

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Low Voltage Cable**

with type designation(s)

**S103 BFOU(i) & S104 BFOU(c), S103 BFOU(i) M & S104 BFOU(c) M, BFOU(c&i), BFOU(c&i) M**

Issued to

**Shandong Zhongchuan Cable Co., Ltd.  
Weihai, China**

is found to comply with

**DNV GL rules for classification – Ships, offshore units, and high speed and light craft****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

| Type                                       | Rated voltage (V) | Temp. class (°C) |
|--------------------------------------------|-------------------|------------------|
| <b>S103 BFOU(i) &amp; S104 BFOU(c)</b>     | <b>250</b>        | <b>90</b>        |
| <b>S103 BFOU(i) M &amp; S104 BFOU(c) M</b> | <b>250</b>        | <b>90</b>        |
| <b>BFOU(c&amp;i), BFOU(c&amp;i) M</b>      | <b>250</b>        | <b>90</b>        |

Issued at **Hamburg** on **2019-06-26**This Certificate is valid until **2024-06-25**.for **DNV GL**DNV GL local station: **Yantai Station**Approval Engineer: **Carsten Hunsalz**

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**Arne Schaarmann**  
**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.



## Product description

Type: NEK 606 S-types 0,75mm<sup>2</sup> , 1,5mm<sup>2</sup> and 2,5mm<sup>2</sup>:  
S103 BFOU(i) & S104 BFOU(c) & S103 BFOU(i) M & S104 BFOU(c) M  
BFOU types: 0,5mm<sup>2</sup> and 1mm<sup>2</sup>.

Construction:

Conductors: Tinned, stranded copper class 2  
Core insulation: Mica tape + EPR  
Screen: Copper/polyester tape with tinned copper drain wire  
Inner covering: Halogen free compound  
Metal covering: Tinned copper wire braid  
Sheath: SHF 2 or SHF Mud

| Pairs: Number of<br>cores x conductor<br>cross-section | Outer diameter |      |       | NEK<br>TS 606<br>S-type |
|--------------------------------------------------------|----------------|------|-------|-------------------------|
|                                                        | Nominal        |      |       |                         |
|                                                        | (i)            | (c)  | (i&c) |                         |
| mm²                                                    | mm             | mm   | mm    |                         |
| 1×2×0.5                                                | 10,4           | 10,3 | 10,4  |                         |
| 2×2×0.5                                                | 16,4           | 16,2 | 16,4  |                         |
| 3×2×0.5                                                | 17,4           | 17,0 | 17,4  |                         |
| 4×2×0.5                                                | 18,8           | 18,5 | 18,8  |                         |
| 5×2×0.5                                                | 20,4           | 20,0 | 20,4  |                         |
| 7×2×0.5                                                | 22,0           | 21,7 | 22,0  |                         |
| 10×2×0.5                                               | 27,6           | 27,0 | 27,6  |                         |
| 12×2×0.5                                               | 28,4           | 28,0 | 28,4  |                         |
| 14×2×0.5                                               | 29,9           | 29,3 | 29,9  |                         |
| 19×2×0.5                                               | 33,2           | 32,5 | 33,2  |                         |
| 24×2×0.5                                               | 39,6           | 38,4 | 39,6  |                         |
| 27×2×0.5                                               | 40,6           | 39,2 | 40,6  |                         |
| 30×2×0.5                                               | 41,9           | 40,7 | 41,9  |                         |
| 37×2×0.5                                               | 45,2           | 44,3 | 45,2  |                         |
| 48×2×0.5                                               | 52,2           | 51,0 | 52,2  |                         |
| 1×2×0.75                                               | 10,9           | 10,7 | 10,9  | NEK 606                 |
| 2×2×0.75                                               | 17,4           | 17,0 | 17,4  | NEK 606                 |
| 3×2×0.75                                               | 18,5           | 17,9 | 18,5  | NEK 606                 |
| 4×2×0.75                                               | 20,0           | 19,5 | 20,0  | NEK 606                 |
| 5×2×0.75                                               | 21,8           | 21,1 | 21,8  | NEK 606                 |
| 7×2×0.75                                               | 23,5           | 22,9 | 23,5  | NEK 606                 |
| 10×2×0.75                                              | 29,6           | 28,8 | 29,6  | NEK 606                 |
| 12×2×0.75                                              | 30,7           | 29,7 | 30,7  | NEK 606                 |
| 14×2×0.75                                              | 32,1           | 31,1 | 32,1  | NEK 606                 |
| 19×2×0.75                                              | 36,3           | 34,5 | 36,3  | NEK 606                 |
| 24×2×0.75                                              | 42,8           | 40,8 | 42,8  | NEK 606                 |
| 27×2×0.75                                              | 43,7           | 41,8 | 43,7  | NEK 606                 |
| 30×2×0.75                                              | 45,3           | 43,7 | 45,3  | NEK 606                 |
| 37×2×0.75                                              | 49,3           | 47,1 | 49,3  | NEK 606                 |
| 48×2×0.75                                              | 56,3           | 54,2 | 56,3  | NEK 606                 |
| 1×2×1                                                  | 11,2           | 11,1 | 11,2  |                         |
| 2×2×1                                                  | 18,2           | 17,8 | 18,2  |                         |
| 3×2×1                                                  | 19,2           | 18,9 | 19,2  |                         |
| 4×2×1                                                  | 20,9           | 20,5 | 20,9  |                         |
| 5×2×1                                                  | 22,6           | 22,3 | 22,6  |                         |
| 7×2×1                                                  | 24,6           | 24,1 | 24,6  |                         |
| 10×2×1                                                 | 31,0           | 30,4 | 31,0  |                         |
| 12×2×1                                                 | 32,0           | 31,3 | 32,0  |                         |
| 14×2×1                                                 | 33,7           | 33,0 | 33,7  |                         |

