Moving together
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1. The value of Experience.

More than 70 years of experience in the design and manufacturing of products and solutions for the electrical sector and the millions of pieces of equipment installed all over the world have allowed us to acquire a wide knowledge of the electrical system in its different areas.

We have a large team of highly qualified professionals with proven experience in the field, something which, together with our well-known customer orientation, makes ARTECHE a natural partner, capable of offering a wide range of integral services, covering the areas of:

› Technical training
› Technical Assistance for Renewable Energy Network Connection
› Product-Specialized Services
› Services Specialized in Networks and Systems
› Full Product Life Cycle

Knowledge and experience allow us to understand the particular needs of each electrical installation and each customer, and to propose action plans suited to achieve the expected outcome.
Knowledge is key across all processes, from the specification and design of the installation to its daily operation. Improving the training of your personnel prepares them to make effective decisions in each situation and minimize risks, with the consequent reduction of operating costs.

ARTECHE offers its customers the knowledge and years of experience for their training, both theoretical and practical, in different product and application areas:

**Instrument Transformers**
- Instrument Transformers Approach Course.
- Instrument Transformers Introductory Course.
- Instrument Transformers Operation and Maintenance Course.

**SAS systems**
- Communication systems based on the IEC 61850 standard.

**Connection to the renewable energy grid**

From general concepts to specific knowledge of products and applications, always with the objective that the participants can use this learning to improve their daily operations, whether in the field of technical specification, grid operation, asset management, etc., ARTECHE offers different training modalities to adapt to every need.

*See our Training Catalog for more information.*
3. Technical Consultancy for Renewable Grid Connection.

Technical advice and consultancy for the grid integration of renewable plants: wind, photovoltaic, hybrid with battery storage systems (BESS), etc.

GRID CONNECTION OF RENEWABLE POWER PLANTS.

Phenomena associated with power quality are growing as the penetration of renewable energy sources increases, affecting the stability of the grid and compromising the power supply.

Determining the consequences of connecting a renewable plant to the grid, analyzing the stability of the supply and ensuring that the equipment fulfills its purpose is essential to the profitability of a renewable energy project.

POWER QUALITY STUDIES.

We develop studies in both dynamic and steady-state under extensive scenarios, performing analysis and electrical diagnostics in Medium and High Voltage to obtain an accurate evaluation of the installation and propose solutions adapted to each project.

We have a large team of professionals devoted to and specialized in Technical Analysis and Electrical Studies, equipped with the most advanced and powerful modeling and simulation tools for diagnosis, proposal and validation of power quality solutions.

› Electrical studies
› Power quality: Harmonics, flicker and voltage unbalance
› Steady-state power flow: Reactive power and power factor compensation
› Dynamic power flow: Voltage dips, (LVRT, HVRT), P-f, Q-V droop control
› Electrical losses and voltage drops in installations
› Rapid Voltage Changes (RVC)
› Transients in dynamic regime (TRV): Switching studies, on and off
› Short-circuit and installation dimensioning / Short circuit impedances
› Network Status/Compliance Reports Network Code
› Grid-Code compliance reports
› Modeling and simulation of electrical power systems, generating plants, etc.
› Equipment Specification

Arteche is able to perform the complete package of studies required in Spain by the new Technical Supervision Standard (NTS). Performing these simulations and studies are an indispensable requirement for obtaining the Final Operational Notification (FON) and the Electricity Generation Module Certificate (MGE Certificate) according to EU Regulation 2016/631.

FIELD SERVICE.

Our team of trained and qualified field technicians enable Arteche to take measurements on site, essential for a correct simulation and later verification of the Grid-Code compliance. In addition, we provide support during commissioning, energization, maintenance and diagnostic services.

Expediting maturity and complementing the product is a requirement in all organizations and structures. Increasingly, “full services”, along with transactional and life cycle services, provide a new source of progressive and efficient growth, thus increasing their benefits and providing greater competitiveness to companies.

Electrical Laboratory Testing.

Arteche has several laboratories distributed across all geographical areas, with the capacity to carry out certified tests on any type of electrical switchgear, at any voltage level.

Located in the Arteche Group facilities in Mungia (Spain), the U.H.V.L (Ultra High Voltage Laboratory) is the largest High Voltage laboratory in Spain, and one of the largest in Europe. Opened in May 2013, this laboratory is designed to test instrument transformers of up to 1,200 kV under ENAC accredited certification in accordance with ISO/IEC 17025.

All this, under an efficient management system, which accumulates experience, guarantees the independence of the activity and ensures the confidentiality of results, using the most innovative technological means of the market.

