

IMPERIAL CHEMICAL INDUSTRIES PETROCHEMICALS DIVISION

SAFETY NEWSLETTER NUMBER 35

By Trevor Kletz

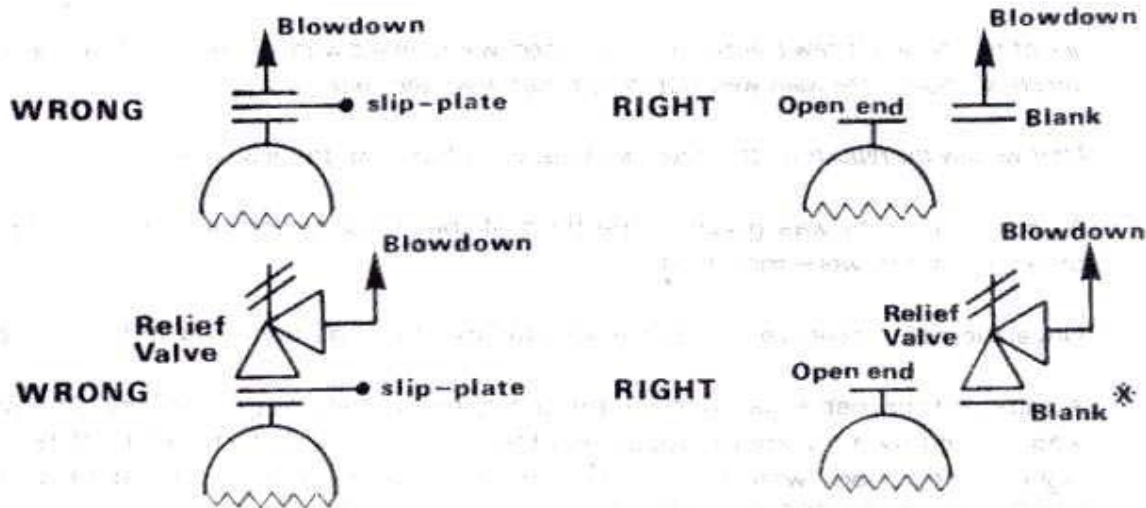
35/1 A TANK NEARLY BURSTS

A plant operator noticed a slip-plate on a tank vent. The slip-plate had been fitted to isolate the tank from the blow-down system while the tank was under maintenance. When the maintenance was complete, the slip-plate was overlooked.

Fortunately, the tank, an old one, was stronger than it needs to be for its present duty, or it would have burst.

If a vessel has to be isolated from the vent or blow-down line do not slip-plate it off but disconnect it and leave the vessel vented to atmosphere, as shown in the diagrams below.

If the vent line forms part of a blow-down system it will have to be blanked to prevent air being sucked in. Make sure the blank is put on the flare side of the disconnection, not on the tank side.



* A blank must be fitted here in case the relief valve leaks. The blank prevents air being sucked into the blow-down lines or gas being blown out.

Note that if the tank is to be entered, the joint nearest the tank should be broken. Full marks to the plant operator who noticed the slip-plate

35/2 THE BEST BUILDING HAS NO WALLS

Newsletter 14, Item 1 reported three explosions in closed-in, badly ventilated buildings. All the explosions had fatal consequences.

In the first incident, in Africa, briefly described in Newsletter No. 12, Item 4(a), a leak of light oil occurred in a pumphouse and was ignited by a diesel engine.

In the second incident, in Germany, a leak of ethylene oxide in a pumphouse was ignited by an unknown cause, possibly static.

In the third incident, in this country, a leak of gas in a compressor house was ignited by

an unknown cause, possibly static, possibly faulty electrical equipment. (For details see Report 0.21,156/B, available from Division Reports Centres).

All these incidents show that causes of ignition cannot be completely eliminated and that mixtures of flammable gas or vapour with air may ignite.

All these incidents might have been prevented by better ventilation, by siting the equipment in the open air. There is no need whatever to put pumps in a pumphouse.

Compressors are more difficult; some protection may be necessary. In HOC Division we usually supply a roof (with a large ridge ventilator) and part-walls; there are no walls at compressor level; the walls start about 10 feet above the level of the compressor platform.

Tests show that even on a still day ventilation in these part-open structures is many times (say 10- 40 times) better than in a closed-in building supplied with forced ventilation.

