification of the quality control program lapse before the expiry date, this registration shall become void.

Contact me if you have any questions. The invoice for registration will be forwarded under separate cover.

SHARON PETERS
(778) 396-2027
Sharon.Peters@safetyauthority.ca
Design Administration

cc:
MODEL NUMBERS:
OPTIMASS 6000 series, this includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x= 0-9)

DESCRIPTION:
OPTIMASS 6000 series of 10 sizes and 3 materials (S08, H08, S10, H10, S15, H15, S25, H25, S50, H50, S80, H80, S100, D100, S150, D150, S200, D200, S250) represents a Mass Flow Meter "tube" with a welded "flange" on each side (S denotes 316 stainless steel, H Hastelloy and D Duplex stainless steel full material specifications are given below). One of the following signal converters can be directly mounted on top of each Mass Flow Meter or be remotely connected by electrical cable: MFC02xC, MFC04xC, MFC400C, MFC400F, MFC400W. OPTIMASS 602xC and 604xC do not have a signal converter attached, instead are only remotely connected to customer's PLC or other non-KROHNE converter equipment. The Optimass 6000 can also be fitted with optional heating jackets. (Please note the Optimass 6000 is an extended range of flow meters replacing the Optimass 8000k already registered under CRN OF07838.2, the 6000 range has additional sizes and materials and extended temperature range. From a pressure retaining point of view the Optimass 8000k and 6000 are the same except for some differences in the size designations; S15, S25, S80 and S100 are the same in both ranges. However Optimass 8000k S40 is equivalent to Optimass 6000 S50).

DESIGN STANDARD FOR TUBE: ASME B31.3
DESIGN STANDARD FOR FLANGE: ASME B16.5-2003; table 2-2.2 and 2-2.8
DESIGN STANDARD FOR HEATING JACKET: ASME B31.3, ASME Section VIII, Division 1 paragraph UG-101

MATERIAL OF TUBES: Stainless Steel 316/316L Dual certified to ASTM A269, mechanical properties to ASTM A213.
Hastelloy C22 NO6022 to ASTM B622, B619 or B626
Duplex Stainless Steel UNS S31803 to ASTM A789 or A790

MATERIAL OF FLANGES:
Meters with 316 stainless steel or hastelloy tubes: ASME B16.5-2003; table 2-2.2 16Cr-12Ni-2Mo (316/316L stainless steel dual certified.)
Meters with Duplex stainless steel tubes: ASME B16.5-2003; table 2-2.8 22Cr-5Ni-3Mo-N (Gr. F51 or S31803)

MAXIMUM TEMPERATURE OF TUBE / FLANGE: 316 stainless steel and HC22 400°C (752°F), Duplex 230°C (446°F)

Maximum Working pressures are given on the following page.
### OPTIMASS 6000 SERIES 316/316L TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100</td>
<td>0.5 -16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
<td>2880</td>
</tr>
<tr>
<td>200</td>
<td>0.5 -16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1832</td>
<td>2552</td>
</tr>
<tr>
<td>300</td>
<td>0.5 -16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1120</td>
<td>1714</td>
<td>2434</td>
</tr>
<tr>
<td>400</td>
<td>0.5 -16 inclusive</td>
<td>195</td>
<td>515</td>
<td>1025</td>
<td>1540</td>
<td>2250</td>
</tr>
<tr>
<td>446</td>
<td>0.5 -16 inclusive</td>
<td>184</td>
<td>497</td>
<td>992</td>
<td>1491</td>
<td>2184</td>
</tr>
<tr>
<td>500</td>
<td>0.5 -16 inclusive</td>
<td>170</td>
<td>480</td>
<td>955</td>
<td>1435</td>
<td>2128</td>
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<tr>
<td>600</td>
<td>0.5 -16 inclusive</td>
<td>140</td>
<td>450</td>
<td>900</td>
<td>1355</td>
<td>2016</td>
</tr>
<tr>
<td>700</td>
<td>0.5 -16 inclusive</td>
<td>110</td>
<td>435</td>
<td>870</td>
<td>1305</td>
<td>1947</td>
</tr>
<tr>
<td>752</td>
<td>0.5 -16 inclusive</td>
<td>94</td>
<td>424</td>
<td>854</td>
<td>1280</td>
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</tbody>
</table>

