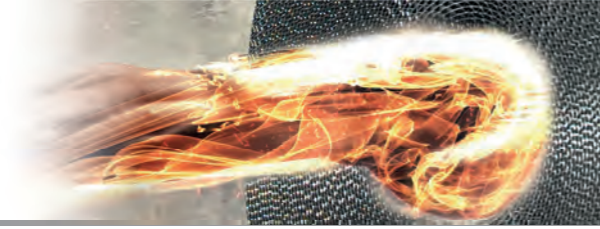




KITO® Protection examples



For the protection of the vapor recovery line against flashbacks KITO® recommend the following devices:



KITO® FDN-Det4-IIA (Unidirectional, in-line Detonation Flame Arrester in angle design with shock absorber) - catalogue – chapter G



KITO® EFA-Det4-IIA (Bidirectional, eccentric in-line Detonation Flame Arrester) - catalogue – chapter G

In case of an Inert Gas supply like Nitrogen into the storage tank it might be necessary to install an in line breather valve to prevent nitrogen losses and avoid possible product contamination from other tanks.

For this application KITO® recommends the following solutions:



KITO® VD/TA (In-line Pressure or Vacuum Relief Valve to protect against under or overpressure)- catalogue-Chapter F or alternatively



KITO® VD/TG (In-line Pressure and Vacuum Relief Valve) - catalogue-chapter F



KITO® Protection examples



In case the filling line of the storage tank runs dry during operation it is recommended to install a liquid detonation flame arrester. The liquid detonation arrester works according the siphon principle where they build up a liquid barrier which stops the flame propagation.

For this application KITO® recommends the following solution:



KITO® FL/INO-IIB3 (Liquid Detonation Flame Arrester for the filling line, installed inside the tank at the end of the line) - catalogue- chapter G

In case of inert gas blanketing according API 2000 7th / ISO 28300 Annex F - level 3 (Guidance for inert gas Blanketing of tanks for flashback protection) no additional protection against flame propagation is required.

In this case a standard pressure and vacuum relief valve without integrated Flame Arrester Element can be installed; KITO® recommends the following solution:



KITO® VD/oG (Pressure and Vacuum Relief Valve for end of line installations) – catalogue – chapter E



For Nitrogen blanketing KITO® can offer the following solution:

Blanketing valve ZM/R (only in stainless steel housing material available)



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KITO® - Explosion protection for the Oil & Gas industry

Risk management in the Oil & Gas industry

The complexity of industrial plants, in conjunction with the handled substances in the process, requires a suitable risk management.

In the Oil & Gas industry there are many activities which deal with hazards arising from the use of flammable liquids. The storage and transport of flammable liquids as well as the treatment of released vapors request effective and efficient solutions with absolute reliability to protect people and assets.

The basic step to minimize the risks is avoiding the formation of a flammable mixture of hydrocarbon vapors with air. However often there are processes where following this step is not possible. Furthermore, the ignition of a potential explosive mixture should be avoided, but within assumption that an ignition source (lightning, electrical discharge) can occur at any time, an explosion protection system like flame arresters shall be installed.



