

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00000ET
Revision No:
4

This is to certify:

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

with type designation(s)
T1D/S/F, BT1, RQP1, DF1D, DK1D

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:
T1D/S/F	-60°C to +100°C (see page 3)	40 bar to 250 bar (see page 3)	DN 5, 6, 8, 10, 12, 16, 19, 25, 31, 38 & 51
BT1	-40°C to +100°C (see page 3)	50 bar (for all sizes)	DN 6, 8, 10, 12, 16, 20 & 25
RQP1	-40°C to +150°C (see page 3)	90 bar to 225 bar (see page 4)	DN 6, 8, 10, 12, 16, 19 & 25
DF1D	-40°C to +100°C (see page 3)	90 bar to 225 bar (see page 4)	DN 6, 8, 10, 12, 16, 19 & 25
DK1D	-40°C to +100°C (see page 3)	100 bar to 295 bar (see page 4)	DN 6, 8, 10, 12, 16, 19, 25 & 31

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.



Product description

5 types of flexible rubber hoses with permanently attached couplings:

1. **T1D/S/F** constructed according to SAEJ517 type SAE100R1/ EN 853 Type 1SN

Hose inner tube	: Black, oil resistant synthetic rubber
Reinforcement	: One braid of high tensile steel wire
Hose cover	: T1D : DIEHARD™ Black, abrasion and oil resistant synthetic rubber T1S : SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene T1F : Red, heat resistant, oil and abrasion resistant rubber
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. **BIOTRANS BT1** constructed according to SAE J1527 Type Class I

Hose inner tube	: Black, oil resistant synthetic rubber
Reinforcement	: One braid of high tensile steel wire
Hose cover	: Blue, oil resistant and abrasion resistant synthetic rubber
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
3. **SURVIVOR RQP1** constructed according to SAEJ517 type SAE100R1/ EN 853 Type 1SN

Hose inner tube	: Black, synthetic rubber, specifically compounded for temperature resistance and multi fluid resistance
Reinforcement	: One braid of high tensile steel wire
Hose cover	: Blue, oil resistant and abrasion resistant synthetic rubber
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. **DF1D** constructed according to EN 857 Type 1SC

Hose inner tube	: Black, oil resistant synthetic rubber
Reinforcement	: One braid of high tensile steel wire
Hose cover	: DIEHARD™ Black, extra abrasion and oil resistant synthetic rubber
End fittings	: 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. **DK1D** constructed according to EN 857 Type 1SC

Hose inner tube	: Black, oil resistant synthetic rubber
Reinforcement	: One braid of high tensile steel wire
Hose cover	: DIEHARD™ Black, ozone, extra abrasion and oil resistant synthetic rubber
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

Hose manufacturing locations:

<u>Site address</u>	<u>Hose types covered</u>
Manuli RYCO Hydraulics Sdn. Bhd., Malaysia	All sizes under hose types T1D/S/F, BT1, RQP1, DF1D and DK1D
Manuli Hydraulics (Suzhou) Co., Ltd., China	T13D, T14D, T15D, T16D, T18D, T110D, T112D, T116D, T120D, T124D and T132D

End fittings manufacturing locations:

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

Hose assembling locations:

<u>Site address</u>	<u>Hose types covered</u>
Manuli Ryco Hydraulics Sdn. Bhd., Malaysia	T1D/S/F, BT1, RQP1, DF1D, DK1D
MANULI RYCO Hydraulics (Dalian) Co., Ltd., China	T1D/S/F, BT1, RQP1
Manuli Hydraulics (Suzhou) Co., Ltd., China	T1D/S/F, BT1

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		
	Types BT1, DF1D & DK1D	Type T1	Type RQP1
Petroleum based hydraulic fluids	-40°C to +100°C	-40°C to +100°C	-40°C to +150°C
Water based Hydraulic fluids	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C
Water and air	0°C to +70°C	0°C to +70°C	0°C to +70°C
CO ₂ applications	-	-60°C to +100°C	-

(1) Sizes up to 1" covered under type designations T1S/D/F are allowed to be used for CO₂ applications within temperature range between -60°C and 100°C.

