# CHRISTIAN AHLHOLM

**SHORT RESUME**

Christian has almost 15 years' experience in the field of high voltage technology. He has been involved in earthing studies, inductive coordination studies, pollution severity assessments and dimensioning of insulation with respect to pollution. From numerous field inspections Christian has also inspected hundreds of composite insulators in service.

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**MAIN FIELDS OF COMPETENCE**

- Earthing design and fault current calculation
- Inductive coordination and risk assessments
- Step and touch voltages
- Pollution severity assessment
- Dimensioning of insulation with respect to pollution
- Corona and field effects
- Assessment of composite insulators
- Software development involving inductive coordination, step and touch voltages, earthing

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**WORK EXPERIENCE**

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| 2017 – | **Independent Insulation Group Sweden AB**<br>*Specialist.* |
| 2011 – 2017 | **STRI AB**, Ludvika, Sweden.<br>*Senior Engineer, High voltage technology*<br>Employed as engineer with focus on insulation. Involved in a range of projects including dimensioning of outdoor insulation, field and laboratory inspections and failure cause investigations of outdoor insulation especially composites. Software responsible of the STRI developed TPE software used for calculation of induction and earthing effects. |
| 2009 – 2011 | **ABB Components AB**, Ludvika, Sweden.<br>*Design engineer at the bushing department.* |

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## EDUCATION

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| 2004-2008 | **Master of Science in Physics**<br>University of Lund, Lund, Sweden. |
| 2006-2007 | **Exchange studies**<br>University of Waterloo, Canada. |
| 2001-2004 | **High school degree – Science with focus on energy and technology**<br>Forsmarks gymnasium owned by Forsmarks kraftgrupp AB which is a part of Vattenfall AB. |

## COURSES

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| 2020 | **Active Electrical Networks - ET2011, 7,5 hp, Dalarna University**<br>Construction of smart grids and how these should be optimized for efficient power transmission, including modelling in Powerfactory and short circuit calculations. |
| 2020 | **Electrical installations, Authorization B - ET1028, 15 hp, Dalarna University**<br>Low voltage installation rules and laboratory work. |
| 2020 | **EBR Earthing design**<br>Planning, design, construction of earth electrodes. |
| 2019 | **ESA - 19 - Fackkunning repetition**<br>Webb course |
| 2016 | **ESA - 14 - Tillträde**<br>Webb course |
| 2012 | **ESA 05 och skötselåtgärderna** |

## LANGUAGES

Swedish (native), English (professional level)

## LIST OF PROJECTS

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| 2022 | ***Pollution measurements in Austria***<br>Installation of pollution measurement stations and training of personnel for analyzing pollution samples. |
| 2022 | ***Calculation of induced voltages***<br>Calculation of induced voltages in insulated shield wires. |
| 2022 | ***Dimensioning of earthing equipment***<br>Calculation of induced current in earthing equipment during normal operation. Dimensioning of the earthing equipment from the results. |
| 2022 | ***Measurement of touch voltages without de-energization***<br>Feasibility study of an alternative method to the heavy current injection method to measure touch voltages |
| 2022 | ***Earthing study of wind farm (several projects)***<br>Fault current calculation and design of earthing system. |

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| 2021 | ***Risk assessment of induced voltages from 400 kV OHL near Barsebäck***<br>Calculation of induced voltages at worksites along the right of way and mitigation strategies for areas with high risk. |
| 2021 | ***Risk assessment of induced voltages in cable system from 400 kV OHL near Stor-Skälsjön***<br>Calculation of induced voltages at worksites along the right of way and mitigation strategies for areas with high risk. |
| 2021 | ***Evaluation of Wind turbine earthing system design***<br>Calculation of step and touch voltages and analysis of earthing system during lightning current. |
| 2021 | ***Earthing study of wind farm***<br>Fault current calculation and design of earthing system. |
| 2020 | ***Heating of shield wires for de-icing***<br>Feasibility study of using resistive losses for de-icing of shield wires |
| 2020 | ***Evaluation of site pollution severity in Norway***<br>Evaluation of pollution measurement and service experience in to determine the site pollution severity. |
| 2020 | ***Assessment of magnetic field exposure from 400 kV OHL***<br>Calculation of B-field exposure to along 400 kV OHL |
| 2020 | ***Risk assessment of induced voltages from 400 kV OHL near Storfinnforsen***<br>Calculation of induced voltages at worksites along the right of way and mitigation strategies for areas with high risk. |
| 2020 | ***Inspection of composite station post insulators***<br>Several composite station post insulators were inspected with IR and UV-camera. |
| 2020 | ***Risk assessment of exposure to electrical fields during work in 400 kV substation***<br>Calculation of electrical field at different worksites withing the substation and mitigation strategies for handling areas with high risk of exposure. |
| 2020 | ***Measurements of electric and magnetic field within a 130 kV substation***<br>Measurement of electric and magnetic field at several heights and location beneath substation busbar. |
| 2019 | ***Review of earthing study***<br>Review of report for evaluating of step and touch voltages after reconstruction of earthing system. |
| 2019 | ***Software development***<br>Update of VBA macro for reading overhead line database files to automatically create case files Tower/Pole earthing program which is used for calculation of induction and earthing impact on low voltage systems. |
| 2019 | ***Evaluation of site pollution severity in Germany***<br>Evaluation of pollution measurement and service experience in to determine the site pollution severity |
| 2019 | ***Dimensioning DC cable terminations, Germany***<br>Evaluation of pollution measurement and service experience in to determine required specific creepage distance for DC cable termination insulators. |
| 2019 | ***Development and verification of software for motion detection*** |

