

IMPERIAL CHEMICAL INDUSTRIES PETROCHEMICALS DIVISION

SAFETY NEWSLETTER NUMBER 37

By Trevor Kletz

37/1 A MAN IS KILLED BECAUSE EQUIPMENT UNDER REPAIR HAS NOT BEEN PROPERLY ISOLATED AND IDENTIFIED

Many times these Newsletters have stressed the importance of isolating and identifying equipment which is given to maintenance. Now a fatal accident in another Division has demonstrated once again that: -

Equipment given to maintenance must be properly isolated, electrically and mechanically.

Equipment given to maintenance must be identified by a numbered label. If there is no permanent label a numbered tag must be used.

Two pumps (No. 1 & No. 2) were being repaired by two different fitters. When No. 1 pump was finished the fitter decided to try it out. By mistake he pressed the start button for No. 2 pump. It started up and the two men who were working on it were injured, one of them fatally.

Two things were wrong: -

1. The pumps should have been defused or the starters should have been locked off.
2. The label on the starter of No. 1 pump was covered with tar and there was no label on the starter of No. 2 pump.

As so often happens in these cases, the job was behind schedule and people were being pressed to complete it as soon as possible.

If you would like to refresh your memory, other incidents which have occurred because equipment under maintenance was not isolated or identified properly are described in the following Newsletter items:-

Isolation 1/2, 3/2, 4/1, 6/1, 11/2, 12/1, 14/7 & 8, 17/1, 19/2, 20/3, 25/1, 27/2

Identification 1/2, 9/1, 10/1, 11/1, 13/2, 20/1, 29/3, 32/3

However busy we are, do not take short cuts when preparing equipment for maintenance. Stick to the rules.

37/2 SOME OTHER ACCIDENTS CAUSED BY NOT FOLLOWING THE RULES ON PERMITS-TO-WORK?

The incident just described occurred in another Division but recently several dangerous incidents in Petrochemicals Division have been caused by errors in Permits-to-Work (Clearance Certificates). Four are described below:-

- (a) A Permit was issued "To fit slip-plates and remove on completion of overhaul". Due to a misunderstanding, a slip-plate was removed while repair work was still going on and a man was still inside a vessel

If a job has to be isolated by slip-plates (or physical disconnection) three Permits are needed: one to fit the slip-plates (or make the disconnection), one for the main job and one to remove the slip-plates afterwards (or make up the disconnections).

- (b) Halfway through a job, extra work was added to a Permit. The precautions on the Permit were not carried out, probably because the maintenance supervisor did not sign it again.

If there is a change of intention, the Permit must be withdrawn and a new one issued.

- (c) A vessel had to be hosed out. The machinery on the vessel was switched off, the door opened and a hose pushed in. Another man noticed the machinery was not moving and switched it on again, trapping the hose and the fingers of the man holding it.

If work has to be done on machinery, or in a vessel containing machinery, it must be locked off or defused under a Permit-to-Work. If vessels containing machinery have to be opened frequently, the power should be interlocked with the door so that it is switched off automatically.

- (d) While a choked line was being cleared, hot liquid came out of a broken joint. The line had not been slip-plated off.

Equipment given to maintenance must be isolated by slip-plates (or other equally effective means) unless fitting slip-plates would take as long and be as dangerous as the main job. When clearing a choked line it is often difficult to know how long it will take or if the isolation valves are fully closed. Fitting slip-plates to isolate the choked section is usually a wise precaution.

37/3 HOW DO WE GET THE FITTER TO READ THE PERMIT-TO-WORK?

Everyone agrees that fitters and other craftsmen should be encouraged to read Permits-to-Work so that they see for themselves exactly what job is to be done, what are the hazards and what precautions have to be taken.

On some Works an increasing number of Permits-to-Work are accepted by the fitters, who are going to do the job, particularly by shift fitters and fitters who form part of a production team. One Works tries to make out the Permits-to-Work in the presence of the fitter. Neither of these methods is possible if a number of people are going to work on a job.

One Works in the Division, therefore, exhibits the Permit-to-Work on the job in a polythene bag so that it is protected from the weather. The system has been in use now for some months and has proved popular, particularly with the fitters. Of course, exhibiting the Permit in this way reinforces but does not replace the instructions given by the supervisors.

Is it worth extending the system to your plant? Perhaps you could try it for entry jobs.

37/4 ANOTHER EXPLOSION IS CAUSED BY A LEAK INSIDE A BUILDING

Newsletter 35, Item 2 described several explosions which have occurred because flammable liquids or gases were handled inside closed buildings. Now another Company has described another incident.

A reactor was being filled with LPG after a shut-down. A joint leaked and some LPG escaped. The reactor also contained water and a detergent, so the escaping

LPG formed a foam. The reactor was *inside a building* and the ground floor was soon covered by the foam.

After the leak had been stopped the Fire Brigade started to wash the foam away with water. The gas which was contained in the foam became free. One of the fire hoses broke a lighting fitting and this ignited the gas. The explosion killed 8 men. The best buildings have no walls.

