

Current thermal processes for the treatment of metals contaminated with impurities, especially with high contents of organic compounds, present problems in obtaining the metal fraction: the metal fraction oxidises with increasing pro-

oxide layer forms on the surface, which results in metal loss and metal yield loss (loss of material as high as 20%, with the temperature up, the higher the losses). Conventional and secondary methods based on scrap melting are used by secondary metal recyclers, in terms of energy consumption and CO<sub>2</sub> emissions. Induction protective atmosphere can also be used, but the higher cost of electricity compared to traditional furnaces are less used [3]. In Vortex melting, it consists of a vortex that is generated by mechanical or electromagnetic device. In this vortex and due to the speed and movement of the vortex, chips are immersed in the melt and they are melted in a short period of time. It presents problems for melting lacquered metal containing plastics, unless a protective atmosphere is employed. The

tra Vibración SL, Spain) was employed. Carbon wt.% was determined with an Automatic Analyzer, model CS-400,

At 300°C an oxidation process starts, since it is not possible to reduce the temperature afterwards. It was so defined a maximum temperature at the oxidant stage of 300°C. Seven tests were performed to determine the maximum

treatment capacity of the furnace in its oxidising atmosphere treatment stage and the effect of the inert atmosphere treatment stage in the designed pilot plant. Different feeding rates and process parameters were defined at the semi-industrial trials, as shown in Tab. 2.

Parameter	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Feed rate (kg/h)	60	90	120	90	120	120	120
Oxidant temperature (°C)	450	450	450	300	300	300	300
Residence time (min)	5	5	5	15	30	30	30
Product weight (kg)	380	440	480	135	135	135	135
Inert furnace (kg)	20	20	20	-	-	-	450
Residence time (min)	4	4	4	-	-	-	15
C (wt.%)	0.28±0.2	0.34±0.1	0.39±0.1	4.77±0.4	4.33±0.9	3.98±0.2	1.03±0.1
O (wt.%)	0.28±0.2	0.34±0.1	0.39±0.1	4.77±0.4	4.33±0.9	3.98±0.2	1.03±0.1





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