



# NSW <sup>®</sup> Winding Wires

for Submersible Motors



# NSW WINDING WIRES

Norddeutsche Seekabelwerke GmbH (NSW) is a leading manufacturer of communications, submarine, overhead, power and offshore cables as well as engineering plastics and environmental products. For more than 115 years, NSW has been committed to the expansion and improvement of communications.

On the basis of this extensive experience, NSW began developing and producing plastic insulated Winding Wires for Submersible Motors “Made in Germany” in 1946. Submersible motors are made to operate under water or other fluids and are well known for their advantages in many industries.

The Winding Wires used in these motors accordingly require high quality insulation which is impervious to liquids. Over the course of many years the materials chosen for NSW’s winding wires insulation have proved their worth and reliability to meet the requirement of this application.

Regardless of whether standard or customer-specific requirements, we advise and support our customers worldwide and ensure the quality of our products according to the common industry standards ISO 9001, ISO 14001 and OHSAS 18001 based on regular audits.



ISO  
9001



ISO  
14001

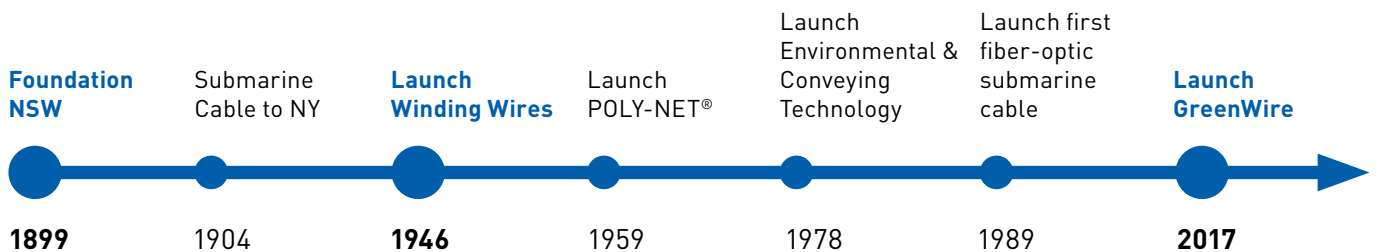


OHSAS  
18001



Made in  
Germany

## History



# PRODUCT OVERVIEW

The **GreenWire** product range consists of an environment-friendly polyethylene. The insulation material of **GreenWire** is free of lead and chlorine and provides the perfect solution for all customer requirements.

**GreenWire PE** with its hard coated surface is the most suitable product for automatic winding processes and is deliverable from stock.

**GreenWire VPE** stands out for a high temperature resistance.

**GreenWire PE2** guarantees the highest application requirements of temperature resistance and electrical properties as well as availability in almost all dimensions. The high mechanical strength is ensured by a thin outer layer of polyamide (PA).



## Conductor Design

### Solid Conductor

- Diameter 0.8 to 4.6 mm
- Cross section 0.5 to 16.60 mm<sup>2</sup>

### Stranded Conductor

- Diameter 4.5 to 17.1 mm
- Cross section 12.10 to 150.00 mm<sup>2</sup>

## Insulation

- Environment-friendly polyethylene
- Free of lead and chlorine\*
- Excellent electrical properties
- Wall thickness depends on operating voltage 0.3 to 3.5 mm

## PA-Sheathing for PE2 and for VPE Insulated Wires

- Additional sheath made of polyamide for surface protection
- Thickness 0.1 to 0.3 mm

## Semiconducting Layer (HL)

- Between copper conductor and PE2 insulation
- For high voltage applications
- Thickness 0.1 to 0.3 mm

\* < 0.1 % by weight

## Product Range / Characteristic

Type	Application temperature	Specific insulation resistance	Color	Method of cross linking
<b>GreenWire PE</b>	70°C	10 <sup>16</sup>	white	none
<b>GreenWire VPE, VPE/PA</b>	80°C	10 <sup>16</sup>	nature	chemical
<b>GreenWire PE2/PA*</b>	90°C	10 <sup>18</sup>	nature	physical

\* HL/PE2/PA for high voltage applications



# PRODUCT QUALITY AND TESTING

## Measuring and Testing

NSW works in accordance with national and international test standards. In order to assure the quality, NSW conducts intensive, long term investigations on the products and materials. The continuous checking, monitoring and evaluation of the tests are just as much a part of the investigations as the subsequent documentation of the results by a well-experienced staff. In this way, customers benefit from ensured and trouble-free operations as well as from a long motor life.

