

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)
H13D, R4SPD, R4SHD

Issued to
RYCO Hydraulics Pty. Ltd.
Derrimut, VIC, Australia

is found to comply with
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL class programme DNVGL-CP-0185 – Type approval – Mechanical joints

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
H13D	-40°C to +121°C (see page 3)	350 bar	DN 19, 25, 31, 38 and 51
R4SPD	-40°C to +100°C (see page 3)	350 to 420 bar (see page 3)	DN 12, 16, 19 and 25
R4SHD	-40°C to +100°C (see page 3)	250 to 420 bar (see page 3)	DN 19, 25, 31 and 38

Issued at **Høvik** on **2020-02-24**

for **DNV GL**

This Certificate is valid until **2023-12-31**.

DNV GL local station: **Melbourne**

Approval Engineer: **Maheshraja Venkatesan**

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Zeinab Sharifi
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.



Product description

Three types of flexible rubber hoses with permanently attached couplings:-

1. DIEHARD H13D constructed according to SAEJ517 type SAE100R13/ EN856 type R13

Hose inner tube : Black, oil resistant synthetic rubber (CR-NBR)
Reinforcement : - 4 layers of alternate, spiral & high tensile steel wire for sizes -12 & -16
- 6 layers of alternate, spiral & high tensile steel wire for sizes -20 to -32
Hose cover : DIEHARD™ Black, abrasion and oil resistant synthetic rubber (CSM-CR)
End fittings : BITELOK NON-SKIVE T9000 series
Material for end fittings : Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045
Stainless steel - ASTM A276 type 316

2. DIEHARD R4SPD constructed according to EN856 type 4SP

Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : 4 layers of alternate, spiral & high tensile steel wire
Hose cover : DIEHARD™ Black, extra abrasion and oil resistant synthetic rubber
End fittings : T7000 Skive series
Material for end fittings : Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045
Stainless steel - ASTM A276 type 316

3. DIEHARD R4SHD constructed according to EN856 type 4SH

Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : 4 layers of alternate, spiral & high tensile steel wire
Hose cover : DIEHARD™ Black, extra abrasion and oil resistant synthetic rubber
End fittings : BITELOK NON-SKIVE T7000 or T9000 (T6000) series
Material for end fittings : Carbon steel - AS1443 grades 12L14, 1010, 1020, 1040 & 1045
Stainless steel - ASTM A276 type 316

Hose manufacturing location:

- RYCO Hydraulics Sdn. Bhd., Malaysia

End fittings manufacturing location:

- RYCO Hydraulics, Victoria, Australia
- RYCO Hydraulics (DALIAN), P.R.China

Hose assembling location:

- RYCO Hydraulics, Victoria, Australia

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.

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.

Max. allowable working pressures (MAWP):

H13D	Hose (size inner diameter)			MAWP		End fitting designation (Bitelok)
	DN	Inch	Dash	Bar	PSI	
H1312D	19	¾	-12	350	5100	T9000 non skive
H1316D	25	1	-16	350	5100	T9000 non skive
H1320D	31	1.¼	-20	350	5100	T9000 non skive
H1324D	38	1.½	-24	350	5100	T9000 non skive
H1332D	51	2	-32	350	5100	T9000 non skive

R4SPD	Hose size (inner diameter)			MAWP		End fitting designation (Bitelok)
	DN	Inch	Dash	bar	PSI	
R4SP08D	12	1/2	-08	420	6100	T7000 non-skive
R4SP10D	16	5/8	-10	380	5500	T7000 non-skive
R4SP12D	19	3/4	-12	380	5500	T7000 non-skive
R4SP16D	25	1	-16	350	5100	T7000 non-skive

R4SHD	Hose size (inner diameter)			MAWP		End fitting designation (Bitelok)
	DN	Inch	Dash	bar	PSI	
R4SH12D	19	3/4	-12	420	6100	T6000 non-skive
R4SH16D	25	1	-16	380	5500	T7000 non-skive
R4SH20D	31	1.1/4	-20	350	5100	T7000 non-skive
R4SH24D	38	1.1/2	-24	300	4350	T7000 non-skive

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

Operating media	Temperature range	
	H13D	R4SPD & R4SHD
Petroleum based hydraulic fluids	-40°C to +121°C	-40°C to +100°C
Water based Hydraulic fluids	-40°C to +70°C	-40°C to +70°C
Water and air	0°C to +70°C	0°C to +70°C

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 DNVGL-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 DNVGL-RU-SHIP Pt.4 Ch.6 Sec.9, then they shall be separately type approved.

