DNV·GL

Certificate No:
**TAE000012V**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Electric Power Cable**

with type designation(s)
**EXANE-VFD, Exane 125 Type P, OBS**

Issued to
**RSCC Wire & Cable LLC**
**East Granby CT, United States**

is found to comply with
**DNV GL rules for classification – Ships, offshore units, and high speed and light craft**

## Application :

**Power cable for variable frequency drives.**

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**
**Voltage class (kV) 1 & 2 & 2kVHD**
**Temp. class (°C) 95**

Issued at **Høvik** on **2017-05-30**
This Certificate is valid until **2021-06-30**.
DNV GL local station: **New York**

Approval Engineer: **Ivar Bull**

for **DNV GL**

**Andreas Kristoffersen**
**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.


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Job Id: **262.1-007169-4**
Certificate No: **TAE000012V**

## Product description

| | |
|---|---|
| Construction: | Exane-VFD, Exane 125 Type P, Overall Braid Shield. |
| Conductor: | Tinned stranded copper |
| Insulation: | XLPO (type P) |
| Grounds: | Single or 3 x segmented grounds |
| Shields: | Overall shield (OS) aluminium/polyester with drain wire or tinned copper braid (OBS). |
| Filler: | Flame retardant (as required) |
| Outer sheath: | SE-1 (Type N) |

| Number of cores x conductor cross-section | | Type designation |
|---|---|---|
| mm² | AWG | |
| 3 x 1.94 | 14 | Exane-VFD-3C14+3x#18 Grds-1KV |
| 3 x 3.08 | 12 | Exane-VFD-3C12+3x#16 Grds-1KV |
| 3 x 5.53 | 10 | Exane-VFD-3C10+3x#14 Grds-1KV |
| 3 x 7.6 | 8 | Exane-VFD-3C8+3x#14 Grds-1KV |
| 3 x 7.6 | 8 | Exane-VFD-3C8+3x#10 Grds-1KV |
| 3 x 12.5 | 6 | Exane-VFD-3C6+3x#12 Grds-1KV |
| 3 x 18.6 | 5 | Exane-VFD-3C5+3x#12 Grds-1KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#12 Grds-1KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#8 Grds-1KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#6 Grds-1KV |
| 3 x 25.6 | 3 | Exane-VFD-3C3+3x#10 Grds-1KV |
| 3 x 30.7 | 2 | Exane-VFD-3C2+3x#10 Grds-1KV |
| 3 x 46.1 | 1 | Exane-VFD-3C1+3x#10 Grds-1KV |
| 3 x 56.3 | 1/0 | Exane-VFD-3C1/0+3x#10 Grds-1KV |
| 3 x 56.3 | 1/0 | Exane-VFD-3C1/0+3x#6 Grds-1KV |
| 3 x 66.5 | 2/0 | Exane-VFD-3C2/0+3x#10 Grds-1KV |
| 3 x 66.5 | 2/0 | Exane-VFD-3C2/0+3x#6 Grds-1KV |
| 3 x 92.1 | 3/0 | Exane-VFD-3C3/0+3x#8 Grds-1KV |
| 3 x 92.1 | 3/0 | Exane-VFD-3C3/0+3x#5 Grds-1KV |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#8 Grds-1KV |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#4 Grds-1KV |
| 3 x 133 | 262 | Exane-VFD-3C262+3x#6 Grds-1KV |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#6 Grds-1KV |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#2 Grds-1KV |
| 3 x 189 | 373 | Exane-VFD-3C373+3x#6 Grds-1KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#6 Grds-1KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1 Grds-1KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1/0 Grds-1KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#3/0 Grds-1KV |
| 3 x 225 | 444 | Exane-VFD-3C444+1x#4/0 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#6 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#4 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#2 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1/0 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2/0 Grds-1KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#4/0 Grds-1KV |
| 3 x 303 | 600 | Exane-VFD-3C600+3x#6 Grds-1KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#5 Grds-1KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#5 Grds-1KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#4 Grds-1KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#2/0 Grds-1KV |
| 3 x 328 | 646 | Exane-VFD-3C646+1x#444 Grds-1KV |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#5 Grds-1KV |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#4 Grds-1KV |

