



DET NORSKE VERITAS TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. P-12766

This Certificate consists of 2 pages

This is to certify that the

Hydraulic Cylinders

778.93

with type designation(s)

HM98

Manufactured by

Fjero A/S

SKIVE, Denmark

is found to comply with

Det Norske Veritas' Rules for Classification of Ships
DNV Standard for Certification 2.9, 5-778.93 Approval of hydraulic cylinders

Application

Hydraulic cylinder for ordinary use, not for steering gear or where a mechanical lock is required by the Rules.

Max work press. push	210/300 bar
Max work press. pull	210/300 bar
Cylinder sizes	See certificate

Place and date
Høvik, 2008-10-20
for Det Norske Veritas AS

This Certificate is valid until
2012-06-30

Hanne Anita Hjerpetjønn
Head of Section

Local Office
DNV Aalborg

Øyvind Skåra
Surveyor

Product description

Double acting hydraulic cylinders: Spherical bearing in each end (SS) or trunnion on tube and spherical bearing in rod end (VS).

Materials:

Barrel: S355J2+AR/N, EN 10025-2

Piston Rod: 20MnV6(SS2142) or SS2387(Wnr. 1.4418) EN 10088-3

Application/Limitation

Hydraulic cylinders for general purpose. The type approval does not cover steering gear application. The approval does not cover cleating application where the Rules require a mechanical lock of cleats.

Dimensions 300 bar:

Rod material:

Pipe inner /Rod outer diameter	SIS 2142		SIS 2324		SIS 2387	
	Max. stroke, mm		Max. stroke, mm		Max. stroke, mm	
Support:	SS	VS	SS	VS	SS	VS
100/50	240	390	350	590	495	800
100/65	830	1390	840	1415	880	1460
125/70	770	1270	780	1290	850	1380
125/80	990	1710	1010	1710	1040	1760
140/70	330	580	490	800	690	1130
140/90	1130	1910	1150	1940	1190	2010
160/80	390	680	570	950	650	1310
160/100	1220	2080	1250	2120	1290	2200
180/90	570	960	740	1210	950	1550
180/110	1370	2290	1390	2690	1440	2780
200/100	520	900	750	1250	1020	1680
200/125	1570	2650	1600	2690	1660	2780
250/125	850	1450	1070	1790	1360	2240
250/150	1880	3160	1910	3210	1980	3320
280/150	1500	2500	1650	2750	1870	3080
280/180	2380	4060	2420	4110	2490	4230
300/180	2340	3880	2380	3940	2560	4060
300/200	2780	4690	2820	4740	2890	4860

Dimensions 210 bar:

Rod material

Pipe inner /Rod outer diameter	SIS 2142		SIS 2324		SIS 2387	
	Max. stroke, mm		Max. stroke, mm		Max. stroke, mm	
Support:	SS	VS	SS	VS	SS	VS
100/50	560	920	600	960	630	1010
100/65	940	1575	955	1590	1000	1670
125/70	900	1470	910	1490	960	1550
125/80	1130	1900	1140	1930	1190	2000
140/70	800	1310	830	1350	870	1410

140/90	1280	2160	1300	2190	1350	2280
160/80	920	1520	950	1560	1000	1630
160/100	1390	2360	1410	2390	1450	2460
180/90	1090	1760	1110	1790	1160	1870
180/110	1550	2590	1580	3030	1620	3120
200/100	1190	1940	1220	1990	1280	2070
200/125	1780	2990	1810	3030	1860	3120
250/125	1550	2530	1580	2580	1640	2680
250/150	2130	3560	2160	3610	2220	3700
280/150	1990	3270	2020	3320	2100	3430
280/180	2720	4560	2760	4610	2850	4820
300/180	2650	4360	2680	4410	2750	4520
300/200	3190	5370	3250	5470	3370	5670

Support:

SS: Spherical bearing in rod and tube end

VS: Spherical bearing in rod end, Trunnion on tube

Each cylinder is to be certified by Det Norske Veritas' Surveyor as outlined in Certification Note 2.9 Program No. 5-778.93 "Approval of Hydraulic Cylinders". A product certificate endorsed or issued by the DNV Surveyor is to accompany each cylinder/delivery. The cylinder is to be hydraulically pressure tested as follows:

Design pressure, bar	Test pressure, bar
210	273
300	390

The test pressure is to be applied to both sides of the piston in sequence.

The material for the cylinder tube, piston rod and end eyes are to be delivered with 3.1B material certificates.

Type Approval documentation

Marking of product

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

- Manufacturer's name or trade mark
- Type designation

Certificate retention survey

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

The scope of the survey is to check that no alterations are made to the product design or choice of materials. The main elements of the survey to be dealt with:

- Ensure that materials used comply with stamped "Type Approved" documents and/or referred material specifications.
- Review of possible changes in design, materials, and performance and make sure that such changes do not affect the type approval given.
- Review of the production process and make sure that any changes do not affect the type approval.

- Ensure traceability between manufacturer marking and the type approval certificate.
- Ensure that documentation stamped "Type Approved" is available.

END OF CERTIFICATE

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

DET NORSKE VERITAS AS · VERITASVEIEN 1, 1322 HØVIK, NORWAY · TEL: (+47) 67 57 99 00 · FAX: (+47) 67 57 99 11