EBAM

European Basic Acrylic Monomer Group

Incident with truck
Guidelines Acrylic Acid

Audience:

- Emergency Responders (review process required)
- Supply Chain
- Authorized Transporting Companies if trained specifically for the product

General hints	
• An ERICARD is available for Acrylic Acid. All recommendations mentioned in this document are intended to supplement the ERICARD	
• Acrylic acid is highly reactive at elevated temperatures and tends to a runaway polymerization.	
• Product temperatures of 30 °C and higher can be hazardous and must be avoided. • High temperatures, contamination, inhibitor depletion or deactivation might cause unintended rapid polymerization. • Pressure build- up may occur rapidly and can lead to the rupture of pipelines, vessels and other containers. At a very high pressure build- up there is a serious risk of the reacting mass self- igniting.	
• Ask the next acrylic acid production plant for assistance	
• Inform local danger defense about handling with acrylic acid.	
For further technical assistance consult the supplier immediately by calling the following emergency response telephone numbers	
• Arkema France +33 3 87 93 8500 • BASF SE +49 180 2273 112 • Dow Europe GmbH +31 11 5694982 • Evonik Superabsorber GmbH +49 2365 49 22 32 • Synthomer a.s. +420 352 614222	

Loss of containment	
	• Define a safe area around the truck. Identify and Remove all ignition sources. Pay attention to the wind direction.
	• Save and remove all injured persons out of this region immediately.
	• If suspecting loss of containment no cars and uninvolved persons are allowed to enter this zone.
	• If the fullframe tankcontainer is not in an upright position (standard transport situation) bring a truck crane to the incident place (40 t for trucks or 100 t for railway wagon). For road tankers and non-fullframe containers lifting shall not be used as a standard since the tank may break apart. Exceptional circumstances may require lifting the tank, but it should be emptied before the operation.
	• Damaged or leaking tank should be pumped immediately into a new containment (clean, stainless steel). Otherwise unintended polymerization might be caused. • Also use an appropriate pump as a centrifugal pump or air driven diaphragm pump (stainless steel, aluminum, PTFE).
	• Do not use nitrogen for transfer or pumping and rinsing, because the inhibitor becomes ineffective and the monomer may polymerize
	• Think of proper grounding to prevent electrostatic hazards
	• As a last resort to prevent a rupture of the vessel, the acid from the tank can be let down in an open reservoir or barred area, covered by a foils. Due to electrostatic issues

	the liquid should be covered by foam or any mean not subject to static electricity.	
	• Don't let water and product into environment, due to the water hazards of acrylic acid	
	• Covering bled liquid with foam to prevent explosive air mixtures	
	• Bind remaining liquid with adsorbents (infusorial earth, turf, SAP-Mixtures e.q.. Teraperl)	
	• In case of a huge loss of containment. Define a safe area around the truck. Evacuate this area.	
	• Acrylic acid vapors or mist should be deposited with a water spray	
	• There will be no explosive mixture of acid and air at ambient temperatures	
	• **Danger of explosion at temperatures above 60°C**!	

Hot weather, heat radiation by sun • This is the case, if the truck or rail car could not be removed within a short time and is exposed to direct sun or hot temperatures		
	• Acrylic acid is loaded at temperatures between 18-22 °C. • Temperature increase due to sun radiation 1-2 °C/day • To prevent overheating (locally) bring truck into a cooler area (building, shadow or cover with planks).	
	• Heat input from sun radiation may result in temperature layers. • The temperature of the top liquid layer might be above the flash point for storage tanks or vessels where there is insufficient insulation or circulation. • A spark discharge from static electricity or any other common ignition source may cause ignition.	
	• Control of local overheating by multiple temperature measurement (bulk, shell, ...) is necessary.	
	• Please use an external temperature measurement device. Measurement of only the wall temperature might give misleading results due to hot surface temperatures or local dimer formation.	
	• During the complete process also control a pressure increase due to temperature increase. (Notice: This is only possible if there is a pressure gauge installed).	
	• Open the top hatch or open balance network pipes if possible to prevent over pressure. It is advisable to use sparkless tools, since the product may be above the flash point due to temperature layer formation in the tank.	
	• If product temperature increases above 30°C, organize short stopper to be at place such that at 45°C PTZ may be added.	

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	• Cool the tank from outside with water. If necessary remove insulation. • If the tank is equipped with so called heating coils, cooling of the tank via the heating coils in conjunction with frequent movement of the tank 1/hour to mix the cold and the warm liquid is advisable.	

