

ARENOPYR

LOCA-Proof I&C Cables

Enhance the safety of personnel, equipment and buildings with Framatome's LOCA-proof instrumentation and control (I&C) cables for harsh environments

Challenge

Vital field cable connections of I&C systems have to remain operational for reactor protection and other essential functions even under loss-of-coolant accident (LOCA) conditions (high temperature, pressure, radiation, humidity).

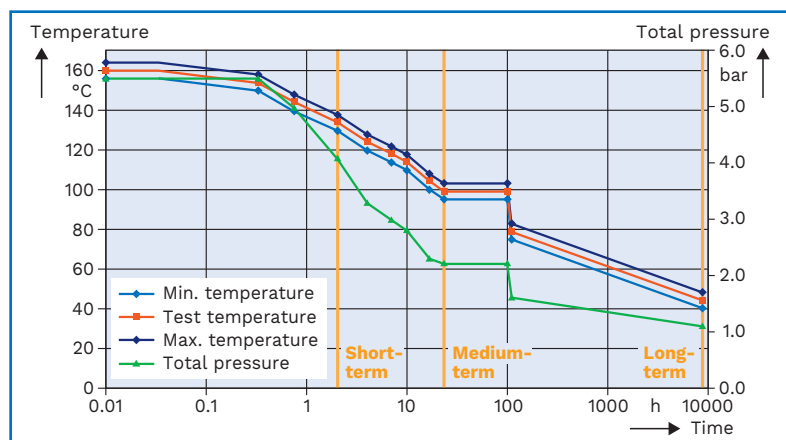
For some purposes cables might be laid in areas with high operational radiation and/or high temperature.

Solution

Together with a leading German cable manufacturer, Framatome provides the ARENOPYR cables that have specifically been proven in practical testing to withstand LOCA and post-LOCA conditions. The cables are designed for a minimum lifetime of 60 years.

The cables are used to transmit signals and measured values in circuits of:

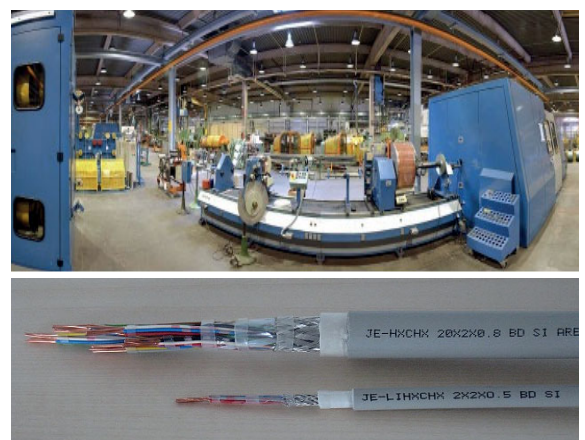
- Centralized process control and reactor protection systems
- Nuclear instrumentation and special monitoring systems
- Power electronics
- Data processing, e.g. with process control computers.



Temperature-time-pressure curve for LOCA test for the ARENOPYR cable

Customer benefits

- We are your full scope solution provider in the field of I&C including cabling and connections
- Our cable solutions are technically proven and qualified according to RCCE and IEC/IEE 60780-323
- ARENOPYR cables are cost-efficient and allow our I&C systems to:
 - Survive severe accidents (medium-term) like the effects of LOCA and post-LOCA conditions
 - Survive temperature and radiation loads caused by operation within a nuclear power plant (NPP)
- Inventory management to bundle demands, optimize manufacturing costs and to cover needs from stock quantities at short notice



Manufacturing line (twisting of cable core)

Your performance
is **our** everyday **commitment**

Technical information

Features

- Code: ARENOPYR*-FRNC-BX**
- Permissible operating temperature: 90°C
- Temperature during laying, transport and storage: -15°C to 40°C
- Solid and stranded conductor types (Class 1 and 2) available
- Suitable for harsh environments
- LOCA (long-term) and severe accident (medium-term) proof
- Applicable to boiling water reactor and pressurized water reactor plants
- Production and operation are continuously complemented by a demanding long-term ongoing qualification program

Test results after the qualification show:

- No significant degradation of initial material properties and performance including LOCA resistance
- The initial requirements and expectations are fully verified during the qualification
- ARENOPYR* cables are insensitive to the extreme loads to be considered in NPP's, such as high temperature, radiation and mechanical stress.

