MONOLITHIC ISOLATION JOINTS

ALFA Isolation Joints serve as a positive leak proof, long lasting block against the flow of electric current in all piping systems. When you put ALFA Isolation Joints into service, you bury maintenance costs forever.

MANUFACTURER OF HIGH QUALITY MONOLITHIC ISOLATION JOINTS FROM OVER 30 YEARS

FACTORY ASSEMBLED

ALFA Monolithic Isolation joints are completely engineered, produced, assembled and tested inhouse and in accordance to all major international requirements of ASME, ASTM, API, DIN and BS codes.

WARRANTY

All ALFA Engineering products are warranted against failure caused by manufacturing defects for a period of 2 years or more. Any product found to be so defective and returned to us within one year from date of shipment will be replaced without charge.

MADE IN ITALY

Made from Italian raw materials, each Monolithic Isolation Joint is designed and manufactured at our plant in Modena (Italy) that has a registered ISO 9001:2000 Quality Management System. Copy of current ISO 9001:2000 certificate is available upon request.

FOR ONSHORE & OFFSHORE PIPELINE PROJECTS

DN: FROM 1/2” TO OVER 120”

ANSI: 150 - 300 - 600 - 900 - 1500 - 2500 - 5000

API: 10,000 - 15,000

CARBON STEEL - DUPLEX & SUPER DUPLEX CRA CLADDING

ASTM • DIN • ASME • DNV • API • ISO • EN • NORSOK

PED Certified

Approved in all major Oil & Gas worldwide vendor’s lists

www.alfa-eng.net
WE ARE ALFA ENGINEERING SOC. COOP.

ALFA Engineering is a worldwide manufacturer of high quality monolithic isolation joints for the Petrochemical & Gas industries from over 30 years. We are based in the north of Italy and we are proud to deliver the Italian Excellence of Isolation Joints all over the world. Wherever you find pipeline, gas distribution system or water pipelines you will also find a wide array of reliable ALFA Engineering Products.

WE ARE THE ITALIAN EXCELLENCE IN MONOLITHIC INSULATION JOINTS.

Our company is a keen supporter of the genuine 100% Made in Italy label, because we wish to guarantee to all our customers that the product they purchase from us is a true product of quality Italian craftsmanship. It means a product that is entirely made in Italy, from the design and working out on paper, the choice of Italian suppliers, up till the product is made, finished, extensively tested and ready for shipment.

Each Monolithic Insulation Joint is designed and manufactured at our plants in Modena (ITALY) that has a registered ISO 9001:2008 Quality Management System, is PED Certified and CE Marked.

NEW On-Line ORDER TRACKING PLATFORM

ALFA ENGINEERING introduces our new on-line platform on Alfa’s web-site to track the status of your orders with ALFA. You will receive on-time updates on PO confirmation, Arrival of Raw Material and constant tracking of the various production steps involved in your order together with pictures. You will never wonder again about what is the real status of your order!

INTRODUCTION

Why to use a Monolithic Isolation Joint

Corrosion destroys approximately 30% of the world’s annual production of steel. Where you find pipelines for gas oil distribution system, you will also find a range of ALFA Engineering isolation joints. The correct location of a monolithic isolation joint results in saving overall cost of corrosion control systems.

For onshore projects, an isolation joint is used to limit the spread and hence cost of cathodic protection current to those pipes that need to be effectively and economically protected by the main CP system.

An isolation joint is used to electrically “split up” long pipelines into distinctive system. Or to isolate and ensure that CP or stray electricity currents do not cause increased corrosion.

Or to provide protection against earthing currents at domestic and industrial premises where the PME (Protection Multiple Earthing) system is in use.

ONSHORE

1. To limit the spread and hence cost of cathodic protection current to those pipes that need to be effectively and economically protected by the main cathodic protection system (e.g. where steel pipelines are connected to iron or ductile iron pipelines, where a well coated/wrapped pipe is connected to a badly coated/wrapped pipe, or where branch connections are made to the main pipeline).

2. To electrically “split up” long pipelines into distinctive cathodic protection systems to prevent “long line” currents and to make the individual systems more effective and hence economical.

3. To isolate a pipeline to ensure that cathodic protection or stray electricity currents do not cause increased corrosion, cause damage or constitute a hazard (e.g. where a pipeline enters a refinery or governor station).

4. To ensure effective electrical isolation at strategic points within designated hazardous areas (e.g. at fuel loading points).

5. To provide protection against earthing currents at domestic and industrial premises where the PME system is in use.

6. Where dissimilar metals are found together, the use of isolating joints may prevent galvanic action (i.e. where steel and ductile iron pipelines are joined).

