Semiconductive Water-Blocking

Water blocking with partial-discharge control for high-voltage cables

Descripción

Semiconductive water-blocking tapes (WBSC2S) combine longitudinal water-blocking capability with controlled electrical conduction. The semiconductive non-woven polyester backing, impregnated with superabsorbent polyacrylate powder and corrosion inhibitor, provides surface resistivity ≤1500 Ω and volume resistivity $<10^6$ Ω·cm, enabling the electric field between layers to be smoothed and the risk of partial discharges in high-voltage cables to be reduced.

In HV power cables, the interfaces between layers at different electrical potentials can generate field concentrations that trigger partial discharges, progressively degrading the insulation. The WBSC2S tape, applied between insulation and shield or under armouring, provides a controlled conduction path that homogenises the potential gradient, eliminating field-concentration points while maintaining water-blocking capability.

Thicknesses range from 0.25 to 0.50 mm with swelling rates reaching ≥18 mm in 3 minutes for heavier-grammage references. Short-term thermal stability of 230°C and continuous service of 90°C per IEC 216 ensure compatibility with extrusion and XLPE cross-linking processes.

Standard series (WBSC2S-30 to WBSC2S-50)

Propiedad	Método	WBSC2S-30	WBSC2S-35	WBSC2S-40	WBSC2S-50
Thickness (mm)	ISO 9073-2	0.30 ±0.03	0.35 ±0.03	0.40 ±0.03	0.50 ±0.03
Grammage (g/m²)	ISO 9073-2	110 ±10	120 ±10	130 ±10	160 ±10
Tensile strength (N/cm, min.)	ISO 9073-3	≥30	≥35	≥40	≥50
Elongation (%, min.)	ISO 9073-3	≥12	≥12	≥12	≥12
Swell rate 1 min (mm)	GB 450	≥8	≥9	≥10	≥12
Swell rate 3 min (mm)	GB 450	≥12	≥13	≥14	≥16
Moisture content (%)	ISO 287	≤9	≤9	≤9	≤9

N series (WBSC2S-25 to WBSC2S-50N)

Propiedad	Método	WBSC2S-25	WBSC2S-35N	WBSC2S-40N	WBSC2S-50N
Thickness (mm)	ISO 9073-2	0.25 ±0.03	0.35 ±0.03	0.40 ±0.03	0.50 ±0.03
Grammage (g/m²)	ISO 9073-2	110 ±10	120 ±10	140 ±10	170 ±10
Tensile strength (N/cm, min.)	ISO 9073-3	≥25	≥35	≥40	≥50
Elongation (%, min.)	ISO 9073-3	≥12	≥12	≥12	≥12
Swell rate 1 min (mm)	GB 450	≥7	≥12	≥12	≥13
Swell rate 3 min (mm)	GB 450	≥10	≥15	≥16	≥18

Electrical properties

Propiedad	Método	Value
Surface resistance	GB 3048	≤1500 Ω
Volume resistivity	GB 3048	$<10^6$ Ω·cm

Thermal properties

Propiedad	Método	Value
Short-term thermal stability	Q/TR.J02.01-2000	230°C
Long-term thermal stability	IEC 216-1990	90°C

Construcción

Backing	Semiconductive non-woven polyester
Active agent	Superabsorbent polyacrylate powder
Additive	Corrosion inhibitor
Type	Double-sided semiconductive

Guía de selección

The right reference depends on the balance between blocking capacity, mechanical strength and available space in the cable construction. All references share the same electrical properties (surface resistivity ≤1500 Ω, volume $<10^6$ Ω·cm), so selection is driven by mechanical criteria and absorption capacity.

Standard series

Reference	Thickness	Grammage	Tensile strength	Swell 1 min	Swell 3 min	When to choose
WBSC2S-30	0.30 ±0.03 mm	110 ±10 g/m²	≥30 N/cm	≥8 mm	≥12 mm	MV cables, standard constructions
WBSC2S-35	0.35 ±0.03 mm	120 ±10 g/m²	≥35 N/cm	≥9 mm	≥13 mm	Capacity/space balance
WBSC2S-40	0.40 ±0.03 mm	130 ±10 g/m²	≥40 N/cm	≥10 mm	≥14 mm	HV cables, greater protection
WBSC2S-50	0.50 ±0.03 mm	160 ±10 g/m²	≥50 N/cm	≥12 mm	≥16 mm	Maximum capacity, EHV cables

N series (higher swelling capacity)

Reference	Thickness	Grammage	Tensile strength	Swell 1 min	Swell 3 min	When to choose
WBSC2S-25	0.25 ±0.03 mm	110 ±10 g/m²	≥25 N/cm	≥7 mm	≥10 mm	Tight spaces, rapid response
WBSC2S-35N	0.35 ±0.03 mm	120 ±10 g/m²	≥35 N/cm	≥12 mm	≥15 mm	High swelling speed
WBSC2S-40N	0.40 ±0.03 mm	140 ±10 g/m²	≥40 N/cm	≥12 mm	≥16 mm	Maximum response, critical cables
WBSC2S-50N	0.50 ±0.03 mm	170 ±10 g/m²	≥50 N/cm	≥13 mm	≥18 mm	Maximum protection and speed

Variantes disponibles

Series
– Standard series — balance between mechanical properties and swelling capacity
– N series — higher swelling speed for critical applications

Non-conductive alternative
– CDZD water-blocking tapes — when partial-discharge control is not required

Formatos de entrega

The supply format directly influences process continuity and taping efficiency. Material can be supplied in different formats and dimensions adapted to each machine type and production speed.

Pad / Roll (pancake)

Core ID:	76 mm (3″), 102 mm (4″), 152 mm (6″)
Max OD:	80 – 600 mm
Width range:	5 – 1000 mm
Core material:	Plastic or cardboard

Spool (TWS / STS reel)

Core ID:	76 mm (3″)
Max OD:	300 – 320 mm
Width range:	3.5 – 80 mm
Winding type:	Traverse Wounded (TWS) or Step to Step (STS)
Core material:	Plastic or cardboard

The values shown below come from tests run to international standards and characterise the material's behaviour both during processing and in service.

Los valores indicados son típicos y no constituyen especificaciones vinculantes.