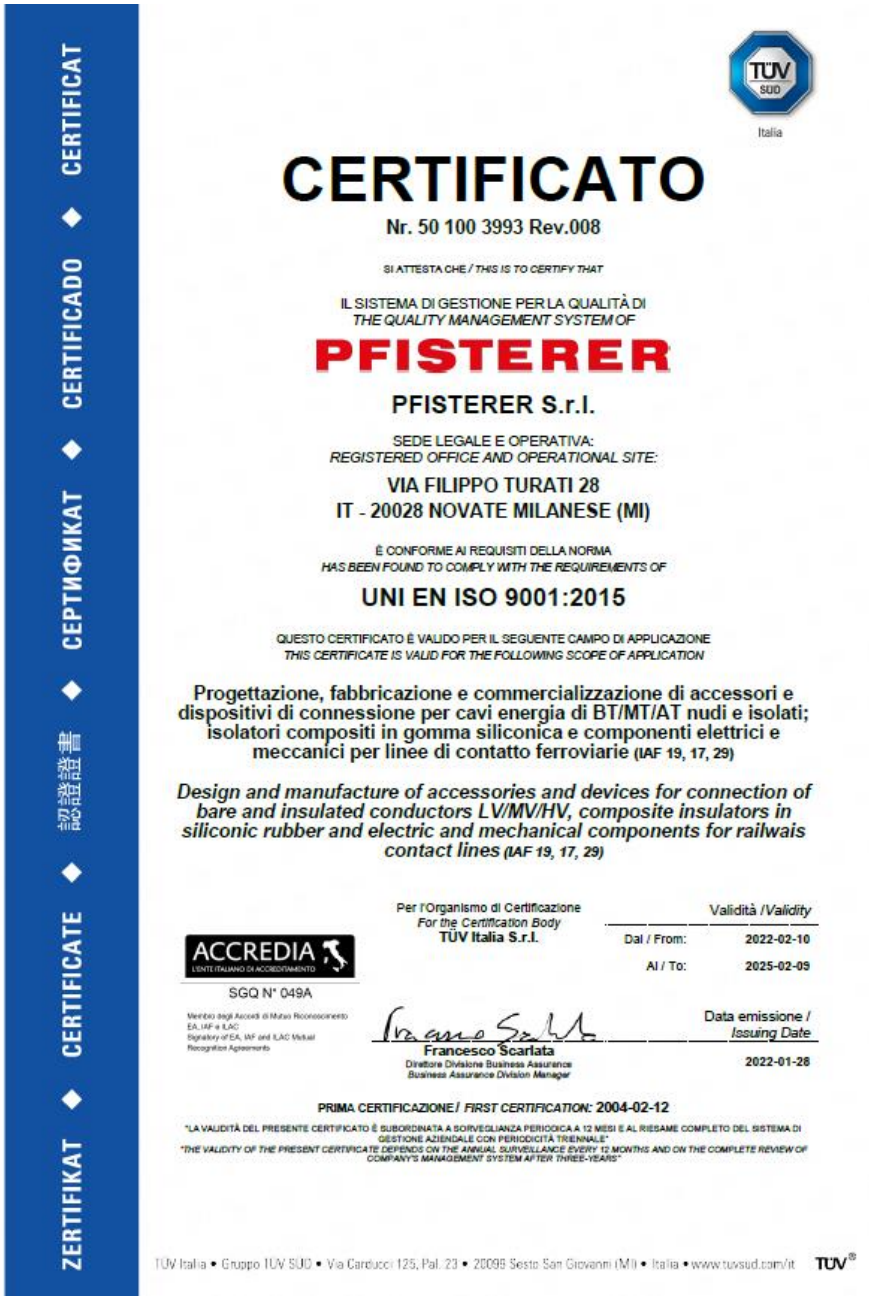
PFISTERER

Introduction to LinkBoxes

NORMS REFERENCE:

- ✓ BS 7912
- ✓ C55
- ✓ IEC 60529 (IP degree)
- ✓ ISO 9001



ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Italia

CERTIFICATO

Nr. 50 100 3993 Rev.008

SI ATTESTA CHE / *THIS IS TO CERTIFY THAT*

IL SISTEMA DI GESTIONE PER LA QUALITÀ DI
THE QUALITY MANAGEMENT SYSTEM OF

PFISTERER

PFISTERER S.r.l.

