



EnverTec

www.envertec.eu

Add.: 26 Luís Amador Street
18014 – Granada (SPAIN)

info@envertec.eu

Polymeric Insulators

DOSSIER ENVERTEC –CAON. 2 013

Informative Document

EnverTec

&

**CAON ELECTRIC
INSTALLATION Co. Ltd.**

This document is made up of fourteen pages and four annexes.



INDEX

1. INTRODUCTION	3
2. MANUFACTURER'S PROFILE.....	3
3. MATERIALS	4
4. PRODUCTION PROCESS.....	4
5. TESTING	5
6. ENVERTEC'S TRACEABILITY	7
7. WARRANTY	8

ANNEXES

ANNEX I:	SUPPLY REFERENCES
ANNEX II:	MARKING AND PACKAGING
ANNEX III:	TAILORED SOLUTIONS
ANNEX IV:	IMAGE GALLERY



1. INTRODUCTION

ENVERTEC's commitment to supply our customers top quality products and services has been always present in this company's mission.

For that we deeply trust in the knowledge, expertise and experience of our own staff but we also feel it is mandatory to establish a really close relationship with our customers, in order to know their real needs, and with our suppliers, in order to obtain the desired results. And those relationships must be based on confidence, professionalism and search of a common objective: a quality and competitive product accord to the final customer's needs so that the result is profitable and fruitful for every involved party.

Considering that philosophy, the present document tries to show the relationship between **ENVERTEC** and one of our suppliers in the polymeric insulator industry, the manufacturer **CAON ELECTRIC INSTALLATION Co. Ltd.**

2. MANUFACTURER'S PROFILE

CAON ELECTRIC INSTALLATION Co. Ltd. (CAON) is a worldwide reference in the field of Polymeric Insulators, boasting a production area of over 27 000 squared meters located in the province of Zhejiang, China.

CAON's main activity is polymeric insulator production to supply electrical overhead lines, substations and railway utilities, with over 20 years of experience in that industry.

To accomplish their objectives of effectiveness, efficiency and top-quality products CAON has more than 100 production employees and a Quality Department managed by a team of five expert technicians.

CAON is a reference and one of the world's biggest exporting manufacturers in this industry.

Annex I in this document shows a list of CAON's supply references specifying type of product and country, between years 2 006 and 2 010. That list includes also several electrical utilities like the following:

- CODENSA SA.ESP – Colombia.
- ENDESA - Spain.
- ENERSIS SA – Chile
- ETALON FIRM Ltd. - Russia
- HONEYWELL - USA.
- IBERDROLA – Spain.
- LINE WIDE Ltd. – South Africa.
- PUBLIC POWER CORPORATION S.A. – Greece.



CAON has a Quality Management System implemented according to Standard ISO 9001:2008 issued by **Direct Assessment Services – DAS Certification** www.das-china.com -, member of multilateral recognition agreement **IAF** (<http://www.iaf.nu/>), Certificate number Q14120220, meeting the requirements to “Manufacture and Service, Design and Development of Silicone Insulator, Epoxy Resin Rod, Arrestor, High-Pressure Fuse Cutout, High-pressure isolated Switch”.

3. MATERIALS

CAON uses first class raw materials in their insulators in order to get the required features and characteristics.

DIELECTRIC HOUSING:

- Silicone rubber HTV without EPDM.
- Water-repellent. Level Hc1.
- Minimum silicone thickness of 3 mm and it reaches 4 mm in the metal fitting – core interface area.

DIELECTRIC CORE:

- Epoxy resin with fiberglass.
- Hydrolysis resistant.
- Acid-penetration resistant.

4. PRODUCTION PROCESS

CAON's insulators are manufactured according to a specific production procedure which takes into account each step of the process:

- Raw material provider acceptance criteria and quality control at reception,
- required venues and production conditions,
- manufacturing equipment,
- required internal quality control activities, including quality control during production process as well as at the end of it on final product,
- testing devices and measuring systems and their periodic calibration in accredited laboratories,
- packing and shipping according to customer's specifications.



DOSSIER ENVERTEC –CAON. 2 013

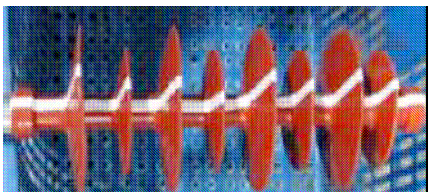
The production procedure defines the operations to be done in each stage of the production by means of a set of specific work instructions and quality control activities, and enables the system to keep the traceability of the process from raw materials to final product.

