



INAEL Total Skid

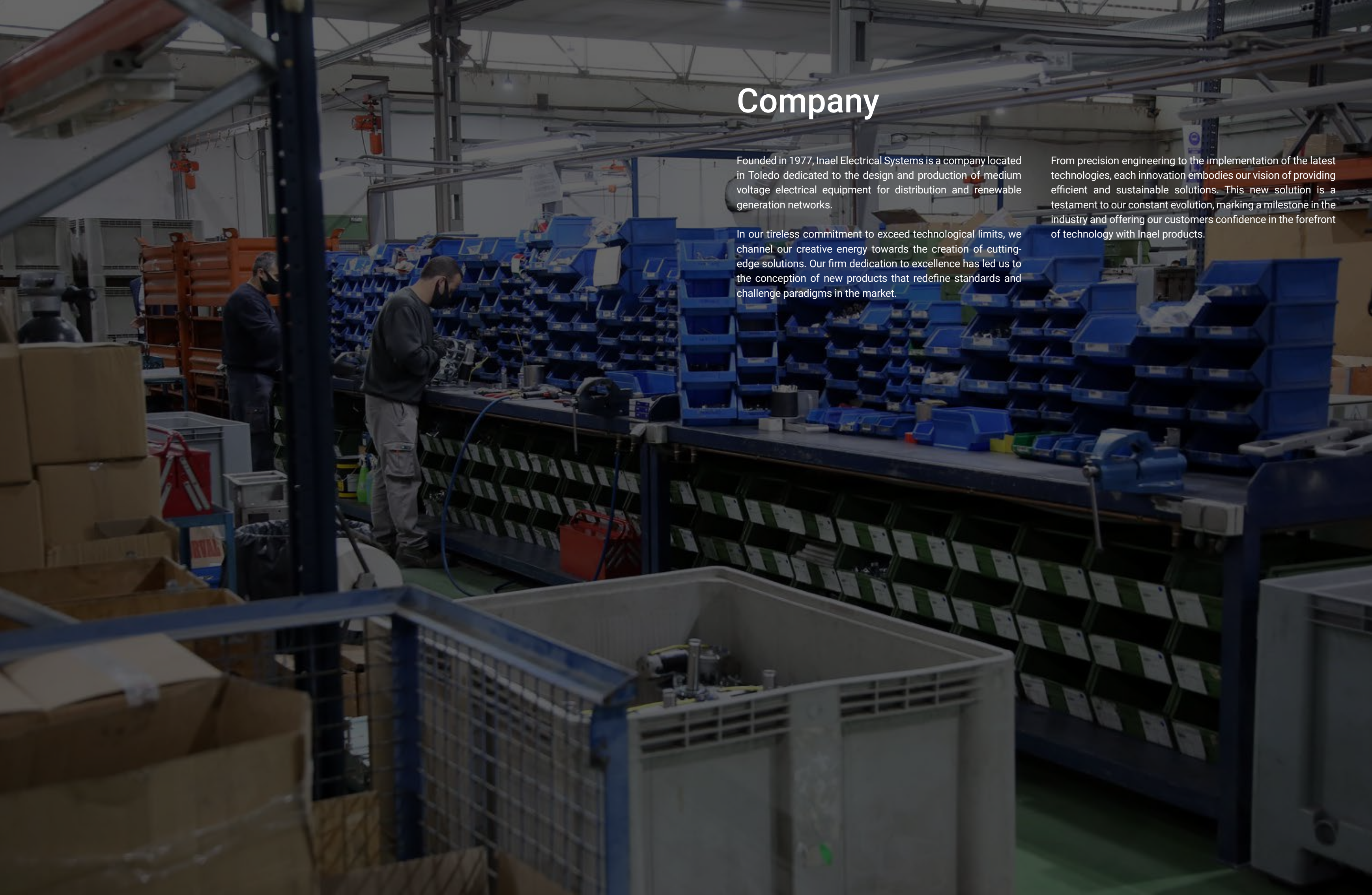
Integrated metal platform for String or Central Inverter

Company

Founded in 1977, Inael Electrical Systems is a company located in Toledo dedicated to the design and production of medium voltage electrical equipment for distribution and renewable generation networks.

In our tireless commitment to exceed technological limits, we channel our creative energy towards the creation of cutting-edge solutions. Our firm dedication to excellence has led us to the conception of new products that redefine standards and challenge paradigms in the market.

From precision engineering to the implementation of the latest technologies, each innovation embodies our vision of providing efficient and sustainable solutions. This new solution is a testament to our constant evolution, marking a milestone in the industry and offering our customers confidence in the forefront of technology with Inael products.





INAEL Total Skid

All in one

The INAEL Total Skid solution provides a turnkey solution that simplifies project design and minimizes installation costs in1 photovoltaic solar plants.

This equipment, consisting of a metal platform, is supplied fully integrated for 24 or 36kV with everything necessary for the conversion of direct current to alternating current and its transformation from LV to2 MV, up to 10MVA of output power, and can be configured to adapt to the needs of any client, one or two photovoltaic inverters, a step-up transformer, medium voltage switchgear and auxiliary services, so that the final product3 becomes a system ready to install and connect in the field.

It does not require any type of housing or covering, since all the elements it presents are suitable for outdoor installation, behaving insensitively to environmental variations and extreme temperatures (-20° +45°).

