

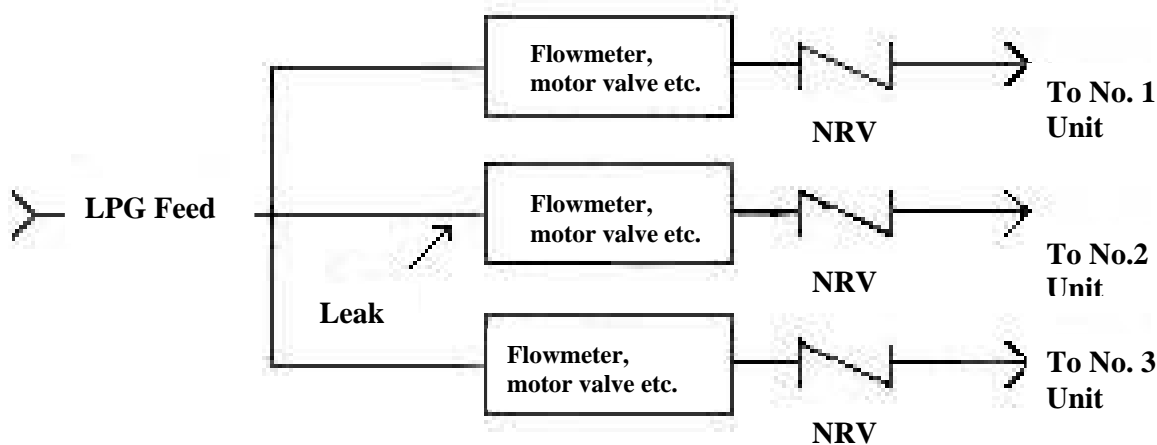
IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

SAFETY NEWSLETTER NUMBER 24

By Trevor Kletz

24/1 AN INCOMPLETE PRESSURE TEST FAILS TO FIND A LEAK.

A bad leak of LPG occurred during a plant start-up.



The plant had been pressure tested before start-up, but the non-return valves (NRVs) ; made it impossible to pressure test the equipment on the left of them.

The non-return valves have now been removed and replaced by a single valve in the common feed line (on the extreme left of the diagram).

One of the causes of a big fire which occurred last year was an incomplete pressure test — some lines were not tested and there was an open end on one of them.

Make sure your pressure tests are comprehensive. (See item 26/1)

24/2 A SMALL FIRE-BUT SEVERAL LESSONS

A 'Timinax' flameproof blanket, used as a windshield while welding was taking place at the top of a 200 ft distillation column, caught fire. The fire was soon put out with a dry powder extinguisher.

Six people went up to the top of the column to deal with the fire. If it had got worse, they would all have had to come down the same cat ladder. There was no need for so many people to put themselves at risk in this way — two people could have dealt with the incident.

Two-way portable radios are available on the Works concerned. If there are any similar incidents one of the men who goes up should take up a radio so that he is in contact with the ground.

'Timinax' sheets should not now be used when there is a risk of fire.

24/3 COLOUR CODING OF CYLINDERS

Another Company has reported that an oxygen cylinder was connected to a purge point on a plant instead of a nitrogen cylinder. Four people handled the cylinder without noticing that it was the wrong sort.

Fortunately analysis of the gas in the plant showed up the error before an explosion occurred. For details see the Quarterly Safety Summary of the British Chemical Industry Safety Council for June September 1970.

If cylinders are used in your plant or laboratory, DOES EVERYONE KNOW THE COLOUR CODE?

If the colour gets rubbed off, do you return the cylinder to store immediately?

24/4 EARTH PROBLEMS ASSOCIATED WITH WELDING

There are two leads from a welding generator or transformer. One lead is connected to the electrode and the other to the workpiece. This lead is usually known as the "earth" but is really a welding current return lead.

There have been a number of dangerous incidents because the so-called "earth" lead was connected to some other equipment. For example, if a pipeline is being welded and the "earth" lead is fixed to another pipe, the return current will pass through bearers or hangers from one pipe to the other, arcing as it does so. In one case the return current passed through a machine and damaged it.

