Alberta
MUNICIPAL AFFAIRS

ABSA
ALBERTA BOILERS SAFETY ASSOCIATION

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Safety Alert!
To Pressure Equipment Owners and Operators

Valve Failure

Incident

Recently, a boiler operator came very close to being seriously injured when the stem blew out of a level gauge isolating valve. The operator was opening the valve to warm up the gauge glass during a boiler startup.

The valve was of the outside screw and yoke (OS&Y) type with a brass bushing at the upper end of a carbon steel yoke. As the hand-wheel was turned, the bushing unscrewed from the yoke instead of the stem's rising through the bushing. Once the bushing had backed totally out of the yoke, there was nothing holding the stem in place and it and the bushing shot out of the valve, propelled by 1500 psi steam. Fortunately, the worker was standing to the side of the valve, rather than directly in front of it, and was not injured.

To avoid future incidents, we recommend the following:

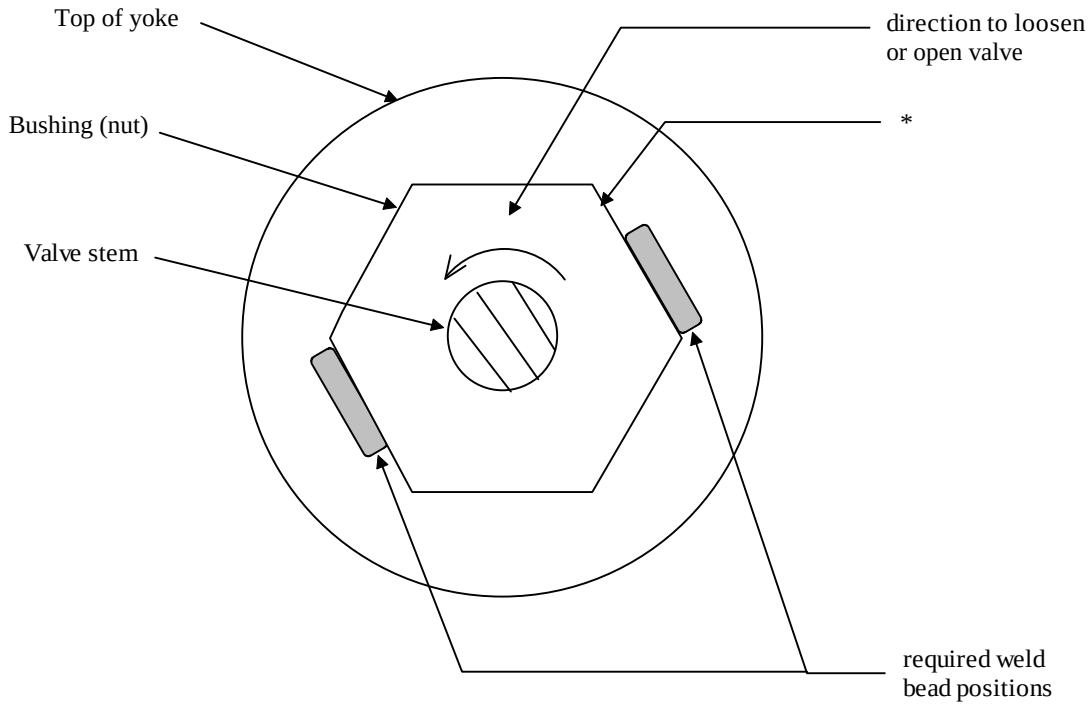
1. Review the valve manufacturer's maintenance procedures regarding anti-rotation tack welds or pins and ensure that all safety elements are present.
2. If a valve has been serviced, ensure that the manufacturer's recommended welds or pins have been properly replaced.
3. Review existing installations and stock to ensure that the appropriate anti-rotation tack welds or pins are in place.
4. Instruct operators to be vigilant when opening valves. If there is unusual movement of parts, corrective actions need to be taken immediately. Operators should **never** position themselves in line with the valve stem.
5. Never install or remove threaded piping from a split-bodied ball valve while the valve is under pressure.
6. Should you find valves that are not in accordance with the manufacturer's specifications, inform ABSA immediately so that we can take appropriate action to see that the issue is corrected.
7. Report any unsafe conditions involving pressure equipment to ABSA.

Discussion

For the particular valve involved, the manufacturer's literature indicates that there should be two adequately sized weld beads placed on the top surface of the yoke, adjacent to opposite faces of the hexagonal wrenching surfaces of the bushing. The purpose of these weld beads is to prevent exactly what happened in this case.

The correct location of the anti-rotation tack welds is shown in the sketch below. Unfortunately the valve that failed had the tack weld(s) at the other end of the facet of the hex, as shown by the asterisk in the sketch. Consequently, when torque was applied to the bushing, the facet of the hex rotated away from the weld nugget instead of jamming against it. By the time the facet of the hex contacted the weld nugget, the bushing had already risen a bit, effectively reducing the height of the weld nugget, which may have been below the manufacturer's recommended height in the first place. As a result, the hexagonal part of the bushing rode up over the weld nugget and the bushing continued to back out of the yoke.

Note: *This was accomplished by manually turning the hand-wheel, no wrench or other mechanical advantage was being applied!*



Top view of an OS&Y type valve

* On the failed valve, weld was mislocated here and smaller then specified.

On further examination of like valves in the plant, the owner found that some valves had no anti-rotation tack welds at all.

Similar types of valves are known to have a drive pin in the top of the yoke to prevent inadvertent backing-out of the bushing.

Sometimes it is obvious that when loosening one part, one has to hold another part with a wrench to keep the wrong piece from rotating. An example of this might be a two-piece ball valve from which a worker is attempting to remove a threaded pipe. Without restraining the part of the valve that is attached to the pipe, the two halves of the valve may come apart rather than having the pipe released from the valve.

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