

Innovations for a better compatibility with the Environment and the Territory

How Insulated Cables can contribute?

Pierre Argaut

SCB1

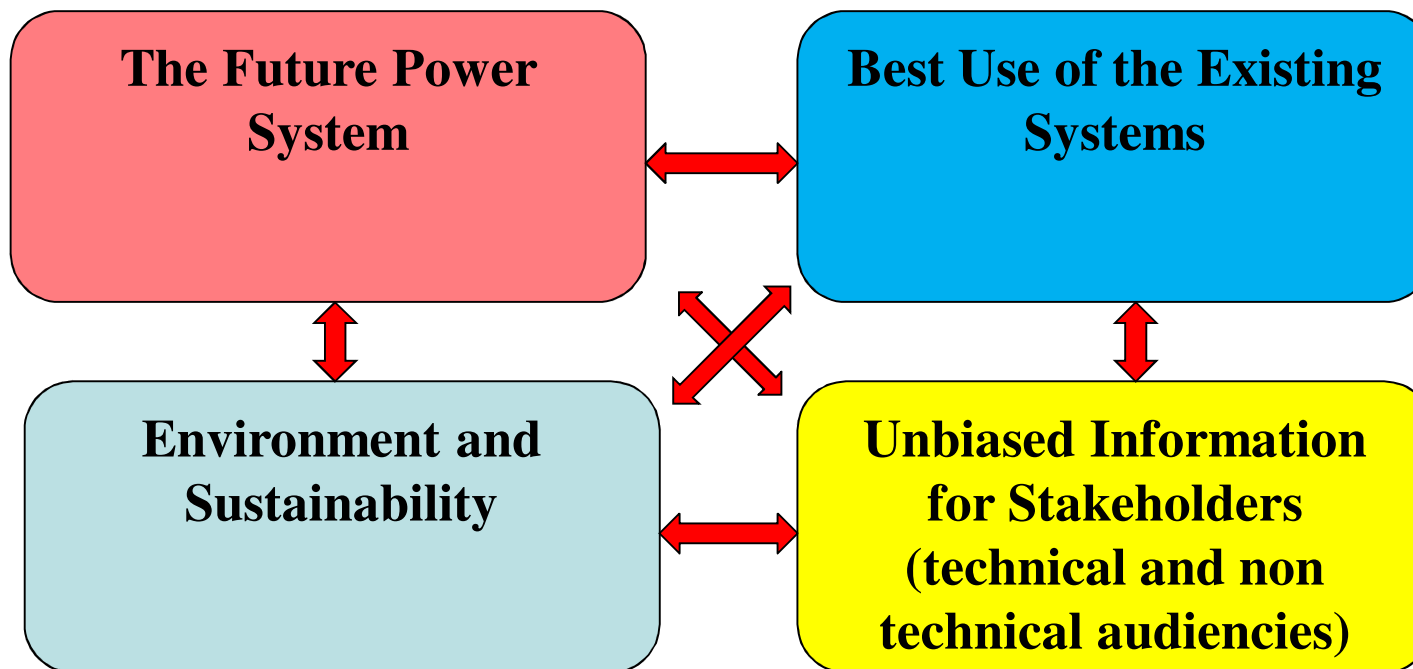


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Strategic Plan of SC B1

Technical Directions

The technical strategies of SC B1 for the ten years to come are fully aligned on the four Technical Directions adopted by the Technical Committee of CIGRE:



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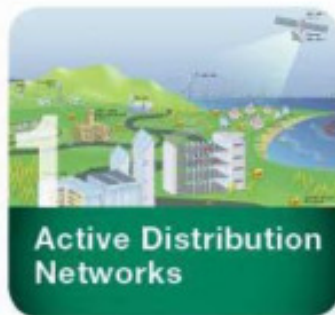
The Future Power System

The Electricity Supply Systems of The Future (Electra 256, June 2011)

Ten Technical Issues

- **TI1:**Active Distribution Networks resulting in bidirectional flows within distribution level and to the higher voltages networks
- **TI2:**Application of advanced metering and resulting massive need for exchange of information
- **TI3:***Growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and **standardisation***
- **TI4:***The need for the development and **massive installation of energy storage systems**, and the impact this can have on the power system development and operation.*
- **TI5:***New concepts for system operation and control to take account of active customer interactions and different generation types*
- **TI6:**New concepts for protection to respond to the developing grid and different characteristics of generation
- **TI7:***New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control*
- **TI8:***New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics*
- **TI9:***Increase of ROW capacity **and use of overhead, underground and subsea infrastructure**, consequence on the technical performance and reliability of the network*
- **TI10:** Increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

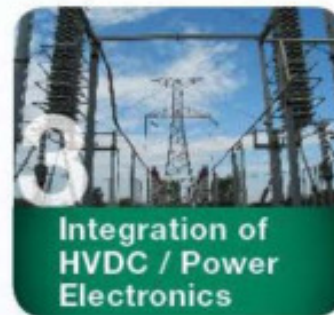
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Active Distribution Networks



Massive Exchange of Information



Integration of HVDC / Power Electronics



Massive Installation of Storage



New Systems Operations / Controls



New Concepts for Protection



New Concepts in Planning



New Tools for Technical Performance



Increase of Underground Infrastructure



Need for Stakeholder Awareness

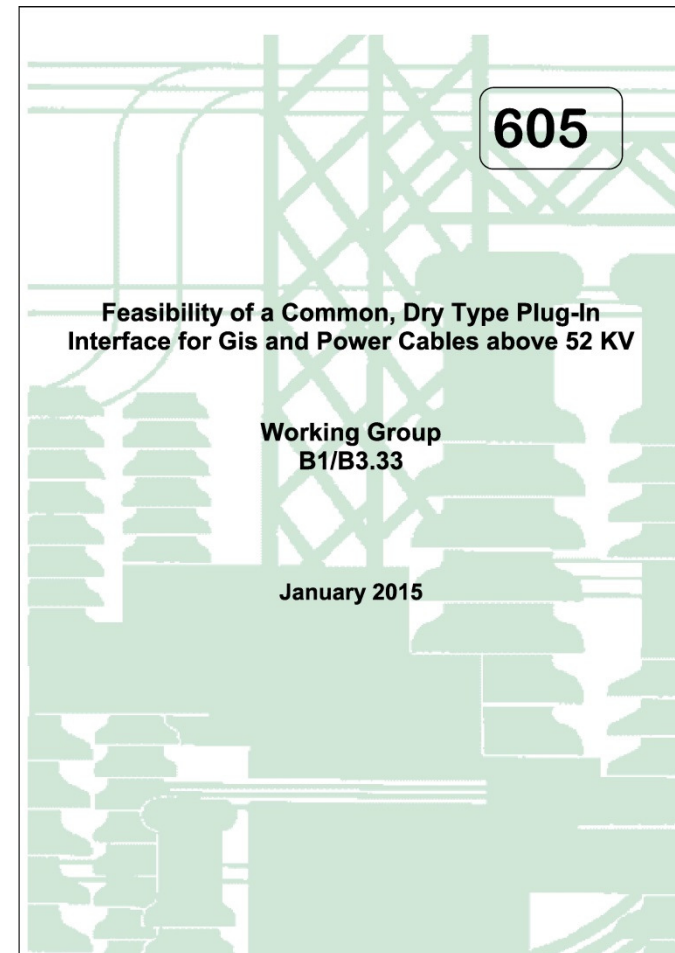
10 Technical Issues



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The Future Power System:

