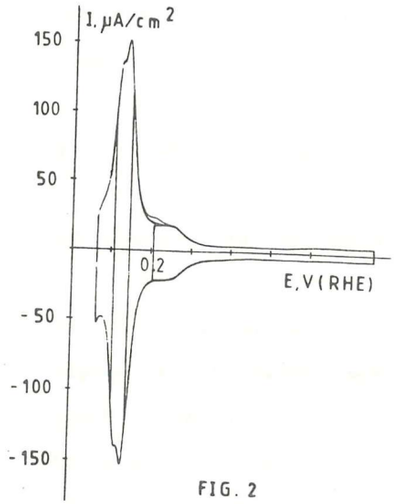

FIG. 2

1M H_3PO_4. Differents amounts of H coverage.

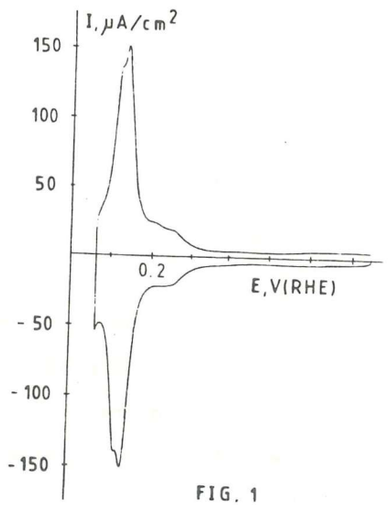

FIG. 1

1M H_3PO_4. Sweeps between 0.750 V and 0.065 V.

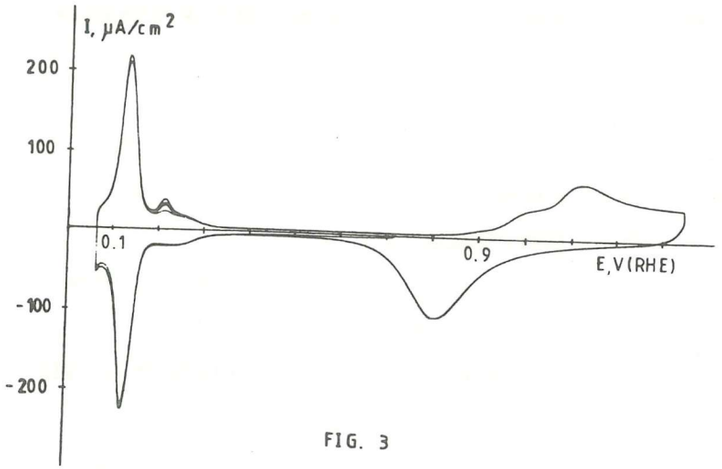

FIG. 3

1M H_3FO_4. Evolution of the voltammogram when the upper limitis 1.35 V.

HIGH TEMPERATURE BEHAVIOUR OF HOT DIP (Zn and Al) STEEL

P. Molera
Dpt. Enginyería Química i Metal.lúrgia. Universitat Barcelona
c/ Martí Franqués, 1. 08028 Barcelona. SPAIN.

ABSTRACT.

The corrosion behaviour of hot dip (Zn and Al) steel parts heated at diferent temperatures and for varying periods of times has been investigated. Mathematic-statistical treatment of results obtained has been applied. This work show the better protection of steel at high temperature with the aluminized in front of galvanized.

INTRODUCTION.

It is well know that hot dip aluminized steel is more resistent that galvanized [1] steel to environmental corrosion [2]. The objective of the present work is prove the corrosion resistance at high temperature of this protection's system.

EXPERIMENTAL PART.

The raw material used are specimens of ferritic steel with a 0,04 % carbon. The aluminium contained 4,1 % silican. The flux bath consisted of a mixture of sodium chloride, potassium chloride and cryolite in this proportion of 2:2:1 by weight. The galvanized contained inmexed zinc.

The aluminized specimens were subjected to the following operations: degreasing, washing, pickling, washing, drying, fluxing, aluminium bath, dripping and cooling. First they were immersed in a sodium hydroxide bath at 485ºC for 15 minutes. Then they were washed and placed in a 10% sulphuric acid solution containing thiourea at 70-80ºC for 15 minutes. Once the test specimens were washed and dry, they were placed in a fused salts bath where they were kept at 700ºC for 10-15 minutes. Next they were immersed in the liquid aluminium, which was kept at 700-750ºC. After that the surplus aluminium was removed from the test specimens by reimmersion in the fusing bath or by centrifuging. Then they were cooled in water.

