European Organization for Nuclear Research
Organisation européenne pour la recherche nucléaire

Group Code: EN-EL

MS-5082/EN

Market Survey

Technical Description
High Voltage Cable Accessories Installation at CERN

Abstract

This Technical Description concerns the supply of high voltage cable accessories for rated voltages from 3.3 kV up to 30 kV as well as the installation and connection of high voltage cable accessories for rated voltages from 3.3 kV up to 66 kV at CERN.

The present Market Survey will be followed by the issue of an Invitation to Tender to qualified and selected Firms in June 2025 for a Contract to start on 01 January 2026 for a duration of three years with up to two two-year optional extensions. The future Invitation to Tender will be adjudicated on a best-value-for-money basis.

April 2025

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1. INTRODUCTION

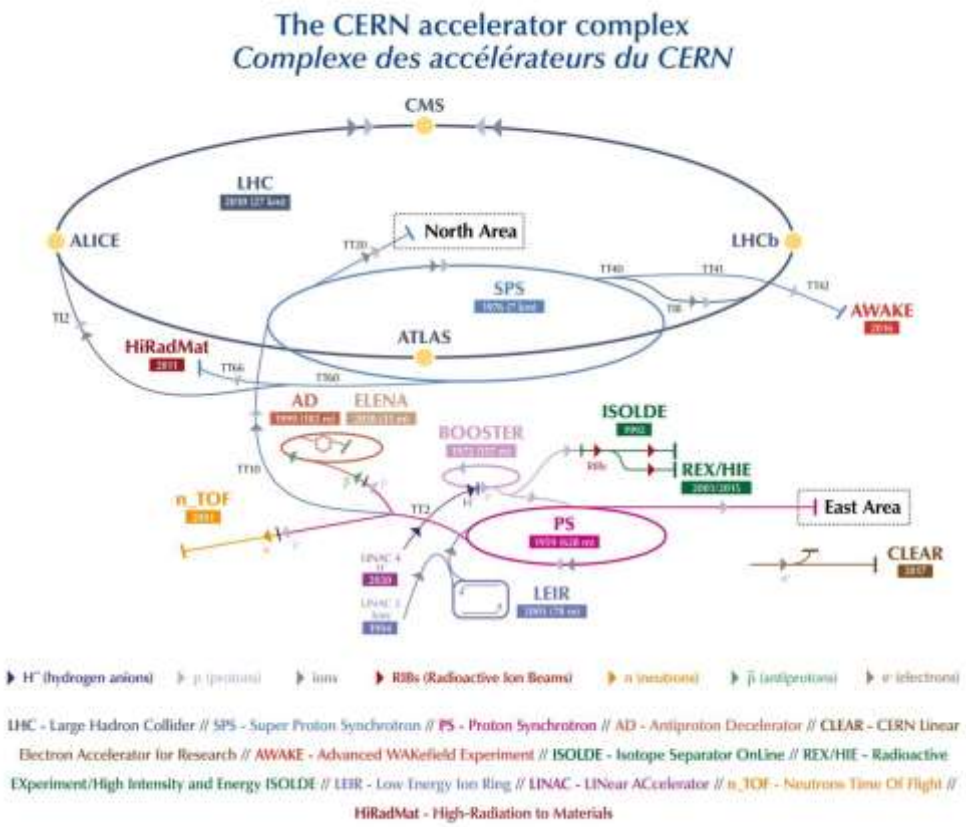
1.1 Introduction to CERN

CERN, the European Organization for Nuclear Research, is an intergovernmental organization with over 30 Member States[1].

Its seat is in Geneva but its premises are located on both sides of the French-Swiss border (https://maps.web.cern.ch).

CERN's mission is to enable international collaboration in the field of high-energy particle physics research and to this end it designs, builds and operates particle accelerators and the associated experimental areas. At present more than 10 000 scientific users from research institutes all over the world are using CERN's installations for their experiments.

The accelerator complex at CERN is a succession of machines with increasingly higher energies. Each machine injects the beam into the next one, which takes over to bring the beam to an even higher energy, and so on. The flagship of this complex is the Large Hadron Collider (LHC) as presented below:



Further information is available on the CERN website: http://cern.ch

[1] http://home.cern/about/member-states

1.2 Introduction to the Engineering Department - Electrical Group

The Engineering Department (EN) provides CERN with the engineering competences, infrastructure systems and technical coordination required for the design, installation, operation, maintenance and dismantling phases of the CERN accelerator complex and its experimental facilities.

