

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00002G8
Revision No:
1

This is to certify:

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

with type designation(s)

Alfagomma Alfabiotech 5K Minetuff Evolution – Dunlop Hiflex Powerflexbio 5k Minetuff Extra, Alfagomma Alfabiotech 4K Minetuff Evolution – Dunlop Hiflex Powerflexbio 4k Minetuff Extra, Alfagomma Alfabiotech 6K Minetuff Evolution – Dunlop Hiflex Powerflexbio 6k Minetuff Extra, Alfagomma Alfabiotech 5K Plus Minetuff Evolution – Dunlop Hiflex Powerflexbio 5k Plus Minetuff Extra

issued to

Alfagomma Hydraulic S.p.A.
Castelnuovo Vomano – Castellalto, TE, Italy

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV class programme DNV-CP-0183 – Type approval – Flexible non-metallic hoses

Application:

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

Type:	Temperature range:	Max. working press.:	Sizes:
Alfagomma Alfabiotech 5K Minetuff Evolution – Dunlop Hiflex Powerflexbio 5k Minetuff Extra	-40°C to +120°C	350 bar	DN16 to DN51
Alfagomma Alfabiotech 4K Minetuff Evolution – Dunlop Hiflex Powerflexbio 4k Minetuff Extra	-40°C to +120°C	280 bar/290 bar	DN12 to DN38/DN51
Alfagomma Alfabiotech 6K Minetuff Evolution – Dunlop Hiflex Powerflexbio 6k Minetuff Extra	-40°C to +120°C	420 to 450 bar depending on the size	DN6 to DN51
Alfagomma Alfabiotech 5K Plus Minetuff Evolution – Dunlop Hiflex Powerflexbio 5k Plus Minetuff Extra	-40°C to +120°C	380 bar	DN19 & DN25

Issued at **Høvik** on **2024-04-24**

This Certificate is valid until **2028-03-13**.

for **DNV**

DNV local unit: **Italy/Malta CMC**

Approval Engineer: **Sarah Miller**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

Four different types of non-metallic hoses with permanently fitted couplings:

ALFABIOTECH 4000 Evolution (Alfagomma branding)/ POWERFLEXBIO 4000 EXTRA (Dunlop branding)

(according to ISO 18752 Type CC Class 280)

Tube	: Synthetic rubber resistant to oil and Biodegradable Hydraulic Fluids
Reinforcement	: Four high tensile steel spirals (4S)
Cover	: Abrasion, ozone, and hydrocarbon resistant synthetic rubber – MINETUFF and Supertuff cover
Coupling	: Material grade 11sMnPb30, AISI 316

ALFABIOTECH 5000 Evolution (Alfagomma branding)/ POWERFLEXBIO 5000 EXTRA (Dunlop branding)

(according to ISO 18752 Type CC Class 350)

Tube	: Synthetic rubber resistant to oil and Biodegradable Hydraulic Fluids
Reinforcement	: Four High Tensile Steel Spirals(4S) up to DN32, Six Spirals(6S), over DN32
Cover	: Abrasion, ozone, and hydrocarbon resistant synthetic rubber – MINETUFF and Supertuff cover
Coupling	: Material grade 11sMnPb30, AISI 316

ALFABIOTECH 6000 Evolution (Alfagomma branding)/ POWERFLEXBIO 6000 EXTRA (Dunlop branding)

(according to ISO 18752 Type CC Class 420)

Tube	: Synthetic rubber resistant to oil and Biodegradable Hydraulic Fluids
Reinforcement	: Four High Tensile Steel Spirals(4S) up to DN25, Six Spirals(6S), over DN32
Cover	: Abrasion, ozone, and hydrocarbon resistant synthetic rubber – MINETUFF and Supertuff cover
Coupling	: Material grade 11sMnPb30, AISI 316

ALFABIOTECH 5000 Plus Evolution (Alfagomma branding)/ POWERFLEXBIO 5000 Plus EXTRA (Dunlop branding)

(constructed according to ISO 18752 Type CC Class 350)

