

IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

SAFETY NEWSLETTER NUMBER 15

By Trevor Kletz

15/1 A TUBE BURSTS IN A FURNACE

Another Division have reported a fire in a furnace which caused a serious loss of production.

The fire was caused by a burst tube. The tube burst because it was overheated by flame impingement (the design temperature of the tubes was 420°C but they had been heated to over 600°C for many hours). The flame impingement was not spotted because there was no way of measuring the temperature of the tubes.

Reliable equipment for measuring metal temperatures on furnace tubes is now available and should be installed in all furnaces in which there is any danger of overheating. Have you got them in your furnaces?

The report recommends that the detailed design of packaged deals should be scrutinized much more critically than in the past. It suggests that recent deals should be studied to see if value for money is being obtained at the expense of safety.

The report brings out several other points:

- (a) The isolation valves on the inlet to the furnace could not be reached and the fire was fed for much longer than it might otherwise have been. Remote operation of the valves is suggested. How soon can you stop the flow of your furnace if a tube leaks?
- (b) The fire spread to three other furnaces via a common flue gas duct, as the stack dampers could not be closed in time.
- (c) The heaters were very close to a structure. Fortunately the wind blew the flames away. The report recommends that the heaters should be some distance away.

15/2 A TUBE BURSTS IN ANOTHER FURNACE

A tube burst occurred in another furnace - also as a result of overheating. Many tubes were damaged and others bowed.

The furnace was being started up and the flow through the tubes was low - so low that it did not show on the flowmeter. The tube temperature recorders were out-of-order and drawing straight lines.

The report recommends:

- (a) Low flows through the tubes should always be measured (using an additional or re-scaled flowmeter if necessary).
- (b) All instruments should be checked before start-up.
- (c) All recorded temperatures should also be connected to a temperature indicator. These recommendations apply to all furnaces.

What do your operators do when recorders draw straight lines?

15/3 A RELIEF VALVE IS TOO SMALL

Another incident has shown the need to check in detail the safety features of package deals.

A reciprocating compressor was started up in error with the delivery and by-pass valves both closed. The relief valve was too small to take the rate and the packing around the piston rod was blown out, releasing a poisonous and flammable gas. Fortunately it did not fire and no one was gassed.

The manufacturers admit that the valve was too small but say that at the time the compressor was supplied, about 10 years ago, only "sentinel" relief valves were fitted. When these blow they indicate that something is wrong and the operator is supposed to take action.

Nowadays we specify relief valve sizes ourselves, but 10 years ago we left it to the manufacturer. There are many compressors in use in the Company bought about 10 years or more ago. Are we sure their relief valves are big enough?

This incident also illustrates another point. The relief valve was shown in the relief valve register as 7/16 inch diameter. Below it a venturi restricted the effective orifice to 5/16 inch diameter, i.e. half-the-size. The relief valve should have been registered as effective size, 5/16 inch.

15/4 WHICH WAY DID THE MOTOR TURN?

Electric motors are often connected up so that they turn the wrong way. Usually it does not matter very much and is soon put right.

If a centrifuge turns the wrong way the snubber can catch in the basket and cause serious damage. Do your operators and electricians realise this?

Recently a centrifuge was connected up wrongly. Fortunately the cake was hard and the snubber did not damage the basket.

15/5 SOLVENTS FOR CLEANING

What do you use in your Workshop? Engineering Note No. 9, issued by Teesside Materials Group, discusses those that are available and recommends non-flammable, non-toxic ones such as Mond Division's "Genklene".

Some people still use petrol. It's OK they say, because, "We only use a little. Why, we keep it in 2 oz. bottles"

Do you realise that 2 oz. of petrol can give off enough energy to move a 2 ton vehicle 500 feet along a level road?

15/6 DOES THE FITTER KNOW WHAT TO WEAR?

The report on a recent accident — in which the injured man was not wearing the right protective clothing — focusses our attention on an old problem. A better way must be found of letting maintenance workers know what safety precautions are necessary.

The usual system is to put the precautions on the Permit-to-Work (clearance); the maintenance supervisor reads the clearance and tells the men who are going to do the job. In practice, he often forgets to tell them or they forget what they are told.

A tear-off slip on the clearance — to be given to the man who is going to do the job - is suggested in the report. If a tag is used to identify equipment, the tag number can be put on the slip.

One Works used to use separate slips for the same purpose. The maintenance supervisor filled in a slip and gave it to the man who was to do the job (specimen on request). The system lapsed after a while, as all systems do when managers fail to take sufficient interest.

Any ideas?

15/7 COMMENTS FROM READERS

(a) Newsletter 14, Item 3, suggested that when removal of a restriction plate, for example, in the steam line to a still, could overload the relief valve, the restriction plate should be included in the relief valve register and checked whenever the relief valve is checked.

