

# Comparing Examination of an Acid Gumming Solution and VEGRA Gumming Solution Neutral 2091 with Regard to their Corrosion Behaviour against Nickel

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## 1.) Task

Strict test standards are applied for fountain solutions and cleaning agents regarding their corrosion behaviour towards metallic materials like e.g. nickel, in order to achieve the approval for their use on printing presses.

The electro chemical examinations comprised further printing chemicals, like e.g. gumming solutions for plates which had so far received only little attention but which also get in contact with nickel-plated surfaces during application.

## 2.) Summary

We diluted the **acid gumming solution** of a competitor to application concentration and then produced the current density potential diagrams according to FOGRA and to Dr. Neubert (WIFAG).

The resulting corrosion potentials are alarming. With rising voltage the current density increases constantly which resulted in uncovering of the nickel crystalline structure when measured according to FOGRA and in extensive pitting when measured according to Dr. Neubert's method.

The steep and constant increase of the corrosion current to  $5000 \mu\text{A}/\text{cm}^2$  (absolute limit for fountain solutions:  $20 \mu\text{A}/\text{cm}^2$ ) already starts in the neutral range around 0 mV which corresponds with the standstill of the press.

Besides, with a pH of 3.5 and a conductivity of  $3100 \mu\text{S}/\text{cm}$  in application concentration the product does not meet with the maintenance instructions of the machine manufacturers.

**VEGRA Gumming Solution Neutral 2091** (on basis of gum arabic) showed an absolutely neutral behaviour in both measurements. When carrying out the test according to FOGRA the determined limit values were met without any problems, the curve corresponds to the one of a certified fountain solution.

The measuring method according to Dr. Neubert shows that the product can be valued as uncritical in the complete field. VEGRA Gumming Solution 2091 has a neutral pH of approx. 7 and a conductivity of  $2650 \mu\text{S}/\text{cm}$ .

To summarize, we suggest to be careful when using acid gumming solutions. We would recommend to change to VEGRA Gum Solution 2091.

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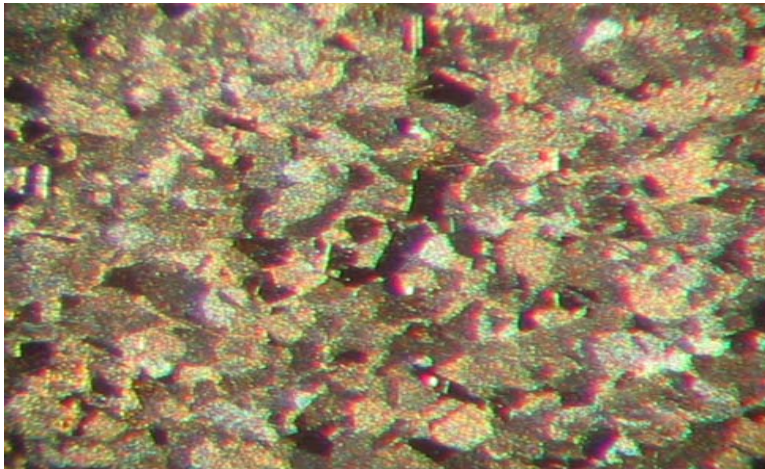
### regarding 3.1.) FOGRA diagram

The curve of the acid gumming solution indicates strong corrosion against rolled nickel 2.4060. We could determine a constant and direct increase of the corrosion current density. The test body showed strong corrosion on the previously polished surface; nickel crystalline structures were uncovered. When using VEGRA Gumming Solution 2091, the determined limit values were met without problems (curve can be compared with a certified fountain solution; the nickel surface was unchanged).

