

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pneumatic Actuator

with type designation(s)
RC200

Issued to

Rotork Sweden AB
FALUN, Sweden

is found to comply with

Det Norske Veritas' Rules for Classification of Ships
Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Dsgn. press./Torque See certificate

This Certificate is valid until **2018-12-31**.

Issued at **Høvik** on **2015-09-17**

DNV GL local station: **Stockholm**

for **DNV GL**

Approval Engineer: **Simon Ratcliffe**

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Marianne Spæren Marveng
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Double acting (DA) and single acting spring closing (SR) pneumatic actuators approved according to DNV Ship Pt.4 Ch.7 Class III in the following sizes: RC210, 220, 230, 240, 250, 260, 265, 270, 280 and RC88.

This type approval covers the entire aluminium RC200 range with the exception of the following designations:

- C – Carbon steel variants
- E – Electric hydraulic variants

Materials:

| | | |
|------------------------|----------------------------------|--|
| Cylinder | Aluminium | ISO 6361 Al-SiMg |
| Endplate RC210–240 | Aluminium | ISO 3522 Al-Si12(Fe) AISI A360 (UNS A13600) |
| Endplate RC250–88 | Aluminium | ISO 3522 Al-Si10Mg AISI A360 (UNS A13600) |
| Spring house RC210–260 | Aluminium | ISO 3522 Al-Si12(Fe) AISI A360 (UNS A13600) |
| Spring house RC270–88 | Aluminium | ISO 3522 Al-Si10Mg AISI A360 (UNS A13600) |
| Drive shaft | Stainless steel/steel (optional) | |

Operating medium: Air/Inert gas
 Corrosion allowance: 0 mm

Application/Limitation

This approval is related to the strength of parts subjected to internal pressure. Actuator functionality and output torque have not been subject to review.

The actuators are approved for the following design temperature ranges:

Standard: -20/+80 °C
 High temp: 0/+150 °C
 Low temp: -40/+60 °C
 Low temp (arctic): -47/+60 °C

Maximum allowable pressures for each model:

| Model | Cylinder diameter (mm) | Maximum allowable pressure | |
|-------|------------------------|------------------------------|-------------------------|
| | | Standard and low temp models | High temp model |
| RC210 | Ø55 | 10 bar | 10 bar |
| RC220 | | | |
| RC230 | Ø85 | 10 bar | 10 bar |
| RC240 | | | |
| RC250 | Ø125 | 10 bar | 8.3 bar |
| RC260 | | | |
| RC265 | Ø140 | 8 bar | 6.3 bar |
| RC270 | Ø200 | 10 bar | 10 bar |
| RC280 | | | |
| RC88 | Ø200 | 6 bar (SR) 7bar (DA) | 6 bar (SR) 7bar (DA) |

The actuators have not been subject to fire testing.

Production testing

Each actuator is to be pneumatically tested at 1.1x the maximum allowable pressure before delivery. Testing shall be witnessed by a DNV Surveyor when required by the rules or by the customer.

Certification

Actuators may be delivered with a manufacturer's works certificate only.

Type Approval documentation

| <i>Doc. no.</i> | <i>Rev.</i> | <i>Description</i> | <i>Status</i> |
|-----------------|-------------|---|---------------|
| | | Rotork DNV Type Approval Application – verification of burst test pressure. | For Info |
| | | RC200 Catalogue | For Info |
| | | RC200-DA/SR Technical Data | For Info |
| 105613-M | | Spring Configurations for RC-Actuators | For Info |
| 119773 | E | Spring Housing RC230-240 | For Info |
| 119423 | F | Spring Housing machined RC230-240 | Approved |
| 009250 | B | Spring House Machined RC250-260 | Approved |
| 009249 | C | Spring house blank RC250-260 | For Info |
| 007354 | A | Cylinder drilling plan RC88 | For Info |
| 007347 | A | Cylinder Upper RC88 | For Info |
| 007346 | C | Cylinder lower RC88 | For Info |
| 001912 | C | Spring housing machined RC270-280-88 | Approved |
| 001908 | D | Spring housing blank RC270-280-88 | For Info |
| 000577 | C | Cylinder RC270 | Approved |
| 000575 | F | Cylinder RC260 | Approved |
| 000573 | G | Cylinder RC250 | Approved |
| 000567 | B | Cylinder RC240 | Approved |
| 000565 | E | Cylinder RC230 | Approved |
| 000561 | C | Cylinder RC220 | Approved |
| 000529 | F | End plate RC250-260 | Approved |
| 000525 | F | End plate RC230-240 | Approved |
| 000329 | C | Cylinder RC280 | Approved |
| 000317 | E | End plate RC270-280-88 | Approved |
| 000287 | G | Spring housing RC265 | Approved |
| 000274 | C | Cylinder RC265 | Approved |
| 000216 | E | End plate RC265 | Approved |

Tests carried out

Burst testing (Sizes RC220, 240, 260, 265, 280).

Marking of product

For traceability to this type approval the actuators are to be marked with:

- Manufacturer's name or trade mark
- Pressure rating and maximum torque
- Type designation

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform a survey - every second year and before the expiry date of this certificate - to verify that the conditions for the type approval are complied with.