

CIGRE SC B1 – Insulated Cables

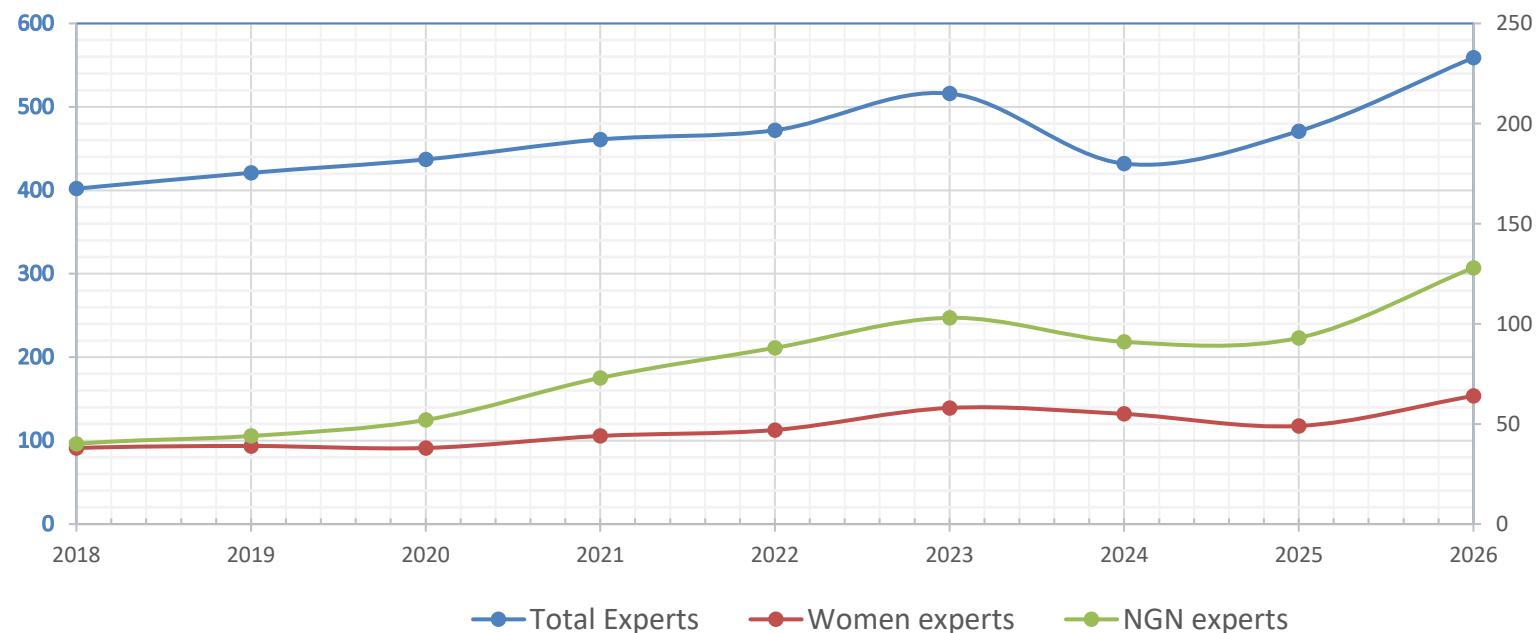
Paris Session August 2026 - Peter van der Wielen



Number of B1 experts : Total, Women/Men, NGN

	2026	2025	2024	2023	2022	2021	2020	2019	2018	2017
Total Experts	559	471	432	516	472	461	437	421	402	389
Women	64	49	55	58	47	44	38	39	38	34
Men	495	422	377	458	425	417	399	382	364	355
NGN	128	93	91	103	88	73	52	44	40	29

SC B1 experts : Total/Women/NGN - June 1st 2026



Evolution follows the creation and disbandment of Working Groups

2025 - 2026 :

