Instrumentation cables are required to transmit ‘clean’ signals within industrial environments, often where there is a high level of electromagnetic interference through potentially hazardous areas. In order to achieve accurate process control, it is important that signals to and from machines are uncorrupted.

**THE CHALLENGE: NOISE REJECTION**

Common Mode noise occurs due to a difference in potential between conductor use for earthing the system at different location. This potential difference causes currents to flow in the conductors of screen of the cable, which interfere with the signal. This type of noise is normally prevented by using a common earth for or parts of the system, preferably at the equipment end, to which all circuits and screens are connected.

Crosstalk is the transfer of signal from one pairs to another in the same cable due to electromagnetic and/or electrostatic effect. This is reduced by making the lay lengths with which the pairs are twisted differ between adjacent pairs, so that in a long lengths of cable each conductor and any induced noise is cancelled.

The pairs and triples of cables are twisted to a lay length of not more than 100 mm for single pair and single triple cable. In the multipair overall screens cables the lays are staggered to minimize the crosstalk.

Electromagnetically induce noise is due to an induced e.m.f. in the signal-carrying conductor due to an alternating magnetic field such as that existing around a conductor carrying a heavy electric current. Although such current are generally at 50Hz, which can be filtered out in the equipment, harmonics of very much higher frequency can be produced, particularly where electric motors and welding plants are in use.

Electrostatically induce noise is due to an induced e.m.f. in the signal-carrying conductor due to the capacitance between it and another conductor. The most effective method of reducing interference of electrostatic and electromagnetic origin is to form the two wires carrying the instrument into a twist pair. This ensures the voltages induce in the two wires are approximately equal and opposite, so that they cancel each other out. Additional protection against electrostatic interference is achieved by the use of the total coverage conducting screen.

**THE SOLUTION: INSTRUMENT CABLE DESIGN**

Screen instrumentation cables are screen with a tape of aluminium-coated polyester films. For multipair applications where electrostatic crosstalk is likely, such as where some pairs operate at higher potential than others, cables are available with the pairs individually screened with aluminium-coated polyester films. All screen in cables are provide with a tinned annealed copper drain wire to equalise potential along the screens and to allow easy connection to earth. Individual screens are electrically separated from each other by a polyester separator tape to prevent circulating current which could cause common mode noise.

**TRANSMISSION CHARACTERISTICS**

The low conductor resistance, inductance and capacitance of cable make it ideal for direct current and alternating current frequencies up to 10kHz, distances of up to 10 kilometres and low medium speed digital transmission.

For frequencies exceeding 10kHz all for high speed data transmission over long distances