Bulletin No.102

Standard Recommended Practice for the Safe Use of Oxygen Combustion Bombs

Factory repair service and user maintenance guidelines

ASTM E-144

The title for this tech note comes from ASTM E144 - 94. This method has been the standard method for the hydrostatic and proof testing of oxygen bombs in the ASTM world for many years. In essence, it calls for bombs to be hydrostatically tested to 3000 psig as well as proof fired with 2 grams of benzoic acid and 40 ATM of oxygen pressure after a specified number of firings.

When this method was first adopted, 500 firings was the recommended factory interval and represented perhaps a minimum of ten weeks service. Today, with faster calorimeters and companies operating two shifts a day, the user may be performing routine maintenance on the bomb as frequently as every week.

User Maintenance Guidelines - 500 Firing Maintenance

All seals and any other expendable/ non-repairable parts shall be renewed after each 500 firings or at a more frequent interval if the bomb seals or other internal parts show evidence of deterioration. This, along with keeping the bombs clean in day-to-day operation, is the most important aspect of ensuring safe operation.

> **Never, under *any* circumstances, use oil on the o-rings which seal the bomb head or on any of the valves or fittings which handle compressed oxygen. This precaution applies to all of the oxygen bomb parts as well as the oxygen filling connection**.

Parr offers Oxygen Bomb Maintenance kits which supply the parts needed to perform the 500 firing maintenance service on the bomb twelve times.

Bomb Model No.	Service Kit Part No.	Bomb Model No.	Service Kit Part No.
1108 / 1108CL	6008	1104 / 1104B	6004
1108P / 1108PCL	6008P	1109	6009
1108R / 1108RCL	6008R	1109A	6009A
1136(CL) & 1138(CL) with A895DD	6036	1107	6007
1136(CL) & 1138(CL) with A1450DD	6038	1131 / 1131CL	6031

Parr Service Guidelines

To deal with the realities of today's test loads and cycle times, the ASTM Committee has adopted a revised method which recommends that "all seals and other parts that are recommended by the manufacturer be replaced or renewed after each 5000th firing or at a more frequent interval if the seals or other parts show evidence of deterioration". Oxygen bombs returned to Parr for service will be tested in accordance with ASTM E144-94. This service includes:

- Disassembly, cleaning and inspection of all parts
- Re-polishing of the inner surfaces of the bomb
- Re-assembly with new insulators, and seals, sealing rings, and valve seats
- Replacement of electrodes as required
- Proof testing
- Hydrostatic testing

The hydrostatic and proof testing of the oxygen bomb should be performed after every 5000 firings or if:

- The bomb has been fired with an excessive charge.
- The ignition of any of the internal components has occurred.
- There have been any changes in the threads on the bomb cylinder and/or screw cap.
- The bomb has been machined by any source other than Parr Instrument Company.

If the interior of the bomb should become etched or severely pitted, the resistance of the metal to further attack can be improved by restoring the surface to its original polished condition. Bombs needing re-bore or other major repair work should be returned to Parr Instrument Company.

Discussion

Essentially, Parr has never had a bomb fail hydrostatic testing without some clear evidence present which predicted that it would fail the test. Either the bomb had been severely corroded, deeply machined, badly burned, or the screw cap had been worn to the point where it rattled.

Parr has developed very stringent guidelines for the fit of the screw cap and the machining which can be done on the inside of the bomb. Recognizing that it will be impossible for the user to estimate the depth of corrosion in the field, it is not recommended that any user attempt to machine the inside of the vessel as the fit in the sealing area is absolutely critical for safe sealing. Typically, a bomb can be polished any number of times without removing a significant amount of metal. If machining (as opposed to polishing) is required to renew the inner surface of an 1108 bomb, it can typically be re-machined twice before reaching its minimum dimension. Parr furnishes a report with bombs which are near their minimum dimensions indicating that we do not expect to be able to further machine this particular bomb.

While the hydrostatic and proof fire interval has been greatly extended, it must be reemphasized that the user of the bomb clean and regularly replace the seals, insulators, valve seats, electrodes and fuel capsules to ensure the safety and longevity of the vessel.

Reference

ASTM E144 - 94, "Standard Practice for Safe Use Of Oxygen Combustion Bombs," ASTM International