

## Free translation for GALVATOR<sup>®</sup> corrosion behavior



### AMIRKABIR UNIVERSITY POLY TECHNIC TEHRAN

#### 1- subject:

refer to the request of GHADIR ENGINEERING COMPANY (GCE Co.) for studying and doing the necessary tests on their product, which is CORROSION RESISTANT STEEL REBAR with the brand of GALVATOR<sup>®</sup>, some samples of their product was delivered to the laboratory of surface coatings of polymer faculty – Amirkabir University to do the necessary tests and study about its corrosion protecting behavior and comparing it with uncovered carbon steel rebars.

## 2- Specimens:

- 8 samples as bellow were tested:
  - 2 straight uncoated ribbed rebar type Carbon Steel with the diameter of 14 mm.
  - 2 bended uncoated ribbed rebar type Carbon Steel with the diameter of 14 mm (the rebars were bended at site).
  - 2 straight ribbed GALVATOR<sup>®</sup> with thickness layer of 50 microns and the diameter of 14 mm.
  - 2 bended ribbed GALVATOR<sup>®</sup> with thickness layer of 50 microns and the diameter of 14 mm (the rebars were bended at site).

## 3- Visual aspect inspection of GALVATOR<sup>®</sup> after bending

By inspecting carefully the bended GALVATOR<sup>®</sup> with magnifying lens, very small cracks were seen radiusly on the bending zone. But there was no detaching and peeling seen on the coating. Also at some places because of bending process the coating was scratched by the bending tools.

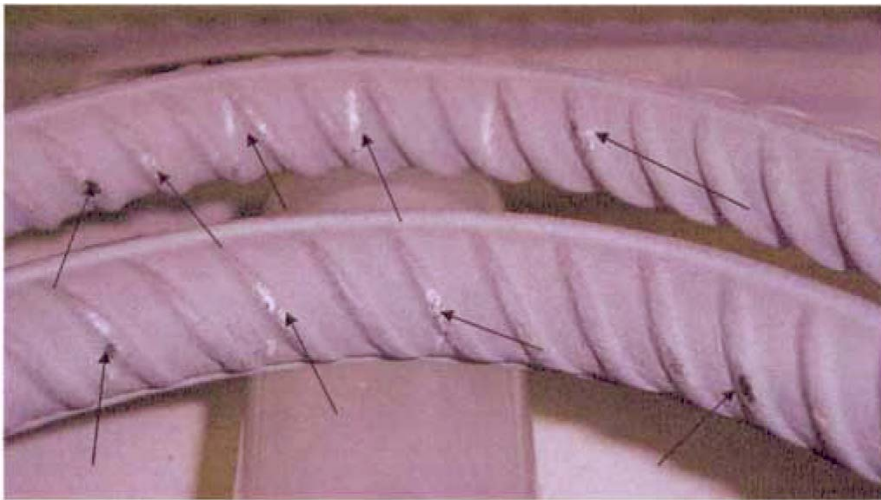


Figure (1)  
Scratched places made by bending tools

#### 4- Salt spray test

The salt spray test was done according to ASTM B 117 Standard and all specimens were continuously under inspection and the following results we obtained:

Visual appearance of rebars:

Time	GALVATOR <sup>®</sup>	Carbon Steel Rebar	Figure
At beginning of test	-----	-----	2
48 Hours	Forming oxide and hydro-oxide of zinc on the surface of GALVATOR <sup>®</sup>	Highly rusted *	3
130 Hours	Increasing oxide complexes on the surface	-----	-
300 Hours	No changes on the amount of zinc oxide and no traces of rust	-----	4
500 Hours	No traces of any rust on GALVATOR <sup>®</sup>	-----	5

After 48 Hours from beginning of the test the carbon steel rebars rusted highly and for preventing the spreading of rust in the salt spray cabinet the carbon steel rebars were taken out.

## 5- Conclusion:

5-1- the protection capacity of GALVATOR<sup>®</sup> is very higher than carbon steel rebars in corrosive environment containing chloride ion. Due, the rusting started on carbon steel rebars only after 2 hours from the beginning of test.

