

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

Alfagomma: Flexor 4SH, -4SP, Flexor 12, Flexor 13 Dunlop Hiflex: 790L, 790G, 730L, 730G, 712L, 713L, 713G Argus: 4SH, 4SP

Issued to

ALFAGOMMA HYDRAULIC SPA
CASTELNUOVO VOMANO TE, Italy

is found to comply with

Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment
Det Norske Veritas' Standards for Certification 2.9 No. 5-791.70
Det Norske Veritas' Rules for Classification of Ships Pt.4, Ch.6 "Piping Systems"

Application :

Hydraulic and Pneumatic systems (incl. power and control for steering gears) / Fuel Oil / Lube Oil / Compressed Air / Fresh Water / Sanitary

Temperature range:	See certificate.
Max. working press.:	See certificate.
Sizes:	See certificate.

This Certificate is valid until **2018-03-31**.

Issued at **Høvik** on **2014-10-02**

for **DNV GL**

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. If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million. In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **P-14949**
File No: **791.70**
Job Id: **262.1-016581-1**

Product description

Alfagomma Type designation: Flexor 12, according to EN 856 R12 and SAE J517 100R12
Dunlop Hiflex Type designation: 712 L acc. EN 856 R12 and SAE J517 100R12

Design: Flexible rubber hoses reinforced by four steel spiral wires.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant
Reinforcement: Four layers of high tensile spiral steel wire wrapped in alternating directions.

Alfagomma Type designation: Flexor 13, according to EN 853 R13 and SAE J517 100R13
Dunlop Hiflex Type designation: 713 L, according to EN 853 R13 and SAE J517 100R13
713 G (Greenline branded)

Design: Flexible rubber hoses reinforced by four or six steel spiral wires.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant
Reinforcement: Four or six layers of high tensile spiral steel wire wrapped in alternating directions.

Alfagomma Type designation: Flexor 4SH, according to EN856
Dunlop Hiflex Type designation: 790L, 790G according to EN856

Design: Flexible rubber hoses reinforced by four steel spiral wires.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant
Reinforcement: Four layers of high tensile spiral steel wire wrapped in alternating directions.

Alfagomma Type designation: Flexor 4SP (R9R), according to EN856 (DN ≤ 25)
Flexor 4SP, according to EN856 and SAE 100 R10 (DN > 25)

Dunlop Hiflex Type designation: 730L, 730G according to EN856

Design: Flexible rubber hoses reinforced by four steel spiral wires.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant
Reinforcement: Four layers of high tensile spiral steel wire wrapped in alternating directions.

Couplings: Alfagomma and Dunlop Hiflex series of inserts and ferrules in carbon or stainless steel.

Manufacturing plants:

Couplings	Hoses
Alfagomma Hydraulic S.p.A Area Industriale Piano Lago 87050 Mangone (CS) – Italy	Alfagomma Hydraulic S.p.A. Via Enrico Mattei no.6 64020 - Castelnuovo Vomano (TE)
	Alfagomma Hydraulic S.p.A. Area Industriale Piano Lago 87050 Figline Vegliaturo (CS)

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Flexor 4SH, 790L 790G, 4SH

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316		
	Skive fittings	Interlock fittings	
Dash	DH Branding	AG Branding (INOX Version)	AG Branding (carbon Steel)
- 12	D190000-12	H3400200-12	H1400200-12
- 16	D190000-16	H3400200-16	H1400200-16
- 20	D190000-20	H3400200-20	H1400200-20
- 24	D190000-24	H3400200-24	H1400200-24
- 32	D190000-32	H3400200-32	H1400200-32

Flexor 4SP, 730L 730G, 4SP

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316			
	Skive fittings			Interlock fittings
Dash	AG Branding	AG Branding (INOX Version)	DH Branding	AG Branding
- 04	H1100404-04	H3100200-04	D440000-04	
- 06	H1100404-06	H3100200-06	D440000-06	H1400200-06
- 08	H1100404-08	H3100200-08	D440000-08	H1400200-08
- 10	H1100404-10	H3100200-10	D440000-10	H1400200-10
- 12	H1100204-12	H3100200-12	D440000-12	H1400200-12
- 16	H1100204-16	H3100200-16	D330000-16	H1400200-16
- 20	H1100204-20		D330000-20	
- 24	H1100204-24		D330000-24	
- 32	H1100204-32		D330000-32	

