

Ryssen Alcools

Validating the frangibility of stainless steel tanks

Instead of installing emergency venting devices on its stainless steel tanks, Ryssen Alcools decided to demonstrate the frangibility of the tanks through structure calculation. These elements are now integrated into hazard analysis.

In order to have a direct access to the sea and to optimise its supply chain at the same time, Ryssen Alcools decided to leave Hesdin (Pas-de-Calais, Northern France) to settle in Loon Plage (Northern France). But, instead of transferring its storage tanks, the company preferred to build 30 new stainless steel tanks on its new site.

Prove frangibility

This is a choice that could have been questioned by the Circular dated 23rd July 2007, pertaining to evaluation of risks and distances of effect around flammable fluid depots and liquefied flammable gas depots.

"This circular requires the installation of rupture discs on stainless steel tanks in order to guarantee that there will be no risks of explosion if one stainless steel tank undergoes slow pressure increase when surrounded by fire", Laurent Saltel, plant manager, says. "Instead of launching such a costly operation with new tanks, we found it preferable to prove, by calculation, that our stainless steel

tanks are frangible and that the hazard area is reduced."

This was considered as the more judicious choice, since installing 1-meter diameter rupture discs necessitates additional operations such as draining and degassing of each tank, without mentioning the risk of rupture of the stability of the tank.

A mathematical model

When the frangibility of carbon stainless steel tanks is governed by the Codres (Code de construction des réservoirs de stockage cylindriques verticaux, Construction code for vertical cylindrical storage tanks), this is not the case for stainless steel tanks. For these



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tanks, Cetim has developed a mathematical model making it possible to check their frangibility using the Abaqus software. According to these calculations, this pressure, corresponding to the rupture of roof to shell joint, is between 250 and 400 mbars.

"We forwarded Cetim's report to the firm in charge of our hazard analysis in order to demonstrate that the hazard areas generated by the slow pressure increase phenomenon on these tanks in a fire would remain within our property", Laurent Saltel continues. "Therefore, there is no additional work to be carried out."

OUR CUSTOMER

Corporate name
Ryssen Alcools SAS

Activity
Ryssen Alcools produces agricultural alcohol (96% pure) which is used as a basis for the manufacture of spirits and perfumes

Sales turnover
Approximately 110 million euro

Workforce
42 persons

Cetim's asset

Cetim has strong expertise in the verification of the frangibility of vertical tanks. Cetim regularly works within the Codres to improve the design methods for these tanks. The studies carried out during the last 25 years in the field of frangibility have made it possible to develop a high-performance method of finite element calculation.