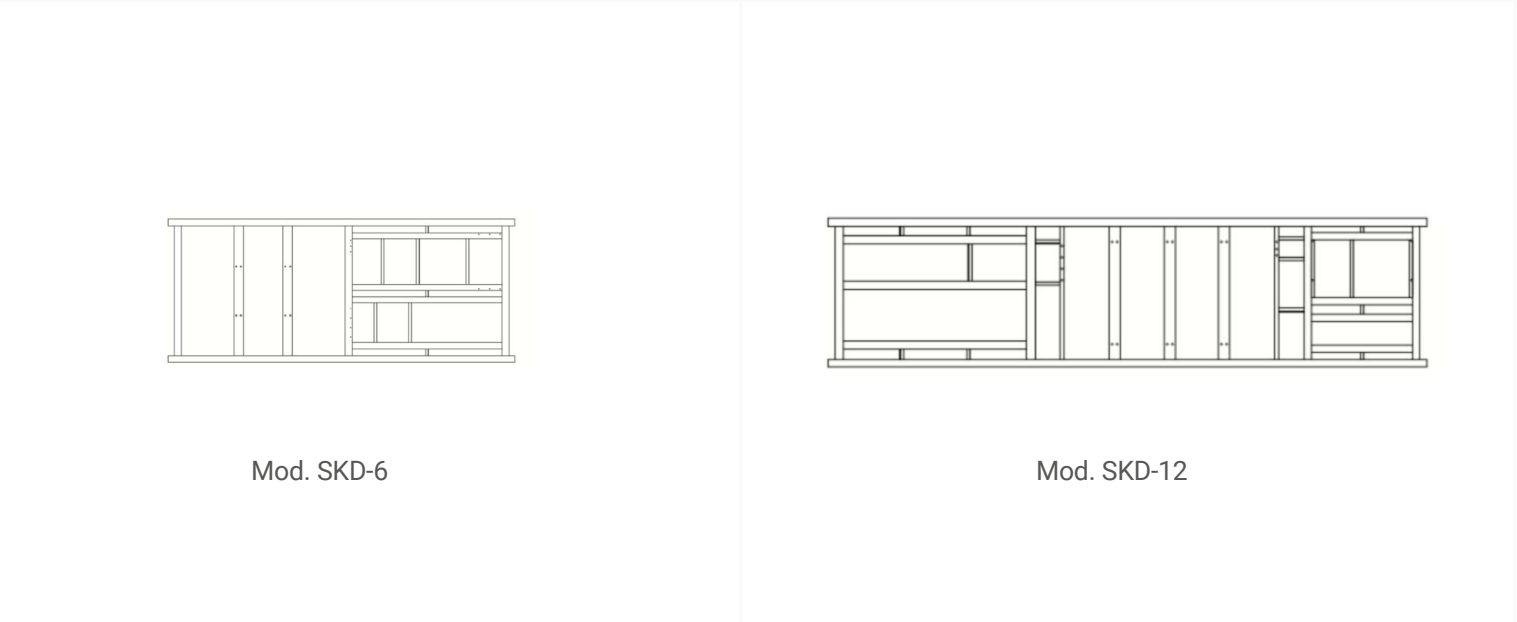
INAEL Total Skid is also ideal for the international market, being suitable for transport in 40' HC OPEN TOP containers.



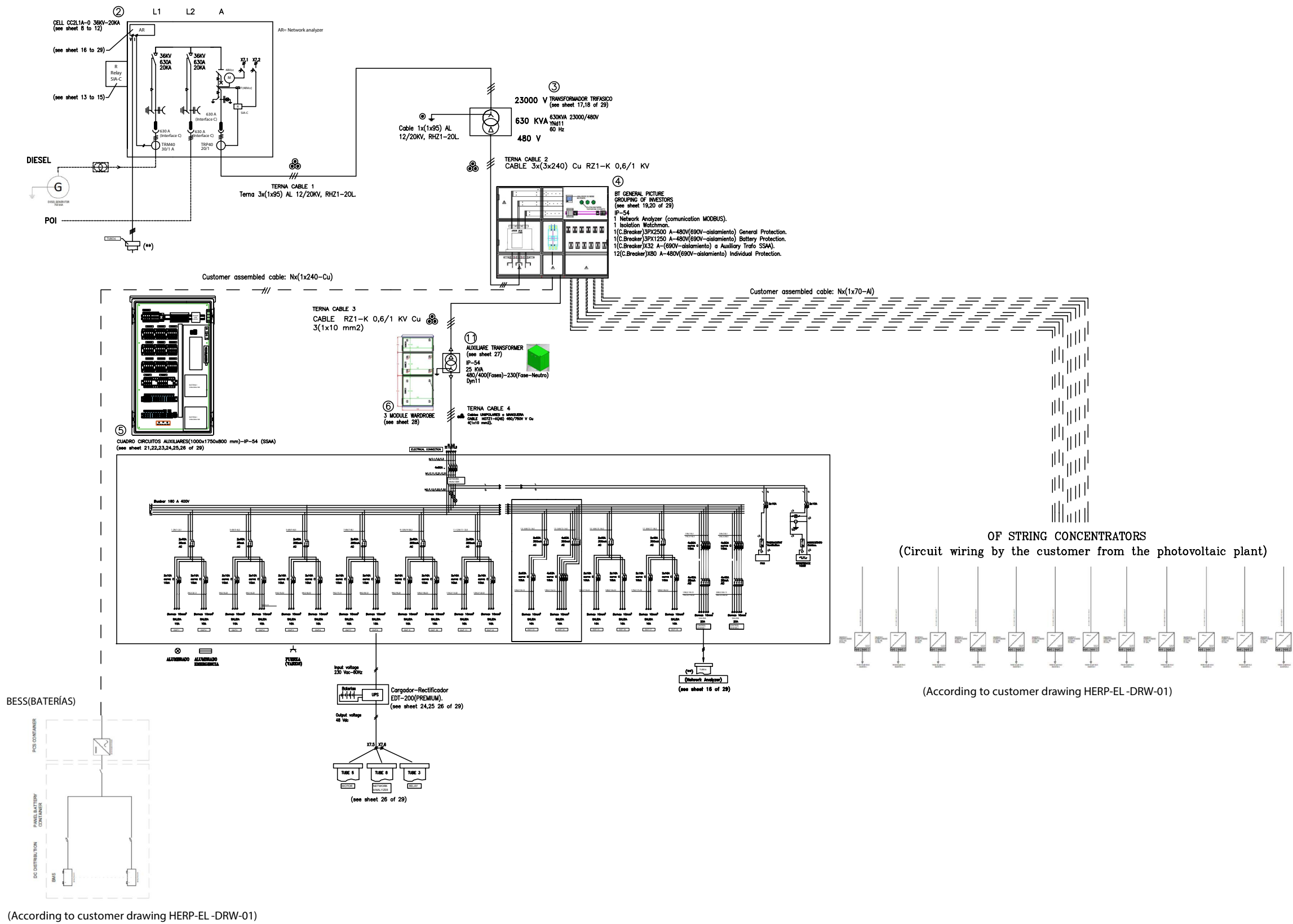
INAEL TOTAL SKID consists of a metal platform that integrates:

