Piping systems are utilised across the world to carry a multitude of different media such as oil, gas, water, chemicals and many other fluids and gases and are found in nearly all sectors of industry. These piping systems are all interconnected and are tethered together with welded joints or via flanged connections and can encompass valves, pumps and many other connections. From the early days, flanged joint connections have been considered to be the weakest part of any piping system. However when referring to a weakness, we may not necessarily be referring to a lack of strength, it may just be that there are a number of factors that can contribute to flange failure. Incorrect bolt load, incorrect gasket selection or gasket stress, poor flange face conditions are just some of the factors that could cause a flanged joint connections to fail and cause leakages of fluids or gases. Generally, if all factors are considered, particularly the design and installation, then flanged connections are generally safe and reliable.

INTEGRITY OF ELECTRICALLY ISOLATED FLANGED JOINT CONNECTIONS

When sealing flanged joints in piping systems that require electrical isolation, this then adds complexity to all the factors we have highlighted above. Flange Isolation Kits are installed in thousands of applications around the world and have multiple uses. By isolating all metallic components and preventing any metal to metal contact, flange isolation kits can control current flow in cathodic protection systems, they can also prevent galvanic corrosion by isolating flanges of dissimilar metals such as carbon steel connecting to Inconel. These flange isolation kits can also connect and seal flanges of dissimilar design such as connecting raised face to RTJ facing.

Flange isolation kits have a number of components, a central gasket to seal and electrically isolate the connecting flanges, bolt sleeves to isolate the bolts from the flanges, isolation washers to isolate the steel washers and nuts from the flanges. See fig.1 (below)

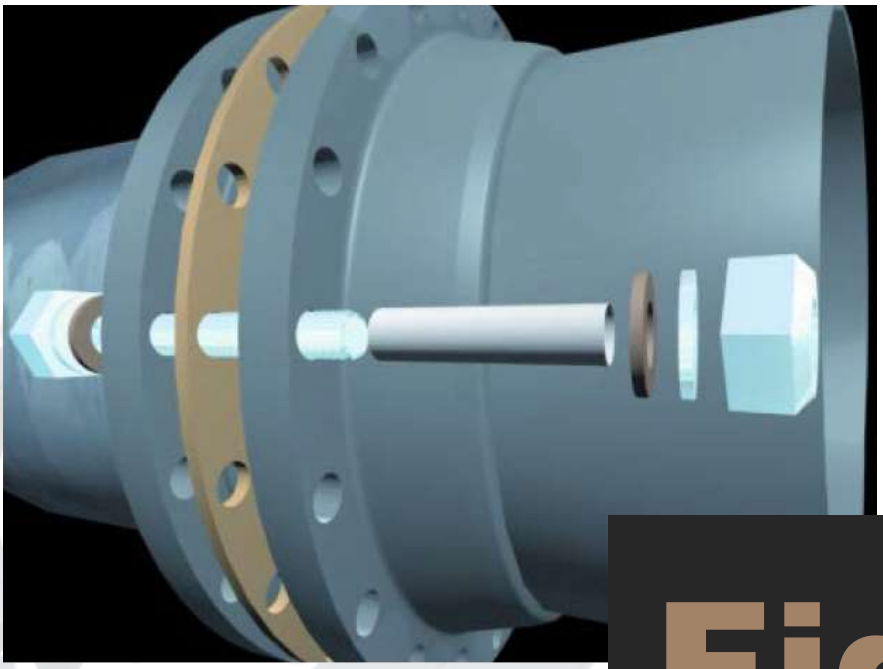

Fig 1

So Flange Isolation Kits have been around for a very long time and over the years we at GPT have modified designs and material selections in order that these kits can electrically isolate flanges conveying aggressive and sour media in critical service applications.

One of GPT's innovative solutions was the design and manufacture of the world's first fire safe flange isolation kit. The most common variant of flange isolation kits is non-fire safe which when installed within hazardous zone areas should be a major concern to asset owners. Flanged joints which are connected and sealed with FIK's are installed globally in extremely hazardous locations such as tank farms, storage facilities, and offshore platforms etc. and standard FIK's are not fire safe and will fail if there is a fire in the plant that reaches the flanged joint.

