CLAIMS

1. A vacuum system pipe coupling comprising:

a first coupling member;

a second coupling member;

a seal system to be positioned between said first and second coupling members to seal between said coupling members; and

a securing system to releasably secure said first coupling member to said second coupling member,

said seal system comprising an inner seal element and an outer seal element and said first coupling member being provided with a flow passage configured to conduct a pressurised gas to a space that in use is provided between said inner and outer seal elements to shield said outer seal element from fluid flowing through said pipe coupling in the event of failure of said inner seal element, wherein said outer seal element comprises a first material and said inner seal element comprises a second material that is different to said first material.

2. A vacuum system pipe coupling as claimed in claim 1, wherein said inner and outer seal elements are separated by a spacer that is configured to be received in said space.

3. A vacuum system pipe coupling as claimed in claim 2, wherein said spacer is integral with at least one of said inner and outer seal elements.

4. A vacuum system pipe coupling as claimed in claim 2 or 3, wherein said inner seal element has a width, said outer seal element has a width and said spacer comprises at least one portion having a width less than the respective said widths of said inner and outer seal elements.

5. A vacuum system pipe coupling as claimed in claim 2, 3 or 4, wherein said second coupling member is provided with a flow passage and said spacer is provided with at least one through-hole configured to permit pressurised gas from said flow passage of said first coupling member to flow to said flow passage of said second coupling member.

6. A vacuum system pipe coupling as claimed in claim 5, comprising a first pipe to be connected to an inlet end of said flow passage of said first coupling member, a flow restrictor and a first transducer to be connected with said first pipe so that said first transducer can provide signals indicative of the pressure of a pressurised gas flowing in said first pipe pressure upstream of said flow restrictor, a second pipe to be connected with an outlet end of said flow passage of said second coupling member, a second transducer to be connected with said second pipe to provide signals indicative of the pressure of said pressurised gas flowing in said second pipe and a determining unit that receives said signals and determines seal system condition based on a comparison of the respective said seals received from said first and second transducers.

7. A vacuum system pipe coupling as claimed in any preceding claim, wherein said first material has a better compression set characteristic than said second material.

8. A vacuum system pipe coupling as claimed in any preceding claim , wherein said second material has at least one of better:

i) high temperature stability than said first material; and

ii) resistance to chemical corrosion than said first material.

9. A vacuum system pipe coupling as claimed in any preceding claim, wherein said first material is a fluoroelastomer.

10. A vacuum system coupling as claimed in any preceding claim, wherein said second material is a perflouroelastomer.

11. A vacuum system pipe coupling as claimed in any preceding claim, wherein said inner seal element comprises a substrate and said second material is carried on said substrate.

12. A vacuum system pipe coupling as claimed in any one of the preceding claims, wherein said first coupling member comprises a first flange having a first sealing surface, said second coupling member comprises a second flange having a second sealing surface and in use said

sealing system is disposed between and in engagement with said first and second sealing surfaces, said space being defined between said first and second sealing surfaces and said inner and outer seal elements.

13. A vacuum system comprising:

a first pipe;

a second pipe; and

a vacuum system pipe coupling according to any preceding claim coupling said first pipe to said second pipe,

wherein said vacuum system pipe coupling comprises:

said first coupling member connected with said first pipe;

said second coupling member connected with said second pipe.