Production testing

All hose assemblies delivered under the DNV GL 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

<u>Document No.</u>	<u>Rev.</u>	<u>Title</u>
Page 27	-	Datasheet – DIEHARD H13D
Page 107	-	Datasheet – DIEHARD R4SPD
Page 108	-	Datasheet – DIEHARD R4SHD
28913076	-	DNV Inspection and Testing Report dated 2009-04-17
3089	-	Burst test report witnessed by DNV Surveyor
Page 27	-	Datasheet – DIEHARD H13D
1823i		Impulse test certificate dated 2004-08-09
1568		RYCO Burst test report witnessed by DNV Surveyor dated 2003-04-11
1423i		Impulse test certificate dated 2002-07-12
4640i		Impulse test certificates dated 2012-03-19
RH-WI-83	8	Hose and coupling Assembly instructions dated

		29/11/2017
RH-WI-61	09	RYCO – Metric Crimp Chart and Rapid Numbers dated 2017-12-21
5378	-	Report on burst pressure test witnessed by GL Surveyor dated 2013-02-20
20181024	-	Renewal burst test report witnessed by DNV GL Surveyor dated 2018-11-02
RH-FT-30; RH-FT-49; RH-FT-57	-	Fire test report for H13A/D/S hoses witnessed by DNV Surveyor
RH-FT-147; RH-FT-148; RH-FT-149	-	Fire test report for R4SPD hoses witnessed by DNV Surveyor
RH-FT-150; RH-FT-151; RH-FT-152	-	Fire test report for R4SHD hoses witnessed by DNV Surveyor
20181212	-	Burst test certificate witnessed by DNV GL Surveyor dated 2018-12-12
6496-030	-	Impulse test certificate dated 24/05/2019
	-	R4SH test summary data sheets dated 24/05/2019
3952-030	-	Impulse test certificate dated 13/06/2017
6497-030	-	Impulse test certificate dated 24/05/2019
6498-030	-	Impulse test certificate dated 24/05/2019 for R4SH24D & R4SP08D
KP1 009/17	-	Impulse test certificate dated 08/04/2017
KP1 012/17	-	Impulse test certificate dated 08/04/2017
5802-030; 3952-030; 5803-030	-	R4SHD Impulse test certificates
5800-030; KP1009/17; KP1012/17	-	R4SPD Impulse test certificates
6480-030	-	H1312D Test summary datasheet dated 23/05/2019
6481-030	-	H1316D Test summary datasheet dated 23/05/2019
6481-030	-	H1324D Test summary datasheet dated 23/05/2019
6482-030	-	H1332D Test summary datasheet dated 23/05/2019
6492-030	-	R4SH12D Test summary datasheet dated 24/05/2019
6493-030	-	R4SH20D Test summary datasheet dated 24/05/2019
2434-030	-	R4SH16D Test summary datasheet dated 19/12/2015
2435-030	-	R4SH24 Test summary datasheet dated 22-12-2015
6494-030	-	R4SP10 Test summary datasheet dated 24/05/2019
6495-030	-	R4SP16 Test summary datasheet dated 24/05/2019
2436-030	-	R4SP08 Test summary datasheet dated 19-12-2015
2437-030	-	R4SP12 Test summary datasheet dated 19-12-2015

Tests carried out

As per DNVGL-CP-0183 Sec.2 Table 1 and 2 (except vacuum testing)

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

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