

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

Alfabiotech 3000 (Supertuff) / Powerflexbio 3000 (TUFLEX), Alfabiotech 4000 (Supertuff) / Powerflexbio 4000 (TUFLEX), Alfabiotech 5000 (Supertuff) / Powerflexbio 5000 (TUFLEX), Alfabiotech 5000PLUS (Supertuff) / Powerflexbio 5000PLUS (TUFLEX), Alfabiotech 6000 (Supertuff) / Powerflexbio 6000 (TUFLEX)

Issued to

Alfagomma Hydraulic S.p.A.
Castellalto TE, Italy

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:
Alfabiotech 3000 (Supertuff) / Powerflexbio 3000 (TUFLEX)	-40°C to +121°C	210 bar	-20,-24,-32,-48
Alfabiotech 4000 (Supertuff) / Powerflexbio 4000 (TUFLEX)	-40°C to +121°C	280 to 290 bar	-12,-16,-20,-24,-32
Alfabiotech 5000 (Supertuff) / Powerflexbio 5000 (TUFLEX)	-40°C to +121°C	350 bar	-10,-12,-16,-20,-24,-32,-40,-48
Alfabiotech 5000PLUS (Supertuff) / Powerflexbio 5000PLUS (TUFLEX)	-40°C to +121°C	380 bar	-12,-16
Alfabiotech 6000 (Supertuff) / Powerflexbio 6000 (TUFLEX)	-40°C to +121°C	420 to 450 bar	-04,-06,-08,-10,-12,-16,-20,-24,-32

Issued at **Høvik** on **2019-02-21**

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

DNV GL local station: **Milan**

for **DNV GL**

Approval Engineer: **Adel Samiei**

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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.



Job Id: **262.1-016580-4**
 Certificate No: **TAP00000Y9**
 Revision No: **1**

Product description

Five types of flexible rubber hoses with permanently attached couplings constructed according to ISO 18752 with type designations (except Alfabiotech 5000 DN76 which is not according to ISO18752)
 ALFAGOMMA designations: ALFABIOTECH 3000, 4000, 5000/ 5000 PLUS, 6000 (SUPERTUFF)
 DUNLOP HIFLEX designations: POWERFLEXBIO 3000, 4000, 5000/ 5000 PLUS, 6000 (TUFLEX)

Design:

Tube: Oil resistant synthetic rubber and biodegradable hydraulic fluids
 Cover: Abrasion, ozone and hydrocarbon resistant synthetic rubber. MSHA.
 Reinforcement: Type 3000: Four/six high tensile steel spirals
 Type 4000: Four high tensile steel spirals
 Type 5000: Four/six high tensile steel spirals
 Type 5000PLUS: Four high tensile steel spirals
 Type 6000: Four/six high tensile steel spirals

ALFABIOTECH 3000	Size		Ferrule	Insert
	1 ¼"	-20	H1100404-20	H12xxxxx-20
	1 ½"	-24	H1100404-24	H12xxxxx-24
	2"	-32	H1200204-32	H12xxxxx-32
	3"	-48	H1T00600-48	H1Txxxxx-48

ALFABIOTECH 4000	Size		Ferrule	Insert	Ferrule	Insert
	¾"	-12	H1200204-12	H12xxxxx-12	-	-
	1"	-16	H1200204-16	H12xxxxx-16	H1100404-16 H3100404-16	H12xxxxx-16 H32xxxxx-16
	1 ¼"	-20	H1200204-20	H12xxxxx-20	-	-
	1 ½"	-24	H1300NS4-24	H13xxxxx-24	H1400200-24	H14xxxxx-24
2"	-32	H1300NS4-32	H13xxxxx-32	H1400200-32	H14xxxxx-32	

ALFABIOTECH 5000 Plus							
Size	Ferrule	Insert	Ferrule	Insert	Ferrule	Insert	
¾"	-12	H1300NS4-12	H13xxxxx-12	H1100404-12	H12xxxxx-12	H1400200-12	H14xxxxx-12
1"	-16	H1300NS4-16	H13xxxxx-16	-	-	H1400200-16	H14xxxxx-16

