

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

Flexor 1SN/1AT-HF (Dunlop Hiflex: Greenline plus 122), Flexor 2SN/2AT-HF (Dunlop Hiflex: Greenline plus 222), 1SN MINETUFF (Dunlop Hiflex: 1SN HI-TUFF), 2SN MINETUFF (Dunlop Hiflex: 2SN HI-TUFF)

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 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:
Flexor 1SN/1AT-HF (Dunlop Hiflex: Greenline plus 122)	-40°C to +100°C	40 bar to 225 bar	DN6 to DN51
Flexor 2SN/2AT-HF (Dunlop Hiflex: Greenline plus 222)	-40°C to +100°C	80 bar to 400 bar	DN6 to DN51
1SN MINETUFF (Dunlop Hiflex: 1SN HI-TUFF)	-40°C to +100°C	40 bar to 225 bar	DN6 to DN51
2SN MINETUFF (Dunlop Hiflex: 2SN HI-TUFF)	-40°C to +100°C	80 bar to 400 bar	DN6 to DN51

Issued at **Høvik** on **2020-07-08**

for **DNV GL**

This Certificate is valid until **2024-06-30**.

DNV GL local station: **Italy/Malta CMC**

Approval Engineer: **Adel Samiei**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **262.1-010925-4**
 Certificate No: **TAP000002W**
 Revision No: **2**

Product description

Four types of hose assemblies. Hoses and fittings are manufactured by ALFAGOMMA Hydraulic SPA.
 Hoses:

- Flexor 1SN/1AT-HF (Dunlop Hiflex: Greenline Plus 122) & 1SN MINETUFF (Dunlop Hiflex: 1SN HI-TUFF), Designed according to EN853 / 1SN
 Tube: Oil Resistant synthetic rubber
 Reinforcement: One high tensile steel braid (1B)
 Cover: Abrasion, Ozone and hydrocarbon resistant synthetic rubber
- Flexor 2SN/2AT-HF (Dunlop Hiflex: Greenline Plus 222) & 2SN MINETUFF (Dunlop Hiflex: 2SN HI-TUFF), Designed according to EN853 / 2SN
 Tube: Oil Resistant synthetic rubber
 Reinforcement: Two high tensile steel braids (2B)
 Cover: Abrasion, Ozone and hydrocarbon resistant synthetic rubber

Couplings:

- Flexor 1SN/1AT-HF & 1SN MINETUFF (Dunlop Hiflex: Greenline Plus 122 & 1SN HI-TUFF)

Nominal size (DN / inch)		Carbon Steel 11SMnPb30 Stainless Steel AISI 316				AG Branding*
		Skive fittings 1SN/1AT-HF		No Skive fittings 1SN/1AT-HF		
		AG Branding	DH Branding	AG Branding	DH Branding	
6	¼	H1100204-04	D330000-04/0	H1200102-04	D110000-04/0	H1200AD1-04
8	5/16	H1100204-05	D330000-05/0	H1200202-05	D110000-05/0	H1200AD1-05
10	3/8	H1100204-06	D330000-06/0	H1200212-06	D110000-06/0	H1200AD1-06
12	½	H1100204-08	D330000-08/0	H1200212-08	D110000-08/0	H1200AD1-08
16	5/8	H1100204-10	D330000-10/0	H1200202-10	D110000-10/0	H1200AD1-10
19	¾	H1100204-12	D330000-12/0	H1200202-12	D110000-12/0	H1200AD1-12
25	1	H1100204-16	D330000-16/0	H1200202-16	D110000-16/0	H1200AD1-16
31	1 ¼	H1100104-20	H1100104-20	H1200102-20	D110000-20/0	H1200AD1-20
38	1 ½	H1100104-24	H1100104-24	H1200202-24	D110000-24/0	H1200AD1-24
51	2	H1100104-32	H1100104-32	H1200202-32	D110000-32/0	H1200AD1-32

- Flexor 2SN/2AT-HF & 2SN MINETUFF (Dunlop Hiflex: Greenline Plus 222 & 2SN HI-TUFF)