| Pairs: Number of<br>cores x conductor<br>cross-section | Outer diameter |      |       | NEK<br>TS 606<br>S-type |
|--------------------------------------------------------|----------------|------|-------|-------------------------|
|                                                        | Nominal        |      |       |                         |
|                                                        | (i)            | (c)  | (i&c) |                         |
| mm²                                                    | mm             | mm   | mm    |                         |
| 19×2×1                                                 | 37,8           | 36,7 | 37,8  |                         |
| 24×2×1                                                 | 44,8           | 43,8 | 44,8  |                         |
| 27×2×1                                                 | 45,7           | 44,9 | 45,7  |                         |
| 30×2×1                                                 | 47,5           | 46,4 | 47,5  |                         |
| 37×2×1                                                 | 51,6           | 50,1 | 51,6  |                         |
| 48×2×1                                                 | 58,9           | 57,9 | 58,9  |                         |
| 1×2×1.5                                                | 12,4           | 12,2 | 12,4  | NEK 606                 |
| 2×2×1.5                                                | 20,2           | 19,8 | 20,2  | NEK 606                 |
| 3×2×1.5                                                | 21,5           | 20,9 | 21,5  | NEK 606                 |
| 4×2×1.5                                                | 23,5           | 22,9 | 23,5  | NEK 606                 |
| 5×2×1.5                                                | 25,5           | 25,0 | 25,5  | NEK 606                 |
| 7×2×1.5                                                | 27,8           | 27,0 | 27,8  | NEK 606                 |
| 10×2×1.5                                               | 35,8           | 34,2 | 35,8  | NEK 606                 |
| 12×2×1.5                                               | 36,9           | 35,5 | 36,9  | NEK 606                 |
| 14×2×1.5                                               | 39,3           | 37,2 | 39,3  | NEK 606                 |
| 19×2×1.5                                               | 43,6           | 42,4 | 43,6  | NEK 606                 |
| 24×2×1.5                                               | 51,6           | 49,6 | 51,6  | NEK 606                 |
| 27×2×1.5                                               | 52,7           | 50,8 | 52,7  | NEK 606                 |
| 30×2×1.5                                               | 54,7           | 53,0 | 54,7  | NEK 606                 |
| 37×2×1.5                                               | 59,0           | 57,4 | 59,0  | NEK 606                 |
| 48×2×1.5                                               | 68,1           | 66,0 | 68,1  | NEK 606                 |
| 1×2×2.5                                                | 13,3           | 13,2 | 13,3  | NEK 606                 |
| 2×2×2.5                                                | 22,2           | 21,8 | 22,2  | NEK 606                 |
| 3×2×2.5                                                | 23,5           | 23,2 | 23,5  | NEK 606                 |
| 4×2×2.5                                                | 25,7           | 25,5 | 25,7  | NEK 606                 |
| 5×2×2.5                                                | 28,1           | 27,7 | 28,1  | NEK 606                 |
| 7×2×2.5                                                | 30,7           | 30,2 | 30,7  | NEK 606                 |
| 10×2×2.5                                               | 40,0           | 39,0 | 40,0  | NEK 606                 |
| 12×2×2.5                                               | 41,3           | 40,2 | 41,3  | NEK 606                 |
| 14×2×2.5                                               | 43,4           | 42,8 | 43,4  | NEK 606                 |
| 19×2×2.5                                               | 48,5           | 47,6 | 48,5  | NEK 606                 |
| 24×2×2.5                                               | 57,4           | 56,4 | 57,4  | NEK 606                 |
| 27×2×2.5                                               | 58,6           | 57,6 | 58,6  | NEK 606                 |
| 30×2×2.5                                               | 60,8           | 59,8 | 60,8  | NEK 606                 |
| 37×2×2.5                                               | 66,3           | 64,6 | 66,3  | NEK 606                 |
| 48×2×2.5                                               | 76,0           | 74,6 | 76,0  | NEK 606                 |
|                                                        |                |      |       |                         |
|                                                        |                |      |       |                         |
|                                                        |                |      |       |                         |

