

# TYPE APPROVAL CERTIFICATE

Certificate no.:  
**TAP00001SJ**  
Revision No:  
**2**

## This is to certify:

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

with type designation(s)

**T3000D/S, T3600D/S/C, T4000D/S, T5000D/S, T6000D/S, SRF/SRX**

issued to

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

is found to comply with

**DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021**

**DNV rules for classification – Ships Pt.4 Ch.6 Piping systems**

**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:
T3000D/S	-40°C to +100°C (see page 5)	215 to 245 bar (see page 3)	DN6, 8, 10, 12, 16, 19 & 25
T3600D/S/C	-40°C to +100°C (see page 5)	215 to 250 bar (see page 4)	DN6, 8, 10, 12, 16, 19 & 25
T4000D/S	-40°C to +100°C (see page 5)	280 bar (for all sizes)	DN6, 8, 10, 12, 16, 19 & 25
T5000D/S	-40°C to +100°C (see page 5)	350 bar (for all sizes)	DN6, 8, 10 & 12
T6000D/S	-40°C to +100°C (see page 5)	420 bar (for all sizes)	DN6, 8 & 10
SRF/SRX	-40°C to +100°C (see page 5)	4 to 21 bar (see page 4)	DN19, 25, 31, 38, 51, 63 & 76

Issued at **Høvik** on **2024-11-21**

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

for **DNV**

DNV local unit: **Inspection Malaysia**

Approval Engineer: **Sarah Miller**

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.



## Product description

7 types of flexible rubber hoses with permanently fitted couplings:

1. **T3000D/S** constructed according to ISO 18752 type BC
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	Two braids of high tensile steel wire
Hose cover	:	<u>T3000D</u> : DIEHARD™ Black, oil and extra-abrasion resistant synthetic rubber <u>T3000S</u> : SLIDER™ Black, oil and extremely abrasion resistant synthetic rubber sheathed with a layer of extremely abrasion resistant Polyethylene
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T2000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
2. **T3600D/S/C** constructed according to ISO 18752 type BC
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	One braid (-04 to -06 size) or two braids (-08 to -16 size) of high tensile wire
Hose cover	:	<u>T3600D</u> : DIEHARD™ Black, oil and extra-abrasion resistant synthetic rubber <u>T3600S</u> : SLIDER™ Black, oil and extremely abrasion resistant synthetic rubber sheathed with a layer of extremely abrasion resistant Polyethylene <u>T3600C</u> : Black, oil and abrasion resistant synthetic rubber
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T2000 series for all sizes except T3612 for which T1000 series is used
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
3. **T4000D/S** constructed according to SAEJ517 type SAE100R19
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	One braid (-04) or two braids (-05 to -12) of high tensile steel wire <u>T4000D</u> : DIEHARD™ Black, oil and extra abrasion resistant synthetic rubber <u>T4000S</u> : SLIDER™ Black, oil and extremely abrasion resistant synthetic rubber sheathed with a layer of extremely abrasion resistant Polyethylene
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T2000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
4. **T5000D/S** constructed according to ISO 18752-AC
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	Two braids of high tensile steel wire
Hose cover	:	<u>T5000D</u> : DIEHARD™ Black, oil and extra abrasion resistant synthetic rubber <u>T5000S</u> : SLIDER™ Black, oil and extremely abrasion resistant synthetic rubber sheathed with a layer of extremely abrasion resistant Polyethylene
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T2000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
5. **T6000D/S** constructed according to ISO 18752-AC
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	Two braids of high tensile steel wire
Hose cover	:	<u>T6000D</u> : DIEHARD™ Black, oil and extra abrasion resistant synthetic rubber <u>T6000S</u> : SLIDER™ Black, oil and extremely abrasion resistant synthetic rubber sheathed with a layer of extremely abrasion resistant Polyethylene
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T2000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
6. **DEFIANT SRF/SRX** constructed according to SAEJ517 type SAE100R4
 

Hose inner tube	:	Black, oil resistant synthetic rubber
Reinforcement	:	Textile reinforcement with spiral wire
Hose cover	:	Black, oil resistant and abrasion resistant synthetic rubber
End fittings	:	BITELOK NON-SKIVE ONE PIECE CRIMP T4000 series
Material for end fittings	:	Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045 Stainless steel - ASTM A276 type 316
Fire protection	:	Fire sleeve FS1072

Both types SRF and SRX have identical design/ construction except with the minimum bending radius (MBR), refer page 4.

Hose manufacturing locations

- Hose types T3000, T3600, T4000, T5000 and T6000: MANULI RYCO Hydraulics Sdn. Bhd.
- Hose types SRF/SRX: Wellcall Hose (M) Sdn. Bhd., Malaysia
- Hose types SRX : ILKE (SEL)
- Hose types T3000, T3600, T4000, T5000, T6000: Manuli Hydraulics (Suzhou) Co., Ltd.
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End fittings manufacturing locations

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

Hose assembling locations

- MANULI RYCO Hydraulics (Dalian) Co., Ltd.
- Manuli Hydraulics (Suzhou) Co., Ltd.
- Manuli Ryco Hydraulics Sdn. Bhd.