5. TESTING

ROUTINE AND SAMPLING TESTING IN OWN LABORATORIES.

Besides internal quality control test and measurements carried out during production process, CAON performs in their own laboratories the specified routine and sampling tests according to the corresponding Standard.

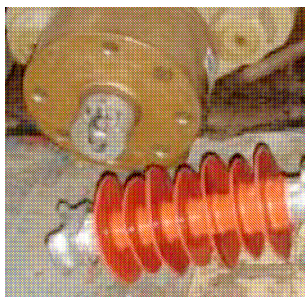
Internal testing activity is done by qualified technical staff of the manufacturer's Quality Control Department, and CAON has the required testing and measurement systems to do those tests. All quality control measurement devices are maintained and calibrated in accredited external laboratories according to a suitable maintenance and calibration schedule.



Verification of.
Creepage Distance.



Specified Mechanical Load Test.



Cantilever Test (kN).



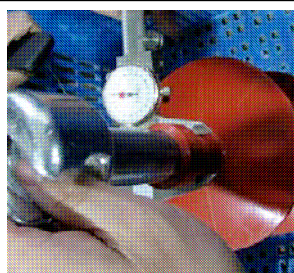
Metal fittings Test.



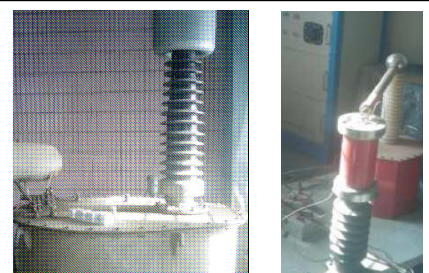
Calibration of internal couplings.



Galvanizing Test.



Dimensional Test.



Dielectric Tests(AC, lightning impulse).



TYPE TESTING IN EXTERNAL LABORATORIES.

Furthermore, **CAON** has performed successful type tests of all its insulators according to the required IEC Standards.

In any event, ENVERTEC sees to it that CAON performs type tests in independent accredited laboratories which are signatories of ILAC – Mutual Recognition Agreement among National Accreditation Bodies throughout the world (<http://www.ilac.org/index.php?id=321>).

Some CAON testing suppliers are the following:

- Testing and Certification Center of “**XIHARI**” (<http://www.xihari.com>) – China -. Accredited by the China National Accreditation Service (CNAS, file L0223) to ISO 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories, for the competence of testing in the required tests. Besides, the laboratory is entitled to operate as a Testing Laboratory under the responsibility of TÜV Rheinland InterCert Kft., MEEI Division as National Certification Body and to carry out testing within the IECEE CB Scheme for all its scope (see www.iecee.org for further information).
- Laboratorio Central Oficial de Electrotecnia, “**LCOE – F2I2**” (<http://www.f2i2.net>) – Spain -. Accredited by the Spanish National Accreditation Body (ENAC, file LE-192) to ISO 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories, for the competence of testing in the required tests. Besides, LCOE is depositary of the Spanish national high voltage standards which assures tests are performed counting on top level metrological traceability.
- Laboratorio de Pruebas de Equipos y Materiales, “**CFE - LAPEM**” (<http://www.cfe.gob.mx>) – México -. Mexican national laboratory Accredited by the Mexican National Accreditation Service (EMA, several files, e.g. EE-0132-012/11 –power testing-, EE-0159-005/12 –metrology-) to ISO 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories, for the competence of testing in the required tests.
- STRI AB laboratory (Sweden) (<http://www.stri.se/index.pl?id=2189>) for 5 000 hour-long climatic ageing tests.



6. ENVERTEC'S TRACEABILITY

ENVERTEC's philosophy has developed in our relationship with CAON by means of undertaking concrete actions to give origin to ENVERTEC-CAON polymeric insulators.

In ENVERTEC we closely work with the manufacturer in matters like materials, design, quality, reporting and traceability from raw materials to the customer. And all that led into our Integral Plan to Control and Quality of Supplies, open and participative project with the general objective of keeping us going ahead in the service we deliver not being only traders but providing an added value to work on our customers' confidence on the base of clear proves of the quality of the products we supply.

