

Publication

EP 0572780 A3 19940427

Application

EP 93105667 A 19930406

Priority

DE 4211457 A 19920406

Abstract (en)

[origin: EP0572780A2] The invention relates to a process and to a device for thermal cleaning of metal strip surfaces during heating in continuous annealing lines, in particular for removing oil-containing coatings, while dispensing with alkaline and acidic cleaning solutions, chlorinated hydrocarbons, caustic alkalis and the like. The oil film is caused to evaporate by blowing with a hot hydrogen-nitrogen gas mixture, and the oil vapours are converted to CO and CO₂ by stoichiometrically adequate feeding of steam, so that the carburisation of the low-carbon annealing material, otherwise unavoidable in view of the existing high carbon potential, is avoided. By means of a circulation fan and of nozzles directed onto the strip surface, an impact flow is generated under which the vapour pressure of the oil film increases proportionally to the heating rate and the evaporating hydrocarbon compounds react with the steam fed in accordance with the heterogeneous and homogeneous water gas equilibrium. In this case, the circumstance is exploited that the blanketing gas temperature is already very high, but the temperature of the strip running in is still comparatively low. Because of this, and owing to the short residence time of the strip in the cleaning section, oxidation reactions on the strip surface and diffusion processes in the strip material are not yet activated. The evaporating oil film, whose maximum boiling point is not reached until just before the exit from the cleaning section, provides additional protection. The boiling curve and the distribution of the evaporation rate over the temperature are known, so that strip heating, blanketing gas throughput and circulation can be matched to the boiling properties of the oil residue. Pretreatment of the strip in tristream degreasing units or electrolytic degreasing units or other precautions against carburisation of the annealing material can be dispensed with; an appropriate blanketing gas circulation ensures that no carbon epitaxy occurs in the furnace chamber. The process is designed for the lowest possible pollution of the environment and is particularly suitable for the continuous heat treatment of thin strip cross-sections of ferrous materials such as fine sheet and very fine sheet, low-carbon grain-oriented and non-grain-oriented magnetic steel sheets, stainless steel sheets, strip of iron/nickel alloys and of non-ferrous metals such as alloys of titanium, copper, zinc and aluminium, whenever residues of fabrication aids such as oil and emulsion must be removed before annealing. After the evaporation of the oil film, pigments such as abraded metal and dust are blown off from the strip surface by the gas jet, and this counteracts the formation of pimples on the furnace support rollers and the formation of scratches on the underside of the strip. <IMAGE>

IPC 1-7

C23G 5/06; **C23G 5/00**; **B08B 3/02**

IPC 8 full level

B08B 3/02 (2006.01); **B21B 45/02** (2006.01); **C23G 5/00** (2006.01); **C23G 5/06** (2006.01)

CPC (source: EP)

B08B 3/022 (2013.01); **B21B 45/0284** (2013.01); **C23G 5/00** (2013.01)

Citation (search report)

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Designated contracting state (EPC)

BE DE FR GB IT SE

DOCDB simple family (publication)

EP 0572780 A2 19931208; **EP 0572780 A3 19940427**; **EP 0572780 B1 19950726**; DE 59300400 D1 19950831

DOCDB simple family (application)

EP 93105667 A 19930406; DE 59300400 T 19930406