

# WESGEN OVERVIEW

## 4343/6343



# WESMAN

## COMBUSTION EQUIPMENT

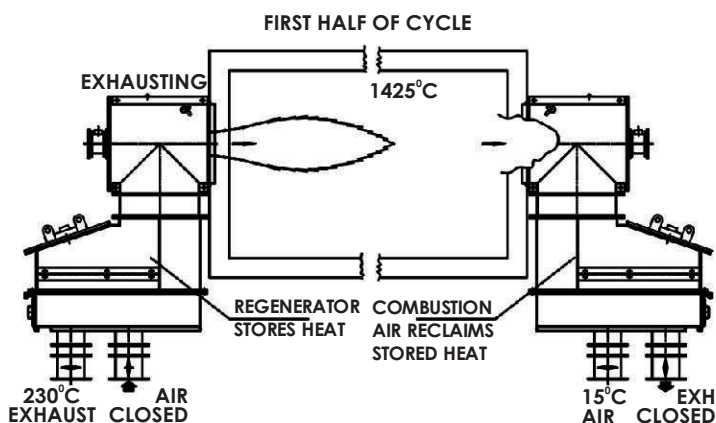
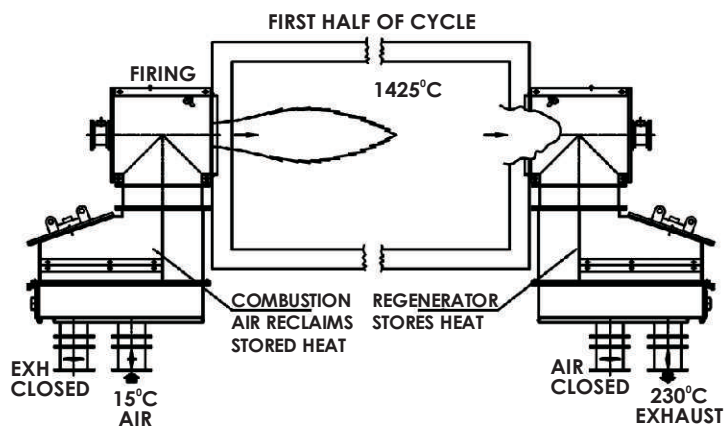
**WESGEN REGENERATIVE BURNERS** recover waste heat from furnace exhaust gases and preheat combustion air, to significantly increase efficiency over conventional burners or burners with recuperators. NOx emissions are extremely low, even when compared with cold air burners. WESGEN regenerators are heat and corrosion resistant and tolerate hostile environments that can destroy recuperators.

WESGEN burners save significant amounts of fuel when applied to a variety of high temperature furnaces. The higher the process temperature, the higher the potential fuel saving when compared with conventional burners.

### TYPICAL APPLICATIONS

- Aluminium Melter
- Heat Treat Furnace
- Steel Reheat Furnace
- Glass Melter
- Steel Forage Furnace

| FURNACE<br>TEMP F | AIR<br>PREHEAT<br>TEMP F<br>(AVERAGE) | WASTE GAS<br>TEMP F<br>AT 90 % BED<br>EXTRACTION | COMBUSTION<br>EFFICIENCY %<br>(AVERAGE)% | COMBUSTION<br>EFFICIENCY %<br>(COLD AIR) | FUEL<br>SAVINGS<br>OVER<br>COLD AIR %<br>OPERATION |
|-------------------|---------------------------------------|--|--|--|--|
| 1470              | 1220                                  | 270  | 82                                       | 57                                       | 30   |
| 1830              | 1560                                  | 330  | 79                                       | 47                                       | 42   |
| 2190              | 1900                                  | 370  | 77                                       | 37                                       | 52   |
| 2640              | 2280                                  | 460  | 74                                       | 23                                       | 69   |



