Operating Instructions for the 1121 Oxygen Combustion Bomb

An Oversize Special Purpose Bomb

The 1121 oxygen bomb has been developed specifically to burn large samples of slow burning materials such as grain, wood fiber, paper and other vegetable matter. Volatile liquids can also be burned in this bomb provided special techniques are used to retard the burning rate. The ability of the 1121 bomb to handle large samples with complete recovery of all liquid and gaseous combustion products makes it particularly effective for determining trace elements in combustible materials and for preparing samples for tritium and carbon-14 measurements.

Allowable Sample Size

Slow burning, combustible samples weighing up to 10 grams can be burned in the 1121 bomb using oxygen charging pressures up to 300 psig (20 atm), but these limits vary and must be checked experimentally for each sample. The sample size must be adjusted to an amount which will give complete combustion with peak pressures held in the range from 1000 to 1200 psig. The pressure should never exceed 1500 psig as an absolute maximum. After a safe procedure has been established for a specific material, the entrance to the gage can be closed at the underside of the bomb head using the 440A plug which is furnished for this purpose. This will prevent repeated stress on the gage and keep combustion products out of the gage passage.

Sample Preparation

Finely divided samples to be burned in this bomb must be compressed into pellets or, if this is not convenient, powdered samples must be packed firmly in the bottom of the combustion cup. Cellulosic materials should be reasonably dry, but some moisture may be desirable since bone-dry samples usually burn too fast, resulting in incomplete combustion. It may be necessary, therefore, to add moisture to cellulosic materials to slow the burning rate. The amount of water added will have to be determined

experimentally, with some materials such as paper accepting up to 40% water by weight to obtain good combustions. In all cases, compress the sample into the cup as firmly as possible.

Preparing the Charge

When loading the 1121 bomb, set the head in the tripod support ring and adjust the capsule support so that the top of the cup is positioned 6 to 7 inches from the underside of the bomb head. Fasten a 10 cm length of 45C10 fuse wire to the electrode hooks and bend the wire so that it touches the sample but not the capsule. If the wire does not reach the sample, its length can be increased to 14 or 15 cm, but longer lengths should not be used because the wire will not get hot enough to ignite the sample. If the wire does not reach the sample, add an auxiliary fuse made from a strip of filter paper or a length of cotton or nylon thread. It is always well to place from 25 to 50 ml of water in the bottom of the cylinder before closing this bomb. This is not absolutely necessary, but it is an excellent safeguard against damage which might be caused if any of the metal parts should ignite and drop to the bottom of the bomb.

Closing the Bomb

Before closing the bomb, check the head gasket to be sure that it is in good condition and moisten it with a few drops of water; then push the head firmly into the cylinder. Slide the clamping rings into position and raise the band from the bottom of the bomb to encircle the rings. Position the band so that its cone pointed screw enters the dimple drilled in the outer face of one of the ring sections, then tighten the screw. Seal the bomb by tightening each of the cap screws, applying a firm, hard pull to the wrench supplied with the bomb. Or, if a torque wrench is available, apply 25 ft-lbs to each screw. Tightening should proceed in a criss-cross pattern rather than progressively around the circle.

Filling the Bomb

All of the fittings needed to charge the 1121 bomb with oxygen from a commercial oxygen cylinder are provided in a Parr 1825A Oxygen Filling Connection. As an alternate, the bomb can be filled by purchasing only the A19A7 hose assembly used on the 1825 filling connection and attaching this hose to a standard pressure regulator on the oxygen tank. The threaded coupling needed for the bomb inlet connection is furnished with the A19A7 oxygen hose.
To fill the bomb, attach the hose to the inlet valve, open the valve on the filling connection slowly and watch the gage as the bomb pressure rises to the desired filling pressure. The bomb should not be filled to more than 300 psig (20 atm.) at room temperature. Do not overfill the bomb. If too much oxygen should accidentally be introduced, do not proceed with the combustion. Detach the filling hose; exhaust the bomb and refill with oxygen before igniting the charge.

Firing the Bomb

Recommended practice is to immerse the bomb in water when it is fired, however this is not required. It must always be placed behind a heavy shield or barricade to protect the operator in case of an accidental explosion. Set the ignition unit outside the barricade and arrange the bomb so that the operator will be protected by the barricade but with the pressure gage visible so that he can observe the bomb pressure. The bomb must stay behind the barricade during firing and remain there until there is a definite indication that the peak pressure has been reached and the pressure is definitely going down.
The pressure will increase rapidly during the first 3 to 5 seconds after firing, after which it may drop slightly, only to rise again during the next 30 seconds. Most combustions are complete after the first minute, but it is well to wait at least 2 minutes after firing before handling the bomb. In all cases, be sure that the pressure is definitely going down before opening the discharge valve. Always open the valve slowly and be sure that the operator's hand or face are not in line with the discharge.

Opening the Bomb

To open the 1121 bomb: loosen the cap screws in the split ring sections then loosen the knurled screw in the outer band and push the band downward to rest on the table. The ring sections can now be removed and the head lifted from the cylinder. Transfer the head to the tripod support ring, being careful not to bend or disturb the electrode or sample holder. Normally the 441HC sealing ring will come out with the head, but if the bomb has been under pressure for some time the ring may have absorbed oxygen and become swollen, in which case it will drop away from the head. The gasket will gradually return to its normal size after the absorbed gas dissipates.

