

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PETROCHEMICALS DIVISION

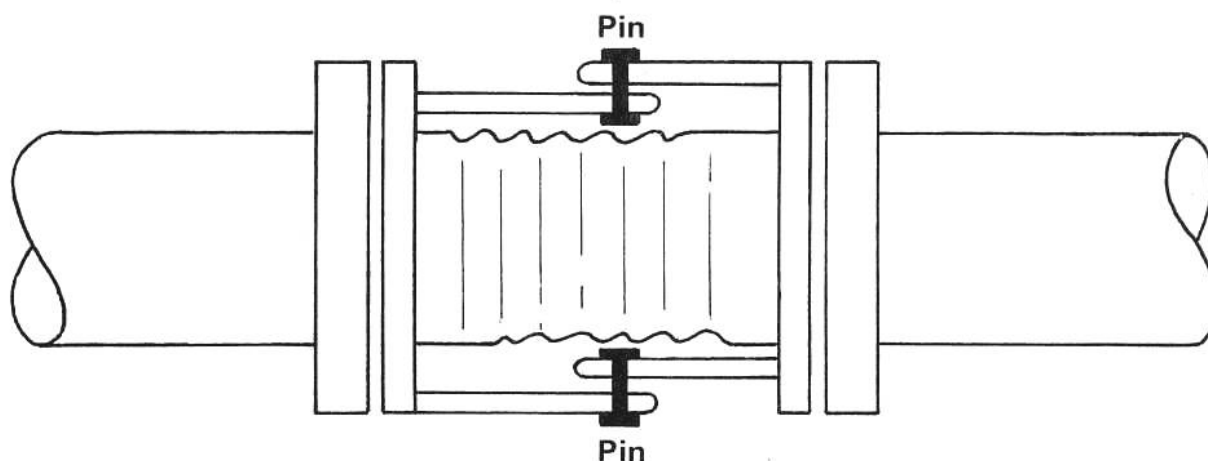
SAFETY NEWSLETTER No.74

74/1 MORE ABOUT BELLOWS

Newsletter 71/2 discussed equipment which failed because of errors in installation and suggested that wherever possible we should use equipment which can tolerate less-than-perfect installation. Bellows were quoted as an example of equipment which has to be installed with great care and are therefore best avoided.

This is illustrated by an incident in another Division. A Fluon bellows failed, spraying an operator with acid and causing severe burns. The pipe containing the bellows was free to move and transmit sideways thrust to the bellows. Since a bellows is intended primarily for axial compression, this sideways movement could have weakened it.

In another incident, a bellows in a 6 inch diameter line was mounted between a pair of flanges hinged together to carry the pressure end load; lugs on the flanges were connected by pins. Two pins failed by fatigue and the bellows became distorted, fortunately without leaking.



If there are any hinged bellows on your plant you should consider if stronger pins are necessary, or if they should be inspected regularly. Bill Jones (P2335 or B3240) may be able to help you.

Report No PC. 200,812/A, available from Division Reports Centres, describes a survey of the use of bellows in Petrochemicals Division. The general message of the Report is that critical questioning should precede a decision to use bellows, that more care should be taken in the selection of the material and type of bellows, and that more care should be taken over handling, installation and inspection. Although bellows will continue to be used for many applications, there will be no technical difficulty in making other provision when bellows are considered undesirable.

The Report also lists a number of situations where bellows should not be used.

74/2 SIX YEARS AGO - AN EXPLOSION IN A MESS ROOM

The following is reprinted from Safety Newsletter No 8, March 1969.

An explosion occurred recently in a mess-room and blew down a partition wall. Two men in the room at the time were shocked but not hurt.

The mess room was pressurised, so how did the vapour get in?

