

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

EFG3K, EFG4K, EFG5K, EFG6K, M3K, M4K, M5K, M6K, G1, G2, Megaflex CM2T

Issued to

Eifeler Maschinenbau GmbH
Euskirchen Nordrhein-Westfalen, Germany

is found to comply with

**Det Norske Veritas' Rules for Classification of Ships Pt.4, Ch.6 "Piping Systems"
 Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment
 Det Norske Veritas' Rules for Classification of High Speed and Light Craft.**

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:
EFG3K	-40°C to +121°C	21,0 MPa	-20 to -32
EFG4K	-40°C to +121°C	28,0 MPa	-6 to -20
EFG5K	-40°C to +121°C	35,0 MPa	-6 to -32
EFG6K	-40°C to +121°C	42,0 MPa	-6 to -32
M3K	-40°C to +100°C	22,5 MPa	-4 to -16
M4K	-40°C to +100°C	28,0 MPa	-4 to -16
M5K	-40°C to +100°C	35,0 MPa	-4 to -8
M6K	-40°C to +100°C	42,0 MPa	-4
G1	-40°C to +100°C	4,2 to 22,5 MPa	-4 to -32
G2	-40°C to +100°C	8,0 to 40,0 MPa	-4 to -32
Megaflex CM2T	-40°C to +100°C	16,5 to 40,0 MPa	-4 to -16

This Certificate is valid until **2018-06-30**.

Issued at **Høvik** on **2016-11-03**

for **DNV GL**

DNV GL local station: **Essen**

Approval Engineer: **Zeinab Sharifi**

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.

Job Id: **262.1-016887-5**
Certificate No: **TAP000003S**
Revision No: **1**

Product description

Flexible hoses of non/metallic materials with permanently fitted couplings tested according to DNV Standard for Certification 2.9 No. 5-791.70:

EFG3K: Inner tube of NBR reinforced by four alternating layers of wire, outer cover of CR

EFG4K: Inner tube of NBR reinforced by four alternating layers of wire, outer cover of CR

EFG5K: Inner tube of NBR reinforced by four (six for ≥ -20) alternating layers of wire, outer cover of CR

EFG6K: Inner tube of NBR reinforced by four (six for ≥ -20) alternating layers of wire, outer cover of CR
Couplings all types: Gates GlobalSpiral™ Non-skive (GS/GSH/GSM/GSP) PCM skived

M3K: Tube of NBR reinforced by 1 braid (-4, -5, -6, and -8), 2 braids (-10, -12 and -16) of high-tensile steel wire. Cover of NBR/PVC according to SAE 100 R 17.

Couplings: Gates type G.

M4K: Tube of NBR reinforced by 2 high-tensile steel wire braids. Cover of NBR/PVC according to SAE 100 R 19.

Couplings: Gates type G & GS

M5K: Tube of NBR reinforced by 2 high-tensile steel wire braids. Cover of NBR/PVC according to Gates proprietary standard.

Couplings: Gates type G

M6K: Tube of NBR reinforced by 2 high-tensile steel wire braids. Cover of NBR/PVC according to Gates proprietary standard.

Couplings: Gates type G

G1: Tube of NBR reinforced by 1 braid of high-tensile steel wire. Cover of NBR/PVC according to SAE 100 R1AT/EN 853 1 SN.

Couplings: Gates type G for dash sizes 4 to 20 and type GSP for dash sizes 24 and 32

G2: Tube of NBR reinforced by 2 high-tensile steel wire braids. Cover of NBR/PVC according to SAE 100 R2AT/EN 853 2SN.

Couplings: Gates type G for dash sizes 4 to 20 and type GSP for dash sizes 24 and 32

Megaflex CM2T: NBR-based tube with 2 wire braid reinforcement, SBR-based cover all according to EN 857 2SC/ISO 11237-1.

Couplings: Gates type G, PCK/GB

Hose and couplings may be assembled at the below locations:

Gates Hydraulics

A Division of Gates (U.K.) Limited

5 Alpha Drive

Eaton Socon

St. Neots, Cambridgeshire, PE19 8JJ

United Kingdom

Gates Hortum Sanayi Ve Ticaret Ltd. Sti.

Adliye Mahallesi 1520. Sokak No.18

54580 Arifiye

Sakarya Turkey

The hoses are manufactured at:

Gates Corporation

1450 Montana Road

Iola Kansas 66749

USA

Gates India Private Limited

Ambala-Chandigarh Highway

PO Lalru 140501, Punjab

INDIA

Job Id: **262.1-016887-5**
 Certificate No: **TAP000003S**
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Gates Mexico COHISA
 Calle 6 S/N
 Parque Industrial Atlacomumco
 Atlacomumo Estado De Mexico, 50450
 Mexico

Gates Fluid Power Technologies (Changzhou) Co. Limited
 11 Kohler Road
 National Hi-Tech District, 213022 Changzhou
 People's Republic of China

Gates Hortum Sanayi Ve Ticaret Ltd. Sti.
 Adliye Mahallesi 1520. Sokak No.18
 54580 Arifiye
 Sakarya Turkey

The couplings are manufactured at:

GS-couplings(CZ/US/IN/CN), GSH/GSM-couplings(CZ/US/IN/CN), GSP-couplings(CZ/US/IN/CN),
 PCM-couplings(CZ/US/IN/CN), PCK/GB (CZ/US/IN/CN)

CZ = Gates Karvina Fluid Power Plant, Karvina, Czech Republic.
 US = Gates Corp, Versailles, MO, USA
 IN = Gates India Private Limited, Punjab, India
 CN = Gates Fluid Power Technologies (Changzhou) Co., Ltd., Changzhou, China

