tyco Electronics

Energy Division

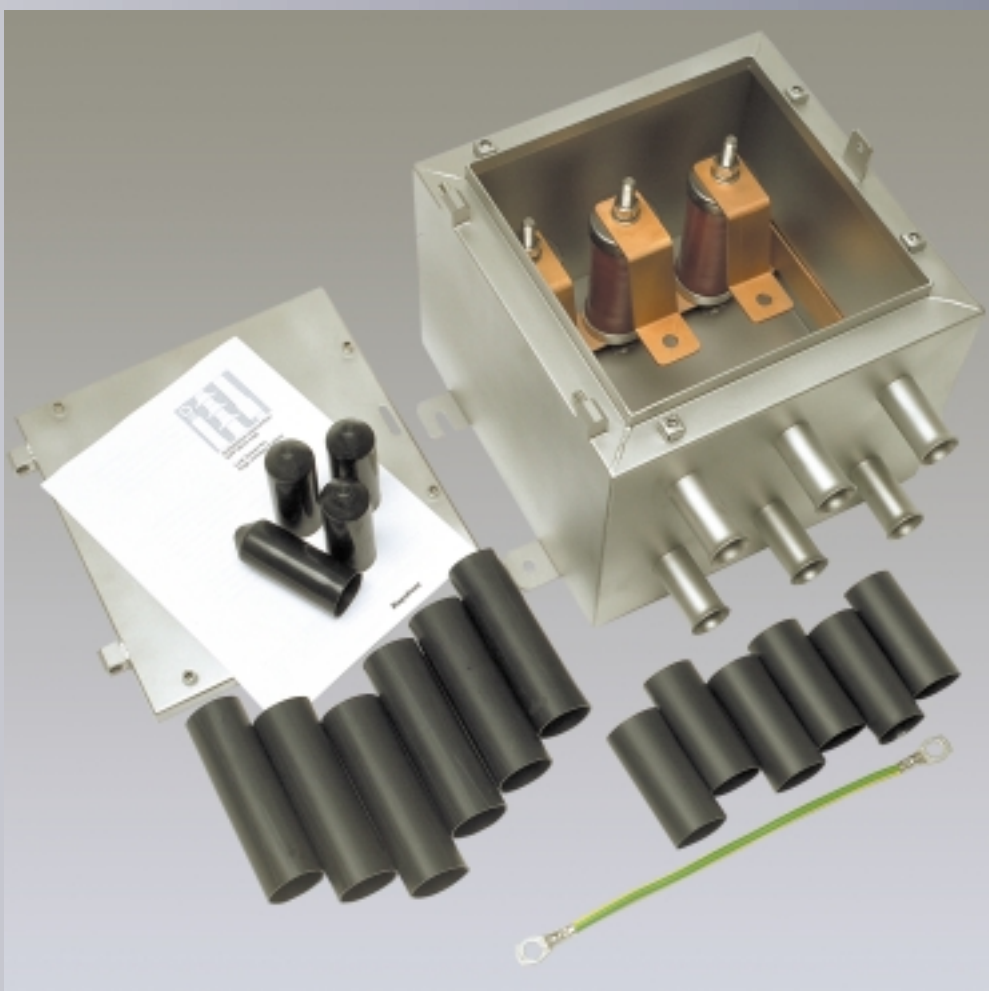
LINK BOXES
Cross bonding and sectionalisation for high-voltage cable systems

Applications

- Direct grounding
- Single point bonding
- Cross bonding
- Cross bonding and transposition
- Sheath voltage limiters (SVL)

Features

- Compact design
- Stainless steel
- Hermetically sealed
- 1-phase and 3-phase boxes
- Sheath voltage limiters (SVL)



Raychem

LINK BOXES

Cross bonding and sectionalisation for high-voltage cable systems

Link boxes and sheath voltage limiters
Link boxes are used with cable joints and terminations to provide easy access to shield breaks for test purposes and to limit voltage build-up on the sheath. Lightning, fault currents and switching operations can cause overvoltages on the cable sheath. The link box optimizes loss management in the cable shield on cables grounded both sides.

Mechanical design
- Made of stainless steel
- Compact design
- 1-phase and 3-phase link boxes
- Hermetically sealed
  - Resists water pressure up to 1 bar (20 psi)
  - Lugs and bonding cables are heatshrink sealed inside and outside
- Suitable for different applications
  - Single point bonding
  - Cross bonding
  - Direct grounding
  - Grounding through SVL
  - Combined direct and SVL grounding
  - Cross bonding and transposition

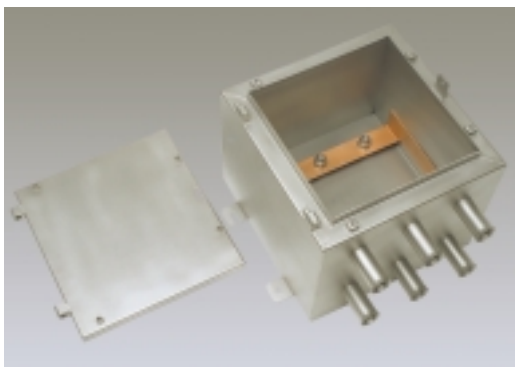
Electrical design
- Grounding box
- Link box
  - ZnO sheath voltage limiter
  - 3 kV and 6 kV protection levels
  - Same outer dimensions for both levels

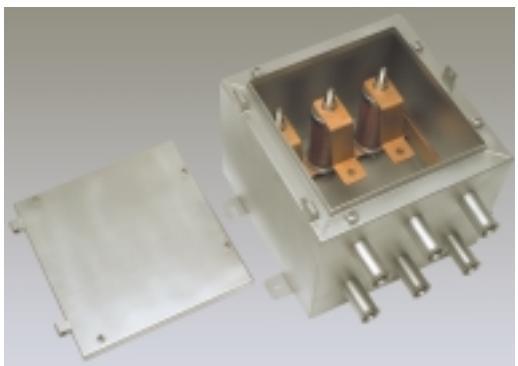
Application
- Can be installed in pits or vaults and on structures or poles
- Use with single core or concentric bonding lead
- Cross section up to 120 mm^2 *)

Type tests
- Tested to ANSI/IEEE Std 575-1988 IEEE – Guide for the application of sheath-bonding methods for single conductor cables and the calculation of induced voltages and currents in cable sheaths
- CIGRE/ELECTRA recommendations for cross bonding

*) Larger cable cross sections on request

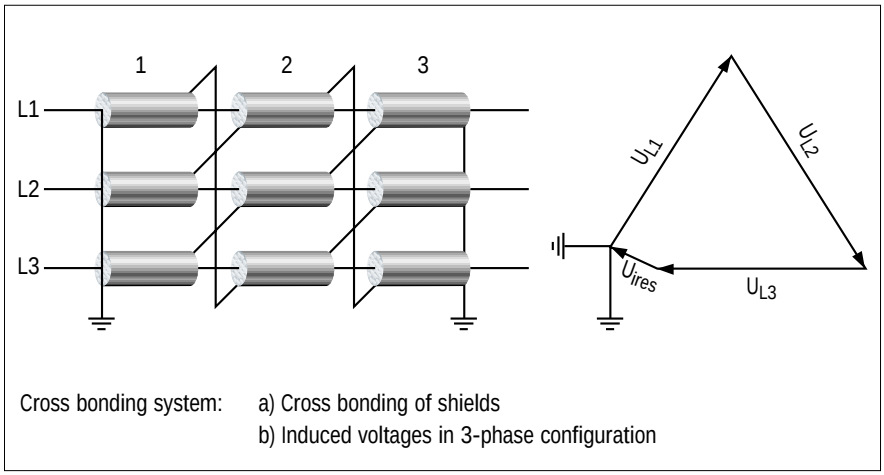

Link box installed with cross bonding cables


Grounding box


Link box with sheath voltage limiters (SVL)

Cross bonding

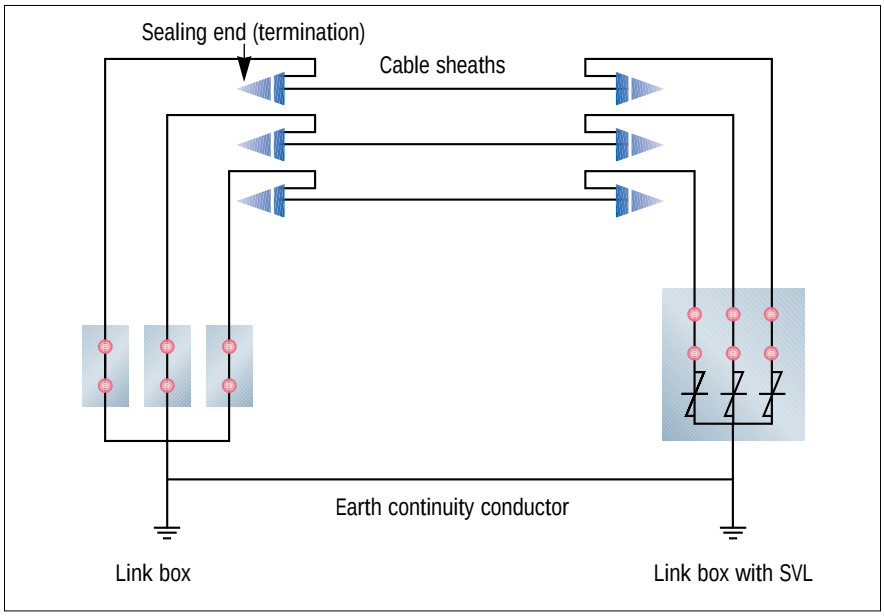
For cross bonding, the cable length is divided into three approximately equal sections. Each of the three alternating magnetic fields induces a voltage with a phase shift of 120° in the cable shields. The cross bonding takes place in the link boxes. Ideally, the vectorial addition of the induced voltages results in $U_{ires} = 0$. In practice, the cable length and the laying conditions will vary, resulting in a small residual voltage and a negligible current. Since there is no current flow, there are practically no losses in the screen. The total of the three voltages is zero, thus the ends of the three sections can be grounded.



Cross bonding system: a) Cross bonding of shields
b) Induced voltages in 3-phase configuration

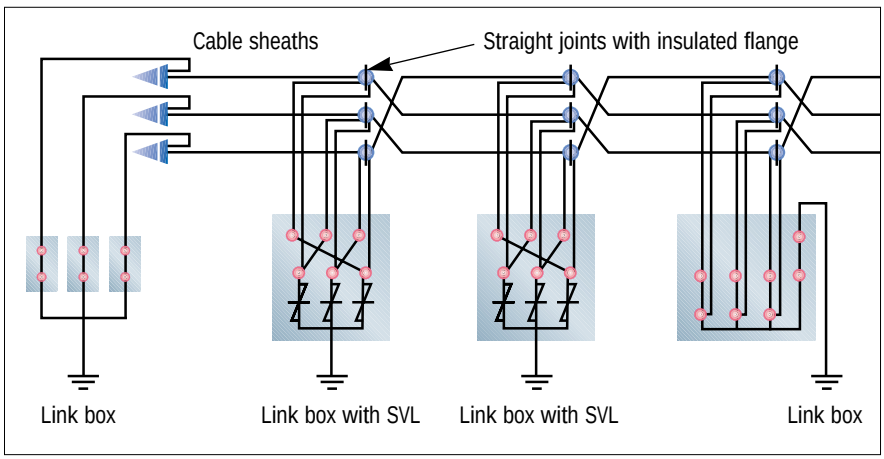
Single point bonding

This is the simplest form of special bonding. The sheaths of the three cable sections are connected and grounded at one point only along their length. At all other points, there will be a voltage between sheath and ground that will be at its maximum at the farthest point from the ground bond. The sheaths must therefore be adequately insulated from ground. Since there is no closed sheath circuit, except through the sheath voltage limiter, current does not normally flow longitudinally along the sheaths and no sheath circulation current loss occurs.



Cross bonding and transposition

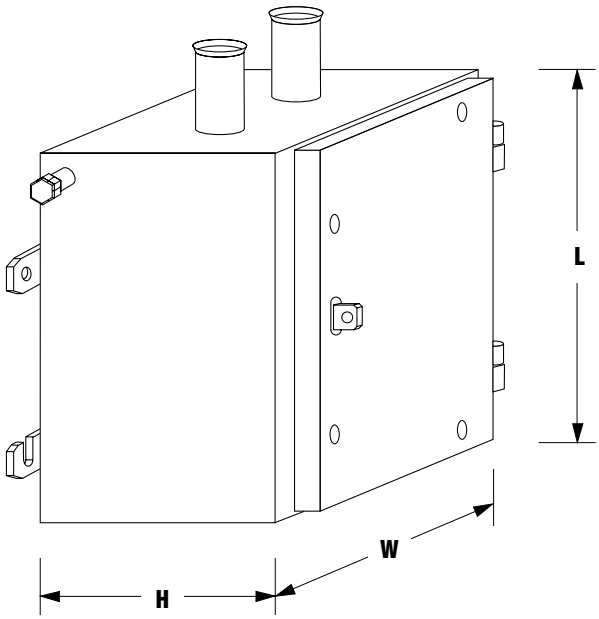
In addition to cross bonding the shield, the induced voltage can be reduced by cyclically transposing the main conductors of the 3-phase system.



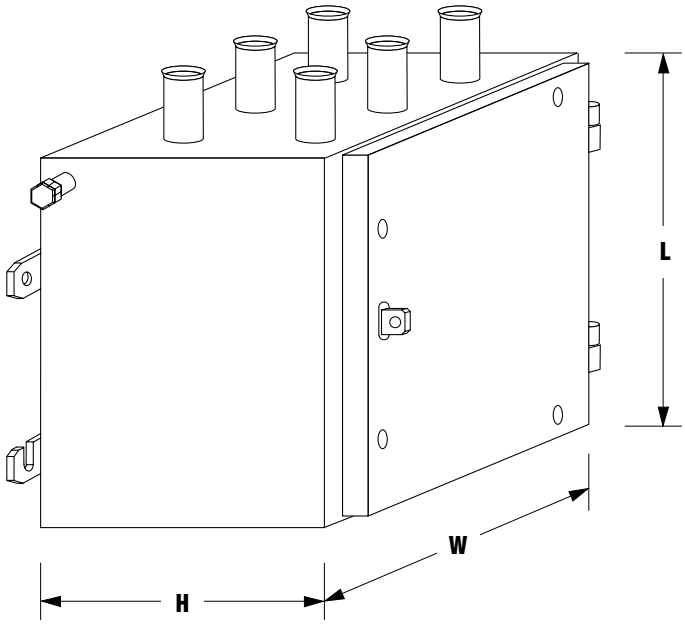
Cross bonding layout of a transmission cable system

Cross bonding and sectionalisation for high-voltage cable systems

1-Phase Link box



3-Phase Link box



Description		Number of phases	Sheath voltage limiter	Dimensions L (mm)	W (mm)	H (mm)
EPPA-055-0/1	Direct grounding	1	---	300	190	165
EPPA-055-3/1	Cross bonding	1	3 kV	300	190	165
EPPA-055-6/1	Cross bonding	1	6 kV	300	190	165
EPPA-055-0/3	Direct grounding	3	---	310	310	255
EPPA-055-3/3	Cross bonding	3	3 kV	310	310	255
EPPA-055-6/3	Cross bonding	3	6 kV	310	310	255

Literature: Test Report PPR 1168 Type Test of Link Box LBOX3-ZnO-3
PPR 1449 Type Test of Link Box EPPA-055-6/3

tyco Electronics

Energy Division

Argentina
Phone: ++54-11-4733 2277
Fax: ++54-11-4733 2267

Australia
Phone: ++61-2-4390 1111
Fax: ++61-2-4353 2497

Brazil
Phone: ++55-11-861 1311
Fax: ++55-11-861 1862

Canada
Phone: ++1-905-475 6222
Fax: ++1-905-470-4453

France
Phone: ++33-3-80583200
Fax: ++33-3-80341015

Mexico
Phone: ++52-5-729 0405
Fax: ++52-5-361-8545

Thailand
Phone: ++66-2-7394026 - 32
Fax: ++66-2-3260563 - 64

United States of America
Phone: ++1-800-327-6996
Fax: ++1-800-527-8350

AMP Dulmison Hellstern Raychem SIMEL

www.tycoelectronics.com

Tyco Electronics Raychem GmbH
Energy Division
Haidgraben 6, 85521 Ottobrunn/Munich, Germany
Phone: ++49-89-6089-0, Fax: ++49-89-6096345