

# 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**

for **DNV**

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

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

Approval Engineer: **Maheshraja Venkatesan**

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**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) |             |             |            |
|------------------|--------|----|---------------------------------------------|-------------|-------------|------------|
| SAE              | inch   | DN | 1SN/2SN/2SC/2SNK                            | 1SC         | 4SP         | 4SH        |
| -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) |             |              |             |
|------------------|--------|----|------------------------------------------------|-------------|--------------|-------------|
| SAE              | inch   | DN | 1SN/2SN/2SC/2SNK                               | 1SC         | 4SP          | 4SH         |
| -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

| <u>Document no.</u>      | <u>Rev.</u> | <u>Title</u>                                                                                                                                                                                                                                                                                              |
|--------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -                        | -           | Declaration of Consent from Polimer Kaucuk Istanbul dated 25.04.2022                                                                                                                                                                                                                                      |
| TAP0000136               | 1           | DNV Type Approval certificate to cover hose design for 1SN, 2SN, 1SC, 2SC, 4Sp and 4SH                                                                                                                                                                                                                    |
| TAP00002KB               | 0           | DNV Type Approval certificate to cover hose design for 2SNK                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 853 1SN                                                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 853 2SN                                                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 853 4SH                                                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 853 4SP                                                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 857 1SC                                                                                                                                                                                                                                                                               |
| -                        | -           | DICSA data Sheet EN 857 2SNK                                                                                                                                                                                                                                                                              |
| -                        | -           | DICSA data Sheet EN 857 2SC                                                                                                                                                                                                                                                                               |
| -                        | -           | SEL POLIMER data sheet POWERSTREAM 4SH                                                                                                                                                                                                                                                                    |
| -                        | -           | SEL POLIMER data sheet POWERSTREAM 4SP                                                                                                                                                                                                                                                                    |
| -                        | -           | SEL POLIMER data sheet FORCESTREAM 2AT                                                                                                                                                                                                                                                                    |
| -                        | -           | SEL POLIMER data sheet FORCESTREAM 2SC                                                                                                                                                                                                                                                                    |
| -                        | -           | SEL POLIMER data sheet SUPERSTREAM 2K                                                                                                                                                                                                                                                                     |
| -                        | -           | SEL POLIMER data sheet FORCESTREAM 1SC                                                                                                                                                                                                                                                                    |
| -                        | -           | SEL POLIMER data sheet FORCESTREAM 1AT                                                                                                                                                                                                                                                                    |
| <u>Ferrule drawings:</u> |             |                                                                                                                                                                                                                                                                                                           |
| 1SN/2SN/2SC/2SNK         |             | Carbon St.: DI221200400, DI221200501, DI221200600, DI221200800, DI221201000, DI221201200, DI221201600, DI221202000, DI221202400, DI221203200<br>Stainless St.: ZPF221200400, ZPF221200500, ZPF221200600, ZPF221200800, ZPF221201000, ZPF221201200, ZPF221201600, ZPF221202000, ZPF221202400, ZPF221203200 |
| 1SC                      |             | Carbon St.: SC21120400, SC21120500, SC21120600, SC21120800, SC211201000, SC211201200, SC211201600<br>Stainless St.: ZSC21120400, ZSC21120500, ZSC21120600, ZSC21120800, ZSC21121000, ZSC21121200, ZSC21121600                                                                                             |
| 2SC                      |             |                                                                                                                                                                                                                                                                                                           |
| 4SP                      |             | Carbon St.: DI122400600, DI122400800, DI122401000, DI122401200, DI122401600, DI122402000, DI122402400, DI122403200<br>Stainless St.: ZPF122400600, ZPF122400800, ZPF122401000, ZPF122401200, ZPF122401600, ZPF122402000, ZPF122402400, ZPF122403200                                                       |
| 4SH                      |             | Carbon St.: A610101200, A610101600, A610102000, A610102400, A610103200<br>Stainless St.: ZA610101200, ZA610101600, ZA610102000, ZA610102400, ZA610103200                                                                                                                                                  |
| <u>Test reports:</u>     |             |                                                                                                                                                                                                                                                                                                           |
| 1987.OIS0100/22          | -           | LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R1AT DN19                                                                                                                                                                                                              |
| 1986.OIS0100/22          | -           | LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R1AT DN06                                                                                                                                                                                                              |
| 402.OIS0110/23           | -           | LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R1AT DN51                                                                                                                                                                                                              |
| 2103.OIS0100/22          | -           | LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 2SC DN25                                                                                                                                                                                                           |

