

# TYPE APPROVAL CERTIFICATE

**This is to certify:**

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

with type designation(s)

**AVENGER T1A/T3KA, SURVIVOR RQP1, DIEHARD T1D/T3KD, ADVANTAGE DF1E, ADVANTAGE T1E, T1F-Fire suppression, Biotrans BT1, T1S, Slider T3KS and Dinflex DF2A**

Issued to

**RYCO Hydraulics Pty. Ltd.**  
**FOOTSCRAY VICTORIA, Australia**

is found to comply with

**Det Norske Veritas' Rules for Classification of Ships Pt.4, Ch.6 "Piping Systems"**  
**Det Norske Veritas' Standards for Certification 2.9 No. 5-791.70**

**Application :**

**May be used for: Water based hydraulics , pneumatic systems (see cert.), fresh water, sanitary, hydraulic oil, fuel oil and lube oil systems.**

<p><b>Type:</b>  <b>AVENGER T1A/T3KA, SURVIVOR RQP1, DIEHARD T1D/T3KD, ADVANTAGE DF1E, ADVANTAGE T1E, T1F-Fire suppression Biotrans BT1</b></p>	<p><b>Temperature range:</b>  <b>-40°C to 150°C (see cert.)</b></p> <p><b>BT1: dependent on medium, see certificate</b></p>	<p><b>Max. working press.:</b>  <b>65 bar to 225 bar (dep. on size and type, see cert.)</b>  <b>50 bar all sizes</b></p>	<p><b>Sizes:</b>  <b>DN6 - DN50, 1/4" - 2" (see cert.)</b>  <b>DN6, 8, 10, 12, 16, 20 and 25</b></p>
<p><b>T1S</b></p>	<p><b>-40°C to +100°C</b></p>	<p><b>40 to 225 bar size dependent</b></p>	<p><b>DN6, 8, 10, 12, 16, 19, 25, 31, 38, 51</b></p>
<p><b>Slider T3KS and Dinflex DF2A</b></p>	<p><b>-40°C to +100°C (-40°F to +212°F)</b></p>	<p><b>Slider: 210 bar all sizes, Dinflex: 167 to 420 bar</b></p>	<p><b>DN6, 8, 10, 12, 16, 19, 25</b></p>

This Certificate is valid until **2018-12-31**.

Issued at **Høvik** on **2014-11-12**

DNV GL local station: **Melbourne**

for **DNV GL**

Approval Engineer: **Tom Berg-Nielsen**

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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. If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million. In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **P-14690**  
 File No: **791.70**  
 Job Id: **262.1-015853-1**

## Product description

Flexible rubber hoses with permanently attached couplings.

### Materials:

Inner tube: Oil resistant synthetic rubber

Reinforcement: 1 wire braid acc. to SAE 100R1.

Cover: Oil and weather resistant rubber.

End couplings: Carbon steel AISI/SAE 12L14, 1010, 1020, 1040, 1065, electroplated Fe/Zn12c acc. to AS1789

Stainless steel 316 ASTM A276 or equivalent

T3K10D to T3K16D and T3K10A to T3K16A have 2 wire braids reinforcement.

Rubber hoses for SURVIVOR are produced by Diesse Rubber S.p.A.

Rubber hoses for AVENGER and DIEHARD are produced by RYCO Hydraulics SDN BHD.

End couplings are produced by RYCO Hydraulics, Australia and RYCO Hydraulics (DALIAN) Ltd, P.R.China .

### Design Biotrans BT1 and T1S:

Inner tube of black synthetic rubber, reinforced by one layer of wire braid Cover of black synthetic rubber.

The BT1 hose is according to SAE J1527 Type Class 1, USCG SAE J1942, SAE J30R2

The T1S hose is according to SAE 100R1AT, AS 3791 100R1AT, DIN 20022-1SN, EN853 Type 1SN, ISO 1436 Types R1AT and 1SN.