A reader suggests that a length of smaller diameter pipe is better than a restriction plate as it can be replaced only as a result of a workshop's order to make a new pipe.

(b) In Newsletter 14, Item 8, I said that Billingham managed for 40 years without the HOC rules on the isolation of equipment for maintenance. I suggested that fitters may have broken into lines and found they were not isolated, but the lines were mostly small and the quantities that could leak out were limited. Now lines are larger, the consequences of a mistake are greater and new rules are necessary.

A reader comments: “. . . in making a point, and a very good one, you have rather shamed old Billingham to excuse present lapses.

To my knowledge we had on Gas and Power Works in the early '50's rigid instructions covering slip-planting and isolation for maintenance and a whole set of excellent instructions. . . for semi-technical plant in Research Works. . .“

(c) The Bacharach Fyrite oxygen analyser described in Newsletter 14, Item 5, costs £125, not £251

15/8 OXYGEN USED INSTEAD OF AIR

Another Division has reported that an apprentice plater connected a pneumatic hand grinder to the workshop piped oxygen supply instead of the compressed air supply. When he started to use the grinder his clothing caught fire.

The error was possible because the 1/2 inch B.S.P. barrel nipples used for connecting the hoses to the air lines will fit the oxygen lines — though not perfectly.

The report recommends:

- a) The dangers of oxygen must be made known to all men who work where it is used.
- b) British Oxygen Co. safety valve adaptors should be fitted on all oxygen lines.

Four men were killed when a similar incident occurred recently in a ship repair yard at South Shields

15/9 THE TANK'S STORY — A CHRISTMAS FAIRY TALE (see also 17/7)

It was 3 am on a cold Christmas Eve. The operators were all in the control room and the plant was deserted. Father Christmas, looking for somewhere to stop for a rest, landed on the roof of a storage tank. He had stopped there once before, a few years earlier.

“I haven't seen you for some time”, said the tank.

“I've been too busy”, said Father Christmas, “I've agreed to visit all these new houses without extra help; S.D.P. it's called. How are you?”

“Frightened”, said the tank. “I've been terrified since the last time I saw you. They used to keep petrol inside me. For months the nitrogen blanketing was switched off; I was full of explosive vapour and every day I expected a static electricity spark to blow me up. One of my friends blew up. Things are better now; a tank inspector comes round every week to check the blanketing.”

“Then they took the petrol out and put heavy oil inside me. ‘Hurry’ I said ‘I can't blow up. But my steam coil leaked, the oil used to come in hot and heat up the water, and the steam nearly burst me. One of my friends burst this way. Things are better now; water is drained off every day and the incoming oil is kept below 100°C.”

“Then they took out the heavy oil and put a nice safe liquid in me, non-hydrocarbon so there is no danger from static, and stored cold. ‘Hurray’, I said. ‘I can't blow up and can't burst’. But for over a year now they haven't cleared my flame traps. I can feel them clogging up. Every time some more liquid is pumped in I feel I am going to burst and every time some more liquid is pumped out I feel I am going to collapse. One of my friends has collapsed already”!

“Cheer up”, said Father Christmas, feeling in his sack, “I've brought you a present”. “What is it?” said the tank.

“A new sort of flame trap”, said Father Christmas. “Your operator can pull it out, hold it up to the light to see it's clear, and put in back. He can check it every day if he wants to”.

“Thank you”, said the tank, “and a Merry Christmas”.

The new design of flame trap is described in Report No. 0.200, 625/A, "A Guide to the Venting of Storage Tanks", by B. G. D.

15/10 RECENT NOTES

- a) "Statutory Registers and Reports", a list of the records which we have to keep and the reports we have to make under the Factories Act (S. A. L, 12.11.69). It runs to six pages!
- b) "Working Safely with Phenol and Phenolic Materials on Oil Works' a booklet for men who have to work with them. (Available from J.S, extrn. B.2161).
- c) "Precautions to be taken against Static, Lightning and Stray Currents", Safety Note No. 69/11, E.S. Hunt, 10.11.69 a four-page summary of the precautions to be taken on plants handling flammable liquids.
- d) "The Use of Diesel Engines in areas where Flammable Vapour may be present"~, Safety Note No. 69/9A a revised version of a note issued last September describing the ways in which diesel engines can cause ignition and recommending the precautions that should be taken. A check list is included.
- e) "New Factory Legislation" an account of the changes under discussion for the coming revision of the Factories Acts; some of the government's proposals, though well intentioned, are hardly desirable. (S. A. L, 19.11.69).

For copies of all except (b), or more details of other items, please write to: Mrs. J. M. W, Organic House, Billingham or phone B.3927.

We hope you find these Newsletters interesting. If not, please let us know so we can reduce the circulation. If you do not see them regularly and would like to do so, please ask Mrs. W to send you copies.