37/5 COMMENTS FROM READERS

- (a) The formation of rust uses up oxygen

Newsletter 37, Item 4, described how three men were overcome by lack of oxygen when they entered a tank which had contained only water. The cause of the oxygen deficiency was not known.

A reader points out that if a tank is isolated, the formation of rust can use up the oxygen and, in addition, the drop in pressure can cause the tank to collapse.

(b) 6% Ethylene, 94% nitrogen will burn in air

Newsletter 31, item 4, stated that mixtures of hydrocarbon and nitrogen will burn if they contain more than about 10% hydrocarbon.

Of course they will only burn if they are mixed with air.

A reader points out that the figure of 10% is too high. Many hydrocarbon/nitrogen mixtures will burn if they contain more than the amount of hydrocarbon shown below.

Methane	14% v/v
Ethane	7%
Ethylene	6%
Cyclohexane	4%

(c) Isolating a vessel from its vent

Newsletter 35, Item 1, recommended that when a vessel has to be isolated from its vent line it is better to disconnect it rather than slip-plate it. A reader points out that if the vent line is very large this may be impracticable, and that in these cases we shall have to rely on administrative procedures to make sure the slip-plate is removed before the vessel is brought back into use.

(d) Are your fuses and switchgear labelled correctly?

Newsletter 33, Item 4, recommended that electrically-driven equipment which is faulty should be defused so that it cannot be started up in error. A reader suggests that if the fault cannot be repaired quickly it is better to disconnect the equipment. He also reminds us that accidents have occurred because the labels on fuses were incorrect. Some time ago, an electrician in the Division racked out the wrong compressor because the names used by Process to describe the machines were not the same as the names on the switchgear labels.

It might be worth checking the labels on your fuses and switchgear

37/6 THE IMPORTANCE OF CORRECT LABELLING

Other incidents, as well as the one just described, have occurred because something was not labelled correctly.

- (a) Six drums of hypo (sodium hypochlorite) had to be added to a tank of water. Some of the drums were not labelled. One contained sulphuric acid. It was added after the hypo with the result that chlorine was given off and the men doing the job were affected. NEVER USE DRUMS OR BOTTLES WHICH ARE NOT LABELLED
- (b) Some time ago, a trainee sampler took a sample from the wrong sample point because the sample points were not labelled. Butenes were sampled instead of a high boiling liquid. The sample was placed in a refrigerator which was not cold enough to prevent the sample evaporating and the refrigerator was filled with vapour.

37/7 THREE YEARS AGO

An artificer was called to check a faulty Rototherm. He decided to remove the Rototherm and when he did so oil spurted out from the pocket. He thought the Rototherm was in a sheath but it was not. If some of the Rototherms on a Works are in sheaths and some are not, then those without sheaths should be clearly marked in some way on or near the Rototherm itself.

From Safety Newsletter No. 7, January 1969.

37/8 DONT JUST TREAT THE SYMPTOMS, DIAGNOSE THE ILLNESS

A report from another Company shows what can happen if we go on repairing faults, but never ask why so many faults occur.

A cylinder lining on an HP compressor was changed twenty-seven times in nine years; on eleven occasions it was cracked and on the other occasions showed signs of wear. No one asked why it had to be changed so often; they just went on changing it.

Finally, a bit of the lining got caught between the piston end and the cylinder head and split the cylinder.

37/9 UNUSUAL ACCIDENTS NO. 7

A lorry driver, while sheeting his load, threw a rope over the top. A loop on the end of the rope fell over the head of a cyclist and pulled him off his bicycle.

37/10 DO YOU WEAR SAFETY SHOES?

Overheard in the canteen

- 1st Manager: I did try a pair of safety shoes once, they weren't very comfortable and I couldn't get used to them.
- 2nd Manager: How did you get them?
- 1st Manager: From the store of course.
- 2nd Manager: I didn't ask where you got them, I asked how you got them.
- 1st Manager: Well, the foreman sent a bloke up to the store to get a pair for me.
- 2nd Manager: Those shoes you've got on, did your wife buy them for you?
- 1st Manager: No, of course not. I couldn't get a good fit that way. I went to a shoe shop and tried them on.
- 2nd Manager: Why not go to the store yourself and try on a pair of safety shoes? You might get a pair that will fit.

37/11 RECENT PUBLICATIONS

- (a) "Mercury", Technical Data Note No. 21 published by the Factory Inspectorate and available from your safety officer or Division Library. (Safety Note No. 70/14, "Recommended Precautions to be taken when handling Mercury", is available from us).
- (b) The poster showing how to tell if Audco, Klinger and Truflo cocks are open or shut (see Newsletter 32, Item 10(e)) has been revised.
- (c) There is a lot of data available on the reliability of instruments but none of it applies specifically to chemical plants. Now an article in "The Chemical Engineer", November 1971, page 396, gives some data on the reliability of instruments in chemical plants.
- (d) Newsletter 35, Item 7(b) suggested that a tank can be made safe for welding or demolition by filling it with foam that has been gasified with inert gas. John Kerr and Co. are now supplying equipment for doing this. See "Chemical Processing", Jan 1972, page 15 or "Occupational Safety & Health", Jan 1972, page 27.

For a copy of (b) 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.

February 1972