

Tikal Marine Systems GmbH
Werkstraße 6
22844 Norderstedt

order no. : 1776471
client no. 10070717



Dr. Olaf Günnewig
t +49 231 9742-7303
f +49 231 9742-7349
olaf.guennewig@sgs.com

Consumer Testing Services
Automotive

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SGS INSTITUT FRESENIUS GmbH
Joseph-von-Fraunhofer-Straße 13
44227 Dortmund

Your order/project Salt spray test on aluminium blocks with stainless steel screws
Your order No. without
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Report

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Salt Spray Test on Aluminium Blocks with Stainless Steel Screws

Date of sample delivery: 30.09.2010
Sample name: Samples (see page2)
Period of investigation: 30.09. - 25.10.2010
Operator: Dipl.-Ing. Harald Schoon
Report size: 19 Pages (including 2 appendices)

i.V. Dr. Olaf Günnewig
Branch Manager

i.A. Dipl.-Ing. Harald Schoon
Project Engineer

1. Task

Eight screw connections (M12 stainless steel screws in aluminium blocks) shall undergo a salt spray test according to IEC 60068-2-52 and comparable to the ageing of constructional elements of the deck made of teakwood (see our report W-21-06-0359).

An anti corrosion paste is applied on six of the eight screws before the ageing. A comparable light microscopical investigation of the screw connections shall show if the anti corrosion paste can prevent corrosion.

2. Samples

The following sample has been handed in by the client:

Samples 1 – 8: 8 aluminium blocks with M12 stainless steel screws, SAP ID: 100551188 – 100551195

Paste 9ff: 10 tubes anti corrosion paste, labelling Tikal Marine Systems, TEF-Gel, SAP ID: 100605935

3. Applied Investigation Methods

- **Photographic documentation and light microscopical examination** of the sample before the salt spray test.
- **Ageing of the sample in a salt spray chamber** according to IEC 60068-2-52 (severity level 2) and table 1 (In total cycles with 24 h = 6 days).
- **Visual and light microscopical examination** of the sample after salt spray test.
- **Preparation** of two samples (with and without anti corrosion paste) for further investigations.
- **Light microscopical examination of the threads** of the chosen samples.
- **Analysis and report**

4. Results

4.1 Photographic documentation and light microscopical examination of the sample before salt spray test (Appendix 1)

The sample has been photographically and light microscopically documented before the ageing in the salt spray chamber. The photographs and LM micrographs are depicted in tables 1.1 to 1.4. Table 5 includes the photographs of the tubes of the anti corrosion paste provided by the client.

Six of the eight screws have been treated with the anti corrosion paste after the light microscopical investigation. As requested in the instruction manual the anti corrosion paste has been thinly applied on the threads with a brush.

4.2 Ageing of the samples in the salt spray chamber

The stainless steel screws have been manually screwed into the aluminium blocks as far as they will go. The samples have been aged in the salt spray chamber according to the conditions listed in table 1 which are based on IEC 60068-2-52.

Table 1: Ageing conditions in salt spray chamber

Sample	Ageing Time	Treated with Anti Corrosion Paste
Sample 1, SAP ID 100551188	1 Cycle = 24 h	Yes
Sample 2, SAP ID 100551189	2 Cycles = 48 h	Yes
Sample 3, SAP ID 100551190	3 Cycles = 72 h	Yes
Sample 4, SAP ID 100551191	4 Cycles = 96 h	Yes
Sample 5, SAP ID 100551192	5 Cycles = 120 h	Yes
Sample 6, SAP ID 100551193	6 Cycles = 144 h	Yes
Sample 7, SAP ID 100551194	3 Cycles = 72 h	No
Sample 8, SAP ID 100551195	6 Cycles = 144 h	No

4.3 Inspection of the samples after ageing in salt spray chamber (Appendix 2)

After the ageing the samples have been visually and light microscopically investigated. To do this the excess anti corrosion paste has to be removed from the aluminium blocks and the screws. Tables 2.1 to 2.4 show the results of this examination. The samples treated with anti corrosion paste reveal no signs of corrosion or salt deposits on the surfaces of the screws and the aluminium blocks.

Salt-like deposits are visible on the aluminium block and the screw of the untreated samples in the area of the beginning of the thread. Additionally, dull appearing thread flanks at the area of the beginning of the thread of sample 8 point to a corrosive attack.

As agreed with the client the threaded holes of samples 8 (without anti corrosion paste) and 6 (with anti corrosion paste) have been cut, cleaned and light microscopically investigated to evaluate the extent of the corrosive attack. The results are shown in tables 2.5 and 2.6.

Sample 8 clearly shows a corrosive attack but only on the first two turns of the thread. The salt spray could probably not penetrate further into the thread due to a sealing effect of the screw connection. The opposite exhibits only a very weak corrosive attack.

No corrosion could be detected at sample 6.

5. Conclusion

The anti corrosive effect of the anti corrosion taste "Tikal Marine Systems, TEF-Gel" has been confirmed by this salt spray test.

Samples without anti corrosion paste reveal a strong corrosive attack on the first turns of the thread.

It cannot be estimated with the realised tests how long the anti corrosion paste can prevent the corrosion (lifetime prediction of the screw connection of aluminium block / stainless steel) as these testes are only comparable salt spray tests (severity level 2).

- The results are related to the investigated samples only -

- End of the report -

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Appendices