|                 |                |     |
|-----------------|----------------|-----|
| Triples: Number | Outer diameter | NEK |
|-----------------|----------------|-----|

|                    |                |     |
|--------------------|----------------|-----|
| Triples: Number of | Outer diameter | NEK |
|--------------------|----------------|-----|

| of cores x<br>conductor cross-<br>section | Nominal |      |       | TS 606<br>S-type |
|-------------------------------------------|---------|------|-------|------------------|
|                                           | (i)     | (c)  | (i&c) |                  |
| mm <sup>2</sup>                           | mm      | mm   | mm    |                  |
| 1 x3 x 0,5                                | 10,8    | 10,7 | 10,8  |                  |
| 2 x3 x 0,5                                | 17,4    | 17,0 | 17,4  |                  |
| 3 x3 x 0,5                                | 18,3    | 18,1 | 18,3  |                  |
| 4 x3 x 0,5                                | 20,0    | 19,5 | 20,0  |                  |
| 5 x3 x 0,5                                | 21,5    | 21,3 | 21,5  |                  |
| 7 x3 x 0,5                                | 23,4    | 22,9 | 23,4  |                  |
| 10 x3 x 0,5                               | 29,4    | 28,8 | 29,4  |                  |
| 12 x3 x 0,5                               | 30,5    | 29,9 | 30,5  |                  |
| 14 x3 x 0,5                               | 31,9    | 31,3 | 31,9  |                  |
| 19 x3 x 0,5                               | 36,0    | 34,7 | 36,0  |                  |
| 24 x3 x 0,5                               | 42,4    | 41,6 | 42,4  |                  |
| 27 x3 x 0,5                               | 43,2    | 42,4 | 43,2  |                  |
| 30 x3 x 0,5                               | 45,3    | 43,9 | 45,3  |                  |
| 37 x3 x 0,5                               | 48,8    | 47,3 | 48,8  |                  |
| 48 x3 x 0,5                               | 55,8    | 54,6 | 55,8  |                  |
| 1 x3 x 0,75                               | 11,5    | 11,1 | 11,5  | NEK 606          |
| 2 x3 x 0,75                               | 18,4    | 18,0 | 18,4  | NEK 606          |
| 3 x3 x 0,75                               | 19,4    | 18,9 | 19,4  | NEK 606          |
| 4 x3 x 0,75                               | 21,2    | 20,5 | 21,2  | NEK 606          |
| 5 x3 x 0,75                               | 23,1    | 22,3 | 23,1  | NEK 606          |
| 7 x3 x 0,75                               | 24,9    | 24,3 | 24,9  | NEK 606          |
| 10 x3 x 0,75                              | 31,6    | 30,6 | 31,6  | NEK 606          |
| 12 x3 x 0,75                              | 32,6    | 31,5 | 32,6  | NEK 606          |
| 14 x3 x 0,75                              | 34,7    | 33,0 | 34,7  | NEK 606          |
| 19 x3 x 0,75                              | 38,9    | 37,3 | 38,9  | NEK 606          |
| 24 x3 x 0,75                              | 45,4    | 44,0 | 45,4  | NEK 606          |
| 27 x3 x 0,75                              | 46,5    | 44,9 | 46,5  | NEK 606          |
| 30 x3 x 0,75                              | 48,5    | 46,6 | 48,5  | NEK 606          |
| 37 x3 x 0,75                              | 52,5    | 50,7 | 52,5  | NEK 606          |
| 48 x3 x 0,75                              | 60,5    | 57,9 | 60,5  | NEK 606          |
| 1 x3 x 1                                  | 11,9    | 11,5 | 11,9  |                  |
| 2 x3 x 1                                  | 19,2    | 18,8 | 19,2  |                  |
| 3 x3 x 1                                  | 20,4    | 19,8 | 20,4  |                  |
| 4 x3 x 1                                  | 22,1    | 21,6 | 22,1  |                  |
| 5 x3 x 1                                  | 24,2    | 23,4 | 24,2  |                  |
| 7 x3 x 1                                  | 26,3    | 25,5 | 26,3  |                  |
| 10 x3 x 1                                 | 33,2    | 32,2 | 33,2  |                  |
| 12 x3 x 1                                 | 34,8    | 33,4 | 34,8  |                  |
| 14 x3 x 1                                 | 36,5    | 35,0 | 36,5  |                  |