- Outdoor ventilated transformer up to 7.5MVA power.
- INAEL MV outdoor switchgear (configuration according to power).
- Outdoor LV electrical panel with fuse or circuit breaker protection for STRING inverters OR central inverter cabinets.
- Auxiliary Services Panel
- Communications Panel
- Safety elements
- Oil collecting tank with filter.

Structure



Esquema Tipo 1





Outdoor Transformers

Power from 250 up to 3000 kVA. 24 kV Series

24kV Insulation level

The transformers manufactured by Inael have been designed and built to comply with the requirements established in the UNE 21.428, EN-60076, IEC 76 standards. These meet the following characteristics:

- Transformadores trifásicos 50Hz y 60Hz*.
- Three-phase transformers 50Hz and 60Hz*
 - Indoor or outdoor mounting.
 - Submerged in liquid dielectric, in accordance with the UNE 21-320/5-IEC 296 standard.
 - The material used in the windings is Aluminum.

Technical Data

Serie · 24kV											
Power	kVA	250	400	630	800	1000	1250	1600	2000	2500	3000
Secondary voltage	V	420V *									
Regulation	%	±2,5 ±5%*									
Connection group		Dyn11*									
Dielectric liquid		Mineral oil*									
No-load losses	W	306	445	613	646	790	979	1291	Data under request		
Load losses	W	2523	3598	5050	6336	8341	10450	13291			
Short-circuit impedance at 75°	%	4	4	4,15	5,99	5,83	6	6			
Acoustic power level	dBA	42	43	42	36	40	48	50			
Efficiency at full load	%	98,88	99	99,14	99,13	99,09	99,08	99,10			
Efficiency at 75% load	%	99,09	99,18	99,30	99,30	99,27	99,27	99,27			

Serie · 36kV											
Power	kVA	250	400	630	800	1000	1250	1600	2000	2500	3000
Secondary voltage	V	420V *									
Regulation	%	±2,5 ±5%*									
Connection group		Dyn11*									
Dielectric liquid		Mineral oil*									
No-load losses	W	306	451	617	646	646	802	978	1291	Under request	
Load losses	W	2593	3572	5087	6336	6336	8213	10719	13291		
Short-circuit impedance at 75°	%	4,43	4,49	4,20	5,96	5,99	5,96	6	6		
Acoustic power level	dBA	42	43	42	36	36	40	48	50		
ReEfficiency at full load	%	99,07	99,19	99,09	99,11	99,13	99,11	99,07	99,10		
Efficiency at 75% load	%	98,75	99	99,26	99,30	99,30	99,28	99,28	99,07		

*Options upon request
NOTE 1 Data referring to double-voltage transformers on the MV side

Standard supply

- Off-load tap changer (voltage regulation switch).
 - Mineral oil, other options upon request.
 - Lifting lugs.
 - Dragging lugs.
 - Porcelain secondary bushings (connection blades included).
 - Grounding terminals.
 - Drain valve.
 - Thermometer pocket.
 - Nameplate.
 - Installation and maintenance manual.
 - Filling device.
 - Radiator panels on all four walls.
- 2-contact thermometer.
 - Protection relay.
 - Plug-in or bolted type A, B or C insulators (medium voltage).
 - Clamping elements for installation.
 - Other paint types and thicknesses available upon request.
 - Outdoor oil collection tank.
 - Terminal cover box.
 - Pressure relief valve.

Technical Datasheet

The following outlines the dimensions and weights for transformers with dual primary voltage below 24 kV and power ratings from 250 kVA to 3000 kVA.