### Couplings:

BT1: Bitelok non-skive one-piece crimp coupling type T2000

T1S: Bitelok non-skive one-piece crimp coupling type T2000 for sizes -03 to -20. T7000 for sizes 06 to -32

Hose manufacturer: RYCO Hydraulics, Malaysia

Coupling Manufacturer: RYCO Hydraulics, Footscray, Vic., Australia

RYCO Hydraulics Pty. Ltd. Ryco Hydraulics (DALIAN) Ltd, P.R. China

## Application/Limitation

The hoses may be used with the following max. allowable working pressures:

### AVENGER T1A

	Hose size ID		Max. pressure		Couplings	
	inches	mm	psi	bar	Bitelok	
T14A	1/4"	6	3,250	225	T2000	
T16A	3/8"	10	2,600	180	T2000	T7000
T18A	1/2"	12	2,300	160	T2000	T7000
T110A	5/8"	16	1,900	130	T2000	T7000
T112A	3/4"	20	1,500	105	T2000	T7000
T116A	1"	25	1,300	90	T2000	T7000
T120A	1 1/4"	32	945	65	T2000	T7000
T124A	1 1/2"	40	725	50	T2000	T7000
T132A	2"	50	580	40	T2000	

### AVENGER T3KA

	Hose size ID		Max. pressure		Couplings
	inches	mm	psi	bar	Bitelok
T3K4A	1/4"	6	3,050	210	T2000
T3K5A	5/16"	8	3,050	210	T2000
T3K6A	3/8"	10	3,050	210	T2000
T3K8A	1/2"	12	3,050	210	T2000
T3K10A	5/8"	16	3,050	210	T2000
T3K12A	3/4"	20	3,050	210	T2000
T3K16A	1"	25	3,050	210	T2000

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**SURVIVOR RQP1**

	Hose size ID		Max. pressure		Couplings	
	inches	mm	psi	bar	Bitelok	
RQP14	1/4"	6	3,250	225	T2000	
RPQ15	5/16"	8	3,120	215	T2000	
RQP16	3/8"	10	2,600	180	T2000	T7000
RQP18	1/2"	12	2,300	160	T2000	T7000
RQP110	5/8"	16	1,890	130	T2000	T7000
RQP112	3/4"	20	1,740	120	T2000	T7000
RQP116	1"	25	1,300	90	T2000	T7000

**DIEHARD T1D**

	Hose size ID		Max. pressure		Couplings	
	inches	mm	psi	bar	Bitelok	
T14D	1/4"	6	3,250	225	T2000	-
T16D	3/8"	10	2,600	180	T2000	T7000
T18D	1/2"	12	2,300	160	T2000	T7000
T110D	5/8"	16	1,900	130	T2000	T7000
T112D	3/4"	20	1,500	105	T2000	T7000
T116D	1"	25	1,300	90	T2000	T7000
T120D	1 1/4"	32	945	65	T2000	T7000
T124D	1 1/2"	40	725	50	T7000	-
T132D	2"	50	580	40	T7000	-

**DIEHARD T3KD**

	Hose size ID		Max. pressure		Couplings
	inches	mm	psi	bar	Bitelok
T3K4D	1/4"	6	3,050	210	T2000
T3K5D	5/16"	8	3,050	210	T2000
T3K6D	3/8"	10	3,050	210	T2000
T3K8D	1/2"	12	3,050	210	T2000
T3K10D	5/8"	16	3,050	210	T2000
T3K12D	3/4"	20	3,050	210	T2000
T3K16D	1"	25	3,050	210	T2000

**DF1E**

	Hose size ID		Max. pressure		Couplings
	inches	mm	psi	bar	Bitelok
DF14E	1/4"	6	3250	225	T2000
DF15E	5/16"	8	3100	215	T2000
DF16E	3/8"	10	2600	180	T2000
DF18E	1/2"	12	2300	160	T2000

**T1E**

	Hose size ID		Max. pressure		Couplings
	inches	mm	psi	bar	Bitelok
T13E	3/16"	5	3600	250	T2000
T14E	1/4"	6	3250	225	T2000
T15E	5/16"	8	3100	215	T2000
T16E	3/8"	10	2600	180	T2000
T18E	1/2"	12	2300	160	T2000
T110E	5/8"	16	1900	130	T2000
T112E	3/4"	20	1500	105	T2000