### OPTIMASS 6000 SERIES HC22 TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
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</thead>
<tbody>
<tr>
<td>-319 to 100</td>
<td>0.5 -16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
<td>2880</td>
</tr>
<tr>
<td>200</td>
<td>0.5 -16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1832</td>
<td>2552</td>
</tr>
<tr>
<td>300</td>
<td>0.5 -16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1120</td>
<td>1714</td>
<td>2434</td>
</tr>
<tr>
<td>400</td>
<td>0.5 -16 inclusive</td>
<td>195</td>
<td>515</td>
<td>1025</td>
<td>1540</td>
<td>2250</td>
</tr>
<tr>
<td>446</td>
<td>0.5 -16 inclusive</td>
<td>184</td>
<td>497</td>
<td>992</td>
<td>1491</td>
<td>2184</td>
</tr>
<tr>
<td>500</td>
<td>0.5 -16 inclusive</td>
<td>170</td>
<td>480</td>
<td>955</td>
<td>1435</td>
<td>2128</td>
</tr>
<tr>
<td>600</td>
<td>0.5 -16 inclusive</td>
<td>140</td>
<td>450</td>
<td>900</td>
<td>1355</td>
<td>2016</td>
</tr>
<tr>
<td>700</td>
<td>0.5 -16 inclusive</td>
<td>110</td>
<td>435</td>
<td>870</td>
<td>1305</td>
<td>1947</td>
</tr>
<tr>
<td>752</td>
<td>0.5 -16 inclusive</td>
<td>94</td>
<td>424</td>
<td>854</td>
<td>1280</td>
<td>1838</td>
</tr>
</tbody>
</table>

### OPTIMASS 6000 SERIES Duplex TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes ((^\circ)F)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500 (D08-D100)</th>
<th>Class 1500 (D150/200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-58 to 100</td>
<td>0.5 -16 inclusive</td>
<td>290</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
<td>2920</td>
<td>2920</td>
</tr>
<tr>
<td>200</td>
<td>0.5 -16 inclusive</td>
<td>260</td>
<td>745</td>
<td>1490</td>
<td>2230</td>
<td>2880</td>
<td>2880</td>
</tr>
<tr>
<td>300</td>
<td>0.5 -16 inclusive</td>
<td>230</td>
<td>665</td>
<td>1335</td>
<td>2000</td>
<td>2580</td>
<td>2580</td>
</tr>
<tr>
<td>400</td>
<td>0.5 -16 inclusive</td>
<td>200</td>
<td>615</td>
<td>1230</td>
<td>1845</td>
<td>2430</td>
<td>2430</td>
</tr>
<tr>
<td>446</td>
<td>0.5 -16 inclusive</td>
<td>186</td>
<td>599</td>
<td>1198</td>
<td>1797</td>
<td>2113</td>
<td>2113</td>
</tr>
</tbody>
</table>

### OPTIMASS 6000 SERIES OPTIONAL HEATING JACKETS MAXIMUM WORKING PRESSURE (psig):

<table>
<thead>
<tr>
<th>Temp</th>
<th>Meter Sizes</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 446 F</td>
<td>All Sizes and materials</td>
<td>145</td>
</tr>
<tr>
<td>-319 to 752 F</td>
<td>All Sizes and materials</td>
<td>72.5</td>
</tr>
</tbody>
</table>
July 17, 2014

ABSA
9410 20th Ave NW
Edmonton, AB
T6N 0A4

Attn: Cynthia Formaniuk

REGISTRATION OF VALVES AND FITTINGS

Manufacturer: KROHNE LTD.

The design(s) for the following Valves/Fittings has been received by us and has been examined and accepted for registration in the Province of Manitoba as follows.

<table>
<thead>
<tr>
<th>DRAWING / CATALOGUE</th>
<th>CRN</th>
<th>FILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7961089989 OPTIMASS 6000</td>
<td>0H14014.24</td>
<td>33790</td>
</tr>
</tbody>
</table>

An invoice covering survey and registration fees is enclosed.

NOTE: CRN registered under reciprocal agreement & is conditional based on compliance with the notes set by the original issuing Jurisdiction: ABSA. See attached stamped “this is part of CRN” for scope of registration. This registration expires December 27, 2023.

