

Certificate No:
P-14943
 File No:
791.70
 Job Id:
262.1-016581-1

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 1ST, -1A, -1SN, -1AT; Flexor 2ST, -2A, -2SN, -2AT; Flexopak 2, Flexopak 2SC HF, Flexopak 1SC Dunlop Hiflex: 122T, 122G, 222T, 222G, 241T, 241G, 221T, 221G, 121 Argus: 1SN, 2SN, 2SCS, 2SC, 1SC

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. 122T and 122G, sizes 1/4" to 3/4" may be used as connection between valves and manifolds on high pressure CO2 systems

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

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

Issued at **Høvik** on **2014-09-29**

DNV GL local station: **Milan**

for **DNV GL**

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.

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Product description

Alfagomma Hose Type designations: Flexor 1ST acc. EN 853 and 100R1A acc. SAE J517 (skive)
Flexor 1SN acc. EN 853 and 100R1AT acc. SAE J517 (non-skive)
1 SC acc. EN 857 1SC

Dunlop Hiflex Hose Type designations: Greenline 122T, 122G acc. EN 853 1SN

Design: Flexible rubber hoses reinforced by one steel wire braid.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant

Alfagomma Hose Type designations: Flexor 2ST acc. 2ST in EN 853 and 100R2A in SAE J517 (skive)
Flexor 2SN acc. 2SN in EN 853 and 100R2AT in SAE J517 (non-skive)

Dunlop Hiflex Hose Type designations: 222T, 222G acc. EN 853 2SN

Alfagomma Hose Type designation : Flexopak 2 acc. 2SC in EN857 (DN≤25), 100R16 acc. SAE 517 (DN32)

Design: Flexible rubber hoses reinforced by two steel wire braids.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant

Dunlop Hiflex Hose Type designations: Super Slimline 241T

Design: Flexible rubber hoses reinforced by two steel wire braid.
241T – Black rubber cover.
241G – Black rubber cover "Greenline" branded.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant

Alfagomma Hose Type designation : Flexopak 2SC HF, 221T, 221G and 2SC acc. EN 857 and SAE 100 R16

Design: Flexible rubber hoses reinforced by two steel wire braids.
Tube: Oil resistant syntetic rubber compound
Cover: Syntetic rubber compound, weather-, oil- and abrasion resistant

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

Flexopak 1 SC - 121 - 1SC

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316	
	No skive fittings	
Dash	AG Branding	DH Branding
- 04	H1200103-04 H1200101-04	
- 05	H1200103-05	D110000-05
- 06	H1200103-06	D110000-06
- 08	H1200103-08	D110000-08
- 10	H1200202-10	D110000-10
- 12	H1200202-12	D110000-12
- 16	H1200103-16	D110000-16

Flexor 1ST - 1A - 1SN - 1AT, 122T - 122G, 1SN

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Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316			
	Skive fittings		No Skive fittings	
Dash	AG Branding	DH Branding	AG Branding	DH Branding
- 04	H1100204-04	D330000-04	H1200102-04	D110000-04
- 05	H1100204-05	D330000-05	H1200202-05	D110000-05
- 06	H1100204-06	D330000-06	H1200202-06 H1200212-06	D110000-06
- 08	H1100204-08	D330000-08	H1200202-08 H1200212-08	D110000-08
- 10	H1100204-10	D330000-10	H1200202-10	D110000-10
- 12	H1100204-12	D330000-12	H1200202-12	D110000-12
- 16	H1100204-16	D330000-16	H1200202-16	D110000-16
- 20	H1100104-20		H1200102-20	D110000-20
- 24	H1100104-24		H1200202-24	D110000-24
- 32	H1100104-32		H1200202-32	D110000-32

Flexor 2ST - 2A - 2SN - 2AT, 222T - 222G, 2SN

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316			
	Skive fittings		No Skive fittings	
Dash	AG Branding	DH Branding	AG Branding	DH Branding
- 04	H1100204-04	D330000-04	H1200102-04	D220000-04
- 05	H1100204-05	D330000-05	H1200202-05	D220000-05
- 06	H1100204-06	D330000-06	H1200202-06 H1200212-06	D220000-06
- 08	H1100204-08	D330000-08	H1200202-08 H1200212-08	D220000-08
- 10	H1100204-10	D330000-10	H1200202-10	D220000-10
- 12	H1100204-12	D330000-12	H1200202-12	D220000-12
- 16	H1100204-16	D330000-16	H1200202-16	D220000-16
- 20	H1100204-20	D330000-20	H1200202-20	D220000-20
- 24	H1100204-24	D330000-24	H1200202-24	D220000-24
- 32	H1100204-32	D330000-32	H1200202-32	D220000-32

Flexopak 2SC HF - Flexopak 2

Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316	
	Skive fittings	No skive fittings
Dash	AG Branding	AG Branding
- 04	H1100204-04	H1200102-04
- 05	H1100204-05	H1200202-05
- 06	H1100204-06	H1200202-06 H1200212-06
- 08	H1100204-08	H1200202-08 H1200212-08
- 10	H1100204-10	H1200202-10
- 12	H1100204-12	H1200202-12
- 16	H1100204-16	H1200202-16
- 20	H1100104-20	-

241T - 241G - 2SCS

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Hose size	Carbon Steel 11SMnPb30 according UNI EN 10277 Stainless Steel AISI 304 - AISI 316		
	Skive fittings		No skive fittings
Dash	AG Branding	DH Branding	DH Branding
- 04	H1100204-04	D330000-04	D110000-04
- 05	H1100204-05	D330000-05	D110000-05
- 06	H1100204-06	D330000-06	D110000-06
- 08	H1100204-08	D330000-08	D110000-08
- 10	H1100204-10	D330000-10	D110000-10
- 12	H1100204-12	D330000-12	D110000-12
- 16	H1100204-16	D330000-16	D110000-16
- 20	H1100104-20	-	-