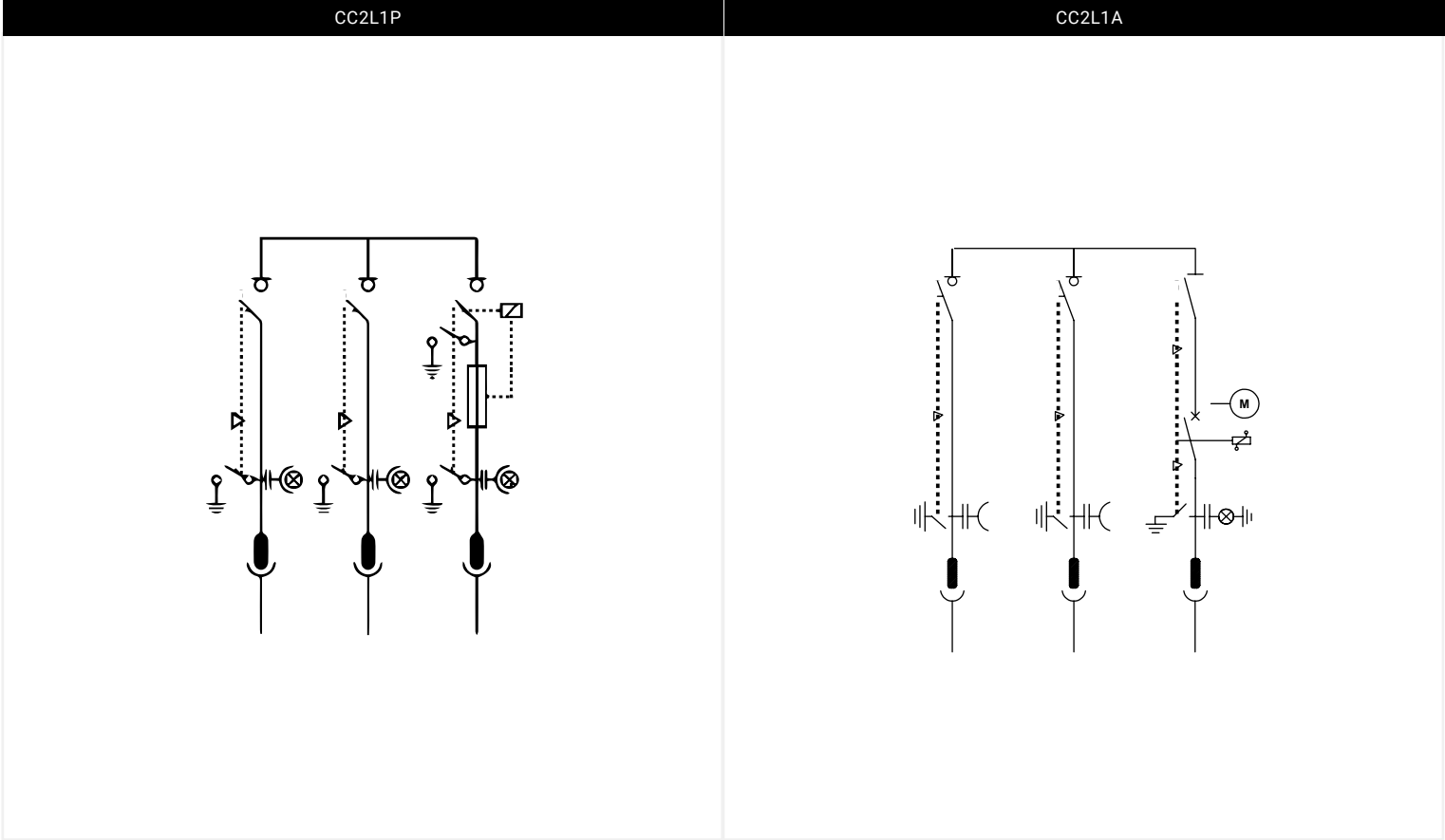
Outdoor Medium Voltage Switchgear

Since 1998, Inael Electrical Systems has been designing and manufacturing medium voltage switchgear. Cabel units are built in compliance with international standards and are approved by the main utility companies worldwide.

More than 90% of the components used in a Cabel medium voltage unit are manufactured and assembled at our production facility located in Toledo, Spain.

Optional integration of protection relay according to customer requirements::

- Monitoring capabilities available
- Designed for remote operation
- Internal arc gas exhaust through chimney system