Further temperature increase in the tank
• Acrylic acid is highly reactive at elevated temperatures and tends to a runaway polymerization.
• In the beginning there will be only a slow temperature increase, hardly observable.
• At temperatures above 45°C add short stopper (see procedure) 200 -1000ppm • truck with 25t 25 kg PTZ (x kg Shortstopper) railcar with 75t 75 kg PTZ (x kg Shortstopper)
• Open top hatch to prevent over pressure (not necessary for L4BH tanks and the use of TUIS RESTAB* units)
• After adding short stopper temperature control is still necessary until the temperature will decrease Heat input from sun radiation may result in temperature layers. The temperature of the top liquid layer might be above the flash point for storage tanks or vessels where there is insufficient insulation or circulation. A spark discharge from static electricity or any other common ignition source may cause ignition. • Further information on how to avoid issues with static electricity can be retrieved from CENELEC.
• PTZ will not work in case of contamination or wrong construction materials (for example carbon steel). • *If this is the assumed reason for the temperature increase, remove the acid as quick as possible and try to dilute the solution with water.*
• At the same time the acid from the tank can be let down into another containment, if necessary into an open reservoir or barred area and then be covered immediately with foam. Water contamination must be avoided. • Authorities might need to be consulted prior to this step being performed since this will involve emissions to the air and potentially to the ground and water.
• At temperatures above 60 °C polymerization will be very rapid (danger of an explosion of the tank), keep cooling, no further actions, evacuate area immediately

Fire	
• Remove container, if possible out of danger zone, if there is extinguishable fire nearby	
• Cooling of the container with water from the most applicable distance	
• If the fire near the container could not be extinguished immediately and if the tank could not be removed. Define a safe area around the truck. Evacuate and secure this area.	
• In the case of fire always apply a Restabilization Shortstopper as long as tank temperature is still below 45°C	

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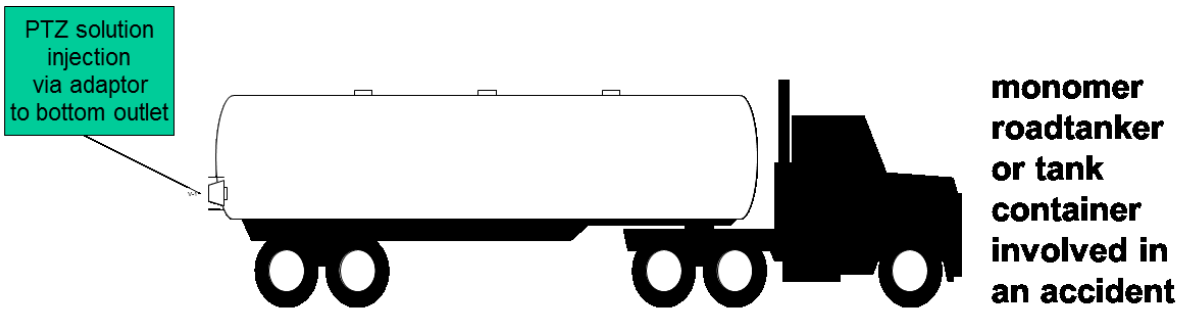
	• At temperatures above 60 °C polymerization will be very rapid (danger of an explosion of the tank), keep automatic cooling while evacuated, no further actions, evacuate area immediately.
	• Add a restabilization agent as quickly as possible as a first step; in the event that a part of the truck has caught fire (a tire, the engine, the diesel fuel etc). This will help to prevent a runaway polymerization, assuming that this was not the cause of the fire.
	• Addition of water into burning Acrylic Acid could result in a local pressure build-up if the temperature of the Acrylic Acid is above 100 °C, resulting in jets of liquid. In any case the sequence must always be first to add the restabilization agent and then only if this action is not effective - to add water. • Authorities need to be consulted prior to this step being performed since this will involve emissions to the air and potentially to the ground and water.
Burning Acrylic Acid	
	• Water may be used to fight a fire, since acrylic acid and water are miscible in all proportion.
	• Small fires may be fought with carbon dioxide or dry chemical extinguishers. For larger fires, foam may be used.
	• Addition of water into a tank of burning Acrylic Acid could result in a pressure build-up if the temperature of the Acrylic Acid is above 100 °C. In addition the sequence must always be first to add the restabilization agent and - only if this is not effective - to add water.

Addition of short stopper to a truck or railcar, Restabilization of Roadtanker or Isocontainer Acrylate load	
A	**Addition via the bottom outlet of a single compartment or a multiple compartment tank**
	
	Bottom outlet valve (inner and outer valve necessary to be operated)
	Addition of PTZ solution via RESTAB* (available from Total Feuerschutz "TUIS RESTAB")
	For L4BH or L4BN tanks the use of "TUIS RESTAB*" units sold commercially is possible

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adapter to connect the TUIS-RESTAB* unit to the bottom outlet valve in case of TW 80 connection. In other cases like Guillemin connector additional adaptors required , Adapter set to accompany TUIS-RESTAB units.

Equipment necessary to add liquid PTZ solution to a railcar or isocontainer. Please be aware that this equipment will only mix an isocontainer load but not a storage tank. For a storage tank a different type of RESTAB* unit is required.

- Phenothiazine (PTZ) in solution is the preferred shortstop agent. In this case it is provided as a RESTAB* unit that comes with the propellant gas that injects the solution into the tank volume. 50 liters of solution containing 35% of PTZ are injected with a gas volume of 450 liters. The injection itself takes place within 3seconds.

