

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)
H12D/S/C, H3000D/S/C, H4000D/S/C, H5000D/S/C, H6000D/S/C

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

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018
DNV GL class programme DNVGL-CP-0183 – Type approval – Flexible hoses

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:
H12D/S/C	-40°C to +100°C (see page 4)	255 to 350 bar (see page 3)	DN10, 12, 16, 19, 25, 31, 38 & 51
H3000D/S/C	-40°C to +100°C (see page 3)	215 bar (for all sizes)	DN31, 38 & 51
H4000D/S/C	-40°C to +100°C (see page 3)	280 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51
H5000D/S/C	-40°C to +100°C (see page 3)	350 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51
H6000D/S/C	-40°C to +100°C (see page 3)	420 bar (for all sizes)	DN10, 12, 16, 19, 25, 31, 38 & 51

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

Issued at **Høvik** on **2020-07-31**

for **DNV GL**

DNV GL local station: **Melbourne**

Approval Engineer: **Maheshraja Venkatesan**

.....
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.

Job Id: **262.1-015853-12**
Certificate No: **TAP0000094**
Revision No: **2**

Product description

5 types of flexible rubber hoses with permanently fitted couplings:

- H12C/D/S** constructed according to SAEJ517 type SAE100R12/ EN 856 type 4SP
Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : Four alternating layers of spiralled high tensile steel wire
Hose cover : H12C: Black, oil and extra abrasion resistant synthetic rubber
H12D: DIEHARD™ Black, abrasion and oil resistant synthetic rubber
H12S: SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
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
- H3000C/D/S** constructed according to SAEJ517 type SAE100R12/ EN856 type R12
Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : Four alternating layers of spiralled high tensile steel wire
Hose cover : H3000C: Black, oil and extra abrasion resistant synthetic rubber
H3000D: DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene)
H3000S: SLIDER™ Black, abrasion and oil resistant rubbersheathed with a layer of polyethylene
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
- H4000C/D/S** constructed according to ISO 18752-DC
Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -24
- Six alternating layers of spiralled high tensile steel wire for size -32
Hose cover : H4000C: Black, oil and extra abrasion resistant synthetic rubber
H4000D: DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene)
H4000S: SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
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
- H5000C/D/S** constructed according to ISO 18752-CC
Hose inner tube : Black, oil resistant synthetic rubber
Reinforcement : - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -20
- Six alternating layers of spiralled high tensile steel wire for sizes -24 & -32
Hose cover : H5000C: Black, oil and extra abrasion resistant synthetic rubber
H5000D: DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene)
H5000S: SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
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

Job Id: **262.1-015853-12**
 Certificate No: **TAP0000094**
 Revision No: **2**

5. **H6000C/D/S** constructed according to ISO 18752-CC
- Hose inner tube : Black, oil resistant synthetic rubber
 - Reinforcement : - Four alternating layers of spiralled high tensile steel wire for sizes -06 to -16
 - Six alternating layers of spiralled high tensile steel wire for size -20 & -24
 - Eight alternating layers of spiralled high tensile steel wire for size -32
 - Hose cover : **H6000C**: Black, oil and extra abrasion resistant synthetic rubber
 - H6000D**: DIEHARD™ Black, abrasion and oil resistant synthetic rubber (Neoprene)
 - H6000S**: SLIDER™ Black, abrasion and oil resistant rubber sheathed with a layer of polyethylene
 - 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

Hose manufacturing location

- RYCO Hydraulics Sdn. Bhd., Malaysia

End fittings manufacturing location:

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

Hose assembling locations

- RYCO Hydraulics, Victoria, Australia : Hose types covered
All types as covered by this certificate
- RYCO Hydraulics (Dalian) Ltd., Dalian City, Liaoning Province, China : H3000D, H3000S, H4000D, H4000S, H5000S, H5000C, H5000D, H6000D & H6000S

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.