Flexor 12, 712L

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316				
	Skive fittings			No Skive fittings	Interlock fittings
Dash	AG Branding	AG Branding (INOX Version)	DH Branding	AG Branding	AG Branding (carbon Steel)
- 04	H1100404-04	H3100204-04	D440000-04		
- 06	H1100404-06	H3100204-06	D440000-06	H1200204-06	
- 08	H1100204-08	H3100204-08	D330000-08	H1200204-08	H1400200-08
- 10	H1100204-10	H3100204-10	D330000-10	H1200204-10	H1400200-10
- 12	H1100204-12	H3100204-12	D330000-12	H1200204-12	H1400200-12
- 16	H1100204-16	H3100204-16	D330000-16	H1200204-16	H1400200-16
- 20	H1100204-20	H3100204-20	D330000-20	H1200204-20	H1400200-20
- 24	H1100204-24	H3100204-24	D330000-24		H1400200-24
- 32	H1100204-32		D330000-32		H1400200-32

Flexor 13, 713L 713G

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316		
	Skive fittings	Interlock fittings	
Dash	DH Branding	AG Branding (carbon Steel)	AG Branding (INOX Version)
- 12	D190000-12	H1400200-12	H3400200-12
- 16	D190000-16	H1400200-16	H3400200-16
- 20	D190000-20	H1400301-20	H3400301-20

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- 24	D190000-24	H1400301-24	H3400301-24
- 32	D190000-32	H1400301-32	H3400301-32
- 32		H1T00600-32	H1T00600-32
- 40	D190000-40	H1T00301-40	

Application/Limitation

Maximum working pressure (MWP):

Flexor 12, 712L			Flexor 13, 713L, 713G		
DN		MWP	DN		MWP
[inch]	[mm]	[bar]	[inch]	[mm]	[bar]
3/8	10	280	-	-	-
1/2	12	280	3/4	19	350
3/4	19	280	-	-	-
1	25	280	1	25	350
1 1/4	31	207	1 1/4	31	350
1 1/2	38	172	1 1/2	38	350
2	51	172	2	51	350
2 1/2	-	-	2 1/2	63	350

Maximum working pressure (MWP):

DN		MWP [bar]		
[inch]	[mm]	Flexor 4SH, 790L, 790G	Flexor 4SP	730L, 730G
1/4	6	-	450	450
3/8	10	-	445	445
1/2	12	-	415	415
5/8	16	-	350	350
3/4	19	420	380	380
1	25	380	320	320
1 1/4	31	350	210	-
1 1/2	38	290	185	-
2	51	250	172	-

Temperature range:

-40 to 121°C continuous operation.

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.

All hose assemblies delivered under this type approval certificate shall be in compliance with an assembly procedure issued by the certificate holder.

Each hose assembly is before delivery to be hydraulic pressure tested to 1.5 times the maximum working pressure.

Hose assemblies delivered from the certificate holder shall be delivered with the following documentation:

- Pressure test report with reference to the type approval certificate.

Hoses used for continuous operation at temperatures higher than 100°C will have their lifetime reduced. In such cases more frequent inspections and planned exchange should be a part of the maintenance program.

The hose assemblies covered by this type approval may be assembled and delivered by other than the

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certificate holder under the following conditions:

- The assembler is authorised by a written authorization from a course holder. The course holder shall keep record of all assembler authorisations.
- Hose assemblies are in accordance with an assembly procedure issued by the certificate holder and the assembler has proved their qualifications by burst testing of a selection of hose/coupling combinations.
- One sample of each hose type is to be burst tested and the testing is to be witnessed by DNV. This testing is to be performed every 4 years.

Hose assemblies delivered from an authorized assembler shall in addition to the pressure test report with reference to the type approval certificate be delivered with a copy of the written authorization stamped by DNV.

For compressed air or gases the cover is to be pin pricked.

Flexible hoses are only to be used in lengths up to 2 meters 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 must only be fitted in places where they are always accessible.

Flexible hoses of these types are not to be used in boiler fronts.

