

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

1SN HF (ALFAGOMMA type designation) / 122 Greenline Plus (DUNLOP HIFLEX type designation), FLEXOR 4SH MSHA (ALFAGOMMA type designation) / POWERTRAK 790 (DUNLOP HIFLEX type designation), AT6K/R15 (ALFAGOMMA type designation) / POWERTRAK 420 (DUNLOP HIFLEX type designation)

Issued to

**ALFAGOMMA HYDRAULIC SPA
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:
1SN HF (ALFAGOMMA type designation) / 122 Greenline Plus (DUNLOP HIFLEX type designation)	See certificate	See certificate	-6 to -25
FLEXOR 4SH MSHA (ALFAGOMMA type designation) / POWERTRAK 790 (DUNLOP HIFLEX type designation)	see certificate	see certificate	-20 to -51
AT6K/R15 (ALFAGOMMA type designation) / POWERTRAK 420 (DUNLOP HIFLEX type designation)	-40°C to 121°C	420 bar	-20 and -38

This Certificate is valid until **2019-06-30**.

Issued at **Høvik** on **2016-05-18**

for **DNV GL**

DNV GL local station: **Milan**

Approval Engineer: **Adel Samiei**

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**Marianne Spæren Marvang
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: **262.1-017346-3**
Certificate No: **TAP000000R**
Revision No: **1**

Product description

Three types of hose assemblies:

- 1SN HF (ALFAGOMMA type designation)
122 Greenline Plus (DUNLOP HIFLEX type designation)
Designed according to EN853 1SN
Inner Tube: Oil Resistant Synthetic Rubber
Reinforcement: One High Tensile Steel Braid (1B)
Cover: Abrasion, Ozone and Hydrocarbon Resistant Synthetic Rubber
Fitting: PH – Germany – AISI 316 (Type: P5)
- FLEXOR 4SH (MSHA) (ALFAGOMMA type designation)
POWERTRAK 790 (DUNLOP HIFLEX type designation)
Designed according To EN856 4SH
Inner Tube: Oil Resistant Synthetic Rubber
Reinforcement: Four High Tensile Steel Spirals (4S)
Cover: Abrasion, Ozone and Hydrocarbon Resistant Synthetic Rubber
Fitting: PH – Germany – AISI 316 (Type: P4)
- AT6K/R15 (ALFAGOMMA type designation)
POWERTRAK 420 (DUNLOP HIFLEX type designation)
Designed according To SAE 100R15
Inner Tube: Oil Resistant Synthetic Rubber
Reinforcement: Four/Six High Tensile Steel Spirals (4S/6S)
Cover: Abrasion, Ozone and Hydrocarbon Resistant Synthetic Rubber
Fitting: PH – Germany – AISI 316 (Type: P7)

Hoses made by: ALFAGOMMA Hydraulic SPA

Fittings made by: PH Industrie-Hydraulik GmbH & Co. KG Stefansbecke 35-37D-45549 Sprockhövel
According to PH catalogue edition 2013 section 2 and 3.

Application/Limitation

Hose assemblies types 1SN HF (ALFAGOMMA type designation) /122 Greenline Plus (DUNLOP HIFLEX type designation) & FLEXOR 4SH (MSHA) (ALFAGOMMA type designation) / POWERTRAK 790 (DUNLOP HIFLEX type designation) are suitable for use in:

- hydraulic fluids in accordance with ISO 6743-4 with the exception of HFD R, HFD S and HFD T at temperatures ranging from -40 °C + 100 °C;
- water based fluids at temperatures ranging from -40 °C to +70 °C;
- Water at temperatures ranging from 0 °C to +70 °C.

Hose assemblies type AT6K/R15(ALFAGOMMA type designation) POWERTRAK 420 (DUNLOP HIFLEX type designation) are approved for use with petroleum base hydraulic fluids within a temperature range of -40°C to +121°C.

