

Hazardous area tutorial from Extech

In the interests of education, here are some regular misconceptions:

1) We receive enquiries where people are looking for zener barriers or galvanic isolators for Explosion protection(Exd) field devices. This is not required. Only Intrinsic Safety(Exi) field devices require a barrier or isolator. Exd devices require mechanical protection (i.e. armoured cable & Exd glands, enclosures etc.). Exi comes into its own for systems 24V & below. Intrinsic Safety should work out cheaper than Exd for these systems & allows greater flexibility including live working. Intrinsic Safety is the only technique that includes faults in the cabling and with Exma are the only protection techniques allowed for zone 0.

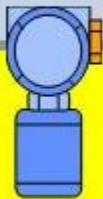
2) Another misconception is that putting a barrier or isolator in front of a normal uncertified safe area field device makes it safe. NOT TRUE. The barrier/isolator has a safety description that has to match the field device to make it safe. The inductance & capacitance of the cabling has to be considered too. A normal field device would have capacitance & inductance that could store sufficient energy for ignition.

New legislation in South Africa (ARPO108): All hazardous area equipment requires local re-certification (IA certification) – the good news is that 95% of what we sell is already certified.

With respect to point 1 above, there is one confusing situation. Although quite rare, there are some Exd (flameproof) field devices which have options for Exi (Intrinsic Safety) wiring and the connection terminals will be certified Exi. In this case a barrier or isolator is required if the Exi option is chosen.

Exi works on matching parameters and this is done with loop approvals. Exi devices have a Safety Description (e.g. 28V 93mA 0.65W). To assess a loop you need to look at the Safety Description output parameters of the barrier/isolator (28V 93mA 0.65W) and compare to the field device input parameters (eg. 30V 100mA 1.3W). The field device is certified to be safe provided the parameters are below those specified. The barrier/isolator is certified to never give out more than specified. So in this case, we have a match.

Now we need to consider cabling - cable capacitance/inductance are energy storing & therefore a source of ignition. The Co & Lo specify the maximum loop capacitance & inductance; deduct the Ci & Li of the field device. This leaves you with the maximum cable capacitance & inductance for the cable. Cables have parameters of capacitance and inductance per metre. This allows you to specify the maximum cable length. This is documented in the loop approval.

**Transmitter****EEx ia IIC T4** $U_i < 30 \text{ V}$
 $I_i < 100 \text{ mA}$
 $P_i < 1.3 \text{ W}$ $C_i < 20 \text{ nF}$
 $L_i < 10 \mu\text{H}$ **System****EEx ia IIC T4****Cable Parameters** $C_c < 0.063 \mu\text{F}$ $L_c < 4.20 \text{ mH}$ $L/R_c < 55 \mu\text{H}/\Omega$ **Interface****[EEx ia] IIC** $U_o < 28 \text{ V}$
 $I_o < 93 \text{ mA}$
 $P_o < 0.65 \text{ W}$ $C_o < 0.083 \mu\text{F}$
 $L_o < 4.2 \text{ mH}$
 $L/R < 55 \mu\text{H}/\Omega$ 

For MTL7787+
Cable parameters are quoted for
IIC unless otherwise stated