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

It must be possible to shut off from the system all flexible hoses used in systems for compressed air, lube oil, fuel oil and petroleum base hydraulic oil.

Each hose is to be hydraulic pressure tested to 1.5 times the maximum working pressure and to be delivered with manufacturer's pressure test certificate.

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

The approval is based on the following documentation:

- Production Cycle and Branding Procedure.
- Test reports on Rubber Compounds: Cold flex.test, Ozone resistance test, and Oil resistance test (volume change).
- Quality control manual dated 12.04.99
- Test reports dated 03.07.2000
- Alfagomma hose catalogue 99/03, 3rd Edition
- Other Alfagomma documents: "Hose / fitting combinations", dated 26.07.2000, "Fitting drawings list", rev. 01 dated 20.07.1999 and "Crimping table", rev. 05 dated 29.11.1998
- Insert Dimensions For Spiral Hose, rev. 01 dated 20/07/00
- Ferrule Dimensions H1400200-, H1400301-, rev. 01 dated 20/07/00
- LAPI fire test reports: 159/05, 222/05 and 274/05 dated 16.02, 07.03 and 08.03-2005.
- "ALFAGOMMA S.p.A. HYDRAULIC HOSE DIVISION HYDRAULIC PRODUCT TRAINING MANUAL" issue 1 dated 07/04/1998.
- Ferrule Dimensions H1100204-, rev. 01 dated 20/07/00
- Ferrule Dimensions H1100104-, rev. 01 dated 20/07/00
- LAPI fire test reports: 221/05, 272/05 and 273/05 dated 07.03 and 08.03-2005.
- "Crimping table", rev. 02 dated 09.03.99 "Crimping table", rev. 07 dated 18/11/98
- Insert Dimensions For Braid Hose, rev. 01 dated 20/07/00
- Ferrule Dimensions H1100204-, rev. 01 dated 20/07/00

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- Ferrule Dimensions H1100104-, rev. 01 dated 20/07/00
- LAPI fire test reports: 223/05, 224/05 and 275/05 dated 07.03 and 08.03-2005.
- Ferrule Dimensions H1400200- and H1400301- rev. 01 dated 20/07/00
- LAPI fire test reports: 158/05, 276/05 and 277/05 dated 16.02 and 08.03-2005
- Alfagomma Test report 153/2012 for R13 – 2" with coupling H1T00600-32
- Alfagomma Impulse Test Report 140/11A for R13 – 2" with coupling H1T00600-32
- Burst Test report 25/2012 for R13 – 2" with coupling H1T00600-32
- LAPI fire test report for for R13 – 2" with coupling H1T00600-32: 386.0IS0110/12 dtd. 29.03.2012
- Alfagomma drawing for interlock coupling H1T00600-32 for R13 – 2"
- Test report dated 2014-03-05 witnessed by DNV local station Milan (acc. to ISO 1402)
- Type approval assessment report dated 2014-03-06 signed and stamped by DNV local station Milan.
- LAPI fire test report for R13 - 2.1/2" with coupling H1T00600-40: 299.0IS0110/14

Tests carried out

Dimensional Check Test, Change in Length Test, Burst Test, Cold Flexibility Test, Ozone Resistance Test, Impulse Test, Oil Resistance Test according to EN856 and SAE J517 respectively and Fire Test according to ISO 15540.

Marking of product

For traceability to this type approval, the final products (hoses with couplings) are to be marked: Manufacturer's name or trademark and type designation:

- Alfagomma Flexor 12 or Flexor 13, Flexor 4SP or Flexor 4SH
- Dunlop Hiflex, 712L, 713 L or 713 G, 730L, 730G or 790 L, 790 G
- Argus 4SH, 4SP

Additional marking at manufacturer's option.

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform a periodical assessment every second year and before the expiry date of this certificate, to verify that the conditions for the type approval are complied with and to witness the Burst test on a selection of sizes.

The Burst tests shall be performed in accordance with procedures given in DNV Certification notes no. 2.9 5-791.70 "Type Approval of Flexible Hoses of Non-Metallic Material" or another recognized standard. The test is to be performed with the type of couplings fitted that is Type Approved with the compensators.

END OF CERTIFICATE