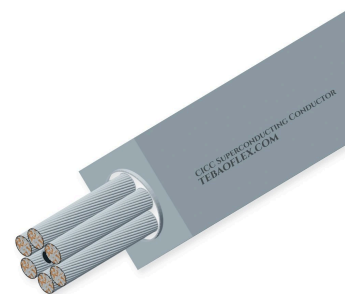




IEC 61788 / ITER 4.5 K CICC conductor

CICC Superconducting Conductor

Nb₃Sn & NbTi 4.5 K forced-flow supercritical helium Cable-in-Conduit Conductor (CICC)



IEC 61788 · 4.5 K Supercritical He

Nb₃Sn (13.5 T) & NbTi (6.4 T)

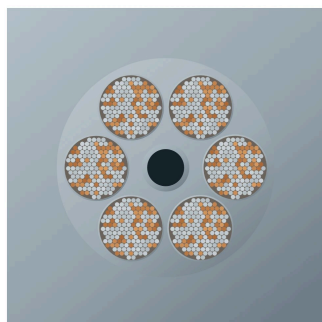
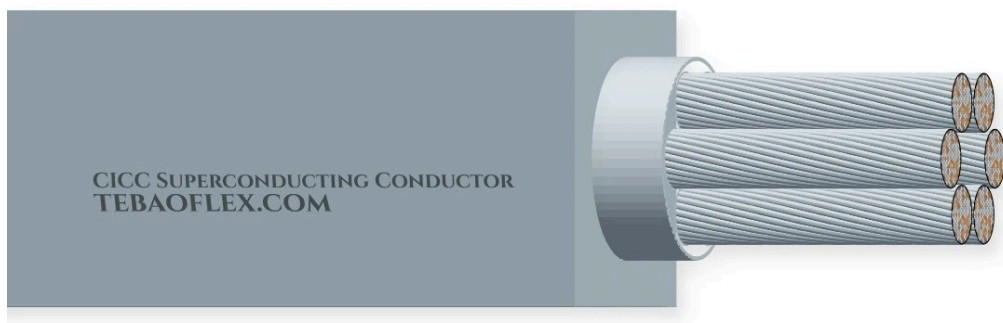
10–80 kA · AISI 316LN Conduit

Application

High-field Cable-in-Conduit Superconducting Magnet Conductor (CICC) built to IEC 61788 and fusion magnet standards with Cr-plated Nb₃Sn or Ni-plated NbTi/Cu strands cabled in 5 stages around a central helium cooling spiral and compacted inside a.

Typical uses: Tokamak & Stellarator Fusion Reactors (TF/CS/PF), High-Energy Physics Detector & Dipole Magnets, High-Field Hybrid Research Solenoids (15–45 T), Superconducting Magnetic Energy Storage (SMES)

Construction



Cross-section, not to scale

- 1 5-stage transposed Nb₃Sn or NbTi + OFHC Cu rope
- 2 Central supercritical helium cooling spiral
- 3 Sub-cable & bundle AISI 316L stainless wraps
- 4 Seamless compacted AISI 316LN (or Ti/Incoloy 908)