New designs of Cables and Accessories

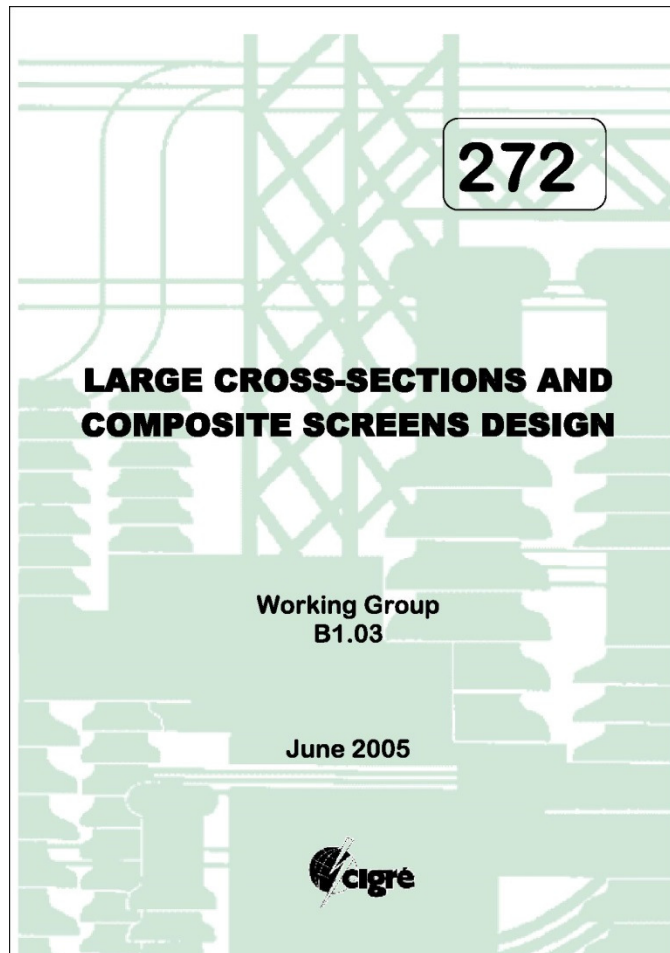


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The Future Power System

Use of Larger and Larger Cable Conductors

To come soon



MECHANICAL FORCES IN LARGE CROSS SECTION CABLE SYSTEMS

WG B1.34

Members

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The Future Power System

Use of Larger and Larger Cable Conductors

194

CONSTRUCTION, LAYING AND
INSTALLATION TECHNIQUES FOR
EXTRUDED AND SELF CONTAINED
FLUID FILLED CABLE SYSTEMS

Working Group
21.17

October 2001

To be updated
After B1.34
B1.35 & B1.48

MECHANICAL FORCES IN LARGE CROSS
SECTION CABLE SYSTEMS

WG B1.34

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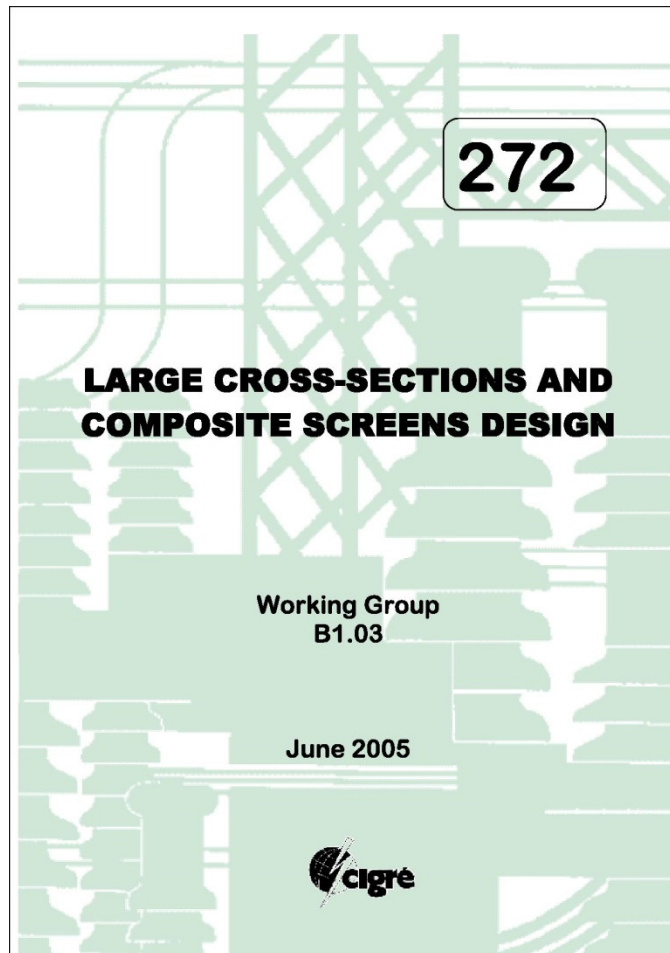
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The Future Power System

Use of Larger and Larger Cable Conductors

To come soon



Stresa, 27th Aug

A GUIDE FOR RATING CALCULATIONS OF INSULATED CABLES

A GUIDE FOR RATING CALCULATIONS OF INSULATED CABLES

Workgroup B1.35

Frank de Wild, convenor (NL), Jos van Rossum, secretary (NL), George Anders (CA), Rusty Bascom (US), Bruno Brijis (BE), Marcio Coelho (BR), Pietro Corsaro (SU), Antony Falconer (SA), Alberto Gonzalez (SP), Georg Hülken (GE), Nikola Kuljaca (IT), Bo Martinsson (SE), Seok-Hyun Nam (KO), Aleksandra Rakowska (PL), Christian Rémy (FR), Tsuguhiro Takahashi (JP), Francis Waite & James Pilgrim (UK)

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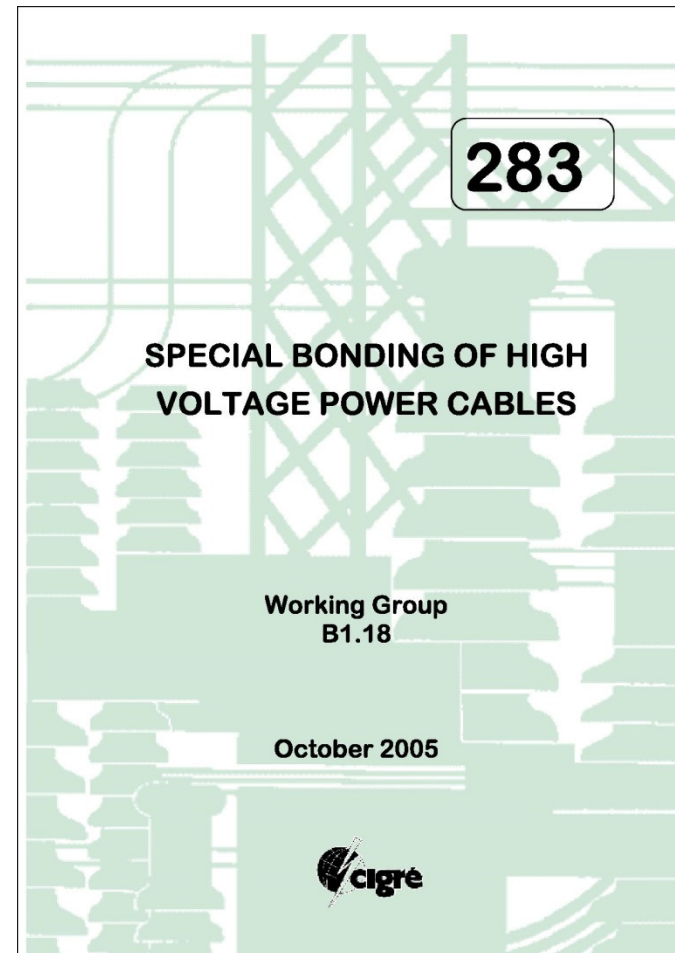
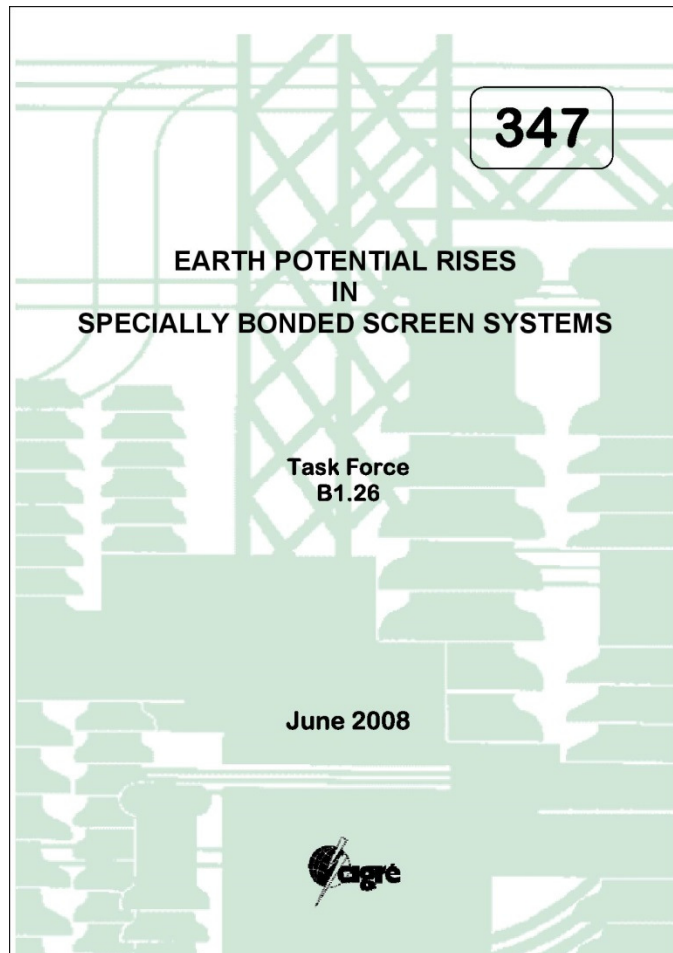
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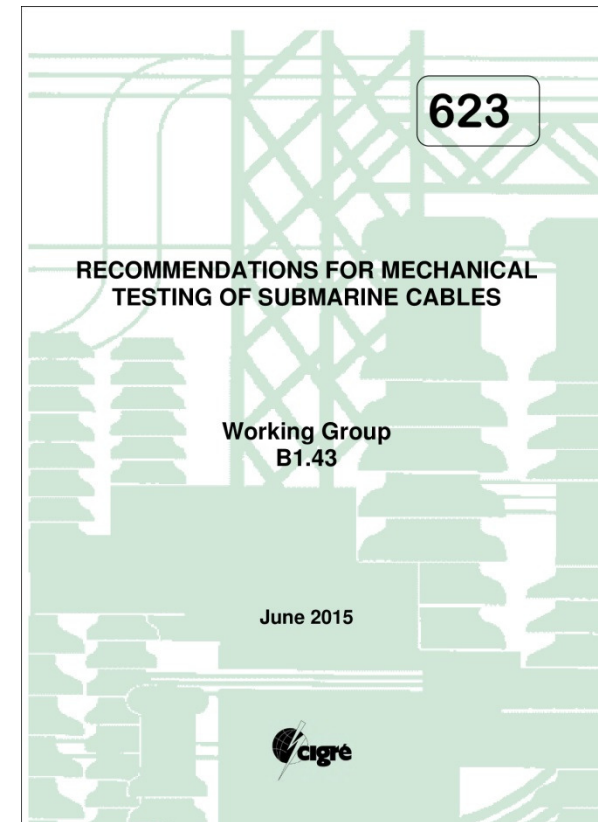
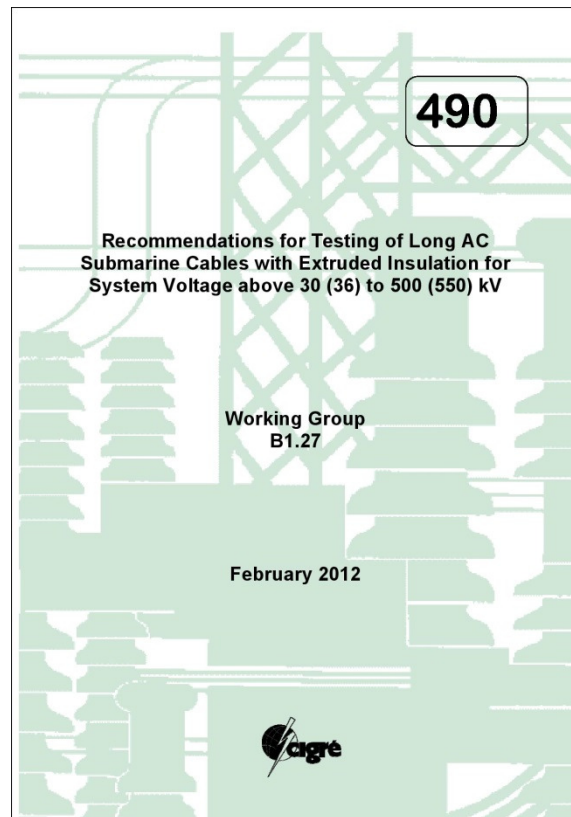
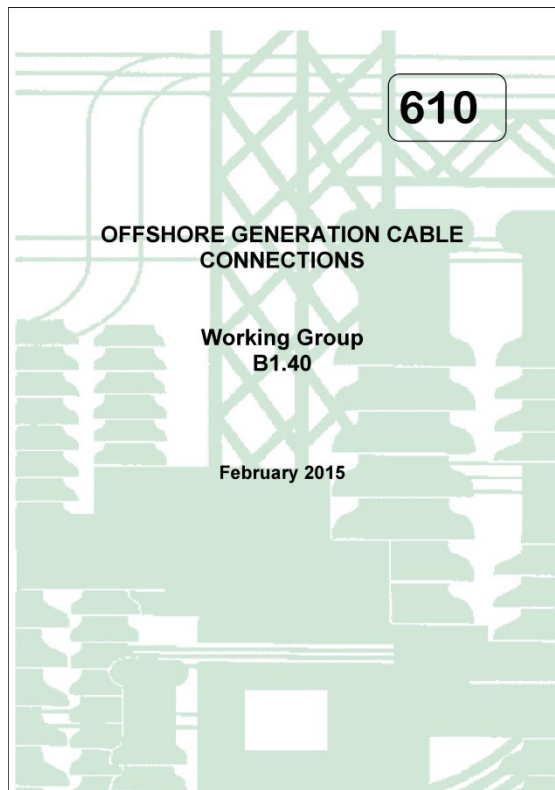
Design Issues for Cable Systems