Within the EN Department, the Electrical Engineering (EL) Group is responsible for the CERN electrical distribution network, covering voltages from 400 kV, 66 kV, 18 kV, 3.3 kV, and 400/230 V. Its main missions include the analysis, design, operation, maintenance, extension, and renovation of the network, as well as managing relations with energy suppliers and analysing electrical energy consumption projections for CERN. This mandate also covers the safety electrical networks, ensuring the safety of people and equipment through backup power supply solutions such as UPS units, diesel generators, battery systems, and safety lighting. Additionally, the group is responsible for the installation, replacement, and repair of high-voltage (HV) accessories on both existing and newly installed power cables.

1.3 Background information for the performance of the future Contract

CERN is mainly supplied with electricity from the French network via a 400 kV overhead line and a back-up 130 kV line from Switzerland. The CERN electrical network is composed of more than 500 km of underground power lines operating at 3.3 kV, 18 kV and 66 kV operating voltages.

The extent of the network is spread over large distances, with up to 15 km between infrastructure elements. Power lines are installed both on the surface and in accelerator underground areas, which include pits, trenches, technical galleries and caverns.

2. SCOPE OF THE SERVICES

The purpose of this Market Survey is to identify potential Bidders for the supply of HV cable accessories for rated voltages from 3.3 kV up to 30 kV as well as the installation and connection on the CERN site of HV cable accessories for rated voltages from 3.3 kV up to 66 kV., as defined in this Technical Description and in accordance with the criteria defined in the Qualification Questionnaire. The accessories to be installed will include the following: straight-through termination (outdoor/indoor), elbow separable connector, straight separable connector, T-shaped separable connector, straight-through joint, and transition joint.

Only firms qualified by CERN after analysis of their reply to this Market Survey will be included in the forthcoming Invitation to Tender.

3. TECHNICAL DESCRIPTION OF THE SERVICES

3.1 General

The required Services to be performed on power cables of rated voltages from 3.3 kV up to 66 kV consist of the following:

- Supply of certified HV cable accessories for rated voltages from 3.3 kV up to 30 kV;
- Installation and connection on the CERN site of HV cable accessories for rated voltages from 3.3 kV up to 66 kV;
- Performance of dielectric tests on new or existing HV cables after the installation of accessories;
- Stock management of HV cable accessories on CERN premises;
- Standby service;

- Documentation and test reports;
- Additional services, as defined in section § 3.3.7.

3.2 HV cables Installed at CERN

The characteristics of the most commonly installed HV cables at CERN are listed below:

Rated voltages:	From 3.3 kV up to 66 kV
Conductor:	Copper, Aluminium
Configuration:	Single-core, three-core
Core cross-sections:	From 35 mm^2 up to 1600 mm^2
Insulation:	Polymeric (EPR, XLPE), oil-filled (PILC)
Screen cross-sections:	Copper wires, single or double copper tape, aluminium/metal sheath
	From 16 mm^2 up to 50 mm^2

The HV cable accessories shall be assembled on both newly installed and existing cables for which the cable construction may be unknown.

The electrical equipment to connect is mainly cable systems, switchgears, transformers, power converters, filters, compensators, generators and motors.

3.3 Technical requirement

The HV cable accessories components shall comply with applicable international standards and CERN's safety rules, in particular IS41 and IS23 (http://cern.ch/safety-rules).

3.3.1 Supply of certified HV cable accessories

The HV cable accessories for power cables of rated voltages from 3.3 kV up to 30 kV shall be supplied within the scope of the future Invitation to Tender. Those HV cable accessories shall be certified and validated by CERN. To this day, the only material certified and validated by CERN is from CELLPACK Electrical Products (http://electricalproducts.cellpack.com/).

3.3.2 Installation and connection of HV cable accessories

3.3.2.1 Installation and connection of HV Cable Accessories for rated voltages from 3.3 kV up to 30 kV

The HV cable accessories for rated voltages from 3.3 kV up to 30 kV to be installed and connected on the CERN site shall be of the following types:

- Straight terminations;
- Separable connectors and coupling elements. The connectors shall be straight, elbow or T-shaped and be capable of interfacing with bushing interfaces A to C as described in EN 50180 and EN 50181 standards;
- Straight-through joints, branch joints and transition joints.

In order to perform the above-mentioned Service, the future Contractor shall fully master both cold shrink and hybrid assembly methods.

3.3.2.2 Installation and connection of HV cable accessories for rated voltage 66 kV

The HV cable accessories for rated voltage 66 kV to be installed and connected on the CERN site shall be of the following types:

- Self-supporting and non-self-supporting cable terminations for outdoor installation;
- Composite and silicone cable terminations;
- Straight-through joints, branch joints and transition joints between polymeric and oil-filled cables;
- Cross-bonding link boxes.