7. Where pipelines enter or pass through mass concrete, i.e. the wall of a valve pit or building or the wall of a storage tank or treatment plant.

8. Where a pipeline is supported from a metallic structure that is in contact with soil or water, i.e. a bridge crossing a road or river, but there is a need to maintain electrical continuity throughout the pipeline. Isolating joints may be provided on either side of the metallic structure. The cathodic protection system may be bonded across the isolated section using a jumper cable.

9. Where both sacrificial anodes and impressed current is used on a pipeline it may be advantageous to electrically isolate each section.

10. To assist control or for testing, of a cathodic protection system applied to various sections of a pipeline or pipeline system. Current controlling resistors may be bonded across an isolating joint linking the various system.

11. Electrical isolation of power and instrumentation grounding systems may be required where electrically operated valves and similar components form part of a pipeline system. Electrical isolation measures taken in this respect must comply with all relevant safety standards.
1. In riser pipes on offshore structures to isolate the pipeline cathodic protection system from the structure cathodic protection system.

2. At field ‘tie-ins’

The above data are showing that the main reason behind pipeline failures is corrosion, 60% of pipeline failures is attributed to corrosion. Ensuring an efficient cathodic protection system is the best way to ensure the longevity of the pipelines.

SOURCE: Penn West 2013

### OFFSHORE

The design of the ALFA Engineering S.C. monolithic isolating joint has been proven by extensive independent prototype testing and is supported by many years satisfactory “in-line” service in the most arduous conditions. The ALFA Engineering S.C. joint design has been verified by Lloyds Register for arduous offshore project use. Standard ALFA Engineering S.C. joints can withstand considerable external loads (bending/torsion/axial) in addition to internal pressure.

### COST AND PERFORMANCE ADVANTAGES OF MONOLITHIC JOINTS VS. FLANGES & KITS

<table>
<thead>
<tr>
<th>ADVANTAGES OF USING MONOLITHIC ISOLATION JOINTS</th>
<th>DISADVANTAGES OF USING FLANGE &amp; INSULATION KITS</th>
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<tr>
<td>1. Pre-Assembled and Pre-Tested</td>
<td>1. Has to be assembled on field</td>
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<td>2. Saving on skilled on-site labour</td>
<td>2. Requires skilled knowledge to be installed</td>
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<td>3. No maintenance required</td>
<td>3. It easily breaks during installation</td>
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<td>4. No Failure caused by improper installation</td>
<td>4. Failure may cause plant shut down and expensive leakages.</td>
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<td>5. No Pipeline shutdown because of failure, replacement or leakage.</td>
<td>5. Does not grant the same level of electrical insulation as Monolithic Insulation Joints.</td>
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<td>7. Increases the safety of the pipeline</td>
<td>7. Repairing a damaged or leaking Kit exceeds by far the initial cost of a Monolithic Insulation Joint</td>
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<tr>
<td>8. Increases the life duration of the pipelines</td>
<td>8. Has to be assembled on field</td>
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<tr>
<td>9. Drastically decreases the OVERALL project LIFE CYCLE COSTS.</td>
<td>9. Drastically increases the OVERALL project LIFE CYCLE COSTS IN COMPARISON TO MONOLITHIC JOINTS</td>
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### DESIGN

The above data are showing that the main reason behind pipeline failures is corrosion, 60% of pipeline failures is attributed to corrosion. Ensuring an efficient cathodic protection system is the best way to ensure the longevity of the pipelines.

SOURCE: Penn West 2013
Production Process:

Alfa Engineering Soc. Coop. carries out internally all the production steps involved in the manufacturing, assembly and testing of all our monolithic isolation joints because we want our customer to have the guarantee that every single step is carefully monitored and managed by qualified personnel with extensive knowledge of the Oil & Gas Sector.

**PRODUCTION PROCESS**

1. **ENGINEERING**
   - Is 100% conducted internally.

2. **MACHINING**
   - Forgings and pipe machining is conducted 100% internally.

3. **WELDING**
   - Conducted 100% internally by qualified workers (over 140 welding qualification in house).

4. **ASSEMBLY**
   - Carried out internally by specialized personnel.

5. **PAINTING**
   - Is applied internally at our painting facility.

6. **TESTING**
   - Is conducted internally by our testing engineer teams.
     - Only chemical tests are carried out with our Accredia certified partner laboratories.

**QUALITY CONTROL TEST & INSPECTION**

One of the main features characteristics of Alfa Engineering is its high quality level, integrity and control of procedures application. It is therefore fundamental for the future not only to maintain the same levels but to improve them. This is the reason of the continuous investments on improving production and testing processes.