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The Future Power System

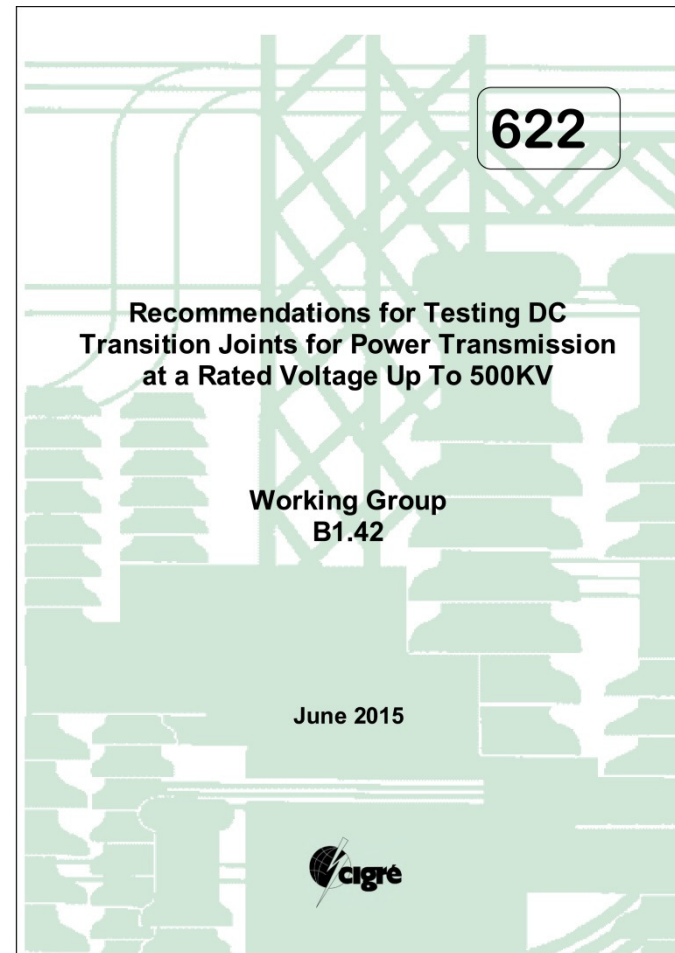
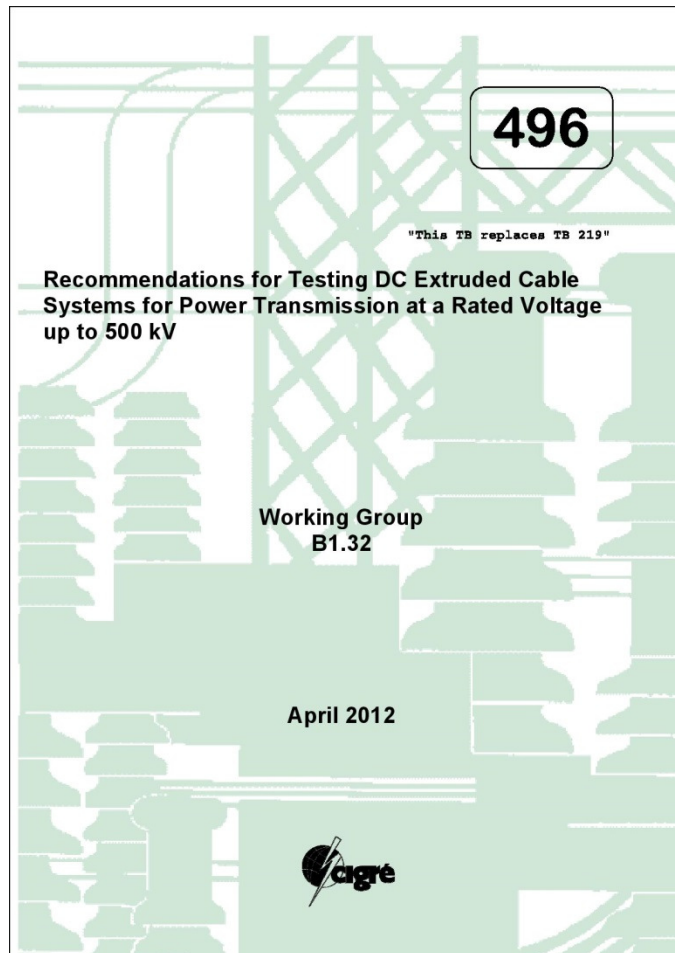
Increasing use of Submarine Cables



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The Future Power System

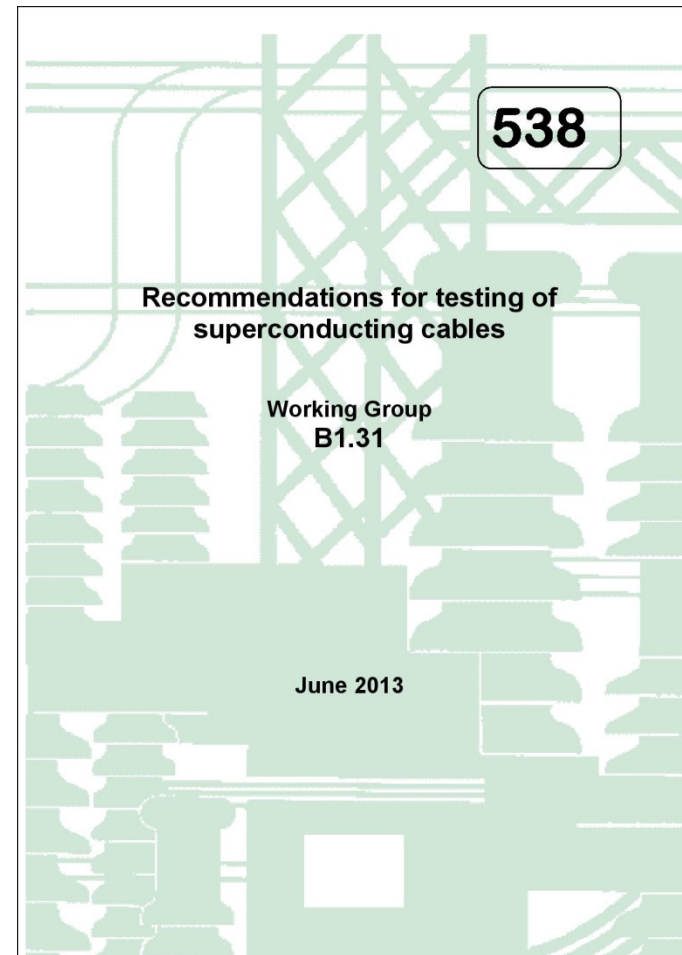
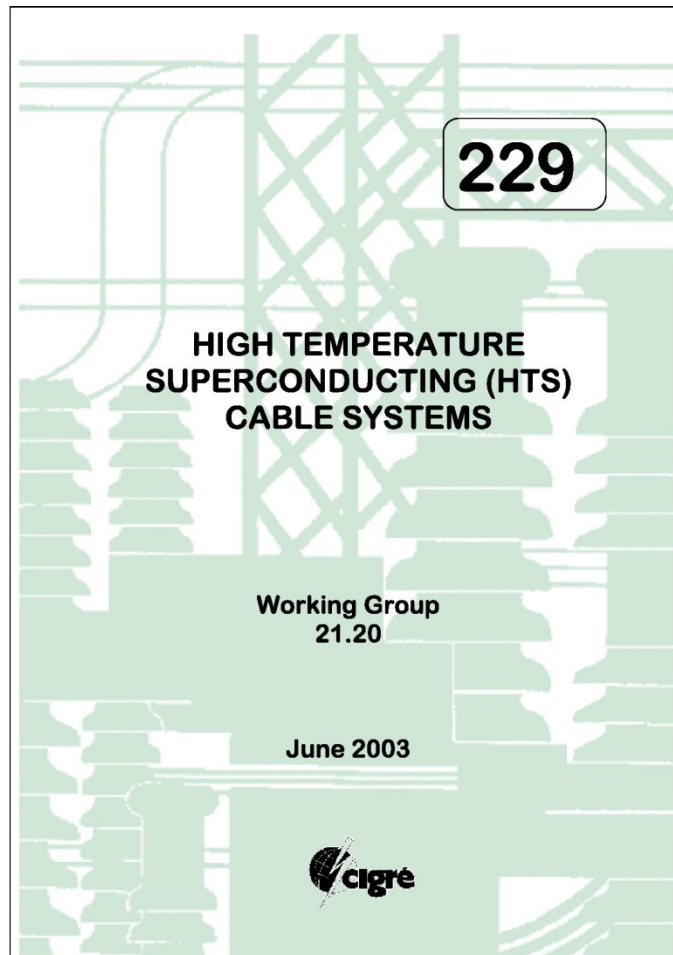
Increasing use of HVDC (TI 3)