- 1992.0IS0100/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 2SC DN12
- 1991.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 2SC DN06
- 1664.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Superstream 2K exceed DIN-EN 857/ ISO 11237-1 2SC DN06
- 1665.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Superstream 2K exceed DIN-EN 857/ ISO 11237-1 2SC DN12
- 1993.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Superstream 2K exceed DIN-EN 857/ ISO 11237-1 2SC DN25
- 1666.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SP DN10
- 057.0IS0110/23 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SP DN12
- 404.0IS0110/23 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SP DN25
- 1668.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SH DN31
- 2105.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SH DN51
- 1667.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Powerstream EN 856/ ISO1307 4SH DN19
- 055.0IS0100/23 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R2AT DN19
- 1988.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R2AT DN06
- 403.0IS0110/23 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 853/ SAE 100 R2AT DN51
- 1989.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 1SC DN06
- 1990.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 1SC DN12
- 1663.0IS0110/22 - LAPI fire test report – Dicsa CS fittings with SEL Forcestream DIN-EN 857/ ISO 11237-1 1SC DN25
- EI20221122/1 - Impulse Test Report 1SC ¼" dated 22/11/21
- EI2022926/1 - Impulse Test Report 2SNK ¼" dated 26/09/22
- EI2022413/1 - Impulse Test Report R2AT/2SN ¼" dated 13/04/22
- EI202246/2 - Impulse Test Report R1AT ¼" dated 16/12/21
- EI22930/30 - Impulse Test Report 4SP/R9 3/8" dated 30/09/22
- EI202157/1 - Impulse Test Report R2AT/2SN 3/8" dated 07/05/21
- EI2022614/2 - Impulse Test Report R1AT/1SN 3/8" dated 14/06/22
- EI202299/1 - Impulse Test Report 1SC ½" dated 09/09/22
- EI2022729/1 - Impulse Test Report 2SNK ½" dated 09/09/22
- EI20211210/1 - Impulse Test Report 2SC ½" dated 10/12/21
- EI2022420/1 - Impulse Test Report R2AT/2SN ¾" dated 20/04/22
- EI202296/1 - Impulse Test Report R1AT ¾" dated 20/04/22
- EI20221027/1 - Impulse Test Report 4SP/R9 ¾" dated 20/04/22
- EI22912/12 - Impulse Test Report 4SH ¾" dated 12/09/22
- EI20221129/1 - Impulse Test Report 1SC 1" dated 29/11/22
- EI202271/1 - Impulse Test Report 2SN-K 1" dated 01/07/22
- EI2022425/2 - Impulse Test Report 2SC 1" dated 25/04/22
- EI2022718/1 - Impulse Test Report R1AT/1SN 1 ½" dated 18/07/22
- IED2022722/1 - Impulse Test Report R2AT/2SN 1 ½" dated 22/07/22
- EI221019/1 - Impulse Test Report 4SP/R9 1 ½" dated 19/10/22
- EI2022727/1 - Impulse Test Report 4SH 1 ½" dated 27/07/22
- Burst test reports witnessed by DNV dated 2023.04.18: IPP230418/1, IPP230418/2, IPP230418/3, IPP230418/4, IPP230418/5, IPP230418/6, IPP230418/7, IPP230418/8, IPP230418/9, IPP230418/10, IPP230418/11, IPP230418/12, IPP230418/13, IPP230418/14, IPP230422/15, IPP230422/16, IPP230422/17, IPP230422/18, IPP230422/19, IPP230522/1, IPP230422/21

## 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.