| cores x conductor<br>cross-section | Nominal |      |       | TS 606<br>S-type |
|------------------------------------|---------|------|-------|------------------|
|                                    | (i)     | (c)  | (i&c) |                  |
| mm <sup>2</sup>                    | mm      | mm   | mm    |                  |
| 19 x3 x 1                          | 41,1    | 39,9 | 41,1  |                  |
| 24 x3 x 1                          | 48,4    | 46,6 | 48,4  |                  |
| 27 x3 x 1                          | 49,6    | 47,5 | 49,6  |                  |
| 30 x3 x 1                          | 51,3    | 49,8 | 51,3  |                  |
| 37 x3 x 1                          | 55,5    | 53,7 | 55,5  |                  |
| 48 x3 x 1                          | 64,0    | 61,5 | 64,0  |                  |
| 1 x3 x 1,5                         | 12,9    | 12,8 | 12,9  | NEK 606          |
| 2 x3 x 1,5                         | 21,4    | 21,2 | 21,4  | NEK 606          |
| 3 x3 x 1,5                         | 22,8    | 22,4 | 22,8  | NEK 606          |
| 4 x3 x 1,5                         | 24,8    | 24,5 | 24,8  | NEK 606          |
| 5 x3 x 1,5                         | 27,1    | 26,6 | 27,1  | NEK 606          |
| 7 x3 x 1,5                         | 29,5    | 29,0 | 29,5  | NEK 606          |
| 10 x3 x 1,5                        | 38,4    | 37,4 | 38,4  | NEK 606          |
| 12 x3 x 1,5                        | 39,8    | 39,0 | 39,8  | NEK 606          |
| 14 x3 x 1,5                        | 41,7    | 41,0 | 41,7  | NEK 606          |
| 19 x3 x 1,5                        | 46,9    | 45,8 | 46,9  | NEK 606          |
| 24 x3 x 1,5                        | 55,0    | 54,0 | 55,0  | NEK 606          |
| 27 x3 x 1,5                        | 56,1    | 55,3 | 56,1  | NEK 606          |
| 30 x3 x 1,5                        | 58,7    | 57,2 | 58,7  | NEK 606          |
| 37 x3 x 1,5                        | 63,5    | 62,0 | 63,5  | NEK 606          |
| 48 x3 x 1,5                        | 72,7    | 71,5 | 72,7  | NEK 606          |
| 1 x3 x 2,5                         | 14,5    | 13,8 | 14,5  | NEK 606          |
| 2 x3 x 2,5                         | 23,6    | 23,2 | 23,6  | NEK 606          |
| 3 x3 x 2,5                         | 25,0    | 24,7 | 25,0  | NEK 606          |
| 4 x3 x 2,5                         | 27,4    | 26,9 | 27,4  | NEK 606          |
| 5 x3 x 2,5                         | 30,0    | 29,5 | 30,0  | NEK 606          |
| 7 x3 x 2,5                         | 32,7    | 32,2 | 32,7  | NEK 606          |
| 10 x3 x 2,5                        | 42,6    | 42,0 | 42,6  | NEK 606          |
| 12 x3 x 2,5                        | 44,2    | 43,5 | 44,2  | NEK 606          |
| 14 x3 x 2,5                        | 46,9    | 45,6 | 46,9  | NEK 606          |
| 19 x3 x 2,5                        | 52,3    | 51,4 | 52,3  | NEK 606          |
| 24 x3 x 2,5                        | 61,8    | 60,4 | 61,8  | NEK 606          |
| 27 x3 x 2,5                        | 63,3    | 61,9 | 63,3  | NEK 606          |
| 30 x3 x 2,5                        | 65,5    | 64,4 | 65,5  | NEK 606          |
| 37 x3 x 2,5                        | 70,9    | 69,8 | 70,9  | NEK 606          |
| 48 x3 x 2,5                        | 81,9    | 80,1 | 81,9  | NEK 606          |
|                                    |         |      |       |                  |
|                                    |         |      |       |                  |
|                                    |         |      |       |                  |

## Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 60331.

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

Instrumentation, communication and control.

Fire resistant. Flame retardant in bunch Cat. A. Halogen free. Low smoke.

Mud resistant.

## Type Approval documentation

### Tests carried out

| Standard      | Release | General description                                                                                                                                                              | Limitation                                                                  |
|---------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| IEC 60092-350 | 2014-08 | General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications                                                       |                                                                             |
| IEC 60092-376 | 2017-05 | Cables for control and instrumentation circuits 150/250 V (300 V)                                                                                                                |                                                                             |
| IEC 60092-360 | 2014-04 | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables. |                                                                             |
| IEC 60331-1/2 | 2018-03 | Fire resistance / Circuit integrity – Test for method for fire with shock at temperature of at least 830°C for cables rated up to and including 0,6/1 kV                         |                                                                             |
| EC 60332-3-22 | 2018-07 | 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          | Charred portion of sample does not exceed 2,5m above bottom edge of burner. |
| IEC 60754-1   | 2011-11 | Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content                                                         | Low Halogen:<br><0,5% Halogen                                               |
| IEC 60754-2   | 2011-11 | Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity                                         | Halogen free:<br>pH > 4,3<br>Conductivity<br>< 10µS/mm                      |
| IEC 60684-2   | 2011-08 | Flexible insulating sleeving – Part 2: Methods of test.                                                                                                                          | Fluorine content<br>< 0,1%                                                  |
| IEC 61034-1/2 | 2013-06 | Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements                                                             | Low smoke<br>Light<br>transmittance >60%                                    |
| NEK TS 606    | 2016    | Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.                                                                                   | S-types only                                                                |

Job Id: **262.1-015175-9**  
Certificate No: **TAE00003DH**

## Marking of product

Shandong Zhongchuan Cable Co., Ltd. – S103 BFOU(i) or S104 BFOU(c) or S103 BFOU(i) M or S104 BFOU(c) M – Size –150/250V – IEC 60331-1/2 – IEC 60332-3-22 Cat.A – Year or  
Shandong Zhongchuan Cable Co., Ltd. – BFOU(i) or BFOU(c&i) or BFOU(c) or BFOU(i) M or BFOU(c&i) M or BFOU(c) M – Size –150/250V – IEC 60331-1/2 – IEC 60332-3-22 Cat.A – 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