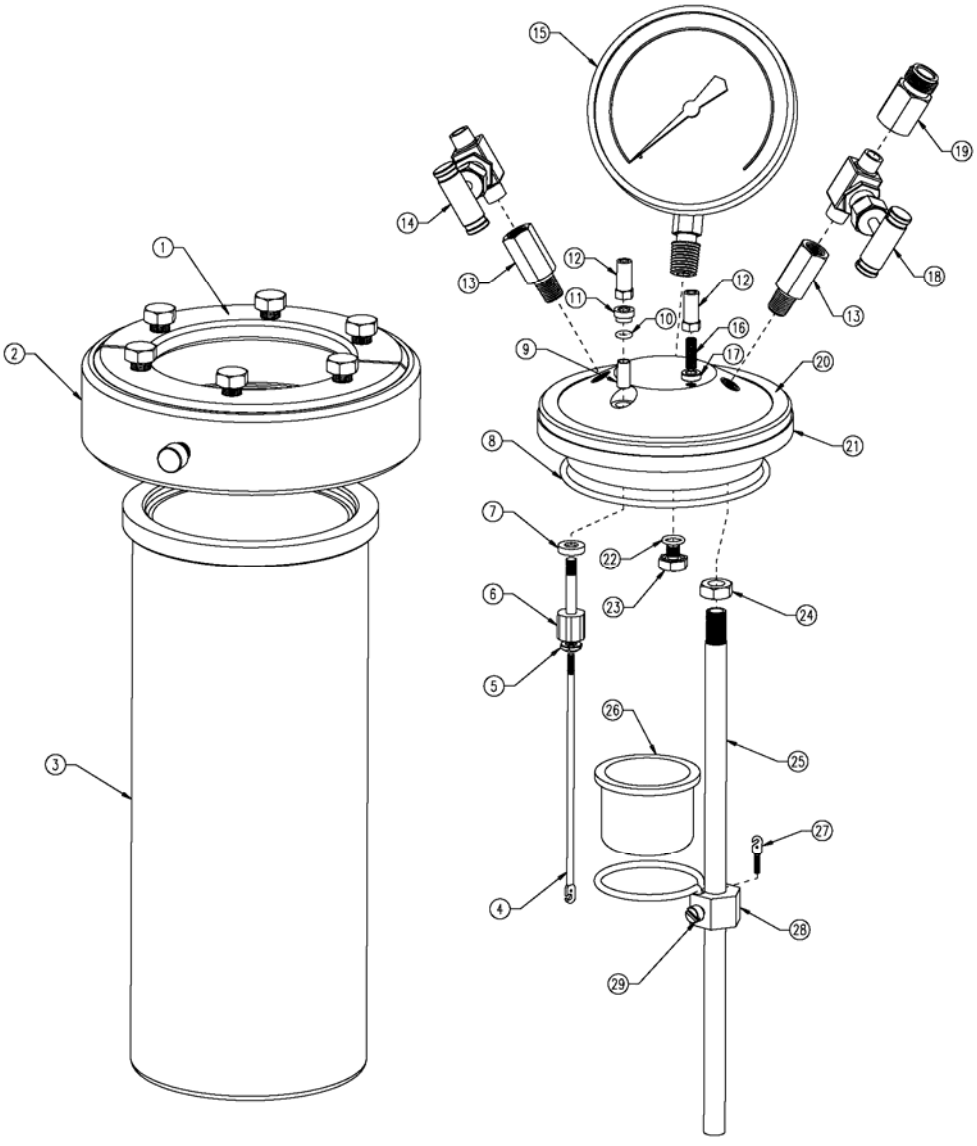
> **WARNING**: Do not overcharge this bomb and do not fire it if there is any evidence of a gas leak. The sample weight must not exceed 10 grams and the charging pressure should not exceed 300 psig, unless cautious experiments show that a higher charging pressure is required to obtain complete combustion, and the higher charge does not produce a peak pressure in excess of 1500 psig at any time during a test. If there is any reason to suspect that the bomb is leaking, immerse it in water and check for leaks before firing. Inspect the bomb regularly and replace any parts which are no longer serviceable or which show signs of weakness.

Special Procedures

Suggested procedures for handling volatile liquids or other unusual materials can be obtained by contacting the Parr Instrument Company direct, either by telephone or correspondence.

Item #	Part #	Description
1	A232HC	SPLIT RING W/ 232HCFDE CAP SCREWS
2	A233HC	DROP BAND W/ 233HCF SCREW
3	599HC2	BOMB CYLINDER, 1850mL, 316SS
4	4A5CN	STRAIGHT ELECTRODE, 5', NICKEL
5	68AC2	LOCK NUT, 303SS
6	402A2	ELECTRODE, CORE
7	96AC	CERAMIC WASHER
8	441HC	0-RING, 4' O.D., NEOPRENE
9	401A	SLEEVE INSULATOR
10	238A	0-RING, BUNA-N
11	143AC	INSULATOR
12	411A	TERMINAL NUT (2)
13	260HC2	VALVE EXTENSION (2)
14	A133VB	NEEDLE VALVE, 1/8' NPTM, 316SS
15	593HCP30YE	GAGE, 3-1/2", 3000 PSI, SS

Item #	Part #	Description
16	SC1932SC10	10-32 X 5/8 SHSS
17	388A	SPACER
18	A122VB	NEEDLE VALVE, 1/8" NPTM, 316SS
19	590HC	ADAPTER FOR FILLING CONNECTION
20	234HC	COMPRESSION RING
21	432A3	BOMB HEAD, 316SS
22	712HC	0-RING, NBR
23	440A	GAGE PLUG
24	SN3742HX	3/8-24 JAM NUT
25	523A	INLET TUBE W/NUT SS
26	446A	COMBUSTION CUP
27	23AC	HOOK ELECTRODE
28	A445A	CUP SUPPORT BRACKET
29	358HC2F	SET SCREW



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