ALFABIOTECH 6000						
Size		Ferrule	Insert	Ferrule	Insert	
¼"	-04	H1100404-04	H12xxxxx-04			
		H3100404-04	H32xxxxx-04			
3/8"	-06	H1100404-06	H12xxxxx-06			
		H3100404-06	H32xxxxx-06			
½"	-08	H1100404-08	H12xxxxx-08	H1400200-08	H14xxxxx-08	
		H3100404-08	H32xxxxx-08			
5/8"	-10	-	-	H1400200-10 H3400200-10	H14xxxxx-10 H34xxxxx-10	
				H1400200-12 H3400200-12	H14xxxxx-12 H34xxxxx-12	
¾"	-12	H1300NS4-12	H13xxxxx-12	H1400200-16 H3400200-16	H14xxxxx-16 H34xxxxx-16	
1"	-16	H1300NS4-16	H13xxxxx-16	H1400301-20 H3400301-20	H14xxxxx-20 H34xxxxx-20	
1 ¼"	-20	H1300NS6-20	H13xxxxx-20	H1400301-24 H3400301-24	H14xxxxx-24 H34xxxxx-24	
1 ½"	-24	-	-	H1T00600-32 H3T00600-32	H1Txxxxx-32 H3Txxxxx-32	
2"	-32	-	-			

ALFABIOTECH 5000						
Size	Ferrule	Insert	Ferrule	Insert	Ferrule	Insert

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5/8"	-10	-	-	H1100404-10	H12xxxxx-10	-	-
3/4"	-12	H1300NS4-12	H13xxxxx-12	H1100404-12	H12xxxxx-12	H1400200-12	H14xxxxx-12
1"	-16	H1300NS4-16	H13xxxxx-16	H1100404-16	H12xxxxx-16	H1400200-16	H14xxxxx-16
1 1/4"	-20	H1300NS4-20	H13xxxxx-20	-	-	H1400200-20	H14xxxxx-20
1 1/2"	-24	H1300NS6-24	H13xxxxx-24	-	-	H1400301-24 H3400301-24	H14xxxxx-24 H34xxxxx-24
2"	-32	H1300NS6-32	H13xxxxx-32	-	-	H1400301-32	H14xxxxx-32
2 1/2"	-40	-	-	-	-	H1T00600-40	H1Txxxxx-40
3"	-48	-	-	-	-	H1T00600-48 H3T00600-48	H1Txxxxx-48 H3Txxxxx-48

End fittings material: Carbon Steel 11SMnPb30 according UNI EN 10277
 INOX Steel AISI 316

Manufacturing plants:

Hoses: Alfagomma Hydraulic S.p.A., Via Enrico Mattei no.6, 64020 - Castelnuovo Vomano (TE)
 Couplings: Alfagomma Hydraulic S.p.A, Area Industriale Piano Lago, 87050 Mangone (CS) – Italy

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 or below assembling locations:

- 1) Dunlop Hiflex Oy, Pirkkala, Finland (Except ABT 5K and 6K)
- 2) Dunlop Hiflex AB, Halmstad, Sweden
- 3) Dunlop Hiflex OY, Turku, Finland (Except ABT 5K and 6K)
- 4) Alfagomma Germany GmbH, Herne, Germany
- 5) Alfagomma Germany GmbH, Hamburg, Germany
- 6) Dunlop Hiflex AS, Stavanger, Norway
- 7) Dunlop Hiflex AS, Bergen, Norway
- 8) Dunlop Hiflex AS, Kristiansand, Norway
- 9) Dunlop Hiflex AS, Esbjerg, Denmark
- 10) Dunlop Hiflex AS, Kolding, Denmark
- 11) Alfagomma UK Ltd, Hydock, UK
- 12) Dunlop Hiflex AS, Ålesund, Norway
- 13) Alfagomma Hydraulic S.P.A., Mangone, Italy (Except ABT 3K)
- 14) Alfagomma hydraulic S.P.A, Bellusco, Italy
- 15) Alfagomma China, Ningbo, China