SEDE LEGALE E OPERATIVA:
REGISTERED OFFICE AND OPERATIONAL SITE:

VIA FILIPPO TURATI 28
IT - 20028 NOVATE MILANESE (MI)

È CONFORME AI REQUISITI DELLA NORMA
HAS BEEN FOUND TO COMPLY WITH THE REQUIREMENTS OF

UNI EN ISO 9001:2015

QUESTO CERTIFICATO È VALIDO PER IL SEGUENTE CAMPO DI APPLICAZIONE
THIS CERTIFICATE IS VALID FOR THE FOLLOWING SCOPE OF APPLICATION

Progettazione, fabbricazione e commercializzazione di accessori e dispositivi di connessione per cavi energia di BT/MT/AT nudi e isolati; isolatori compositi in gomma siliconica e componenti elettrici e meccanici per linee di contatto ferroviarie (IAF 19, 17, 29)

Design and manufacture of accessories and devices for connection of bare and insulated conductors LV/MV/HV, composite insulators in siliconic rubber and electric and mechanical components for railwais contact lines (IAF 19, 17, 29)

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
SGQ N° 049A

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

Per l'Organismo di Certificazione
For the Certification Body
TÜV Italia S.r.l.

Francesco Scarlata
Direttore Divisione Business Assurance
Business Assurance Division Manager

Validità / *Validity*
Dal / From: 2022-02-10
Al / To: 2025-02-09

Data emissione / *Issuing Date*
2022-01-28

PRIMA CERTIFICAZIONE / *FIRST CERTIFICATION:* 2004-02-12

"LA VALIDITÀ DEL PRESENTE CERTIFICATO È SUBORDINATA A SORVEGLIANZA PERIODICA A 12 MESI E AL RIESAME COMPLETO DEL SISTEMA DI GESTIONE AZIENDALE CON PERIODICITÀ TRIENNALE"
"THE VALIDITY OF THE PRESENT CERTIFICATE DEPENDS ON THE ANNUAL SURVEILLANCE EVERY 12 MONTHS AND ON THE COMPLETE REVIEW OF COMPANY'S MANAGEMENT SYSTEM AFTER THREE-YEARS"

TÜV Italia • Gruppo TÜV SÜD • Via Carducci 125, Pal. 23 • 20099 Sesto San Giovanni (MI) • Italia • www.tuvsud.com/it TÜV®

MAIN CUSTOMERs‘ APPROVAL:

- ✓ RTE
- ✓ PRYSMIAN
- ✓ TERNA
- ✓ DEWA (UAE)
- ✓ RETE ELETTRICA (ESPANA)
- ✓ POLAND MARKET
- ✓ FINLAND MARKET

WORLDWIDE MARKET PRESENCE

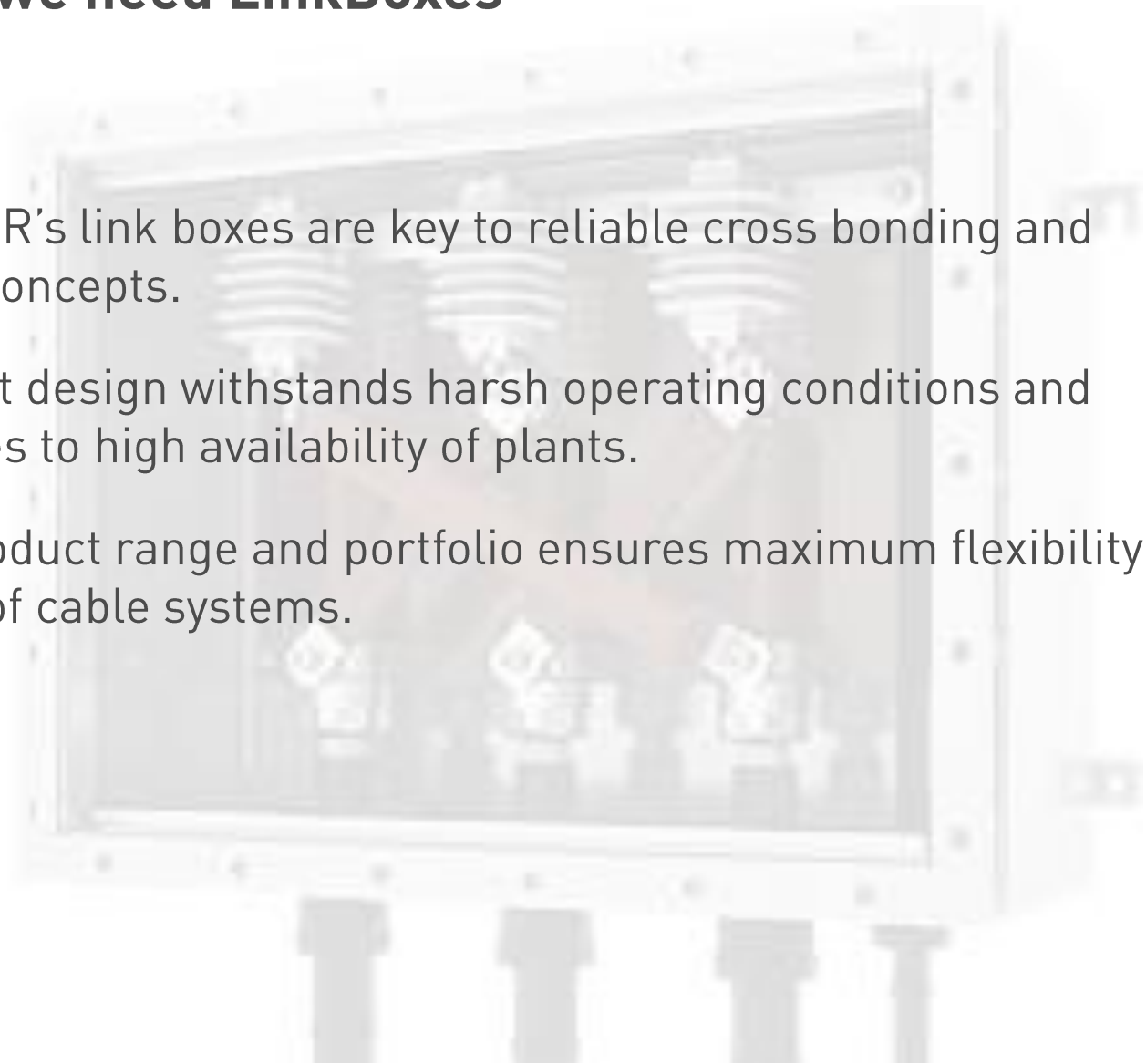
A LINK BOX FOR EVERY APPLICATION: WE ALREADY DESIGNED

MORE THAN 500 TYPES OF LINK BOXES

... And we design at least 5 new types per months ...

PFISTERER

Why do we need LinkBoxes



PFISTERER's link boxes are key to reliable cross bonding and earthing concepts.

The robust design withstands harsh operating conditions and contributes to high availability of plants.

A wide product range and portfolio ensures maximum flexibility in planning of cable systems.

LinkBoxes – Designation & explanation

example:

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

W.	X.	3.	2.	S3.	E1.	060a.	M63.	M40.	e
MOUNTING TYPE: WALL MOUNTING	BOX MATERIAL: A2 / AISI 304	CONNECTION FUNCTION: CROSS BONDING BY SVL	CABLE TYPE: COAXIAL BONDING CABLE	NUMBER OF BONDING CABLE ENTRIES: 3	EARTHING CABLE CONNECTION: INSIDE THE BOX	SVL Ur = 6.0 kV / Class 1	CABLE GLAND SIZE FOR BONDING CABLE: 27-45 mm	CABLE GLAND SIZE FOR EARTHING CABLE: 13-28 mm	BONDING CABLE DIAMETER: 18-21 mm

