Method and Result of Atmospheric Corrosion Measurement

INFO SHEET No. 05

Description	Qualitative and quantitative determination of corrosive stress on material for solar applications during outdoor exposure, within the projects *Speed*Coll (2011-2015) and *Speed*Coll2 (2016-ongoing)
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Download & further information	www.speedcoll2.de

Atmospheric Corrosion Assessment

The measurements are taken by exposing standard specimens at defined service locations for one year according to international standard ISO 9226. The standard specimens are flat plates of the four standard metals: aluminium (Al), copper (Cu), steel (Fe) and zinc (Zn). The corrosivity of the exposure location is deduced from the corrosion rate, calculated from the loss of mass per unit area of these standard specimens after exposure periods.

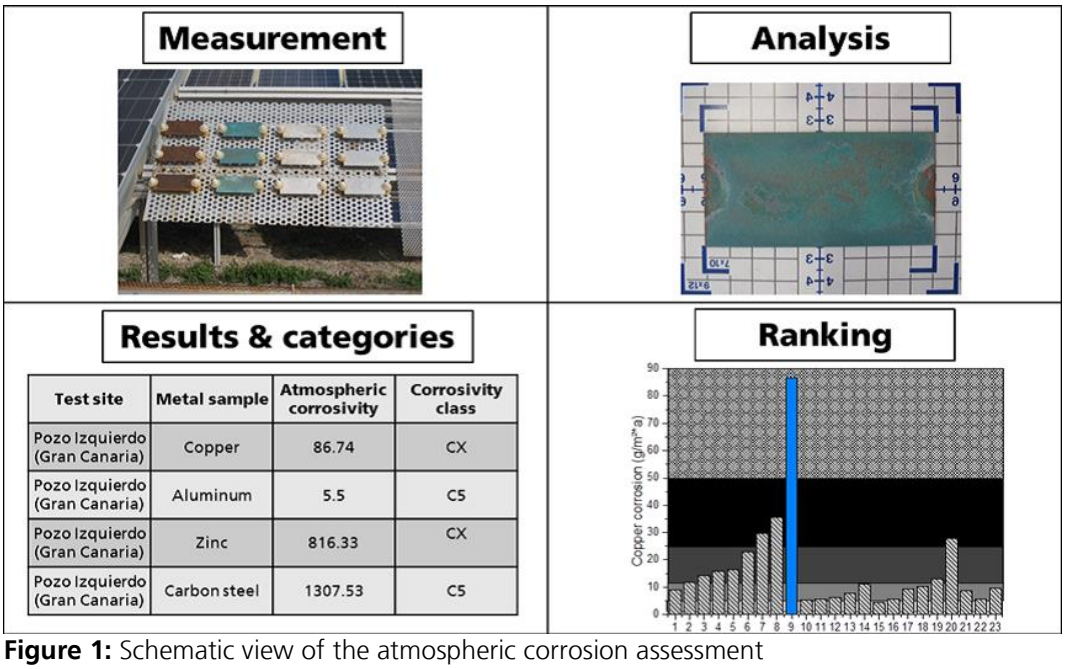

Figure 1: Schematic view of the atmospheric corrosion assessment

The complete process of a corrosivity assessment is presented by figure 1 starting with the measurement on the defined test site, continuing with the analysis of exposed samples and ending with the categorisation and ranking of the atmospheric corrosion at the defined test site.

Corrosion Set-up and Exposure

The corrosion set-up includes 12 metal samples of aluminum, carbon steel, zinc and copper. There are three samples from each metal mounted on aluminium frame with insulating polyamide screws. The corrosion sets are exposed to the atmosphere facing south (northern hemisphere) or facing north (southern hemisphere) with an angle of 45°.

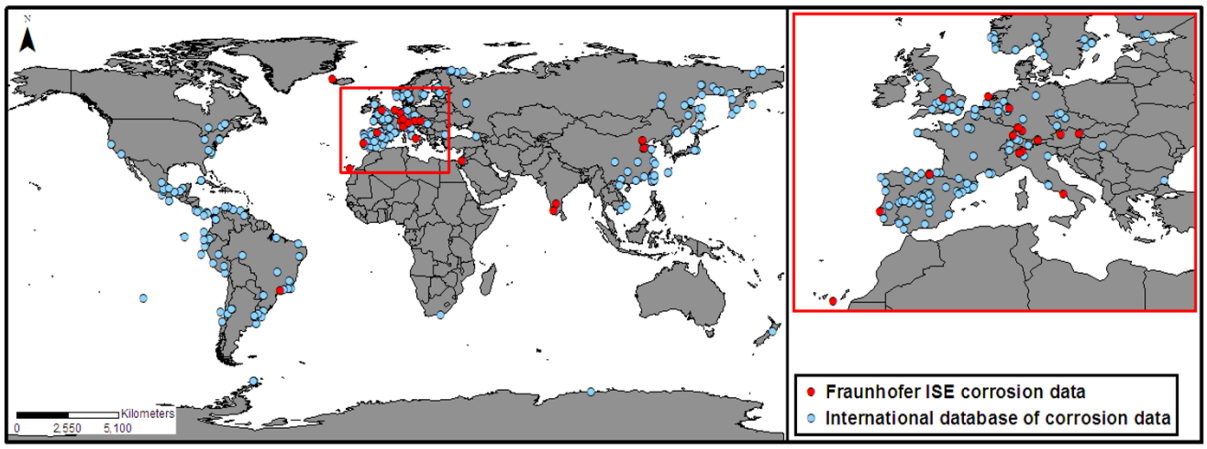

Figure 2: Global classification of atmospheric corrosivity by exposition of metal coupons for one year at 23 locations with various climate and immission conditions (further information in Info Sheet Climatic Loads)

Results and Report

After the required exposure period of one year, the rate of corrosion r_{corr} of each metal coupon is determined. The corrosion rate r_{corr} derived from the mass loss measurement in grams per square meter and per year will be calculated for each sample according to ISO 9226. The loss of weight after one year of exposure is shown in figure 3. Further, these values are used as classification criteria for the evaluation of atmospheric corrosivity according to ISO 9223. The atmosphere at the test site is classified from C1 to CX.

r_{corr} [g *m^{-2} *a^{-1}] / Location	Al		Cu		Fe		Zn	
Freiburg, Germany	0.9	C3	5.4*	C3	29	C2	4	C2
Gran Canaria, Spain	5.5	C5	86	CX	1307	C5	816	CX
Sede Boqer, Israel	1.4	C3	9	C3	154	C2	4.7*	C2
UFS, Germany	1.1	C3	4	C2	2	C1	3	C2
Kochi, India	1.3	C3	36	C5	341	C3	10	C3

Figure 3: Results of the corrosion rate r_{corr} in [g/m²a] and the according classification of atmospheric corrosivity for five *Speed*Coll exposure test sites. Note (*) rounding to one decimal place necessary for correct classification.