

IMPERIAL CHEMICAL INDUSTRIES HEAVY ORGANICS DIVISION

SAFETY NEWSLETTER NUMBER 13

By Trevor Kletz

13/1 ISOLATION OF EQUIPMENT FOR MAINTENANCE – WHAT SORT OF SLIP-PLATES?

In these Newsletters I have frequently mentioned the need to isolate equipment for maintenance by slip-plate or other equally effective means, unless the job to be done is so quick that fitting slip-plates would take as long and be as hazardous as the main job.

It has recently come to light that on one Works some of the slip-plates used have been too thin. If $\frac{1}{4}$ in thick slip-plate is put into a large line operating at a pressure of several hundred psi, the slip-plate may be stretched and may even burst.

Slip-plates should be made to the same standard as the pipeline, details can be found in Engineering Department Specifications DB 2400 (Class 150 piping), 2401 (Class 300 piping), and DB 2403 (Class 600 piping). Sometimes on existing plants it is difficult to spring the line sufficiently to get a slip-plate of the thickness required by the standard. In these cases the plant or section engineer should be consulted and he may be able to authorise the use of a slightly thinner slip-plate for the particular duty.

They should, however, never be used without an engineer's authorisation.

On new plants, if there is not sufficient spring in the pipeline then spacer rings or spectacle plates should be incorporated in the design. For details see Engineering Dept. Project Group Design Note No. 12, "The design aspects of isolating equipment for maintenance work,"

If a pipe-line is made of stainless or other special material, then spacer rings and spectacle plates must be made of the same material. Whether or not a stainless slip-plate is used depends on the circumstances. If stainless is used for the pipe-line because the material is corrosive then the slip-plate must also be of stainless. On the other hand if stainless is used because the pipe-line operates at high or low temperature but would be at normal temperature when a slip-plate is fitted, then a mild steel slip-plate will be satisfactory.

13/2 IDENTIFICATION OF EQUIPMENT FOR MAINTENANCE.

Two recent incidents in the Division show the importance of working strictly within the limits defined on a Permit-to-Work and not going outside them.

In the first incident a Permit-to-Work was issued for modifications to the walls of a room. The maintenance workers started work on the ceiling as well and cut through some live electric cables.

In the second incident a Permit-to-Work was issued for welding on the top only of a tank which had been removed from the plant. When welding was complete the welders rolled the tank over and started work on the bottom. Some residue which had previously been covered by a layer of water caught fire.

Three years ago there was a major fire in which three lives were lost - hot oil came out of a pump on which men were working and caught fire as the suction valve had been left open. The Permit-to-Work authorised attention to the bearings - a job which did not require breaking into the process side of the pump. When it was decided to dismantle the pump a new Permit-to-Work was not taken out. If it had been the suction valve might have been checked. (See HOC Report No. 0.21, 100/B).

13/3 MAINTENANCE OF FLAMEPROOF ELECTRICAL EQUIPMENT

A recent report, No. 0.21, 110/B describes a survey of the standard of electrical maintenance in the Division. On all the plants examined, both in this survey and in similar surveys elsewhere in the Company, the results were similar. A first look round suggested that nothing much was wrong. A

more thorough look paying particular attention to equipment which was not readily accessible disclosed numerous faults. For example, in a compressor house containing 121 items, 33 were found to be in need of some attention. The faults included missing and loose screws, the wrong stoppers in flameproof boxes, a purge gas flow-meter out of order, and incorrect glands used.

The faults could not all be blamed on shoddy workmanship. On many plants spare screws for the flameproof fittings were not in stock and the special spanners needed for tightening them up were not available.

The report makes recommendations for improving the standard of electrical maintenance. It also includes a useful description of the various types of equipment that are used in areas where flammable gas and vapours may be present, namely, flameproof equipment, intrinsically safe equipment, purged equipment, and "approved apparatus".

P.G. of Plastics Division (Teesside) Works has devised an experiment to demonstrate the need for proper assembly of flameproof equipment. A sparking mechanism has been fixed up inside a flameproof light fitting. The fitting is put in a polythene bag full of ethylene and air and if it has been assembled correctly no ignition occurs. The flameproof fitting is then assembled incorrectly, for example, with wide gaps or with bolts missing, and the test repeated; this time ignition occurs. Mr.G will be happy to show the experiment to anyone who gets in touch with him.

13/4 AN EXPLOSION IN A BOILER

An official report (Boiler Explosions Act 1882 and 1890, Preliminary Enquiry No. 3453, HMSO, 1/9d) describes the causes of a boiler explosion which killed two men. The explosion occurred because the water level was lost. The boiler was fitted with two glass water gauges, two low level alarms, a low level trip to actuate the water feed pump and a low level trip to isolate the fuel supply; all of them had been isolated from the boiler.

