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FEATURING:

NEW STANDARDS FOR QUALITY CONTROL AND ASSURANCE OF BOLTED FLANGES

BY NEIL FERGUSON, JOINT INTEGRITY LEADER, HYDRATIGHT
If necessity is the mother of invention, then the American Society of Mechanical Engineers (ASME), the Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA) are the parents of guidelines, standards, and regulations that help keep industrial operations safe for humans and the environment. While the great majority of global business managers are already seriously committed to conducting safe practices to avoid mishaps and reduce risk in their construction and operational activities, the adoption of standards and guidelines can assist managers when hiring and training their personnel, staying within regulatory compliance, and documenting safety procedures. To support such endeavors, ASME periodically publishes new series of guidelines and standards — some of which are specifically for bolted flange and joint assemblies.

Historically, the management of bolted flanges has been regulated by relatively limited guidelines. However, recent events have illustrated the need for new standards. In fact, in 2013, the Environmental Protection Agency reported that 32% of all volatile carbon emissions came from bolted flanges. For example, several years ago an offshore platform in the North Sea experienced a large and costly fire. The investigation showed that a carbon steel ring had been inserted between two stainless steel flanges through a weak positive material verification program and passed the helium pressure test. Three years later the carbon steel ring eroded away from galvanic corrosion and leaked. Eventually, the process release was enough to cause a fire that spread across the platform and upon investigation, inspectors determined that the incident occurred, in part, due to a lack of standards and procedures for bolted joints, although a plethora of standards exist to govern welded joints. In fact, according to ASME, practically no requirements for bolted joints existed, compared to welded joints, even though bolted joints hold back the same process conditions and therefore pose a similar risk. As a result, industry managers are encouraged to treat bolted joints with the same attention to detail and safety as a welded joint (see Figure 1) and evaluate the training and competency of bolting technicians much the same as coded welders.

Recently, as a result of similar events, ASME and Comité Européen de Normalisation (CEN), a European committee for standardization, have each published major updated standards concerned with defining the requirements for evaluating competent bolting personnel. ASME's publication is an update to the agency's 2010 PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint assembly, which includes an appendix defining the requirements for training and qualification of bolted joint personnel. CEN's publication is an update of its EN1591 Part 4, with modifications of its standards, now entitled “Flanges and Their Joints Part 4: Qualification of Personnel Competency in the Assembly of the Bolted Connection of Critical Service Pressurized Systems.”

The ASME guidelines' underpinning philosophy is: “To understand the importance of bolted joint assembler training, it is worthwhile to compare a bolted joint with the current practices for other pressure boundary joints: the welded joint.” The publication of new standards for flange assembly and management with more stringent requirements is an attempt to help engineers understand the importance of bolted joint assembler training, among other issues. The new guidelines include grades and types of experience for technician competency to allow technicians to achieve qualifications. These new guidelines will impact the industry markets, as well as operating contractors. Specifically, ASME categorizes assembly personnel according to their experience and training. Personnel with six months of constant work experience with formal training with a qualified organization...
are categorized as qualified bolting specialists. A senior qualified bolting specialist must prove at least two or more years of field experience. A qualified senior bolting instructor must have at least four years of experience. And a subject matter expert must have an engineering degree and at least four years of experience.

With these standards, ASME has effectively offered the industry an opportunity to ensure that bolted joints meet the same standards as welded joints. The standards contain advice and best practices on virtually every aspect of flange assembly and management, such as recommendations for three levels of joint assembly recordkeeping, including short, medium, and long term. The type of recordkeeping depends upon a number of factors such as process criticality, history, and referral criteria. Also, similar to the standards for welded joints, personnel will have to prove their competency on a regular basis (every three years) and document their activities using pre-approved procedures and traceable bolt loads. Such personnel must maintain permanent records for future reference. When rigorously followed, the industry can expect significant paybacks via reduced leaks, improved safety performance, and new construction and turnaroundst completed on time and within budgets.

Industry executives and managers have two options to take advantage of the new standards to improve their operations. One option is to develop and conduct training in-house. Such program development would also include record-keeping, testing, and certification programs to ensure compliance with the new standards. A second option is to outsource bolt flange assembly and inspection to third-party providers who specialize in the past, present, and future operations. As a core competency, such third-party providers often include processes and strategies to meet or exceed future standards and guidance from ASME and other agencies and associations, and can do so in a more cost-effective manner. With either option, industry operators should keep in mind that many times the guidance and standards issued from associations such as ASME can become government regulatory codes at a later date, so being prepared in advance for compliance is often the most efficient and economical strategy to ensure safe and successful operations.

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