Certificate No:
TAP00002MF

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Bulk Loading Hoses with Permanently Fitted Couplings

with type designation(s)
DUNBAR/24, FH12, FH20, FS12, FS20, MES12, MEH12, PH12, PH20, PS12, PS20, CH12, CS12

Issued to
Hydrasun Ltd.
Aberdeen, **United Kingdom**

is found to comply with
DNV class programme DNV-CP-0183 – Type approval – Flexible non-metallic hoses

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
DUNBAR/24	-25°C to +70°C	24 bar	4"
FH12	-30°C to +90°C	12 bar	4"
FH20	-30°C to +90°C	20 bar	4"
FS12	-30°C to +90°C	12 bar	4"
FS20	-30°C to +90°C	20 bar	4"
MES12	-40°C to +60°C	12 bar	4"
MEH12	-40°C to +60°C	12 bar	4"
PH12	-40°C to +100°C	12 bar	4"
PH20	-40°C to +100°C	20 bar	4"
PS12	-40°C to +70°C	12 bar	4"
PS20	-40°C to +70°C	20 bar	4"
CH12	-40°C to +70°C	12 bar	5"
CS12	-40°C to +70°C	12 bar	5"

Issued at **Høvik** on **2023-01-20**
This Certificate is valid until **2028-01-19**.
DNV local unit: **UK & Ireland CMC & VMC**

Approval Engineer: **Andreas Hansen**

for **DNV**

Bosman van der Merwe
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

Nine types of flexible hose assemblies for transfer of hydrocarbons, solvents, dry bulk, and freshwater during bunkering operations, as below:

DUNBAR 24 – Softwall
Tube : Black, smooth PVC/NBR rubber
Reinforcement : High strength synthetic cord with antistatic copper wire embedded
Cover : Black, smooth synthetic rubber resistant to ageing, abrasion, oil and sea water

FH 12/20 – Hardwall
Tube : Black, smooth PVC/NBR rubber
Reinforcement : High strength synthetic cord, embedded helix wire and antistatic copper wire
Cover : Black, smooth synthetic rubber resistant to weather, abrasion, oil and sea water

FS 12/20 – Softwall
Tube : Black, smooth PVC/NBR rubber
Reinforcement : High strength synthetic cord and antistatic copper wire
Cover : Black, smooth synthetic rubber resistant to weathering, abrasion, oil and sea water

MES12 – Softwall
Tube : Black, smooth EPDM rubber
Reinforcement : High strength synthetic cord
Cover : Blue, smooth EPDM rubber resistant to weathering, abrasion and sea water

MEH12 – Hardwall
Tube : Black, smooth EPDM rubber
Reinforcement : High strength synthetic cord and steel helix wire
Cover : Blue, smooth EPDM rubber resistant to wearing, abrasion and sea water

PH 12/20 – Hardwall
Tube : White, smooth EPDM rubber
Reinforcement : High strength synthetic cord and steel helix wire
Cover : Orange, smooth EPDM rubber resistant to weathering, ozone and sea water

PS 12/20 – Softwall
Tube : White, smooth EPDM rubber
Reinforcement : High strength synthetic cord divided by a layer of rubber
Cover : Orange, smooth synthetic rubber resistant to weathering, ozone, and sea water

CH12 – Hardwall
Tube : Black, smooth NR/SBR rubber resistant to abrasion.
Reinforcement : High strength synthetic cord, steel helix wire, and antistatic copper wire
Cover : Black, smooth, and weathering resistant synthetic rubber

CS12 – Softwall
Tube : Black, smooth NR/SBR rubber resistant to abrasion
Reinforcement : High strength synthetic cord plus antistatic copper wire
Cover : Black, smooth, and weathering resistant synthetic rubber

Coupling materials:

Part	Material	Grade	Standard
Fig unions	Carbon steel	E470	EN 10294-1
		LF2	ASTM A370
UHN nipples	Carbon steel	Grade B	ASTM A106/A106M
	Stainless steel	316/316L	EN 10216-5
Ferrules	Carbon steel	Grade B	ASTM A106/A106M
		S355J2H / P355N / E355	EN 10210 / EN 10216-3 / EN 10297-1
	Stainless steel	316/316L	EN 10216-5

Hose manufacturing location:
IVG Colbachini SpA
Via Fossona, 132, 35030 Cervarese Santa Croce
PD, Italy 35030

Coupling manufacturing location:
Hydrasun Ltd.
Myrtlefield Industrial Estate
Aviemore, United Kingdom, PH22 1SB

Hose assembly location:
Hydrasun Ltd.
Gateway Business Park, Moss Road
Aberdeen, United Kingdom, AB12 33GQ GB

Application/Limitation

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.

Type	Size [mm / inch]	MAWP [bar]	Minimum Bend Radius [mm / inch]	Axial Tensile Rated Break Load [kgf]
DUNBAR24	102 / 4	24	918 / 36.0	7000
FH12	102 / 4	12	600 / 23.6	4000
FH20	102 / 4	20	600 / 23.6	7000
FS12	102 / 4	12	918 / 36.0	4000
FS20	102 / 4	20	918 / 36.0	7000
MES12	102 / 4	12	918 / 36.0	4000
MEH12	102 / 4	12	600 / 23.6	4000
PH12	102 / 4	12	600 / 23.6	4000
PH20	102 / 4	20	600 / 23.6	7000
PS12	102 / 4	12	918 / 36.0	4000
PS20	102 / 4	20	918 / 36.0	7000
CH12	127 / 5	12	900 / 35.5	7000
CS12	127 / 5	12	900 / 35.5	7000

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions.

The hoses covered by this certificate shall not be installed in systems subject to pressure below atmospheric or vacuum conditions.

End connections shall fulfil the restrictions in DNV-RU-SHIP Pt.4 Ch.6 Sec.9 [5] as below:

- 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 national or international 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.
- Mechanical joints other than standard bolted flanges are not covered by this certificate and shall be type approved separately in accordance with DNV-CP-0185.

Hose assemblies are not fire tested and shall not be used in applications where fire resistance is required.

Hoses assemblies covered by this certificate shall not be installed in systems subject to pressure pulsation.

Type Approval documentation

Tests carried out

Proof pressure test, dimension check test, bend test, electrical resistance, pull test, breaking temperature test, ozone resistance test, liquid resistance test, abrasion resistance test, and burst pressure test.

Marking of product

For traceability to this Type Approval, each hose is at least to be marked with:

- Manufacturer's name or trademark
- Hose identification
- Nominal diameter
- Pressure rating
- Temperature rating

Where a flexible hose assembly is made up of items from different manufacturers, the components are to be clearly identified and traceable to evidence of prototype testing.

Periodical assessment

For retention of the type approval, a DNV surveyor shall perform periodical assessment after one year (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the type approval are complied with. Reference is made to DNV-CP-0338.