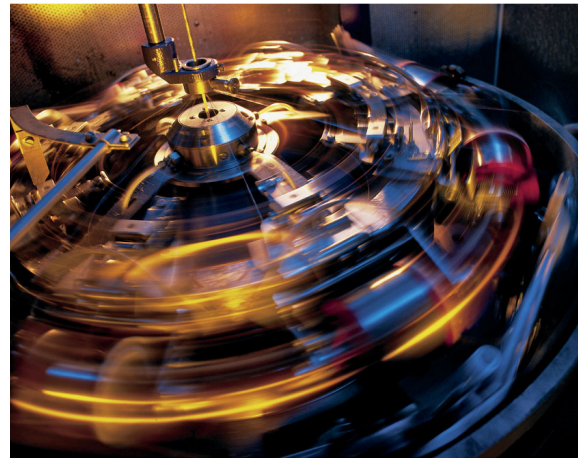
Licensing / standard compliance

ARENOPYR-FRNC-BX cables meet the following requirements:

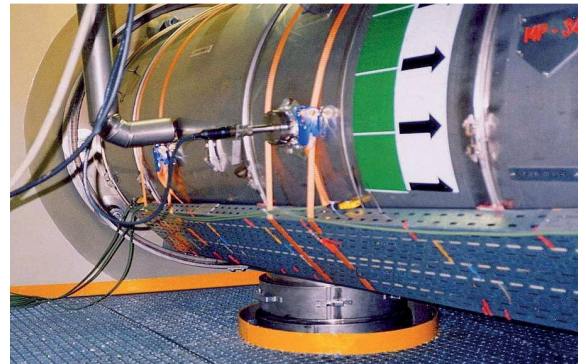
- Qualification according to RCCE and IEC / IEE 60780-323
- Fire requirements according to IEC 60332-3-23
- Halogen requirements according to IEC 60754-2-2
- Smoke emission requirements according to IEC 61034-2
- Radiation resistance under LOCA (long-term) and severe accident (medium-term) conditions according to Framatome's "worst case" specifications.

* Registered brand name of Framatome

** Halogen-free cables with improved characteristics in case of fire (Category B) and accident proof



Cable braiding machine



Accelerated aging cable samples mounted on a main cooling pipe: samples are tested annually to allow long-term cable aging predictions

Key figures

More than **25** years of operating experience

ARENOPYR cables allow systems to achieve an operational lifetime of a minimum of **60** years

References

- German NPPs (e.g. Philippsburg, Emsland, Unterweser, Grohnde)
- Switzerland: Gösgen NPP
- Finland: Olkiluoto 3 NPP
- Japan and China: severe accident mitigation systems in NPPs
- Brazil: Angra 3 NPP
- Argentina: Atucha II NPP

Contact: ic@framatome.com
www.framatome.com

It is prohibited to reproduce the present publication in its entirety or partially in whatever form without prior written consent. Legal action may be taken against any infringer and/or any person breaching the aforementioned prohibitions.

Subject to change without notice, errors excepted. Illustrations may differ from the original. The statements and information contained in this publication are for advertising purposes only and do not constitute an offer of contract. They shall neither be construed as a guarantee of quality or durability, nor as warranties of merchantability or fitness for a particular purpose. These statements, even if they are future-orientated, are based on information that was available to us at the date of publication. Only the terms of individual contracts shall be authoritative for type, scope and characteristics of our products and services.

framatome