Manufacturing plants:

Couplings

Alfagomma Hydraulic S.p.A.
 Area Industriale Piano Lago
 87050 Mangone (CS) – Italy

Hoses

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)
 Additional location for Flexor 1SN and Flexor 2SN:
 Alfagomma-Mardec SDN BHD
 PLO 344, Jalan Perak 4, Pasir Gudang Ind.
 Estate,
 Pasir Gudang, 81707 Johor
 Malaysia

Application/Limitation

Maximum working pressure (MWP):

DN		MWP[bar]		
[inch]	[mm]	Flexor 1ST, -1A, -1SN, -1AT, 122T, 122G	Flexor 2ST, -2A, -2AT, -2SN, 222T, 222G	Flexopak 2
1/4	6	225	400	420
5/16	8	215	350	375
3/8	10	180	330	350
1/2	12	160	275	310
5/8	16	130	250	280
3/4	19	105	215	240
1	25	88	165	185
1 1/4	31	63	125	112
1 1/2	38	50	90	-
2	51	40	80	-

DN		MWP[bar]	
[inch]	[mm]	Super Slimline 241T	Flexopak 2SC HF, 221T, 221G and 2SC
1/4	6	420	400
5/16	8	375	350
3/8	10	350	330
1/2	12	310	275
5/8	16	280	250

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¾	19	240	215
1	25	210	165
1 ¼	31	145	-

DN		MWP[bar]
[inch]	[mm]	1 SC
¼	6	225
5/16	8	215
3/8	10	210
½	12	160
5/8	16	130
¾	19	105
1	25	88

Temperature range:

-40 to 100 °C continuous operation.

For air and water based fluids: Maximum 70°C

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.

The hose assemblies covered by this type approval may be assembled and delivered by other than the certificate holder under the conditions listed in DNV Type approval programme 5-791.70.

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.

For compressed air or gases the cover should 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.

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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

- 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", dated 20.07.1999 and "Crimping table", dated 29.11.1999
- "ALFAGOMMA S.P.A. HYDRAULIC HOSE DIVISION HYDRAULIC PRODUCT TRAINING MANUAL" issue 1 dated 07/04/1998.
- Insert Dimensions For Braid Hose, rev. 01 dated 20/07/00
- Ferrule Dimensions H1100204-, rev. 01 dated 20/07/00
- Ferrule Dimensions H1100104-, rev. 01 dated 20/07/00
- LAPI fire test reports: 156/05, 216/05 and 217/05 dated 11.02 and 07.03 2005.
- LAPI fire test reports: 157/05, 218/05, 219/05, 220/05, 270/05 and 271/05 dated 16.02, 07.03 and 27.01-2005.
- Test reports: 01-06/2008, 84-89/2009 and 103/2009, Impulse test reports: 66/03, 65/03, 66/06, 59/07A, 63/03, 64/03, 59/07
- Fire test reports: 444.OIS0110/08, 443.OIS0110/08, 442.OIS0110/08
- Specifications: Dunlop Hiflex Super Slimline / Super Maxaflex
- Qualification test results dated July 2004
- LAPI fire test report nos 525/04, 527/04 and 528/04 dated 2004-06-21
- DNV retention survey report 53004044 dated 2004-08-19
- Fax from Gummi A/S K. Lund & Co, Oslo, Norway dated 1996-02-15.
- Det Norske Veritas burst test report 95-0263.
- Det Norske Veritas burst test reports dated 2009-10-12 and 2008-06-19
- Impulse test reports dated 2007-02-21, 2006-04-03, 2008-11-20
- Alfagomma test reports dated 2009-10-23, 2010-06-16, 2009-10-16, 2010-05-15
- LAPI fire test reports dated 2009-11-09
- Drawings for couplings (Flexopak 2SC, 221T, 221G and 2SC):

Drawing No.	Rev./Date	Drawing No.	Rev./Date
D330000-04/4/01	1	H0100204-060010/05	5
D330000-05/4/01	1	H0100204-080010/05	5
D330000-06/4/01	1	H0100204-100010/04	1
D330000-08/4/01	1	H0100204-120010/05	5
D330000-10/4/01	1	H0100204-160010	7
D330000-12/4/01	1	H0200102-040010	5
D330000-16/4/01	1	H0200202-050010	5
D110000-04	8	H0200212-060010	4
D110000-05	8	H1200202-060000/11	11
D110000-06	8	H0200212-080010	3
D110000-08	8	H1200202-080000/05	5
D110000-10	8	H0200202-100010	4
D110000-12	8	H0200202-120010	5
D110000-16	10	H0200202-160010	7
H0100204-040010/05	5	5/G/U/TA/800	0
H0100204-050010/05	5		

- Test report dated 2014-03-05 witnessed by DNV local station Milan (acc. to ISO 1402)

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- Type approval assessment report dated 2014-03-06 signed and stamped by DNV local station Milan
- Survey report MIL-14-0455-6 dated 2014-03-06 signed and stamped by DNV local station Milan

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 EN853 and SAE J517 respectively and Fire Test according to ISO 15540.

Burst test at - 60°C qualifying 122T and 122G: 3/16" to 3/4" for CO₂

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 1ST, -1A, -1SN, -1AT; Flexopak 2; Flexor 2ST, -2A, -2AT, -2SN, Flexopak 2SC-HF, Flexopak 1SC
- Dunlop Hiflex 122T, 122G Greenline, 222T, 222G Greenline, 241T, 241G, 221T, 221G, 121
- Argus 1SN, 2SN, 2SCS, 2SC, 1SC
- 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