

Recommended Test Procedure for ARC Immersion Samples

Introduction: Due to the large number of chemicals, chemical mixtures and process fluids encountered throughout industry, it is sometimes necessary to conduct field evaluation of ARC Composites to determine chemical compatibility. A field evaluation can be carried out by either installing a trial area on the equipment wall or by using immersion samples. Installing a trial area on the equipment wall is the preferred method as this incorporates any cold wall effect experienced by the coating during the evaluation. However, this is not always practical and chemical compatibility can be assessed through the use of immersion samples by following this procedure.

Objective: The objective of this procedure is to outline a standard method for evaluating ARC immersion samples in media of unknown aggressiveness. For this purpose solid composite immersion samples that are approximately 40mm (1½") in diameter and 3mm (1/8") thick should be used. Drill a 3mm (1/8") hole in the immersion sample to allow it to be hung or fixed in a suitable area that is representative of the application.

Test Procedure: Before exposure to the media, each sample is weighed using a balance that can weigh to two decimal places and to an accuracy of +/- 0.02g. This weight is recorded as the Initial Weight. The samples are then placed in the media. For best results, it is recommended to test 3 or more samples at a time and average the results. The immersion samples should be safely secured and positioned in an area where they can be retrieved periodically for inspection and weighing.

Ideally, the samples should be removed every 7 days, patted dry using an absorbent paper towel, and weighed. This weight is recorded. Any changes to the visual appearance of the composite should also be noted. These changes may include softening, etching, checking, cracking, blistering or loss of gloss. After weighing, the samples should be returned immediately to the exposure area.

The test should be continued for a minimum period of 28 days. Following the test period, the data is analyzed as follows.

The percentage weight change of the composite can be calculated from the difference between the Initial Weight and the weight recorded at 7, 14, 21 and 28 days. This difference should be expressed as a percentage of the initial composite weight. The percentage change should be denoted as either a positive (weight gain) or negative (weight loss). The following is an example showing how this calculation is carried out.

Sample ID ARC 855	Weight	Weight Change	% Weight Change	Visual Observations
Initial	8.75g			
7day	8.85g	0.1g	+1.1%	
14 day	8.90g	0.15g	+1.7%	
21 day	8.94g	0.19g	+2.2%	
28 day	8.97g	0.22g	+2.5%	

Interpretation of Results:

% Weight Change at 28 days	Chemical Resistance Rating	Numerical Rating
0 – 2%	Continuous Immersion	1
2.1 – 3%	Short Term / Intermittent Immersion	2
3 – 5%	Spills with Immediate Clean-up	3
> 5%	Not recommended for direct contact	4

Visual changes such as softening, etching, cracking, checking, or blistering of the composite indicate that it is not suitable for these service conditions. A color change or loss of gloss of the composite on its own does not indicate incompatibility. When the result is close to or on the border between two resistance ratings, it is advisable to continue the immersion test for several more weeks and report the data to ARC Technical Services for a final recommendation.

Notes: The reason for weighing the samples every 7 days is important in helping identify situations where a composite may initially absorb the test media, followed by chemical attack resulting in composite degradation. A composite that follows this pattern would show an initial weight increase followed by a weight loss. However, if the samples are weighed only once after 28 days immersion, this pattern could be missed and the composite may be incorrectly assumed to be suitable for the environment.

ARC Technical Services requests that the data collected during immersion testing are submitted to add to our data base of chemical compatibility information. Information from these tests will be most useful when all information from the test conditions are known, including precise chemical composition and temperature. It is recommended that an ARC Lining Inspection Log be completed to document sample preparation and cure conditions. It is also important that this procedure be closely followed.

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