Outdoor Low Voltage Electrical Panel

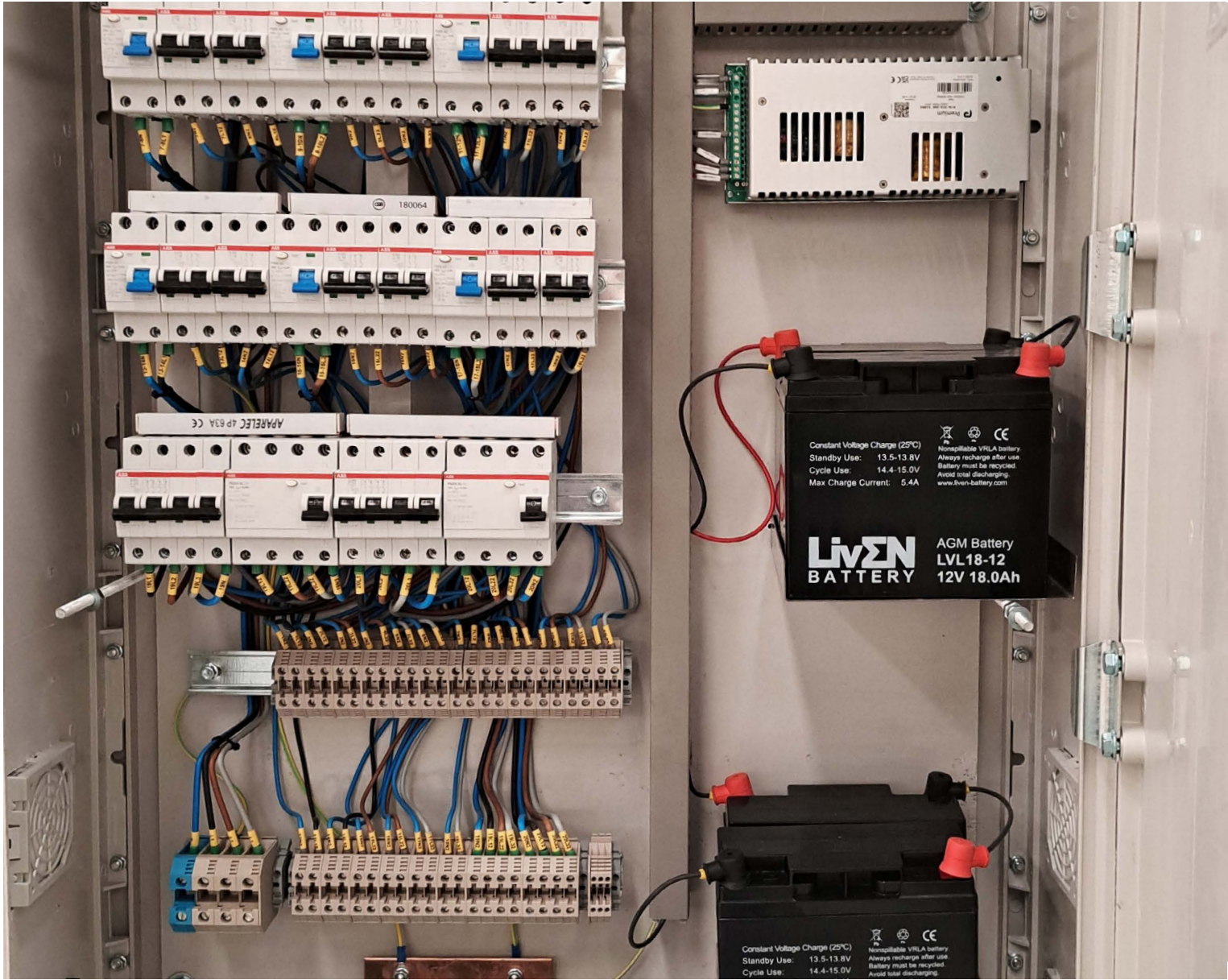
Outdoor LV Panel

INAEL presents its new panels for the grouping of string inverters on the AC side, designed for both indoor and outdoor installations, operating at voltages from 400 V to 800 V AC. These panels are available in a wide range of amperages, input configurations, and protection devices, either with molded case circuit breakers or BTVC fuse bases (Closed Vertical Tripolar Base). These panels are connected to the transformer located on the skid. The LV panels (CBT) receive input cables from the inverters through BTVC NH 00/1/3 fuse bases or circuit breakers. All components are type-tested and certified for operation up to 800 Vac.



Description

- Metallic or polyester enclosure
- Bottom cable entry | BTVC NH 1/3 fuse bases or circuit breakers
- Top cable exit via Telergon load break switch or molded case circuit breaker;
- Rated current up to 4000 A for 800 V AC
- IP55 protection rating
- Manufactured in compliance with UNE-EN-61439-5 standard



Auxiliary services panel

These LV Auxiliary Panels are manufactured for outdoor use (polyester material) with an IP-54 protection rating, with an IK-10 mechanical impact protection rating and are custom made.

They are responsible for providing the necessary protections (overcurrent, indirect contacts and overvoltages) to the auxiliary circuits, both single-phase and three-phase, that the Skid type center may have.

- The panel has the following protection and switching elements:
- 2P, 3P and 4P circuit breakers.
 - 2P and 4P residual current circuit breakers with 30 and 300 mA.

It also incorporates an ECS-200 type charger (230 Vac/48 Vdc).
For Medium Voltage, it has a network analyzer with RS-485 port (MODBUS communication).
They also have light, Schuko socket, each circuit is identified with its label.