Nominal size (DN / inch)		Carbon Steel 11SMnPb30 Stainless Steel AISI 316				AG Branding*
		Skive fittings		No Skive fittings		
		AG Branding	DH Branding	AG Branding	DH Branding	
6	¼	H1100404-04 H3100404-04	D330000-04/0	H1200202-04	D220000-04/0	H1200AD2-04
8	5/16	H1100404-05 H3100404-05	D330000-05/0	H1200202-05	D220000-05/0	H1200AD2-05
10	3/8	H1100404-06 H3100404-06	D330000-06/0	H1200212-06	D220000-06/0	H1200AD2-06
12	½	H1100404-08 H3100404-08	D330000-08/0	H1200212-08	D220000-08/0	H1200AD2-08
16	5/8	H1100404-10 H3100404-10	D330000-10/0	H1200202-10	D220000-10/0	H1200AD2-10
19	¾	H1100404-12 H3100404-12	D330000-12/0	H1200202-12	D220000-12/0	H1200AD2-12
25	1	H1100404-16 H3100404-16	D330000-16/0	H1200202-16	D220000-16/0	H1200AD2-16
31	1 ¼	H1100404-20 H3100404-20	D330000-20/0	H1200202-20	D220000-20/0	H1200AD2-20
38	1 ½	H1100404-24 H3100404-24	D330000-24/0	H1200202-24	D220000-24/0	H1200AD2-24
51	2	H1100404-32 H3100404-32	D330000-32/0	H1200202-32	D220000-32/0	H1200AD2-32

*) AD1 and AD2 coupling are the Alfagomma branding of D11 and D22 coupling branding Dunlop Hiflex

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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) Alfagomma Hydraulic S.P.A., Mangone, Italy
- 2) Dunlop Hiflex AB, Halmstad, Sweden
- 3) Dunlop Hiflex OY, Turku, Finland
- 4) Alfagomma hydraulic S.P.A, Bellusco, Italy excluding 2SC
- 5) Alfagomma Germany GmbH, Herne, Germany Except 1SN/2SN MINETUFF
- 6) Alfagomma Germany GmbH, Hamburg, Germany Except 1SN/2SN MINETUFF
- 7) Dunlop Hiflex AS, Oslo, Norway
- 8) Dunlop Hiflex AS, Ålesund, Norway
- 9) Dunlop Hiflex AS, Stavanger, Norway
- 10) Dunlop Hiflex AS, Bergen, Norway
- 11) Dunlop Hiflex AS, Kristiansand, Norway
- 12) Dunlop Hiflex AS, Esbjerg, Denmark
- 13) Dunlop Hiflex AS, Kolding, Denmark
- 14) Alfagomma UK Ltd, Hydock, UK
- 15) Alfagomma Korea Co, Ltd., Hwaseong-Si, Gyeonggi-do, Korea
- 16) Alfagomma (Ningbo) Co. Ltd, Ningbo, China Just 1SN/2SN MINETUFF
- 17) Argus Fluidtechnik GmbH, Ettlingen, Germany

Hose assemblies are approved to use with:

- Petroleum based hydraulic fluids at temperatures ranging from -40 °C + 100 °C;
- Water based fluids at temperatures ranging from -40 °C to +70 °C;
- Water and Air at temperatures ranging from 0 °C to +70 °C.
- Fuel Oil
- CO2 systems at temperatures ranging from -60°C to 100°C (Just hose assemblies 1SN MINETUFF (Dunlop Hiflex:1SN H1-TUFF) with AD1 couplings (or D11 Dunlop Hiflex branding) up to size 1" can be used in CO2 applications)

Maximum working pressure of each hose assemblies shall be as follows:

Nominal size (DN / inch)	1SN/1AT HF		2SN/2AT HF	
		1SN MINETUFF		2SN MINETUFF
6	¼	225 bar		400 bar
8	5/16	215 bar		350 bar
10	3/8	180 bar		330 bar
12	½	160 bar		275 bar
16	5/8	130 bar		250 bar
19	¾	105 bar		215 bar
25	1	88 bar		165 bar
31	1 ¼	63 bar		125 bar
38	1 ½	50 bar		90 bar
51	2	40 bar		80 bar

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.

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

Hose assemblies covered by this certificate shall not be used in system subject to pressure below atmospheric or vacuum condition.