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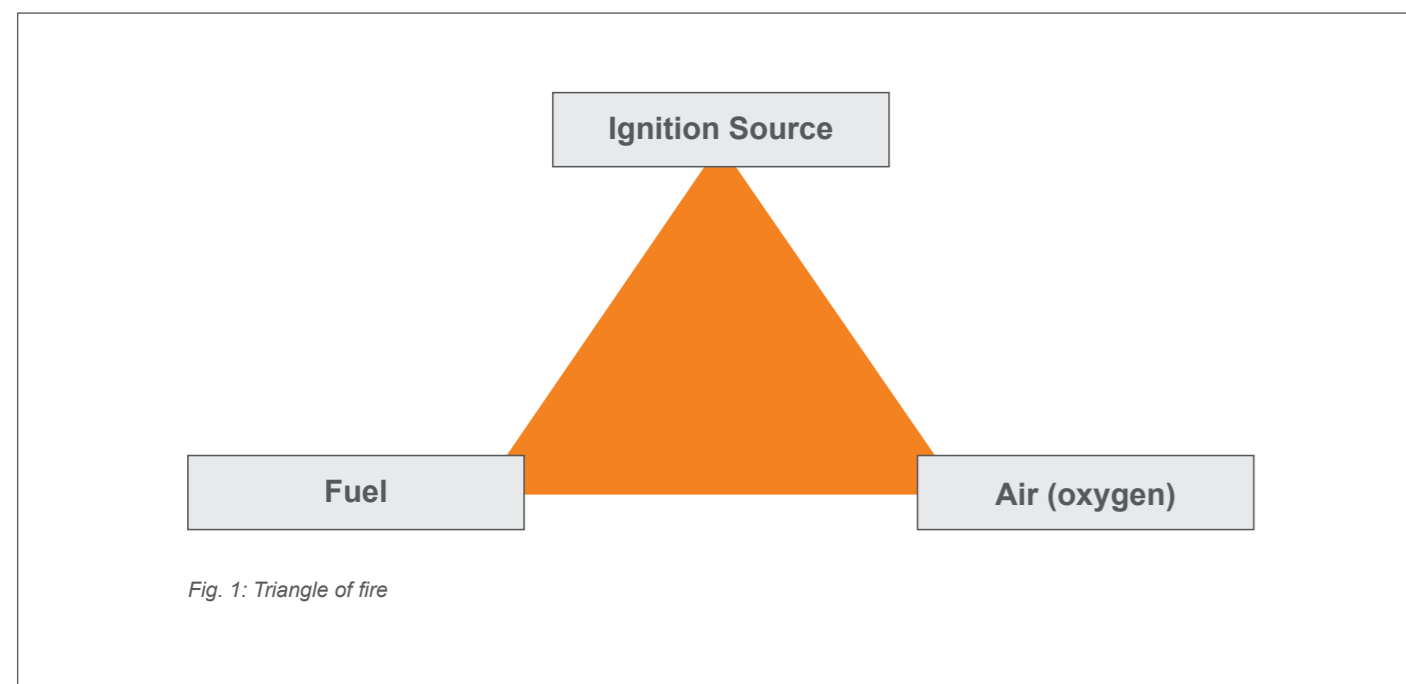
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KITO® Protection Examples



A fire or explosion usually takes place when three elements are present simultaneously. A combustible gas together with oxygen (air) must exist in certain proportions along with an ignition source. (Image 1)



The minimum concentration of a combustible gas or vapor necessary to support the combustion in air is defined as the Lower Explosive Limit (LEL) for that gas. Below this level, the mixture is too "lean" to burn. The maximum concentration of a gas or vapor that will burn in air is defined as the Upper Explosive Limit (UEL). Above this level, the mixture is too rich to burn.

