

Gravimetric Testing Procedures

Increasingly tight cleanliness specifications make it difficult to know when a part is clean without a reliable testing method. Contamination on parts is often very small material, not visible to the eye, and therefore an objective method is necessary to properly evaluate whether or not a part is ready to be shipped or moved to the next step in the production process.

Gravimetric (also referred to as Millipore) Testing is one method by which a manufacturer can have their parts checked for cleanliness. It is an objective, scientific method that helps to take the guesswork out of meeting cleanliness specifications. Using a flushing solvent and filters, the amount of contamination on a part can be weighed to produce an accurate account of how much contaminant is left after the production washing of the part.

Gravimetric testing requires a specific set of equipment to be properly performed. A vacuum pump, vacuum flask, filter funnel, funnel support, and a micron filter with a diameter sized according to the cleanliness specification that must be met are necessary. Also, an oven will be used during the test. The oven must be capable of reaching 150-300 degrees Fahrenheit. A flushing solvent and equipment for solvent spraying will be necessary to soak the part, and a container will be needed for collection of the excess solvent. To weigh the results of the test in an accurate manner, an analytical balance with a +/- accuracy of .0002 grams is used.

First, the oven must be pre-heated to 200 degrees. Then the individual performing the test must set up the vacuum pump and filter flask to accommodate the filter funnel. Ensure the filter funnel has been properly cleaned, using clean solvent, before the test begins. Once the pump, flask, and funnel are in place, the appropriately sized micron filter can be put into the funnel. Wash the filter paper with test solvent by spraying the solvent into the filter with the vacuum pump powered up. After cleaning, turn off the pump, remove the filter paper, and place it in the oven for approximately 10 minutes. Remove the filter, let it cool, and then record the weight. By recording the weight of the filter paper, the tester will be able to compare the difference in the clean, "before" filter weight and the contaminated, "after" weight. This will be the amount of contamination removed from the part during the test.

Once the weight is recorded, the filter paper is returned to its position in the funnel. Now, the part to be tested is flushed with solvent over the collection container. Take the solvent that has been collected through the process, and run it through the filter with the vacuum pump turned on.

After all the solvent has been run through the filter, carefully remove the filter paper from the funnel. Make sure that nothing is spilled from the filter paper. If anything is removed from the filter paper before it can be heated again, the test results will be inaccurate.

Heat the filter paper in the oven for 10 minutes once again. Then remove the filter paper and allow it to cool for 5 minutes. Weigh the contaminated filter, and then subtract the weight of the “before” filter from the “after” filter. Multiply this value by 1000, and the result is the amount of contamination in terms of milligrams that was present on the part.

This testing method is reliable, simple, and accurate. While intuitive and relatively uncomplicated, Gravimetric Testing is accurate enough to meet most cleaning specifications and is not as cost intensive as other methods of cleanliness testing. The simple procedure can be employed for any part, as long as the proper equipment can be found and employed.

For more information of Cleanliness part testing go to www.midbrook.com