Total number of experts : +19%

Women : +31%

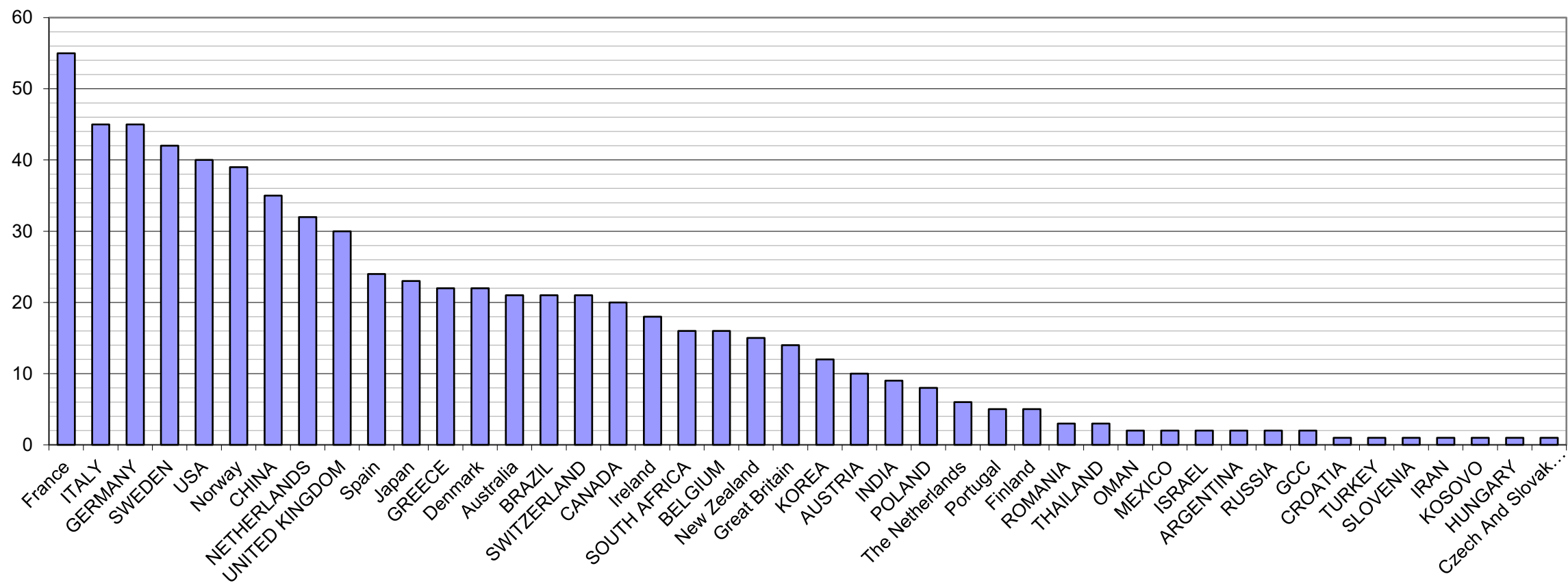
NGN : +38 %



SC B1 Statistics – 2026

Number of B1 positions per country (SC + WG + TF + AG)

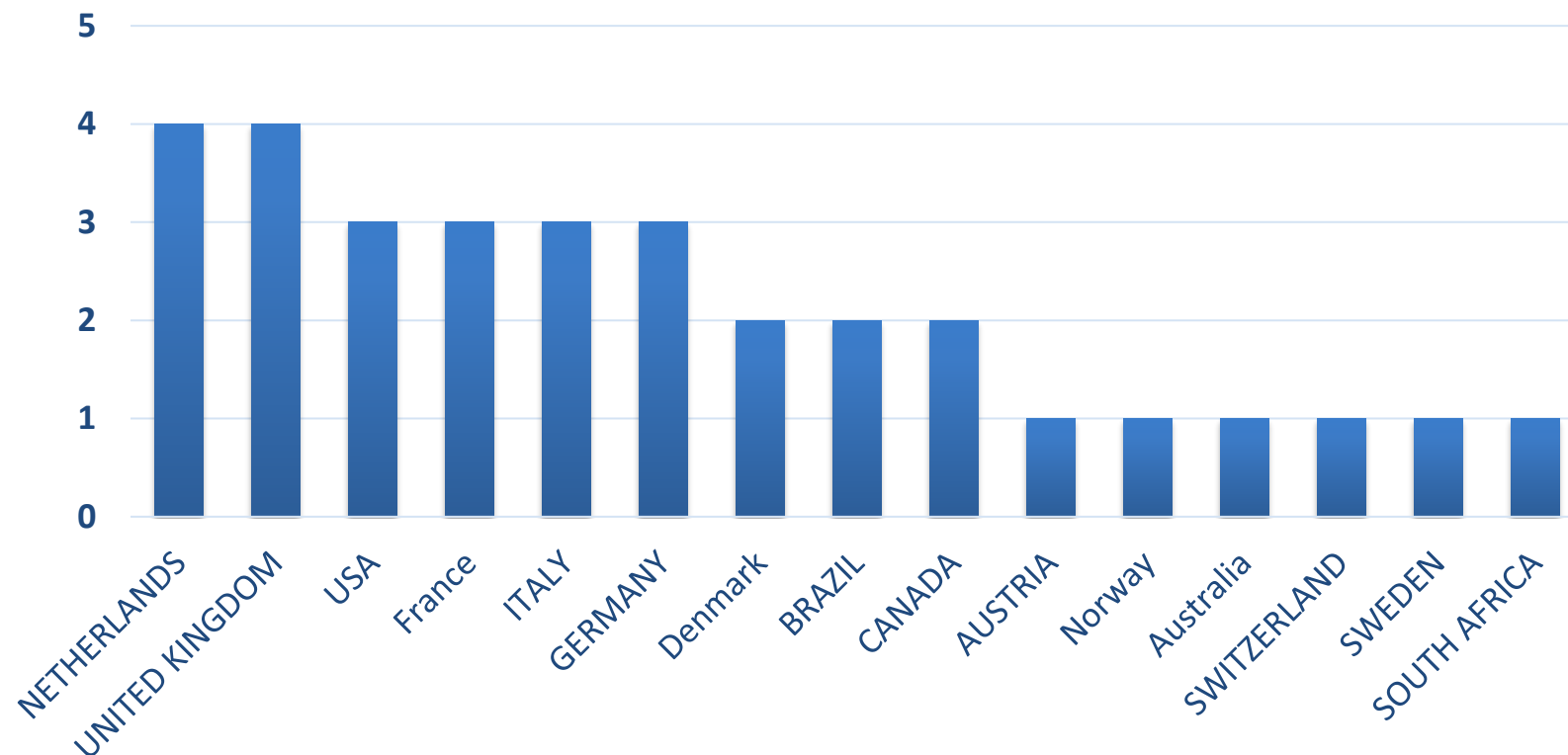
Number of positions per country



WG & AG Conveners per country

(WG + JWG + TF + JTF + AORC + 4 AG)