## Final Testing

Dimension and mechanical routine tests at room temperature include

- diameter,
- wall thickness,
- concentricity,
- surface characteristics.

High voltage routine testing is performed in mains water bath, alternating voltage (50 Hz), ambient water temperature for 24 hours. This testing is in compliance with the NSW Quality Plan. Customized specification can be applied. A Test Certificate 3.1 is available on demand (DIN EN 10204).

## Type Tests

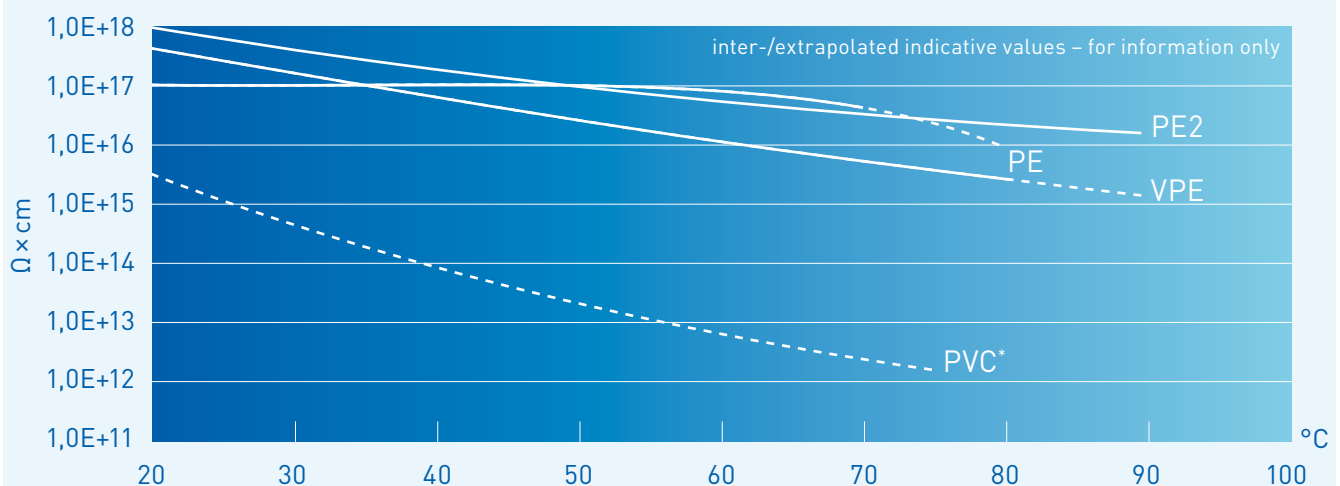
At regular intervals, samples of wires are taken from the current production batch and subjected to type testing.

This includes a testing and validation of

- specific insulation resistance,
- instantaneous breakdown voltage,
- instantaneous breakdown field strength.

## Electrical properties of NSW® Winding Wires

Specific insulation resistance  $\rho$ ;  $\Omega \times \text{cm}$



\*PVC to be substituted by GreenWire

# APPLICATIONS

## Standard Applications

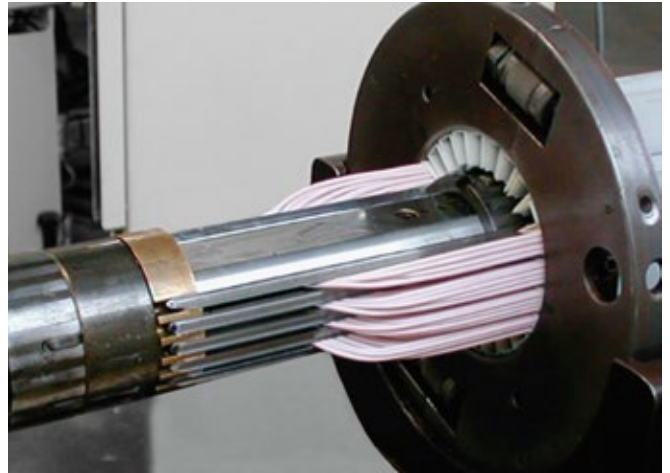
- Agricultural irrigation systems
- Water supply
- Booster stations

