

EGLE Pentane Sampling Plan

Michigan Foam Products, LLC

Revised by Jovan Willis, Engineer, 10/21/2020

Introduction

The purpose of this plan is to establish goals, requirements, responsibilities, and methods for the sampling of the final molded product of Michigan Foam Product, LLC (MFP) to ensure that compliance is maintained according to the Michigan Department of Environment, Great Lakes, and Energy (EGLE). This sampling plan will detail the methodology utilized to maintain our data, the specific testing that is conducted and frequency of sampling to be completed.

Goal

The goal of sampling is to determine the amount of pentane emitted during the process of pre-expanding, aging, molding, and storing expanded polystyrene (EPS) for the previous calendar year. Pentane is the required blowing agent to facilitate the production of EPS. During the production of EPS, a large percentage of pentane is emitted into the environment. A small percentage of pentane is retained in the finished product. The final finished product of EPS will be sampled and tested. The results from sampling will be used to determine the remaining amount of pentane compared to the amount of pentane in the raw polystyrene bead provided by its suppliers and serve as the determinant for the retention factors of each bead type. The retention factor is the amount of pentane remaining in the finished product.

Required Test

The test conducted to determine the remaining amount of pentane is a modified EPA Method 8015B. Trace Analytical Laboratories, LLC has developed a modified method to analyze specifically pentane. The samples of EPS are dissolved in toluene. The resulting solution is injected onto the Gas Chromatographer with Flame Ionization Detector, which has been calibrated with a known pentane standard. The pentane standards are used to generate the calibration factor, which is used to determine the amount of pentane in the samples of EPS. The modified method most closely resembles the method 8015 (SW-846). The EPA method 8015 (SW-846) is performance based, so additional compounds are permitted given that they meet the original method's quality requirements.

Sampling Plan

The sampling of which bead types to be tested is based on the previous calendar year. The samples of EPS will be collected from the finished product and will be produced from quality material and not remnant material such as scrap. The samples of EPS will be collected the same day as delivery to the testing laboratory to ensure more accurate results. The number of samples collected will be (4) 1" x 4" x 4" EPS samples of each bead type until it comprises 80% of MFP's total annual usage for the previous calendar year. The designated laboratory needs (1) EPS sample to conduct the testing. MFP will provide (4) EPS samples of each bead type to ensure that the selected EPS samples meet the laboratories requirements of quality. Duplicate samples will be collected to verify any potential errors in the results.

Through the modified EPA method 8015B, MFP will be able to determine the percentage of pentane emitted through its process. The test results will be compared to the percentage of pentane in the raw material from the suppliers. MFP will sample the bead types that comprise 80% of the total annual usage for the previous calendar year. The most used bead type will be sampled first. If the most used bead type does not represent 80% of all bead types used for the previous year, the next most used bead type will be selected for sampling and MFP will continue sampling the next most used bead type until the samples are representative of 80% of the total annual usage of the previous calendar year. If the bead type with the highest pentane content is not included in the 80% of total usage, that bead type must be sampled. The bead type with the lowest retention factor will serve as the retention factor for the remaining bead types that have not been sampled.

The bead type with lowest retention factor will emit the most pentane into the environment and retain the least amount of pentane in the finished product.

The Engineering Department of MFP will determine the amount of residual pentane within the final finished product. The results of the modified EPA method 8015B will be directly compared to the pentane level of the raw material used to produce the finished product.

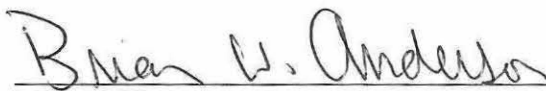
1. The amount of pentane emitted is calculated by dividing the residual pentane amount in the EPS samples by the pentane amount in the raw material as specified by the supplier and subtracting the quotient from (1).


a.
$$\text{Pentane Emission} = 1 - \frac{\text{Residual Pentane in EPS samples}}{\text{Pentane in Raw Material}}$$


Testing will be completed in the first quarter of the reporting year. The results will be stored on MFP's server in the folder designated EGLE (S:\General\Engineering\EGLE). MFP will utilize its ERP system and company schedule to schedule and remind all members of the Engineering Department and the General Manager. Testing is to be done no later than the last business day of March. The results of testing will be submitted to the AQD within 14 days upon receipt of results. Emission calculations will be updated once results are approved by the AQD.

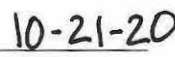
Conclusion

In order to maintain compliance, the Engineering Department of MFP will be responsible for collecting (4) EPS samples of each bead type that comprises 80% of MFP's total annual usage for the previous calendar year. Those samples will be collected the same day as delivery to the designated laboratory, Trace Analytical Laboratories, LLC. The designated test method is the modified EPA method 8015B, which will test the residual pentane in the provided EPS samples. The testing results will be utilized to determine the amount of pentane emitted. These results will be submitted to the AQD as well as stored electronically for MFP's records. Once approved, MFP will update emission calculations, accordingly. This document will be updated as necessary changes occur such as a change in test method or a modification to the sampling plan. With each revision, it will be noted in the header and saved with this document.


General Manager


Date


Engineer


Date