- The connection to the bottom valve is made available by an adapter. The usual adapter is a TW80 that connects to the bottom outlet. Adapter sets for different bottom outlet connectors are available and should be arranged such that they will always go with the RESTAB* unit.

- The amount of nitrogen with 450 liters is designed such that a 4bar tank e.g. L4BN will not be pressurized to an inacceptable final pressure. In case of a tank with less than 4 m3 pleaseverify this on your own.

B Addition of PTZ solution via the upper hatch

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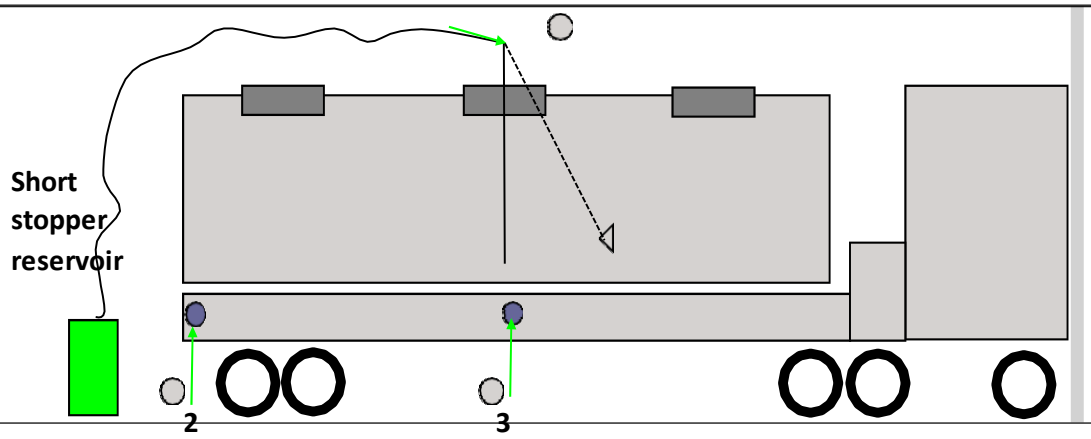

1 upper hatch
2 end valve
3 middle valve

- Phenothiazine (PTZ) in solution is the preferred shortstop agent.
- While addition of PTZ has worked in most cases, there is no assurance that it will always be effective. Obvious exceptions are contamination of Acrylic Acid with gross amounts of a polymerization initiator or a delay in activation of the shortstop system.
- As PTZ is a solid it should be added as a solution to ensure easier addition and mixing. Commercial solutions are available. Please consult your supplier for details.
- PTZ is not soluble in water and only slightly soluble in aqueous Acrylic Acid. Addition of a large amount of de-ionized water to Acrylic Acid undergoing polymerization could moderate the reaction by removing heat. The addition of large amounts of water should therefore only be considered as a last resort after the addition of PTZ. However, the release of large volumes of steam and Acrylic Acid vapor, and the possibility of tank overflow detract from this option.
- The final concentration of PTZ in the Acrylic Acid to be shortstopped is suggested to be in the range of 200 to 1000 ppm.
- However, in the case of contamination, restabilization may not be possible at any concentration of PTZ, depending on the nature and concentration of the contaminant.
- PTZ shortstop inhibitor does not abort or oppress dimerization or oligomerization

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Incident during acrylic acid transport	
Questionnaire	
Is the product acrylic acid, • Dangerous substance number 839, UN number2218?	
Accident location? • Are there buildings nearby (up to 1500 m)?	
Are there any casualties? • First aid of the driver possible?	
• Specify type of vessel: Tank Truck, Tankcontainer with fullframe, Tankcontainer with partial frame or rail car is involved in the accident.	
Is there a fire? • Is it possible to distinguish?	
Is the local fire department alarmed or at place?	
Does the tank have a leakage? • Where it is, how huge is it?	
Are there any other damages visible?	
Is the tank upside?	
Are there any other accidents? • (e.g. rear-end collision, railway accident)	
Is water available? • How much water is available?	
Is the area for trucks accessible?	
Transport registration number • Company, who ordered the transport?	
Other questions of the fire department possible	
• How far is the truck away from a possible PTZ network location or potential assistance	
• Do you know the product temperature	
• Does the temperature increases	
• Is it possible to isolate the truck or isocontainer to keep spectators off	

*Trade names for solutions are to our best knowledge the following: Allesan Protacryl®, RESTAB®, Phenothiazine LVT 2330®. The authors and the editor of the guidelines would like to stress that trade names are given to foster on safety and handling and not for commercial purposes. Please consult your supplier of Acrylic Acid for details

For more information please contact:
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About Cefic
Cefic, the European Chemical Industry Council, founded in 1972, is the voice of large, medium and small chemical

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companies across Europe, which provide 1.2 million jobs and account for 16% of world chemicals production.

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