Technical data

Typical values

Operating current (I_{op} @ 4.5 K)	10 kA to 80 kA DC / pulsed (standard 45 kA CS & 68 kA TF)	Current-sharing temperature (T_{cs})	≥ 5.7 K (TF at 68 kA, 11.8 T) · ≥ 5.2 K (CS at 45 kA, 13.0 T)
Copper stabilizer RRR (R_{273K} / R_{20K})	≥ 100 (after +650 °C Nb ₃ Sn reaction heat treatment) · ≥ 150 (NbTi)	Non-Cu critical current density (J_c)	$\geq 850\text{--}1,100$ A/mm ² (Nb ₃ Sn @ 12 T, 4.2 K) · $\geq 2,700$ A/mm ² (NbTi @ 5 T)
Cryogenic coolant & inlet conditions	Supercritical Helium (SHe) at 4.2–4.5 K, 0.5–0.6 MPa, 3–10 g/s mass flow	Nb ₃ Sn reaction heat-treatment cycle	+210 °C / +340 °C / +450 °C plateaus + +650 °C (200 h) under high-purity
Bundle void fraction	29 % to 34 % in strand annulus (plus open central spiral)	Conduit cryogenic yield & Charpy	$\sigma_{0.2} \geq 1,000$ MPa & $K_{IC} \geq 150$ MPa·√m at 4.2 K (AISI 316LN)
Maximum quench pressure rating	≥ 25 MPa (250 bar) hydraulic proof test; 100 % helium leak $\leq 10^{-10}$ Pa·m ³ /s	Nuclear activation control	Cobalt content Co ≤ 0.05 wt% and Niobium/Tantalum controlled in 316LN
Standards	IEC 61788-1 (NbTi), IEC 61788-2 (Nb ₃ Sn), IEC 61788-11 (RRR) & ITER Criteria		

Sizes

7 standard constructions

Tick the sizes you need and send this page to info@tebaoflex.com or WhatsApp +86 185 9591 3361.

Order designation	Strand architecture	Jacket profile	Outer dim. mm	I_{op} @ 4.5K kA	Peak B T	Cryogen
Nb ₃ Sn High-Field Wind-and-React CICC Conductors (11.8 T to 13.5 T @ 4.5 K) 3 sizes						
☐ CICC-Nb3Sn-TF-68kA	900 Nb3Sn + 522 Cu strands	43.7 mm Ø Round	43.7	68.0	11.8	4.5 K SHe
☐ CICC-Nb3Sn-CS-45kA	576 Nb3Sn + 288 Cu strands	49.0×49.0 mm Sq.	49.0	45.0	13.0	4.5 K SHe
☐ CICC-Nb3Sn-HF-80kA	1080 Nb3Sn + 540 Cu strands	52.0×52.0 mm Sq.	52.0	80.0	13.5	4.5 K SHe
NbTi Ductile Pulsed & Busbar CICC Conductors (4.0 T to 6.4 T @ 4.5 K) 4 sizes						
☐ CICC-NbTi-PF1-48kA	1440 NbTi/Cu strands	53.8×53.8 mm Sq.	53.8	48.0	6.4	4.5 K SHe
☐ CICC-NbTi-PF2-55kA	1152 NbTi/Cu strands	51.9×51.9 mm Sq.	51.9	55.0	5.0	4.5 K SHe
☐ CICC-NbTi-CC-10kA	240 NbTi/Cu strands	19.2×19.2 mm Sq.	19.2	10.0	4.0	4.5 K SHe
☐ CICC-NbTi-Bus-68kA	1440 NbTi + Cu sub-cables	48.0 mm Ø Round	48.0	68.0	4.5	4.5 K SHe

– Custom petal counts, Cu:non-Cu ratios and square/rectangular jacket profiles are engineered per magnet winding pack.

Standards and approvals

- ✓ IEC 61788-1 / -2 / -11 Superconductor Qualified
- ✓ SULTAN 11 T / 4.5 K Full-Size Sample Validated
- ✓ EN 10204 3.1 / 3.2 Cryogenic Metallurgy Cert.

Certifications



Management systems: ISO 9001, ISO 14001, ISO 45001

Request a quotation

Send the size, length and destination. An application engineer replies within 2 business hours.

WhatsApp / phone

+86 185 9591 3361

Email

info@tebaoflex.com

Web

tebaoflex.com/cables/cable-in-conduit-superconducting-magnet-conductor-cicc



Typical values for this cable type, based on IEC 61788-1 / IEC 61788-2 / ITER Magnet Design Criteria. Values for your order are confirmed in the quotation. Subject to change without notice. Jiangsu Tebaoflex Special Cable Co., Ltd., Taicang, Jiangsu, China.