Certificate No:
TAP00002C3

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible Hoses for CO2 Systems

with type designation(s)
OL7CO2, MTH1CO2

Issued to
ZEC S.p.A.
Colorno, PR, Italy

is found to comply with
DNV GL class programme DNVGL-CP-0183 – Type approval – Flexible hoses
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems

Application :

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

Type:	Temperature range:	Sizes:
OL7CO2	-40°C to +100°C	DN 5, 6, 8 and 12
MTH1CO2	-40°C to +100°C	DN 6, 8, 10 and 12

Issued at **Høvik** on **2021-05-28**

This Certificate is valid until **2026-05-27**.

for **DNV**

DNV local station: **Italy/Malta CMC**

Approval Engineer: **Jane Lozanov**

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

1. OL7CO2
   Hose constructed according to SAE 100R7 type from SAE J517 comprising of
   Tube : thermoplastic polyester inner tube
   Reinforcement : one or two layers of polyester fiber reinforcement
   Cover : polyurethane cover
   Couplings : swaged ferrule series 7 + hydraulic type fittings

2. MTH1CO2
   Hose constructed according to EN 857 1SC comprising of
   Tube : thermoplastic polyester inner tube
   Reinforcement : single layer of steel wire braid reinforcement
   Cover : polyurethane cover
   Couplings : swaged ferrule series 7 + hydraulic type fittings

Material of construction for couplings : Carbon Steel 11SMnPb37 (Zinc plated)

Hose manufacturer: ZEC S.p.A., Via Lungolorno 11, 43052 Colorno (Parma), Italy

Ferrule types & manufacturing locations: ZEC S.p.A., Via Lungolorno 11, 43052 Colorno (Parma), Italy

Application/Limitation

Approved to be used in systems carrying liquid or gaseous CO_2 applications as covered under the Rules mentioned on the front page of the certificate.

Hose assemblies covered by this certificate are not fire safe & shall not be used in systems conveying sea water and flammable fluids.

This certificate is valid for the specific assembly of hose and ferrule type as specified, assembled and delivered by the holder (named as manufacturer) of this certificate.

Maximum working pressure (bar) of each hose type shall be according to following table:

Hose size			OL7CO2			MTH1CO2		
inch	DN	Dash	M.A.W.P.	Designation	Ferrule des.	M.A.W.P.	Designation	Ferrule des.
3/16	5	-3	210 bar	OL7271**CO2	BP316R7	/		
1/4	6	-4	200 bar	OL7371**CO2	BP14R7	300 bar	MTH1371**CO2	BP14MT1
5/16	8	-5	190 bar	OL7471**CO2	BP516R7V	240 bar	MTH1471**CO2	BP516R7V
3/8	10	-6	/			225 bar	MTH1571**CO2	BP38R7V
1/2	12	-8	140 bar	OL7671**CO2	BP12R7V	190 bar	MTH1671**CO2	BP12R7V

The outer end of the pipe coupling (performing the connection to the fixed piping) is not covered by this certificate and shall follow the below requirements:

- Flanged ends shall be according to a recognized standard
- Slip-on threaded joints having pipe threads where pressure-tight joints are made on the threads with parallel or tapered threads, shall comply with requirements of a recognized standard. Limitations stated in DNVGL-RU-SHIP Pt.4 Ch.6 Sec.9 [5.2.6] to be followed.
- If these outer ends are going to be part of a mechanical joint as covered by Table 10 DNVGL-RU-SHIP Pt.4 Ch.6 Sec.9, then they shall be separately type approved.

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.

Flexible hoses are only to be used in short lengths 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 hose assemblies must only be fitted in places where they are always accessible. Flexible hoses of these types are not to be used on boiler fronts.

Hose assemblies covered by this certificate shall not be used in system subject to pressure below atmospheric.

The hoses shall be pinpricked according to the manufacturer's procedure.

Production testing

All hose assemblies delivered under the DNV type approval scheme shall be subject to a pressure test at 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to this type approval certificate.

Type Approval documentation

Tests carried out

Dimensional Check, Change in Length, Burst Test, Cold Flexibility, Impulse Test, Pin pricking test and Endurance test.

Marking of product

For traceability to this Type Approval, the products are at least to be marked with:

- hose manufacturer's name or trademark;
- type designation;
- nominal diameter;
- pressure rating;
- temperature rating;
- additional marking at manufacturer's option;

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.