

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

Issued at **Høvik** on **2019-02-21**

for **DNV GL**

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

DNV GL local station: **Milan**

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
¾"	-12	H1300NS4-12	H13xxxxx-12	H1400200-12 H3400200-12	H14xxxxx-12 H34xxxxx-12
1"	-16	H1300NS4-16	H13xxxxx-16	H1400200-16 H3400200-16	H14xxxxx-16 H34xxxxx-16
1 ¼"	-20	H1300NS6-20	H13xxxxx-20	H1400301-20 H3400301-20	H14xxxxx-20 H34xxxxx-20
1 ½"	-24	-	-	H1400301-24 H3400301-24	H14xxxxx-24 H34xxxxx-24
2"	-32	-	-	H1T00600-32 H3T00600-32	H1Txxxxx-32 H3Txxxxx-32

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ALFABIOTECH 5000							
Size	Ferrule	Insert	Ferrule	Insert	Ferrule	Insert	
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**

Alfagomma hydraulic hose fittings and adapters catalogue dated 2017-01-16

Alfagomma technical data sheets for types 3000/4000/5000 & 5000 Plus/6000

LAPI fire test reports:

2089.OIS0110/16, 2090.OIS0110/16, 2091.OIS0110/16 (ALFABIOTECH 3000)

074.OIS0110/14, 075.OIS0110/14, 076.OIS0110/14, 1049.OIS0110/18, 1050.OIS0110/18,

2314.OIS0110/18 (ALFABIOTECH 4000)

077.OIS0110/14, 078.OIS0110/14, 079.OIS0110/14, 2092.OIS0110/16, 1051.OIS0110/18,

1052.OIS0110/18,1053.OIS0110/18,1054.OIS0110/18, 1055.OIS0110/18, 1056.OIS0110/18,

1057.OIS0110/18, 2902.OIS0110/18, 2903.OIS0110/18 (ALFABIOTECH 5000/5000PLUS)

1058.OIS0110/18, 1059.OIS0110/18, 1060.OIS0110/18, 276.OIS0110/18, 277.OIS0110/18,

278.OIS0110/18, 080.OIS0110/14, 081.OIS0110/14, 082.OIS0110/14 (ALFABIOTECH 6000)

Rubber hose test reports dated 2014-07-22

Burst pressure test, change in length and leakage test report dated 2014-04-03 witnessed by DNV GL surveyor

Burst pressure test, change in length and leakage test report dated 2017-04-19 witnessed by DNV GL surveyor

Impulse test reports numbers 061/14-, 041/12-, 083/13, 053/14, 186/12, 071/13, 138/11, 197/13,

206/13, 257/14, 138/15, 169/15, 217/15A, 068/16-, 161/16, 080/17, 095/17, 141/17-, 145/17,

150/17-A, 216/17-, 217/17-, 220/17-, 221/17-, 003/18, 039/18, 058/18,080/18, 136/18

Renewal burst pressure test report numbers: 253,254,257,259,260,261,265,266,237,238,239,240,241,

213,214,215,216,217,218,219,220,221,222,203,204,205,206,207,223,224,225,226,227,245,246,247,

228,229,230,231,232,242,243,244,208,209,210,211,212,272,273,274,275,276,233,234,235,236,248,

249,250,251,252,255,256,258,262,263,264,198,199,200,201,202,267,268,269,270,271,277,278,279,2

80, 281


### **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.



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**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.