



Standard Test Method for Collecting Gross Samples and Determining the Fuel Quality of RDF¹

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INTRODUCTION

It is not possible to gather a sample of a multi-ton lot of refuse derived fuel (RDF) with assurance that the sample is representative of the lot. Therefore, this test method has been developed whereby a series of twenty samples are analyzed over the course of a month and the average of the results are an empirical estimate that is adequate to be used to represent the RDF production over that month. This test method may be used to ascertain RDF quality for purposes of contractual adjustment between producer and user.

1. Scope

1.1 This test method covers the procedure for collection of a series of 20 gross samples for analyses. The results of analysis, when averaged, are deemed representative of the lot or a production stream for a 1-month period.

1.2 This test method may be used to determine fuel quality on other than a monthly basis if 20 gross samples are gathered, analyzed and averaged.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Section 7.

2. Referenced Documents

2.1 ASTM Standards:²

E 711 Test Method for Gross Calorific Value of Refuse-Derived Fuel by a Bomb Calorimeter

E 790 Test Method for Residual Moisture in a Refuse-Derived Fuel Analysis Sample

E 791 Test Method for Calculating Refuse-Derived Fuel Analysis Data from As-Determined to Different Bases

E 829 Test Method for Preparing RDF Laboratory Samples for Analysis

E 830 Test Method for Ash in the Analysis Sample of Refuse-Derived Fuel

E 856 Definitions of Terms and Abbreviations Relating to Physical and Chemical Characteristics of Refuse-Derived Fuel

E 954 Test Method for Packaging and Shipping of Laboratory Samples of Refuse-Derived Fuel

E 955 Test Method for Thermal Characteristics of Refuse-Derived Fuel Macrosamples

3. Terminology

3.1 *Definitions*—The definitions covered in Definitions E 856 are applicable to this test method.

4. Summary of Test Method

4.1 Twenty gross samples on RDF are taken at intervals over a 1-month period and sent to the laboratory for analysis.

4.2 The analysis results are averaged to establish the fuel quality of RDF for the month.

5. Significance and Use

5.1 This test method is available to producers and users of RDF as a means of determining thermal characteristics of RDF produced over a 1-month production period for purposes of contract adjustment.

¹ This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.06 on Recovery and Reuse.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

6. Apparatus

6.1 *Conveyor Belt Sample Divider*—made of two vertical wall members have a profile matching that of the top of the belt, and having a space between the two walls not less than three times the top nominal particle size of the RDF is required.

6.2 *Conveyor Stream Sampling Device*—a container with a handle or mechanism to control insertion and withdrawal, suitable for collecting a representative sample from a stream of material falling from the discharge end of a conveyor is needed. It shall have dimensions not less than three times the size of the top nominal particle size (95 % passing) of the RDF, to avoid bridging and rejection of large particles.

6.3 *Sample Container*— 3-mil polyethylene bags, double bagged, properly sealed, or noncorroding buckets or barrels with airtight covers, of sufficient size to hold the samples is required.

7. Hazards

7.1 Due to the origins of municipal solid waste, workers shall use proper safety precautions in handling samples and conducting tests. Workers shall wear gloves and safety glasses, and when appropriate, dust masks. Workers shall be cautioned to wash their hands before eating, smoking or handling genitalia.

7.2 Appropriate safety precautions shall be taken when working on or near equipment in collecting samples, due to the possibility of getting objects or clothing caught in moving equipment.

8. Sampling

8.1 Samples may be collected from a stopped belt, from a free-falling stream, or from a static pile.

8.1.1 Stopped-belt samples shall be taken over the full width of the belt between the boards, and all material, including grit, collected and immediately placed in a container, and the container sealed.

8.1.2 The free-falling stream sampling device shall make a full sweep across the stream and accept material from the full cross section of the stream.

NOTE 1—Make sure that the sweep is parallel with flow and not perpendicular to flow of the RDF stream.

8.1.3 Samples may be taken from static piles, containers or bins, provided that the samples are taken from 1 ft beneath the surface of the pile (hence not subjected to loss of moisture due to exposure to the atmosphere).

NOTE 2—Static pile sampling may lead to biased results.

8.2 Number and Weight of Samples:

8.2.1 Take over the monthly period, gross samples, one per day, at random times during the day, for 20 days spread over the month.

8.2.1.1 If for reasons beyond the control of the sample gathered, such as plant shutdown, as few as 15 samples may be considered acceptable for determining the monthly average.

8.2.2 Make sure that the weight of each sample is between 5 and 10 lb (2 and 4 kg), or as agreed upon.

8.3 Place the entire gross sample in a sealed container and send to the laboratory in accordance with Test Method E 954.

9. Procedure

9.1 Prepare the laboratory samples and analyzed in accord with either Test Method E 829, followed by Test Methods E 790, E 830, E 711, or E 955.

10. Calculation

10.1 Calculate percent moisture, percent ash, and higher heating value, for each laboratory sample by either Test Method E 791, or Test Method E 955.

10.2 Average the monthly laboratory sample data for moisture, ash, and heating value.

11. Report

11.1 The report shall include the following RDF average data for the month, rounded to the nearest percent or 50 Btu/lb (0.1 MJ/kg)

Moisture	A %
Ash	B %
Heating Value	C Btu/lb (MJ/kg)

where:

A = mass % moisture, “as received,”

B = mass % ash, “as received,” and

C = heating value, “as received.”

NOTE 3—Heating value is normally reported as higher heating value. The producer and user may agree to report lower heating value.

NOTE 4—The producer and user may agree to include range and standard deviation in the report.

12. Precision and Bias

12.1 Precision, bias, variance, and accuracy for RDF sampling is supported by EDS-18, “Determination of Relationship Between Precision and Procedures used for Collection and Division of RDF Samples.”

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