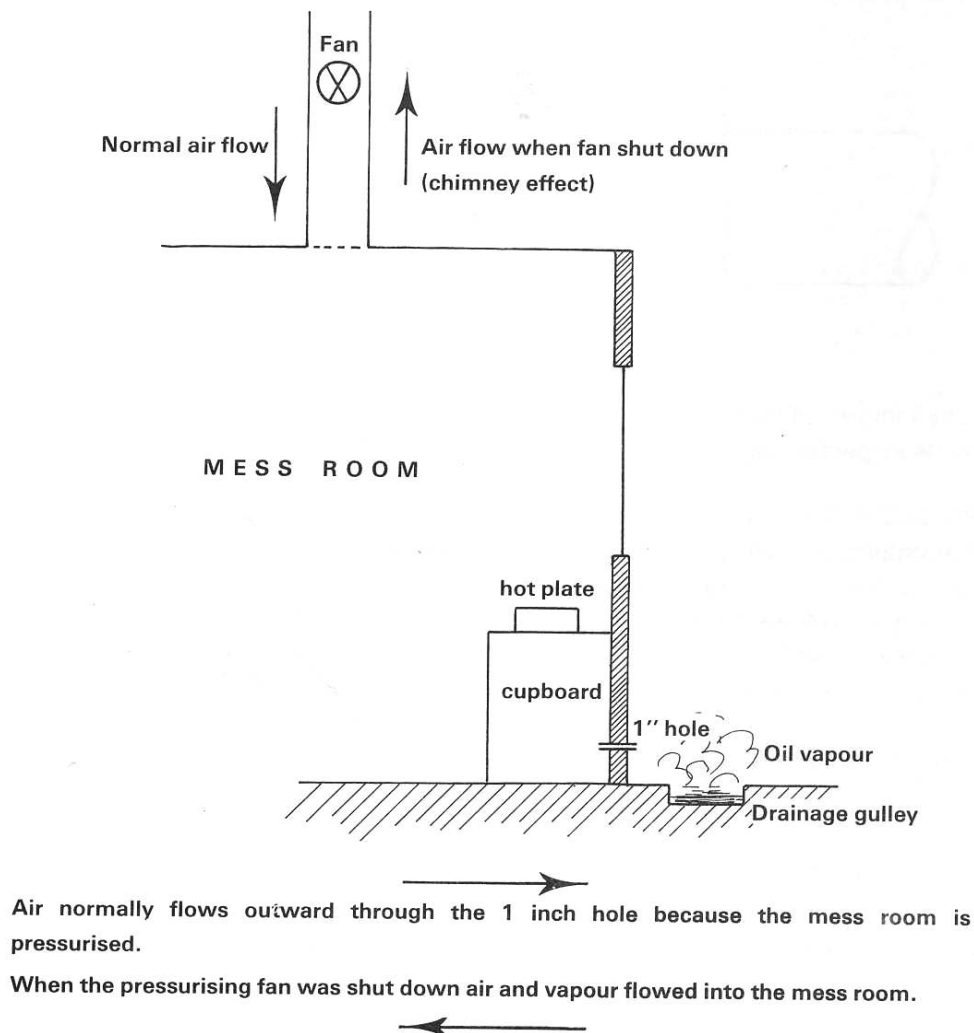
A drainage gully ran alongside the outside wall of the mess-room. When the pressurising fans were

shut down for a few days for repair, vapour from the drainage gully entered the mess-room through a 1 inch hole in the wall. The vapour may have been sucked in by a chimney effect caused by the flow of warm air up the ventilation inlet pipe. At one time a drain pipe had gone through the hole but when the pipe was removed the hole was not blocked up. The vapour accumulated in a cupboard under a sink.

While the pressurising fans were shut down, smoking was stopped in the mess-room and the electric equipment was not used. The explosion occurred 7 hours after the pressurising was restored and was ignited by a hot-plate. The cupboard had not been opened and the vapour had not dispersed.

It is clear that:

- (1) All pressurised buildings in areas where flammable materials are handled should be examined carefully to make sure there are no openings which have been overlooked and through which vapour can enter. This examination should be repeated every year.
- (2) If the pressurising fan has been shut down, when it is started up again and before smoking etc. is permitted, the nooks and crannies in the building should be checked with an explosimeter.
- (3) On new plants obvious sources of vapour, such as drainage gullies, should be located away from pressurised buildings.



