

SUBJECT HYDROGEN HUMIDIFIER

SUPERSEDED DATE

Supersedes former 34-1-8.

Humidified hydrogen was initially used in firing ceramic material such as insulator supports and coated coiled heaters. Object of process is to introduce oxygen in the form of a controllable amount of water vapor (1) in case of coated coiled heaters to eliminate carbon in binder and thus prevent the formation of tungsten carbide which is extremely brittle and (2) in case of ceramic insulators to improve power factor.

### 1. APPARATUS

The humidifier consists of a closed metal bottle 12.5 cm. O.D. x 28 cm. depth, to the top of which are fitted 3 tubes, one for hydrogen inlet extending nearly to bottom of bottle, one for water inlet half way into bottle and other for exit hydrogen just below top of bottle. A water gauge 22 cm. long with petcock at bottom is connected to side of bottle to indicate water level. Bottle is provided with 2 safety valves consisting of parchment paper stretched across openings at top and held down by bushings. As a safety precaution, never plug these holes with cork. For maintenance of any desired temperature, an electrical heating element with thermostat is located in bottom of bottle.

### 2. OPERATION

Fill bottle a little more than half full of water and connect to supply line. Run hydrogen from supply line first thru a control valve, then thru a flow gauge and then into longest tube. The gas bubbles thru water and passes out thru shortest tube into exit end of furnace as humidified or wet hydrogen. Temperatures at which water must be maintained will be specified under processes.

### PRECAUTIONS

1. Always keep bottle filled with water to level indicated on gauge.
2. Do not rely on hydrogen flame in furnace as in indication that humidified hydrogen is being used. Always check flow gauge in rear of furnace to see that humidified hydrogen flow is maintained. Firing tub is porous and flame in furnace may be due entirely to seepage of casing gas into furnace.
3. Drain bottle occasionally to prevent sediment in bottle from blocking hydrogen inlet and to clean out sediment in water gauge.