FULL LENGTH SLEEVE, DOUBLE WASHER SET CONFIGURATION

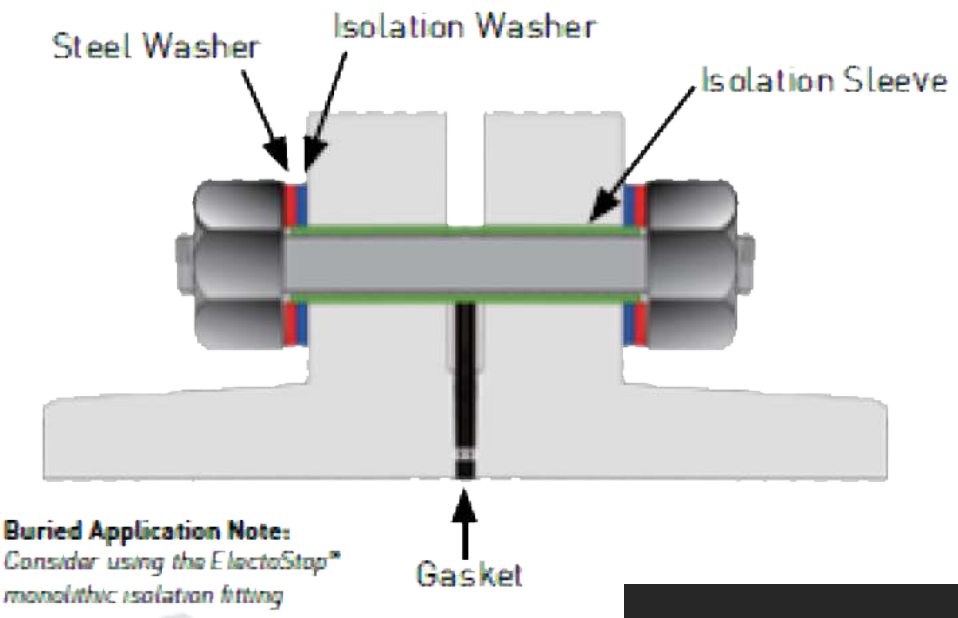

Fig 2

The typical make up of a standard non-fire safe FIK's is shown in fig 2. So in the event of a fire in a plant which spreads to the flanges, the two isolation washers which are located on both sides flange will burn away. These are 3mm thick, thus allowing the flanges to relax and open by 6mm allowing flammable liquid or gases to leak and fuel the fire.

Fig 3

THIS IMAGE IS WRECKAGE OF TANK 11 AT THE CONOCO PHILLIPS GLENPOOL SOUTH TANK FARM, OKLAHOMA, USA WHICH EXPLODED BACK IN 2003.

Whilst leakage of a flanged joint was not the root cause of the fire, a standard FIK was installed and failed.

The Pipeline Accident Report which was compiled by the National Transportation Safety Board in the USA.

An isolation flange assembly in the piping failed because of the fire, allowing the pressurized crude oil to spray the surrounding area through the loosened flange assembly
In their fire safe design, Garlock Pipeline Technologies (GPT) made significant changes to the overall design and material selection in order to achieve fire safe capability within their FIK's. Both the gasket and washer systems had fundamental design changes, whereas the bolt sleeves remain unchanged.

We at GPT, manufacture the world renowned Pikotek brand and we have seen a significant shift towards fire safe products over recent years with major end users such as ADNOC , Chevron, Shell and Saudi Aramco making investments into the safety and integrity of their assets and employees alike.

All GPT's fire safe flange isolation kits are accredited to API 6FB standards.
If you would like to learn more about how GPT can help keep your flanged joints free from corrosion, free from leakages and keep your employees free from harm, please contact us. We can also carry out live fire safe demonstrations at your premises in order for you to see first-hand how out systems work in real fire situations.
GPT – Sealing, Connecting and Protecting the world pipelines.