74/3 PRESSING THE WRONG BUTTON

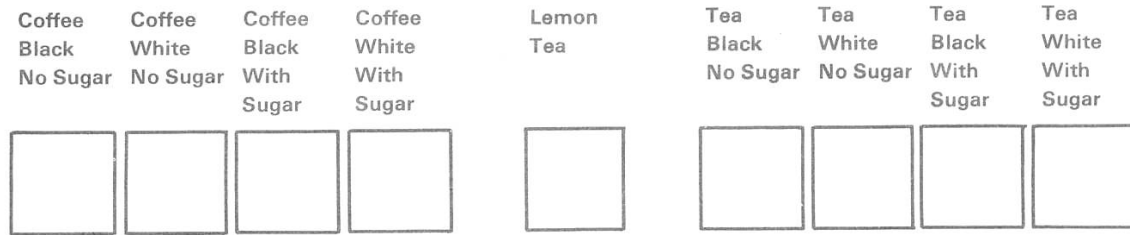
In Safety Newsletter 66/3 I pointed out that I press the wrong button on a beverage machine and get the wrong drink on about one occasion in fifty a frequency rather higher than might be expected, suggesting some stress and distraction.

Obviously, it does not matter if I get the wrong drink, but on a plant pressing the wrong button might result in an accident or spillage or customer complaint. An example of this was also given in

Newsletter 66/3.

In our new Headquarters building we have a different type of beverage machine and the panel is arranged as shown below:

Fig 1

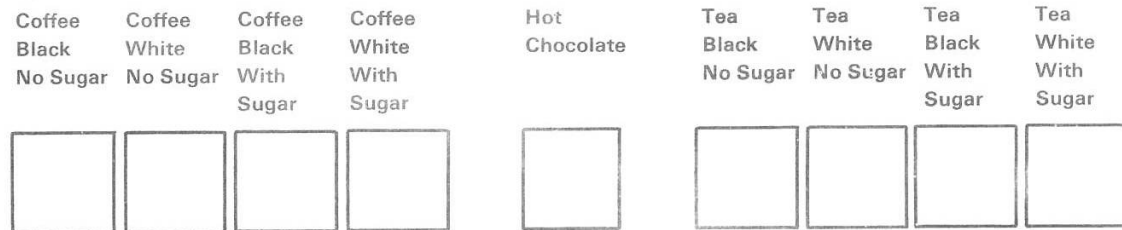


I have been drinking lemon tea. I felt sure I would not make mistakes in future as the lemon tea button is on its own, apart from the other buttons.

Nevertheless, after a few weeks I did make a mistake and got the wrong drink. I was on the floor below the machine I usually use. I pressed the centre button and I got hot chocolate I

The panel on this machine is arranged as shown below.

Fig 2



I was so used to pressing the centre button that I did not stop to read the lettering and did not notice that it was different from that on my usual machine.

This is a good example of a situation which sets a trap for the operator. Again, it does not matter very much in this case, but a similar situation on the plant might have serious consequences. If you have more than one unit in the control room with a separate panel for each, and the panels are slightly different, you are setting a trap for the operator and you cannot blame him if he presses the wrong button. The panels should be identical or they should be entirely different. If they are slightly different and cannot be altered then a striking notice or a change of colour is needed to draw people's attention to the difference.

74/4 AROUND THE SITE

- Some scaffolders were stacking planks by throwing them a distance of about three feet onto a pile which was lying against a torque tube level measuring instrument. The vibration caused the torque tube to signal a high level and this tripped a compressor.
- A piece of pipe weighing 250 lb fell while being lifted by a crane. It just missed someone.

Examination of the lifting lug on the pipe showed that it had been considerably stretched and that a force of 4 tons would have been needed to do this.

It is believed that sometime in the past an attempt had been made to lift the pipe before it was unbolted and that this caused the lifting lug to be stretched and weakened.

Reminder: As mentioned in Newsletter 62/6b, ICI Engineering News for December 1973 (Report No A128,120/73/12) describes the precautions to be taken in the design and fabrication of lifting lugs. It also points out that all lifting lugs should be checked before use.