The installation and connection of the HV cable accessories for rated voltage 66 kV shall be performed under the supervision of the HV cable accessories manufacturer. The future Contractor shall remain responsible for all the works.

3.3.3 Stock Management of HV Cable Accessories

The Contractor shall procure the HV cable accessories and necessary material to be stored on CERN premises and manage the stock. Such stock management service shall allow the Contractor to perform the Services as specified by CERN, and, in particular, to fully comply with the delivery schedule provided by CERN and the standby service (see § 3.3.4) requirements.

3.3.4 Standby service

The Contractor shall provide a standby service operational 365 days / 24 hours. In case of standby request, at least two technical employees shall be available to intervene on the CERN site, including CERN's underground and radiation-controlled areas, within a maximum of six hours' notice.

3.3.5 Perform test on HV cables

The Contractor shall perform Very Low Frequency (VLF) dielectric testing on the installed power cables after completing the cable accessories (terminations and joints). The tests shall be conducted in accordance with the applicable international standards, such as **IEEE 400.2** and **IEC 60502-2**, to verify the integrity of the cable insulation before commissioning. The test voltage levels and duration shall comply with the requirements specified in the relevant standards.

3.3.6 Documentation and Installation Reports

In order to allow full traceability of the cable accessories installed, the Contractor shall provide a comprehensive report for each HV cable accessory installed. Such report shall contain all information requested by CERN.

3.3.7 Additional services

The Contractor shall provide additional Services, as requested by CERN, such as:

- Cable fault localisation and diagnosis;
- Localisation and identification of HV cable networks.

These services shall be provided within a maximum of 48 hours' notice.

4. WORKING ON THE CERN SITE

The Contractor shall perform the Contract on both the French and Swiss parts of the CERN site. The applicable labour law will be stipulated in the forthcoming Invitation to Tender documents.

Particular Features of the CERN Site

- Customs formalities since the installations straddle the Swiss-French border;
- Work in underground areas;
- Work in radiation-monitored areas;
- Work at heights;
- Extent of the CERN domain and distances between sites;

5. RESOURCES

The Contractor shall be able to provide the human and material resources described in the sections below.

5.1 Personnel

5.1.1 Profile qualifications and training

The Contractor shall provide the adequate number of suitably qualified and experienced personnel for the performance of the Services required, including standby services.

The Contractor shall be responsible for the training of its personnel so as to ensure the compliance of the Services with the CERN requirements.

5.1.2 Estimated volume and variations

The average yearly volume of Services is estimated as follows:

- Around 200 accessories installed per year;
- Between 30 and 50 interventions per year;
- 150 additional accessories to be installed in 2027.

The accelerator schedule is divided into the physics run period and a shutdown period. During the physics run period there are few days of technical stops where intervention is allowed. During the long shutdown and technical stops (TS, YETS, EYETS), a significant number of additional resources are needed. The Contractor shall have predefined solutions to reinforce the Contractor's teams present on the CERN site.

5.2 Tooling and Materials

The Contractor shall provide all the necessary tools to provide the Services, including personal tooling and personnel protective equipment.

The Contractor shall provide all the necessary equipment needed to access the installations such as scaffolding, mobile working platforms or ladders, etc. to provide the Services.

Any materials and tools required for the Service on the CERN site shall be conforming to European directives and regulations.

5.3 Languages

The Contractor shall ensure that the personnel speak fluently one the two CERN official languages (French or English) and has at least good knowledge of the other language.

6. OTHER REQUIREMENTS

6.1 Warranty

During the execution of the Contract, the Contractor shall provide a warranty period for the supply and installation of HV cable accessories of at least two years in accordance with the conditions set forth in the General Conditions of CERN Contracts.

7. CERN CONTACT PERSONS

All administrative, commercial and technical correspondence concerning the Market Survey shall be communicated to the CERN Procurement Officer and in copy to the Technical Officer and Procurement.Service@cern.ch. Any communication by or to any other person than the CERN Procurement Officer shall not be valid and have no effect.

Technical Officer	**Tel**	**Email**
Mr. Mathieu Rigollet EN/EL	Tel: +41 22 767 9620 Tel: +41 75 411 14 97	Mathieu.rigollet@cern.ch
In case of absence: Mr. Mario Parodi EN/EL	Tel: +41 22 766 4675	Mario.parodi@cern.ch
Procurement Officer	**Tel**	**Email**
Mr. Anthony Veyret	Tel: +41 22 766 0504	anthony.veyret@cern.ch
In case of absence: Mr. Sebastien Sonnerat	Tel: +41 22 767 3092	sebastien.sonnerat@cern.ch