Application/Limitation

Hose assemblies covered by this certificate may be used for: Fuel oil, lubricating oil, hydraulic oil, fresh water cooling, sanitary and compressed air systems

Max Working Pressure (MWP), MPa, depending on dash size:
 Hose type

EFG3K		EFG4K		EFG5K		EFG6K	
Dash Size	MWP MPa	Dash Size	MWP MPa	Dash Size	MWP MPa	Dash Size	MWP MPa
-20	21,0	-6	28,0	-6	35,0	-6	42,0
-24	21,0	-8	28,0	-8	35,0	-8	42,0
-32	21,0	-10	28,0	-10	35,0	-10	42,0
-	-	-12	28,0	-12	35,0	-12	42,0
-	-	-16	28,0	-16	35,0	-16	42,0
-	-	-20	28,0	-20	35,0	-20	42,0
-	-	-	-	-24	35,0	-24	42,0
-	-	-	-	-32	35,0	-32	42,0

Temperature range: -40°C to +121°C constant
 +75°C for air
 +93°C for water

Max Working Pressure (MWP), MPa, depending on dash size:
 Hose type

M3K		M4K		M5K		M6K	
Dash Size	MWP MPa	Dash Size	MWP MPa	Dash Size	MWP MPa	Dash Size	MWP MPa
-4	22,5	-4	28,0	-4	35,0	-4	42,0
-5	22,5	-5	28,0	-5	35,0	-	-
-6	22,5	-6	28,0	-6	35,0	-	-
-8	22,5	-8	28,0	-8	35,0	-	-

Job Id: **262.1-016887-5**
Certificate No: **TAP000003S**
Revision No: **1**

-10	22,5	-10	28,0	-	-	-	-
-12	22,5	-12	28,0	-	-	-	-
-16	22,5	-16	28,0	-	-	-	-

Temperature range: -40°C to +100°C constant, 120°C intermittent.
+75°C for air
+85°C for water

Max Working Pressure (MWP), MPa, depending on dash size:
Hose type

G1		G2	
Dash Size	MWP MPa	Dash Size	MWP MPa
-4	22,5	-4	40,0
-5	21,5	-5	35,0
-6	18,0	-6	33,0
-8	16,0	-8	27,5
-10	13,0	-10	25,0
-12	10,5	-12	21,5
-16	9,0	-16	16,5
-20	6,4	-20	12,5
-24	5,0	-24	9,0
-32	4,2	-32	8,0

Temperature range: -40° to +100°C constant, 120°C intermittent.
+75°C for air
+85°C for water

Max Working Pressure (MWP), depending on nominal inner diameter (ID):
Hose type

CM2T	
Dash Size	MWP MPa
-4	40,0
-5	35,0
-6	33,0
-8	27,5
-10	25,0
-12	21,5
-16	16,5

Temperature range: -40°C to +100°C
+75°C for air
+85°C for water

This certificate is valid for the specific assembly of hose and coupling type as specified, assembled and delivered by the holder (named as manufacturer) and other approved assembling locations on the second page 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.

Job Id: **262.1-016887-5**
 Certificate No: **TAP000003S**
 Revision No: **1**

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 hoses can be used for ordinary machinery purposes in the systems mentioned on the front page. They are not to be used where fixed 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 on 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, lubrication oil, fuel oil and petroleum base hydraulic oil.

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

For use with compressed air or gases above 16 MPa, the cover of the hose has to be pin pricked.

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

Type Approval documentation

The approval is based on the following documentation:

- Manufacturer's catalogue "Gates Fluid Power"
- Leaflets "Submission for type approval" dated 8/8/03
- Fire test reports from WehrTechnische Dienststelle WTD 71 and Southwest Research Institute ISO 15540:

Hose type	Test date	Hose type	Test date	Hose type	Test date
4G1	13/05/2009	4G2	13/05/2009	20EFG3K	15/09/2010
6G1	11/01/2011	6G2	22/07/2000	12EFG4K	27/04/2010
8G1	26/01/2009	8G2	27/01/2009	32EFG5K	15/09/2010
10G1	09/08/2000	10G2	09/08/2000	6EFG6K	27/04/2010
16G1	14/09/2004	16G2	10/01/2011		
32G1	13/05/2009	32G2	13/05/2009		

Hose type	Test date	Hose type	Test date	Hose type	Test date
6M3K	21/07/2000	6M4K	21/07/2000	CM2T06	17/10/2007
8M3K	23/03/2000	8M4K	10/01/2011	CM2T08	17/10/2007
10M3K	21/07/2000	10M4K	09/08/2000	CM2T10	10/01/2011
12M3K	11/01/2011	6M5K	09/08/2000	CM2T16	17/10/2007
16M3K	21/07/2000				

- Burst testing and survey at Gates Turkey. Burst test of CM2T hose sizes 5, 10, 12, dated 2015-09-09. Survey checklist dated 2015-09-09.
- Letter received from Gates EMB, dated 2015-07-07, confirming change of certificate ownership from Gates Cambridgeshire to Eifeler Maschinenbau Essen.

Tests carried out

Impulse, Ozone resistance, Abrasion resistance, Cold bend, Adhesion, Change in length, Oil resistance, Burst, Fire Resistant.

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Revision No: **1**

Marking of product

For traceability to this type approval the final hose is at least to be marked with:

- Manufacturer's name or trade mark
- Type designation

Periodical assessment

For retention of the Type Approval, DNV GL Surveyor shall perform a survey 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 from all bulk hose manufacturing plants:

- Dimensional check.
- Change in length
- Leakage test
- Burst test

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