This registration is valid until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of the quality management system lapse before the expiry date indicated above, this registration shall become void.

The registration of this design does not relieve the manufacturer, the owner or his agent of the responsibility for the design or construction of a fitting in accordance with the applicable Acts, Codes and Standards. Inspection and Technical Services assumes no responsibility by registering designs, examining plans and/or inspecting equipment or facility.

Yours truly,

[Signature]

Ryan DeLury, C.E.T.
Senior Design Surveyor, Inspection and Technical Services
I, Dr Yousif Hussain, Technical Director of KROHNE Limited, declare that the fittings, which are subject to the Safety Codes Act, comply with the requirements of ASME B31.3 or ASME VIII as supported by the attached data which identifies the dimensions, materials of construction, pressure/temperature ratings and the basis for such ratings, and the marking of the fittings for identification.

I further declare that the manufacture of these fittings is controlled by a quality control program which has been verified by the following authority, TUV-UK as being suitable for the manufacture of these fittings to the stated standard. The fittings covered by this declaration, for which I seek registration, are Category F

Optimass 6000

DECLARED before me at Wellesby in the county of Lincolnshire on this 28th day of March 2012

(Signature of Applicant)

For Office Use Only

To the best of my knowledge and belief, the application meets the requirements of the Safety Codes Act and CSA Standard B51, Clause 4.2, and is accepted for registration in Category "A" Registration Number: BH14014.24

Date Registered: June 20, 2014

Expiration Date: Dec 27, 2013

The information you provide is necessary only for the administration of the programs as required by the Alberta Safety Codes Act and Regulations in the Boiler Discipline.
December 17, 2013

Attention: C N Rolph
KROHNE LIMITED
RUTHERFORD DRIVE
NORTHANTS
WELLINGBOROUGH, NN8 6AE

The design submission, tracking number 2013-00838, originally received on February 08, 2013 was surveyed and accepted for registration as follows:

CRN : 0H14014.2
Accepted on: December 17, 2013
Reg Type: New Design
Expiry Date: December 17, 2023
Drawing No. : 7961089989 OPTIMASS 6000 PER NOTES BELOW Rev 07 As Noted
Fitting type: FLOWMETERS

The registration is conditional on your compliance with the following notes:

This registration is valid only for fittings fabricated at the location(s) covered by the QC certificate attached to the accepted AB-41 Statutory Declaration form. This registration is valid only until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of the quality management system lapse before the expiry date indicated above, this registration shall become void.

- MAWPs are as per the above referenced document.
- With the exception of heating coils, all models referred to on the above document are included with this registration.
- The heating tubes / coils for the following models are included, with conditions, for this registration: S100, S150, S200, D100, D150, D200. The conditions are as follows:
  * per your indication by telephone, welds attaching the box section to connection pipes / threaded connections shall be full groove with fillet.
  * per your indication by telephone, all longitudinal welds, and circumferential welds are full groove.
  * per your indication by telephone, material for the box sections shall be A182-316/316L or A240-316/316L, and connection pipes shall be A312-316/316L.

- The heating tubes / coils for models S08, S10, S15, S25, S50, S80, S250, H08, H10, H15, H25, H50, and H80 are excluded from this registration.
- Some 600# flange attachment configurations are not rated to match ASME B16.5 ratings. Per the above document, some 900# and all 1500# flanges are not rated to match ASME B16.5 ratings.
- When the assembly is incapable of meeting ASME B16.5 ratings, the ASME B16.5 markings shall be removed from the flanges.
- External 0.5 inch BSPP threads for the half inch schedule 40 pipe shall have a minimum diameter of at least 18.63 mm.
- The drawings included with this application shall be revised in accordance with the above notes.
- The document entitled "Optimass 6000 CRN application Rev 04" is part of this application.
December 17, 2013

The registration is conditional on your compliance with the following notes:

- The FEA report dated September 17, 2013, depicts the spiggot and formed tube from drawings 3969002089 and 3969112089, and this report represents the worst case of all design conditions, model numbers and configurations proposed.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 3356 or fax (780) 437-7787 or e-mail sterling@absa.ca.

