

TYPE APPROVAL CERTIFICATE

This is to certify:

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

with type designation(s)

TrΔle® EN 853 2SN / SAE 100 R2AT, TrΔle® EN 857 1SC, TrΔle® EN 853 1SN / SAE 100 R1AT, TrΔle® EN 857 2SC, TrΔle® EN 856 4SP, TrΔle® EN 856 4SH, EN 857 2SNK TrΔle® GOLD

Issued to

DISTRIBUIDORA INTERNACIONAL CARMEN, S.A.U. (DICSA)
Zaragoza, Spain

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems

DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021

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:
TrΔle® EN 853 1SN / SAE 100 R1AT	-40°C to +100°C	See page 3	DN06 to DN51 (see page 3)
TrΔle® EN 853 2SN / SAE 100 R2AT	-40°C to +100°C	See page 3	DN06 to DN25 (see page 3)
TrΔle® EN 857 1SC	-40°C to +100°C	See page 3	DN06 to DN51 (see page 3)
TrΔle® EN 857 2SC	-40°C to +100°C	See page 3	DN06 to DN25 (see page 3)
TrΔle® EN 856 4SP	-40°C to +100°C	See page 3	DN10 to DN51 (see page 3)
TrΔle® EN 856 4SH	-40°C to +100°C	See page 3	DN19 to DN51 (see page 3)
EN 857 2SNK TrΔle® GOLD	-40°C to +100°C	See page 3	DN06 to DN25 (see page 3)

Issued at **Høvik** on **2023-10-09**

This Certificate is valid until **2028-10-08**.

for **DNV**

DNV local unit: **Area NB/CMC Iberia**

Approval Engineer: **Maheshraja Venkatesan**

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

7 different types of non-metallic hose assemblies with permanently fitted 'DICSA' couplings :

1. **TrΔle® (or) TrΔle® GOLD EN 853 1SN / SAE 100 R1AT (SEL: FORCESTREAM 1AT)**
Hoses designed and constructed according to SAE 100R1 AT from SAE J517/ EN 853 1SN:
 Tube : synthetic rubber resistant to hydraulic oil
 Reinforcement : one braid of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather.
2. **TrΔle® (or) TrΔle® GOLD EN 853 2SN / SAE 100 R2AT (SEL: FORCESTREAM 2AT)**
Hoses designed and constructed according to SAE 100R2 AT from SAE J517/ EN 853 2SN:
 Tube : synthetic rubber resistant to hydraulic oil
 Reinforcement : two braids of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather.
3. **TrΔle® (or) TrΔle® GOLD EN 857 1SC (SEL: FORCESTREAM 1SC)**
Hoses designed and constructed according to EN 857 1SC:
 Tube : synthetic rubber resistant to cold and hot water with usual cleaning agents
 Reinforcement : one braid of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather
4. **TrΔle® (or) TrΔle® GOLD EN 857 2SC (SEL: FORCESTREAM 2SC)**
Hoses designed and constructed according to EN 857 2SC:
 Tube : synthetic rubber resistant to mineral, vegetable and hydraulic oil
 Reinforcement : two braids of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather
5. **EN 857 2SNK TrΔle® (or) TrΔle® GOLD (SEL: SUPERSTREAM 2K)**
Hoses constructed according to EN 853 2SN:
 Tube : synthetic rubber resistant to hydraulic oil
 Reinforcement : two braids of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather
6. **TrΔle® (or) TrΔle® GOLD EN 856 4SP / SAE 100 R9R-R10 (SEL: POWERSTREAM 4SP)**
Hoses designed and constructed according to EN 856 4SP:
 Tube : synthetic rubber resistant to mineral, vegetable and hydraulic oil
 Reinforcement : four braids of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather
7. **TrΔle® (or) TrΔle® GOLD EN 856 4SH (SEL: POWERSTREAM 4SH)**
Hoses designed and constructed according to EN 856 4SH:
 Tube : synthetic rubber resistant to mineral, vegetable and hydraulic oil
 Reinforcement : four braids of steel wire
 Cover : synthetic rubber resistant to oil, abrasion and weather