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**T1F**

	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	bar	Bitelok
T13F	3/16"	5	3600	250	T2000
T14F	1/4"	6	3250	225	T2000
T16F	3/8"	10	2600	180	T2000
T18F	1/2"	12	2300	160	T2000
T112F	3/4"	19	1500	102	T2000

Temperature range all hoses above: -40°C to +100°C (-40°F to +212°F)

**Biotrans BT1**

	Hose size			Max pressure		Couplings
	DN	Inches	Dash size	Bar	Psi	Bitelok
BT14	6	1/4	-04	50	725	T2000
BT15	8	5/16	-05	50	725	T2000
BT16	10	3/8	-06	50	725	T2000
BT18	12	1/2	-08	50	725	T2000
BT110	16	5/8	-10	50	725	T2000
BT112	20	3/4	-12	50	725	T2000
BT116	25	1	-16	50	725	T2000

Temperature range: Fuel oils: -40°C to +100°C (-40°F to +212°F)

Water, glycol: -40°C to +80°C (-40°F to +176°F)

Hydraulic oil: -40°C to +135°C (-40°F to +275°F)

Compressed air: -40°C to +121°C (-40°F to +250°F)

**SLIDER T1S**

	Hose size			Max. pressure		Couplings	
	DN	Inches	Dash Size	bar	psi	Bitelok	
T13S	5	3/16	-03	250	3600	T2000	
T14S	6	1/4	-04	225	3250	T2000	
T15S	8	5/16	-05	215	3100	T2000	
T16S	10	3/8	-06	180	2600	T2000	T7000
T18S	12	1/2	-08	160	2300	T2000	T7000
T110S	16	5/8	-10	130	1900	T2000	T7000
T112S	20	3/4	-12	105	1500	T2000	T7000
T116S	25	1	-16	90	1300	T2000	T7000
T120S	31	1 1/4	-20	65	945	T2000	T7000
T124S	38	1 1/2	-24	50	725	T2000	T7000
T132S	51	2	-32	40	580	T2000	T7000

Temperature range: -40°C to +100°C (-40°F to +212°F)

**SLIDER T3KS**

	Hose size			Max. pressure		Couplings
	DN	Inches	Dash Size	bar	psi	Bitelok
T3K4S	6	1/4	-04	210	3050	T2000
T3K5S	8	5/16	-05	210	3050	T2000
T3K6S	10	3/8	-06	210	3050	T2000
T3K8S	12	1/2	-08	210	3050	T2000
T3K10S	16	5/8	-10	210	3050	T2000
T3K12S	19	3/4	-12	210	3050	T2000
T3K16S	25	1	-16	210	3050	T2000

Temperature range: -40°C to +100°C (-40°F to +212°F)

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**Dinflex  
DF2A**

	Hose size			Max. pressure		Couplings
	DN	Inches	Dash Size	bar	psi	Bitelok
DF24A	6	¼	-04	420	6100	T2000
DF25A	8	5/16	-05	350	5100	T2000
DF26A	10	3/8	-06	350	5100	T2000
DF28A	12	½	-08	295	4250	T2000
DF210A	16	5/8	-10	250	3600	T2000
DF212A	19	¾	-12	215	3100	T2000
DF216A	25	1	-16	167	2400	T2000

Temperature range: -40°C to +100°C (-40°F to +212°F)

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.

All hose assemblies delivered under this type approval certificate shall be in compliance with an assembly procedure issued by the certificate holder.

Hose assemblies delivered from the certificate holder shall be delivered with the following documentation:  
The hose assemblies covered by this type approval may be assembled and delivered by other than the certificate holder under the conditions as described in DNV type approval programme 5-791.70.  
Each hose assembly is before delivery to be hydraulic pressure tested to 1.5 times the working pressure, and delivered with the manufacturer's/assemblers pressure test report and CoC (certificate of compliance) with reference to this Type Approval Certificate.