Tube	: Synthetic rubber resistant to oil and Biodegradable Hydraulic Fluids
Reinforcement	: Four High Tensile Steel Spirals(4S)
Cover	: Abrasion, ozone, and hydrocarbon resistant synthetic rubber – MINETUFF and Supertuff cover
Coupling	: Material grade 11sMnPb30

Manufacturing locations:

Hoses	: Alfagomma Hydraulic S.p.A., Via Enrico Mattei no.6,64020 - Castelnuovo Vomano (TE), Italy Alfagomma Hydraulic - Area Industriale Piano Lago – 87050 Figline Vegliaturo (CS), Italy Alfagomma Malaysia Sdn Bhd - PLO 344, Jalan Perak 4 – 81700 Pasir Gudang – Johor, Malaysia
Couplings	: Alfagomma Hydraulic S.p.A, Area Industriale Piano Lago, 87050 Mangone (CS), Italy Alfagomma (Ningbo) Co. Ltd. – Zhejiang, 315311 China

Hose assembling location:

- Alfagomma Hydraulic S.P.A., Mangone, Italy
- Alfagomma Hydraulic S.P.A, Bellusco, Italy
- Alfagomma Germany GmbH, Herne, Germany
- Alfagomma UK Ltd, Hydock, UK
- Alfagomma Korea Co, Ltd., Hwaseong-Si, Gyeonggi-do, Korea
- Alfagomma China, No.188 Ci Dong Avenue, Zhejiang Intelligent Logistics Park, Cixi Coastal Economic Development District, Ningbo, Zhejiang Province 315338, China
- Argus Fluidtechnik GmbH, Ettlingen, Germany
- Dunlop Hiflex OY, Turku, Finland
- Dunlop Hiflex Oy, Pirkkala, Finland
- Dunlop Hiflex AB, Halmstad, Sweden
- Dunlop Hiflex AS, Stavanger, Norway
- Dunlop Hiflex AS, Bergen, Norway
- Dunlop Hiflex AS, Kristiansand, Norway
- Dunlop Hiflex AS, Kolding, Denmark

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 I.D.	Maximum working pressure (bar)			
	E4000 Evolution	E5000 Evolution	E6000 Evolution	E5000 Plus Evolution
DN				
6	-	-	450	-
10	-	-	445	-
12	280	-	420	-
16	280	-	420	-
19	280	350	420	380
25	280	350	420	380
31.5	280	350	420	-
38	280	350	420	-
51	280	350	420	-

Hose I.D.	Ferrule designation			
	E4000 Evolution	E5000 Evolution	E6000 Evolution	E5000 Plus Evolution
DN				
6	-	-	H1100404	-
10	-	-	H1100404	-
12	H1100404	-	H1100404	-
16	H1100404	-	H1700301	-
19	H1100404	H1700200	H1700200	H1700200
25	H1100404	H1700200	H1700200	H1700200
31.5	H1700200	H1700200	H1700301	-
38	H1700200	H1700301	H1700301	-
51	H1700200	H1700301	-	-

Hose I.D.	Coupling			
	E4000 Evolution	E5000 Evolution	E6000 Evolution	E5000 Plus Evolution
DN				
6	-	-	H3100404	-
10	-	-	H3100404	-
12	H3100404	-	H3100404	-
16	H3100404	H3100404	-	-
20	H3100404	H3100404	-	-
25	H3100404	H3100404	-	-
31.5	H3100404	-	-	-
38	H3100404	-	-	-
51	H3100404	-	-	-

Hose assemblies covered by this certificate are approved for use with petroleum base hydraulic fluids and water base hydraulic fluids within a 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.

The hoses are to be mounted in accordance with the manufacturer's instructions.

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

Materials chosen for the specific system shall be suitable for the intended medium and environmental conditions.

Production testing

All hose assemblies delivered under the DNV type approval scheme shall be hydrostatically tested to a pressure of 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to this type approval certificate and also the hose assembling location.

Type Approval documentation

Tests carried out

Fire test, burst test, dimensional check test, change in length test, cold flexibility test, oil resistance test, cover adhesion test, ozone resistance test, impulse 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 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 DNV-CP-0338.