LinkBoxes – Mounting type

LINKBOX **W**.X.3.2.S3.E1.060a.M63.M40.e

B - Buried

- For outdoor / underground use
- IP 68 protection class
- Metal cover removable
- Delivered with plexiglass protective cover (if coaxial bonding cable type)
- Otherwise cover available on request

W - Wall mounting

- For indoor use
- IP 66 protection class
- Metal cover openable (hinge)
- Plexiglass protective cover available on request

LinkBoxes – Box Material

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

X - Stainless steel A2 (ANSI 304)

- Standard corrosion protection
- Protected against environmental influences
- For indoor & underground use

Y - Stainless steel A4 (ANSI 316L)

- Maximum corrosion protection
- Stainless in harsh environment
- For indoor & underground use

P - Polyester

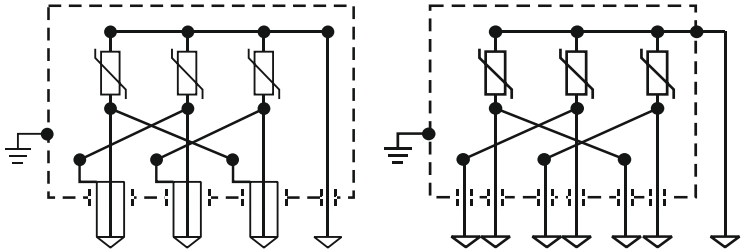
- Basic environmental protection
- For indoor use only

LinkBoxes – Connection function (1)

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

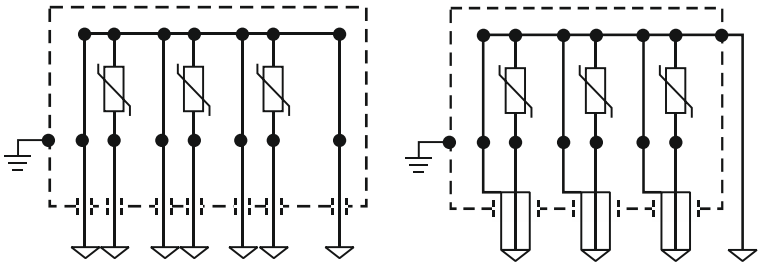
3 - Cross bonding by SVL

- For using with cable joints
- Crossbonding: minimizing of shield voltage
- Coaxial or single core bonding cable



4 - Earthing and SVL

- For using with cable joints
- One side grounded – one side with SVL (per phase)
- Coaxial or single core bonding cable

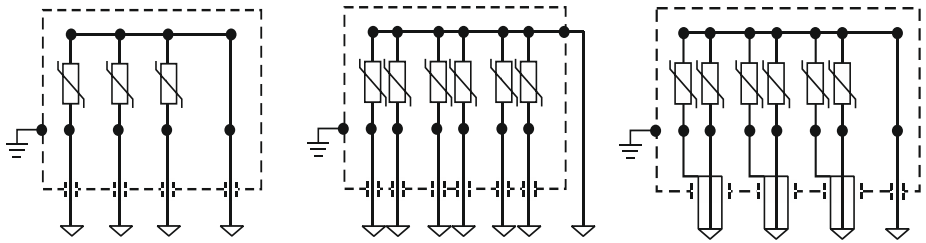


LinkBoxes – Connection function (2)

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

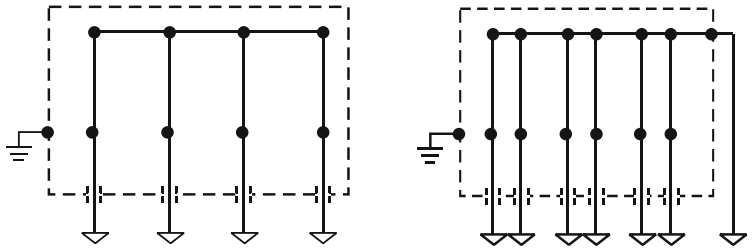
7 - Earthing by SVL

- *Each* bonding cable input with SVL
- Usable for joint or accessory
- Coaxial or single bonding cable



8 - Earthing without SVL

- *Each* bonding cable grounded
- Coaxial or single bonding cable
- For 1 / 3 / 6 bonding cable entries



LinkBoxes – Cable type

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

1 - Single core bonding cable

- ONE conductor per bonding cable
- For cross bonding, 6 single core bonding cables needed

2 - Coaxial bonding cable

- TWO conductors per bonding cable (inner & outer conductor)
- Identical conductor cross section

LinkBoxes – N° of bonding cable entries

LINKBOX W.X.3.2.**S3**.E1.060a.M63.M40.e

S1 - ONE bonding cable

- for singe accessory
- single bonding cable only

S3 - THREE bonding cables

- single bonding cable: Earthing only (3 bonding inputs)
- coaxial bonding cable: Earthing or Cross-bonding (6 bonding inputs)

S6 - SIX bonding cables

- single bonding cable only (6 bonding inputs)
- Earthing or Crossbonding

LinkBoxes – Type of earthing cable connection

LINKBOX W.X.3.2.S3.**E1**.060a.M63.M40.e

E0 - Earthing cable connected outside

- Earth connection outside by means of cable lug
- No cable gland for earthing cable needed

E1 - Earthing cable connected inside

- Earth connection inside – no cable lug needed
- Additional cable gland for earthing cable needed

LinkBoxes – SVL rated voltage (Ur/Uc)

LINKBOX W.X.3.2.S3.E1.**060a**.M63.M40.e

060 - Surge arrester (SVL-) voltage

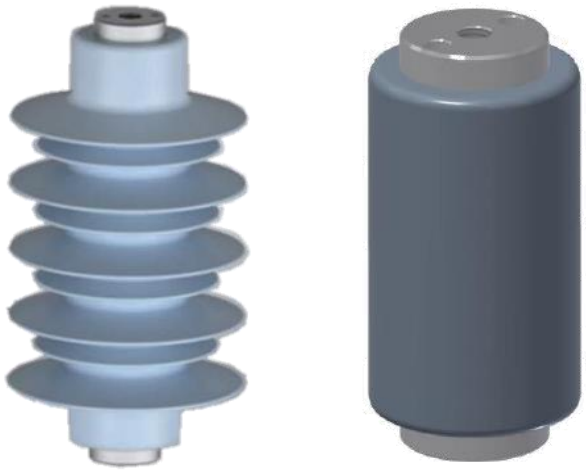
- Voltage of surge arrester (SVL)
- "060" e.g. means Ur = 6.0 kV (Uc = 4.8 kV)
- If NO SVL is used, "000" is indicated

a - Class of SVL (according IEC60099-4)

- "a" means Line discharge class 1 (standard type)
- "b" means Line discharge class 2 (increased switching capacity)
- If NO SVL is used, "0" is indicated

Typical shape of SVL:

class 1 class 2



LinkBoxes - Cable gland sizes

LINKBOX W.X.3.2.S3.E1.060a.**M63**.**M40**.e

M63 - Cable gland size for bonding cable

- Used to seal cable entry
- "M63" means that a cable gland with a ø-range of 27-45 mm is used for bonding cables (example)
- Complete list of cable glands see LB-Questionnaire

M40 - Cable gland size for earthing cable

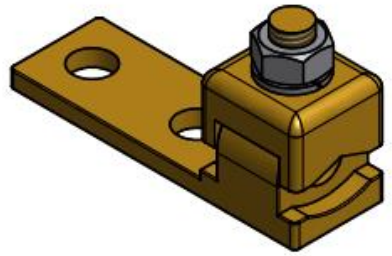
- "M40" means that a cable gland with a ø-range of 13-28 mm is used for the earthing cable (example)
- If no earthing cable connection is used (connection outside of box = E0), “000” is indicated
- Complete list of cable glands see LB-Questionnaire

LinkBoxes - Conductor diameter

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e

e - conductor diameter of the bonding cable

- Needed to define the cable clamp
- "e" means that a cable clamp with a diameter range of 18-21 mm is used for the conductor of the bonding cable (example).
- This corresponds approximately to a cable cross section of 240-300 mm²
- Complete list of conductor diameter ranges see LB-Questionnaire



PFISTERER patented "SICON" clamp

LinkBoxes – Special Versions

LINKBOX W.X.3.2.S3.E1.060a.M63.M40.e.**s**

s - OPTIONAL indicator for special / non standard types

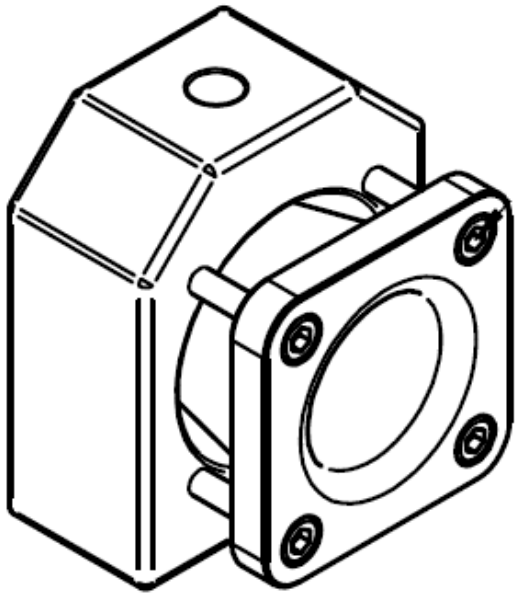
- The “s” - appendix is normally NOT shown
- However, this addition is displayed when:
  - a special painting / coating is used
  - partial discharge sensors are included
  - for other “non-standard” options

Products development by our specifications

ITEMS DESIGNED BY OUR SPECIFICATIONS:

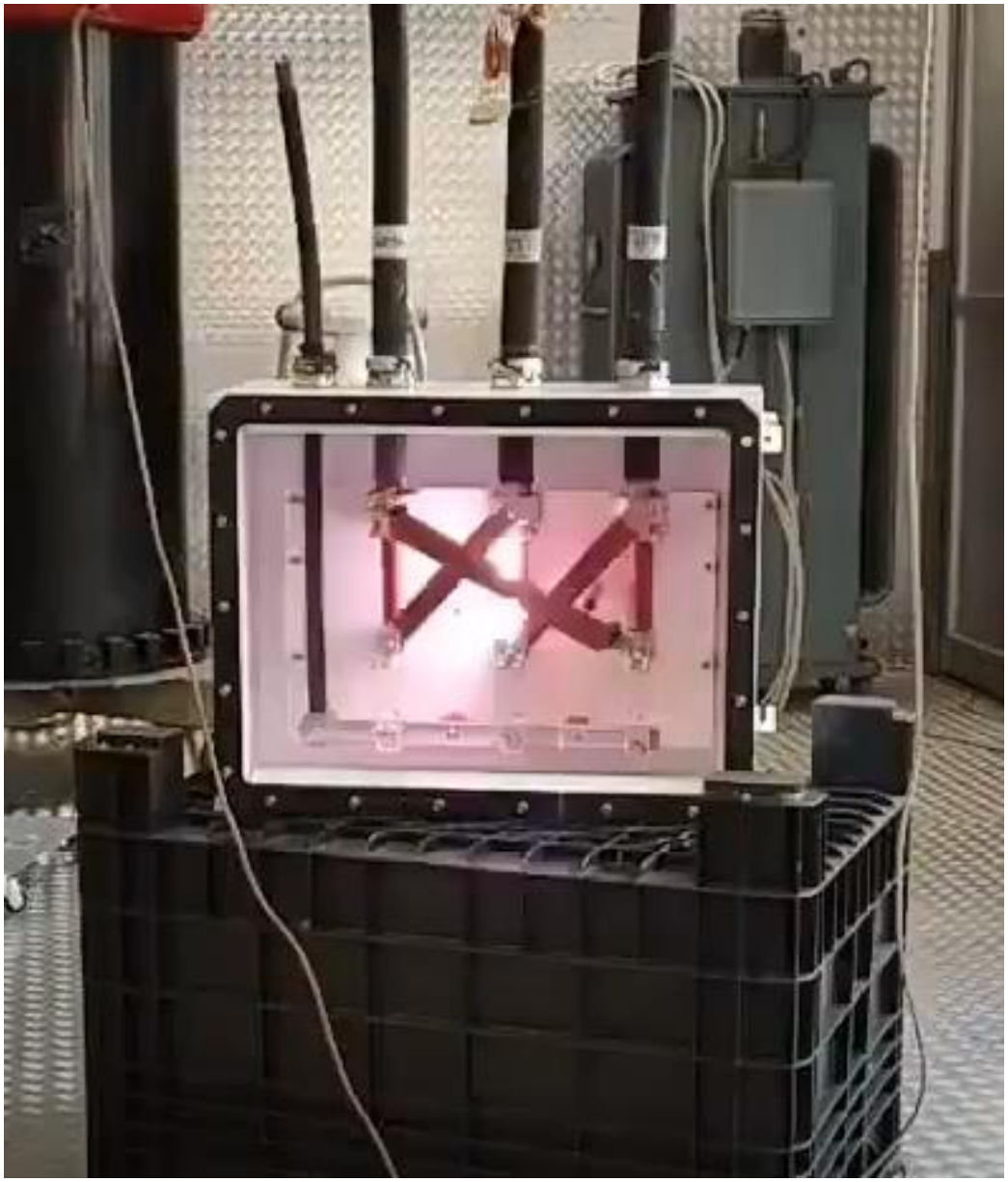
2° GENERATION OF COAXIAL CLAMP

it is lighter and withstands up to 80 kA x1 sec short circuit test.



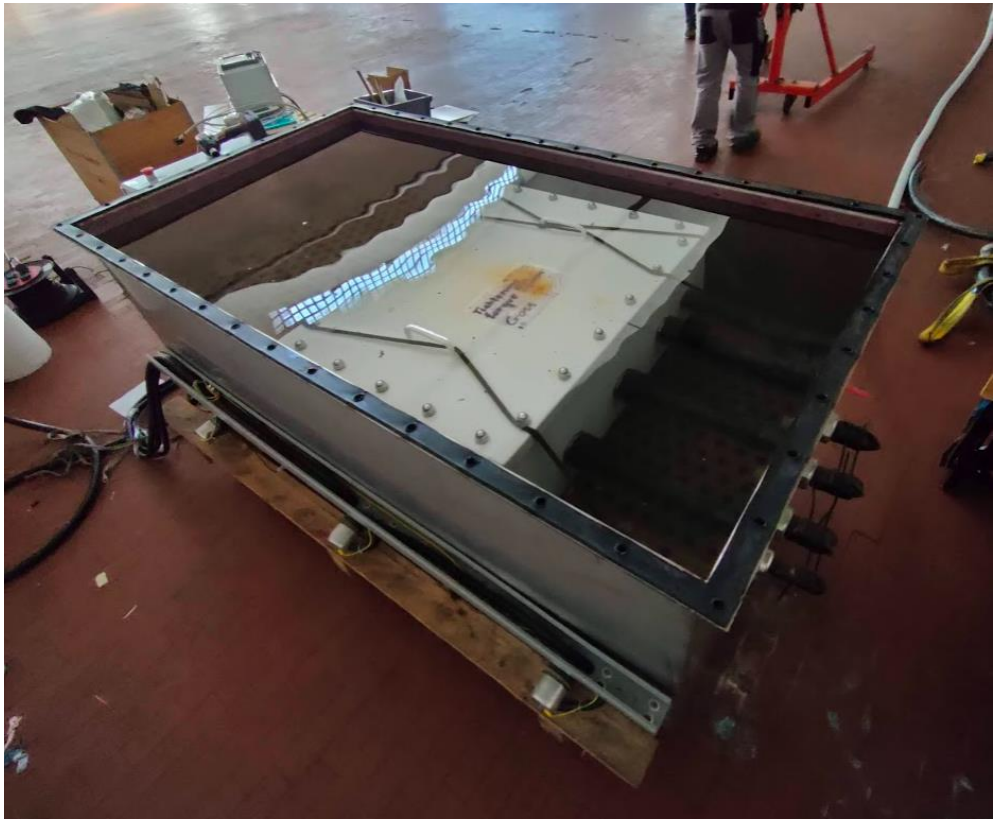
ROUNDED BARS:

to maximize performance during impulse test.



ENCLOSURE GASKET:

to reach up high IP performance.



INTERNAL FILLER:

For special applications

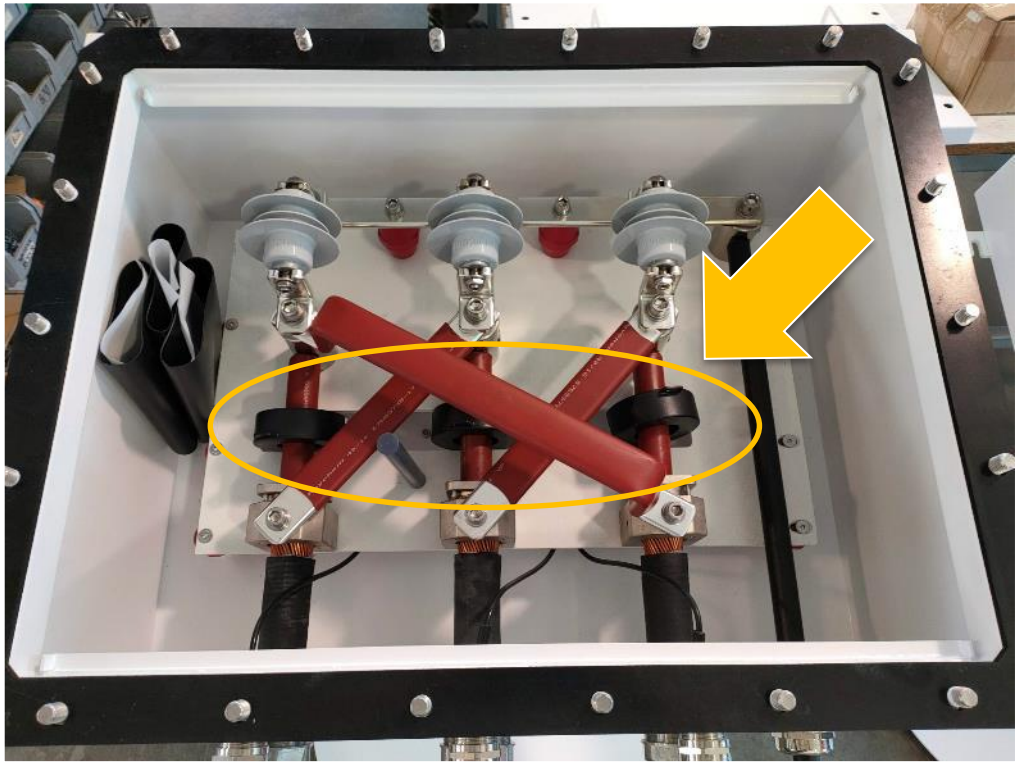
PFISTERER

LB TO ACCOMMODATE EVERY SENSOR TYPES:

We are Link boxes designer, is for this reason we can meet every market requirements and assure it will be suitable in our products.

LB READY TO ACCOMMODATE SENSORs:

Link box with our PD Partial Discharge sensors:



Type Tests and Routine tests

COMMON TYPE TESTS

DC test:	25 kVdc 15min
AC test:	15 kVac 15min
Contact resistance	< 10 µΩ @100 Adc
Insulation resistance	> 10 MΩ @1 kVdc
Short Circuit:	up to 63 kA x1 sec
Internal Arc test:	40 kA x0,1 sec
Impulse test:	75 kVp ph/ph and 37,5 kVp ph/earth
IP degree:	up to IP68 0,4bar 15min

ROUTINE TESTS (100% production checked)

Dimensional / thickness
Contact/Insulation resistance
DC test
Internal enclosure overpressure (to test its weldings)

LAT CERTIFIED INSTRUMENTS

Our internal laboratories

HV LAB

Impulse test up to 400 kV
DC test
AC test
Power frequency test

PFISTERER

NEW H_2O LAB

Water underpressure test up to 3 bars

Hot / cold cycling from +5 to +60°C

Underwater DC test available

PFISTERER

Thank you for your attention.