Once the test specimens had been aluminized and galvanized, they where exposed in a electric heat-treatment furnace (AIM model 96) with air atmosphere. The specimens were weighed before introduction in the furnace at prefixed temperature and after scaling and drying process.

Every specimen was scaled with a volume of 60 ml. aprox. scaling dissolution, shaken with a spatula for five minutes. The washing was carried out with distilled water (80 ml aprox.), twice consecutively, shaken with a spatula and in different glasses. Finally, the drying was carried out in a stove at 150ºC for 1 hour, following the method proposed by D.ITZMAK and S.MARUSH [3]. The weight of the part, scaled and dried, was obteined, for every one of them, eight minutes after coming out them of the stove.

RESULTS AND DISCUSSION.

Figs. 1-3 represent the loss of weight by unit of surface against time at three differents temperatures (400, 450 and 500ºC) for galvanized steel specimens.

The graphics has been adjusted by a polynomic regression order 3.

$Y = Ax^3 + Bx^2 + Cx + D$, with Y= increase of weight/ surface (mg/cm^2), X= time (hours).

T=400ºC $y=3.59E-9x^3-8.23E-6x^2+6.36E-3x+0.46$ ($R=0.965$; $R^2=0.932$)
T=450ºC $y=4.52E-9x^3-1.05E-5x^2+8.28E-3x+0.68$ ($R=0.966$; $R^2=0.933$)
T=500ºC $y=5.05E-9x^3-1.19E-5x^2+1.02E-2x+1.03$ ($R=0.967$; $R^2=0.936$)

Similary the steel specimen with Al at temperature 500ºC, 600ºC, 700ºC y 800ºC with the following results:

T=500º $y= 7.35E-11x^3-2.91E-7x^2+3.9E-4x-8.73E-3$ ($R=0.995$;$R^2=0.990$)
T=600º $y=-1.79E-10x^3+0.37E-8x^2+9.37E-4x-2.35E-2$($R=0.999$;$R^2=0.998$)
T=700º $y= 9.04E-10x^3-3.74E-6x^2+5.82E-3x+4.83E-2$($R=0.997$;$R^2=0.994$)
T=800º $y= 7.11E-9x^3-7.37E-6x^2+1.44E-2x+0.227$ ($R=0.999$;$R^2=0.998$)

This results has been show in figures 4-7. The fig. 8 represent conjointly behaviours the hot dip (Zn and Al) steel at 500ºC.

Micrograph of the aluminized low-carbon steel is shown in figure 9.

CONCLUSION.

The experimemtal results of the corrosion resistance at high temperatures of the plated that we have study are ajusted at polynomial order 3.

This work shows the better protection of steel with the aluminized in front to galvanized.

The steel galvanized present a behavior practically parabolic at 800 hours of exposing. At longer times, the variations of temperature give a appreciable alteration of the slope.

The steel plated with aluminium present the inflexion at higther time (1400 hours) and a inclination to linear conduct with the temperature increase is observed.

ACKNOWLEDGEMENT.

The author wish to express your gratitude to CIRIT de la Generalitat de Catalunya for "beca" to Jordi Salas.