Sincerely,

STERLING, CAMERON, P. Eng.
SCOPE of OPTIMASS 6000 Series
CRN application

MODEL NUMBERS:
OPTIMASS 6000 series, this includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x= 0-9)

DESCRIPTION:
OPTIMASS 6000 series of 10 sizes and 3 materials (S08, H08, S10, H10, S15, H15, S25, H25, S50, H50, S80, H80, S100, D100, S150, D150, S200, D200, S250) represents a Mass Flow Meter "tube" with a welded "flange" on each side (S denotes 316 stainless steel, H Hastelloy and D Duplex stainless steel full material specifications are given below). One of the following signal converters can be directly mounted on top of each Mass Flow Meter or be remotely connected by electrical cable: MFC02xC, MFC04xC, MFC400C, MFC400F, MFC400W. OPTIMASS 602xC and 604xC do not have a signal converter attached, instead are only remotely connected to customer's PLC or other non-KROHNE converter equipment. The Optimass 6000 can also be fitted with optional heating jackets. (Please note the Optimass 6000 is an extended range of flow meters replacing the Optimass 8000k already registered under CRN OF07838.2, the 6000 range has additional sizes and materials and extended temperature range. From a pressure retaining point of view the Optimass 8000k and 6000 are the same except for some differences in the size designations; S15, S25, S80 and S100 are the same in both ranges. However Optimass 8000k S40 is equivalent to Optimass 6000 S50).

DESIGN STANDARD FOR TUBE: ASME B31.3
DESIGN STANDARD FOR FLANGE: ASME B16.5-2003; table 2-2.2 and 2-2.8
DESIGN STANDARD FOR HEATING JACKET: ASME B31.3, ASME Section VIII, Division 1 paragraph UG-101

MATERIAL OF TUBES: Stainless Steel 316/316L Dual certified to ASTM A269, mechanical properties to ASTM A213.
Hastelloy C22 NO6022 to ASTM B622, B619 or B626
Duplex Stainless Steel UNS S31803 to ASTM A789 or A790

MATERIAL OF FLANGES:
Meters with 316 stainless steel or hastelloy tubes: ASME B16.5-2003; table 2-2.2 16Cr-12Ni-2Mo (316/316L stainless steel dual certified.)
Meters with Duplex stainless steel tubes: ASME B16.5-2003; table 2-2.8 22Cr-5Ni-3Mo-N (Gr. F51 or S31803)

MAXIMUM TEMPERATURE OF TUBE / FLANGE: 316 stainless steel and HC22 400 °C (752 °F), Duplex 230 °C (446 °F)

Maximum Working pressures are given on the following page.
Note: Maximum Working Pressures for each Class is based upon the lower of the design calculation rate of the OPTIMASS 6000 flowmeter and the Flange limits as described in ASME B16.5-2003; table 2-2.2. Pressures for some Class 900 and 1500 flanges are lower than those given in B16.5 and are highlighted in **green**.