So remember, the earth lead must be connected to the workpiece as close as possible to the point of welding.

For further details see "Engineering Note No. 20", available from Mrs. J. G. Teesside Materials Group (Ext. B.2504).

24/5 WELDING ON TO STEEL PIPELINES UNDER PRESSURE

From time to time it is necessary to weld on to steel pipelines while they contain process fluids under pressure. The most frequent need arises from what is known in America as the "Hot tap and stopple technique" or here as "Under pressure break-ins."

The Pipeline Industries Guild have written an interim Code of Practice, "Welding on to Steel Pipelines Under Pressure", which is soon to be issued by BSI as a "Draft for development". This is based, in part, on work done by Fred Hahn of the Teesside Materials Group, and an ICI member of the drafting panel, Joe Heaton (B.3207) will welcome any comments.

As well as giving evidence in determining the GO or NO GO conditions to those responsible for authorising such welding, the interim code gives a useful procedure and safety check list and Works should check their Permanent Instructions against it.

Copies of the code may be obtained from Miss P.G. (B.3300), but remember it is an interim statement and subject to further development.

24/6 TANK EXPLOSIONS - DUDGEON'S WHARF AND ELSEWHERE

The official report of the "Public Inquiry into a fire at Dudgeon's Wharf on 17 July 1969" (HMSO, 7/-) is worth reading if you are concerned with fire-fighting or with the preparation of tanks for welding or demolition.

The tank which exploded contained a gummy deposit on the walls and roof which was unaffected by steaming but gave off flammable vapours when a burner's torch was applied to the outside of the tank.

So many other things were wrong at Dudgeon's Wharf and the people in charge were so uninterested in safety that our first reaction, on reading the report, is to say, "It couldn't happen here." It may therefore be worth reminding ourselves that a very similar incident did happen in the Division a few years ago.

Welding had to take place on the roof of a tank containing phenol (melting point 41°C, flash point 79°C). The steam heating was switched off and the tank allowed to go cold. When the welder started work, the heat from his torch vaporised some of the phenol which was stuck to the inside of the roof and a hot spot ignited it. Fortunately the welder saw smoke coming out of the vent and got off the roof just before the explosion occurred.

24/7 CALCIUM OXIDE EXPLOSIONS

Another Division have reported that several bottles of calcium oxide have exploded. The cause is not known. (See Newsletter 25/8)

24/8 THE FIRE PROTECTION OF LIQUID FILLED VESSELS NEAR THE CRITICAL POINT

In choosing fire relief valves for pressure vessels it is usually assumed that:

- (a) The liquid in the vessel is boiling
- (b) The liquid has a substantial latent heat of vaporisation
- (c) All the heat entering the vessel below the liquid level is absorbed as latent heat.

A recent note by A L Cude, "The Fire Protection of High Pressure Liquid Filled Vessels", 21.10.70, points out that if the material in the vessel is near its critical point, (b) and (c) are not true. As the critical point is approached the latent heat falls, becoming zero at the critical point, when the liquid changes to a gas without any sudden change in properties.

If a vessel is therefore operating near the critical point, fire protection cannot be obtained by treating the vessel as a kettle and allowing the contents to boil off. The vessel must be protected by insulation, or preferably, depressured.

Copies of A L Cude's note are available on request.

24/9 RE-MOULD TYRES

An HOC Safety Officer reports the following:

"Recently while travelling down the A1 about three-quarters of the tread from my car's offside rear tyre ripped off. At 70 mph this was an alarming experience; only the fact that the tyre stayed up saved me from a bad accident.

The garage owner who fitted the tyre told me that tyre manufacturers do not recommend re-moulds for motorway driving, and that he had seen many similar tyres to mine. I did not know that re-moulds were unsuitable for sustained high speeds and wondered how many people realised this — hence this note. The moral — don't use remoulds on sustained high speed runs."

