

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

Alfabiotech/ Powerflexbio 3000, Alfabiotech/ Powerflexbio 4000, Alfabiotech/ Powerflexbio 5000, Alfabiotech/ Powerflexbio 5000PLUS, Alfabiotech/ Powerflexbio 6000

Issued to

Alfagomma Hydraulic S.p.A.
Castelnuovo Vomano 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 July 2015
DNV GL class programme DNVGL-CP-0183 – Type approval – Flexible hoses

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
Alfabiotech/ Powerflexbio 3000	-40°C to +121°C	210 bar	DN31,38,51,76
Alfabiotech/ Powerflexbio 4000	-40°C to +121°C	280/290 bar (See certificate)	DN19,25,31,38,51
Alfabiotech/ Powerflexbio 5000	-40°C to +121°C	350 bar	DN16,19,25,31,38,51,63,76
Alfabiotech/ Powerflexbio 5000PLUS	-40°C to +121°C	380 bar	DN19,25
Alfabiotech/ Powerflexbio 6000	-40°C to +121°C	420 to 450 bar (See certificate)	DN6,10,12,16,19,25,31,38

Issued at **Høvik** on **2017-06-15**

for **DNV GL**

This Certificate is valid until **2018-12-31**.

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.



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
 DUNLOP HIFLEX designations: POWERFLEXBIO 3000, 4000, 5000/ 5000 PLUS, 6000

Construction:

Tube: Oil resistant synthetic rubber and biodegradable hydraulic fluids
 Cover: Abrasion, ozone and hydrocarbon resistant synthetic rubber. MSHA APPROVED
 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
 End fittings material: Carbon steel

Hose and end fitting are manufactured by: Alfagomma Hydraulics S.p.A.

Size	Type 3000	Type 4000	Type 5000	Type 5000 PLUS	Type 6000
DN6	-	-	-	-	H1100404
DN10	-	-	-	-	H1100404
DN12	-	-	-	-	H1100404/ H1400200
DN16	-	-	H1100404	-	H1400301
DN19	-	H1200204	H1100404/ H1400200	H1100404 H1400200	H1400200
DN25	-	H1100404/ H1200204	H1100404/ H1400200	H1400200	H1400200
DN31	H1100404	H1200204	H1400200	-	H1400301
DN38	H1100404	H1400200	H1400301	-	H1400301
DN51	H1200204	H1400200	H1400301	-	-
DN63	-	-	H1T00600	-	-
DN76	H1T00600	-	H1T00600	-	-

No skive fitting: H1200204 Ferrule H12XXXXX Insert
 Interlock: H1400200/301 Ferrule H14XXXXX Insert
 H1T00600 Ferrule
 Skive fitting: H1100404 Ferrule H11XXXXX Insert

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.

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

Size	Type 3000	Type 4000	Type 5000	Type 5000 PLUS	Type 6000
DN6	-	-	-	-	450 bar
DN10	-	-	-	-	445 bar
DN12	-	-	-	-	420 bar
DN16	-	-	350 bar	-	420 bar
DN19	-	280 bar	350 bar	380 bar	420 bar
DN25	-	280 bar	350 bar	380 bar	420 bar
DN31	210 bar	280 bar	350 bar	-	420 bar
DN38	210 bar	290 bar	350 bar	-	420 bar
DN51	210 bar	280 bar	350 bar	-	-
DN63	-	-	350 bar	-	-
DN76	210 bar	-	350 bar	-	-

Job Id: **262.1-016580-2**
Certificate No: **TAP00000Y9**

Hoses covered by this certificate are suitable for use with hydraulic fluids in temperature range of -40°C to +120°C.

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.

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 the type approval certificate.

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.

Hose assemblies with couplings made of carbon steel are not to be used at temperatures below -10°C unless the material is normalized.

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.IS.110/16, 2090.IS.110/16, 2091.IS.110/16 (ALFABIOTECH 3000)

080.IS.110/14, 081.IS.110/14, 082.IS.110/14 (ALFABIOTECH 6000)

077.IS.110/14, 078.IS.110/14, 079.IS.110/14, 2092.IS.110/16 (ALFABIOTECH 5000/5000PLUS)

074.IS.110/14, 075.IS.110/14, 076.IS.110/14 (ALFABIOTECH 4000)

Rubber hose test reports dated 2014-07-22

Burst pressure test, change in length and leakage test report dated 2017-04-03 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 061/15-, 041/15-, 083/13, 053/14, 186/12, 071/13, 138/11, 197/13

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:

- Manufacturer's name or trade mark
- Type designation
- Maximum working pressure
- Size

Periodical assessment

For retention of the Type Approval, DNV GL Surveyor shall perform a periodical assessment every second year, to verify that the conditions for the type approval are complied with and to burst tests on every 3rd sizes. The tests are to be performed with the type of couplings fitted that are Type Approved with the hoses.