WG Convener per country



Reviewer status pr country

Row Labels	Count of personID
Argentina	2
Australia	4
Austria	4
Belgium	5
Brazil	3
Canada	3
China	5
Croatia	2
Denmark	3
Finland	4
France	5
Germany	4
Greece	1
India	1
Ireland	2
Italy	2
Japan	4
Netherlands	8
Norway	6
Portugal	1
South Africa	1
Spain	4
Sweden	3
Switzerland	3
United Arab Emirates	1
United Kingdom	5
United States	4
(blank)	
Grand Total	90

Active Working Groups / Task Forces

CAG	Customer Advisory Group	WG B1.90	Cable Systems Electrical Characteristics (Update to TB 531)
TAG	Tutorial Advisory Group	JWG B2/B1.90	Transition facilities between overhead and underground lines
RAG	Reliability Advisory Group	WG B1.91	Transient Thermal Modelling of Power Cables (update to IEC 60853)
WG B1.67	Loading Patterns on Windfarm Array and Export Cables	WG B1.92	Qualification of lead-free submarine cables with $72.5\text{kV} < U_m \leq 170\text{kV}$
JWG B1/C4.69	Recommendations for the insulation coordination on AC cable systems	WG B1.94	Impact of the energy transition, including increased switching and load changes, on the reliability of AC cable systems
WG B1.70	Recommendations for the use and the testing of optical fibres in submarine cable systems	WG B1.95	Mechanical performance and limits of submarine power cable systems
WG B1.72	Cable ratings verification (2nd part)	TF B1.97	Improvements of Range of Approval criteria for HV and EHV power cables & Extrusion line equality
JWG B4.C4.B1.73	Surge and extended overvoltage evaluation of HVDC cable systems for testing	TF B1.98	TF B1.98 - Test Recommendations for Earth Screen Power Cable Connections in Wind Farm Array Cabling
WG B1.76	Enhancing Quality Assurance/Quality Control Procedures for HV and EHV Cable Systems	WG B1.99	Evaluation of sustainable power cables system and their installation
WG B1.80	Guidelines for Site Acceptance Test of DTS and DAS systems	WG B1.100	Guide for robust qualification procedures of DMR cable
WG B1.82	MV DC cables topics	WG B1.101	Recommendations for testing of DC superconducting cable systems
WG B1.83	Grounding aspects for long HVDC land cable connections	WG B1.102	IEC : Specific tests and characteristics of Large Cross Section conductor of cables
JWG B1/C3.85	Environmental impact of decommissioning of underground and submarine cables	TF B1.103	Recommendations for Spare Parts management
WG B1.86	Assessment, Prevention and Mitigation of Safety Risk in Cable Systems	TF B1.104	Cable Lifetime Extension
WG B1.88	Non-SF6 GIS terminations	WG B1.105	Update of TB 756 DTS RTTR DAS
JTF B4.B1.88	Insulation coordination focusing on interaction between Voltage Source Converters (VSC) in HVDC stations and DC cable systems	JTF B1.B4.C4.106	Addendum to TB 852 / 853 on TOV testing
WG B1.89	Guidance for conducting cable systems failure analysis	JWG B4/B1.106	Guideline of VSC HVDC Converter and DC Cable Interface Management
		WG B1.107	Cable accessory failure hazard mitigation

New WG & TF 2026

WG or TF	Number (and direct link to KMS page)	Name of group (to be adjusted)	Convener
WG	B1.104	Cable Lifetime Extension	
TF	B1.108	Digital Twins of Power Cable Systems	
TF	B1.109	Condition Assessment and Online Diagnostic Techniques for High Voltage Cable Sheath Bonding and Grounding Systems	

Recent Technical Brochures (since last Paris session)

TB	Electra	Title	Publication date	WG/JWG#	Convener
994	347_8 2026	Enhancing QA/QC Procedures for HV and EHV Cable Systems	July 2026	B1.76	C. Freitag
991	347_8 2026	Assessment, Prevention and Mitigation of Safety Risk in Cable Systems	July 2026	B1.86	J. Lopes
988	347_8 2026	Surge and Extended Overvoltage Evaluation of HVDC Cable Systems for Testing	June 2026	B4/B1/C4.73	M. Saltzer
984	346_6 2026	Guidelines for SAT of DTS and DAS Systems when used for power cable systems monitoring	April 2026	B1.80	S. Cherukupalli
980	345_4 2026	Limitations in Operation of High Voltage Equipment Resulting of Frequent Temporary Overvoltages	March 2026	A3/A2/A1/B1.44	B. Rusek
974	343_12 2025	Strategies and Tools for Corrosion Prevention for Cable Systems	November 2025	D1/B1.75	J. Tusek
968	341_8 2025	Interaction between cable and accessory materials in HVAC and HVDC applications	July 2025	B1/D1.75	A. Gustafsson
963	340_06 2025	Finite Element Analysis for Cable Rating Calculations	May 2025	B1.87	J. Pilgrim
959	339_04 2025	Behaviour of Cable Systems under Large Disturbances	March 2025	B1.54	H.Orton
957	339_04 2025	Recommendations for dielectric testing of HVDC gas-insulated cable connection assemblies	February 2025	B1/B3/D1.79	A. Plet
945	337_12 2024	Recommendations for a Performance Guideline of Solid Insulated Busbar Systems	November 2024	B1/B3.74	J. Fan

Preferential subjects in 2026 Paris session

- PS1: Future cable systems and innovative cable applications.
- PS2: Recent experience with AC and DC cables, both land and submarine
- PS3: Environmental Impact and Cable Lifecycle

RAG paper: Paper 10426: Insulated cable statistics 2014–2023

Russell Wheatland • CIGRE SC B1 Reliability Advisory Group • Australia

Topic

- Second regular update from the SC B1 Reliability Advisory Group.
- Covers ten years of service experience from 2014 through 2023.
- Includes AC and DC land and submarine cables above 36 kV.
- Reports population, failures and unavailability for cables, joints, terminations and auxiliary components.