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The Future Power System :

Provide guidelines and Recommendations for HTS



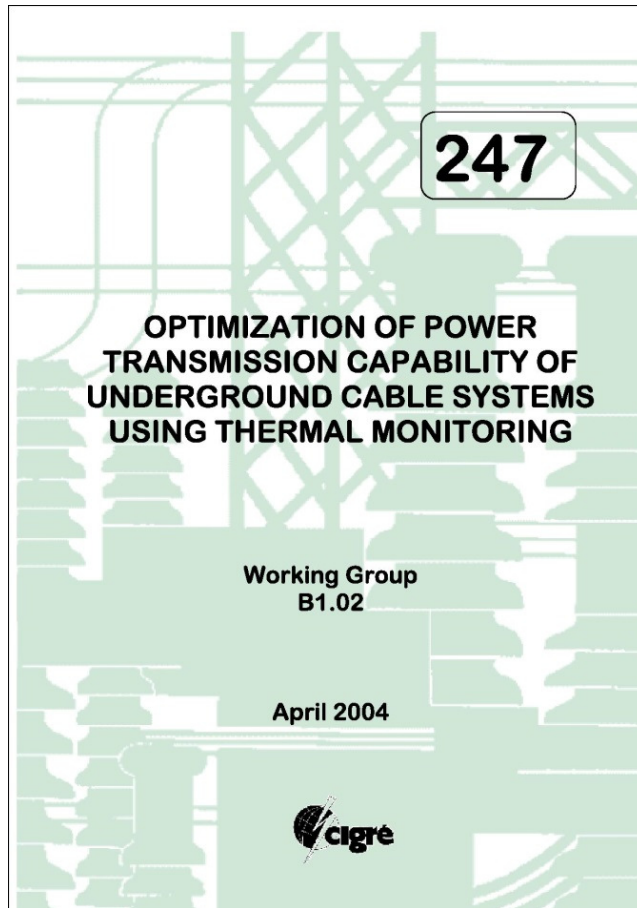
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Making the Best Use of Existing Systems

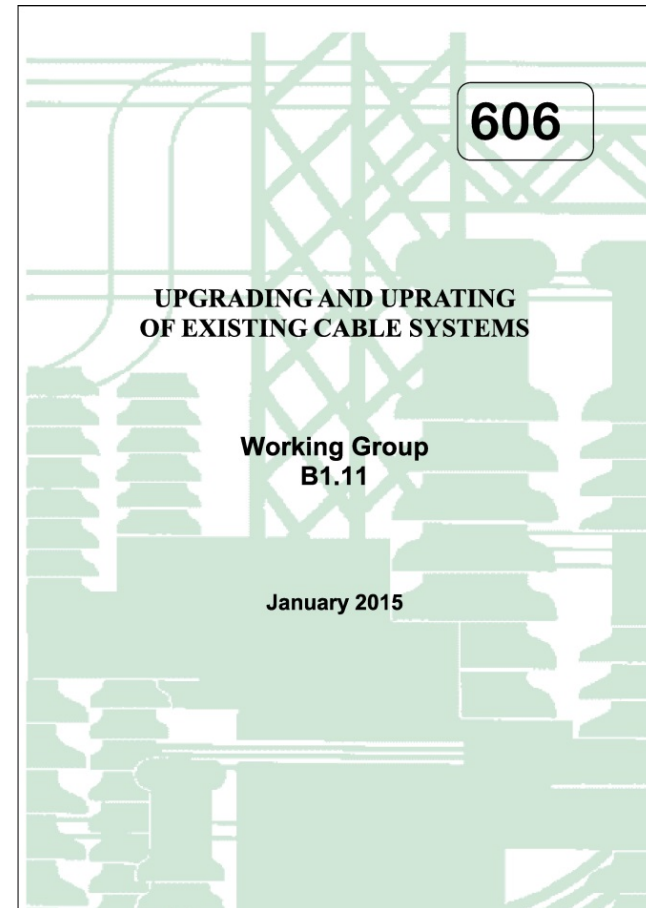
- Refurbishment, life extension
- Condition monitoring & diagnostics
- Corridor usage
 - Increased voltage, conversion AC to DC,
 - Compact, high capacity lines
 - Dynamic loading
- Tools & techniques - Asset Health Indices
- Technical risk management

Making the Best Use of Existing Systems

Updating in progress by B1.45

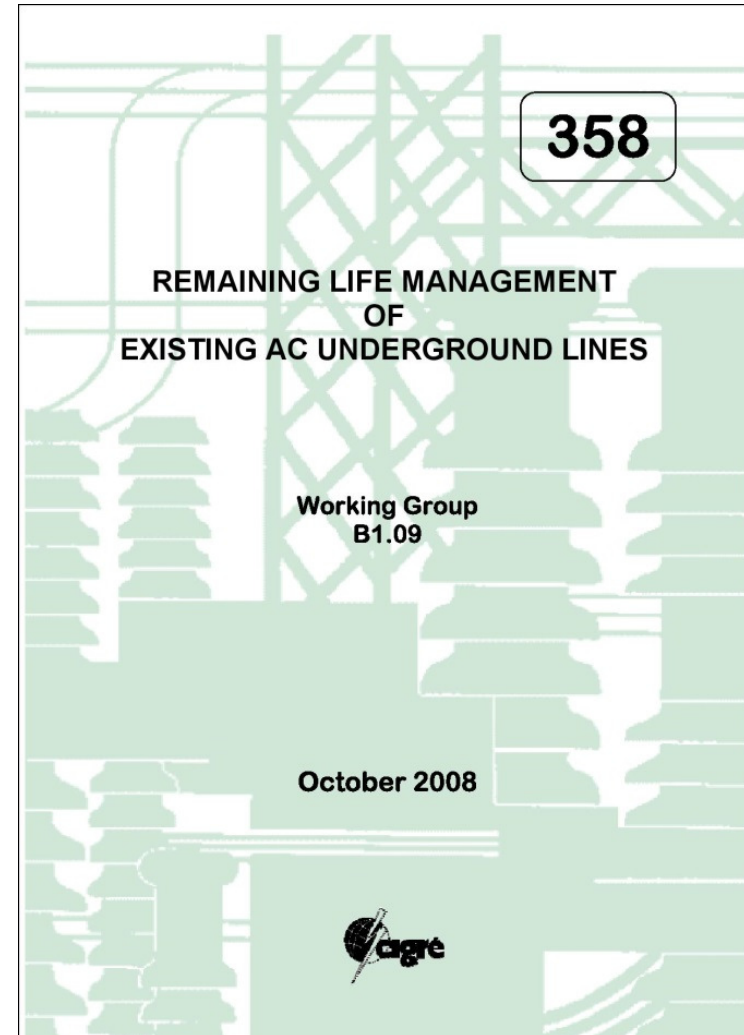
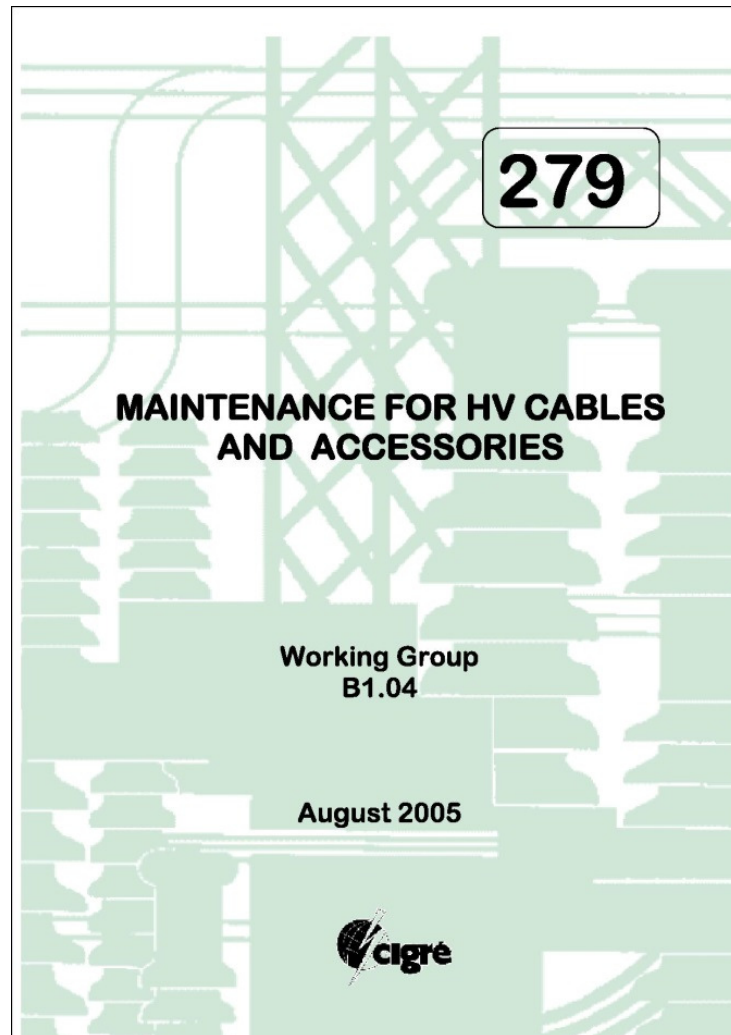