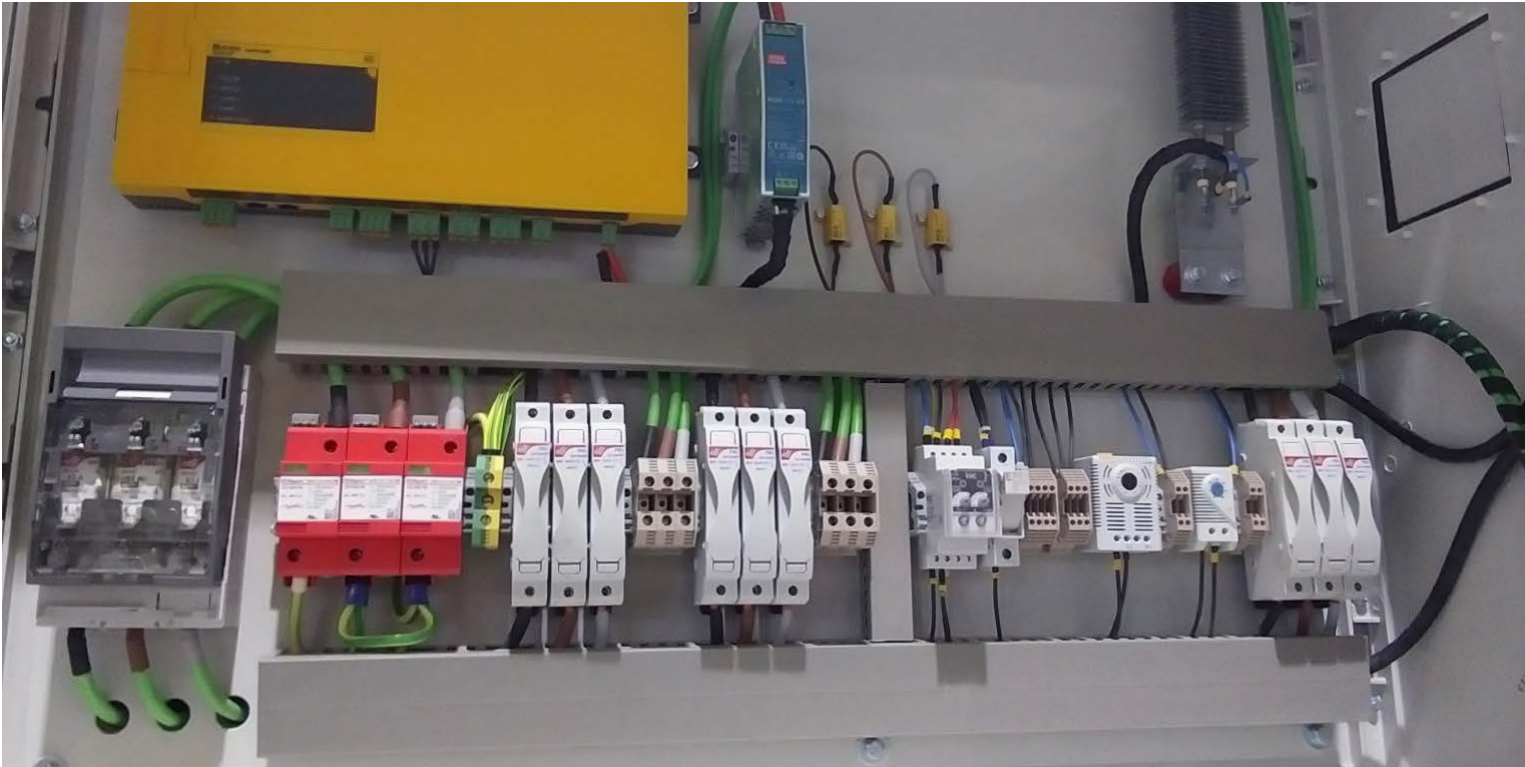
Protection panel for inverter grouping center in SKID

These LV Protection Panels are manufactured for outdoor use (polyester material) with an IP-54 protection rating, with an IK-10 mechanical impact protection rating and are custom made.

Generally, the input of the inverters is done either with circuit breaker protection or with BTVC fuse bases, these are usually in the lower right module.

In the upper right module there are the busbars and equipment such as:

- Network Analyzer.
- Insulation monitors.
- Overvoltage protection devices
- Busbar voltage presence indicators on the door.
- Light with 230 Vac Schuko socket (50/60~Hz).
- 100 W heater and 110-250 V.
- Heat thermostat with adjustment range of 0° to 60°C.



General protection is provided by an open-frame circuit breaker (depending on power rating), located in the middle module of the panel.



The upper module contains part of the copper busbar system along with the current transformers.



Modular Cabinet

Cabinet for Auxiliary Services Transformer + Additional Elements + RAC

- Made of glass fibre-reinforced polyester, IK-10, IP55, Class II electrical insulation.
- Dimensions: 2,250 mm height × 1,000 mm width × 600 mm depth + 100 mm high metal base plinth.
- Side ventilation with IP55 filter (as shown in the drawings). Door ventilation with DV-2 louvres (as shown in the drawings).
- Cabinet configuration: 510 CC + 710 CC + 1010 CC T1B, with retractable handle and padlockable triangular key lock.

Mechanical Openings

- Opening between upper and middle cabinet: 700 × 200 mm
- Openings between middle and lower cabinet: 4 circular openings Ø 50 mm
- Bottom closed off with 100 mm metal plinth and floor anchoring kit
- 2 IP67 cable glands for cable entry (pending final cable diameter)
- IP-rated bottom plates

Mounting Plates

- Upper cabinet: YES (600 mm depth), 5 mm thick polyester material
- Middle cabinet: YES (600 mm depth), 5 mm thick polyester materia
- Lower cabinet: NO (see attached drawing)



Testing

Once the manufacturing of the equipment included in this supply is completed, tests and inspections are carried out to ensure that the equipment meets the required specifications and can operate safely without posing any risk to people and/or equipment.

The following tests will be included in the protocols supplied with the equipment:

Verification

- Dimensional check (length, height, width).
- Weld inspection.
- Assembly of parts and components.
- Adjustment of doors and gates.
- Airtightness.
- Finishing details.

Mechanical Tests

- Paint scheme (thickness, adhesion, tone).
- Torque checks.

Coating verification according to IEC 60439-1

- Complete visual inspection of parts and components.
- Electrical verification according to drawings.
- Interconnections.
- Dielectric strength test.
- Insulation measurements.

Transformer tests according to IEC 60076

- Complete visual inspection of parts and components.
- Winding insulation test using 5000 Volt Megger.