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| | Validation and creation of software for analyzing vibration from video recordings of overhead line conductors. |
| 2019 | ***Biological growth on composite insulators***<br>Inspection of composite insulators with biological growth and evaluation of performance of composite insulator with biological growth. |
| 2018 | ***Evaluation of site pollution severity at Haugesund, Norway***<br>Evaluation of pollution measurement and service experience in to determine the site pollution severity. |
| 2018 | ***Course instructor***<br>Course instructor on induction and earthing calculations with Tower/Pole earthing program which is used for calculation of induction and earthing impact on low voltage systems |
| 2018 | ***Software development***<br>Software development project the Tower/Pole earthing program which is used for calculation of induction and earthing impact on low voltage systems. |
| 2018 | ***Minimum clearance between HV-cables and low voltage systems***<br>Determination of required minimum clearance between HV-cables and low voltage systems due to induction and earthing. |
| 2011-2017 | ***Failure analysis of insulators (several projects)***<br>Testing, dissection and analysis of insulator design to find root cause of failure |
| 2014-2017 | ***Inductive coordination and earthing studies*** **(several projects)**<br>Mitigation of circulating currents in earthing systems. Induced voltage in pipelines and low voltage systems. |
| 2015 | ***Electromagnetic shielding***<br>Mitigation of excessive magnetic field at ground level above HV cable joint |
| 2014 | ***Laboratory test of a Long Line Cargo Hook for helicopter regarding sensitivity for electromagnetic fields***<br>Calculation of magnetic field from 400 kV line. |
| 2011-2016 | ***Site pollution severity assessment*** **(several projects)**<br>Measurements and analysis, creation of pollution maps |
| 2013-2015 | ***Feasibility study – AC to DC conversion of transmission lines*** **(several projects)**<br>Corona and field effects and dimensioning of insulation |
| 2011-2016 | ***Dimensioning and selection of insulation with respect to pollution*** **(several projects)**<br>Both for AC and DC |
| 2012 | ***Worldwide survey of client's composite insulators in polluted environments***<br>Visual inspections and collection of pollution data at several different substations around the world |
| 2011-2017 | ***Inspections of composite insulators*** **(several projects)**<br>Close-up inspections of composite insulators in substations |
| 2011 | ***Guidelines for Design of Controllable Compact Overhead Lines***<br>Setting up excel spread sheet for calculating electric and magnetic field from transmission lines |

**LIST OF PUBLICATIONS**

B. Adum, K.Å. Halsan, P. Sidenvall, **C. Ahlholm**, L. Carlshem, M. Jalonen, M Palsson
*Measuring aeolian vibrations by video analysis*
Second International Symposium on Dynamics and Aerodynamics of Cables - ISDAC 2021

Xidong Liang, Weining Bao, Yanfeng Gao, Shaohua Li, I. Gutman, **C. Ahlholm**, M. Radosavljevic, W. Vosloo
*A new type of failure of composite insulators: service experience, degradation characteristics, root cause, experimental simulation and countermeasures*
CIGRE-2020, D1-207

W. Chisholm, **C. Ahlholm**, I. Gutman
*Dust & Sea Salt Pollution Mapping: Satellite versus Ground Truth Results*
2019 World Congress, Tucson, USA, 20-23 October 2019

M. Radosavljevic, I. Gutman, **C. Ahlholm**, P. Sidenvall
*Ageing and deterioration of composite post insulators exposed to high electric field in 220 kV and 400 kV switchyards in Swedish network*
CIGRE SC B3 Colloquium in Racife, Brazil, 18-20 September, 2017

B. Thorsteinsson, K. Halsan, M. Abraha, P. Hagen, W. Troppauer, **C. Ahlholm**, D. Loudon
*Design and engineering of a new 525 kV HVDC line in Norway*
CIGRE B2-113, 2016

I.Gutman, **C. Ahlholm**, K. Halsan, L. Carlshem, W.L. Vosloo, J-F Goffinet
*Application of weather models for the evaluation of design ESDD for harsh pollution conditions*
CIGRE D1-212, 2014

I.Gutman, **C. Ahlholm,** U. Akesson, A. Holmberg, D. Wu, L. Jonsson
*Long-term service experience and inspection results of HV equipment made of silicone rubber insulators*
CIGRE Symposium 2013, 412