Technology and approach

- Combines the 2022–2023 survey with the relevant subset of the previous data capture.
- Calculates mean observed failure rates from component service years.
- Separates results by application, insulation technology, voltage class, component and failure source.
- Suppresses groups with fewer than three respondents to reduce single-owner influence and preserve confidentiality.

Results

- 2023 population: 121,806 circuit-km AC and 11,157 pole-km DC.
- AC land data are the most reliable because this category has the largest captured population.
- Various categories (e.g. DC land and submarine results) require caution because their reported populations are comparatively small.

Table 1 - Total survey population compared with other surveys

Year published	RAG (kV)	36 – 100	100 – 200	200 – 300	≥ 300	All voltages
	Other surveys (kV)	60 – 109	110 – 219	220 – 314	> 315	All voltages
	AC Land and Submarine survey, Length of circuit reported (circuit-km)					
2026	SC B1 RAG	84 612	24 778	9549	2867	121 806
2024	SC B1 RAG	26 420	21 393	7 724	2 032	57 570
2019	Cigre TB 815	15 307	11 443	3 226	904	30 880
2009	Cigre TB 379	18 764	11 370	4 992	1 488	36 614
1991	Electra 137 ²	2 895	718	1 591	241	5 445
DC Land and Submarine survey, Length of cable reported (cable-km)						
2026	SC B1 RAG	0	198	1 560	9 173	11 157 ³
2024	SC B1 RAG	0	0	1 176	6 240	7 416
2019	Cigre TB 815	0	289	1 745	3 578	5 612
2009	Cigre TB 379	408	1 137	855	1 725	125

Paper PS1-10320: 4000 mm² aluminium Milliken conductor for 150 kV systems

Roy Zijderduin • TenneT • The Netherlands

Topic

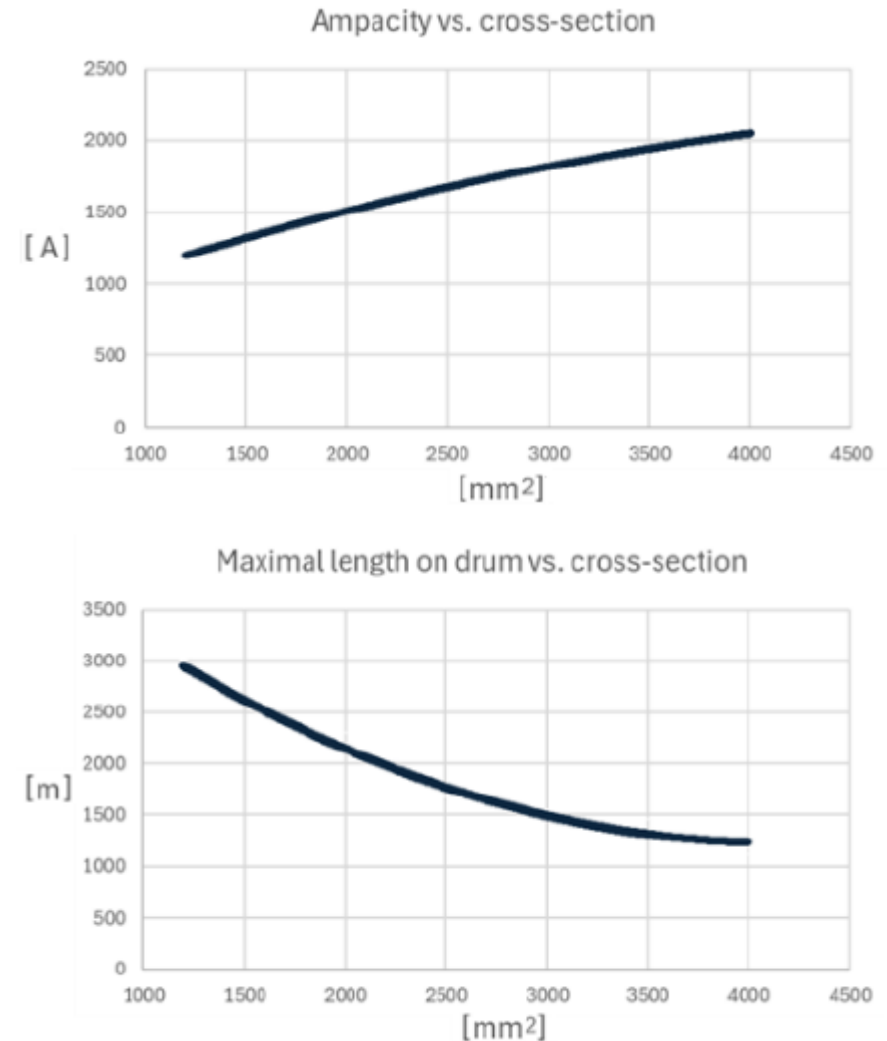
- A high-capacity 150 kV aluminium cable system intended to accelerate major Dutch underground-grid expansion.
- Development and evaluation of 4000 mm² aluminium Milliken conductor for 150 kV systems as cost effective and sustainable alternative to Cu.

