

## DEFINITIONS

The Coke Oven and its associated equipment has, over a period of time, adopted a group of names for its various parts in order that communication among those building, maintaining or operating the facility could understand each other with reasonable assurance.

The following discussion is presented with this aim in mind.

The Coke Oven at Acme (1) is a rectangular chamber about 40 feet long, 13 feet high and 18 inches average width. Its width is tapered about 3 inches from the Pusher Side (2) to the Coke Side (3). The Pusher Side is the side from which the coke is pushed out of the oven and The Coke Side is the side where coke leaves the oven. It should be noted that ovens of smaller and larger size are also in use.

The sides of the oven are called Oven Walls (4). The bottom is called the Oven Floor (5) and the interior top is called the Oven Roof (6). The level to which coal is charged is called The Coal Line (7). One oven end is closed by a Pusher Side Door (8). This door also has a small door near the top called a Leveler Door (9) through which the Leveler Bar (10) of the Pusher Machine enters to level the coal charge.

The other oven end is closed by a Coke Side Door (11).

Coal is dropped into the oven through three Charging Holes (12). The holes are covered during coking by Charging Hole Lids (13). During the charge aspiration is assisted by providing negative pressure at the Assist Hole (14) at one end and by aspiration in the Stand Pipe (15) at the other.

Ovens are arranged in parallel groups of fifty at Acme and the group is called a Coke Oven Battery.

Ovens are separated by heating Walls. Each wall is divided into Heating Flues. Acme's battery has 29 Flues arranged in the Wilputte Four-Divided System in which Outer Flues on each end of the heating wall burn and the waste products exit through The Inner Flues. After 20 minutes the flow Reverses and the inner flues now burn.

During coking, coal is distilled and the gases exit up the Standpipe into the Gooseneck (16) and through the inner Gooseneck (16a) and Damper Pan (17) into the Collecting Main (18). Flushing Liquor - condensate from previous coking cycles - is sprayed onto the Pullman valve and into the collecting main in order to cool the Raw Gas down to about 85°C. The Gooseneck has a Standpipe Cap (19) above the Standpipe to allow venting of oven while the oven is isolated from the Collecting Main during the pushing part of the Carbonizing Cycle.

In order to be more heat effective, the heating system is regenerative, i.e., heat from the waste gas on the burning cycle is passed through regenerators to be stored and then passed back to incoming combustion air during the burning cycle. Outer Regenerators (20) are associated with Outer Flues

and Inner Regenerators (21) with Inner Flues separated by Division Wall (22). The regenerators are located below the ovens. Each regenerator is filled with slotted tiles to provide good contact with waste gas or air and improve storage ability. Air and waste gas are led to and from the regenerators via Bus Flues (23) located directly under the regenerators. The Bus Flues are connected to the Air Waste Heat Box (24). Air enters from the basement through an Air Box (25) and is controlled by an Air Lid. Waste gas leaves via the Waste Heat Mushroom (26) past the Waste Heat Butterfly (27) into the Waste Gas Canal (28) to the Stack Canal past the Stack Damper to the Oven Stack.

The interior of the heating system can only be observed through the Peep Holes in the Regenerator Face at Bench Level and by removing Flue Caps on the Battery Top.

There is an Air /Waste Gas Port in the bottom of each flue, a High or Low Burner for fuel entry and a Slide Brick at the top to control flows. Waste gas is collected from each group of flues in the Horizontal Flue.

Fuel - Coke Oven Gas from previous charges is distributed to the flues from the basement area. Clean coke oven gas from the by-product passes through the Coke Oven Gas Preheater to raise its temperature above the dew point. Thence, to the C.O. Gas Pressure Regulator Butterfly into the Fuel Gas Main (29). Each heating wall is provided with an Inner and Outer Distribution Header (30) connected to the fuel gas main by a Riser Pipe that contains a Reversing Valve and an Emergency Cock.

From the header the C.O. gas passes through a Metering Pin and Orifice assembly up a Riser into the cross battery Pillar Wall and into the flue.

The whole heating system is interconnected mechanically to the Reversing Machine in the Control Room. This machine repositions all fuel, air and waste heat valves for each burning cycle. (inner or outer zones)

In the control room means are provided to alter Fuel Flows and Stack Draft and a Timer to control the Reversing Machine. In addition various operating information is displayed and recorded e.g. Stack Draft & Stack Temp; C.O. Gas Flow, Supply Pressure, C.O. Gas Temperature and F. G. Header Pressure; Basement Pressure, etc.

The Pushing/Charging part of the operation is accomplished by four machines - Pusher Machine, Door Machine, Larry or Coal Charging Car and Quenching Car.

The Pusher Machine has three functions:

- (a) Remove and replace oven doors and clean jambs.
- (b) Push the carbonized coal - now coke - out of the oven , and
- (c) Level the next coal charge.

The Door Machine has two functions:

- (a) Remove and replace oven doors and clean jambs.
- (b) Guide the coke through the Coke guide into the quenching or Hot Car.

The Quenching Car transports the coke to the Quenching Station in which water is sprayed onto the coke in order to cool it, and then to the coke to the Coke Wharf.

The battery is mostly a silica brick structure. It is restrained in place by Longitudinal Tie Rods from end to end and by a two Cross Tie Rods between each oven. Pressure to the Heating Wall ends is applied to the brickwork by the Buckstays located at the end of each heating wall.

Oven machines travel on a R.R. Tracks: Located at grade for the Pusher and Quenching Car; located on the he coke side bench for the Door Machine; and on the battery top for the Larry Car.

Emissions during pushing are collected by a hood and duct system that travels along the coke side of the Battery called the Pushing Emission Control (H.K.C.) System. A fan pulls the collected material to a scrubber in order to capture the emissions.

Emissions during charging are controlled by a Stage Charge; (one hopper at a time). Drafting from the Pusher Side through a Jumper Pipe to an oven 1 space away and on the coke side by the Standpipe Aspirator Jet; tight connections at the charging holes and a Smoke Sleeve on the Leveler Bar.

This list of terms is not intended to cover all of the names of the various parts of unit. The small numbers on the underlined names can be found on the battery sections.

In addition there are some operating variables that have distinctive names.

Flue Temp is the temperature of the top of the burner block in the flue bottom.

Top Temp is the temp of the slide brick at the top of the flue.

Span Temp is the list and average of the Flue Temps. of each wall of four selected flues on each wall for the length of the battery.

Crosswall Temp is the Flue Temp of each row of flues and can be both bottom and top.

Pushing Schedule is the time that each oven will be pushed.

Gross Coking Time is the time from push to push for an oven.

Net Coking Time is the time from charge to push for an oven.

Operating Delay is the time that the push of a coked out oven(s) is late in being pushed as a result of machinery problems, etc.

Coking Delay is the time that the pushing operation must stop as a result of the charge being

Green - i.e., insufficiently coked.

Pushing is the actual push out of the coke.

Charging is the filling of the oven with coal.

**Leveling** is the use of the Leveler bar to provide a clear gas passage across the oven to the standpipe.

**Dragback** refers to the coke carried back to the pusher bench during the retraction of the **Pusher Ram**.

**Door Fire** is the flame resulting from ignition of raw gas leaking from a poorly sealed oven door.

**Roof or Wall Carbon** refers to carbon deposits on the oven roof or walls as a result of raw gas cracking in the hot oven.

**Pushing Ahead** means pushing out the coke in the oven ahead of the scheduled time.

**Sticker** refers to a coke charge that cannot be pushed.

**Hard Push** occurs when the power to push out the oven is excessive.

**Jamb Leak or Charging Hole Leak** is the leakage of raw oven gas into the flue system.