- Turns ratio test on all taps (TTR).
- Measurement of winding resistance for HV and LV windings
- Verification of vector group
- Applied voltage test at power frequency
- Induced voltage test (double voltage
- Measurement of no-load losses
- Measurement of short-circuit losses
- Dielectric fluid test
- Anti-corrosion protection test

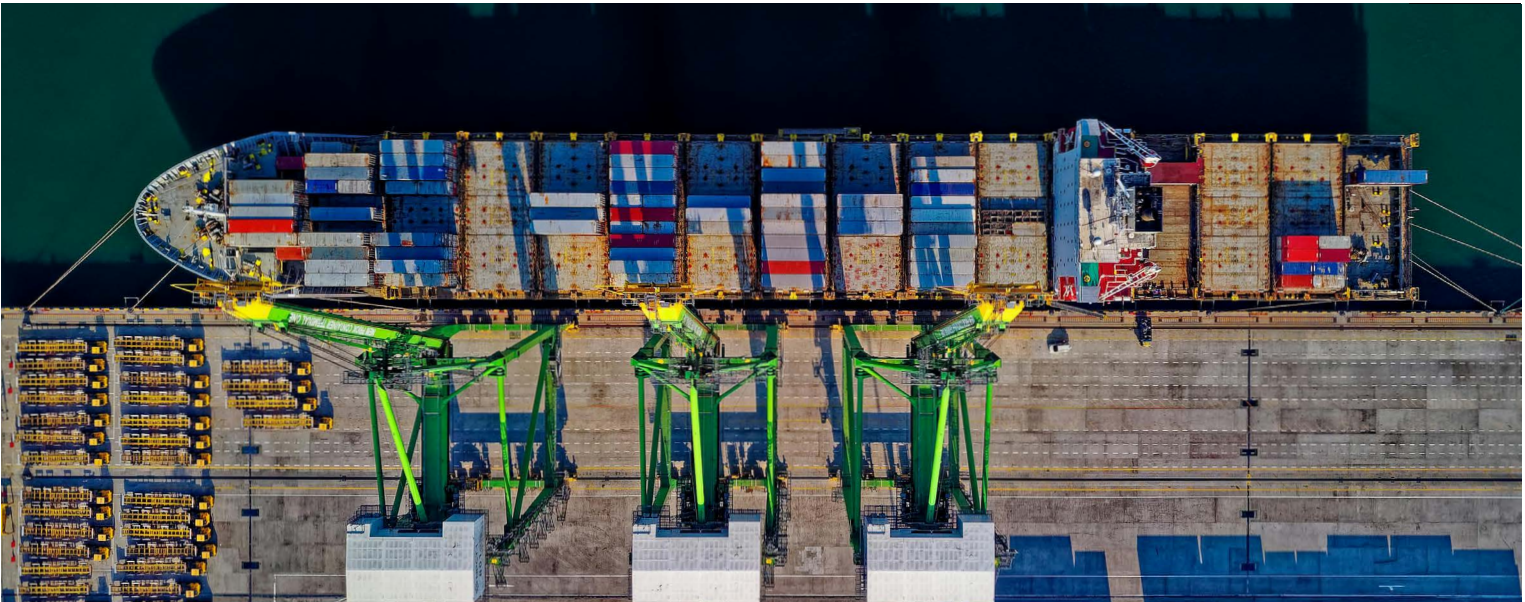
Tests on switchgear according to IEC 62271-200:

- Complete visual inspection of all parts and components
 - Measurement of SF6 gas concentration
 - Measurement of gas leakage rate and filling pressure
 - Mechanical operation test
 - Measurement of main circuit resistance
 - Power frequency withstand voltage test on the main circuit
 - Voltage test on auxiliary and control circuits
 - Measurement of contact opening and closing times
- Standard: IEC 62271-202



Transport

- Inael Total Skid is suitable for transport using 40 HC Open Top containers.



Advantages of INAEL Total Skid

Choosing the INAEL Total Skid system offers several key benefits:

- **Versatility:** Various solutions tailored to all types of projects.
- **Full Integratio:** A comprehensive solution that incorporates all necessary components. It simplifies installation, reduces space requirements, and streamlines operational management.
- **Cost-Efficiency:** Minimises installation costs. Simplifies project design, reducing engineering hours. A more cost-effective solution without compromising quality.
- **Energy Efficiency:** The complete integration of components within the INAEL TOTAL SKID platform contributes to higher energy efficiency. Optimised layout and interconnection of elements reduce energy losses and improve overall system performance.
- **Enhanced Safety:** Full integration not only simplifies the design but also improves safety. Fewer external connections reduce potential failure points, and the compact design enhances management of electrical safety aspects.
- **Regulatory Compliance:** The INAEL TOTAL Skid platform, designed and built as a complete solution, facilitates compliance with industrial standards and regulations – a key factor in highly regulated environments.
- **Logistics:** Suitable for road transport or for shipping in 40' HC OPEN TOP containers for sea transport.



GENERAL CONDITIONS OF SALE

TODOS LOS PRECIOS, CÓDIGOS Y REFERENCIAS INDICADOS EN LA PRESENTE TARIFA, ESTÁN SUJETOS A VARIACIÓN SIN PREVIO AVISO

GENERAL TERMS

Any sale made by the Seller shall be expressly subject to the Buyer's full acceptance of the terms and conditions specified below and the waiver of the Buyer's general conditions of purchase, which acceptance and waiver shall be deemed to have been made on any order placed by the Buyer.

PURPOSE AND SCOPE OF THE OFFERS

The applicable prices are those shown in the Seller's price list in force on the date of the order.

The prices and conditions for specific offers shall relate exclusively to the products offered, valid for one month, unless otherwise stipulated.

The acceptance of an offer must be materialised with an order to the Seller. This shall be understood to be definitively accepted after the express and unreserved acceptance of the order by the Seller. The modifications and/or variations to the scope, deadlines or other terms of the contract that may be proposed by one of the parties must always be notified in writing and accepted by the same means.