Recently published



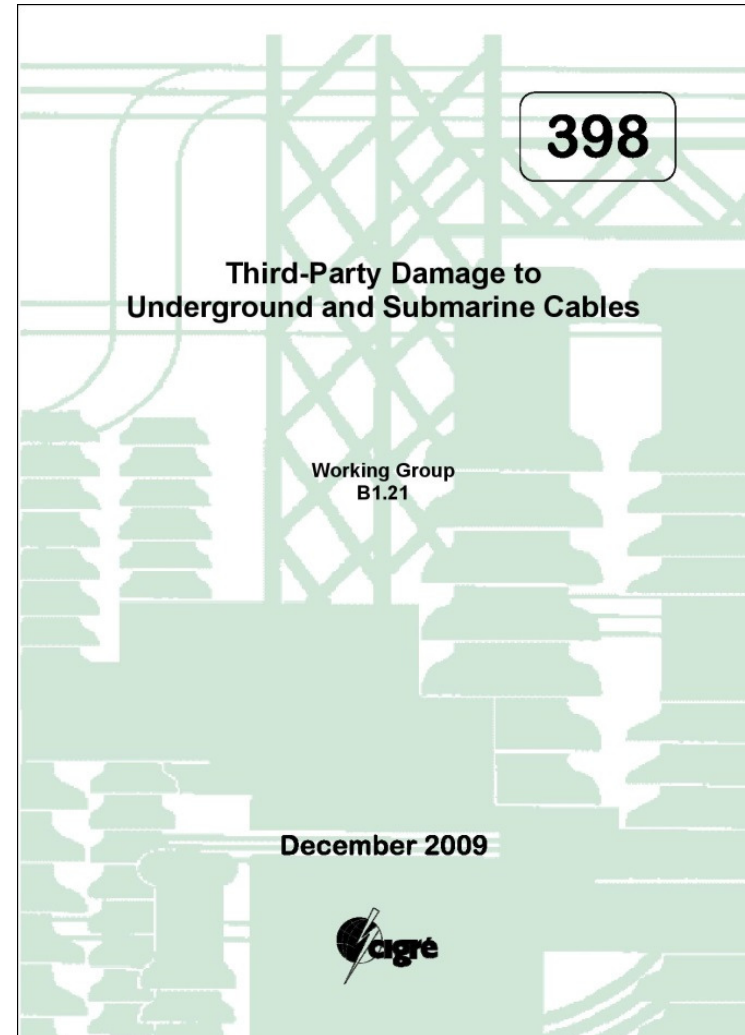
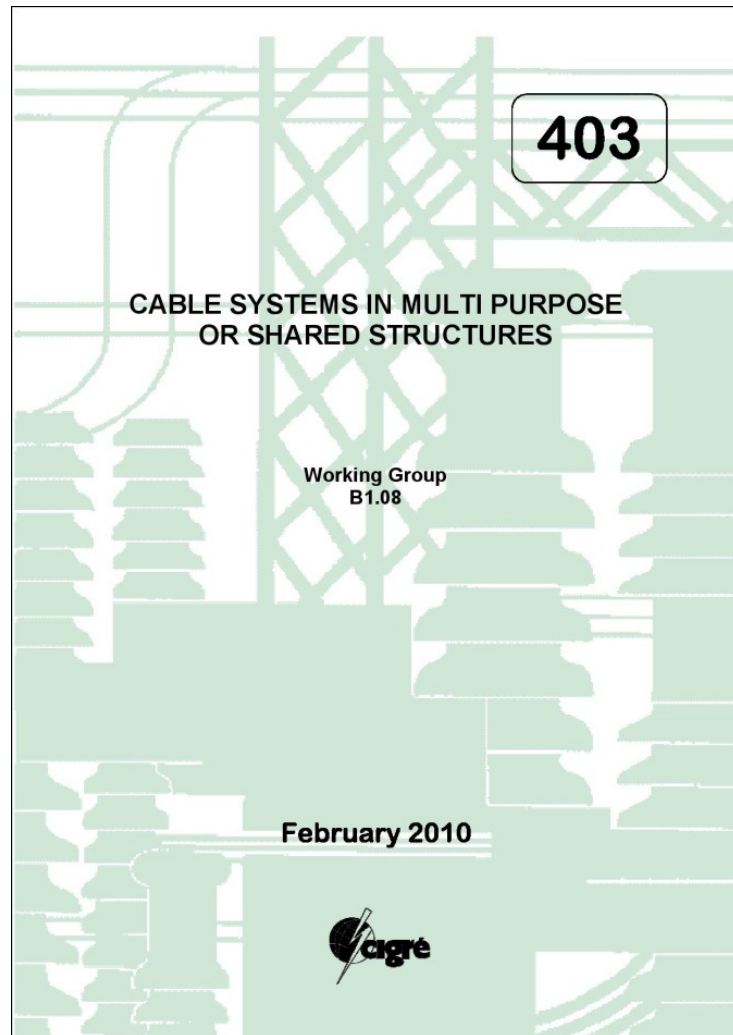
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Making the Best Use of Existing Systems



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Making the best use of Existing Systems

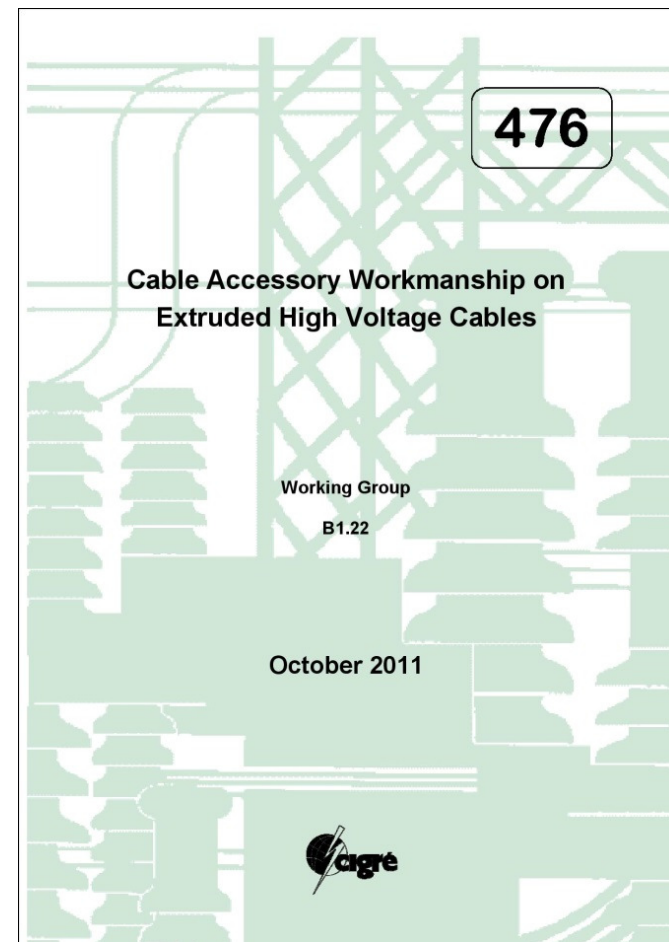
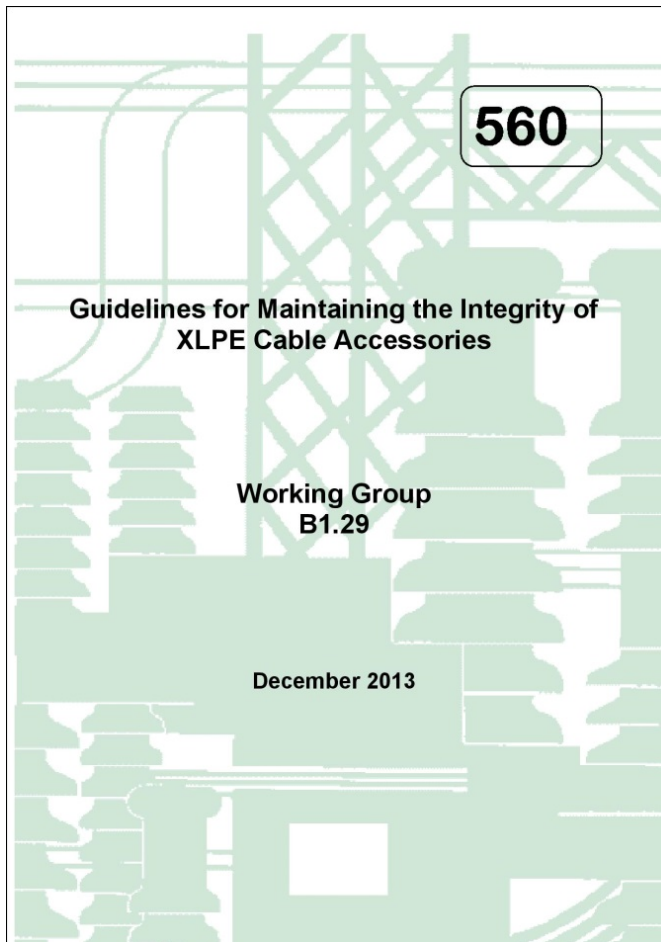