Technology and approach

- Comparison with CuMil 2500 mm² copper.
- Cost of ownership, environmental and compliance with standard, various installation methods
- Conductor sizing and skin-effect mitigation
- R&D and type testing program

Results

- The paper reports 14% lower global warming impact and 50% lower costs for the assessed aluminium option.
- Validated and scalable solution
- (note: paper 11845: Alu conductors for wet-design HV cables)



Paper PS1-11412: Curvature sensing inside an operating dynamic cable

Vilhelm Rydén • NKT HV Cables AB • Sweden

Topic

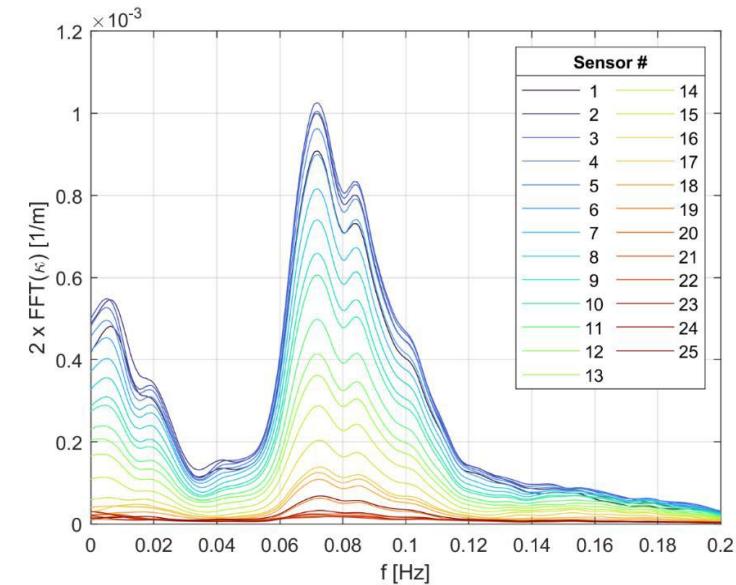
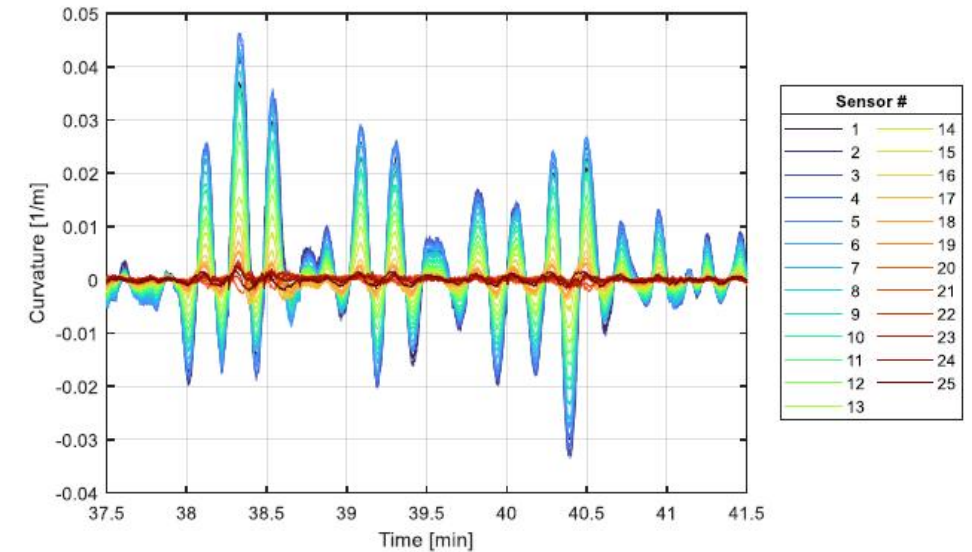
- First in-cable operational curvature measurements for fatigue assessment on a floating platform.
- Curvature sensing inside an operating dynamic cable.

Technology and approach

- Sensor rod with three optical fibres and 25 Fibre Bragg Gratings (FBGs) per fibre
- curvature reconstruction and comparison with weather data.
- Validation, modelling and/or field evidence are combined as described in the paper.

Results

- Curvature sensor successfully installed inside dynamic HV cable
- Operational curvature time series and scatter plots were obtained
- Statistical analysis provides input for cable fatigue-life assessment.