In addition, Arteche is a founding member of BELA (Basque Electrical Laboratories Alliance), thus expanding its test range to the fullest: www.bela-labs.com

Technical advice on Asset Management.

Optimizing the investment in an installation while maintaining the performance objective is possible adapting the specifications of the system and components, not only to the technical standards and applicable local regulations, but also to the real requirements during their use.

A correct specification and adequate maintenance avoids over-sizing - which increases costs unnecessarily. This ensures that external conditioning factors (which may affect the system and its components, causing availability problems and reducing its useful life) are taken into account.

Bringing the experience of years of manufacturing and support to thousands of installations all over the world, ARTECHE offers:
Specialized consultancy for asset behavior:

We specialize in Instrument Transformers, to help get a picture of the current situation of the installed park and of the information quality available. Also a guidance on how to improve it. Among the actions to be carried out there is:

› Analysis, Diagnosis and Report of the quality of the data collected on the assets:
  › Analysis of test protocols information that the customer performs
  › Analysis of data quality and traceability: Detection of missing, incomplete or inconsistent data
  › Trend and status analysis on equipment with good data quality
  › Diagnostic situation
  › Conclusions, Recommendations and Suggestions

› Review, complement and report Technical Specifications of Instrument Transformer Operation and Maintenance, proposing improvements and suggestions for optimizing these processes, and getting an image of the transformer condition with the fullest guarantee:
  › Advice on parameters to be monitored and methods for greater assurance
  › Test analysis and customer information
  › Analysis of evaluable data
  › Technical guidance for possible errors in execution and variants
  › Applicability for more adequate diagnostics. Data interpretation
  › Technical instructions and test protocols
  › Conclusions, Recommendations and Suggestions for improvement and alternatives

Asset Studies, Analysis and Diagnostics:

Where the variables of behavior of the assets are analyzed and depending on the operating conditions, and a diagnosis of the situation is offered with recommendations and suggestions for action:

› Preventive Diagnosis based on Capacitor Transformer Condition:

The maintenance operations typically carried out on Instrument Transformers usually require disconnection from the line, works at height, under voltage, expensive HV test devices to simulate real operating conditions, difficult to handle secondary loads and slow to operate, provisional wiring, the presence of a master element, etc.

As an alternative to conventional methods, Arteche has developed a condition-based preventive diagnosis method, valid for any Capacitive Voltage Transformer, from any manufacturer, for any voltage level and under live conditions. There is no need to plan outages or disconnect the HV lines.

This method is non-invasive, so it is not necessary to intervene in transformers or in their loads, it is not subject to obsolescence, it does not require wiring or patterns; it is a reliable and efficient method, based on the CVT accuracy verification, that periodically identifies the deviation of the accuracy of an equipment, thus giving an idea of how its isolation can evolve over time.
This diagnostic detects which units might be failing, and what level of degradation they might have. There are no models or simulations: CVTs’ accuracy is measured under real operating conditions.

For the application of the diagnostic method, data is collected and action work is planned for later execution. Voltage and current values are recorded for each unit and a general visual inspection of the transformers and their accessories is carried out as well.

In the final phase of analysis and diagnosis, the data obtained is evaluated, thereby generating Recommendations and Considerations depending on the state and condition of each asset.

The most characteristic advantages of the method are that it allows us to diagnose the capacitor transformer in service and without the need for a standard transformer, reducing the costs of operation. In addition, it detects the level of deterioration in order to plan the necessary actions and investments, reducing financial and operating costs as well. As no active high-voltage parts are handled, the risk to people and installations is practically zero.

The periodic integral diagnosis service of all the installed base of CVTs with this method allows our clients:

› To have statistics on the aging of the installed base according to brands, models, location, use, etc.
› To adapt maintenance and replacement plans to real needs and risks.
5. Specialized services in Networks and Systems: Solutions and Innovation at your service.

Our model and strategy is based on a detailed situation analysis of the networks and systems where operation is taking place, on evaluating the different scenarios and on providing a clear and objective response, recommendations, suggestions, solutions and actions to reduce inefficiencies and to increase the network’s performance potential.

Technical Consulting in Networks and Systems.

› **Technical Consultancy for Renewable Energy Network Connection**

› **Specification of new installations, extensions and retrofits:** Aimed at all types of electrical projects - whether it be new ones or extensions or adaptations - determining the most appropriate standards, requirements and procedures for each project, based on our customer’s areas, and also covering all aspects of the application, construction, manufacturability and regulatory compliance of equipment and systems that integrate it.

