

TYPE APPROVAL CERTIFICATE

Certificate No:
TAP00001K4
Revision No:
2

This is to certify:

That the Flexible hoses of metallic material with permanently fitted couplings

with type designation(s)
MasterFlex, Annuflex, Pressuremax HP

Issued to
Hose Master, LLC
Euclid, OH, USA

is found to comply with
DNV GL class programme DNVGL-CP-0184 – Type approval – Flexible hoses with permanently fitted couplings
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021

Application :

Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV.

Type:	Temperature range:	Max. working press.:	Sizes:
MasterFlex	-32°F to +1112°F	449 to 2700 (see page 2)	1/4", 3/8", 1/2", 3/4", 1", 1 1/2", 2"
Annuflex	-32°F to +1112°F	449 to 2700 (see page 2)	1/4", 3/8", 1/2", 3/4", 1", 1 1/2", 2"
Pressuremax HP	-32°F to +1112°F	1675 to 6000 (see page 2)	1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2"

Issued at **Høvik** on **2021-10-19**

for **DNV**

This Certificate is valid until **2022-12-30**.

DNV local station: **Houston, Approval CMC**

Approval Engineer: **Andreas Hansen**

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 AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") 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.



Product description

Flexible hoses with one wirebraid (Masterflex and Annuflex) or two wire braids (Pressuremax HP) of metallic material with permanently fitted couplings.

Materials:

Masterflex and Annuflex: T321 stainless steel corrugated hose core with T304 stainless steel single outer braid.
 Pressuremax HP: T321 stainless steel corrugated hose core with T316L stainless steel double outer braid.
 Coupling: T304 / T316

Coupling types:

Pipe nipple (male), female half coupling, female union, male jic fitting, female jic, c stub end with slip on flange, weld nipples, welded neck fitting, a stub end with slip on flange, elbow, reducer, hex male connector.

Hose and coupling manufacturer:

Hose Master, 1233 East 222nd Street, Cleveland, Ohio

Application/Limitation

Maximum working pressure in psi:

Size	Type		
	MasterFlex	AnnuFlex	Pressuremax HP
1/4"	1800	1800	6000
3/8"	1558	1558	5000
1/2"	1186	1186	4500
3/4"	898	898	3600
1"	718	718	3000
1 1/4"	-	-	2600
1 1/2"	531	531	2200
2"	449	449	1675

At elevated temperature, maximum working pressure is to be reduced according to reduction factors:

Temp	°C	20	50	100	150	200	250	300	350	400	450	500	550	600
	°F	68	122	212	302	392	482	572	662	752	842	932	1022	1112
Factor		1,00	0,95	0,85	0,77	0,71	0,67	0,63	0,60	0,58	0,57	0,56	0,55	0,50

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 and below assembling locations:

- Hose Master, LLC, Houston, Texas
- Hose Master, LLC, Atlanta, Georgia
- Hose Master, LLC, Reno, Nevada

All hose assemblies delivered under this type approval certificate shall be in compliance with an assembly procedure issued by the certificate holder. The hoses are to be mounted in accordance with the manufacturer's instructions.

The outermost end of the coupling performing the connection to the fixed piping is not covered by this certificate and shall fulfil the restrictions in Pt.4 Ch.6 Sec.9 [5] and Pt.6 Ch.2 Sec.5 [11.2] as below:

- Flanged ends shall be according to a recognized standard.
- Threaded joints having pipe threads where pressure-tight joints are made on the threads:
 - 1) with parallel or tapered threads, shall comply with requirements of a recognized standard.
 - 2) shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur.
- Other mechanical joints are not covered by this certificate and shall be type approved separately in accordance with DNV-CP-0185.

The following hoses are not to be used in systems exposed to cyclic loading: Masterflex 3/8" and Annulex 1/4".

Minimum bend radius in installation is to be in accordance with the manufacturer's specifications.

The hoses must only be fitted on places where they are always accessible.

Flexible hoses are only to be used 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.

All flexible hoses used in lubricating oil and compressed air systems must be possible to shut off from the system.

Welding shall fulfill requirements in DNV-RU-SHIP Pt.2 Ch.4. All welding of piping components class I and II shall be carried out by a welding work shop approved by DNV.

The hoses shall not to be used in LNG/LPG systems.

The hoses are not to be considered suitable for seawater applications.

Type Approval documentation

Hose Master Catalogue, Corrugated metal hose & assemblies

Burst pressure test report witnessed by DNV, dated 2017-12-13

Pliability test report, dated 2018-09-10 and 2018-10-19

Fatigue test report, dated 2018-09-10

Drawing Annuflex/Masterflex (with change of tolerance), dated 2020-12-17

Pressure test report (with change of tolerance) witnessed by DNV, dated 2020-07-01

Tests carried out

Burst test, Fatigue test, Pliability (static bend) test

Production testing

Each hose assembly shall be hydrostatically tested at a hydrostatic pressure of 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to this type approval certificate.

Marking of product

For traceability to this type approval, the hose assemblies are to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Size

Periodical assessment

For retention of the Type Approval, a DNV 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.