

UPP Non-conductive Pipework

This simple guide will assist you in understanding the potential risk of spark ignitions before you select and install a pipework system.

Electrostatic Charging

Fuel flow in pipes, filters, valves and/or constrictions which increases velocity and turbulence can give rise to electrostatic charging. This applies both to conductive and non-conductive pipe. Charging alone is not hazardous. However, a high energy spark discharge from a charged conductive object can, in certain situations, result in electrostatic ignitions and even fires.

An energy brush discharge from a non-conductive (plastic) object cannot ignite fuel vapours because they are **too weak**.

Fuel conductivity, flow velocity, pipework material and impurities all contribute to charging of the fuel which can transfer to the pipework.

- Highly conductive biofuel fuels **pose no risk**.
- Fuel station flow velocities **pose no risk**.
- Non-conductive pipes generate much lower discharge energy than insulated conductive pipes. When the flow stops any charge is naturally relaxed within minutes.

History

Non-conductive fuel pipes have been in use for 30 years and have provided both proven reliability and safety performance against the hazards associated with tank filling or fuel dispensing. Hundreds of thousands of installations, around the world, demonstrate a wide margin of safety between the levels of static electricity generated and those necessary to create an ignition hazard. No sparks mean no ignition of vapours.

In contrast, artificially conductive plastic pipework is still somewhat new and the pipe-to-pipe connectors used do not have the same proven track record that is associated with non-conductive pipework.

The Cost

There is a recurring cost of compliance when conductive systems are employed. CENELEC Code of Practice CLC/TR 50404, IEC TR60079-32 and NFPA 77 require the periodic inspection and testing of the earth connections through the whole length of piping when conductive lined pipe systems are employed. Third-party testing will be mandatory for licensing and insurance purposes.

Because fuel conductivity can falsify an annual test result, it will be necessary to drain, disconnect on end, and gas-free every fuel line before its electrical continuity may be tested. Estimated costs for such testing have been quoted at £1,200.

Best practice dictates that during testing the fuel station shall be closed to the public. Why sacrifice a day's business each year for the sake of no added security?

Safety

The principle global standards for fuel pipe - EN14125 and UL971 do NOT require the pipework to be conductive. Industry experts on the committees agree that the risk of spark ignition does not dictate the use of conductive pipework.

Despite competitor inferences to the contrary, the ATEX directive does not apply to pipe.

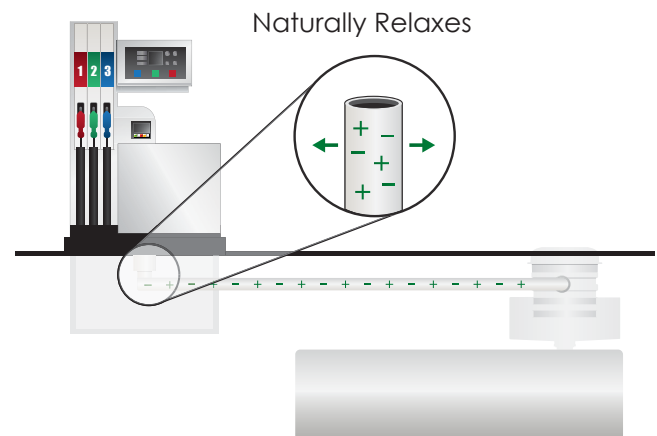
Non-conductive and Conductive Systems

Non-Conductive

A non-conductive pipework system utilizes material which naturally limits the amount of energy build up; no means to dissipate energy is necessary.

Conductive

A conductive polyethylene pipework system utilizes an inner conductive liner in conjunction with inserts between pipe connections to prevent energy build-up via an earthing system.



Best Practice for All Fill Points

- Do bond together and ground all Fill Adapters. There must be NO isolated metal components. (NFPA 77, CLC/TR 50404, IEC TR 60079-32)
- Test Fill Adapter grounding regularly. (NFPA 77, CLC/TR 50404, IEC TR 60079-32)
- Tank trucks should be bonded to the fill system, and all bonding and grounding should be in place prior to starting operations. (NFPA 77)
- The earthing and bonding of all conductive and dissipative items should be regularly checked. (IEC TR 60079, EN 14125)
- Avoid the use of flame arrestors – unless legislated. They generate charging! (IEC TR 60079-32, EN 14125)
- For Offset Fills, ensure Fill Cap is connected to Fill Adapter by a chain or metal link to guarantee electrical bonding and the same electrical potential. (NFPA 77, CLC/TR 50404, IEC TR 60079-32)
- Ensure Fill Boxes are adequately grounded and ventilated. (FFS recommended)
- Tightly fit Fill Caps, Dip Caps and Vapour Adapter Caps after filling. Fit locks to prevent unauthorised access. (FFS recommended)

Conclusions

The use of non-conductive polyethylene fuel pipework for the transport of fuel underground does not constitute any increase in electrostatic hazard over metal pipework or artificially conductive plastic pipework.

It is the metal pipe and fill adapters which generate and store the electrostatic charge which becomes a hazard if these metal items are not correctly connected to ground.

In fact, the overall risk of electrostatic ignition of fuel vapours from non-conductive pipe is likely to be less than with metal pipework since the streaming current, which contributes to the total quantity of charge produced in fuel flow, will be reduced.

Extensive studies simulating fuel flow situations have demonstrated that, with a wide margin of safety, non-conductive pipe is very unlikely to be a source of spark ignition and is therefore a safe choice in view of the risk of electrostatic discharge.