Our Plan is underpinned by two main ideas:

- 1) Close **collaboration** and **communication** with manufacturer, in favour of participatory and constructive decision making processes.
- 2) **Surveillance** and **control** of manufacturer's/supplier's activity on each production process stage.

Implementation of those principles was started a few years ago by means of specific measures like the following:

- **More detailed marking** on each supplied insulator, indelible and including additional data not mandatory according to applicable regulation:
 - **Batch number** written on the surface of each insulator. This batch number is always related to ENVERTEC's order reference in order to keep traceability under control during life of insulator.
 - **Manufacturing month** (only year is mandatory according to standards).
- **Package optimization:**
 - Making it much **easier** to **identify** the material **from** the **outside** by defining the data that have to be included on external marking like brand, type, product description, batch number, year, **customer's reference**/ name, external packing volume, handling instructions and preservation.
 - **Double packing system** so that each wooden crate or external package holds some cardboard boxes with insulators inside. Three or multiple of three pieces are allocated in each box tightly held and separated by shaped polyurethane pieces which reinforce material integrity during transportation and subsequent delivery to final destination and storage / installation.

Annex II shows images of implemented improvements concerning marking and packaging of the insulators.

- **Specific documentation for each order / delivery**

Each order is delivered with a comprehensive report including the following information:

- Information related to production process of the provided product:
 - Control of certification, accreditation and/or recognition validity;



DOSSIER ENVERTEC –CAON. 2 013

- Monitor changes in production center and verification of proper production conditions for the material to be delivered;
 - Supply references of the same type of product;
 - Traceability of suppliers of raw materials, components, and/or subcontracted services or products used to manufacture the insulator batch to be delivered.
 - List of testing and measurement equipment used by the manufacturer to carry out internal quality control activities as well as routine and sampling tests in their premises.
 - Calibration schedule of those measurement devices and systems. Suitability assessment.
- o Information related the provided product:
- List of raw material suppliers;
 - Batch number of each raw material;
 - Marking on each insulator;
 - Production procedure of the product including each step of the process;
 - Internal quality control activity;
 - Design and/or type test reports in accredited independent laboratories;
 - Routine and sampling test reports in manufacturer's laboratories.

Result and validity of tests is based on:

Applied Standard, specification and/or test procedure;

Testing equipment and their calibration state;

Measurement correction factors considering calibration results of the used measuring equipment;

Test uncertainty budget for tests performed in manufacturer's laboratories.

This Plan and its implementation enable ENVERTEC to supply unique and detailed information about the traceability and quality of both production process and product, and from order reception to delivery. Moreover, that traceability chain may be easily extended to the life-cycle of the product after delivery by implementing simple communication links with our customers.

7. WARRANTY

CAON guarantees all their insulators for a fifteen-year time. In case of quality defect or unsuitable performance of the product the warranty includes the replacement of the defective goods and technical service required.

Contact in ENVERTEC: Mr. Richard Martin

docrec@envertec.eu

International Sales Department

Mob.: +34.622 301 401

Tel. +34 911 847886

Fax. +34 958 071530



ANNEX I

REFERENCE OF INTERNATIONAL SALES (2 006 – 2 010)