## Special Applications

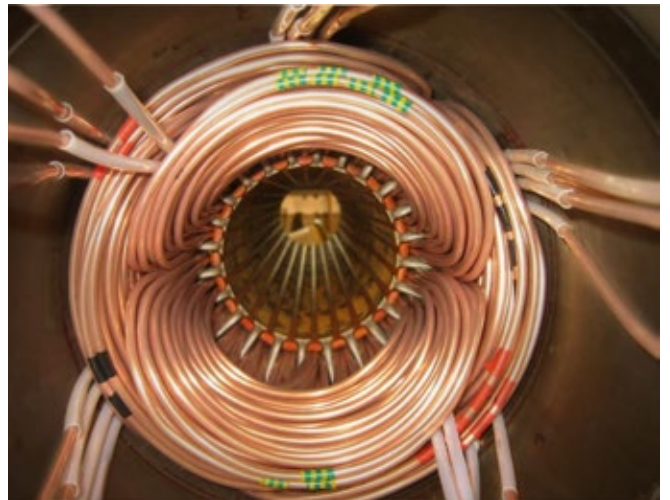
- Firefighting systems for oil and gas platforms
- Dewatering of mines
- High voltage applications
- Deep sea applications
- Circulation pumps in power plants

## We go beyond standard solutions

With more than 115 years' experience we understand customer requirements and meet almost all expectations in customized lengths, dimensions, high quality materials and other special applications.



Automatic winding process for standard motors with PE-insulated winding wires



Motors for special applications with PE2/PA insulated winding wires



## ENERGY

**Markets:** Transmission, Distribution, Generation  
**Products:** Underground Cable, Substation Cable, Overhead Conductor & Cable



## RENEWABLE ENERGY

**Markets:** Solar, Hydro, Wind  
**Products:** Panel Wire, Cu & AL PV Wire, Tower Wire & Cable, Collection System Cable, Industrial Cable, Utility Cable



## CONSTRUCTION

**Markets:** Residential, Commercial, Institutional  
**Products:** Building Wire, Portable Cord, Industrial Cable



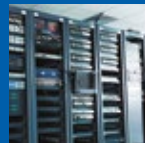
## INDUSTRIAL

**Markets:** Food & Beverage, Automation, Water/Wastewater, Pulp & Paper  
**Products:** Control Cable, Instrumentation Cable, Power Cable, Automation Cable, Portable & Temporary Power Cord, Solar Cable



## TELCO

**Markets:** Independent Telephone Operating Companies (ITOCs), Regional Bell Operating Companies (RBOCs)  
**Products:** Air Core Cable, Filled Core Cable, Wire Products, Central Office Cable, Optical Cable, Indoor/Outdoor Telephone Cable, Drop wire Cable



## ENTERPRISE & COMMUNICATIONS

**Markets:** Commercial/Residential Buildings, Data Centers, Education, Finance, Federal/Government, Healthcare, AV, Manufacturing  
**Products:** Datacom Cable, Fiber Optic Cable, Electronics Cable, Telecommunications Cable



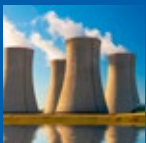
## OIL, GAS & PETROCHEMICAL

**Markets:** Upstream, Downstream, Midstream  
**Products:** Offshore Cable, Subsea Cable, Onshore Cable



## MARINE

**Markets:** Shipyards building, Ships & Other floating vessels  
**Products:** Power, Control Instrumentation & Communication Cables



## NUCLEAR

**Markets:** Nuclear Power Plants  
**Products:** Power, Instrumentation, Control



## MINING

**Markets:** Surface, Underground  
**Products:** Portable & Trailing Mining Cable, Mine Power Feeder Cable, Industrial Cable



## TRANSPORTATION

**Markets:** Automotive, Agricultural Equipment, Rail & Transit, Heavy Duty & Industrial Trucks, Bus  
**Products:** Rolling Stock Cable, Signalling Cable, On-Vehicle Data Communications, Control & Power Wire and Cable, Battery Cable, Primary Wire, Electric Vehicle (EV) Products, Wire Harnesses and Assemblies



## MILITARY

**Markets:** On Land, At Sea, In the Air  
**Products:** Communications Wire & Cable (Cu & Fiber), Shore to Ship Power Cable, Wire Harnesses & Assemblies

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