Maximum allowable working pressures (MAWP):

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				T1S		T1D		T1F		
	DN	Inches	DASH	bar	psi	bar	psi	bar	psi	
T13 ⁽²⁾	5	3/16	-03	250	3600	-	-	250	3600	T2000
T14	6	¼	-04	225	3250	225	3250	225	3250	T2000
T15	8	5/16	-05	215	3100	-	-	-	-	T2000
T16	10	3/8	-06	180	2600	180	2600	180	2600	T2000
T18	12	½	-08	160	2300	160	2300	160	2300	T2000
T110	16	5/8	-10	130	1900	130	1900	-	-	T2000
T112	19	¾	-12	105	1500	105	1500	-	-	T2000
T116	25	1	-16	90	1300	90	1300	-	-	T2000
T120	31	1-¼	-20	65	945	65	945	-	-	T2000
T124	38	1-½	-24	50	725	50	725	-	-	T2000
T132	51	2	-32	40	580	40	580	-	-	T2000

(2) T13 is not fire-resistant and shall not be used for installation in piping systems for flammable media and sea water systems where failure may result in flooding 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.

SURVIVOR RQP1						End fitting designation (Bitelok)
Part No.	Hose size			Max. working pressure		
	DN	inches	Dash size	bar	PSI	
RQP14	6	1/4	-04	225	3250	T2000
RPQ15	8	5/16"	-05	215	3120	T2000
RQP16	10	3/8"	-06	180	2600	T2000
RQP18	12	1/2"	-08	160	2300	T2000
RQP110	16	5/8"	-10	130	1890	T2000
RQP112	20	3/4"	-12	120	1740	T2000
RQP116	25	1"	-16	90	1300	T2000

BIOTRANS BT1 ⁽³⁾						End fittings designation (BITELOK)
Part No.	Hose size			MAWP		
	DN	Inches	Dash size	bar	PSI	
BT14	6	¼	-04	50	725	T2000
BT15	8	5/16	-05	50	725	T2000
BT16	10	3/8	-06	50	725	T2000
BT18	12	½	-08	50	725	T2000
BT110	16	5/8	-10	50	725	T2000
BT112	20	¾	-12	50	725	T2000
BT116	25	1	-16	50	725	T2000

(3) Hose type BT1 shall not be installed in piping systems where pressure pulses and/or high levels of vibration are expected to occur in service.

DIEHARD DF1D						End fitting designation (Non-skive)
Part No.	Hose size			Max. working pressure		
	DN	inches	Dash size	bar	PSI	

DF14D	6	1/4	-04	225	3250	T2000
DF15D	8	5/16	-05	215	3100	T2000
DF16D	10	3/8	-06	180	2600	T2000
DF18D	12	1/2	-08	160	2300	T2000
DF110D	16	5/8	-10	130	1900	T2000
DF112D	19	3/4	-12	105	1500	T2000
DF116D	25	1	-16	88	1280	T2000

DIEHARD DK1D						End fitting designation (Non-skive)
Part No.	Hose size			Max. working pressure		
	DN	inches	Dash size	bar	PSI	
DK14D	6	¼	-04	295	4280	T2000
DK15D	8	5/16	-05	250	3625	T2000
DK16D	10	3/8	-06	230	3340	T2000
DK18D	12	½	-08	200	2900	T2000
DK110D	16	5/8	-10	150	2175	T2000
DK112D	19	¾	-12	125	1815	T2000
DK116D	25	1	-16	110	1600	T2000
DK120D	31	1-¼	-20	100	1450	T2000

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

For all hose types:

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

For hose type T1:

- Burst at -60°C, Endurance & Pin pricking for CO₂ applications

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>.