End Customer or Local Agent	Country	Scope of Work	Approx.Qty (pcs)	Year of supply
PUBLIC POWER CORPORATION S.A.	Greece	10-220KV Suspension, Pin, Post Insulator	260 000	2006-2010
RENMING CO.	Bulgaria	10-220KV Suspension, Pin, Post Insulator	50 000	2006-2010
McWade Productions	South Africa	10-220KV Suspension, Pin, Post Insulator	60 000	2006-2010
National Electricity corporation	Sudan	10-220KV Suspension, Pin, Post Insulator	20 000	2006-2010
Kenya Power & Lighting Company Limited (KPLC)	Kenya	10-220KV Suspension, Pin, Post Insulator	85 000	2006-2010
Syrian Petroleum Company (SPC)	Syria	10-220KV Suspension, Pin, Post Insulator	56 000	2006-2010
Shrika Enterprise PVT.	India	10-220KV Suspension, Pin, Post Insulator	100 000	2006-2010
Asia Pisro Commercial	Iran	10-220KV Suspension, Pin, Post Insulator	35 000	2006-2010
Ampla Energia Y Servicios S.A	Brasil	10-220KV Suspension, Pin, Post Insulator	80 000	2006-2010
Codensa S.A.ESP	Colombia	10-220KV Suspension, Pin, Post Insulator	30 000	2006-2010
Empresa De Energia De Cundinamarca S.A. E.S.P.	Colombia	10-220KV Suspension, Pin, Post Insulator	10 000	2006-2010
Emincco S.A.S.	Colombia	10-220KV Suspension, Pin, Post Insulator	10 000	2006-2010
Manufacturas Industriales Mendoza S.A.	Peru	10-220KV Suspension, Pin, Post Insulator	10 000	2006-2010
Energis S.A.	Chile	10-220KV Suspension, Pin, Post Insulator	10000	2006-2010
GRUPODRIEL	Mexico	10-220KV Suspension, Pin, Post Insulator	Depend	In testing
Honeywell	America	10-220KV Suspension, Pin, Post Insulator	246 000	In process
Siemens Energy, Inc	America	10-220KV Suspension, Pin, Post Insulator	Depend	In process
JSC "Electroshield"-TM-Samara Group"	Russia	10-220KV Suspension, Pin, Post Insulator	One container per month	On Production 2011
HIGH VOLTAGE NEW ZEALAND	New Zealand	10-220KV Suspension, Pin, Post Insulator	Depend	In testing
Granadina De Aparellaje S.L. – KORWI -	Spain	12,5-72,5kV Suspension, Pin, Post Insulator	14 000	2008-2010



REFERENCE OF SALES IN SPAIN (2 008 – 2 013). Total number of delivered insulators: 63 572 Uds.

AISLADORES DE APOYO



Ref.	TENSION - CME	Nº de Unidades	TIPO CLIENTE	ZONA/PROVINCIA
AIPO245IIP	24 kV - 5 kN	7.652	INTERNO - FABRICANTES DE APARAMENTA	ANDALUCIA-CATALUÑA
AIPO363IIP	36 kV - 3 kN	2.612	INTERNO - FABRICANTES DE APARAMENTA	ANDALUCIA-CATALUÑA
AIPO726P	72,5 kV - 6 kN	1.040	FABRICANTE APARAMENTA ALTA TENSION	PAIS VASCO
AIPO2410P	24 kV - 100 kN	2.504	FABRICANTE APARAMENTA ALTA TENSION	CATALUÑA
AIPO368IIP	36 kV - 8 kN	508	FABRICANTE APARAMENTA ALTA TENSION	CATALUÑA
AIPO365IIP	36kV - 5 kN	1.000	FABRICANTE APARAMENTA ALTA TENSION	CATALUÑA



AISLADORES DE CADENA



Ref.	TENSION - CME	Nº de Unidades	TIPO CLIENTE	ZONA/PROVINCIA
24/70EBA	24 kV - 70 kN	3.403	SUBCONTRATAS - ALMACENISTAS	ANDALUCIA-EXTREMADURA
36/70EBA	36 kV - 70 kN	33.339	ENDESA - SUBCONTRATAS	ANDALUCIA-ARAGON-CATALUÑA-ISLAS
C6670EB	66 kV - 70 kN	3.684	SUBCONTRATAS ENDESA- ALMACENISTAS	ANDALUCIA-ARAGON-CATALUÑA
C3670EBAV	36 kV - 70 kN	2.843	ENDESA - SUBCONTRATAS	ANDALUCIA - ARAGON - CATALUÑA
24/70EBMA	24 kV - 70 kN	2.703	ENDESA - ALMACENISTAS	ISLAS BALEARES

AISLADORES RIGIDOS



Ref.	TENSION - CME	Nº de Unidades	TIPO CLIENTE	ZONA/PROVINCIA
ARSI-30E	36 kV - 6 kN	2.284	ENDESA-DISTRELECTRICAS-ALMACENES-SUBCONTRATAS	ANDALUCIA-ARAGON-CATALUÑA



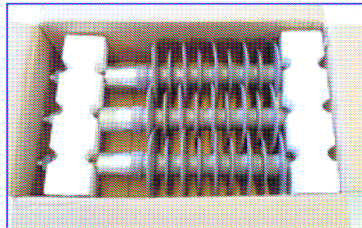
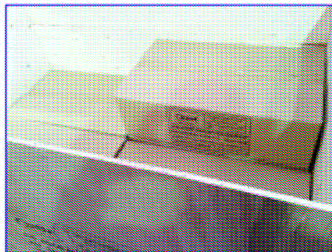
ANNEX II

