DNV·GL

Certificate No:
TAM00000C7

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Rudder Actuator for Steering Gear

with type designation(s)
SR622, SR642 and SR662;For rudder angle 2x35, 2x45 or 2x70 degrees

Issued to
Rolls-Royce Marine AS Dept. Deck Machinery & steering gear-Brattvag
BRATTVÅG, Norway

is found to comply with
Det Norske Veritas' Rules for Classification of Ships

Application :

Can be used for all steering gears which according to current rules may be provided with single rudder actuator.

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2021-12-31**.

Issued at **Høvik** on **2016-10-20**

for **DNV GL**

DNV GL local station: **Ålesund**

Approval Engineer: **Nadine Grace Mosteiro Halvorsen**

Oddvar Deinboll
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.

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Job Id: **262.1-006117-4**
Certificate No: **TAM00000C7**

Product description

Type of actuator: Hydraulic rotary vane

Application/Limitation

Type		*SR 622* *2x(35,45 or 70) degrees*	*SR 642* *2x(35,45 or 70) degrees*	*SR 662* *2x(35,45 or 70) degrees*
Number of vanes		2	2	2
Design pressure	(bar)	156	156	156
Design torque	(kNm)	87,5	137,5	212,5
Max rule rudder torque [1)]	(kNm)	87,5	137,5	212,5
Max Working pressure	(bar)	125	125	125
Max Working torque	(kNm)	70	110	170
Max. rudder angle	(deg.)	35 / 45 / 70	35 / 45 / 70	35 / 45 / 70
Min. rudder stock diameter [2)]	(mm)	170	200	240
Max rudder stock diameter	(mm)	200	240	280
Max. rudder stock rule diameter [3)]	(mm)	200	240	280
Max. radial force	(kN)	400	600	700
Max. axial force	(kN)	200	250	345

Approval is based on a fitting of rudderstock to steering gear with Type Approved Tenfjord Friction Ring F4.

1) Mechanical limit – higher value requires re-approval of all torque transmitting components
2) Minimum rudder stock diameter is due to limitation in torque capacity for Tenfjord friction rings, at a design pressure of 156 bar. A smaller rudderstock may be accepted if design pressure is reduced correspondingly.
3) Based on rudder stock material with yield strength of 235 N/mm2

Type Approval documentation

Marking of product

The product is to be marked with the manufacturer's name or trademark and type number identification

Other conditions

- The approval includes only the hydraulic rudder actuator.
- A steering test is to be carried out under normal working conditions to demonstrate compliance with requirements {Pt.4 Ch.14 Sec.1 I200}.
- Mounting and operation instructions to follow each delivery.
- For steering gears required to comply with Pt.4 Ch.14 Sec.1 Appendix A, NDT shall be carried out on all machined surfaces of the upper and lower housing.

For approval of the complete steering gear the following must be submitted case-by-case:

- Technical data sheet.
- Hydraulic function diagram, piping diagram and electric wiring.
- Operating instructions, including emergency operation.
- Fastening arrangement, including bolting and chocking calculations (yard supply).
- Arrangement of steering gear compartment (yard supply).

Periodical assessment

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

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued. The main scope of the Periodical Assessment will normally include:

·Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
·Review of the Type Approval documentation and that this is still used as basis for the production
·Review of possible changes to the design, the material and the performance of the product
·Verification of the product marking.

END OF CERTIFICATE