One of the Division's new plants, not yet finished, was supplied with an almost fully walled-in compressor house; the walls were put there to cut down the noise outside.

After we saw the reports on the three incidents, we pulled down the new walls.

A lot of publicity was given to the third of the incidents mentioned and many other buildings were modified.

Nevertheless, three years later a similar incident has occurred in the Company.

A leak of flammable gas occurred in a closed-in compressor house. The gas was ignited by an unknown cause and the walls and roof, fortunately of fairly light construction, were blown off. Nine men were injured. (For details see Report No. A.19,896/B, available from Division Reports Centres).

Are you satisfied with the ventilation on your plant?

35/3 DRY POWDER WILL PUT OUT CLOTHING FIRES

Wilton Chief Fire Officer, Dennis Waters, points out that if someone's clothing catches fire Monnex dry powder will put it out quickly and safely.

The powder will not irritate the skin and it is not harmful if it is breathed in.

35/4 NEVER TAKE SHORT CUTS WHEN ENTERING A VESSEL

A tank in another Company had to be inspected. The tank had contained only water and was not connected to any other tanks, so the usual entry procedure was omitted and the atmosphere inside the tank was not tested.

Three men went inside and were affected. Two recovered but one died. The atmosphere was tested afterwards and found to be deficient in oxygen. No-one knows how it got like this.

Never take short cuts when entering a vessel or other confined space — stick to the rules.

35/5 THREE YEARS AGO

"Sparks from a pneumatic cutter grinder recently ignited some oil-soaked ground".

From Safety Newsletter No. 2, June 1968

"Some flammable vapour was ignited by a high speed abrasive wheel which was being used to cut through one of the pipelines".

From Safety Newsletter No. 6, December 1~8

TODAY

"Source of ignition: sparks from air-driven grinder".

From the Report of a fire on a Petrochemicals Division Works, October 1971

35/6 "DO-IT-YOURSELF" AND THE USE OF PETROL AS A SOLVENT

"The sad catalogue of accidents arising from the use of petroleum spirit by 'do-it-yourself' householders and car owners continues to grow. Such accidents appear to occur most often in

circumstances in which petrol is used for cleaning. Six people were injured and one was killed during this year while using petrol in this way in their homes. A further seven people were injured in workshops and garages in which petrol was being used for cleaning. In almost every case, efficient, non-inflammable alternative solvents or cleaning agents were available to carry out the task for which petrol was being used and it is doubtful whether there was even any economic advantage in the use of petroleum spirit. It cannot be overstressed that any action which exposes petroleum spirit to the air, (especially in buildings) produces an inflammable mixture and this presents an immediate fire hazard".

Extract from the Report of Her Majesty's Inspectors of Explosives for 1970

We can let you have a leaflet on 'Genklene', an ICI solvent that is non-flammable and less toxic than other common solvents.

35/7 IN BRIEF

- (a) A very rusty slip-plate was fitted in a pipeline. The joint leaked, some product was lost and a man was sprayed.
- (b) The Fire Protection Review, October 1971, page 400 suggests that a tank can be made safe for welding or demolition by filling it with fire-fighting foam which has been gasified with inert gas instead of air.
- (c) The dresser wheels of a Huntingdon "new type" No. 0 wheel dresser became detached and, nearly hit a man. The report recommends that the "new type" should not be used.
- (d) A "Geest" type drum cradle moved while a drum was being lifted on to it and a man was injured. The report recommends that the Geest type are replaced by the 'Barl' type. All users of Geest cradles should be warned that they are liable to move in this way and should consider replacing them.
- (e) The need to cool cylinders which are exposed to a fire, or to keep out of the way if they cannot be cooled, was shown by an incident which occurred recently near Teesside.

A lorry loaded with cylinders of propane caught fire. Many of the cylinders exploded and bits were found 400 yards away. A fuller report is available on request.

35/8 UNUSUAL ACCIDENTS NO. 5

Another company reports that a scaffolding pole which fell 46 feet embedded itself in the ground, punctured a cable 31 inches below, which was covered with tiles and caused a short circuit.

35/9 THINGS ARE GETTING SAFER

At Yarm Fair this year a man was selling balloons filled with gas. I asked if they contained hydrogen; "No", he said, "Helium; hydrogen's dangerous".