Atmospheric Tank with connection to the atmosphere

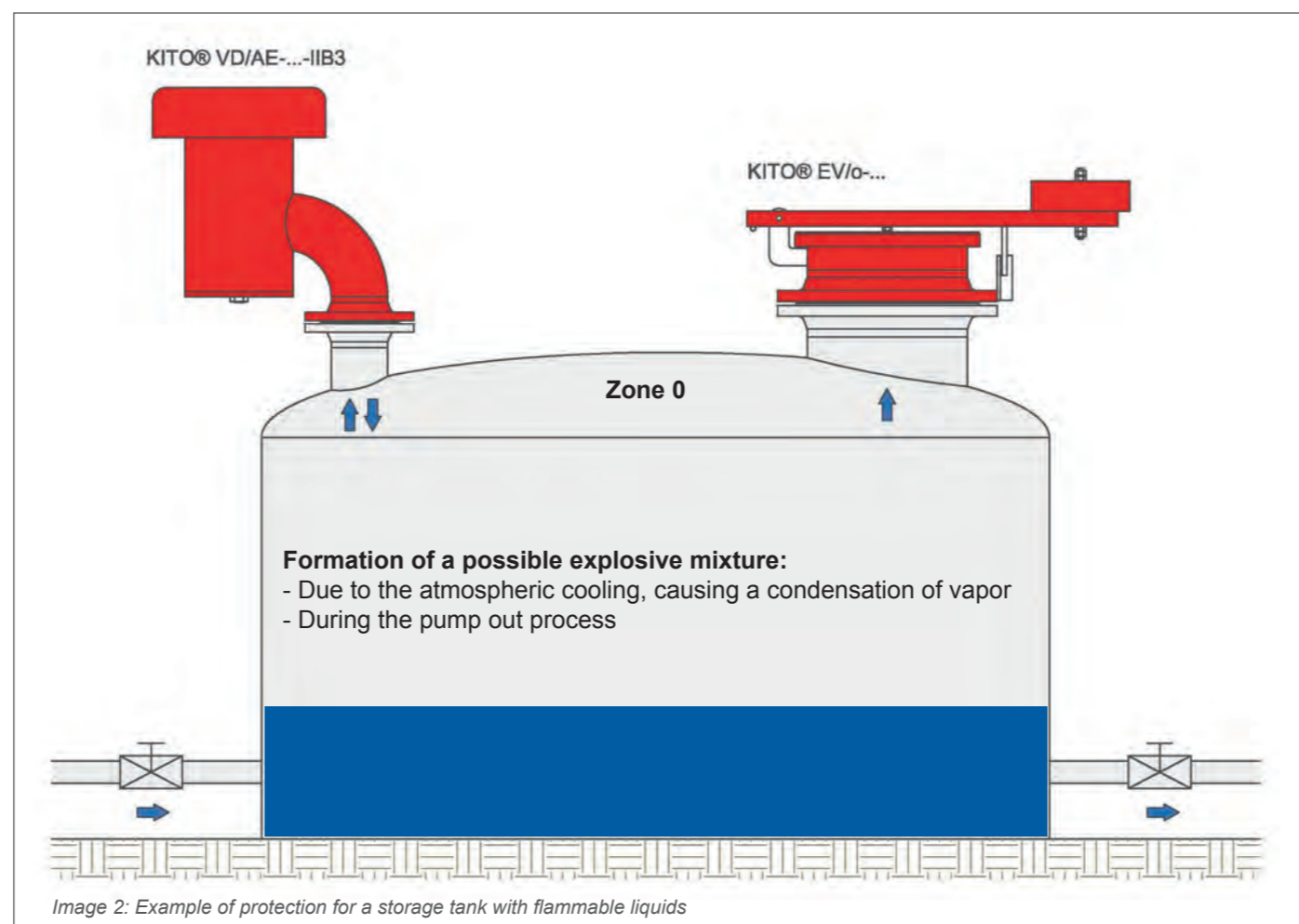
Outdoor bulk storage tanks are normally exposed to climatic conditions like heating up through the sun and cooling down by the rain. The filling and emptying capacities as well as inert-gas supply must be considered in addition. Due to this fact storage tanks must have venting openings where the accumulating pressure can be released. The vented gases or vapors in the Oil & Gas Industry can be flammable, odorous (H₂S content) and poisonous. To avoid product losses and pollution in the atmosphere ventilation devices like pressure and vacuum relief valves are recommended.

Venting lines on tanks with flammable liquids (Flashpoint < 60 °C according ISO 28300) shall be protected with explosion-proof devices. They enable tanks to breathe out flammable gases and breathe in fresh air unrestricted in total safety. In case of venting flammable gases or vapors, pressure and vacuum relief valve with integrated Flame Arrester Elements are used. All KITO® Flame Arresters are approved according to ISO 16852 for the different combustion processes. Pressure and vacuum relief valves with integrated Flame Arrester Element can be approved for atmospheric deflagration and endurance burning combustion processes and installed on top of storage tanks. The sizing and volume flow calculation for the normal in- and out breathing shall be according API 2000 or ISO 28300. In case that the storage tank is built according API 650, API 620 or EN 14015 an emergency venting can be required in addition.

The classification into hazardous zones for the storage tank in accordance to frequency and duration of the presence of explosive atmosphere according the national and international regulations is assessed as Zone 0 / class 1 div.1.



KITO® Protection examples



The above figure shows a typical protection of a storage tank containing flammable liquids, where the flashpoint of the liquid is lower than 60 °C (140 °F).

For the normal atmospheric in-and outbreathing KITO® recommend the following device:

KITO® VD/AE-IIB3 (Pressure-and vacuum relief valve with integrated Flame Arrester Element approved for atmospheric deflagration) - catalogue - chapter E

For the emergency venting KITO® recommend the following device (not necessary for the German market):

KITO® EV/o (Emergency relief valve) - catalogue - chapter C

In case of inert gas blanketing according API 2000 7th / ISO 28300 Annex F - level 3 (Guidance for inert gas Blanketing of tanks for flashback protection) no additional protection against flame propagation is required.