It is our policy to provide our customers with high quality products and reliability that meet their expectation.

**ALFA Engineering Soc.Coop.** Monolithic Isolating Joints are guaranteed to have the mechanical and electrical properties as specified and this is achieved by operating a very strict control over all phases of our business from design and material procurement to final dispatched. All staff are committed to Quality.

Alfa Engineering operates a Quality Assurance System in accordance with the requirements of UNI EN ISO 9001:2008. This ensures close control over all steps of production and manufacturing. Alfa Engineering staff and personnel take pride in manufacturing top quality products and are very proud of the reputation Alfa Engineering has within the Petrochemical & Gas Industries as a Qualified and Quality Oriented Company.

**PROTOTYPE TESTING**

The design of a monolithic isolating joint is very complex and not easily verified by manual calculation. The best way of proving the design is by Prototype testing and many major customers request that a special test programme system is carried out before granting their approval.

Prototype tests may involve independent or customer witness of various stages during the joint manufacture followed by mechanical testing. The mechanical testing usually comprises; Hydrostatic, cyclic and air pressure, combined pressure and bending and torsional loading. Deflections of internal joint faces are often measured to ensure that under all service conditions the joint will maintain its fluid seal without any reduction in electrical properties.

ALFA Engineering Soc.Coop. joints have undergone extensive testing including the measurement of electrical resistance and dielectric strength before and after a combination pressure tests and other specific testing activities.
INSTALLATION ABOVEGROUND / UNDERGROUND/ SUBSEA – On-Shore/Off-Shore

HYDROSTATIC TEST
1.5 Times the Design Pressure (Or as per Customer Requirements)

DIELECTRIC TEST
1.5-5 KV (5-1 min.) @ AC 50÷60 Hz (Special 12 KV @ 1 minute AC 50÷60 Hz)

ELECTRIC INSULATION TEST
> 200 MΩ @ 1000 Volt DC (Special > 100 GΩ @ 5000 Volt DC)

NDE TEST
W1-W2-W3: MT & UT, Bevel Ends MT - According to ASME V ASME VIII

WELDS
W1-W2-W3: According To ASME IX - API 1104 –DNV (X-RAY upon request)

CERTIFICATION
EN 10204 - 3.1 (EN 10204 - 3.2 if requested)

INSPECTION & TEST/ACCEPTANCE
Manufacturer Standard / Customer Applicable Requirements

HYDRO-BENDING TEST
Based on customer requirements up to 90% of SMYS

HYDRO-THERMAL BENDING TEST
Based on customer requirements up to 100 Celsius

TORSION TEST
5% of SMYS

HYDRO FATIGUE TEST
From 5 to 40 cycles at 80% TP or as per customer requirements

HIC TEST
From Accredia Certified Laboratories; on Forgings and on Pipes

MATERIALS

PIPELINE (ISO3183 - API 5L)
Carbon Steel All Grades + Low Alloy & Alloy Steel + Duplex & Super Duplex

BODY PARTS
ASTM / ASME / UNS / EN Materials

ISOLATING ELEMENTS
NEMA G10/G11 - ASTM D709 – Class H

“OR” GASKET
Double “O” Ring ASTM D 2000 we can use ANY kind of O’Ring depending on project for SOUR - NON-SOUR - TOXIC environment requirements and special applications.

BACK SEAL
Silicon Neutral Low Module

FILLER ISOLATOR
Epoxy Resin Cold Cured

CABLE LUGS M10
EN 10025 235JR (Carbon Steel)

INTERNAL / EXT. COATING
Amine Cure Epoxy Resin 200÷1500 microns
We can apply any painting system based on customer requirements.

INTRODUCING THE ADVANCED QUALITY CONCEPT OF ALFA WELD-LESS MONOLITHIC ISOLATION JOINTS

Alfa has advanced the design of the “REAL” Monolithic Isolation Joints.

The new engineering behind our new proposed product of the Weld-less MIJ brings several advantages in terms of performance and overall pipeline cost reduction.

1. This new model is manufactured so that there are no welds W1 and W2, implying that no weld is intouch with the pipeline fluid.
2. We bring 100% uniformity of material thru all the MIJ.
3. Mechanical and Chemical properties are the same thru all the MIJ.
4. Eliminates dissalligment problems between pipes and forging rings.
5. 0% risk to have defect welds.

The absence of the 2 welds W1 and W2 is a very important quality improvement of the joint itself. Isolation Joints as per international standard have to have the minimum number of welds. Our design is so that NO
welds are in touch with the fluid bringing a great advantage in terms of corrosion resistance, uniformity of material, weight of the product and for these reasons grants a longer lasting life of the UJ decreasing all type of welding defect probability.