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

<i>Operating media</i>	<i>Temperature range (for all types)</i>
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

Maximum Allowable Working Pressures (MAWP):

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H12D		H12S		H12C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H1206	10	3/8	-06	350	5100	350	5100	350	5100	T7000
H1208	12	1/2	-08	350	5100	350	5100	350	5100	T7000
H1210	16	5/8	-10	350	5100	350	5100	350	5100	T7000
H1212	19	3/4	-12	350	5100	350	5100	350	5100	T7000
H1216	25	1	-16	350	5100	350	5100	350	5100	T7000
H1220	31	1-1/4	-20	275	4000	275	4000	275	4000	T7000
H1224	38	1-1/2	-24	255	3700	255	3700	255	3700	T7000

Job Id: **262.1-015853-12**
 Certificate No: **TAP0000094**
 Revision No: **2**

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H3000D		H3000S		H3000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H3020	31	1-¼	-20	215	3100	215	3100	215	3100	T7000
H3024	38	1 ½	-24	215	3100	215	3100	215	3100	T7000
H3032	51	2	-32	215	3100	215	3100	215	3100	T7000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H4000D		H4000S		H4000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H4006	10	3/8	-06	280	4100	280	4100	280	4100	T7000
H4008	12	½	-08	280	4100	280	4100	280	4100	T7000
H4010	16	5/8	-10	280	4100	280	4100	280	4100	T7000
H4012	19	¾	-12	280	4100	280	4100	280	4100	T7000
H4016	25	1	-16	280	4100	280	4100	280	4100	T7000
H4020	31	1-¼	-20	280	4100	280	4100	280	4100	T7000
H4024	38	1 ½	-24	280	4100	280	4100	280	4100	T7000
H4032	51	2	-32	280	4100	280	4100	280	4100	T7000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H5000D		H5000S		H5000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H5006	10	3/8	-06	350	5100	350	5100	350	5100	T7000
H5008	12	½	-08	350	5100	350	5100	350	5100	T7000
H5010	16	5/8	-10	350	5100	350	5100	350	5100	T7000
H5012	19	¾	-12	350	5100	350	5100	350	5100	T6000/T7000
H5016	25	1	-16	350	5100	350	5100	350	5100	T6000/T7000
H5020	31	1-¼	-20	350	5100	350	5100	350	5100	T6000/T7000
H5024	38	1 ½	-24	350	5100	350	5100	350	5100	T6000/T7000
H5032	51	2	-32	350	5100	350	5100	350	5100	T6000

Part No.	Hose size			MAWP						End fitting designation (Bitelok)
				H6000D		H6000S		H6000C		
	DN	Inch	DASH	Bar	PSI	Bar	PSI	Bar	PSI	
H6006	10	3/8	-06	420	6100	420	6100	420	6100	T7000
H6008	12	½	-08	420	6100	420	6100	420	6100	T7000
H6010	16	5/8	-10	420	6100	420	6100	420	6100	T7000
H6012	19	¾	-12	420	6100	420	6100	420	6100	T6000/T7000
H6016	25	1	-16	420	6100	420	6100	420	6100	T6000/T7000
H6020	31	1-¼	-20	420	6100	420	6100	420	6100	T6000/T7000
H6024	38	1 ½	-24	420	6100	420	6100	420	6100	T6000
H6032	51	2	-32	420	6100	420	6100	420	6100	T6000

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.

Job Id: **262.1-015853-12**
Certificate No: **TAP0000094**
Revision No: **2**

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 no. 105	-	H12D RYCO hose assembly specification sheet
Page no. 76	-	H4000S RYCO hose assembly specification sheet
Page no. 77	-	H5000C RYCO hose assembly specification sheet
Page no. 80	-	H6000D RYCO hose assembly specification sheet
-	-	'RYCO Product Technical Manual'
28913076	-	DNV Inspection and Testing Report dated 2009-04-17
3089	-	Burst test report witnessed by DNV Surveyor
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
5185	-	Burst test certificate witnessed by DNV GL surveyor dated 2012-11-15
1569, 1570, 1571, 1573	-	Burst test reports witnessed by DNV Surveyor dated 11.04.03
RHAU-HA-H1206A, RHAU-HA-H1208A, RHAU-HA-H1212A, RHAU-HA-H1224A 1417i & 1418i	-	H12 RYCO hose test reports
4770i	-	H12 Impulse test certificates dated 11.07.2002
5041i	-	H12 Impulse test certificate dated 06.07.2012
KP2 047/12	-	H12 Impulse test certificate dated 20.11.2012
KP2 054/12	-	H12 Impulse test certificate dated 12/8/2012
RHAU-HA-H1512A, RHAU-HA-H1520A 2764i	-	H5000 Impulse test certificate dated 22-09-2012
4771i & 5042i	-	H15 RYCO hose test reports
	-	H15 Impulse test certificate dated 12.09.07
	-	H15 Impulse test certificates dated 20.11.2012

