

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP0000094
Revision No:
4

This is to certify:

that the **Flexible Hoses of Non-Metallic Material with Permanently Fitted Couplings**

with type designation(s)
H3000D/S/C, H4000D/S/C, H5000D/S/C, H6000D/S/C

issued to

Manuli RYCO Hydraulics Sdn. Bhd.
Kuala Ketil, Kedah, Malaysia

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV class programme DNV-CP-0183 – Type approval – Flexible non-metallic hoses

Application:

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

Type:	Temperature range:	Max. working press.:	Sizes:
H3000D/S/C	-40°C to +100°C (see page 3)	215 bar (for all sizes)	DN31, 38 & 51
H4000D/S/C	-40°C to +100°C (see page 3)	280 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51
H5000D/S/C	-40°C to +100°C (see page 3)	350 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51
H6000D/S/C	-40°C to +100°C (see page 3)	420 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51

Issued at Høvik on **2025-06-18**

This Certificate is valid until **2028-12-30**.

for DNV

DNV local unit: **Inspection Malaysia**

Approval Engineer: **Maheshraja Venkatesan**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

Revision: 2023-09

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Page 1 of 4

Product description

4 types of flexible rubber hoses with permanently fitted couplings:

1. **H3000C/D/S** constructed according to SAEJ517 type SAE100R12/ EN856 type R12

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	Four alternating layers of spiralled high tensile steel wire
Hose cover	:	<u>H3000C</u> : Black, oil and extra abrasion resistant synthetic rubber <u>H3000D</u> : DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene) <u>H3000S</u> : SLIDER™ Black, abrasion and oil resistant rubbersheathed with a layer of polyethylene
End fittings	:	BITELOK NON-SKIVE ONE-PIECE CRIMP T7000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
2. **H4000C/D/S** constructed according to ISO 18752-DC

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	<ul style="list-style-type: none"> - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -24 - Six alternating layers of spiralled high tensile steel wire for size -32
Hose cover	:	<u>H4000C</u> : Black, oil and extra abrasion resistant synthetic rubber <u>H4000D</u> : DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene) <u>H4000S</u> : SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
End fittings	:	BITELOK NON-SKIVE ONE-PIECE CRIMP T7000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
3. **H5000C/D/S** constructed according to ISO 18752-CC

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	<ul style="list-style-type: none"> - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -20 - Six alternating layers of spiralled high tensile steel wire for sizes -24 & -32
Hose cover	:	<u>H5000C</u> : Black, oil and extra abrasion resistant synthetic rubber <u>H5000D</u> : DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene) <u>H5000S</u> : SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
End fittings	:	BITELOK NON-SKIVE ONE-PIECE CRIMP T7000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
4. **H6000C/D/S** constructed according to ISO 18752-CC

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	<ul style="list-style-type: none"> - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -16 - Six alternating layers of spiralled high tensile steel wire for size -20 & -24 - Eight alternating layers of spiralled high tensile steel wire for size -32
Hose cover	:	<u>H6000C</u> : Black, oil and extra abrasion resistant synthetic rubber <u>H6000D</u> : DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene) <u>H6000S</u> : SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
End fittings	:	BITELOK NON-SKIVE ONE-PIECE CRIMP T7000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316

Hose manufacturing locations:

Site address	Hose types covered
▪ Manuli RYCO Hydraulics Sdn. Bhd., Malaysia	: All sizes under hose types H3000D/S/C, H4000D/S/C, H5000D/S/C & H6000D/S/C
▪ Manuli Hydraulics (Suzhou) Co., Ltd., China	: H4012D, H4016D, H5008D, H5010D, H5012D, H5016D, H5020D, H5024D, H6012D & H6016D

End fittings manufacturing locations:

- Manuli RYCO Hydraulics (Dalian) Co., Ltd., China
- Manuli Hydraulics Polska S.A., Poland

Hose assembling locations:

Site address	Hose types covered
▪ Manuli Ryco Hydraulics Sdn. Bhd., Malaysia	H3000D, H3000S, H3000C, H4000D, H4000S, H4000C, H5000D, H5000S, H5000C, H6000D, H6000S, H6000C
▪ MANULI RYCO Hydraulics (Dalian) Co., Ltd., China	H3000D, H3000S, H3000C, H4000D, H4000S, H4000C, H5000D, H5000S, H5000C, H6000D, H6000S, H6000C
▪ Manuli Hydraulics (Suzhou) Co., Ltd., China	H3000D, H3000S, H3000C, H4000D, H4000S, H4000C, H5000D, H5000S, H5000C, H6000D, H6000S, H6000C

Application/Limitation

This certificate is valid for the specific assembly of hose and coupling type as specified, assembled and delivered by the holder (named as manufacturer) and hose assembling locations as stated in this certificate.