| Number of cores x conductor cross-section | | Type designation |
|---|---|---|
| mm² | AWG | |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#2/0 Grds-1KV |
| 3 x 394 | 777 | Exane-VFD-3C777+1x#444 Grds-1KV |
| | | |
| | | |
| 3 x 12.5 | 6 | Exane-VFD-3C6+3x#12 Grds-2KV |
| 3 x 18.6 | 5 | Exane-VFD-3C5+3x#12 Grds-2KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#12 Grds-2KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#8 Grds-2KV |
| 3 x 21.5 | 4 | Exane-VFD-3C4+3x#6 Grds-2KV |
| 3 x 25.6 | 3 | Exane-VFD-3C3+3x#10 Grds-2KV |
| 3 x 30.7 | 2 | Exane-VFD-3C2+3x#10 Grds-2KV |
| 3 x 46.1 | 1 | Exane-VFD-3C1+3x#10 Grds-2KV |
| 3 x 56.3 | 1/0 | Exane-VFD-3C1/0+3x#10 Grds-2KV |
| 3 x 56.3 | 1/0 | Exane-VFD-3C1/0+3x#6 Grds-2KV |
| 3 x 66.5 | 2/0 | Exane-VFD-3C2/0+3x#10 Grds-2KV |
| 3 x 66.5 | 2/0 | Exane-VFD-3C2/0+3x#6 Grds-2KV |
| 3 x 92.1 | 3/0 | Exane-VFD-3C3/0+3x#8 Grds-2KV |
| 3 x 92.1 | 3/0 | Exane-VFD-3C3/0+3x#5 Grds-2KV |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#8 Grds-2KV |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#4 Grds-2KV |
| 3 x 133 | 262 | Exane-VFD-3C262+3x#6 Grds-2KV |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#6 Grds-2KV |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#2 Grds-2KV |
| 3 x 189 | 373 | Exane-VFD-3C373+3x#6 Grds-2KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#6 Grds-2KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1 Grds-2KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1/0 Grds-2KV |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#3/0 Grds-2KV |
| 3 x 225 | 444 | Exane-VFD-3C444+1x#4/0 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#6 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#4 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#2 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1/0 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2/0 Grds-2KV |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#4/0 Grds-2KV |
| 3 x 303 | 600 | Exane-VFD-3C600+3x#6 Grds-2KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#6 Grds-2KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#5 Grds-2KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#4 Grds-2KV |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#2/0 Grds-2KV |

| Number of cores x conductor cross-section | | Type designation |
|---|---|---|
| mm² | AWG | |
| 3 x 328 | 646 | Exane-VFD-3C646+1x#444 Grds-2KV |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#5 Grds-2KV |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#4 Grds-2KV |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#2/0 Grds-2KV |
| 3 x 394 | 777 | Exane-VFD-3C777+1x#444 Grds-2KV |
| | | |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#8 Grds-2KV(HD) |
| 3 x 113 | 4/0 | Exane-VFD-3C4/0+3x#4 Grds-2KV(HD) |
| 3 x 133 | 262 | Exane-VFD-3C262+3x#6 Grds-2KV(HD) |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#6 Grds-2KV(HD) |
| 3 x 159 | 313 | Exane-VFD-3C313+3x#2 Grds-2KV(HD) |
| 3 x 189 | 373 | Exane-VFD-3C373+3x#6 Grds-2KV(HD) |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#6 Grds-2KV(HD) |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1 Grds-2KV(HD) |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#1/0 Grds-2KV(HD) |
| 3 x 225 | 444 | Exane-VFD-3C444+3x#3/0 Grds-2KV(HD) |
| 3 x 225 | 444 | Exane-VFD-3C444+1x#4/0 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#6 Grds-2KV(HD) |

| Number of cores x conductor cross-section | | Type designation |
|---|---|---|
| mm² | AWG | |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#4 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#2 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+3x#1/0 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#2/0 Grds-2KV(HD) |
| 3 x 271 | 535 | Exane-VFD-3C535+1x#4/0 Grds-2KV(HD) |
| 3 x 303 | 600 | Exane-VFD-3C600+3x#6 Grds-2KV(HD) |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#6 Grds-2KV(HD) |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#5 Grds-2KV(HD) |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#4 Grds-2KV(HD) |
| 3 x 328 | 646 | Exane-VFD-3C646+3x#2/0 Grds-2KV(HD) |
| 3 x 328 | 646 | Exane-VFD-3C646+1x#444 Grds-2KV(HD) |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#5 Grds-2KV(HD) |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#4 Grds-2KV(HD) |
| 3 x 394 | 777 | Exane-VFD-3C777+3x#2/0 Grds-2KV(HD) |
| 3 x 394 | 777 | Exane-VFD-3C777+1x#444 Grds-2KV(HD) |

## Application/Limitation

The cable may be installed and sized according to IEC 60092-352 provided Cable ends with flexible rope stranded conductors are to be terminated using approved compression terminals intended and designed for these conductors.

The requirements of SOLAS Amendments Chapter II-1, Part D, Reg. 45, 5.2 (provision to be taken to limit Fire Propagation along Bunches of Cables or Wires) are fulfilled without any additional measures.

## Type Approval documentation

## Tests carried out

| Standard | Issued | General description | Limitation |
|---|---|---|---|
| IEEE1580 | 2010 | IEEE Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Facilities | |
| IEC 60332-3-22 | 2009-02 | Tests on electric and optical fibre cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A | Bunch test Category A |

## Marking of product

EXANE –VFD Type P - IEEE1580 - Type designation - number and size of conductors – Voltage- IEC 60332-3-22 – Year

## Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.

The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine Tests (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE