Instrumentation Cable

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Instrumentation cables are used in industrial control systems where analogue or digital signals are converted to usable information such as pressure, flow rate, position and temperature.

Instrumentation Cable

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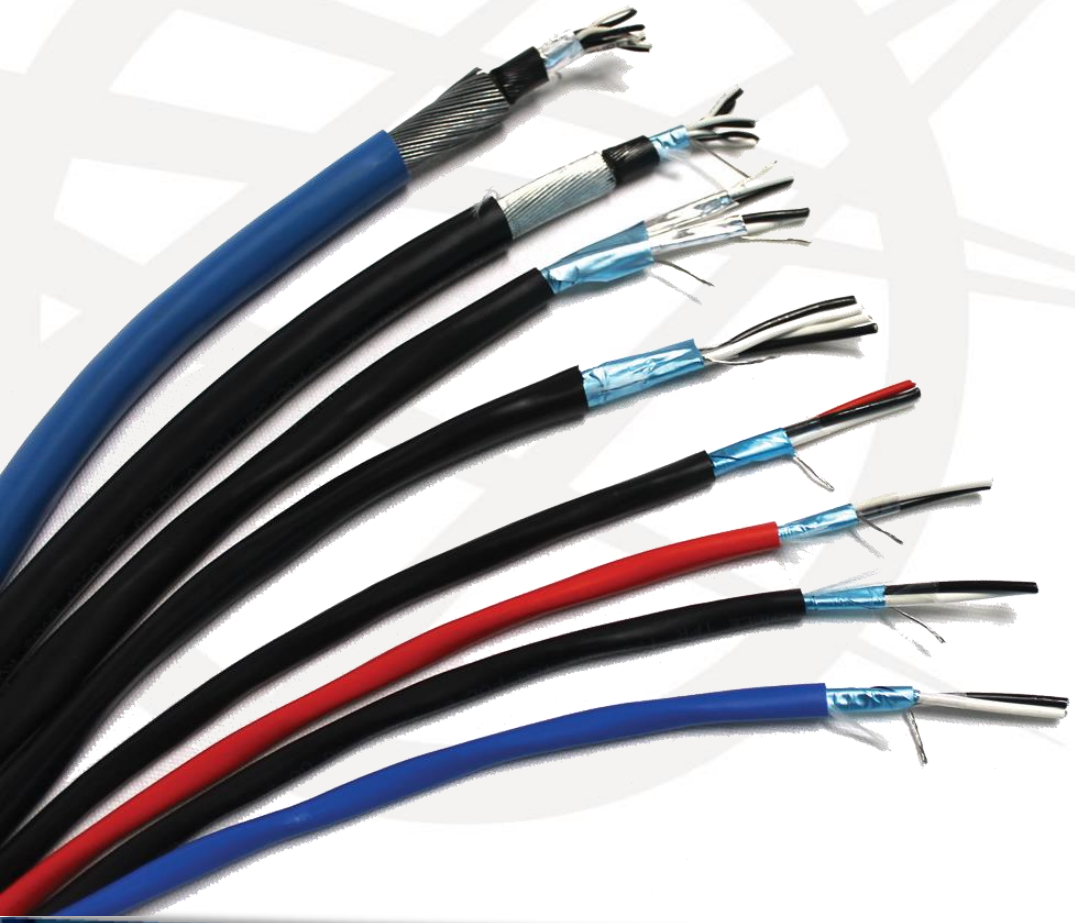

Cable Construction Basics

- Conductors
- Insulation
- Screening/Shielding
- Sheath/Jacket
- Optional Armour & Over Jacket

Instrumentation Cable

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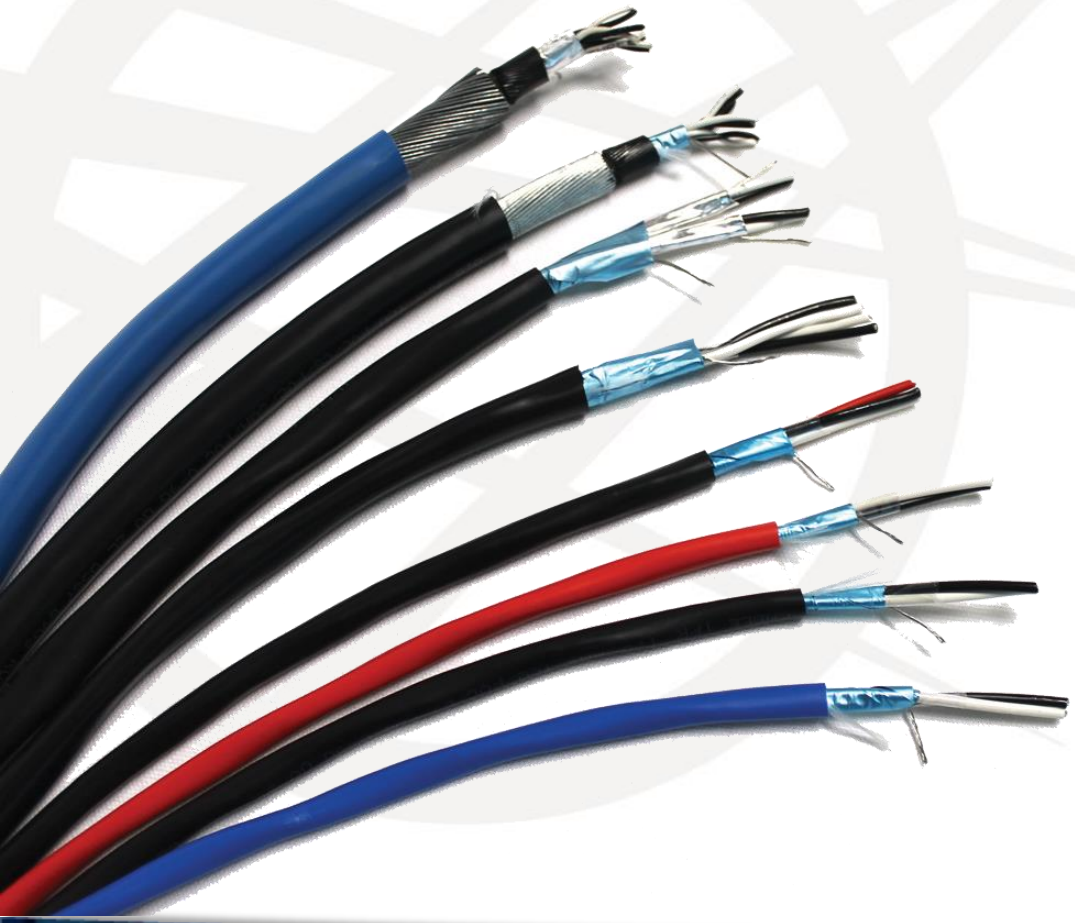

Various configurations available:

Conductors

- Pairs
- Triples

Screen/Shielding

- Overall Screen
- Individual and Overall Screen

Armouring (SWA)

- Steel Wire Armour for protection around industrial environments

Conductors

Bare Copper – BC
Plain Annealed Copper – PAC

- Highest Conductivity of all non-precious metals

Tinned Copper – TC
Tinned Copper Wire – TCW

- Copper is has a tin layer to reduce oxidation

All Maser Instrumentation Cable is **Tinned Copper**, providing better corrosion protection than standard Bare Copper Wire.

Insulation: Voltage Rating

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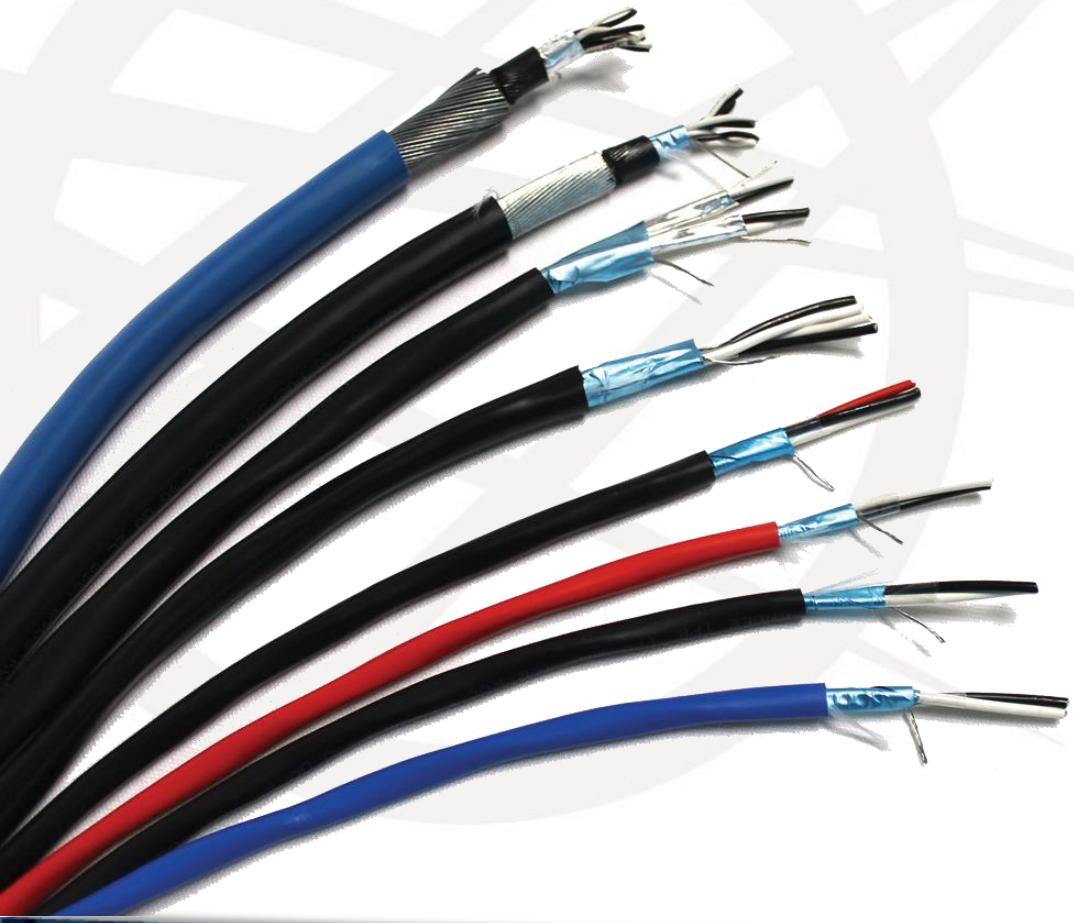

- Maser Instrumentation Cable is tested at 2Kv AC
- Operating voltage = 110VRMS/150VDC
- Insulation voltage = 300V

Shielding/Screening

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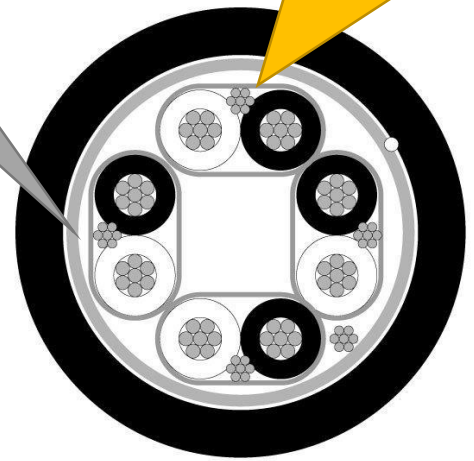
Shielding is typically a foil layer that encloses the conductors to protect against electrical interference (EMI).

ES (or IS)	**Element Screen** (Individual Screen)
CS (or OS)	**Collective Screen** (Overall Screen)
ESCS (or ISOS)	**Element Screen + Collective Screen** (Individual Screen + Overall Screen)

CS / OS
Protects the interior of the cable from external electrical interference.

ESCS / ISOS
Protects the individual pairs or triples from interference between adjacent conductors.



Shielding/Screening

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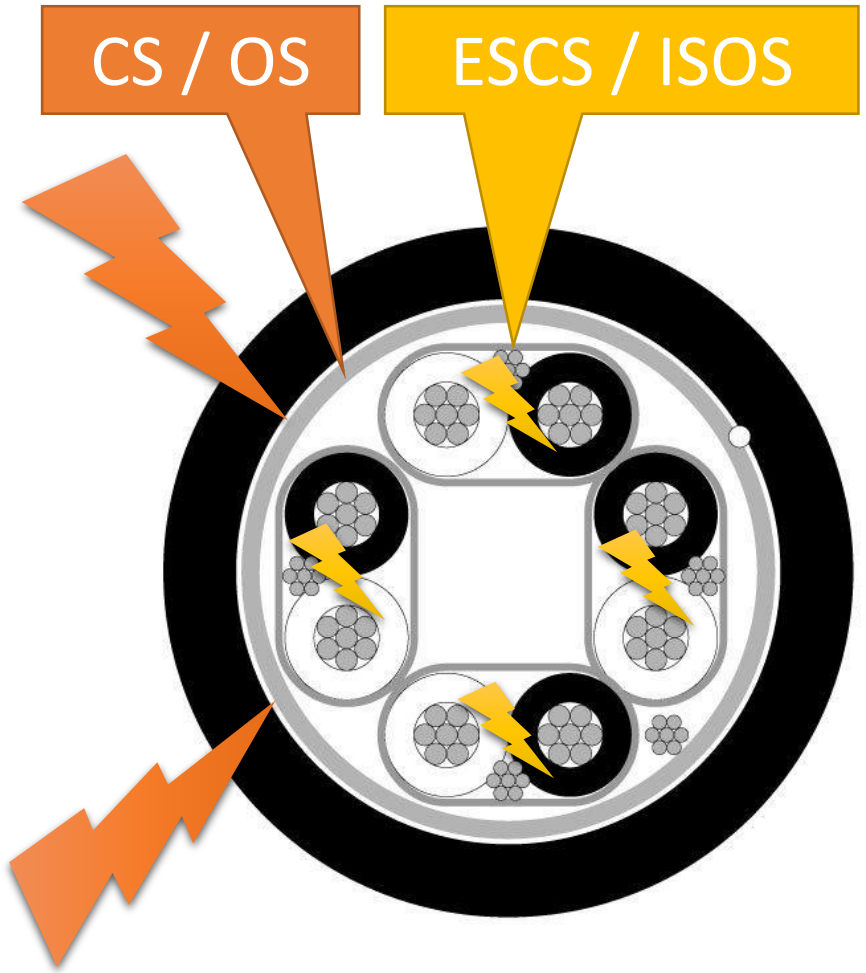
- The overall screen will protect the interior of the cable from external interference.
- However, individual pairs or triples may create interference between themselves, which has the potential to distort signals in adjacent pairs.
- The use of individually screened pairs or triples reduces this distortion.



Sheath / Jacket

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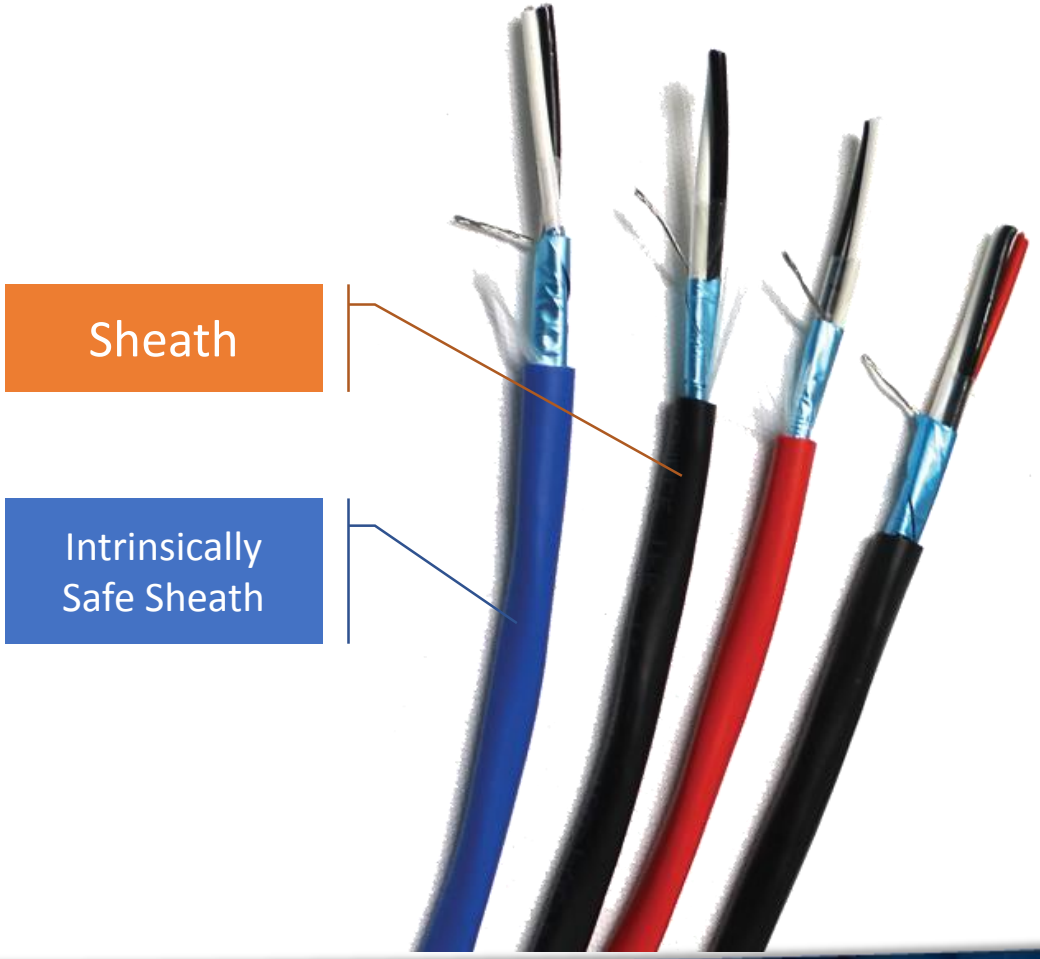
- ✓ Protects cable from the environment
- ✓ Protects cable from installation process
- ✓ Provides flame retardancy
- ✓ Improves the cables appearance

Intrinsically Safe Blue Jacket:

- Intrinsically safe cables are usually coloured blue so as to identify the potential risk of the electric circuit and the need for special consideration. The cables are often protected by tough armour and sheathing.



Sheathing / Jacket Selection

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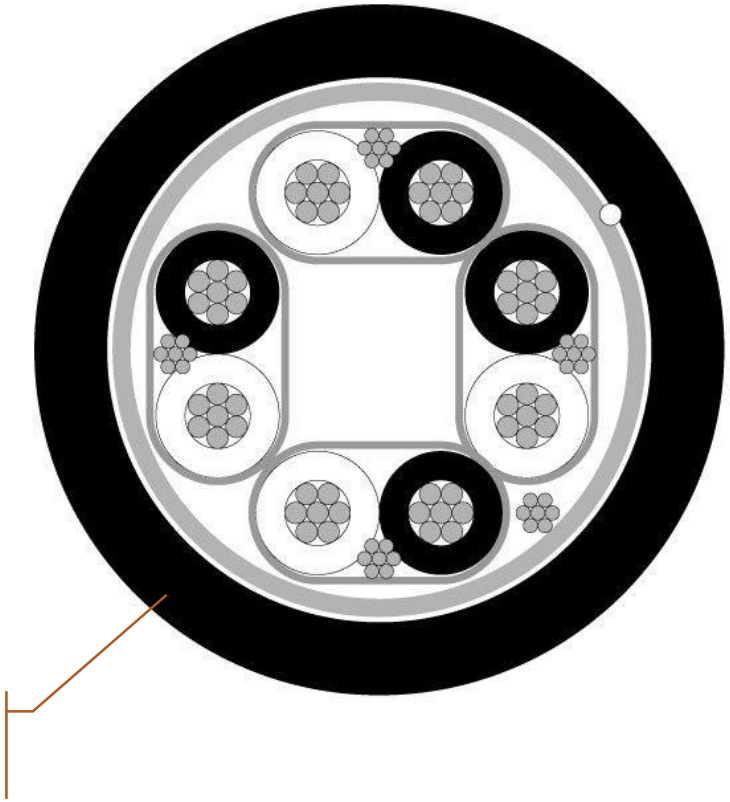
- Environment – Indoor/Outdoor
- Moisture Protection
- UV Protection
- Flammability – Flame Retardant or Flameproof
- Flexibility/Rigidness
- Mechanical Protection – Armour
- Colour for Identification



Insulation: Materials

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Functions of Insulation

Separates conductors, electrically and physically, within a cable.

PVC	• Polyvinyl Chloride *(Most common and cheap)*
PP	• Polypropylene
PE	• Polyethylene
FEP	• Fluorinated Ethylene-Propylene
SI	• Silicone

Cable Configuration

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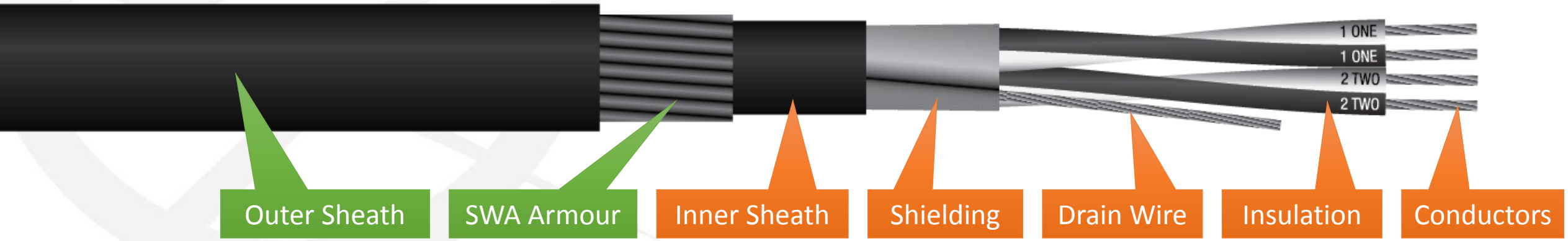
2 Pair - Overall Screened - SWA Armoured



Cable Configurations

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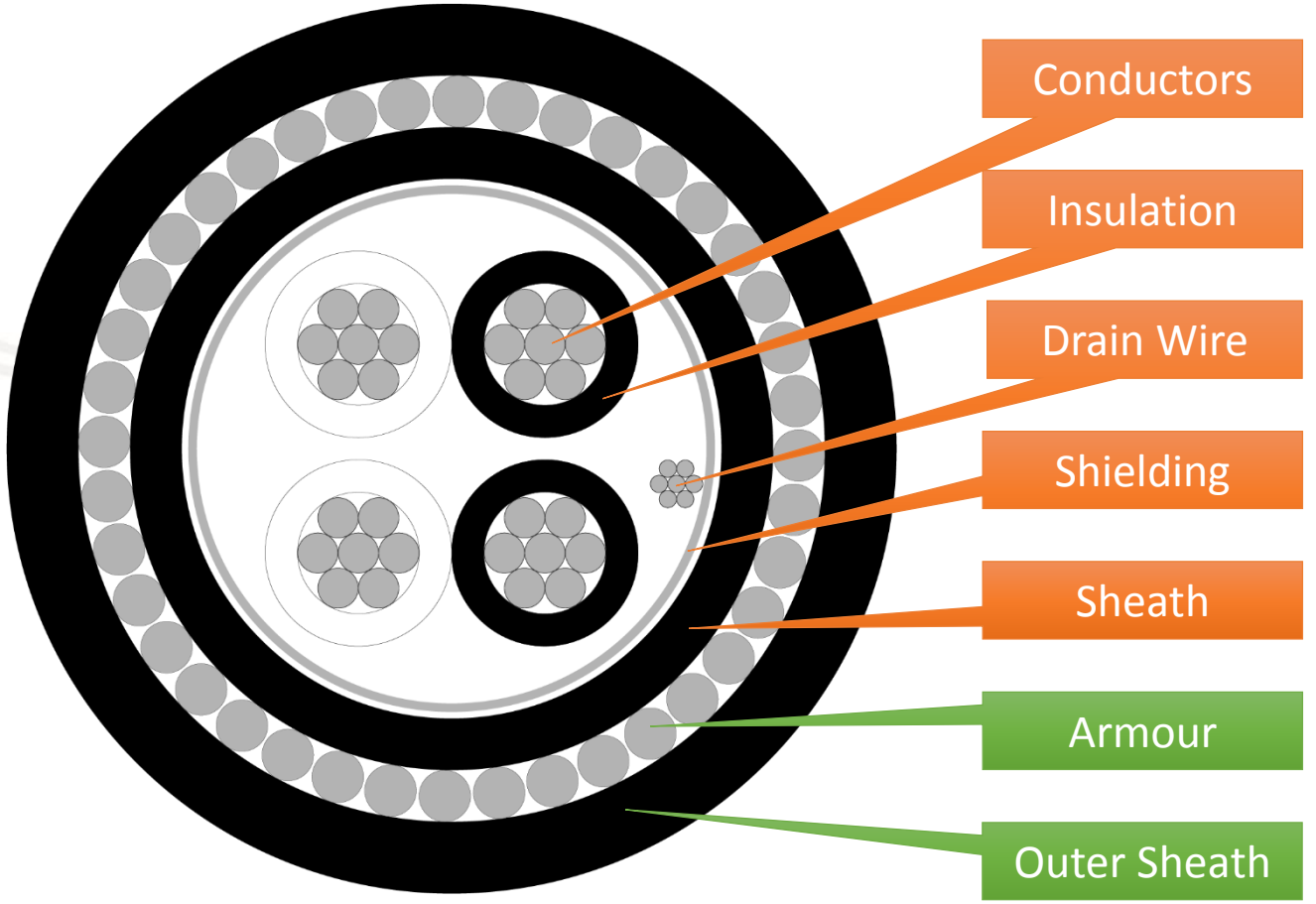
Overall Screened Cross-sectional View

- 2 Pair
- Overall Screened
- SWA Armoured



Cable Configurations

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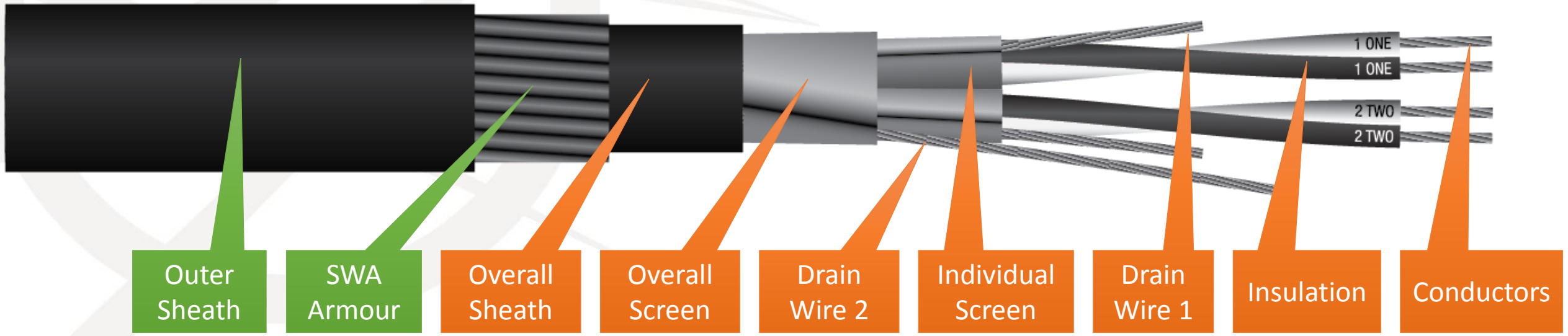
2 Pair – Individual & Overall Screened – SWA Armoured



Cable Configurations

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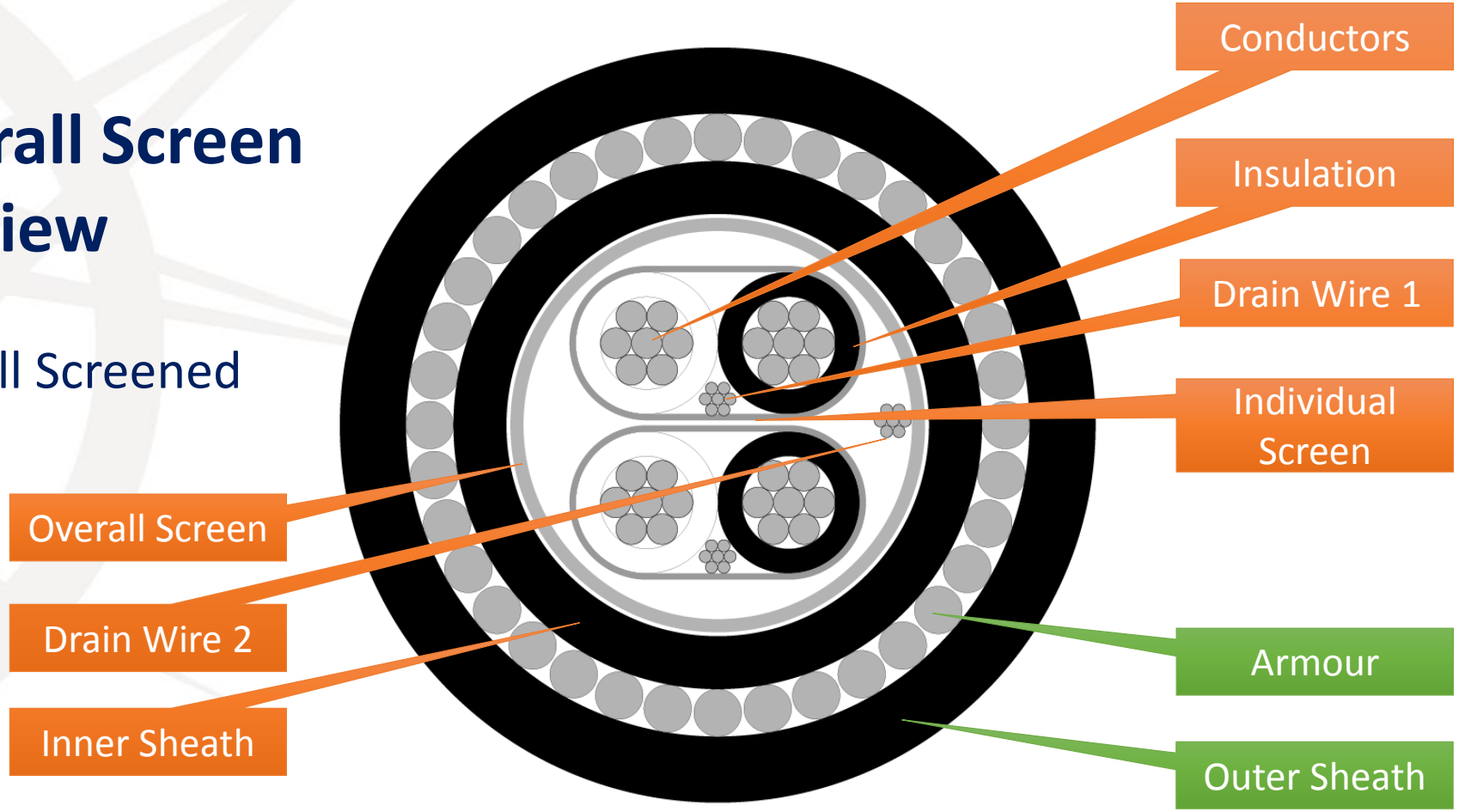
Individual & Overall Screen Cross-sectional View

- 2 Pair
- Individual & Overall Screened
- SWA Armoured



Cable Armouring Options

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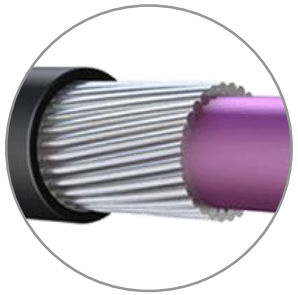
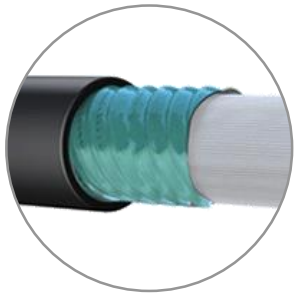