35/10 RECENT PUBLICATIONS

- (a) *"Hazard Analysis of Drier Furnaces"* Report No. MD 12,872/8, by F.J. Willson

In this report quantitative methods are used to assess the risk of an explosion during the start-up and operation of a furnace. Areas where improvements are desirable are highlighted. The details apply to a particular furnace but the *method* will interest everyone who operates or designs a furnace.

- (b) *"Major Loss Prevention in the Process Industries"*

The papers presented at the Symposium held at Newcastle in July have now been published by the Institution of Chemical Engineers, price £8. They will interest everyone concerned with the design and operation of chemical plants. Papers of particular interest are:

D G Neil of IC Insurance on the problems of insuring chemical plants,

A G Pickles of Agricultural Division on an ingenious way of controlling an oxidation process so that it cannot get into the explosive range,

F R Farmer of the UK Atomic Energy Authority on risks to the population at large,
T A Kletz on hazard analysis,
R M Stewart of Petrochemicals Division on High Integrity Protective Systems,
H G Simpson on plant layout,
E M Cairney & A L Cude of Petrochemicals Division on steam curtains,

P J Klaassen of Shell Chemicals on some of the hazards that can be overlooked in the design of a new plant,
and many other equally interesting papers.

(c) Relief valves and flare systems are expensive. Safety Note 71/6A suggests ways in which protective systems can be used instead.

(d) If you use Thermex you may be interested in *Heat Transfer News*

(e) A leaflet describing the Intake Flame Stop Valve developed by Engineering Services (Wilton) Ltd. (in conjunction with the British Internal Combustion Engine Research Institute Ltd.) for stopping diesel engines which are drawing in flammable gases or vapours through the air inlet (see Newsletter 32, Item 2).

(f) Are you familiar with the precautions you should take when handling asbestos? If not, see *Asbestos: Health Precautions in Industry*, Health and Safety at Work booklet No. 44, published by HMSO at 17 1/2p and available from your Safety Officer or Division Library.

For copies of (c) - (e) or for more information on any other item in this Newsletter, please write to Miss M N, Organic House, Billingham, or ring B.3927. If you do not see this Newsletter regularly and would like your own copy please ask Miss N to add your name to the circulation list.

December 1971

CHRISTMAS SUPPLEMENT

TO SAFETY NEWSLETTER NO. 35

FAIRY STORIES

At this time of year, when children's fairy tales are more in evidence than usual, we might look at some of the fairy stories which hard-bitten plant managers and operators used to believe in, and in some cases still do. We don't believe there are fairies behind the furnace or goblins in the gas detectors, but the following are about as true.

Fairy Story

- 1 For a fire or explosion we need air, fuel and a source of ignition. Keep out sources of ignition and a fire cannot occur.
- 2 Petrol engines produce sparks and must be kept out of areas where flammable gases or liquids are handled, but diesels are O.K.
- 3 A relief valve - properly designed and maintained - will prevent a vessel bursting.
4. A high-boiling material like fuel oil is safe and does not have to be treated like petrol.
- 5 If a valve has to be removed, all we need to do is show the fitter the valve.
- 6 If we want to convey some information to a crowd of people, a simple and effective way is to collect them together and tell them.

What We Now Think

(I won't say "facts" because the next generation may have a different view again)

- If flammable gas or vapour is mixed with air, sources of ignition are liable to turn up even though we do everything possible to eliminate them.
- Diesels can ignite mixtures of flammable gas or vapour and air - see Newsletter 23, Item 1 and Newsletter 35, Item 10 e.
- If a vessel gets too hot it will burst at or below its design pressure.
- This is true if the material is below its flash point.
If it is above its flash point it is as dangerous as petrol and must be treated with the same respect. Do you know the flash points of the materials on your plant?
- The fitter may go for his tools and then remove the wrong valve.
Equipment which is given to maintenance must be tagged.
- If we want to tell them a short piece of welcome news (where to get free beer) this is fine, but if we want to tell them a lot of facts, we will be lucky if 10% is remembered the next day. To get information across we need visual aids, discussion,

follow-up - all the tricks of the
communication business.

Best wishes for a Merry Christmas and a Safe New Year to all our Readers. Close
your eyes as you pull your crackers.

December 1971