Hose assemblies covered by this certificate are approved to be used in:

Operating media	Temperature range (for all types)
Petroleum based hydraulic fluids	-40°C to +100°C
Water based Hydraulic fluids	-40°C to +70°C
Water and air	0°C to +70°C

Maximum Allowable Working Pressures (MAWP):

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H3000D		H3000S		H3000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H3020	31	1-1/4	-20	215	3100	215	3100	215	3100	T7000
H3024	38	1 1/2	-24	215	3100	215	3100	215	3100	T7000
H3032	51	2	-32	215	3100	215	3100	215	3100	T7000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H4000D		H4000S		H4000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H4006	10	3/8	-06	280	4100	280	4100	280	4100	T7000
H4008	12	1/2	-08	280	4100	280	4100	280	4100	T7000
H4010	16	5/8	-10	280	4100	280	4100	280	4100	T7000
H4012	19	3/4	-12	280	4100	280	4100	280	4100	T7000
H4016	25	1	-16	280	4100	280	4100	280	4100	T7000
H4020	31	1-1/4	-20	280	4100	280	4100	280	4100	T7000
H4024	38	1 1/2	-24	280	4100	280	4100	280	4100	T7000
H4032	51	2	-32	280	4100	280	4100	280	4100	T7000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H5000D		H5000S		H5000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H5006	10	3/8	-06	350	5100	350	5100	350	5100	T7000
H5008	12	1/2	-08	350	5100	350	5100	350	5100	T7000
H5010	16	5/8	-10	350	5100	350	5100	350	5100	T7000
H5012	19	3/4	-12	350	5100	350	5100	350	5100	T6000/T7000
H5016	25	1	-16	350	5100	350	5100	350	5100	T6000/T7000
H5020	31	1-1/4	-20	350	5100	350	5100	350	5100	T6000/T7000
H5024	38	1 1/2	-24	350	5100	350	5100	350	5100	T6000/T7000
H5032	51	2	-32	350	5100	350	5100	350	5100	T6000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H6000D		H6000S		H6000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H6006	10	3/8	-06	420	6100	420	6100	420	6100	T7000
H6008	12	1/2	-08	420	6100	420	6100	420	6100	T7000
H6010	16	5/8	-10	420	6100	420	6100	420	6100	T7000
H6012	19	3/4	-12	420	6100	420	6100	420	6100	T6000/T7000
H6016	25	1	-16	420	6100	420	6100	420	6100	T6000/T7000
H6020	31	1-1/4	-20	420	6100	420	6100	420	6100	T6000/T7000
H6024	38	1 1/2	-24	420	6100	420	6100	420	6100	T6000
H6032	51	2	-32	420	6100	420	6100	420	6100	T6000

Flexible hoses are only to be used in short lengths where it is necessary due to vibrations or flexible mounting of the machinery. The hoses shall not replace/be used where permanent piping is possible/required.

The hose assemblies must only be fitted in places where they are always accessible. Flexible hoses of these types are not to be used on boiler fronts.

Hose assemblies covered by this certificate shall not be used in system subject to pressure below atmospheric or vacuum condition.

The cover of hoses for gaseous applications shall be pin-pricked.

The outer end of the pipe coupling (performing the connection to the fixed piping) is not covered by this certificate and shall follow the requirements below:

- Flanged ends shall be according to a recognized standard.
- Slip-on threaded joints having pipe threads where pressure-tight joints are made on the threads with parallel or tapered threads, shall comply with requirements of a recognized standard.
Limitations stated in DNV-RU-SHIP Pt.4 Ch.6 Sec.9 [5.2.6] to be followed.
- If these outer ends are going to be part of a mechanical joint as covered by Table 10 DNV-RU-SHIP Pt.4 Ch.6 Sec.9, then they shall be separately type approved.

Production testing

All hose assemblies delivered under the DNV type approval scheme shall be subject to a pressure test at 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to this type approval certificate.

Type Approval documentation

Tests carried out

Dimensional check, Burst, Change in length, Leakage, Cover Adhesion, Cold flexibility, Fluid resistance, Ozone resistance, Fire test.

Marking of product

Flexible hoses are to be permanently marked by the manufacturer with the following details:

- Hose manufacturer's name or trademark;
- Date of manufacture (month/year);
- Designation type reference;
- Nominal diameter;
- Pressure rating;
- Temperature rating

Periodical assessment

This certificate is only valid if periodical assessments are carried out with satisfactory results.

For retention of the Type Approval, a DNV 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 DNV-CP-0338.

To check the validity of this certificate, please look it up at <https://approvalfinder.dnv.com>.