

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

AVENGER T2A, SURVIVOR RQP2, DIEHARD T2D, DIEHARD TXA2D, DINFLEX DF2A, SLIDER T2S, ADVANTAGE T2E, ADVANTAGE DF2E

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"
Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment
Det Norske Veritas' Standards for Certification 2.9 No. 5-791.70

Application :

May be used for the following systems: Hydraulics, pneumatics, fuel and lube oil, fresh water, sea water and sanitary.

Temperature range: -40°C to 150°C (dep. on type, see cert.)
Max. working press.: 69 bar to 420 bar (dep. on size and type, see cert.)
Sizes: DN6 - DN32, 1/4" - 1 1/4" (see cert.)

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**

.....
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-14689**
 File No: **791.70**
 Job Id: **262.1-015853-1**

Product description

2 wire braid reinforced flexible rubber hoses with permanently attached couplings, according to SAE100 R2 AT/ EN853 type 2SN/2SC. Some pressures are outside the limits of the standards. These are based on manufacturer's test reports.

Materials:

Inner tube: Oil resistant synthetic rubber (Nitrile)

RQP2: Specially compounded for temperature and chemical resistance.

Reinforcement: 2 steel wire braids .

Cover: T2D, TXA2D: Oil and weather resistant rubber.

DF2A, AS2D, T2A, RQP2: Oil and abrasion resistant synthetic rubber.

T2S: Oil and abrasion resistant synthetic rubber, sheated with polyethylene.

DF2E, T2E: Oil and abrasion resistant synthetic rubber.

Hose manufacturer for all hoses: RYCO Hydraulics Sdn Bhd, Malaysia.

End couplings:

Carbon steel AISI/SAE 12L14, electroplated Fe/Zn12c acc. to AS1789, 1010, 1020, 1040, 1045

Stainless steel: 316 ASTM A276 or equivalent.

End couplings manufacturers:

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

Application/Limitation

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

AVENGER T2A	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
T24A	1/4"	6	6000	420	T2000
T25A	5/16"	8	5100	350	T2000
T26A	3/8"	10	5100	350	T2000/T7000
T28A	1/2"	12	5000	345	T2000/T7000
T210A	5/8"	16	3600	250	T2000/T7000
T212A	3/4"	20	3100	215	T2000/T7000
T216A	1"	25	2400	167	T2000/T7000
T220A	1 1/4"	32	1800	125	T2000/T7000
T224A	1 1/2"	40	1300	90	T7000
T232A	2"	50	1150	80	T7000
T240A	2 1/2"	63	1000	70	T2000

Temperature range: -40 °C to +100 °C

SURVIVOR RQP2	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	bar	Bitelok
RQP24	1/4"	6	5800	400	T2000
RQP25	5/16"	8	5100	350	T2000
RQP26	3/8"	10	5100	350	T2000/T7000
RQP28	1/2"	12	4350	300	T2000/T7000
RQP210	5/8"	16	3600	250	T2000/T7000
RQP212	3/4"	20	3100	215	T2000/T7000
RPQ216	1"	25	2420	167	T2000/T7000
RPQ220	1 1/4"	32	2175	150	T2000/T7000
RPQ224	1 1/2"	40	1450	100	T7000
RPQ232	2"	50	1300	90	T7000

Temperature range:

Petroleum-base fluids: -40°C to +150 °C, Water/ oil emulsions: to +121 °C, Diesel fuels: to +93 °C

Air: to +121 °C (max. press. to be reduced by 30%)

Certificate No: **P-14689**
 File No: **791.70**
 Job Id: **262.1-015853-1**

DIEHARD T2D	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
T24D	1/4"	6	6000	420	T2000
T25D	5/16"	8	5100	350	T2000
T26D	3/8"	10	5100	350	T2000/T7000
T28D	1/2"	12	5100	350	T2000/T7000
T210D	5/8"	16	3600	250	T2000/T7000
T212D	3/4"	20	3100	215	T2000/T7000
T216D	1"	25	2420	167	T2000/T7000
T220D	1 1/4"	32	1800	125	T2000/T7000
T224D	1 1/2"	40	1300	90	T7000
T232D	2"	50	1150	80	T7000

Temperature range: -40 °C to +100 °C

DIEHARD TXA2D	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	bar	Bitelok
TXA28D	1/2"	12	5440	375	T2000/T7000
TXA210D	5/8"	16	5000	345	T2000/T7000
TXA212D	3/4"	20	4530	313	T2000/T7000
TXA216D	1"	25	3260	225	T2000/T7000
TXA220D	1 1/4"	32	2540	175	T2000/T7000

Temperature range: -40 °C to +100 °C

DINFLEX DF2A	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
DF24A	1/4"	6	6000	420	T2000
DF26A	3/8"	10	5100	350	T2000/T7000
DF28A	1/2"	12	4250	295	T2000/T7000
DF212A	3/4"	20	3100	215	T2000/T7000

