Influence of surface characteristics of tinplate for food cans on adhesion properties of coating

Funded under: ECSC-STEEL C

Abstract

The overall objective of this collaborative project was to develop tinplate grades with new passivation films suitable for increasing the adhesion of the new low-pollution lacquers. The project has been divided into two parts: study and selection of the new passivation films by laboratory and industrial tests and validation of the systems selected by means of can production and pack test.

Passivated and lacquered samples were produced and analysed in a laboratory. A particular passivation cell was constructed to produce suitable tinplate passivated samples. Next, industrial passivation tests were carried out on the basis of the results obtained in the lab tests, using the passivation conditions that had given the best performances in terms of lacquer adhesion. Accelerated corrosion testing, electrochemical testing and surface analysis were used to characterise the chromium layer formed during the passivation trials. Physical and electrochemical tests were used to assess lacquer adhesion. Studies of both the kinetics of the cure/polymerisation process of the lacquers and IR spectra were performed. During the pack tests gross weight, internal vacuum and pH were determined.

The passivation parameters that led to a good adhesion between the tinplate grades studied and the new types of environmentally friendly lacquers were identified. The main passivation parameters were pH = 5.5 and q = 4.5 C/dm(2) together with the new-formulation epoxyphenolic lacquer (at low VOC and BADGE-free) and pH = 2.5, q = 0 C/dm(2) and q = 3.0 C/dm(2) with the UV lacquers.

Additional information

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Last updated on 2004-01-05
Retrieved on 2020-01-13


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