Hose types covered

- : All hose types
- : All hose types
- : All hose types

## 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) of this certificate.

Maximum Allowable Working Pressures (MAWP):

Part No.	Hose size			MAWP				End fitting designation (Bitelok)
				T3000D		T3000S		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	
T3004	6	¼	-04	245	3500	245	3500	T2000
T3005	8	5/16	-05	245	3500	245	3500	T2000
T3006	10	3/8	-06	215	3100	215	3100	T2000
T3008	12	½	-08	215	3100	215	3100	T2000
T3010	16	5/8	-10	215	3100	215	3100	T2000
T3012	19	¾	-12	215	3100	215	3100	T2000
T3016 <sup>(1)</sup>	25	1	-16	215	3100	215	3100	T2000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				T3600D		T3600S		T3600C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
T3604 <sup>(1)</sup>	6	¼	-04	250	3625	250	3625	250	3625	T2000
T3605 <sup>(1)</sup>	8	5/16	-05	245	3500	245	3500	245	3500	T2000
T3606 <sup>(1)</sup>	10	3/8	-06	215	3100	215	3100	215	3100	T2000
T3608 <sup>(1)</sup>	12	½	-08	250	3625	250	3625	250	3625	T2000
T3610 <sup>(1)</sup>	16	5/8	-10	250	3625	250	3625	250	3625	T2000
T3612	19	¾	-12	250	3625	250	3625	250	3625	T2000
T3616 <sup>(1)</sup>	25	1	-16	250	3625	250	3625	250	3625	T2000

Part No.	Hose size			MAWP				End fitting designation (Bitelok)
				T4000D		T4000S		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	
T4004	6	¼	-04	280	4100	280	4100	T2000
T4005	8	5/16	-05	280	4100	280	4100	T2000
T4006	10	3/8	-06	280	4100	280	4100	T2000
T4008	12	½	-08	280	4100	280	4100	T2000
T4010	16	5/8	-10	280	4100	280	4100	T2000
T4012	19	¾	-12	280	4100	280	4100	T2000

Part No.	Hose size			MAWP			
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				T5000D		T5000S		End fitting designation (Bitelok)
	DN	Inch	DASH	Bar	PSI	Bar	PSI	
T5004 <sup>(1)</sup>	6	¼	-04	350	5100	350	5100	T2000
T5005 <sup>(1)</sup>	8	5/16	-05	350	5100	350	5100	T2000
T5006	10	3/8	-06	350	5100	350	5100	T2000
T5008	12	½	-08	350	5100	350	5100	T2000

Part No.	Hose size			MAWP				End fitting designation (Bitelok)
				T6000D		T6000S		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	
T6004 <sup>(1)</sup>	6	¼	-04	420	6100	420	6100	T2000
T6005 <sup>(1)</sup>	8	5/16	-05	420	6100	420	6100	T2000
T6006	10	3/8	-06	420	6100	420	6100	T2000

DEFIANT					SRF <sup>(2)</sup>		SRX <sup>(2)</sup>		End fitting designation (Bitelok)
					MBR (mm)	Part No.	MBR (mm)	Part No.	
Hose size			MAWP						
DN	Inch	Dash	Bar	PSI					
19	¾	-12	21	300	63	SRF12	40	SRX12	T4000
25	1	-16	17	250	75	SRF16	45	SRX16	T4000
31	1-¼	-20	14	200	100	SRF20	60	SRX20	T4000
38	1-½	-24	11	150	125	SRF24	65	SRX24	T4000
51	2	-32	7	100	150	SRF32	100	SRX32	T4000
63 <sup>(1)</sup>	2-½	-40	4	62	-	-	140	SRX40	T4000
76 <sup>(1)</sup>	3	-48	4	56	-	-	180	SRX48	T4000

<sup>(1)</sup> The following hose assemblies are not allowed to be used in in piping systems for flammable media and sea water systems where failure may result in flooding, are to be of fire-resistant type except in cases where such hoses are installed on open decks, as defined in SOLAS II-2/Reg. 9.2.3.3.2.2(10) and not used for fuel oil lines:

- T3016
- T3604, T3605, T3606, T3608, T3610 & T3616
- T5004 & T5005
- T6004 & T6005
- SRX40 & SRX48

<sup>(2)</sup> Hose types SRF/SRX shall not be installed in piping systems where pressure pulses and/or high levels of vibration are expected to occur in service.

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

Hose assemblies for fire safe applications under type DEFIANT SRF/SRX shall always be installed with fire sleeve as specified in this certificate.

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 below requirements:

- 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, cover adhesion, Ozone resistance, fire, Oil resistance, Cold flexibility, Change in length, Burst, Impulse & abrasion resistance tests

### 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 required 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>.