In those cases where big dimensions would not allow such a production we can still propose a second alternative which is by using pup pieces made out of forging material still bringing the following advantages:

1. We bring 100% uniformity of material thru all the MIJ.
2. Mechanical and Chemical properties are the same thru all the MIJ
3. Eliminates dissaligment problems between pipes and forging rings. This problem is very evident in large size isolation joints.

ANSI 150# (PN or DP 25)

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Larger Diameters available upon request. Our production capacity can reach up 120” Inches

*A & D are indicative mesure*
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Larger Diameters available upon request. Our production capacity can reach up 120” Inches.

**CERTIFICATION:**
- EN 10204 3.1 or 3.2
- NDE Pup Bevels
  - 100% MT/UT - ASME V - ASME VIII
- NDE W1-W2 Butt Welds
  - 100% MT/UT/RX - ASME V - ASME VIII
- Pneumatic Air Test
  - 10 bar 10 Min.
- Hydrostatic Test
  - At Test Pressure or as per customer requirements
- Hydro-Fatigue Test (barg x cycles)
  - 5 Cycles at 80% TP or as per customer requirements
- Electric Insulation Resistance
  - >200 MΩ
- Dielectric Strength Test
  - 5 to 12 kV (AC) % 50 Hz (1-5 min)
- Design Code
  - ASME VIII D.I - ANSI B 31.8/4
- Design Factor
  - 0.2 to 0.6
- Max Allowable Loads
  - Up to 95% SMYS-based on customer requirements
- Insulator
  - NEMA G11 Class H
- Resin Filler
  - Cold Cured Epoxy

**NOTE:** Higher Pressure Class (#900, #1500, #2500, #5000 and #10.000) available upon request. Larger Diameters available upon request. Our production capacity can reach up 120” Inches.
DOUBLE SEALING SYSTEMS WITH 4 O’RINGS IS THE BEST WAY TO GUARANTEE LONG TERM INSULATION CAPACITY OF THE ISOLATION JOINT.

“All major corporates viz BP, Shell and ConocoPhillips are enhancing awareness by doing everything within their power to minimize the impact of atmospheric leakage and oil spills in the environment. Not least to ban and replace all those unregulated U-Seals and X-Seals from their plants, if do exist.

…it has been proven that those unregulated U-shape or X-shape rubber seals are unfit to work under extreme conditions nor high pressure services. …dubious sealing design such as U shape seal rubbers can determine failures. The International Standards Organization (ISO) is developing new guidelines to classify and ban dubious rubber seals mounted on pipeline accessories.”

Many internationally recognized gas, oil and engineering’s companies do recommend in their specification to use elastomeric “O” rings only which are toroidal in shape and are used for sealing components against the ingress or egress of fluids under dynamic and static conditions. Alfa Engineering as an internationally recognized isolation joint manufacturer have adhered to the concept of using “O” Rings in the design and fabrication of monolithic isolation joints.

This concept is applied in strict accordance with several international codes and standards:


In the seal design of isolation joints, it is essential to ensure the correct type of polymer to be used for each specific application. Behind this description there is avery remarkable technology in synthetic rubber compounding and the need to produce high precision details with aside the necessary extensive quality control.

Appropriate grade and type of elastomer can be used to best satisfy the fluid temperature. Many type of elastomers are readily available Viton –NBR – Karletz – PTFE, and spring Energised elastomers unexplosive to pipeline decompression. Mechanical design of joint body is not fixed by stock and dimension can vary. Body to suit any loadings, wall , grade etc…“O” rings are not affected by temperature change as they can expand and contract easily in the groove. Compression set is not a problem as the pre-compression is of small entity for static performance. Double “O” ring seals are accommodated easily to give an increased safety factor in sealing.

It is worthwhile to mention that “O” Ring seal design is the only recognised and coded application for static, dynamic and intermittent use under low, medium and very high pressures. “O” Rings are recommended for all pressure vessels and are in use for pressure vessels such as valves, cylinders, isolation joints and have also large and secure application in aerospace and naval engineering practice.

REFERENCES

In the petrochemical and gas industry for most engineering companies the use of “O” Rings in the design and construction of isolation joints and pressure vessels is mandatory requirement. Below some sample of companies requesting O’Rings seals in a double sealing system (Shell, Bechtel, Petronas, BP, Eni, ADCO, BG).