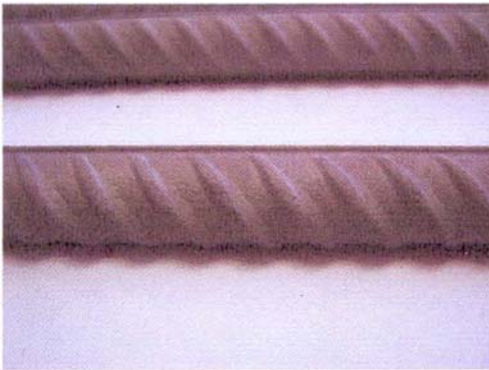
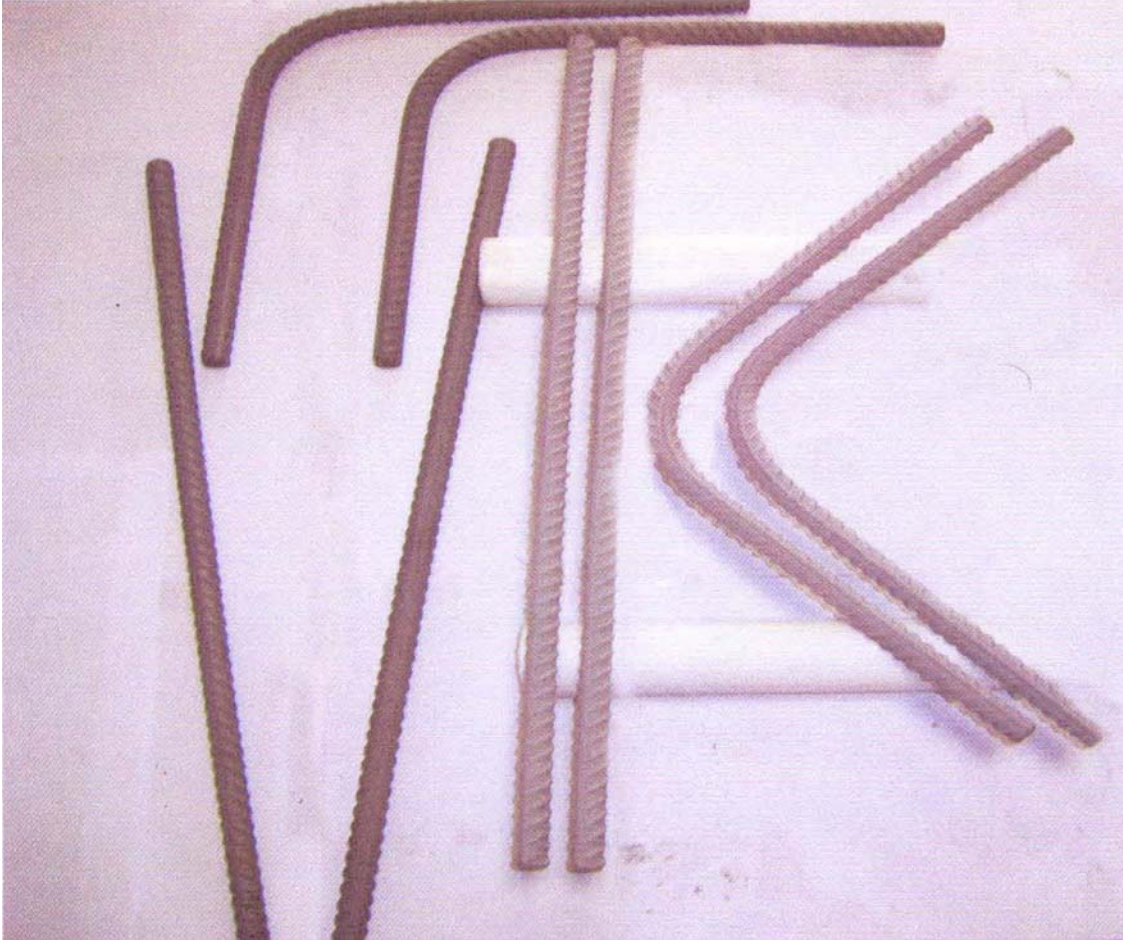
5-2- after 500 hours of salt spray test according to the ASTM D 610 and DIN 53210 standards there was no traces of rust seen on the surface of GALVATOR<sup>®</sup>. This illustrates the good resistance of GALVATOR<sup>®</sup> in corrosive environment.

5-3- in places that the coating was damaged because of bending application, no traces of rust were not seen. This effect is obtained for the cathodic behavior of GALVATOR<sup>®</sup>.

