Asset55

The world's foremost provider of flange management and completions enablement solutions to the global energy market.

iQ Flange Management

Calculation Methodology

Approval

This document has been approved by:

	Kevin Beaumont	9 / 4 / 18

Calculation Methodology

This report describes the methodology used in bolt load calculations carried out by the Asset55 iQ calculation engine.

The principles of the calculation engine are to use the most appropriate traceable calculation method for the relevant connection standard or type, using traceable dimensional data and material properties for the connection.

Where judgement has to be made, then recommendations are based on the principles of ASME PCC-1 2013 - the Energy Institute guidelines for the management of integrity of bolted joints in pressurised systems and latest and forthcoming guidance gained by active contribution and participation to working parties.

Asset55 iQ targets the wider industry focusing on the 99% of flanges, from construction right through to decommission. Through the use of our flange management system, this Module allows users to calculate a joint, produce auto-populated documentation to implement the integrity of the joint, and track all changes of who did what, where and when in a single source of truth to remain transparent and keep uniformity at all times.

Alongside this, iQ also has a heat exchanger and special flange module, enabling users to carry out calculations on both heat exchangers and non-standard flanges in line with ASME PCC-1-2013. This allows users to obtain the optimum bolt load to achieve a leak free joint, whilst taking into account mechanical damage of all components, and long term life cycle costs of the asset.

The main principle of the method is the determination of an assembly bolt load, which will maintain a suitable gasket stress in all conditions. The method also considers the effects on the gasket, flange and bolts.

Asset55 has applied this as follows - gasket parameters are continually researched based on industry data such as EN 13555 to determine minimum seating stresses, minimum operational stresses and maximum gasket stresses for each gasket type. From these values, target gasket assembly stresses are determined.

Required bolt stress to achieve the required gasket stress is then determined.

The maximum bolt stress that can be applied to the flange before flange rotation occurs is determined using the WRC 538 methodology, as described in ASME PCC-1-2013 Appendix O.

An optimum assembly bolt stress is then determined, which optimises the level of margin over leakage of the gasket, whilst minimising risk of damage to flange bolt or gasket in assembly, applied, operating and test conditions.

These results are clearly visible within our colour coded Joint Integrity Review function

The Engine also has a built in temperature relaxation logic to show the effects on bolt and gasket stress from long term relaxation of bolting at elevated temperatures.

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