

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Hydraulic Actuator for Valve (Not Hydraulic Motor)**

with type designation(s)

NS PAC-71 Series, NS PAC-72 Series, NS PAC-73 Series and NS PAC-102 Series

Issued to

**Nakakita Seisakusho Co., Ltd.
Daito, Japan**

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems**DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Dsgn. press./Torque 70 or 100 bar / 0,16 - 122,1 kNm depending on size and type, see cert.**Issued at **Høvik** on **2018-07-18**This Certificate is valid until **2021-12-31**.for **DNV GL**DNV GL local station: **Kobe**Approval Engineer: **Mehdi Rowshan**

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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

Hydraulic actuators for quarter turn valves.

Type	Design
NS PAC-71	Single acting, two cylinders
NS PAC-72	Double acting cylinder
NS PAC-73	Single acting, two cylinders
NS PAC-102	Double acting cylinder

Material:

Item	Material	Grade acc. JIS
Cylinder	nodular cast iron seamless carbon steel tubes	FCD 400, FCD 450 STKM13A, STKM13C
Housing and Cover	grey cast iron nodular cast iron	FC 250 FCD 400, FCD 450
Bolts and Nuts	stainless steel copper alloy Steel	SUS 304, 304N2, 316, 316L, 431 C 3771 SS400, S45C

Application/Limitation

The maximum output torque from actuators used on valves must not exceed the limit at which the valve spindle or disc can be damaged if the disc is restrained in any position. At maximum allowable working pressure of 70 bar or 100 bar, the corresponding maximum torque is:

Type	Torque (kNm)	Type	Torque (kNm)	Type	Torque (kNm)
PAC-71-01	0,16	PAC-72-01	0,51	PAC-72-02	0,63
PAC-72-03	1,43	PAC-72-04	1,57	PAC-72-05	3,29
PAC-72-06	4,05	PAC-72-07	5,45	PAC-72-08	7,52
PAC-72-09	8,31	PAC-72-10	11,5	PAC-72-11	17,9
PAC-72-12	17,9	PAC-72-13	21,6	PAC-72-14	24,1
PAC-72-15	27,2	PAC-72-16	42,8	PAC-72-17	42,8
PAC-72-18	42,8	PAC-72-19	82,3	PAC-72-21	0,26
PAC-72-22	6,73	PAC-72-23	9,1	PAC-72-24	13,0
PAC-72-25	17,9	PAC-72-26	21,4	PAC-72-27	25,8
PAC-72-28	31,2	PAC-72-29	39,2	PAC-72-30	85,5
PAC-73-01	51,3	PAC-73-02	59,0	PAC-73-03	64,1
PAC-102-01	0,72	PAC-102-02	0,90	PAC-102-03	2,04
PAC-102-04	2,24	PAC-102-05	4,70	PAC-102-06	5,79
PAC-102-07	7,79	PAC-102-08	10,7	PAC-102-09	11,9
PAC-102-10	16,4	PAC-102-11	25,6	PAC-102-12	25,6
PAC-102-13	30,9	PAC-102-14	34,5	PAC-102-15	38,9
PAC-102-16	61,1	PAC-102-17	61,1	PAC-102-18	61,1
PAC-102-19	117,6	PAC-102-21	0,37	PAC-102-22	9,61
PAC-102-23	13,0	PAC-102-24	18,6	PAC-102-25	25,6
PAC-102-26	30,5	PAC-102-27	36,9	PAC-102-28	44,5
PAC-102-29	56,0	PAC-102-30	122,1		

Actuators with cylinder tube of material STKM 13A and STKM 13C is to be heat treated unless delivered as Hot Finished or as Welded.

Actuators to be used where a salty and damp atmosphere may be expected shall be equipped with carbon steel bolts and screws, or stainless steel bolts properly electrically isolated to the housing material, in order to avoid possible galvanic corrosion.

Actuators used on remote controlled shipside valves are to have indicators, which will function satisfactory, even if the actuators accidentally should be submerged in water.

Each cylinder body to be hydraulically pressure tested to 1,5 times the maximum design pressure.

Materials used in the pressure exposed parts need to have work's certificate, indicating mechanical and chemical properties and heat treatment.

Type Approval documentation

Marking of product

For traceability to this type approval, the products are at least to be marked with:

- Manufacturers name or trade mark
- Type designation

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3,5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVGL-CP-0338.