KITO® VD/AE...IIB3 - catalogue - chapter E



KITO® EV/o - catalogue - chapter C



KITO® Protection examples

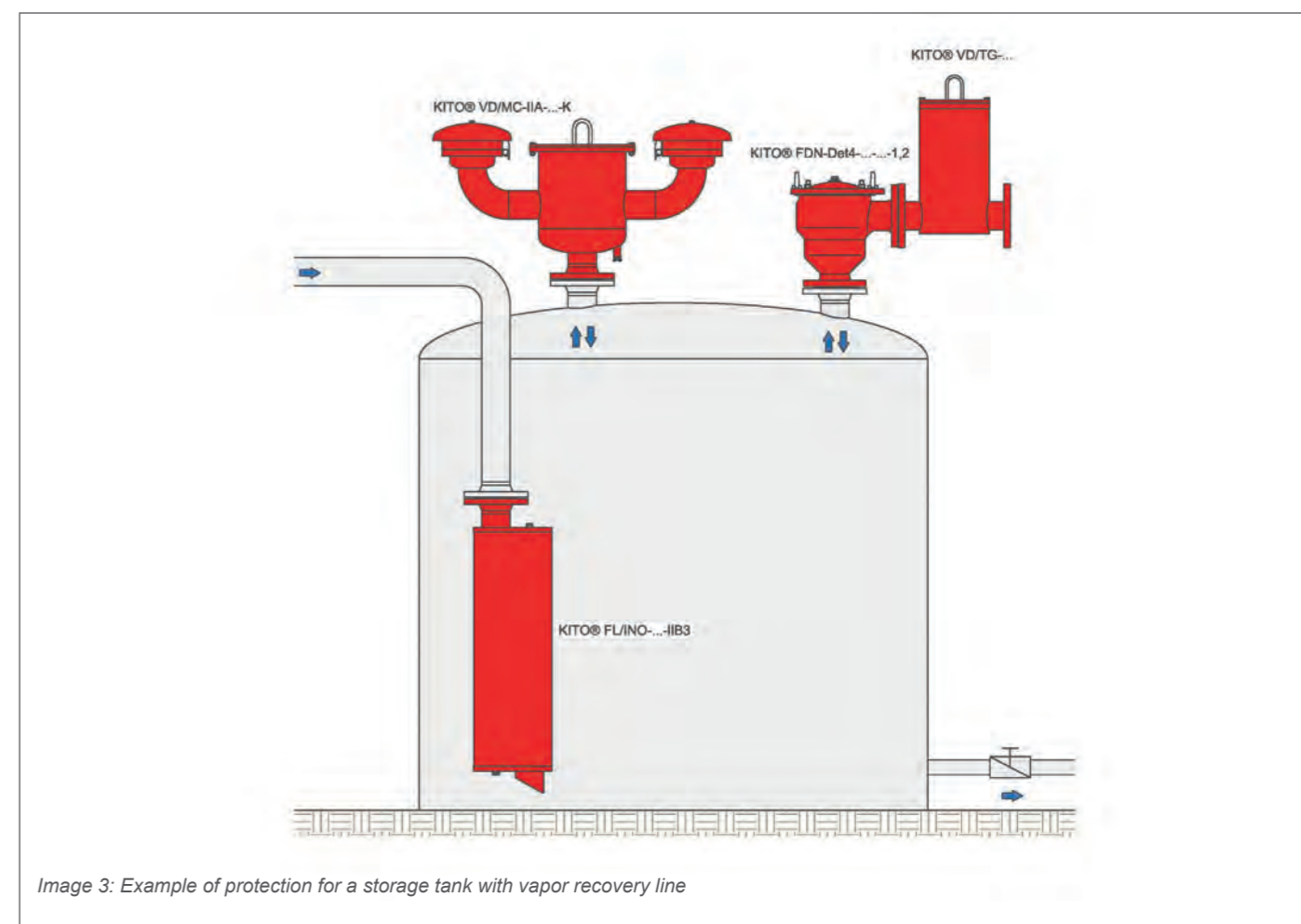


Image 3. Shows a typical protection of a storage tank with flammable liquids, where the Flashpoint of the liquid is lower than 60 °C (140 °F) and where the gas/vapor-air mixture is vented into a vapor recovery line.

For the normal atmospheric in-and outbreathing KITO® recommend the following devices:

KITO® VD/MC-IIA (Deflagration- and endurance burning proof Pressure and vacuum relief valve) - catalogue - chapter E



KITO® FDN-DeM (Deflagration proof Diaphragm Valve) - catalogue - chapter E