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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 technical datasheets no. 255 (FLEXOR 1SN/1AT-HF) and no. 257 (FLEXOR 2SN/2AT-HF) dated 2010-03-15

ALFAGOMMA technical datasheets no. 305 (1SN MINETUFF) and no. 307 (2SN MINETUFF) dated 2015-04-15

Burst test and change in length test reports numbers (stamped as witnessed by DNV/DNV GL):

- 33/2010, 34/2010, 15/2010 & 35/2010 dated 2010-12-16 (1SN/1AT HF – DN6, 10, 20 & 38)
- 09/2015, 10/2015, 11/2015 & 12/2015 dated 2015-07-20 (1SN/1AT HF with AD1 couplings DN6, 12, 25 & 51)
- 01/2015, 02/2015, 03/2015 & 04/2015 dated 2015-07-20 (1SN MINETUFF with AD1 couplings DN6, 12, 25 & 51)
- 13/2015, 14/2015, 15/2015 & 16/2015 dated 2015-07-20 (2SN/1AT HF with AD2 couplings DN6, 12, 25 & 51)
- 05/2015, 06/2015, 07/2015 & 08/2015 dated 2015-07-20 (2SN MINETUFF with AD2 couplings DN6, 12, 25 & 51)
- 38/2010, 36/2010, 16/2010 & 37/2010 dated 2010-12-16 (2SN/2AT – DN5, 10, 20 & 38)

Burst test reports (@-65°C) numbers (stamped as witnessed by DNV/DNV GL):

- 001/2014, 002/2014 & 003/2014 dated 2014-08-01 (1SN/1AT HF – DN6, 12 & 20)
- 17/2015, 18/2015 & 19/2015 dated 2015-07-21 (1SN MINETUFF – DN6, 12 & 20)

Fire test reports (done by LAPI) numbers:

- 1666.OIS0110/10 (1SN/1AT – DN6), 1667.OIS0110/10 (1SN/1AT – DN16) & 1668.OIS0110/10 (1SN/1AT – DN51) with H1100204 type fittings / dated 2010-11-26
- 1669.OIS0110/10 (2SN/2AT – DN6), 1670.OIS0110/10 (2SN/2AT – DN16) & 1671.OIS0110/10 (2SN/2AT – DN51) with H1100204 type fittings / dated 2010-11-26
- 767.OIS0110/15 (1SN MINETUFF – DN6), 768.OIS0110/15 (1SN MINETUFF – DN16) & 769.OIS0110/15 (1SN MINETUFF – DN51) with AD1 type fittings / dated 2015-06-01
- 770.OIS0110/15 (2SN MINETUFF – DN6), 771.OIS0110/15 (2SN MINETUFF – DN16) & 772.OIS0110/15 (2SN MINETUFF – DN51) with AD2 type fittings / dated 2015-06-01
- 279.OIS0110/18 (2SN – DN6), 280.OIS0110/18 (2SN – DN20) & 281.OIS0110/18 (2SN – DN51) with H3100404 & H32XXXXX couplings

Impulse test reports numbers:

- 074/09 (1SN – DN6), 094/10 (1SN-DN12), 090/09 (1SN – DN25), 080/09 (1SN – DN38), 128/10 (2SN – DN5), 120/09 (2SN – DN10), 106/09 (2SN – DN19) & 076/09 (2SN – DN38)
- 227/14, 232/14, 221/14 & 003/14 (1SN MINETUFF – DN6, 12, 25 & 51) with AD1 couplings
- 228/14, 223/14, 240/14 & 012/14 (2SN MINETUFF – DN6, 12, 25 & 51) with AD2 couplings

Change in length, dimensional check, abrasion resistance, cover adhesion test, oil resistance test, cold flexibility test, ozone resistance test reports numbers: 427-10, 428-10, 429-10, 430-10, 431-10, 432-10, 433-10, 434-10, 435-10, 436-10, 437-10, 438-10, 439-10, 440-10, 441-10, 442-10, 443-10, 444-10, 191-10 & 192-10, 01/2015, 02/2015, 03/2015, 04/2015, 05/2015, 06/2015, 07/2015, 08/2015, 09/2015, 10/2015, 11/2015, 12/2015, 13/2015, 14/2015, 15/2015 & 16/2015 dated 2015-07-04

Renewal Burst pressure test and change in length test reports numbers:


017,018,019,020,021,022,023,024,025,026,027,028,029,030,031,032,033,034,035,036,037,038,039, 040,041,042,043,044,045,046,047,048,049,050,051,052,053,054,055,056,057,058,066,067,095,096, 097,098,099,100,101,102,103,104,105,106,107,108,109,110

Endurance test reports 03677RP19 dated 2019-11-29 & 03789RP20 dated 2020-01-23

Burst pressure test reports witnessed by DNV GL on hose assemblies on Argus Plan – dated July 2020

Tests carried out

Change in length, dimensional check, abrasion resistance, cover adhesion test, oil resistance test, cold flexibility test, ozone resistance, fire test, burst pressure, impulse test.



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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.