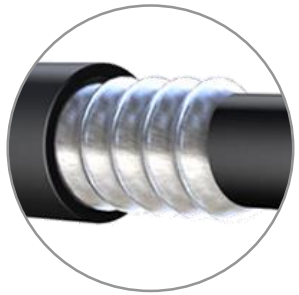
(G)SWA

Galvanised Steel Wire Armoured



CSTA

Corrugated Steel Tape Armour



AIA

Aluminium Interlock Armour

Technical Information

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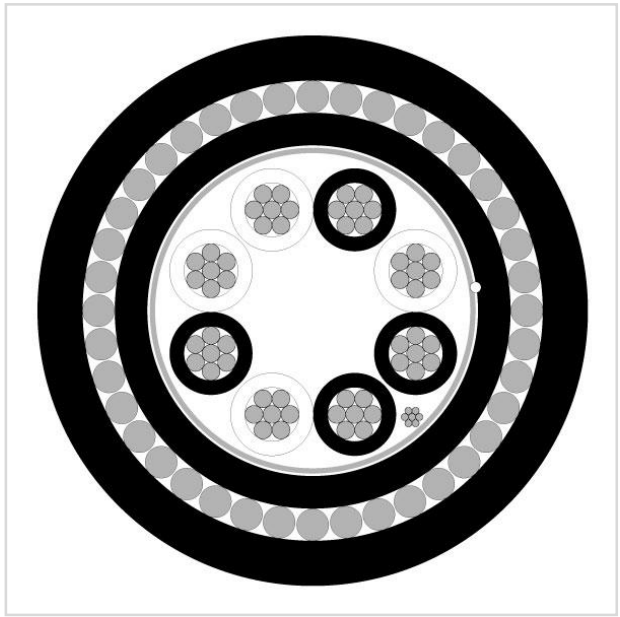
Cable Characteristics	
Conductor	Stranded Tinned Copper Conductor 1.5mm (7/0.50mm)
Insulation	PVC ,V90HT , White/Black Numbered Pair's
Screen	Overall Shield of Ali/Polyester Foil c/w Tinned Copper Drain Wire (7/0.20mm)
Armour	Galvanized Steel Wire
Sheath	PVC , 5V-90 , Flame Retardant , UV Resistant Black PVC , (Also available in Intrinsically Safe Blue)
Operating Temp.	-20°C to +90°C

Electrical Characteristics	
Rated Voltage	110VRMS/150VDC
Max. Current Rating	13 Amp
Max. DC Resistance @ 20°C	13.6 Ω/km
Max. Capacitance Cond. To Cond. (Screened)	200 pF/m
Max. Capacitance Cond. To Scr. (Screened)	300 pF/m
Inductance @ 1kHz	0.95 mH/km
L/R Ratio @ 1kHz	36.5 µH/Ω
Insulation Resistance	140 MΩ/km
Bending Radius (Fixed)	14D (D = Cable Diameter)

4 Pair, 1.5mm², Overall Screen, SWA Armour

Product Code: **MAS5504CSSWA**



Standards: AS/NZS1125, AS/NZS3808, IEC 60332-1-2, IEC 60332-3-22, IEC 60079.14, RoHS Compliant

Questions

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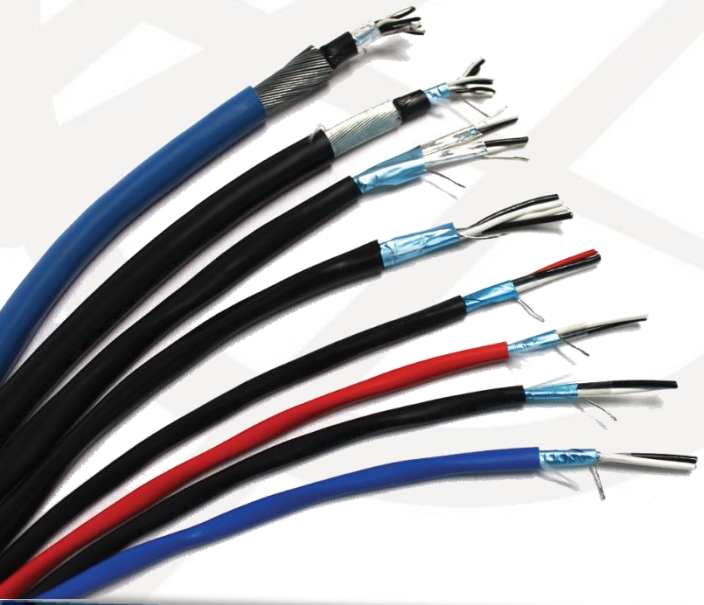
We need to give customers all the relevant information so they can make an informed product choice.



- Conductors
  - How many Pairs or Triples do you need?
  - What size: 0.5mm or 1.5mm?
- Screen/Shielding
  - Overall Screen?
  - Individual and Overall Screen?
- SWA Armouring
  - Steel Wire Armour for protection around industrial environments
- Jacket Colour
  - Black is standard
  - Blue jacket for Intrinsically Safe applications