To make these isolations it was necessary to close only two valves. The "Engineer Surveyor-in-Chief" (nice title) recommends that it should not be possible to isolate all the alarms etc. by operating one or two valves.

13/5 FAILURE OF SOME PIPE HANGERS

On a new plant many cracks have been observed in pipe hangers manufactured by Carpenter & Patterson. Examination shows that the cracking is due to excessive hardness, the result of the steel being scraped over the die in the bending process. All recent deliveries of cold-formed brackets in sizes up to 8 ins diameter made by Carpenter & Patterson are to be examined for cracking or excessive hardening at the bends, and will be replaced if defective; so far about half the hangers tested have had to be discarded. New brackets will be hot formed and this should eliminate the defect.

13/6 WELDING INSIDE A VESSEL

Before we allow welding inside a vessel we always test the atmosphere to make sure that no flammable gases are present. It is also important to make sure that no flammable material is sticking to the sides of the vessels. A dangerous incident was narrowly avoided recently when a maintenance supervisor noticed a deposit on the wall of a vessel for which an entry and welding permit had been issued; he scraped off some of the deposit and tested it; it burnt. [The Factories Act (section 31), says that precautions must be taken in such circumstances, even if no entry is involved].

13/7 THE FILLING AND IDENTIFICATION OF CYLINDERS

Cylinders are often filled by weighing. After a cylinder had been overfilled recently it was found that the weighing machine was too small for the cylinders and that unless great care was taken they overlapped onto the surrounding floor and a low weight was registered. I suggest you check your weighing machines to make sure that this cannot occur.

Another dangerous incident occurred in another Division when a welder used an oxygen cylinder thinking it was argon. All the paint on the cylinders had rusted away.

Never use cylinders which are not labelled or identified.

13/8 DON'T FORGET TO TELL THE DRIVER

A maintenance supervisor was called to look at a faulty cooling water pump. He decided that to prevent damage to the machine it was essential to reduce the machine's speed. immediately. He did so, but did not tell Process straight away. The cooling water rate fell, the process was upset and a leak developed on a cooler.

13/9 AN L.P.G. FIRE

Another company has reported an incident which shows how easily spillages of flammable vapour can be ignited. A propane tank was being prepared for maintenance. The propane was poured out, the tank vented and then filled with water to displace the remaining traces of propane. The water was then drained off through a hose onto the concrete floor of the plant. A small amount of propane came with it and ignited. It is believed that the source of ignition was sparks caused by the steel end of the hose whipping about on the concrete floor.

13/10 STANDARDISATION OF SERVICE LINES

Many different types of connection have been in use in the Division in the past for air, steam and nitrogen flexes. New standards have now been issued by Engineering Department Piping Section for use on all new plants and on modifications to existing plants.

13/11 WHAT IS AN ACCIDENT?

A mathematician was recently asked to calculate the chance of a collision between two ships in the narrow strait of water that separates Denmark from Sweden. He showed that if the traffic doubles the chance of a collision increases eight times and becomes significant. A meeting to discuss his report was held at Elsinor (the scene of Hamlet) overlooking the strait. The mariners present poured scorn on the report. The rules of the sea, they said, and the skill of the mariners would prevent collisions ever happening. While the meeting was in progress a collision actually occurred outside, seen and heard from the meeting room. The author commented that "... men often wait for the inevitable tragedy, before deciding that it may possibly occur".

Most of our fires and explosions, like the collision of the two ships, are not accidents in the sense that they are unexpected and unforeseen events; they are events that we know will occur; the only thing uncertain is the time and place. Regular readers of these Newsletters will be able to forecast that somewhere during the coming year:

A maintenance worker will break into the wrong pipeline,

An explosion will occur because the inert gas supply to a piece of equipment, such as a stack or tank, is inadequate and the atmosphere has not been tested,

An accident will occur because a piece of equipment given to Maintenance was isolated only by closed valves without locking or slip-plating.

And so on.

To try to convince people that these events are inevitable unless we take certain actions I have tried to do the next best thing to waiting for them to occur, that is, to show people pictures of a previous occurrence, let them discuss what happened and decide for themselves what ought to be done to prevent it happening again. Discussions of this sort for plant managers and engineers are, for example, held at Wilton Castle each week; other discussions are held from time to time at Billingham.

If you have not been and want to come, let me know.

13/12 RECENT NOTES

Newsletters Nos. 1-12 have been bound together and issued as HOC Report No. 0.200,630/A.

Safety Note No. 69/6 on Combustible Gas Detectors has been revised and issued as No. 69/6A.

A note has been issued on the conditions under which diesel engines should be used in areas where flammable vapour may be present (Safety Note No. 69/9).

Copies of the first can be obtained from the Reports File. For copies of the other two or for more information on any item, please write to Mrs. J.M. W, Organic House, Billingham, or 'phone B.3927,

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