

## Energy Efficiency of the New I.C.F. & WELKO Kilns

When designing its machinery, I.C.F. & WELKO/IT always focuses on reducing energy consumption and environmental impact to a minimum, in order to manufacture truly “environmental friendly” machines. This philosophy is at the basis of the development and construction of the latest systems for firing ceramic tile, especially designed to guarantee a low consumption and the maximum production output.



**Fig.** The new WFR kiln for firing large-format tiles

(Source: I.C.F. & WELKO)

The WFR series E range of kilns has been expanded to include the 3250 mm and 3600 mm width models that increase the production rate of 90 cm x 90 cm and 60 cm x 60 cm sizes.

The entire series has been improved with the new 50 000 kcal/h burner, with the possibility to equip the kiln with a device for modulating combustion air and with the ZERO R.I.S.K. system that detects roller breakage and allows for replacement without having to remove mechanical or electrical components.

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The new kilns guarantee not only reduced consumption, but also a high performance, production rate, quality and versatility, all of which are essential factors given the growing market demand for new products and large and medium-large sizes with variable thicknesses.

The energy consumed to produce the new size (up to 1,6 m x 4,8 m with thicknesses from 6 mm to max. 30 mm) at temperatures of more than 1200 °C stands at around 390 kcal/kg and 0,015 kWh/kg.

Particular care has been paid towards thermal insulation of the kiln walls and to design of the warm air recovery and combustion air distribution circuits, which have been appropriately insulated to reduce heat dispersion to a minimum. Combustion air is in fact integrated with warm air coming from the cooling zone so that air at a

temperature of over 200 °C can be used for combustion.

Furthermore, while maintaining control over volumes, hot air is recovered at high temperatures for reuse in the production cycle without interfering with process control requirements.

The warm air recovery system allows for air coming from the cooling zone to be conveyed to the dryers installed along the line. The use of intensive combustion burners together with recovered hot air for combustion not only lowers consumptions but also reduces the air volumes involved and consequently emissions. The use of frequency inverters for motor control optimizes electricity consumption and enables the machine to use only the energy actually required for the process.

As for quality and flexibility, pressure control in the channel in both the firing and cooling zones allows the multiple firing and cooling zones allows the multiple firing curves for the various sizes and thicknesses to be managed with complete repeatability.

This is a crucial factor: given the versatility required to produce large sizes, it is no longer sufficient to control the temperature as in traditional kilns but it is above all necessary to control the volumes and their flow in the channel (pre-heating, firing and cooling). Particularly innovative solutions have been adopted to control the curve at the final stage of firing, where different heating and cooling requirements have to be combined according to the cycles and sizes.

Overall, the system satisfies technical and production requirements while meeting the need for quality, flexibility and reduced levels of consumption and pollution.

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