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Gesellschaft für Anlagensicherheit
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Designing Safety Valves for the fire case?

Frequently, the question arises whether safety valves on containers should also be designed for the case of fire. In TRB 403 of October 1998 „Equipment of Pressure Vessels – Devices for recognizing and delimitating pressure and temperature“ the response to this question still was a definite NO. Here, paragraph 3.2.3 says: „When designing safety facilities, it is NOT necessary to consider the fire case.“ In the subsequent guidelines, AD 2000 Information Sheet A 403 with the same title, paragraph 3.2.3 the June edition 2001, however, contains the following statement: „Taking the external fire case into consideration MAY be necessary when designing safety devices against overpressure.“ Meaning: Today immediate answers to this question can no longer be given with absolute certainty.

In API 521 or ISO 23251, the process of calculating heat input for the fire case for different containers under varying surrounding influences is described in detail. Here, it is not only deemed important whether the container is equipped with a heating jacket but also, how quickly fire fighters can be on the site, or, whether there is a sprinkler system. Figure 1 shows the heat input depending on the filling level of a 10 m³ container filled with acetone being heated with differing steam temperatures. For the sake of comparison, the heat input due to fire as calculated by normative formulas is also displayed.

In the most sites of chemical plants, as is also the case in Industrial Park Hoechst, fire fighters arrive on scene in less than ten minutes. Thus, cases in which the worst case scenario need be assumed are indeed rare. The fact that, by standard, many plants possess sprinkler systems, significantly even more reduces heat input due to fire in most cases. As the diagram shows, the design case of „External Heating “ at 6 bar steam normally yields much more heat input than the fire case.

This means, that often, standard containers with heating jacket need not be designed for the fire case if external heating by steam has already been considered. However, such consideration must be given in the case that the heating jacket is designed to function as isolation in the event of underfiring. Safety briefings for containers without heating jackets thus should take special care to ensure that the case of underfiring is effectively excluded, for example, by designing drain channels to prevent accumulation of inflammable/combustible liquids underneath the container.

If you have any questions regarding similar cases, please do not hesitate to contact us. Our experts are always very happy to assist you.

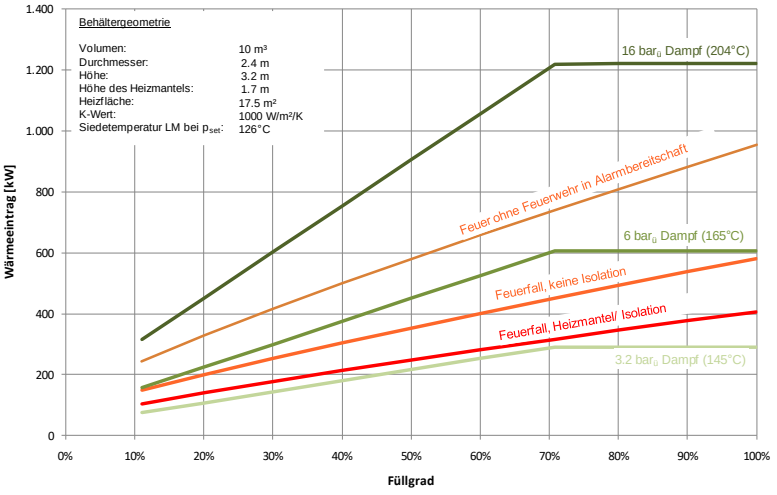

Figure 1: heat input over fill level for different heating conditions

Your contact: *Frankfurt* *phone: +49(0)69 305 30013* *e-mail: kontakt@consilab.de*
Leverkusen *phone: +49(0)214 2605 56458* *e-mail: kontakt@consilab.de*