TERMS OF PAYMENT

Unless special agreements have been made, all our sales are insured by an insurance company and will be made with a maximum payment of 60 days from the date of invoice in accordance with the provisions of Law 15/2010, of 5 July, amending Law 3/2004, of 29 December, which establishes measures to combat late payment in commercial transactions, without exceeding in any case the maximum periods established therein. For orders 300, payment shall be made in advance.

In the case of international sales and purchases, when payment is made by documentary credit, the buyer must obtain the seller's acceptance of the terms of the letter of credit and of the bank confirming it before it is issued. Due to the handling costs borne by the seller, a minimum invoice amount of 150€ will be applied to all sales.

TRANSPORT AND INSURANCE

For shipments within the Peninsula, shipments that exceed a net of 2000€ will go carriage paid, for any other destination the goods will be placed in EXW Toledo conditions. For shipments carriage paid, no transport claims will be accepted after 48 hours from delivery. In cases of urgent shipments, requested by the customer, such goods will always go carriage paid. The goods always travel at the risk of the buyer, who, in case of damage or delay, must make the relevant claim to the companies or transport agents, within 48 hours of delivery.

TOOLING AND PACKAGING

The tools made for the manufacture of special products shall be the responsibility of the customer, and shall be deposited at INAEL and used exclusively for the orders for which they were made. They may only be used for third parties with the express authorisation of the customer, and shall remain at INAEL's disposal five years after the last use. The delivery of the tools must be expressly agreed with the order. All materials shipped from INAEL to customers are in standard packaging suitable for road transport, any other type of specific packaging requested by the purchaser will be at the customer's expense.

MANUFACTURING

In the event of force majeure of any kind, including those caused by an obvious lack of raw materials, manufacturing difficulties, strike, lack of communication or catastrophe, INAEL is automatically released from any commitment made, and reserves the right to cancel orders pending production without prior notice.

DELIVERY TIMES

Delivery times are approximate, unless the Seller expressly accepts firm delivery times.

Delivery times shall commence from the latest of the following dates:

- Delivery times are approximate, unless the Seller expressly accepts firm delivery times.
- Delivery times shall start to run from the latest of the following dates
- Date of unreserved acceptance of the order by INAEL.
- The receipt by INAEL of the information at the customer's expense that is necessary for the execution of the order.
- The receipt by INAEL of the advance payment that is necessary for the execution of the order.

If the preconditions have not been fulfilled within 6 months from the existence of the contract, the contract shall be null and void and the customer shall waive all claims for damages. In the event that the customer requests the postponement of the delivery date, INAEL may invoice with the provision of the products on the agreed date, without prejudice to the passing on to the customer of the storage costs to be borne.

GENERAL CONDITIONS OF SALE

OWNERSHIP OF THE GOODS AND RETENTION OF TITLE

INAEI shall remain the owner of the goods until full payment of the invoice sales price, even if there is a bill of exchange. The customer is authorised to process the goods, but this authorisation shall cease as of right if the customer does not strictly observe the stipulated conditions.

RETURN OF MATERIALS

Returns are not admitted without the express intervention or consent of INAEL, and in no case for special materials. In the event that the return is accepted, all transport, revision and repair or verification costs for a new set-up will be the exclusive responsibility of the sender. No returns of any type of material will be accepted after one year from the date of delivery.

TESTS

Returns are not admitted without the express intervention or consent of INAEL, and in no case for special materials. In the event that the return is accepted, all transport, revision and repair or verification costs for a new set-up will be the exclusive responsibility of the sender. No returns of any type of material will be accepted after one year from the date of delivery.

GUARANTEE

We guarantee the products of our construction for one year, from the date of leaving the factory, against all defects in materials or manufacturing defects, obliging us, during this time, to repair or replace at our expense and in our factory, in the shortest possible time, any part recognized as defective, without compensation for any of the parties, not admitting responsibility for direct or indirect damages that may arise.

In order for our warranty to remain intact, it is essential to comply with the provisions of our operating manuals.

To ensure that our warranty is not affected, it is essential to comply with the instructions in our installation and maintenance manuals. Likewise, the notification or repair of our products without our intervention or consent, implies the termination of our warranty on them.

The repair of the product or part of it, its exchange or replacement during the warranty period, in no case will cause the extension of the warranty period of the product.

NORMATIVA MEDIOAMBIENTAL

It is the responsibility of the waste holder to collect and dispose of the waste or to have it collected and disposed of. For professional electrical and electronic equipment affected by European Directives 2002/96/EC of 27 January 2003 and 2006/66/EC of 6 September 2006 as well as the regulations implementing them, the organisational and financial responsibility for the collection and processing of waste arising from such equipment placed on the market after 13 August 2005 has been transferred to the direct purchaser who accepts it. The direct purchaser undertakes to assume responsibility for the collection and disposal of the waste arising, as well as for its processing and recycling. Failure by the purchaser to comply with these obligations could lead to the application of the criminal sanctions of each member state of the European Union. INAEL hereby warrants that the substances, either alone or contained in products it has incorporated for the production process in question, have been used in accordance with the provisions relating to registration, authorisation and limitation.

JURISDICTION

In the event of disputes, the Courts and Tribunals of Toledo shall have jurisdiction, to which both parties expressly agree to submit, waiving their own jurisdiction.



Inael Electrical Systems, S.A.
C/ Río Jarama, 7, 45007 Toledo,
España

+34 925 233 511
+34 925 231 095
inael@inael.com