

EN 1591-4 – The key to success?

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Awareness and commitment to the issues of “environmental protection” have grown in recent years and have become key parts of political debates, conferences and legislations worldwide. An important aspect for the preservation of our environment is the reduction of so-called “fugitive emissions” from, for example, chemical and petrochemical plants. The revision of the “Technical Instructions on Air Quality Control” (TA-Luft) in 2002 and the referring directive 2290 of the “Association of German Engineers” (VDI) set the political and technical standards in Germany. Other European states will follow this example and gradually adapt their national fugitive emission regulations. It requires all industrial plants to operate according to the current best available techniques (BAT). This includes not only for the reduction of emissions, but also for the reliability of each component of the system. Bolted flanged connections are highlighted key factors in the safe operation of pressure-stressed systems, for the protection of human health and the environment.

The technical committees of the CEN member states (Comité Européen de Normalisation) developed a draft standard which, among other things, set the design of bolted flange connections and the qualifications and technical ability of installation personnel. This

provided a valid and unified foundation for a European wide system. This is now represented by the EN 1591 (EN 1591-1:2001 - Rules for the design of circular flange connections and gasket: Part 1 - Calculation method) which was adopted in 2001. The first of five parts, it set the physical properties and calculation system so that leakage classes of bolted flange connections could be designed in mind. This allowed a plant designer to design in any required compliance with emission legislations.

The assembly values determined by the EN1591-1 calculation method requires the controlled tightening of bolts, so therefore it needs competent and qualified fitters to perform the work. As a result of this, and after many years of work, the EN 1591-4 (Flanges and their joints - Part 4: Qualification of personnel competency in the assembly of the bolted connections of critical service pressurized systems) was brought into force in 2013. It now has the status of a national standard within the CEN member states so can therefore be legally binding. There have been training courses offered by various companies and institutions with foresight throughout the development cycle of the EN1591-4. They were described as being in accordance with EN 1591-4, but sadly many failed to completely cover the requirements of the final standard.

The basic content of the EN 1591-4 is as follows:

It requires the installer to have the ability to disassemble, assemble and tighten bolted flange connections correctly and safely. This knowledge can only be acquired according to the standard through theory and practical experience. These capabilities must be tested and confirmed by a certified expert assessor. The standard provides a modular training curriculum and is very thorough with its technical content. It is important to note that the curriculum exists not only for the

training of fitters but also for the staff who supervise them, such as the responsible engineers and technicians. They too are also required to confirm/reconfirm their skills!

There is also set a clear distinction between a trainer and an assessor. This means that the training and assessment cannot be performed by one and the same person. In the training courses offered with foresight on the market it was usual that a single person performed the training and also carried out the final knowledge tests. This is no longer permitted under the EN 1591-4; a third party assessor must be used.

Within the group being trained it will be distinguished if any trained mechanics, engineers and so-called career changers are present, because the participation in the theoretical training is optional for participants who have the necessary knowledge. If they have proven prior knowledge the assessment can be carried out immediately with no training, only if they fail the assessment must a training course be taken. For employees without specialized training or qualifications an approved training course must be taken before any assessment can be performed. Where the training takes place is for the provider to decide, it can be on a customer site or a purpose built building. It is however crucial that the site has both an adequate classroom and a suitably equipped workshop for the implementation of the practical training sections.

The course content requires each participant to first attain a basic qualification. The basic training module is the most extensive within the new standard and includes a variety of topics of different value. After the successful completion of this basic course several optional higher levels are available, which provide additional knowledge in specific areas such as heat exchangers, pressure vessels, special flanges etc. A crucial aspect is that any responsible engineers



or technicians must have acquired at least the same skill levels as the fitters or mechanics supervised by them. In addition to this, the EN 1591-4 sets further requirements that they must be proven by a separate advanced training module. Any person who acts as “technical management” and isn’t involved in the disassembly or assembly of connections on site or the supervision of people doing so are not required under the standard to be trained and tested. However it is strongly recommended!

The fixed training course content may be supplemented by operator-specific factors, such as local site regulations, specialist equipment training and local environmental policies.

The evaluation of the training course is carried out in two steps - a theoretical and practical assessment by the assessor. The requirements of the theoretical exam are subject to the assessor and can be discussed with the operator. The practical demonstration of the disassembly, assembly and tightening of bolted flange connections must be proven as well, within a controlled environment.

Finally, upon successfully proving their abilities the training participant will receive a certificate with all the relevant information about the course content, skill levels, additional qualifications, etc. This certificate has a validity of 5 years, although they must be able to prove that they have worked with bolted flange connections for at least 6 months without interruption. An extension for another 5 years is possible after a re-assessment only, no new training is required if the assessment is passed. The documentation of the complete training course is required to be kept by the assessor, participant and the operator for the duration of its validity.

With the entry into force of EN 1591-4, there has been given a possibility in Europe to bring the quality of installation work during plant construction projects, maintenance work and shut-downs to a uniformly high level and thereby reduce environmental damage, accidents and production losses to a minimum.

Ultimately, however, this requires a rethinking of the plant operators to employ fully qualified staff and requires them to have confidence in what this standard brings. The paths are now paved, so the journey should be a lot easier.

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