Paper PS1-11380: Passive optical-fibre PD monitoring for very long cables

Javier Ortego • Ampacimon • Spain

Topic

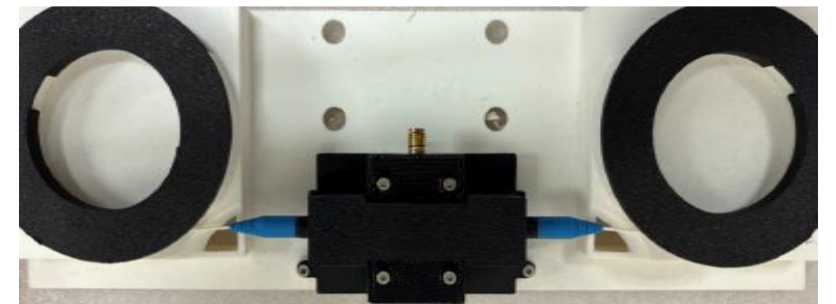
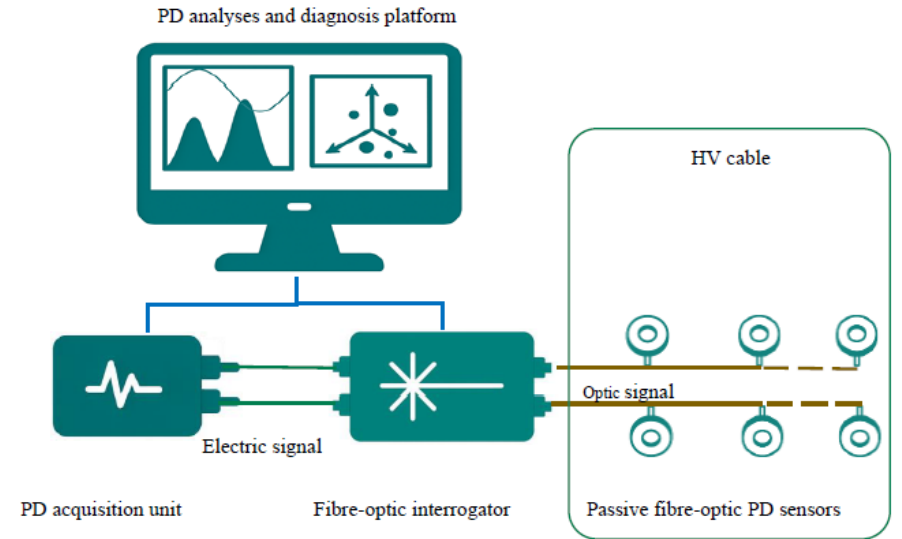
- Online partial-discharge monitoring for very long high-voltage cable systems.
- Addresses attenuation of PD pulses and the need for multiple sensing points along multi-kilometre routes.
- Removes active field electronics, local power supplies and conventional communications from joints and grounding boxes.

Technology and approach

- HFCT sensors capture fast transient screen currents caused by PD activity.
- A passive electro-optic modulator encodes the electrical PD waveform onto an optical carrier.
- Fibre transports the signal to a central interrogator and PD acquisition unit in the controlled substation environment.
- DWDM enables multiple sensor channels on one fibre; AI performs localisation, clustering and pattern classification.

Results

- The prototype converted electrical PD signals into optical modulation and reconstructed them at the interrogator.
- Laboratory work demonstrated detection of synthetic PD activity in a complete four-metre cable setup.
- The paper reports prototype capability for PD signals down to 10 pC and automatic localisation and AI interpretation.
- Two sensing positions can be placed up to 50 km from the interrogator in the described optical-power scenario.
- Further sensitivity characterisation and real HVAC/HVDC field demonstrations remain future work.



Paper PS1-11837: 3D surface inspection for HVDC accessory installations

Espen Doedens • Nexans Norway • Norway

Topic

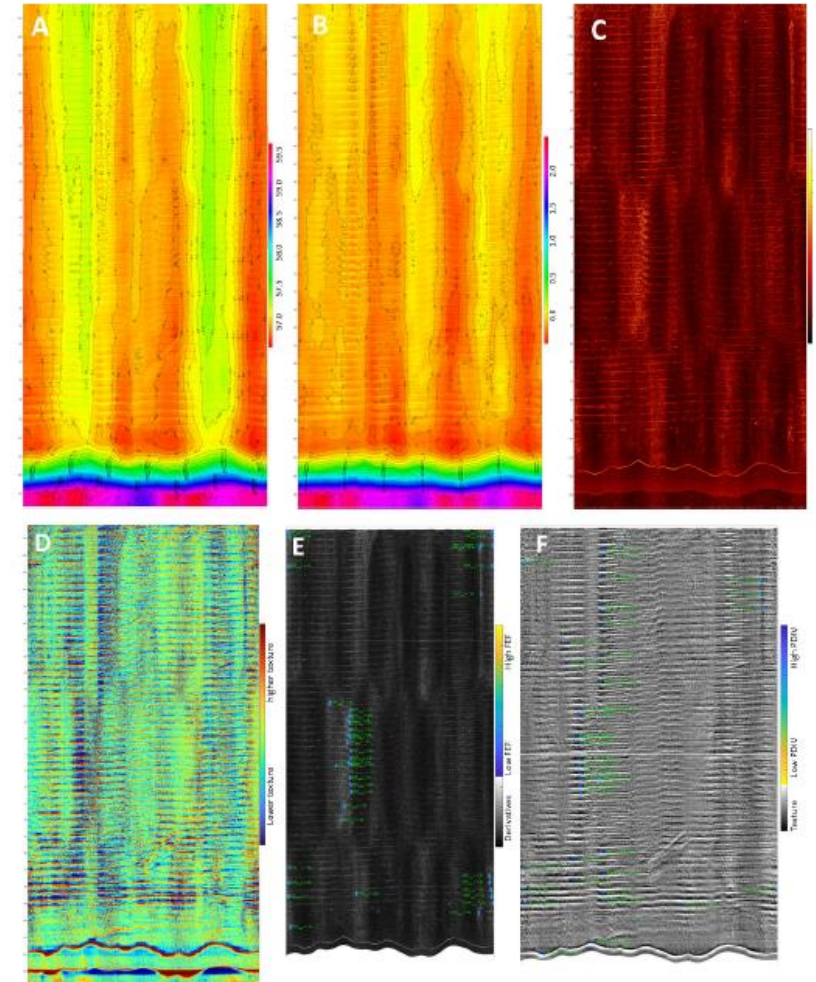
- Quality control of prepared HVDC cable ends before joints or terminations are finalized.
- Reports field experience from 320 kV and 525 kV HVDC cable-joint installations.
- Evaluates a structured dataset drawn from approximately 100 completed scan jobs.