Hose Manufacturer

SEL Polimer Kaucuk San.ve Paz. A.S., Istanbul, Turkey

Coupling Manufacturer

DISTRIBUIDORA INTERNACIONAL CARMEN, S.A.U. (DICSA), Zaragoza, Spain

Material of construction for couplings

Grade 1.0737 from EN 10277-3 or AISI 316L

Application/Limitation

Hose assemblies by this certificate are approved to be used in petroleum based hydraulic oil or fuel oil at temperatures ranging from -40°C to +100°C with maximum working pressures as below:

Nominal size, ID			Maximum Working Pressure (bar)						
			1SN	2SN	1SC	2SC	4SP	4SH	2SNK
SAE	inch	DN							
-04	1/4"	6	225	400	225	400	-	-	450
-05	5/16"	8	215	350	215	350	-	-	420
-06	3/8"	10	180	330	180	330	445	-	385
-08	1/2"	12	160	275	160	275	415	-	345
-10	5/8"	16	130	250	130	250	350	-	290
-12	3/4"	19	105	215	105	215	350	420	280
-16	1"	25	88	165	88	165	280	380	200
-20	1 1/4"	31	63	125	-	-	-	325	-
-24	1 1/2"	38	50	90	-	-	-	290	-
-32	2"	51	40	78	-	-	-	250	-

Coupling configurations

Nominal size, ID			Carbon steel fittings (Ferrule designation)			
			1SN/2SN/2SC/2SNK	1SC	4SP	4SH
SAE	inch	DN				
-04	1/4"	6	DI221200400	SC21120400	DI122400400	-
-05	5/16"	8	DI221200501	SC21120500	-	-
-06	3/8"	10	DI221200600	SC21120600	DI122400600	-
-08	1/2"	12	DI221200800	SC21120800	DI122400800	-
-10	5/8"	16	DI221201000	SC211201000	DI122401000	-
-12	3/4"	19	DI221201200	SC211201200	DI122401200	A610101200
-16	1"	25	DI221201600	SC211201600	DI122401600	A610101600
-20	1 1/4"	31	DI221202000	-	-	A610102000
-24	1 1/2"	38	DI221202400	-	-	A610102400
-32	2"	51	DI221203200	-	-	A610103200

Nominal size, ID			Stainless steel fittings (Ferrule designation)			
			1SN/2SN/2SC/2SNK	1SC	4SP	4SH
SAE	inch	DN				
-04	1/4"	6	ZPF221200400	ZSC21120400	ZPF122400400	-
-05	5/16"	8	ZPF221200500	ZSC21120500	-	-
-06	3/8"	10	ZPF221200600	ZSC21120600	ZPF122400600	-
-08	1/2"	12	ZPF221200800	ZSC21120800	ZPF122400800	-
-10	5/8"	16	ZPF221201000	ZSC21121000	ZPF122401000	-
-12	3/4"	19	ZPF221201200	ZSC21121200	ZPF122401200	ZA610101200
-16	1"	25	ZPF221201600	ZSC21121600	ZPF122401600	ZA610101600
-20	1 1/4"	31	ZPF221202000	-	-	ZA610102000
-24	1 1/2"	38	ZPF221202400	-	-	ZA610102400
-32	2"	51	ZPF221203200	-	-	ZA610103200

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.

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.

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

On the hoses: Dimensional check test, Change in length test, Cold flexibility test, Oil Resistance test, Cover adhesion test, Ozone resistance test

On the hose assembly: Burst test, Fire test, Impulse test

Marking of product

Flexible hoses are to be permanently marked by the manufacturer with the following details:

- Hose manufacturer's name or trademark;
- Date of manufacture (month/year);
- Designation type reference;
- 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.