24/10 RELIABILITY

There is increasing interest in the collection of data on the reliability of plant equipment. If we know how often a piece of equipment will leak or break down or catch fire, then we can:

- calculate the overall reliability of the unit;
- decide which design or make is the 'Best Buy';
- decide whether or not to do preventative maintenance and if so when;
- decide what spares to stock;
- work out the hazard rate and decide if this is acceptable or not.

Naturally I am most interested in the last.

At present quite a lot of data is available on the reliability of instruments. Data on mechanical equipment is not so plentiful, but more is becoming available all the time.

There are some pitfalls in using data based on small samples which have not been adequately defined. This is illustrated by the following example which shows the need to find out as much as possible about the circumstances under which the data was collected.

I wanted to find out how often tea and coffee machines deliver the goods. I found that out of 100 'demands' on the machines the correct drink was delivered 94 times. On 6 occasions I got no drink, or the wrong drink, or a cold drink. We can therefore say:

Failure rate=6%

Before we use this data to draw conclusions about the machines, the standard of maintenance or anything else, let us examine the data a little more closely.

Two of the failures were 'operator failures', i.e., I pressed the wrong button.

So we can say:

Operator failure rate = 2 %

Machine failure rate = 4 %

Operators are never perfect and in every case we should ask if the failure is due to operators or equipment. If we are estimating failure rates we should allow for operator failures as well as equipment failures.

Now let's probe a little more closely:

Of the 4 machine failures, 2 occurred in Organic House and 2 in the Billingham Forum. The Organic House machine was used 98 times and the Forum machine twice

So we can say:

Operator failure rate = 2 %

Machine failure rate — Organic House = 2 %

Machine failure rate — Forum = 100 %

The Forum sample was small and the last figure may be in error but this does show that the failure rate varies widely with the environment (in this case by a factor of perhaps 50). This applies elsewhere — we can go badly wrong if we apply overall figures to a particular environment.

Now let us look more closely. Of the two failures of the Organic House machines, one was due to a broken cup and one to the machine itself.

So we can say:

Operator failure rate	= 2 %
Failure due to raw material quality	= 1%
Machine failure rate — Organic House	= 1 %
Machine failure rate — Forum	= 100 %

This is very different from the original statement that the failure rate was 6 %.

Think of this next time you see some data on equipment reliability — or next time you have a cup of coffee. (See item 26/11)

24/11 SAYINGS OF THE YEAR

1. "There are great dangers in putting all the eggs in one basket but in a competitive world, if a number of people take that risk and get away with it, the remainders will be forced to follow this lead. At least it is a wise precaution to ensure that it is a good, stout, well-made basket and not a flimsy paper bag and that a reliable and trustworthy human being is employed to carry it."

J. A. Lofthouse. Division Chairman

2. "If all Companies could achieve the safety record of the best, accidents would be cut by 80 %".

Chas. Carr, Deputy Chief Inspector of Factories.

3. "You can't use a club when dealing with people. You have to dress up the safety message - make it inviting, attractive and interesting. Dress it up so that it has impact . . . that's showmanship!"

D. Rhodes, vice-president of a U.S. insurance company, addressing a meeting of meat packers.

4. "Jumbos must not tip without contacting process man." Notice in the Billingham Factory.

24/12 RECENT PUBLICATIONS

(a) The list of returns required by the Factories Act and other legislation (Newsletter 15, Item 10) has been reviewed and issued as Report No. 0.200,681/A, available from Division Reports Centres.

(b) Mond Division's monthly safety report has been given a 'new look'. It includes many illustrations and reprints of them can be obtained. For a specimen copy write to Jack Melliush at Winnington.

(c) Safety Note 70/19, Part I describes the results of a survey of road tanker filling in the Division.

(d) "Lighting and Safety in Industry" — report of a talk by Stanley Lyons of the Electricity Council.

(e) "Fire Protection of High-Stack Warehouses" — report on a conference.

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

Please don't be a magpie. Before you put this Newsletter in your file, is there anyone else in your Division or Department who ought to know about any of the items?

Best wishes to all our readers for a Merry Christmas and a Safe New Year.

December 1970