Technology and approach

- A handheld metrology-grade 3D laser scanner creates an x-y-z point cloud of the prepared cable surface.
- The stated scanning resolution is 100 μm , with feature accuracy beyond 20 μm under the referenced setup.
- Algorithms convert and digitally straighten the cylindrical surface, then separate ovality, macro-geometry and local texture.
- FEM calculations estimate local field-enhancement factors and partial-discharge inception voltage in troublesome regions.
- Automated reports compare calculated quality indicators with predefined acceptance criteria and preserve traceable results.

Results

- The paper reports clear distinction between poorer and better surface quality in the evaluated acceptance metrics.
- Examples include cleaning contamination, removing local defects, rescanning corrected areas, or fully remaking rejected cable ends.
- The authors report effective field performance, while noting that a larger database is still needed because serious defects are uncommon.



Paper PS1-12231: Protection of MV cables against nearby lightning strikes

Simon Podkoritnik • Milan Vidmar Electric Power Research Institute • Slovenia

Topic

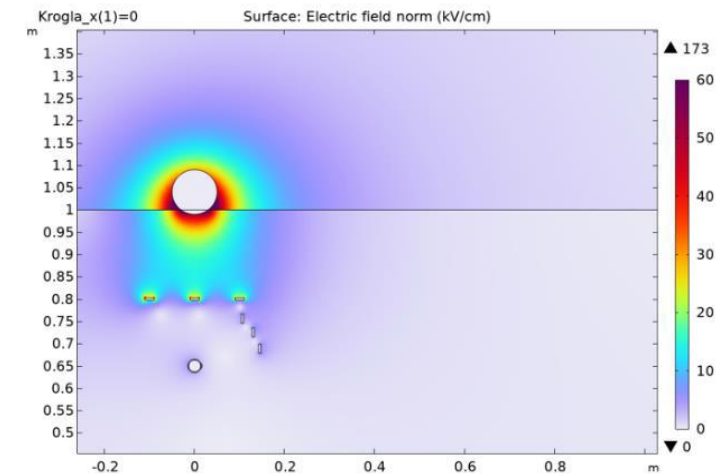
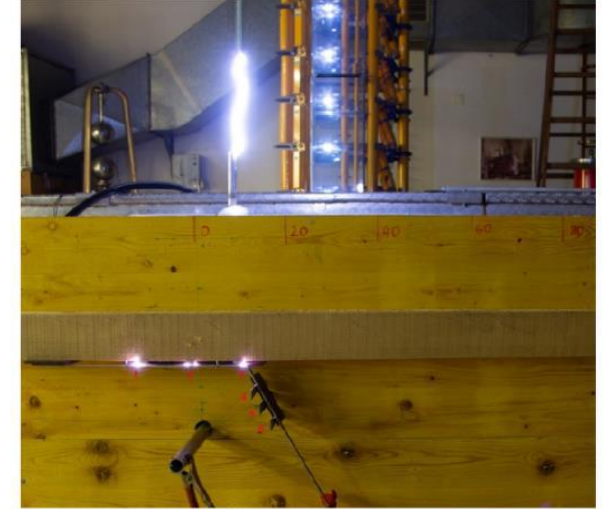
- Investigates transient overvoltages induced in underground MV cables by nearby lightning strikes to ground.
- Focuses on breakdown risk of the outer PE sheath.
- Addresses cable damage that may arise before commissioning as well as during service.
- Develops protective measures for cable routes in areas with elevated lightning activity.

Technology and approach

- A 2 m³ reduced-scale sand-box model represents cable burial, soil resistivity and earthing conditions.
- A 12/20(24) kV cable sample and aluminium tube are used to assess outer-sheath voltage.
- Standard 1.2/50 μ s impulses up to 480 kV are applied through a movable spherical electrode.
- Two-dimensional electrostatic and three-dimensional transient FEM models evaluate electric-field stress and shield-wire positioning.
- Laboratory measurements are compared with numerical results for cable and shield-wire configurations.

Results

- At 240 kV impulse, six shield wires reduced measured sheath peak voltage from 62 kV to 21 kV.
- At 480 kV impulse, the corresponding reduction was from 119 kV to 42 kV.
- Two parallel shield wires provided stronger shielding than a single wire in the reported simulations.
- The recommended arrangement places two shield tapes or wires at approximately half cable depth, forming a V-shape with the cable.
- The paper also warns that partially water-filled ducts can create severe local electric-field stress at air-water transitions.



Paper PS2-10319: Transient-overvoltage measurements on a Dutch 420 kV cable system

Kostas Velitsikakis • TenneT TSO, Asset Management • The Netherlands

Topic

- Failure of 380kV outdoor terminations
- Mechanical root cause was determined
- Later anomaly at sheath interruption and electrical activity discovered → transient overvoltages potential root cause?
- Transient-overvoltage measurements on a Dutch 420 kV cable system, to:
 - test the transient-overvoltage root-cause hypothesis
 - enhance EMT-model

Technology and approach

- Two field transient-measurement methods during switching:
 - 3 capacitive sensors (no galvanic coupling)
 - probes in x-bonding box
- Followed by analysis and EMT-model validation/enhancement.

