

Title (en)
Method for cooling a metal band circulating in a cooling section of a continuous thermal treatment line, and installation for implementing said method

Title (de)
Verfahren zur Kühlung eines umlaufenden Metallbands in einem Kühlabschnitt einer kontinuierlichen Wärmebehandlungsanlage, und Anlage zur Durchführung dieses Verfahrens

Title (fr)
Procédé de refroidissement d'une bande métallique circulant dans une section de refroidissement d'une ligne de traitement thermique en continu, et installation de mise en oeuvre dudit procédé

Publication
EP 2226400 B1 20170329 (FR)

Application
EP 10290086 A 20100219

Priority
FR 0900924 A 20090302

Abstract (en)
[origin: EP2226400A1] The process of cooling a liquid-metal strip (1) circulating in a cooling section (4) of a continuous heat treatment line, comprises projecting a refrigerant medium composed of a body having phase change on the surface of the strip in the cooling section of which the passage in gas phase is carried out at a temperature which is less than the temperature of the strip and without oxidizing the strip so that an energy exchange is carried out in the part of an endothermic process with a phase change of the body. The refrigerant medium is present as solid flakes having a triple point. The process of cooling a liquid-metal strip (1) circulating in a cooling section (4) of a continuous heat treatment line, comprises projecting a refrigerant medium composed of a body having phase change on the surface of the strip in the cooling section of which the passage in gas phase is carried out at a temperature which is less than the temperature of the strip and without oxidizing the strip so that an energy exchange is carried out in the part of an endothermic process with a phase change of the body. The refrigerant medium is present as solid flakes having a triple point, which is greater than the surrounding temperature, and is a fluid (80 vol.%) in the form of fine droplets having a normal boiling temperature which is greater than the external temperature. The endothermic process is carried out with sublimation of the refrigerant medium at the level of the surface of the cooling strip, and evaporation of the refrigerant medium at the surface of the cooling strip. The normal sublimation temperature or boiling of the refrigerant medium is close to the external surrounding temperature. The refrigerant medium is recondensed at a pressure close to the atmospheric pressure. The solid sublimed refrigerant or evaporated refrigerant fluid is recovered in downstream of the cooling section to be recirculated by undergoing a condensation process and separating after which an incondensable fraction is isolated. The fraction is controlled to adjust the temperature for condensing the solid or refrigerant fluid to minimize the energy consumption. The phase change fluid and refrigerant fluid are pentane. The refrigerant fluid further comprises a pentane mixture or hexane having 80/20 mol.%. The atmosphere in the cooling section is isolated from the surrounding temperature at the inlet and outlet of the strip to be cooled to allow a permanent control of the refrigerant medium during the endothermic process. The mass flow of refrigerant medium projected on the surface of the strip is controlled to remain below a predetermined limit ensuring that the total refrigerant medium is impacted by the phase change. An independent claim is included for an installation for cooling a liquid-metal strip circulating in a cooling section of a continuous heat treatment line.

IPC 8 full level
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