**OPTIMASS 6000 SERIES 316/316L TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes (&quot;)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>1450</td>
<td>1450</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1282</td>
<td>1282</td>
</tr>
<tr>
<td>300°F</td>
<td>0.5 - 16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1110</td>
<td>1114</td>
<td>1114</td>
</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>195</td>
<td>515</td>
<td>945</td>
<td>947</td>
<td>947</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>184</td>
<td>497</td>
<td>870</td>
<td>870</td>
<td>870</td>
</tr>
<tr>
<td>500°F</td>
<td>0.5 - 16 inclusive</td>
<td>170</td>
<td>480</td>
<td>818</td>
<td>818</td>
<td>818</td>
</tr>
<tr>
<td>600°F</td>
<td>0.5 - 16 inclusive</td>
<td>140</td>
<td>450</td>
<td>725</td>
<td>725</td>
<td>725</td>
</tr>
<tr>
<td>700°F</td>
<td>0.5 - 16 inclusive</td>
<td>110</td>
<td>435</td>
<td>631</td>
<td>631</td>
<td>631</td>
</tr>
<tr>
<td>752°F</td>
<td>0.5 - 16 inclusive</td>
<td>94</td>
<td>424</td>
<td>580</td>
<td>580</td>
<td>580</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES HC22 TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes (&quot;)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>275</td>
<td>720</td>
<td>1440</td>
<td>2160</td>
<td>2900</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>235</td>
<td>620</td>
<td>1240</td>
<td>1800</td>
<td>2740</td>
</tr>
<tr>
<td>300°F</td>
<td>0.5 - 16 inclusive</td>
<td>215</td>
<td>560</td>
<td>1120</td>
<td>1680</td>
<td>2581</td>
</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>195</td>
<td>515</td>
<td>1025</td>
<td>1540</td>
<td>2422</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>184</td>
<td>497</td>
<td>962</td>
<td>1491</td>
<td>2349</td>
</tr>
<tr>
<td>500°F</td>
<td>0.5 - 16 inclusive</td>
<td>170</td>
<td>480</td>
<td>955</td>
<td>1435</td>
<td>2284</td>
</tr>
<tr>
<td>600°F</td>
<td>0.5 - 16 inclusive</td>
<td>140</td>
<td>450</td>
<td>900</td>
<td>1355</td>
<td>2166</td>
</tr>
<tr>
<td>700°F</td>
<td>0.5 - 16 inclusive</td>
<td>110</td>
<td>435</td>
<td>870</td>
<td>1305</td>
<td>2047</td>
</tr>
<tr>
<td>752°F</td>
<td>0.5 - 16 inclusive</td>
<td>94</td>
<td>424</td>
<td>854</td>
<td>1280</td>
<td>1986</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES Duplex TUBE WITH FLANGE ASME B16.5 MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp(ambient)</th>
<th>Sizes (&quot;)</th>
<th>Class 150</th>
<th>Class 300</th>
<th>Class 600</th>
<th>Class 900</th>
<th>Class 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>-58 to 100°F</td>
<td>0.5 - 16 inclusive</td>
<td>290</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
<td>2900</td>
</tr>
<tr>
<td>200°F</td>
<td>0.5 - 16 inclusive</td>
<td>260</td>
<td>745</td>
<td>1490</td>
<td>2230</td>
<td>2660</td>
</tr>
<tr>
<td>300°F</td>
<td>0.5 - 16 inclusive</td>
<td>230</td>
<td>665</td>
<td>1335</td>
<td>2000</td>
<td>2430</td>
</tr>
<tr>
<td>400°F</td>
<td>0.5 - 16 inclusive</td>
<td>200</td>
<td>615</td>
<td>1230</td>
<td>1845</td>
<td>2209</td>
</tr>
<tr>
<td>446°F</td>
<td>0.5 - 16 inclusive</td>
<td>186</td>
<td>599</td>
<td>1198</td>
<td>1797</td>
<td>2103</td>
</tr>
</tbody>
</table>

**OPTIMASS 6000 SERIES OPTIONAL HEATING JACKETS MAXIMUM WORKING PRESSURE (psig):**

<table>
<thead>
<tr>
<th>Temp</th>
<th>Meter Sizes</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-319 to 446°F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>145</td>
</tr>
<tr>
<td>-319 to 752°F</td>
<td>All Sizes and materials (as specified on ABSA letter)</td>
<td>72.5</td>
</tr>
</tbody>
</table>
**Detail Information - Pressure Fitting Design**

**CRN:** 0H14014.29870YTN  
**Manufacturer:** Krohne Ltd.  
**FID/PV:** FID-1818  
**Trademark:** "KROHNE" in large wide, block font, enclosed in a rectangular shape.  
**Description:** Optimass 6000 series flowmeters (Includes OPTIMASS 6000, 6400C, 602xC, 604xC, 6000F (x=0-9). Note: Heating tubes/coils for S100,S150,S200,D100,D150,D200 are includ. with conditions shown in ABSA registration. Heating tubes/coils for S08toS80,S250 & H08toH80 are excluded from CRN.  
**Design code:** ASME B31.3 or ASME Sec.VIII  
**Registration date:** 2014/03/25  
**Expiry date:** 2023/12/17  

<table>
<thead>
<tr>
<th>Pressure Rating</th>
<th>Type</th>
<th>Size</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl.150 to 1500</td>
<td>OPTIMASS 6000</td>
<td>S08 to S250 (10 sizes)</td>
<td>A269,A213 316/316L;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(S-316SS;H-Hast.;D-Duplex)</td>
<td>B622,B619,B626N06022</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/2&quot; to 16&quot;</td>
<td>A789orA790 S31803</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(above mat'ls for tube)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flgs. B16.5 Table2-2.2 &amp;2.8</td>
</tr>
</tbody>
</table>