Maximum working pressure (bar) of each hose assembly of types 1SN HF (ALFAGOMMA type designation) /122 Greenline Plus (DUNLOP HIFLEX type designation) & FLEXOR 4SH (MSHA) (ALFAGOMMA type designation) / POWERTRAK 790 (DUNLOP HIFLEX shall be according to following table:

-no	Hose I.D. (mm)		1SN HF	FLEXOR 4SH (MSHA)
	min	max		
-6	6,2	7,0	225 bar	-
-8	7,7	8,5	215 bar	-
-10	9,3	10,1	180 bar	-
-12	12,3	13,5	160 bar	-
-16	15,5	16,7	130 bar	-
-19	18,6	19,8	105 bar	420 bar
-25	25,0	26,4	88 bar	380 bar
-31	31,4	33,0	-	325 bar
-38	37,7	39,3	-	290 bar
-51	50,4	52,0	-	250 bar

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Maximum working pressure (bar) of hose assemblies type AT6K/R15(ALFAGOMMA type designation) / POWERTRAK 420 (DUNLOP HIFLEX type designation) shall be according to following table:

-no	Equivalent size in SAE 100R15	Hose I.D. (mm)		AT6K
		min	max	
-20	-12	18,6	19,8	420 bar
-38	-24	37,7	39,3	420 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.

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

All hose assemblies delivered under the DNV 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.

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

The hoses shall not be installed in systems subject to pressure below atmospheric or pressure pulsation.

Type Approval documentation

ALFAGOMMA technical data sheet no. 255 dated 2010-03-15 for hose type 1SN

ALFAGOMMA technical data sheet no. 52 dated 2011-05-30 for hose type FLEXOR 4SH

ALFAGOMMA technical data sheet no. 55 dated 2010-05-30 for hose type AT6K

Burst test and change length test reports witnessed by DNV local station Milan dated 2014-04-04:

- No. 172/2014 (1SN HF-6)
- No. 173/2014 (1SN HF-12)
- No. 174/2014 (1SN HF-25)
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Burst test and change length test reports witnessed by DNV local station Milan dated 2014-09-02:

- No. 202/2014 (4SH-19)
- No. 203/2014 (4SH-31)
- No. 204/2014 (4SH-51)
- No. 205/2014 (AT6K-20)
- No. 206/2014 (AT6K-38)

Fire test reports done by LAPI:

- 1205.0IS0110/14 dated 2014-08-04 (AT6K-38 with PH INOX P7-I fitting)
- 1204.0IS0110/14 dated 2014-08-04 (AT6K-20 with PH INOX P7-I fitting)
- 1203.0IS0110/14 dated 2014-08-04 (FLEXOR 4SH-51 with PH INOX P4-I fitting)
- 1202.0IS0110/14 dated 2014-08-04 (FLEXOR 4SH-32 with PH INOX P4-I fitting)
- 1201.0IS0110/14 dated 2014-08-04 (FLEXOR 4SH-20 with PH INOX P4-I fitting)
- 1186.0IS0110/14 dated 2014-08-04 (1SN HF-6 with PH INOX P5 fitting)
- 1187.0IS0110/14 dated 2014-08-04 (1SN HF-12 with PH INOX P5 fitting)
- 1188.0IS0110/14 dated 2014-09-24 (1SN HF-25 with PH INOX P5 fitting)

Test reports (Cold flexibility, Ozone resistance, Oil resistance, Cover adhesion, dimensional check) dated 2015-04-29 signed by quality manager of ALFAGOMMA

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Tests carried out

Tests on hoses: dimensional check, cold flexibility, oil resistance, ozone, cover adhesion & change in length tests

Tests on hose assemblies: Burst 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 (ALFAGOMMA or DUNLOP HIFLEX)
- Maximum working pressure
- Size
- Additional marking at manufacturer's option

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 witness the following tests on a selection of sizes:

- Dimensional check
- Change in length
- Burst test

The tests are to be performed with the type of couplings fitted that are Type Approved with the hoses.