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Making the Best Use of Existing Systems

Improving Safety

Improving Reliability

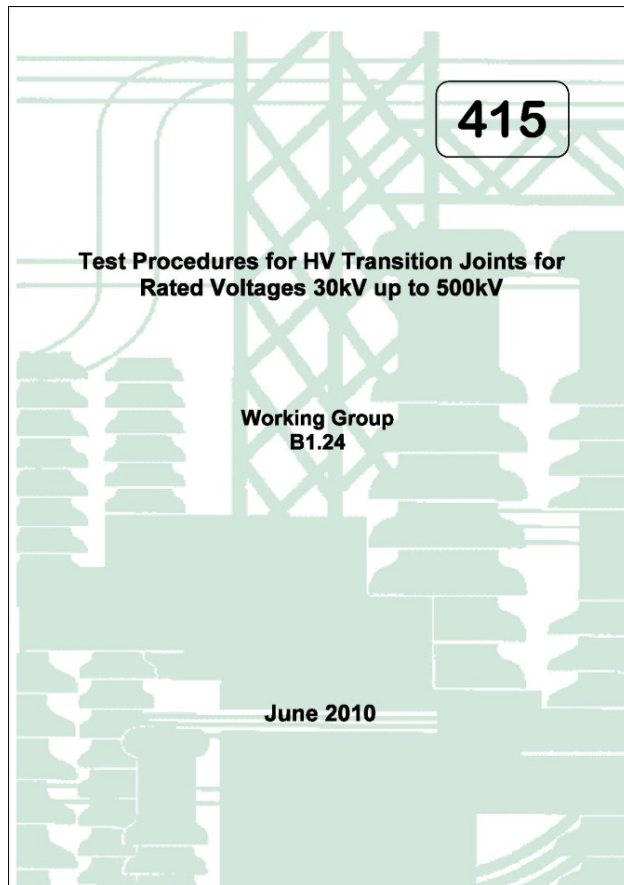


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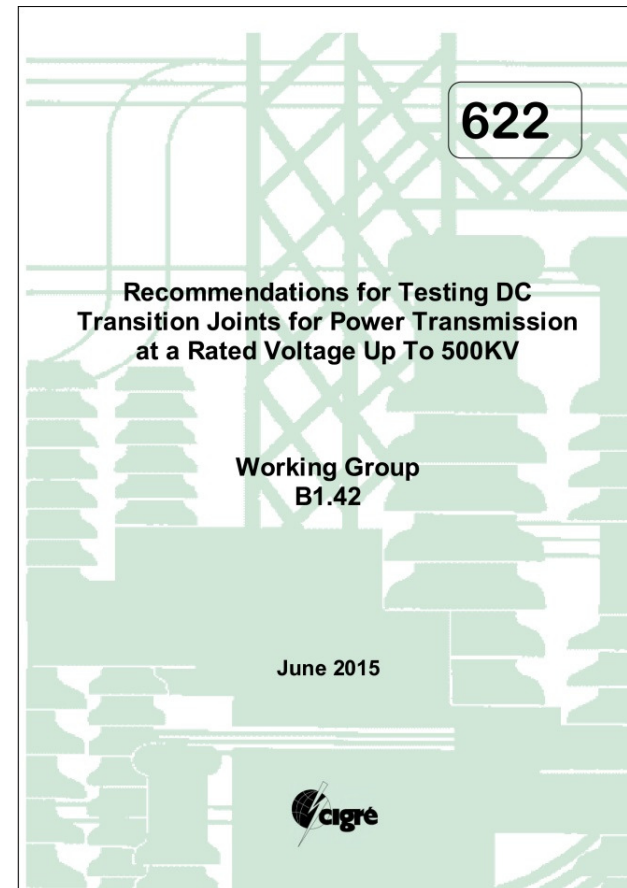
Making the Best Use of Existing Systems

Transitions from old to new Technologies

AC Cables



DC Cables



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Making the best use of existing systems

To be published soon

GUIDE FOR THE OPERATION OF SELF CONTAINED FLUID FILLED CABLE SYSTEMS

WG B1.37

GIGRE WG B1.37 Members

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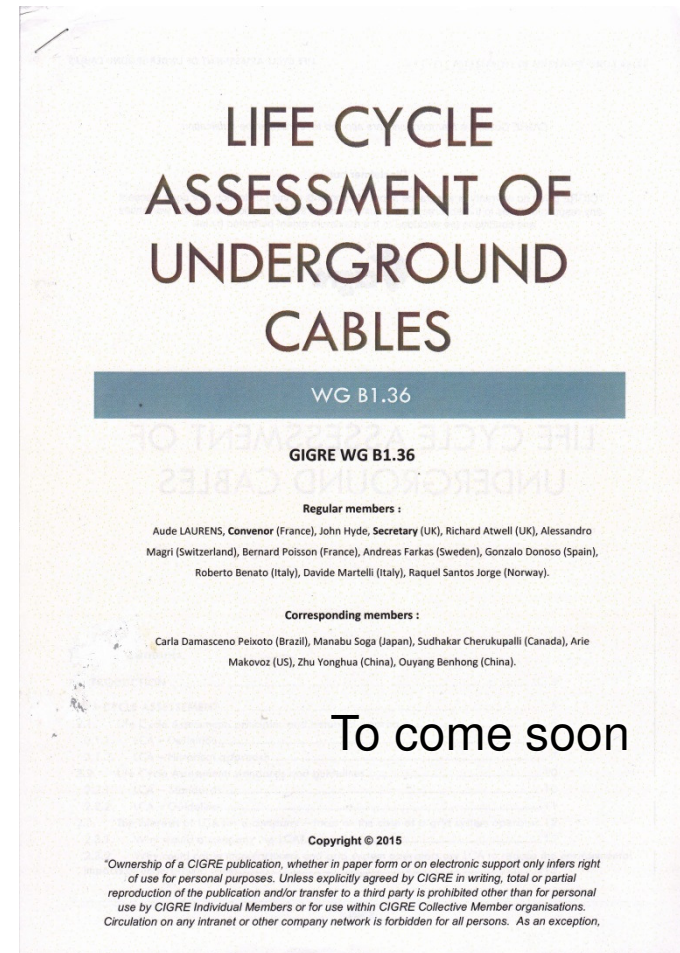
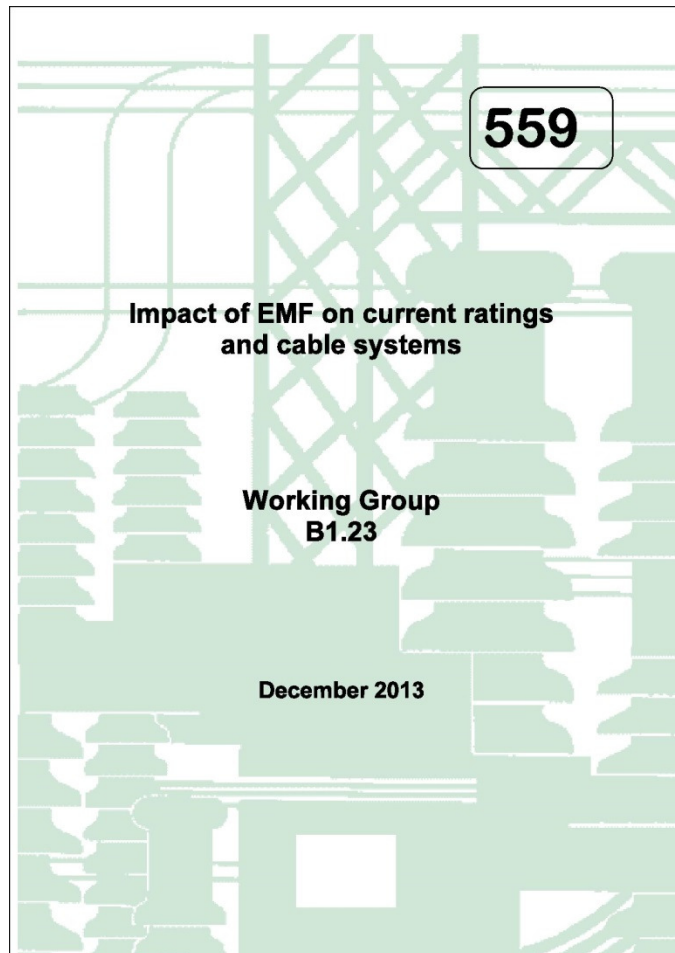
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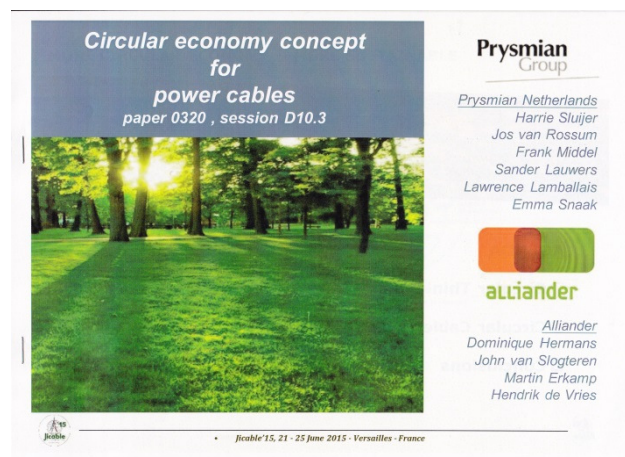
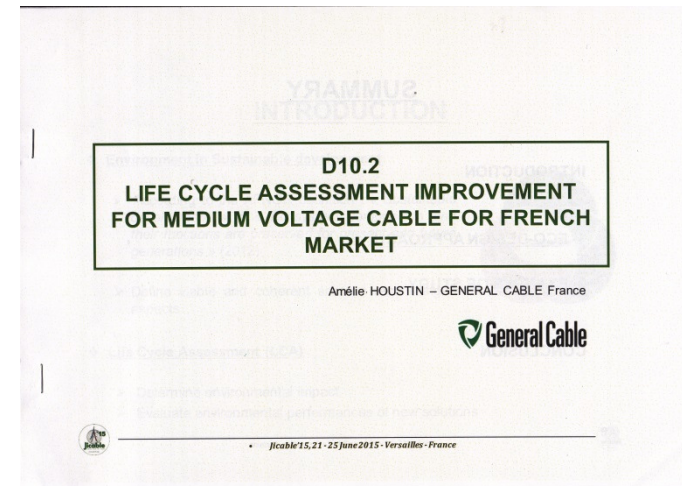
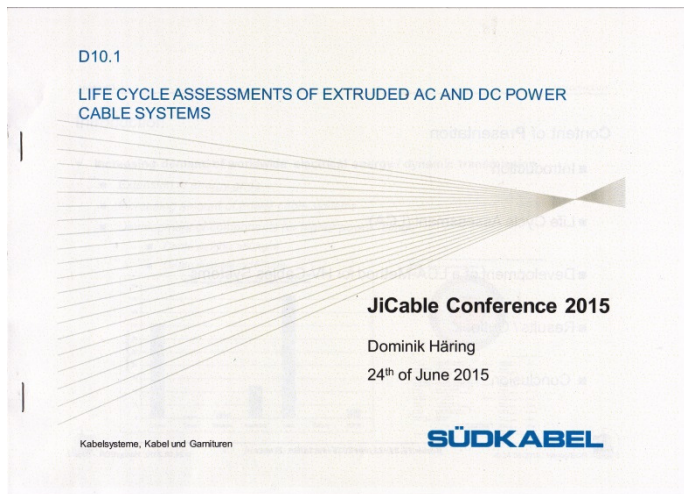
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Focus on Environment and Sustainability



