

Manufacturing Chemists' Association, Inc.

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TO THE EXECUTIVE CONTACTS OF MEMBER FIRMS

SUBJECT: Case Histories of Accidents (including Fires and Explosions)

Member firms are urged to send the MCA Washington Office an account of accidents (or near accidents) which they believe should be included in this report. Factual information on such occurrences is desired whether or not occupational injuries are actually involved.

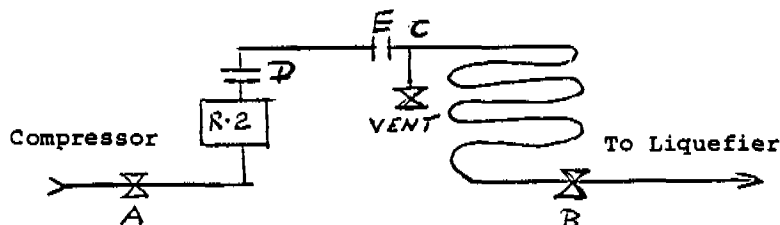
Reader's Comment on Case History No. 1111 "Oxygen Incident"

Preventive Measure A refers to installation on each cylinder of a two-stage regulator. This is one way to lick the problem and perhaps it is economically feasible on a manifold that accommodates only four cylinders. Most industrial and hospital oxygen manifolds however are made for a much larger number of cylinders and a regulator on each cylinder would get pretty expensive. There are oxygen manifolds available from a number of reputable suppliers which have been tested and listed and approved by Underwriters' Laboratories and by Factory Mutual and I believe that the use of such an approved manifold would generally be a better way to solve such a situation.

CASE HISTORY NO. 1112

Operator Burned When Block Valve Fails

Description: A rugged converter had been shut down, block valved from the system, and depressurized in order that the catalyst could be replaced. As the operator loosened one bolt on flanged spool "E", a small flow of gas was heard. He then tightened valve "B" further and the gas flow stopped. Two operators then removed all bolts and disconnected flanged spool "E". They then began disconnecting flanged spool "D". When all but one bolt had been removed, one operator walked away. At that time gas suddenly surged and ignited, severely burning the other operator on arms and legs.



Cause: Failure of valve seat due to thread on seat being tapered.

Preventive Measures:

1. Entire plant to be shut down and system depressurized before start of maintenance work.
2. Installation of double block valves, with bleeder valve between.

CASE HISTORY NO. 1113

Vinyl Chloride Fire

Description: In a vinyl chloride production plant, a caustic scrubber vessel was isolated from the system and was being prepared for a periodic recharging. The scrubber lid was opened and by a visual check, it was established that the inlet valve to the scrubber was partially plugged and not completely closed.

The engineer on duty was consulted as to what might be the way to proceed to get the valve freed of the plug and also the valve closed.

It was decided that heat (steam) be applied to the valve and by alternately opening and closing the valve, the problem might be overcome.

Since the vessels, columns and furnaces in this area are out of doors (not confined to any building), the wind direction is important in precautionary measures to be taken when a vessel is opened. In this particular instance the engineer mentioned that the wind direction was from the north so that in the unlikely chance any vinyl chloride vapors were freed, they would be blown in a direction that would not sweep them to the furnaces (approximately 150 feet away). The lid was swiveled into position but was not bolted. The valve was heated and on the third opening and closing of the valve, the plug was suddenly released.

This pressure pushed the swiveled lid

to one side and a geyser of caustic solution and vinyl chloride went up into the air, raining down on the four men below. Two of the men ran away from the area in a direction away from the furnaces but the other two ran in a general direction towards the furnaces.

One of these two stepped under a shower and wet himself down. The other employee apparently had gotten no caustic on him and decided to go back to the scrubber to check the valve. He was caught in a wave of flame as he approached the scrubber. Apparently he ran to the shower and doused the flames but the burns he received resulted in his death five days later.

Cause: The fire was caused by the ignition of large quantities of vinyl chloride vapors by the furnaces. The large volume of vinyl chloride came from the caustic scrubber and was released by the unsafe operating method in an attempt to remedy an abnormal situation. Three attempts were made to seat the valve with the top manhead closed but not bolted. This method of reseating had been used in the past except in this case the top head was not bolted down.

Preventive Measures:

1. Change in procedure for recharging scrubber.
2. A detailed procedure for preparation of scrubber for maintenance will be written using a safety check list.
3. Automatic steam snuffing will be incorporated into the emergency gas cut-off switch. This could prevent flammable vapors from being sucked into a furnace and ignited by the hot brick even though the gas to the burners was off.
4. The use of a closed vent system for all low level relief valves in the units will be re-evaluated.
5. A high vent system is being studied.
6. Relocation of the caustic scrubbers is under consideration.

CASE HISTORY NO. 1114

Anhydrous-Ammonia Handling

Description: About half-way through the unloading of a 40,000 lb. anhydrous ammonia tank truck, a stream of ammonia was noticed leaking out of the bonnet of the stop valve on the liquid unloading line at the tank. The truck was immediately taken off the line and the storage tank vented to the AN neutralizing pit to relieve its pressure.

In the meantime, the acid mechanic investigated the leak and determined that the bonnet on the valve was cracked and nothing could be done short of replacing the complete valve.

Considerable time and difficulty were encountered in reducing the pressure on the tank sufficiently to stop the flow of liquid ammonia as there is no shut-off between this valve and the tank. However, by using the Frick compressor and exhausting it to the atmosphere, the pressure on the tank dropped sufficiently to install a new valve with the aid of a Scott Air-Pak mask.

Investigation: This storage tank is part of a typical anhydrous ammonia system containing 4 storage tanks in all. Two of these tanks are used for the AN neutralizer through a separate piping system except for the liquid unloading line which is common to all. The tank in question plus the fourth tank are heated and segregated for AOP use.

Ammonia is received by tank truck and unloaded through a combination of the truck's liquid pump supplemented by the plant's Frick compressor. The pressure on the line at the time of the incident was estimated at 140 psi.

Valving on both tank systems are similar employing Vogt 120 series Ammonia Valves (300 lb) and all valves are at ground level except emergency shut-off valves in the older AN neutralizer tanks which would have helped considerably in this situation had they been available on the tank involved.

Examination of the valve afterwards revealed a 2½" crack following the transition line between the rounded body and flattened bonnet flange with a bonnet stud in the center. For a closer examination of the 'break' metal, the cracked section was broken loose from the body requiring only a light hammer tap. The thin white sections were bright metal and were all that held the valve together. The remaining area of the 'break' had been dulled somewhat but the absence of rust leads us to believe it was a 'fresh' break.

Conclusion: The incident was a result of a flaw in the valve coupled with an induced strain from excessive pressure on one of the stud bolts. The strain probably occurred when the valve was overhauled two months ago although the mechanic who did the job does not recall any difficulty. He has done the same job many times in the past.

Action Taken:

1. Publicize this incident as an illustration of the dangers in handling anhydrous ammonia and the need for careful cleaning of gasketed surfaces and uniform take-up on holding nuts.

2. Install emergency shut-off valves on the liquid ammonia lines as close to the tanks as possible and set-up a schedule to test periodically to insure ease of operation during emergencies. These valves will also assist in the periodic renewal of the lead seats of the regular stop valves.