Temperature range: -40 °C to +100 °C

SLIDER T2S	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
T24S	1/4"	6	6000	420	T2000
T25S	5/16"	8	5100	350	T2000
T26S	3/8"	10	5100	350	T2000/T7000
T28S	1/2"	12	5100	350	T2000/T7000
T210S	5/8"	16	3600	250	T2000/T7000
T212S	3/4"	20	3100	215	T2000/T7000
T216S	1"	25	2420	167	T2000/T7000
T220S	1 1/4"	32	1800	125	T2000/T7000
T224S	1 1/2"	40	1300	90	T7000
T232S	2"	50	1150	80	T7000

Temperature range: -40 °C to +100 °C

T2E	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
T24E	1/4"	6	6000	420	T2000
T25E	5/16"	8	5100	350	T2000
T26E	3/8"	10	5100	350	T2000/T7000
T28E	1/2"	12	5000	345	T2000/T7000
T210E	5/8"	16	3600	250	T2000/T7000
T212E	3/4"	20	3100	215	T2000/T7000

Temperature range: -40 °C to +100 °C

Certificate No: **P-14689**
File No: **791.70**
Job Id: **262.1-015853-1**

DF2E	Hose size ID		Max. pressure		Couplings
	Inches	mm	psi	Bar	Bitelok
DF26E	3/8"	10	5100	350	T2000/T7000
DF28E	1/2"	12	4250	295	T2000
DF210E	5/8"	16	3600	250	T2000
DF212E	3/4"	20	3100	215	T2000/T7000

Temperature range: -40 °C to +100 °C

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.

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.

The hoses can be used in short lengths for ordinary machinery purposes in the systems mentioned on the front page. They are not to be used where fixed 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 for T2A, RQP2, T2D, TXA2D:

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.: 1070 dated 1999-09-15, 1073 dated 1999-09-20, 1074 dated 1999-09-20 and 1069 dated 1999-09-15.

Impulse test cert. nos.: 1061 dated 1999-04-14, 1062 dated 1999-09-14, 1063 dated 1999-09-14, 1066 dated 1999-09-14, 787 dated 1998-04-23, 847 dated 1998-08-28, 849 dated 1998-09-03, 1065 dated 1999-09-14, 1022 dated 1999-07-06, 1024 dated 1999-07-06, 1026 dated 1999-07-06, 1038 dated 1999-07-26, 1014 dated 1999-07-02, 1015 dated 1999-07-07, and 1035 dated 1999-07-14.

Material cert. nos.: 2717/99 dated 1999-07-23, 2067/99 dated 1999-04-28, 2102/99 dated 1999-04-30, 2094/99 dated 1999-04-30, 2095/99 dated 1999-04-30, 960/99 dated 1999-02-27 and 961/99 dated 1999-02-27.

Material declarations issued by Phoenix Rubber Products on 1999-09-03, 1999-07-26 and 1999-08-13.

Fire test report: Wehrtechnische Dienststelle für Schiffe und Marinewaffen, test no. 6/96 dated 1996-03-20.

Fire resistant test certificates:

Hose Type T2A: RH-FT-3/15/37

Hose Type T2D: RH-FT-5/8/9

Hose Type RQP2: RH-FT-25/35/40

Certificate No: **P-14689**
File No: **791.70**
Job Id: **262.1-015853-1**

Hose Type TXA2D: RH-FT-12/13/14
Hose Type DF2A: RH-FT-26/38/39
Hose Type T2S: RH-FT-42/43/44
Hose Type DF2E: RH-FT-74/75/76
Hose Type T2E: RH-FT-79/80/81

Reference documents for new hoses:

T2S: Burst test report RYCO No. 1561 dated 2003-04-11
Test reports No. 93, 94, 95, 97, 98.
AS2D: Report No. E2100437, E2100409, E2000426.
DF2A: Burst test report RYCO No. 1564 dated 2003-04-11
Test reports DIESSE No.35-38-39/2001-06-05, No.40/2001-06-14, No.68-69/2001-08-02
DF2E: Manufacturer's test reports dated 2010-09-08
T2E: Manufacturer's test reports dated 2010-09-08

Tests carried out

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

Marking of product

For traceability to this Type Approval, the hoses are to be marked by an embossed system with:

- Manufacturers logo
- Type designation
- Nominal size
- Quarter and year of production.

Periodical assessment

For retention of the Type Approval, DNV 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.
- Change in length
- Leakage test
- Burst test

The tests shall be performed in accordance with procedures given in Det Norske Veritas' Standard for Certification No. 2.9, Type Approval programme 5-791.70, "Type Approval of Flexible Hoses of Non-Metallic Material".

The tests are to be performed with the type of couplings fitted that are Type Approved with the hoses.

END OF CERTIFICATE