- A proprietary pipe stopper was used to plug a 6 inch diameter pipe before pressure testing to 80 psig with compressed air. It blew out. The use of these pipe stoppers is not recommended

and they should never be used without the approval of an engineer who should examine the details of the individual case.

Reminder: The ICI Pressure Vessel Code, Sections 12.6 and 12.7, states the precautions necessary for pneumatic testing.

74/5 ACCIDENTS AT WORK AND OTHER ACCIDENTS COMPARED

I have been asked how the number of ICI employees killed in industrial accidents compares with the number who are killed in accidents of other sorts and the number who die as a result of disease. The following are the figures for 1973:-

Deaths in service as a result of disease	373
Deaths in service from industrial accidents	5*
Deaths in service from other accidents (most of them at home or on the roads)	24
TOTAL	402

*Thjs includes a driver who was killed in a road accident.

74/6 SOME QUESTIONS I AM OFTEN ASKED

8—IS THERE ANY WAY TO GET PEOPLE MORE INTERESTED IN THE PLANT SAFETY BOOK?

Most plants have a 'safety book' in which people write jobs that need doing. (Someone actually wrote in one book "Drain cover propped open with piece of wood" and the manager wrote "Noted" alongside!)

Instead of writing a list of faults, a better idea might be to write down every day something that has been done to improve safety. One plant tried this. Over three months, 64% of the possible number of entries appeared. Here are some of them:-

- Steam hose on Nitrogen Plant rolled up and hung on north wall of compressor house — tripping hazard eliminated.
- Steam trap survey started. I hope to compile a check register in the shape of a training/safety note for plant personnel.
- Sorb-oil spread over oil spillage in nitrogen compressor house.
- Two tanker drivers told to wear safety equipment.
- Fitters asked, and removed, heavy tools which were left scattered around compressor house.

Not world-shattering, but several hundred small jobs done which otherwise might not have been done.

74/7 COMMENTS FROM READERS

- Newsletter 70/3 discussed flashing liquids and pointed out that a leak of liquid ammonia from a pressure storage tank produces much more toxic vapour than a leak of refrigerated ammonia or gaseous ammonia.

A reader reminds us that ammonia is explosive as well as toxic. The lower explosive limit is very high 17% has to be present in the atmosphere before an explosion can occur and so ammonia has never been known to explode in the open air but it has exploded inside closed buildings.

Reminders: Komet Extract S Synthetic fire-fighting foam will reduce evaporation from ammonia spillages (Newsletter 61/9b).

Water should never be sprayed onto a spillage of liquid ammonia as the heat of reaction will increase the rate of evaporation. The water spray should be used to control the spread of vapour (Newsletter 57/2).

- (b) Newsletter 72/3 pointed out that the ends of vent stacks are sometimes fitted with insulated tips to prevent the stack catching fire. I said that they are unlikely to be very effective.

A reader recalls that on one plant, five vent stacks close together were all fitted with plastic tips. This did not prevent the stacks catching fire, and when they did, the plastic softened, drooped and sealed off or restricted the ends of the stacks.

- (c) Newsletter 72/4 quoted the Division's specification for gaskets for pipeline flanges. Several recent leaks might have been avoided if spirally-wound gaskets had been used.

A reader suggests that other readers may not always know when to use high tensile steel bolts and when ordinary mild steel bolts are satisfactory.

For details see Engineering Standards 04-2612 and 04-2617. Cr Mo stud bolts are recommended for Class 300 piping and above, and also for Class 1 50 piping at temperatures above 260°C.

- (d) Newsletter 71/2 item described an Ermeto coupling as a screwed joint. Strictly it is a compression coupling. Both screwed couplings and compression couplings are not permitted in the Division's new plants, except for small-bore lines carrying non-hazardous materials, as, like bellows, they have little tolerance for less-than-perfect installation.