› **Analysis of the condition of installations and components and recommendations, even via electrical studies:**
  Accompanying our customer in the installation, from the moment of information gathering, data collection, prior check-ups, as well as making suggestions and recommendations based on our experience or even providing guidance towards modeling, studies or simulations that may be necessary.

› **Supply solutions to mitigate the harmful effects in the analyses and studies, guaranteeing a correct and satisfactory operation of said transformer from start to finish:**
  Derived from electrical studies, Arteche proposes specific and adequate technical solutions for the different network faults and disturbances, both for resonant phenomena, for example, as well as for harmonics situations or transients in a system.
  These solutions, which range from field assistance for data collection and information gathering, or even staff training, personalized attention during installation, all the way to the necessary equipment supply, assembly, installation and commissioning supervision, jointly and fully guaranteeing the network's correct operation, increasing its efficiency and reducing personal and economic risks.
Studies, Analysis and Diagnostics in Networks and Systems.

Whether it is to guarantee the reliability of a system, its optimum performance or its correct compliance with regulations, the electrical study is the ideal tool for any type of installation or network to be analyzed. Arteche offers a wide range of electrical studies devised for analyzing network situations and behavior, as well as for proposing efficient solutions either to mitigate harmful effects and fatal consequences or to improve network performance, complying with the regulatory standards.

› Ferroresonance Studies:
An analysis and study of ferroresonance is recommended for any installation where inductive voltage transformers are already mounted, or where new positions, changes or replacements, reconditioning, replacements of said transformers, etc. - which depend on an associated switch exposed to high switching operations of connection and disconnection of its respective position - take place. Overall, when changes in plant topologies take place, changes in plant operating sequences, modifications or additions to positions adjacent to the inductive transformer and changes in parameters characteristics, and in series and parallel capacity values.

› Power Flow, Harmonics Studies, etc.

› Energy analysis for grid code suitability.

Technical Engineering.

In order to address the problems associated with electrical systems of power, control, signal processing, as well as the electrical systems of energy transmission and control, Arteche proposes the compilation and documentation of all the information of an electrical project in the following disciplines:

› Substation Electrical Engineering: where the schemes developed and the interconnection of all the systems that make up the electrical project are taken into account
› Engineering of Control Logic Functions: graphically documenting all the control logic functions and configurations of the different systems
› Software Engineering: working, for example, with databases and other software developments

ARTECHE provides Support during the entire lifecycle of the product, to guarantee its reliability and availability.

Over the years, we have created close bonds with our customers, fostering collaboration beyond the supply of a product, and accompanying them throughout the life of the equipment. This has allowed us to develop knowledge of the key factors that influence the equipment’s correct operation - from its installation in the field to the end of its life cycle.

In addition, Arteche’s participation in IEC Working Groups, CIGRÉ committees, and other international collaboration groups allows us to learn and provide knowledge regarding the latest advances in materials, installations, test instrumentation, electrical phenomena, etc. We can help you know what affects the correct functioning of the equipment, how to measure it, and how to assess the results obtained.

Commissioning:

Nobody better than the manufacturer to verify the correct installation of the equipment in the field, ensuring that there will be no problems during the commissioning, and no operations are performed which may affect the guarantee. We offer the following services associated to Arteche’s products:

› Assembly Supervision
› Pre-operational testing
› Start-up assistance

Thanks to their knowledge on Arteche equipment as well as surrounding elements, Arteche field staff will help you to perform these operations in a safe and efficient manner.
Maintenance:

Applying a few small maintenance actions on any equipment will help avoid unexpected failures, extend the useful life and optimize the operation of the system. Arteche will help you draw up an operation plan to be carried out on the equipment supplied, with the aim of maximizing the equipment’s useful life.

By means of advanced tools, ARTECHE offers a wide spectrum of analysis and diagnostics, in order to know the situation of the installation and its components. Tailor-made programs will improve the economic impact of the installation and identify the specific risks upon which it is necessary to act.

› Checking the state of the components.
› Execution of diagnostic tests, measurement of electrical parameters and insulation assessment.
   (Resistance, Capacitance, dielectric dissipation factor, oil sampling and DGA analysis, SF6 gas parameter analysis, etc.)
› Optimization of the power quality solution’s operating point. Measurement of parameters and proposal for re-powering or retuning to return to the ideal operating point.

Warranty Extensions:

ARTECHE can offer guarantee extensions for their equipment, always subject to a previous analysis of use and conditions.
***This catalog is supplemented with the product and service catalogs of each of Arteche’s technological areas***

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