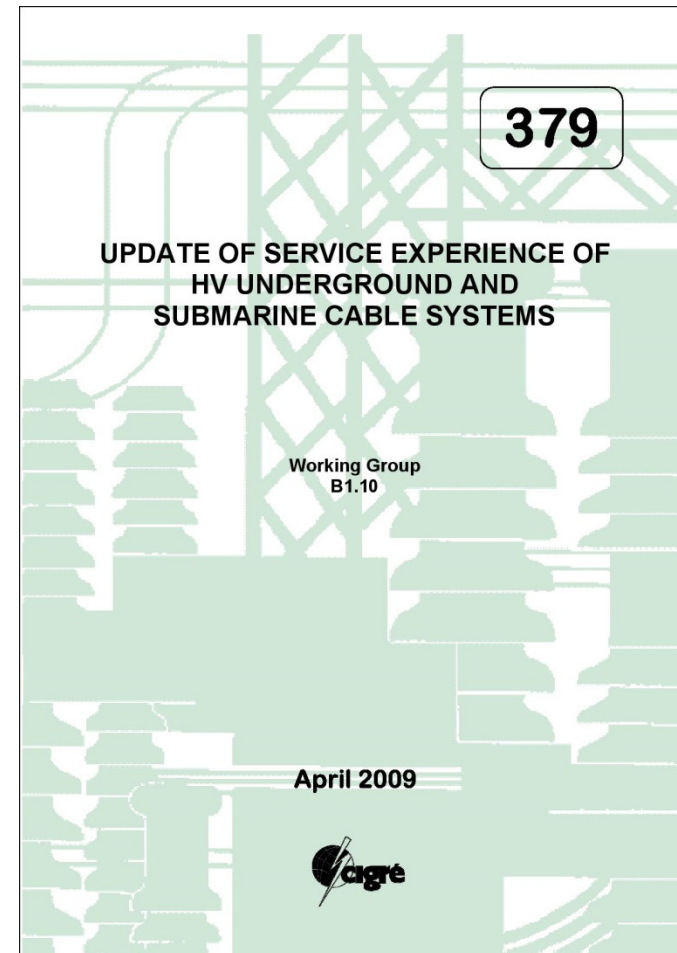
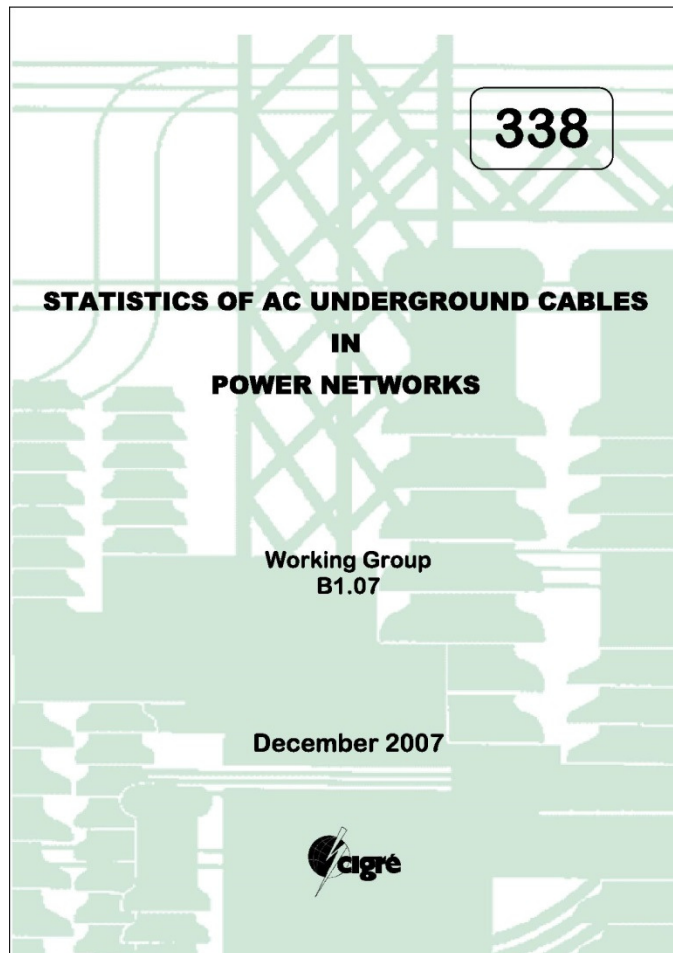
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Papers about LCA at Jicable 2015



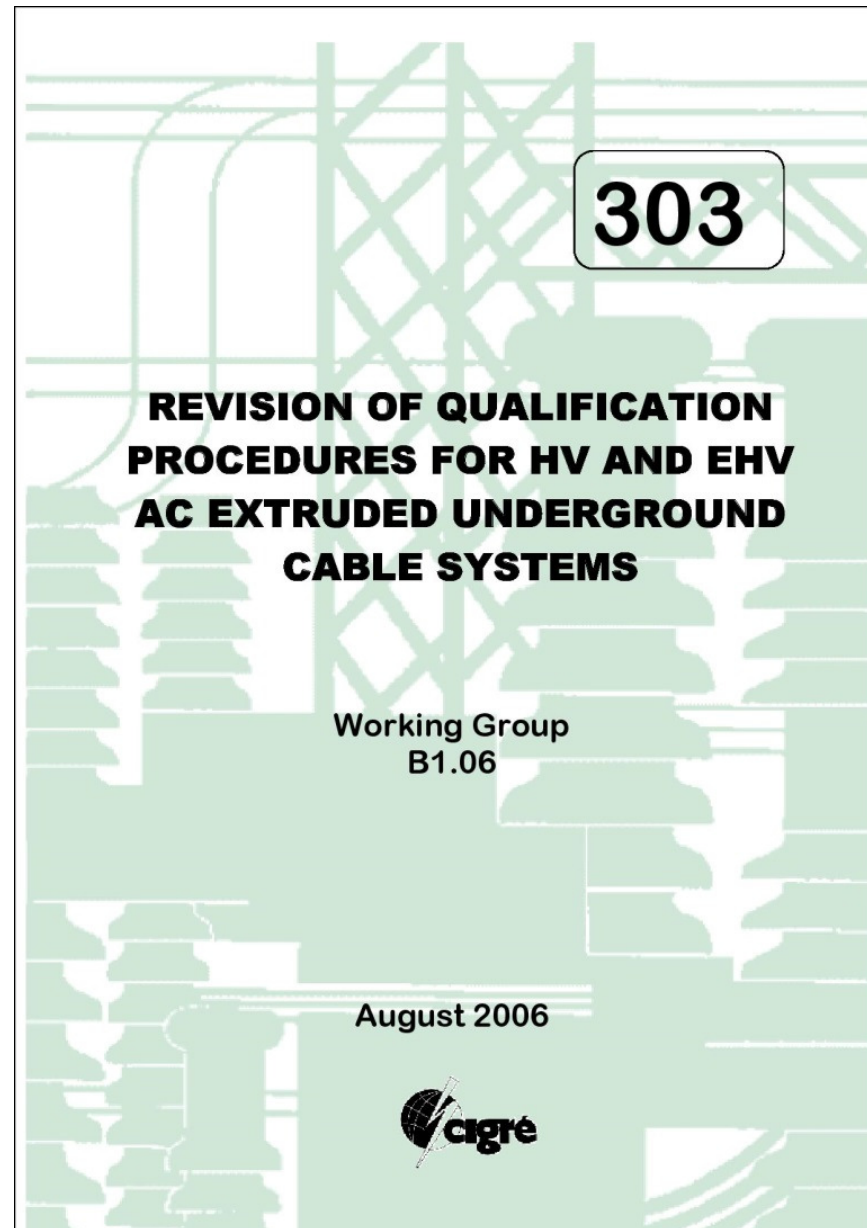
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Provide Unbiased Information



