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IMPIANTI E MACCHINE PER L'INDUSTRIA DEL CAFFE' E PRODOTTI AFFINI

EMISSIONS AND AIR TREATMENT - OVERALL DESCRIPTION

RELEASE POINT <E1> – ROASTING FUMES AND COOLING

The emission abatement system consists of a high-efficiency cyclone equipped with a rotary valve for extracting dust and particulate matter from the gas stream. All roasting fumes are conveyed from the cyclone to the afterburner, where they are treated at high temperatures ranging from 600 up to 700 °C.

The emission time corresponds to the roasting cycle duration, typically between 13 and 18 minutes per cycle. The specific duration depends on the customer's roasting profiles and coffee blends. The flow rate of the roasting fumes varies depending on the working position of the Vortex valve.

At the end of the roasting process, **the machine has the option to cool the coffee before discharge into the cooling tray**. During this phase, the Vortex valve is set to 0% (i.e., fully open to cold air) for a duration defined by the recipe. **This type of abatement significantly improves the level of odorous emissions and almost completely eliminates visible smoke from chimney E2**. The abatement system used during this brief process is the same as in the roasting phase: a cyclone followed by the afterburner.

The roasting machine is equipped with a non-resettable hour counter. The burner used in the process is of the modulating type.

Downstream of the combustion chamber, a continuous temperature sensor is installed. This temperature value is sent to the PLC and stored in the HMI memory.

There is no bypass for the afterburner, nor are there any pollutant flow regulators, as the entire flow is directed to the afterburner, which maintains an air-fuel ratio based on the set operating temperature.

RELEASE POINT <E2> – COOLING AND DESTONING AIRFLOW

Emission point E2 is used for two different processes:

1. The **cooling process flow rate** is fixed; the emission abatement system consists of a high-efficiency cyclone that separates the dust generated during the cooling process.

The discharge is direct, as the cooling air is drawn from the ambient environment and expelled with only a minimal temperature difference. Emission duration is typically around 4–5 minutes per cycle.

2. The **destoner airflow** has an adjustable flow-rate which varies according to process requirements. The same cyclone is also used to treat the process air from the destoning phase. As air passes through the coffee, it may carry residual chaff or dust, which is then removed by the cyclone.

The discharge is direct, as this air is drawn from the ambient environment by a fan, used to transport material, and expelled outdoors without any temperature increase. Emission duration is typically around 4–5 minutes per cycle.

RM120 Daily Emissions Qty (4 roasts per hour, 24h day)

Emission Point	Process	Pollutant	Pollutant concentration [mg/Nm ³]	Mass flow rate [kg/h]	Daily flow rate [kg/day]
E1	Roasting process & cooling	Particles	3	0,009	0,216
		Oxides of Nitrogen	75	0,225	5,400
		Carbon Monoxide (CO)	250	0,75	18,00
		VOCs	15	0,045	1,080
E2	Cooling Process & destoning	Particles	8	0,048	1,152

The indicated concentrations refer to typical use of 4 full-load cycles per hour with medium roasting (>51 points on the Agron scale). The data reported above are indicative and may vary depending on the roasting recipes, machine settings and the type of coffee roasted.

RM60 Daily Emissions Qty (4 roasts per hour, 24h day)

Emission Point	Process	Pollutant	Pollutant concentration [mg/Nm ³]	Mass flow rate [kg/h]	Daily flow rate [kg/day]
E1	Roasting process & cooling	Particles	3	0,0075	0,18
		Oxides of Nitrogen	100	0,25	6
		Carbon Monoxide (CO)	250	0,625	15
		VOCs	15	0,0375	0,9
E2	Cooling Process & destoning	Particles	8	0,02	0,48

The indicated concentrations refer to typical use of 4 full-load cycles per hour with medium roasting (>51 points on the Agron scale). The data reported above are indicative and may vary depending on the roasting recipes, machine settings and the type of coffee roasted.

Dust Collector

Emission Point	Process	Pollutant	Pollutant concentration [mg/Nm ³]
E3	Cooling Process & destoning	Particles	<10

I.M.F. S.r.l