5-4- at the end of the test, no traces of peeling, detaching and blistering were not seen according to ASTM D 714 and DIN 53209 on the surface of the coating. This illustrates the good adhesion of coating with steel substrate.

## 6- expert opinion:

according to results of the test it is observed that the GALVATOR<sup>®</sup> rebars have a good resistance in corrosive environments containing chloride ion. Also for not rusting at the scratched places of the coating it is observed that GALVATOR<sup>®</sup> protects the steel core of rebar by Physical and Cathodic behaviors.



Carbon Steel Rebars



GALVATOR®

Specimens before test



Carbon steel rebars & GALVATOR<sup>®</sup>

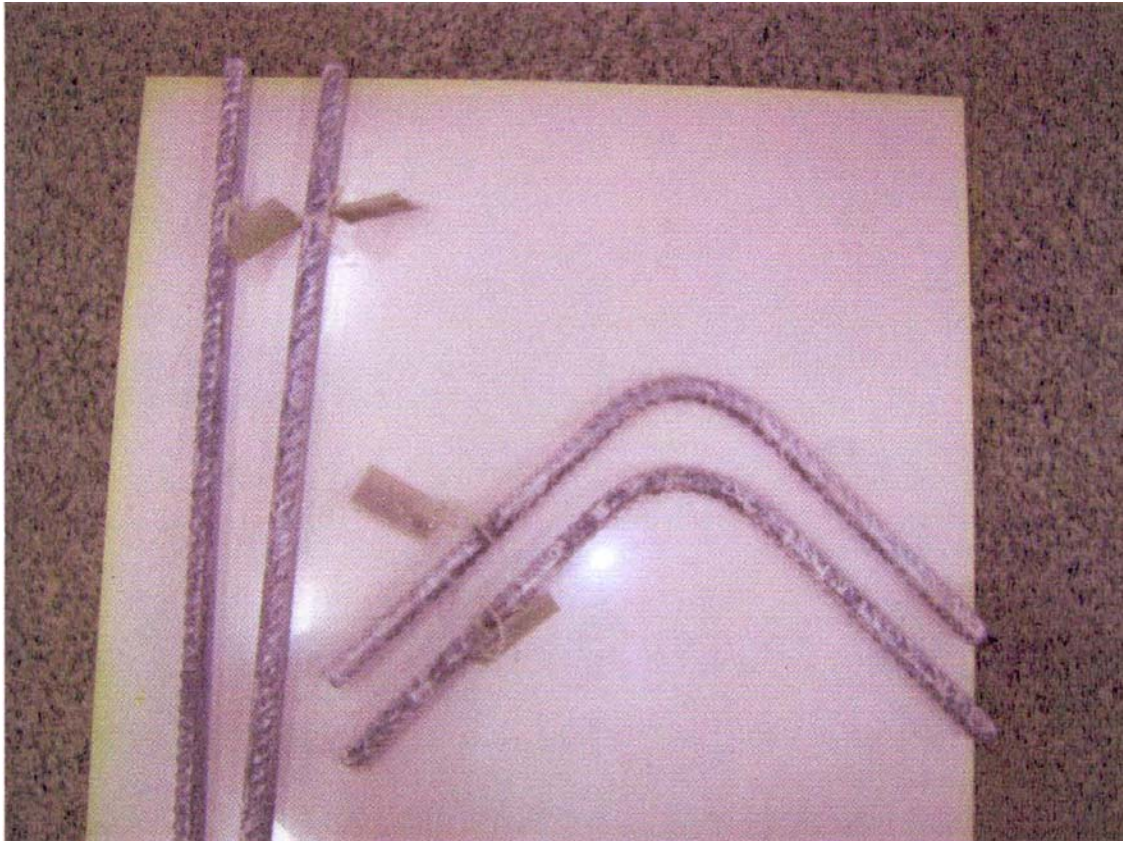


Carbon steel Rebars after 48 hr. salt pray



GALVATOR<sup>®</sup> after 48 hr. salt spray

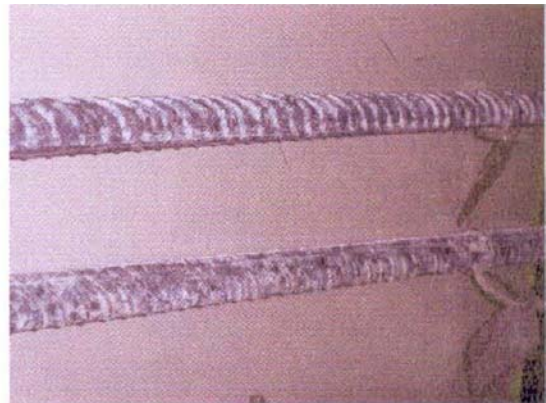
Figure 3  
48 hours after salt spray



GALVATOR© after 300 hours salt spray

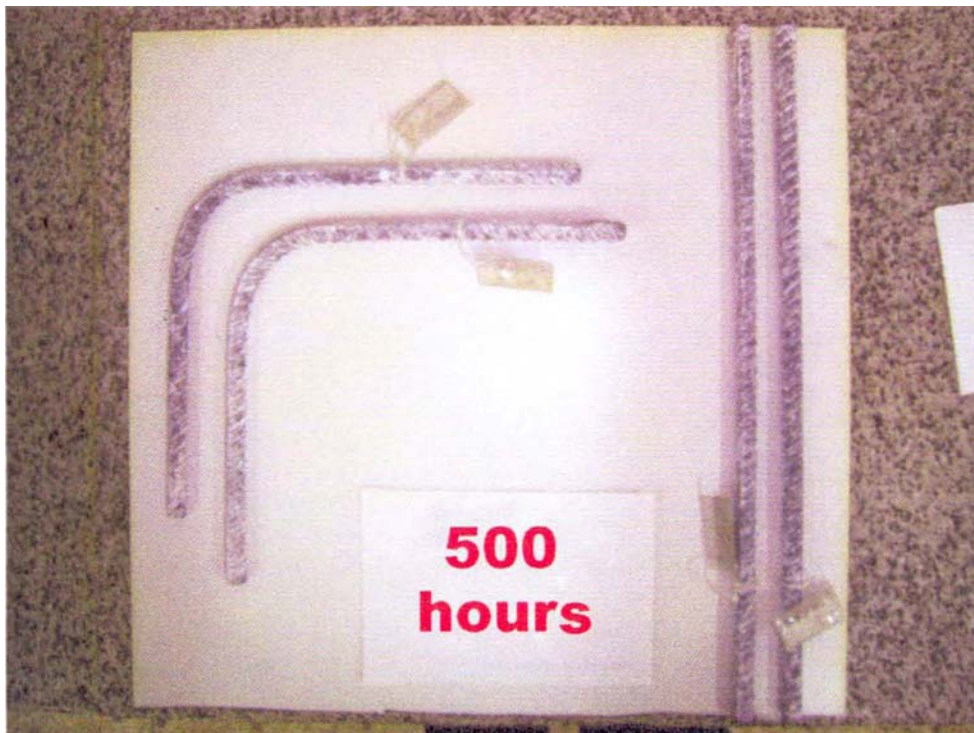


Bended specimens



Straight specimens

Figure 4  
300 hr. after salt spray



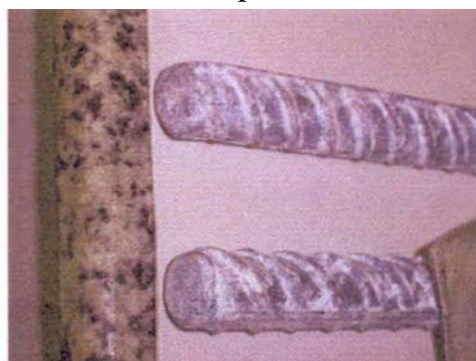
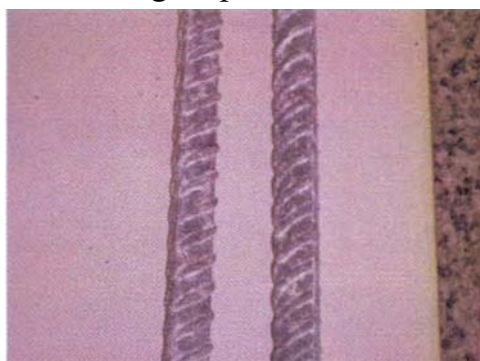
GALVATOR<sup>®</sup> after 500 Hours salt spray



Straight specimens



Bended specimens



GALVATOR<sup>®</sup> after 500 hr. salt spray