Hoses used for continuous operation at temperatures higher than 100°C will have their lifetime reduced. In such cases more frequent inspections and planned exchange should be a part of the maintenance program.

Flexible hoses are only to be used 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 hoses must only be fitted in places where they are always accessible.  
Flexible hoses of these types are not to be used on boiler fronts.  
The hoses are to be mounted in accordance with the manufacturer's instructions.  
It must be possible to shut off from the system all flexible hoses used in systems for compressed air, lube oil, fuel oil and petroleum base hydraulic oil.  
Hose assemblies with couplings made of carbon steel are not to be used at temperatures below -10°C unless the material is normalized.

For use with compressed air or gases, the cover of the hose has to be pin pricked.

## **Type Approval documentation**

Reference documents:  
Manufacturers brochure.

Drawing nos.: 701-1616 dated 1992-08-03, CT201-1616 dated 1992-04-13, 4000-16 dated 1992-10-12 and 2000-16 dated 1996-03-22.

Burst Test Cert. Nos.:  
1068 dated 1999-09-15, 1071 dated 1999-09-17, 1072 dated 1999-09-20 and 1076 dated 1999-09-23.

Impulse test cert. nos.:  
702 dated 1997-05-11, 874 dated 1998-10-16, 877 dated 1998-10-21, 1059 dated 1999-09-14, 1060 dated 1999-09-14, 1064 dated 1999-09-14, 1017 dated 1999-07-06, 1018 dated 1999-07-06 and 1021 dated 1999-07-06.

Material cert. nos.:  
2728/99 dated 1999-07-24, 2065/99 dated 1999-04-28, 2728/99 dated 1999-07-24, 2101/99 dated 1999-04-30 and 2092/99 dated 1999-04-30.

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Material declarations issued by Phoenix Rubber Products on 1999-07-02, 1999-07-09 and 1999-07-26.

Reference documents for new hose DIEHARD AS1D:

Phoenix Report No. E2100509.

Manufacturer's test reports dated 2010-09-08.

Fire Test Certificates Numbers:

Hose Type T1A: RH-FT- 01/16/36/

Hose Type RQP1: RH-FT-22/23/24

Hose Type T1D: RH-FT-02, RH-FT-06, RH-FT-07

Hose Type T3KA: RH-FT-63/64/65

Hose Type T3KD: RH-FT-66/67/68

Hose Type DF1E: RH-FT-72/73

Hose Type T1E: RH-FT-77/78/82

DNV Inspection and Testing Report TAR 28913076 dated 2009-04-17 (with attached Test Certificate No. 3089)

DinflexDF2A:

- Manufacturers leaflet DINFLEX DF2A
- Manufacturers fire test report no RH-FT-74, 6 2SC/R2 AT, 10 2SC/R2AT, 12 2SC/R2AT, 16 2SC/R2AT, 20 2SC/R2AT, 25 2SC/R2AT dated 08-09-2010

Slider T3KA

- Manufacturers leaflet "SLIDER T3K"
- Manufacturers test report nos E2800326, E2800505, 3244i, 3249i, 3250i, 4643i, 4855i
- Manufacturers fire test reports nos RH-FT-66, RH-FT-67, RH-FT-68

## Tests carried out

Dimensional check, Burst, Change in length, Impulse, Cold flexibility, Oil resistance, Ozone resistance, Adhesion, Fire resistance test.

## Marking of product

For traceability to this type approval the hose assembly is to be marked with:

- Manufacturers name or trade mark
- Type designation

## Periodical assessment

For retention of the type approval, DNVGL Surveyor shall perform a survey every second year to verify that the conditions for the type approval are complied with and to witness the following tests on a selection of sizes:

- Dimensional check test
- Change in length
- Leakage test
- Burst test

The tests shall be performed in accordance with procedures given in Det Norske Veritas' Certification Notes No. 2.9 – TAP 5-791.70 "Type approval of Flexible Hoses of non-metallic material", or another recognized standard.

The tests are to be performed with the type of couplings that are type approved with the hoses.

END OF CERTIFICATE