### regarding 3.2.) Dr. Neubert diagram

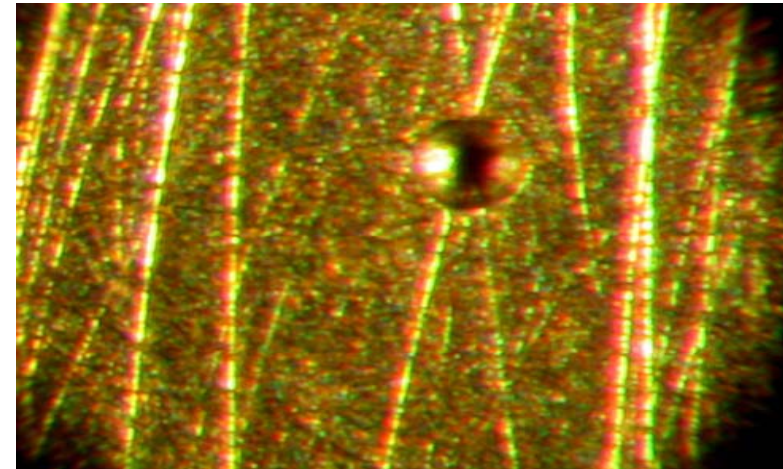
The curves for both gumming solutions were comparative in the beginning but the break-through potential of the acid gumming solution was already received in non-operative condition which explains the strong corrosive characteristic against the nickel surface. In the area to be tested (up to 600 mV) VEGRA Gumming Solution 2091 is neutral regarding corrosion.

#### 3.1.1.) light-microscopy evaluation of the surface of the rolled nickel 2.4060 (FOGRA)



on the previously polished surface crystalline structures can be observed due to the strong corrosion by the acid gumming solution

#### 3.2.1.) light-microscopy evaluation of the surface of the Watt'sche nickel (Dr. Neubert)

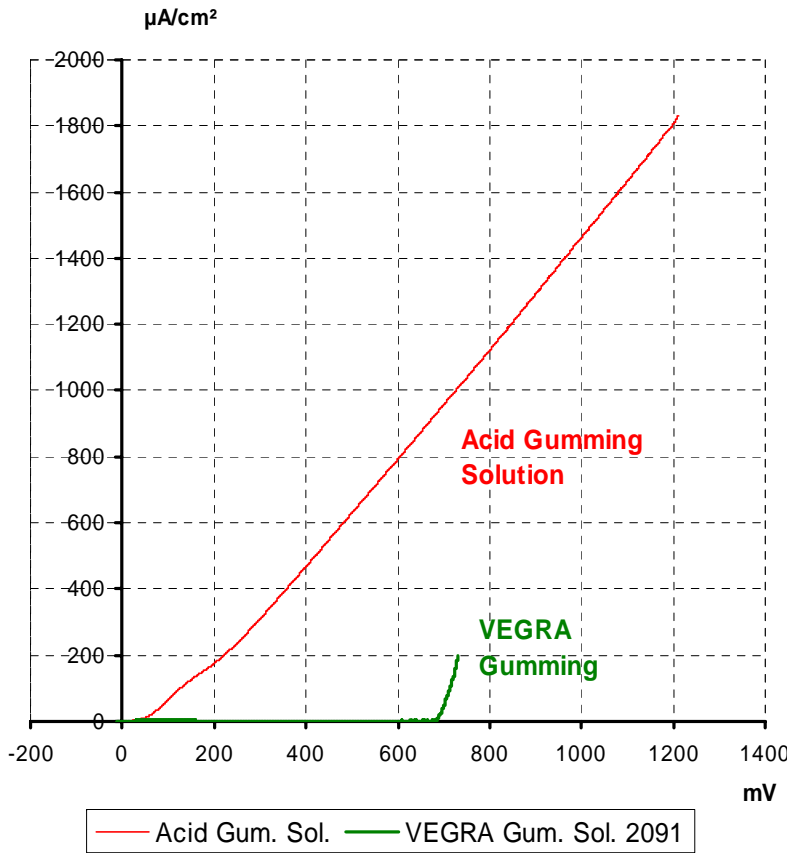


besides the traces by the grinding with 1200 SiC paper, extensive pitting – caused by the acid gumming solution - can be observed



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3.1.) Current Density Potential Diagram according to FOGRA



3.2.) Current Density Potential Diagram according to Dr. Neubert