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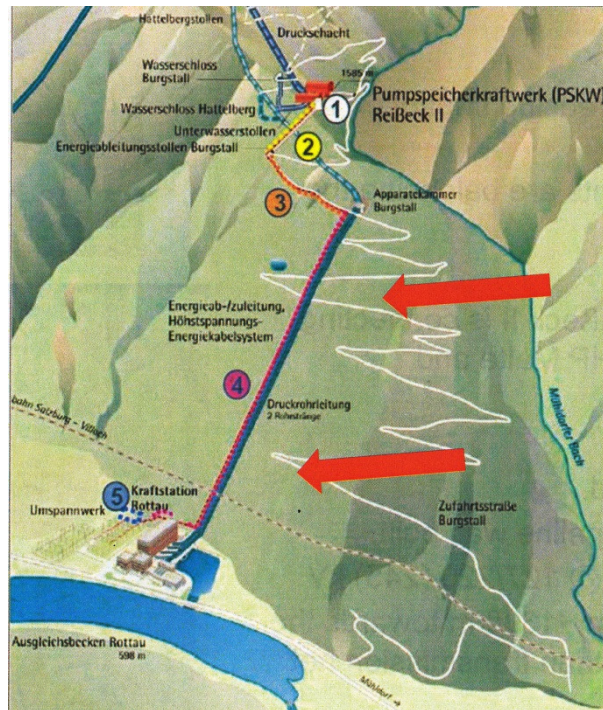
Provide Unbiased
Guidelines to
manage evolutions
and thus to
promote
innovations within
the frame of
existing
recommendations



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Recent Examples of Innovations: Paper A.1.6 (Jicable2015)

Cable Installation in Mountainous Areas, Example of Successful Installation and Service



- **Project design:**

- Joint bays in topologically difficult situations positioning of the joints in terms of thermo-mechanical aspects
- Cable fixing
- Magnetic field emission
- Maintenance friendly installation
- Crossing of a street and a railway

- **Transportation and accessibility of the cableroute:**

- cable laying procedure in high slopes (48°)

- **“Invisible” cable route**

- **Environmental friendly installation**

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Recent Examples of Innovations: Paper A.5.4 (Jicable2015)

« French Feedback on Civil and Installation Works of Underground Cable Systems »

Interest of longer section length of cables

- Long cable lengths mainly relate to rural areas where cable route in open fields and mechanised operations can be favoured by:
 - The reduction of the number of joint bays
 - The wide application of the cable installation in high density polyethylene (HDPE) ducts



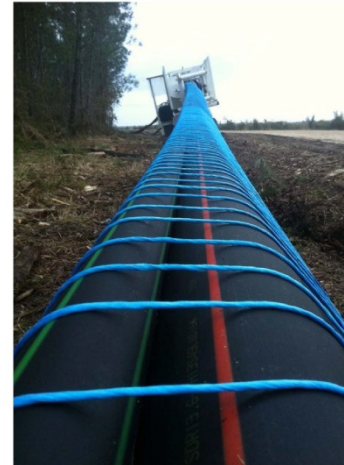
Delivery of HDPE ducts on drums

- HDPE ducts can be delivered on drums (up to a 160 mm diameter) or in bars, and are assembled with a sleeve (mechanical or electro-weldable coupling)
- The operating process requires no workmanship in the trench, and therefore makes unnecessary the operation of timbering



Mechanised laying of HDPE ducts in rural areas

- A trenching machine is used, combined to a mechanised installation process



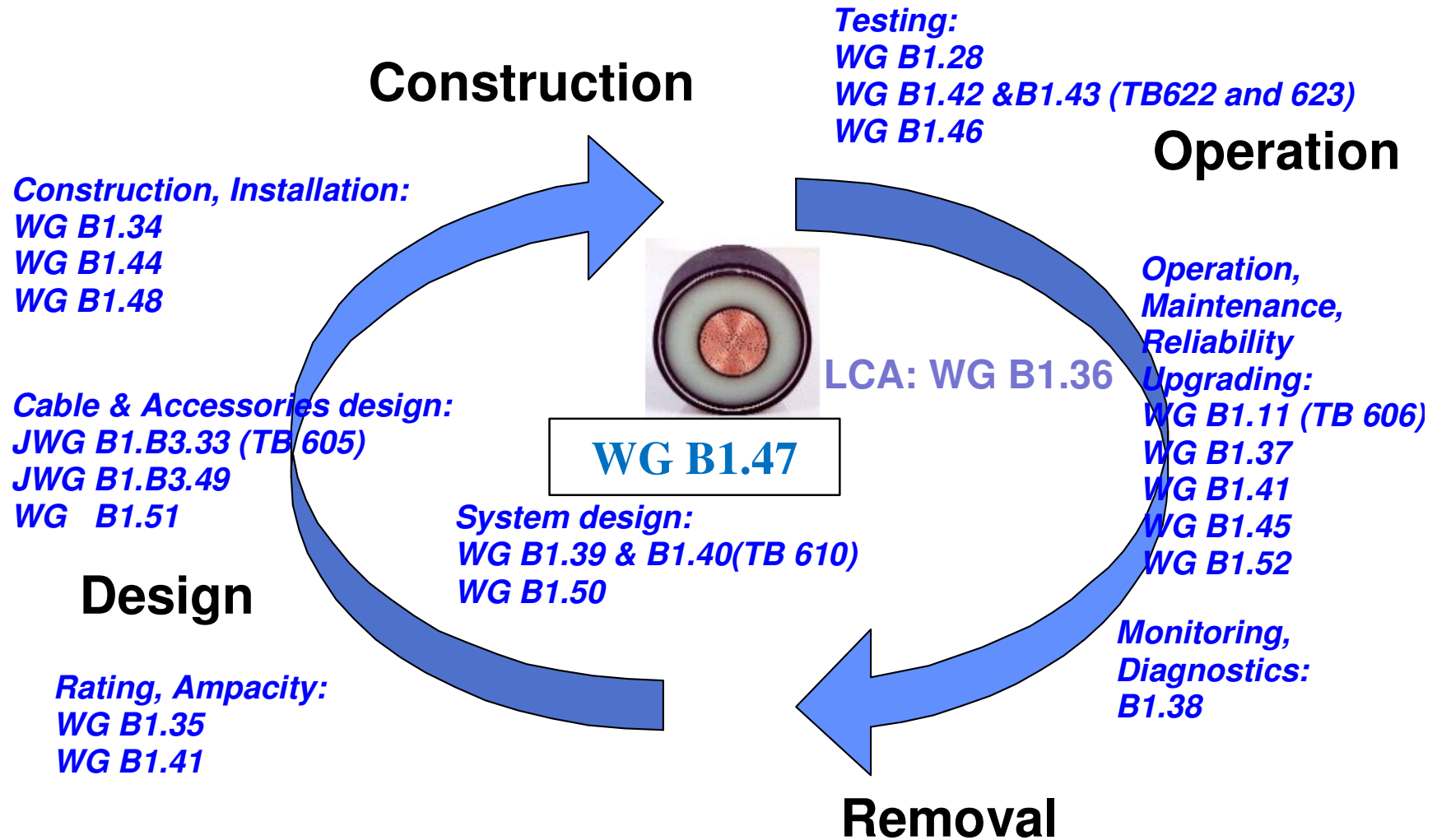
Mobile extrusion plant

- When the linear quantity of pipes is sufficient (45 to 50 km), the installation on site of a mobile extrusion plant can be considered
- The process was experienced for Boutre-Trans 225 kV link (65 km HVAC in South-eastern France)
 - The floor space used by the mobile plant is 70 m by 2.40 m, included in a squared area of 80 m side for the production and storage of the pipes



WG B1.47: Implementation of Long AC HV & EHV Cable Systems

The Whole Cable Life Cycle & B1.47



Conclusion: Innovations for a better compatibility with the Environment and the Territory How SC B1(Insulated Cables) Can Contribute?

- By sharing the experience accumulated in nearly 90 years
 - Around 185 publications since 1969 are available for everyone interested in Underground Cable Systems.
 - HV and EHV , AC and DC, Land and Submarine applications are covered. Lower Voltages topics are more and more addressed.
 - Statistics, Guidelines, are published.
- By preparing recommendations for further Standardization
- By being ready to promptly address any issue identified by SC B1 Target Groups
 - More than 350 experts are currently at work in SC B1 Working Bodies.
 - SC B1 Customer Advisory Group is in charge of proposals for **New Work Items**
- By offering tutorial sessions (more than 25 tutorials available)

**THANK YOU FOR YOUR
ATTENTION!!!**

JOIN US!!!



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