Hose assemblies covered by this certificate may be used in:

Petroleum based (-40°C to +121°C), water based Hydraulic fluids (-40°C to +70°C) fluids, water and air (0°C to +70°C)

Maximum working pressure for each type and size of hose assembly shall be as below:

Size			ABT 3K	ABT 4K	ABT 5K	ABT 5K PLUS	ABT 6K
DN6	-04	1/4"	-	-	-	-	450 bar
DN10	-06	3/8"	-	-	-	-	445 bar
DN12	-08	1/2"	-	-	-	-	420 bar
DN16	-10	5/8"	-	-	350 bar	-	420 bar
DN19	-12	3/4"	-	280 bar	350 bar	380 bar	420 bar
DN25	-16	1"	-	280 bar	350 bar	380 bar	420 bar
DN31	-20	1 1/4"	210 bar	280 bar	350 bar	-	420 bar
DN38	-24	1 1/2"	210 bar	290 bar	350 bar	-	420 bar
DN51	-32	2"	210 bar	280 bar	350 bar	-	420 bar
DN63	-40	2 1/2"	-	-	350 bar	-	-
DN76	-48	3"	210 bar	-	350 bar	-	-

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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.

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

Tests carried out

Dimensional check, change in length, burst pressure, proof pressure , impulse test, oil resistance test, ozone resistance test, cold flexibility test, cover adhesion test, fire test

Marking of product

For traceability to this Type Approval, the products are at least to be marked with:

- 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.

Alfagomma Hydraulic S.p.A.
Att: Ms. Georgia Carpani <Georgia.Carpani@alfagomma.com>
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Italy
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Date:	Our reference:	Your reference:
2019-03-07	M-WI-IMM/BNTT/ 262.1-016580-J-56	Ms. Georgia Carpani

ALFAGOMMA HYDRAULIC S.p.A. - DNVGL Type Approval Certificate No. TAP00000Y9 Rev.01

This is to inform and confirm the approved range (families name) mentioned in the a.m. DNV Type Approval Certificate No.TAP00000Y9 Rev.01 issued to Messrs ALFAGOMMA HYDRAULIC SPA - CASTELNUOVO VOMANO (TE).

- Alfabiotech 3000 (Supertuff) it means that the approved families are **Alfabiotech 3000** and **Alfabiotech 3000 Supertuff**
- Powerflexbio 3000 (TUFLEX) it means that the approved families are **Powerflexbio 3000** and **Powerflexbio 3000 TUFLEX**
- Alfabiotech 4000 (Supertuff) it means that the approved families are **Alfabiotech 4000** and **Alfabiotech 4000 Supertuff**
- Powerflexbio 4000 (TUFLEX) it means that the approved families are **Powerflexbio 4000** and **Powerflexbio 4000 TUFLEX**
- Alfabiotech 5000 (Supertuff) it means that the approved families are **Alfabiotech 5000** and **Alfabiotech 5000 Supertuff**
- Powerflexbio 5000 (TUFLEX) it means that the approved families are **Powerflexbio 5000** and **Powerflexbio 5000 TUFLEX**
- Alfabiotech 5000PLUS (Supertuff) it means that the approved families are **Alfabiotech 5000PLUS** and **Alfabiotech 5000PLUS Supertuff**
- Powerflexbio 5000PLUS (TUFLEX) it means that the approved families are **Powerflexbio 5000PLUS** and **Powerflexbio 5000PLUS TUFLEX**
- Alfabiotech 6000 (Supertuff) it means that the approved families are **Alfabiotech 6000** and **Alfabiotech 6000 Supertuff**
- Powerflexbio 6000 (TUFLEX) it means that the approved families are **Powerflexbio 6000** and **Powerflexbio 6000 TUFLEX**

Sincerely
for DNV GL Italy S.r.l

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