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Corrosion Behavior of Vehicles Operated in North America for 5 Years

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Synopsis :

Some passenger vehicles, which were manufactured in 1989 and 1991 and used around

# Corrosion Behavior of Vehicles Operated in North America for 5 Years\*

*Synopsis:*

Corrosion behavior of vehicles manufactured in

Table 2 Vehicles investigated

Case No.	Registration	Year	Make	Model
1	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
4	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
5	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
6	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
7	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
8	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
9	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
10	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
11	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
12	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
13	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
14	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
15	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
16	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
17	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
18	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
19	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
20	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
21	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
22	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
23	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
24	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
25	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Scab corrosion		Perforation corrosion Scab corrosion	Perforation corrosion	
Lapped part	Stone chipping	Hem flange	Lapped part in low humidity	Lapped part in high humidity

Table 3 Number of scab corroded parts

Corrosion type	Parts	Vehicle-A	Vehicle-B	Vehicle-C	Vehicle-D	Vehicle-E
Lapped part	Pillar outer	2	5	4	1	4
	Side sill outer	3	1	3	1	1
	Quarter panel	4	5	2	2	0
	Rear end panel	5	2	2	0	2
Stone chipping	Hood outer front	4	0	0	0	0
	Door outer	3	0	1	0	0
	Front fender	2	0	0	0	1
Hem flange	Hood hem	2	0	0	0	0
	Door hem	1	3	1	0	0
	Trunklid hem	2	1	0	2	0

	Vehicle-A (1989)	Vehicle-B (1989)	Vehicle-C (1989)	Vehicle-D (1991)	Vehicle-E (1991)
Lapped part in low	Cowltop outer (CR) Front pillar outer (CR) Front pillar inner-up	Center pillar outer (CR)	Cowltop inner (CR) Strut house panel (precoated) Front side member		

Table 5 Quantitative analyses of the mud adhered to panel

	(mass%)					
	Cl	Na	Ca	Mg	Fe	Zn
Front side member outer	8.16	—	—	—	—	—
Front side member outer-rear	1.50	1.31	6.96	2.13	5.38	2.35
Front side member inner	16.90	10.86	7.27	1.55	2.35	0.61
Front floor side member-front	1.84	—	—	—	—	—
Front floor side member-rear	1.51	0.98	8.92	2.32	2.53	4.22
Side sill outer	3.26	1.42	8.92	2.46	3.52	7.74
Center pillar inner lower	1.51	1.02	8.60	2.18	3.06	7.79
Rear floor cross	2.22	—	—	—	—	—

condition for a long time. Thus, even in the same corrosive environment, two-sided coating may have a greater effect on perforation corrosion protection than one-side coating.

As shown in Table 4, perforation corrosion in the present survey did not occur in door hem flanges, despite the general belief that severe perforation corrosion occurs in hem flanges. In addition, it has been reported that in cold-rolled steel sheets without corrosion protection systems, perforation corrosion occurs after three years of use in North America (corrosion rate: 0.3 mm/y)<sup>11,12</sup>.

Table 6 shows a summary of additional corrosion protection of the investigated vehicles. In almost all vehicle types, corrosion protection systems (adhesive, seam seal, injection wax) were used in door hem flanges and, they apparently were effective.