Results

- Measurements successful
- Presence of overvoltage stresses on main insulation and sheath bonding insulation, but values much lower than SIWL
- Critical over-voltages across sheath interruption of X-bonding joint

(Note: paper 12398 is also about transients, might consider using this measurement method)



Paper PS2-10322: Unlocking thermal and ampacity headroom of MV cables

Yifan Zhang • DNV / Eindhoven University of Technology • The Netherlands

Topic

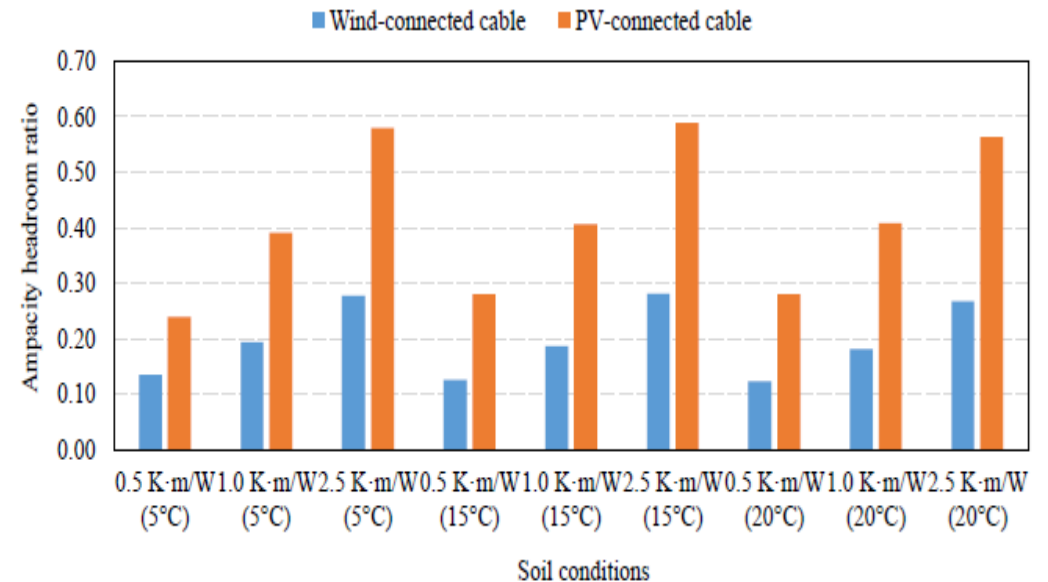
- Dynamic cable rating for Dutch MV networks, explicitly balancing capacity gain against thermal ageing.
- Technical focus: Unlocking thermal and ampacity headroom of MV cables.
- Towards a component-aware distribution planning framework
 - quantifies uprating potential and its associated risk to support planning decisions.

Technology and approach

- IEC 60853 transient thermal network
- load amplification to thermal limits → Ampacity headroom ratio (AHR)
- Arrhenius-Miner ageing
- application to Dutch wind/PV circuits.

Results

- All investigated cables retained substantial headroom at 90 °C
- PV circuits had more headroom (AHR 0.27-0.43) than wind (AHR 0.14-0.26)
- thermal ageing remained limited for 90 °C, but rose sharply at 105–130 °C
- a 45 °C sheath limit removed wind headroom.



(c) Ampacity headroom ratio (AHR)

Figure 5. The results under different soil conditions, considering the thermal limit of 90 °C.

Some other papers to possibly look at (short)

PS1:

- 10282: TDR temperature sensing on PILC cables (NL)
- 10679: XLPE retrofit for pip-type cable
- 10699: MVDC superconducting cable for offshore (2GW, 70km)
- 10701: combination of DAS and DSS for floating offshore wind
- 10823: 500kV DC submarine cable for 1500m depth (Japan)
- 11268: “zero-miss” phenomenon in submarine cable energization with shunts reactors, where zero crossings disappear
- 11824: Type testing of 525kV HVDC MI cable for installation at 3000m depth
- 11827: J-tubeless submarine cable installation - polymer-based CPS
- 11844: Hydrogen-cooled superconducting cables system (EU Scarlet), 500MW, 25kV (under development)
- 12501: 750kV XLPE cable system, design, manufacturing and testing
- 12618: Water tree initiation and propagation in 132kV wet-design dynamic cables

Some other papers to possibly look at (short)

PS2:

- 10315: Multi-disciplinary, data-driven end-of-warranty assessment of Borssele offshore export cable system - integrating thermal, electrical, and mechanical performance data.
- 10355: interaction between 320kV HVDC cable system and cathodically protected metallic pipelines
- 11060: Failure pattern differences in MV and LV cable networks (Milan)
- 11408: Water tree behaviour in XLPE with Super Absorbent Polymer(SAP) tapes

PS3:

- 12273: Controlling quality, costs and risks in high-volume production

JiCable 2027

- CIGRE SC on HV cables was launched in 1927, one of the first 3 SCs to be created.
- Jicable is a cable event held every four years
- ➔ 2027: Two main events on the same year,
- Jicable'27 will take place in Lyon (Congress Center) from 05 to 08/09/2027. Technical visit: 09/09/2027
- CIGRE B1 annual meeting will take place in Lyon (Congress Center) from 09 to 10/09/2027
- Call for abstracts current open – deadline for abstracts submission is October 31, 2026
- And more information on Jicable'27 website
<https://www.jicable27.jicable.org>