MARKING AND PACKAGING

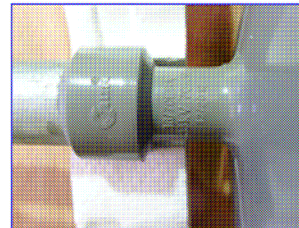
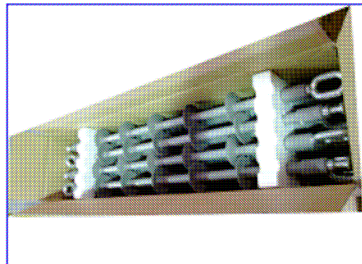
Indelible marking on the outside of the packaging with description, model, batch nr., year and handling and preserving instructions.



Improvements to protect insulators during transportation and storage. Use of cardboard boxes with full identification.



Individual internal protection by means of polyurethane pieces.



More complete individual marking including month and year



Secure transportation up to final destination. Polywood crates suitable to pile up to three stories and designed to be handled with forklift.

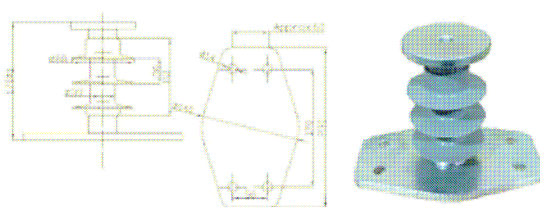




ANNEX III

TAILORED SOLUTIONS

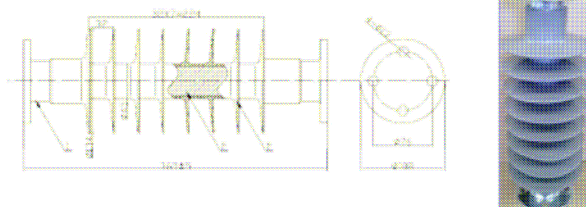
Caon Aisladores Poliméricos Apoyo / Specific Design. FICHA TÉCNICA REF.: AIPO8510IIP



Tipo	Tensión de Servicio kV	Linea de Fuga Mínima mm	Linea Mín. Protegida mm	Carga Mecánica (SGCL-kN)	Tensiones de Ensayo 1,2/50 BL kV	50 Hz Unida sV	H mm
AIPO8510IIP	8,5	230	130	10	65	35	170

Aisladores Soporte Específicos – Central Hidroeléctrica – España – 460ud.

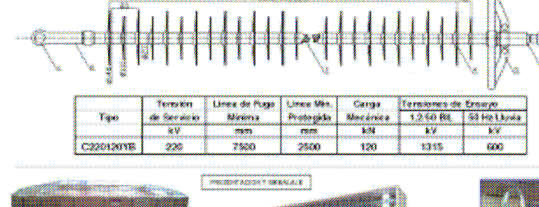
Caon Aisladores Poliméricos Apoyo M.T. M.V. - POST INSULATORS. FICHA TÉCNICA REF.: AIPO365IIP



Tipo	Tensión de Servicio kV	Linea de Fuga Mínima C.D. mm	Linea Mín. Protegida C.D. mm	Carga Mecánica (SGCL-kN)	Tensiones de Ensayo 1,2/50 BL kV	50 Hz Unida Wet / sV	Altura HEIGHT / L mm
AIPO365IIP	36	933	340	5	170	70	365

Aisladores Soporte Interruptores. 36kV – 5kN – 4.780uds. – Middle East.

Caon Aisladores Poliméricos para Líneas Aéreas A.T. FICHA TÉCNICA DEL AISLADOR REF.: C220120YE



Tipo	Tensión de Servicio kV	Linea de Fuga Mínima mm	Linea Mín. Protegida mm	Carga Mecánica kN	Tensiones de Ensayo 1,2/50 BL kV	50 Hz Unida kV
C220120YE	220	7500	2500	120	1315	600

Aisladores Soporte Bobinas de bloqueo en Pórtico 220kV – Luanda ANGOLA



ANNEX IV

IMAGE GALLERY

CAON. New Factory – Year 2 012 (27 000 m²)



TIBET SPRING 5100 – Post insulators in railway – 04/2 010





Installation of insulators in Spain.