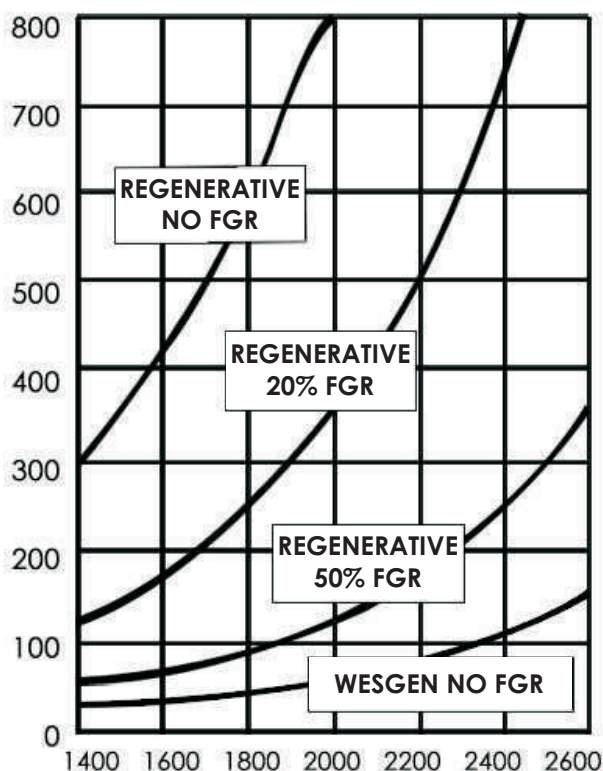
**REGENERATIVE FIRING:** Each WESGEN has a compact heat storage regenerator containing ceramic balls. Operating in pairs, one burner fires while the other burner exhausts. Combustion air is preheated in the regenerator of the firing burner and furnace gas gives up heat to the regenerator in the exhausting burner. Burner Operations are switched within an application specific time period. The burner that was firing, now exhausts; and the burner that was exhausting, now fires. Operation continues cycling between firing and exhausting.

**LOW NOx EMISSIONS:** WESGEN uses Low NOx Injection technology offered by Wesman Thermal is truly the "Best Available Technology" for regenerative burners. To minimize NOx formation, two different air-fuel mixing techniques are used depending on furnace temperature. WESGEN is operated as a conventional regenerative high velocity burner when furnace temperature is below 1300°F (700°C).

Above 1300°F fuel is switched to strategically placed nozzles adjacent to the burner tunnel port. Low NOx Injection of fuel (LNI) into the furnace chamber allows inspiration of combustion products into the air and fuel streams reducing the rate and temperature of the combustion reaction, thus significantly suppressing the formation of NOx. This "in-furnace" direct NOx control method maintains highest potential efficiency. There is no efficiency loss as with fuel gas recirculation (FGR) that is frequently used to reduce NOx emission from regenerative burners.

FGR involves adding furnace exhaust gas to combustion air where the inert constituents reduce the rate and temperature of the combustion reaction. If added after the combustion air flows through the regenerator, FGR can reduce system thermal efficiency up to 15%. If added prior to regenerator system, efficiency can be maintained, but larger regenerators are required to accept the additional volume. Other regenerative burners use up to 50% FGR. A very practical advantage of WESGEN low NOx technology is the simplicity of construction of the burner and tile. Burners that use air staging to reduce NOx require internal refractory baffles that the WESGEN design eliminates.

**CONTROLS:** WESGEN operates with the same controls (air/fuel ratio, furnace pressure, and flame detection) used with conventional burners. Air/fuel ratio is typically controlled with differential pressures from an orifice plate in the combustion air line and a flow-based fuel rate control system-either regulator or electronic.



Typically, about 80% of the furnace gases are exhausted through the regenerators. Remaining 20% passes through a pressure controlled furnace flue. Exhaust flow through the regenerators is controlled by temperature of the exhaust gases leaving the regenerator. If temperature is too low, the exhaust flow through the regenerator is increased. Furnace pressure is controlled with the flue damper. Logic links from the furnace pressure control to burner exhaust system prevent excessive pull through burners which would result in negative furnace pressure.

Each burner's flame supervision uses ultraviolet flame detectors on both pilot and main flames connected to a single flame relay. By switching detector signals when burners alternate firing, flame relays monitor main flame of firing burner and pilot flame of exhausting burner.

**CONSTRUCTION FEATURES:** WESGEN has enhanced rugged construction. Burner and regenerator are separate modules. Angled transitions are available to change burner firing angles relative to generator. Burner and regenerator can be rotated for ease of installation. Other improvements include nozzle-mix pilot with flanged mounting.

WESGEN is insensitive towards furnace operating environments that can quickly destroy recuperators. There are no boundaries between air and waste gas streams to be maintained against leakage. Materials of construction have been chosen to withstand the corrosive effects of exhaust gas borne volatiles. Regenerators can be easily cleaned of dirt or condensed fouling by dropping the bed support plate and removing bed material through the rear hatch. Clean heat transfer material can be replaced through the top hatch. A regenerator can be cleaned while the other burner in the pair fires direct (a non reversing mode) to maintain furnace operation.