74/8 UNUSUAL ACCIDENTS NO 44

Newsletter 64/5 reported that when a power failure occurred in another company the electrically operated barriers could not be opened to let the Fire Brigade in.

Some years ago there was a complete power failure at Wilton. One Works was well prepared with a diesel generator which was tested every week. It started satisfactorily but 5 minutes later it was shut-down by a high cooling water temperature trip. It was supplied with cooling water from the Works system and the cooling water pumps were driven by electricity.

74/9 RECENT PUBLICATIONS

- (a) Report No PC.200,815/A, available from Division Reports Centres, gives brief details of fires and explosions in the oil and chemical industries throughout the world that have been reported in the press, including the trade press, during 1973 and 1974. It has been prepared as a work of reference, and also to draw attention to the serious incidents that can occur if standards of design and operation are relaxed.
- (b) A committee was appointed last year to consider the strength of future plant control buildings. Their report has now been issued (Report No PC.21,654/B) and can be obtained from Division Reports Centres.
- (c) The ICI Materials Handling Information Group have produced a series of twelve volumes on various aspects of materials handling. We can let you have a list of titles.

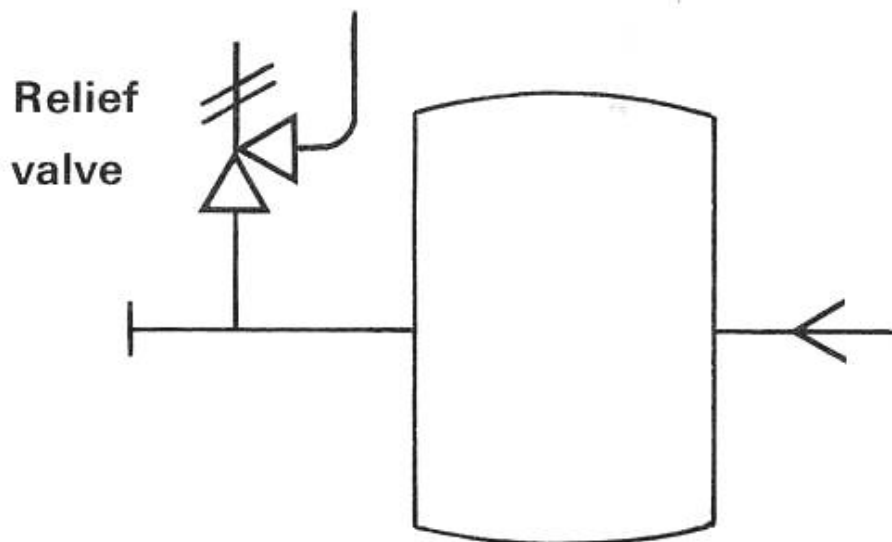
For more information on any item in this Newsletter, please write to E.T. at Wilton, or phone ext P2845. If you do not see this Newsletter regularly and would like your own copy, please ask Mrs T. to add your name to the circulation list.

March 1975

HOW WELL DO YOU KNOW YOUR SAFETY NEWSLETTERS?

The numbers in brackets tell you where to find the answers to the questions. (70/3 means Newsletter 70, item 70/3).

1. Why is a leak of petrol at 120°C and 100 psig more dangerous than a leak of cold petrol? (70/3).
2. We want to start up a piece of equipment on which maintenance has just been completed. It is evening. The top copy of the clearance certificate (permit-to-work) is in the maintenance supervisor's office which is locked. What should be done? (71/1).
3. What are the two sorts of compressed air mask and when should they be used? (67/2).
4. When should we use spirally-wound gaskets and when should we use CAF gaskets? (72/4).
5. What special precautions are necessary before carrying out maintenance on air cooler fans? (7 1/4).
6. What could make an underground tank rise out of the ground? (71/10).
7. Which is the best sort of cupboard for solvents, steel or wood? (70/7 (b)).
8. What is wrong with this arrangement? (70/1).



9. What special precautions must be taken before allowing entry to a tank which contains a stirrer? (69/3).
10. A process operator has to blow off the pressure on a vessel and then open a lid or door. What special design features are necessary? (68/2).