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Fig.1

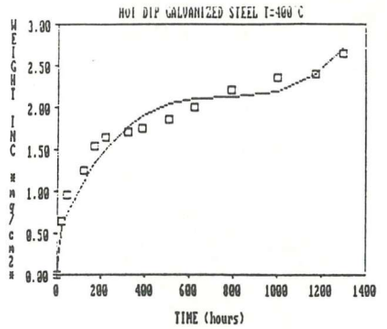

Fig.2

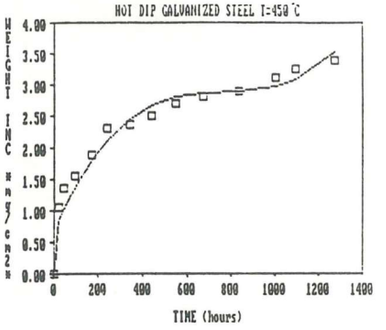

Fig.3

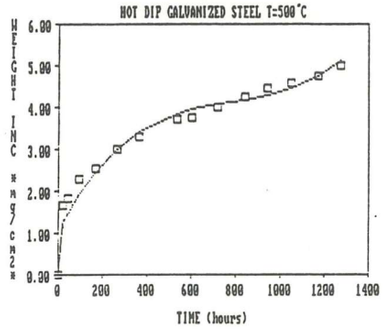

Fig.4

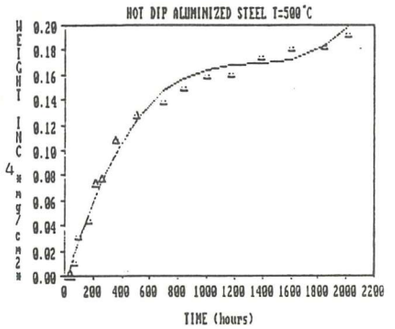

Fig.5

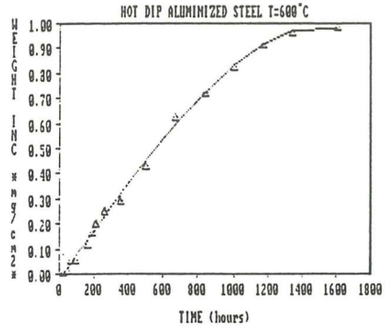

Fig.6

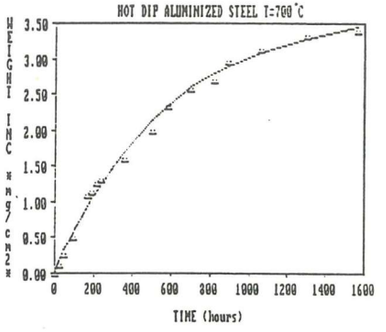

Fig.7

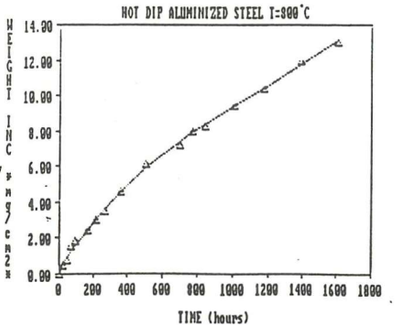

Fig.8

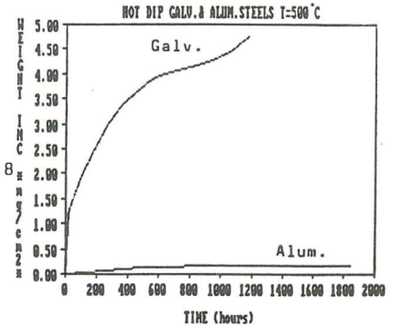

Fig. 9.- External and internal layers of an aluminized low-carbon steel. x 250

ON THE BEHAVIOUR AGAINST ANODIC POLARIZATION OF AMORPHOUS ALLOY, METGLASS 2826.

JUAN DAVALOS PRADO

UNIVERSIDAD NACIONAL DE INGENIERIA. FACULTAD DE CIENCIAS

A.P. 1301 LIMA-PERU.

0. ABSTRACT.

The evolution of the polarization anodic curves of amorphous, Metglass 2826 alloys in SO_4^{2-}, PO_4^{3-} dilute solutions, has been studied electrochemically.

These results show the ranges where they are active (fast metal dissolution) and or passive (formation of protective layers). The mechanisms and interaction parameters through the electrolyte/metal interface have been studied too.

1. EXPERIMENTAL.

Samples of metallic glass, Metglass 2826 (40% at.Fe, 38 Ni, 18 B, 4 Mo) were previously cleaned with dilute Cl_4H, and degreased with aceton. Diluted solutions of SO_4^{2-}, PO_4^{3-} were used as electrolytes.

The acidity variations were carried out adding in a convenient way droplets of H_2SO_4, H_3PO_4 or NaOH. A Wenking POS-73 was used for potenciostatic measurements, with a scanning velocity of about 1mV/seg. All measured potencials were referred to the Satured Calomel Electrode (SCE). The electrolytic solutions were neither stirred nor aereated.

2. RESULTS AND DISCUSSION.

a) EVOLUTION OF ANODIC POLARIZATION CURVES IN SO_4^{2-} 0.1M SOLUTIONS.

Fig. 2.1 shows the anodic evolution of Metglass in acid solutions. There is a small change of the maximum anodic current densities (J_m) with pH, fluctuating around 58mA/cm² value, with correspondent transicion active-passive potencials about E=800mV.

The passivation current densities (J_p) increase rapidly between 0.55 and 2.8 mA/cm², according to the disminution of pH.

These results would indicate that passive layers became more unstable as the solution's acidity decreases.

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