THE IMPORTANCE OF O’RINGS:

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>MATERIAL</th>
<th>RECOMMENDED APPLICATION</th>
<th>NOT RECOMMENDED FOR</th>
<th>DESIGN TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBR</td>
<td>Nitrile Butadiene Rubber Nitrile (Buna-N)</td>
<td>General purpose sealing Petroleum oils and fluids Natural Gas Cold water</td>
<td>Halogenated Hydrocarbons (Carbon Tetrachloride Trichlorethylene) Nitro Hydrocarbons (Nitrobenzene, Aniline) Phosphate Ester Hydraulic Fluids (Skydrol, Fyquel, Pychual) Ketones (MEK, Acetone) Strong Acids Ozone Automotive Brake Fluid</td>
<td>-40°C to +110°C</td>
</tr>
<tr>
<td>FPM</td>
<td>Fluorocarbon</td>
<td>Petroleum Oils Wet Gas ( Sour) Di ester Based Lubricants Silicone Ester Base Lubricants Silicone Fluids and Greases Halogenated Hydrocarbons (Carbon Tetrachloride. Trichlorethylene. Ethylene) Selected Phosphate Ester Fluids Acids Ketones Skydrol fluids Amines, Anhydrous Ammonia Hot hydrofluoric or Chromous Acids</td>
<td>-20°C to +200°C</td>
<td></td>
</tr>
<tr>
<td>FKM - (GFLT)</td>
<td>Tetrafluoroethylene (Anti Decompression)</td>
<td>Petroleum Oils Wet Gas ( Sour) Di ester Based Lubricants Silicone Ester Base Lubricants Silicone Fluids and Greases Halogenated Hydrocarbons (Carbon Tetrachloride. Trichlorethylene. Ethylene) Selected Phosphate Ester Fluids Acids Ketones Skydrol fluids Amines, Anhydrous Ammonia Hot hydrofluoric or Chromous Acids</td>
<td>-50°C to +200°C</td>
<td></td>
</tr>
<tr>
<td>FEP-O-SEAL (MVG - SIL)</td>
<td>Teflon® Virgin (PTFE) F.E.P. ENCAPSULATED O-RINGS SILICONE (Anti Decompression)</td>
<td>Chemical Processing and Production Oil Extraction (on shore and off shore) Petrochemical Refining Pharmaceutical Production Food and Drink Processing Automotive Components Aerospace Engineering</td>
<td>Dynamic use where high speeds and poor finishes are encountered. Where the housing design requires excessive stretch or collapse of the O-ring during installation.</td>
<td>-60°C to +204°C</td>
</tr>
<tr>
<td>FEP-O-SEAL (FPM)</td>
<td>Teflon® Virgin (PTFE) F.E.P. ENCAPSULATED O-RINGS VITON® (Anti Decompression)</td>
<td>Chemical Processing and Production Oil Extraction (on shore and off shore) Petrochemical Refining Pharmaceutical Production Food and Drink Processing Automotive Components Aerospace Engineering</td>
<td>Dynamic use where high speeds and poor finishes are encountered. Where the housing design requires excessive stretch or collapse of the O-ring during installation.</td>
<td>-20°C to +204°C</td>
</tr>
<tr>
<td>ENERSEAL</td>
<td>Teflon® Virgin (PTFE) (Anti Decompression)</td>
<td>Chemical Processing and Production Oil Extraction (on shore and off shore) Petrochemical Refining Pharmaceutical Production Food and Drink Processing Automotive Components Aerospace Engineering</td>
<td>Dynamic use where high speeds and poor finishes are encountered. Where the housing design requires excessive stretch or collapse of the O-ring during installation.</td>
<td>-155°C to +270°C</td>
</tr>
<tr>
<td>KARLEZ</td>
<td>KARLEZ ® Du Pont &amp; Dow Elastomers (Anti Decompression)</td>
<td>Chemical Processing and Production Oil Extraction (on shore and off shore) Petrochemical Refining Pharmaceutical Production Food and Drink Processing Automotive Components Aerospace Engineering</td>
<td>Dynamic use where high speeds and poor finishes are encountered. Where the housing design requires excessive stretch or collapse of the O-ring during installation.</td>
<td>-50°C to +316°C</td>
</tr>
</tbody>
</table>

Sources: Charles D. Coleman, Ph.D ME/AM
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OUR ISOLATION JOINTS DURING OUR >30 YEARS OF EXPERIENCE HAVE BEEN STOPPING CORROSIONS FOR THE FOLLOWING CUSTOMERS:

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- BONATTI
- BP BRITISH PETROLEUM
- BPA
- BRITISH GAS
- CHIYODA ALMANA
- DAEWOO
- DINATECNICA
- DOSSAL
- ENAGAS
- ENGINEERS INDIA LIMITED
- ENI
- ERIKS GASKET
- ESSAR GROUP
- GALFA

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