Job Id: **262.1-015853-12**
Certificate No: **TAP0000094**
Revision No: **2**

RHAU-IS-1005A, RHAU-IS-1005D, RHAU-IS-1005S	-	H3000 RYCO hose test reports dated 27.08.2012
4848-030, 4358-030,	-	H4000 RYCO hose test reports
RHAU-IS-1002A, RHAU-IS-1002D, RHAU-IS-1002S, RHAU-IS-1010A, RHAU-IS-1010D, RHAU-IS-1010S, RHAU-IS-1011A, RHAU-IS-1011D, RHAU-IS-1011S, RHAU-H4-H4032D	-	H5000 RYCO hose test reports dated 27.08.2012
RHAU-IS-1004A, RHAU-IS-1004D, RHAU-IS-1004S, RHAU-IS-1008A, RHAU-IS-1008D, RHAU-IS-1008S	-	H5000 RYCO hose test reports
RHAU-IS-H5008D, RHAU-IS-H5010D, 2434-030, 2735-030, 2736-030 5968-030, 3542-030	-	H6000 RYCO hose test reports
RHAU-IS-H6008D, RHAU-IS-H6020D, RHAU-IS-H6016D, RHAU-IS-1006A, RHAU-IS-1006D, RHAU-IS-1006S, RHAU-IS-1007A, RHAU-IS-1007D, RHAU-IS-1007S	-	Fire test reports for H12 hose assemblies witnessed by DNV Surveyor
RH-FT-11, 33, 50, 51, 54, 56, 167, 168 & 169	-	Fire test reports for H15 hose assemblies witnessed by DNV Surveyor
RH-FT-41 & 58	-	Fire test reports for H3000 hose assemblies witnessed by DNV Surveyor
RH-FT-92, 94, 127, 153 & 154	-	Fire test reports for H4000 hose assemblies witnessed by DNV Surveyor
RH-FT-83, 86, 87, 88, 110, 111, 133 & 155	-	Fire test reports for H5000 hose assemblies witnessed by DNV Surveyor
RH-FT-84, 85, 89, 95, 112, 124, 132, - 158, -159, -160 & 161	-	Fire test reports for H6000 hose assemblies witnessed by DNV Surveyor
RH-FT-90, 91, 96, 109, 118, 119, 130, 162, 163, 164, 165 & 166	-	Impulse test certificate for H4006D hose assembly
6931-030	-	Impulse test certificate for H5006D hose assembly
6930-030	-	Impulse test certificate for H6006D hose assembly
4556-030	-	Impulse test certificate for H6032D hose assembly
6023-030	-	Impulse test certificate for H5006D hose 1182-030i
1182-030i	-	Impulse test certificate for H4032 hose assembly
6179	-	Impulse test certificate for H4006A hose assembly
KP 037/13	-	Impulse test certificate for H5032D hose assembly
2210-030	-	Report on Burst pressure test witnessed by DNV GL Surveyor dated 18/10/2018
RH-BT-003/18	-	T28C hose test summary sheet dated 16-12-2015
2442-030	-	Cold bend test certificates with cover 'C' dated 16/12/2019
CB 19-020/021/022	-	Burst test certificates witnessed by DNV GL Surveyor dated 2020-06-15
C30-1131, C30-1132, C30-1139, C30-1144	-	Hose & coupling assembly instructions
RH-WI-83, Issue no. 8	-	RYCO metric crimp chart and rapid numbers
RH-WI-61	09	Hose crimping assembly/ inspection
RH-WI-70, Issue no. 3	-	Safe operation of crimping machines
RH-WI-101, Issue no. 3	-	Authorization letter dated 13th February 2020 for RYCO Dalian location as hose assembling location
RYCO RHCN Hose Assembler Approval Letter-2020-02-13 v1-0	-	



Job Id: **262.1-015853-12**
Certificate No: **TAP0000094**
Revision No: **2**

Tests carried out

According to 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.