ANEXO F

LAUDO DE EXPLOSIVIDADE DO CARVÃO PELA EXPLOSION TESTING LTD

EXPLOSION HAZARDS TESTING LIMITED

DETERMINATION OF THE FLAMMABILITY CLASSIFICATION OF A SAMPLE OF AMOSTRA DE CARVAO PULVERIZADO DE CANDIOTA PROVIDED BY DNV ENERGY SOLUTIONS.

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BY

EXPLOSION HAZARD TESTING LIMITED.

Explosion Hazard Testing Limited, 8 Dalton Court, Astmoor Industrial Estate, Runcorn, Cheshire, WA7 1PU
Tel: 01928 576722 Mob: 07833468868 Fax: 44 01928 551937 E-mail: russ.littlejohn@explosionhazardtesting.co.uk
Registered in England No.07038097
Registered Office: Victoria House, 488 Knutsford Road, Warrington, Cheshire, United Kingdom, WA4 1DX

SUMMARY RESULTS

The following material properties were determined for the sample of Amostra de carvao pulverizado de candiota provided by DNV Energy Solutions.

Tested as received

Test material	Moisture	Median particle size
	%w/w	µm
Amostra de carvao pulverizado de candiota	8.1	125 to 250

The sample was found to be non flammable under all conditions of the testing at ambient temperature but was flammable at elevated temperatures.

Classified as Class B – Non flammable material at ambient temperatures
Classified as class A – flammable material at elevated temperatures

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1. BACKGROUND

A sample of Amostra de carvao pulverizado de candiota was provided by DNV Energy Solutions to determine its flammability classification.

2. SAMPLE DESCRIPTION

The sample of Amostra de carvao pulverizado de candiota consisted of a fine black powder.

3. TEST METHOD

3.1 Particle Size Analysis

The particle size distribution of the material was measured using sieve shaker and standard 200 mm diameter sieves. A sample of the material was weighed onto the sieves and shaken intermittently (8 seconds on / 4 seconds off) for 30 minutes. The resultant fractions were weighed to determine the particle size distribution.

3.2 Moisture Content Determination

The moisture content of the sample was determined by loss in weight measurement of the sample dried in an oven at 103°C ± 2°C for a period of 4 hours. The samples were repeatedly weighed and returned to the oven for 30 minute periods until consecutive weighing were within 0.005g of one another.

3.3 Flammability Classification

The flammability classification test is a qualitative assessment of whether or not a suspended dust is capable of initiating and sustaining flame propagation in the presence of a small source of ignition. The classification is made purely on visual observation of flame propagation away from the ignition source.

The flammability classification test was carried out in a vertical tube apparatus using either an electric spark ignition source or a heated wire coil. Dust was dispersed vertically by a blast of air. If flame propagation was observed the dust was designated Group A. If after repeated testing no flame propagation was observed the dust was designated Group B.

If the sample is classified as group B in the previous tests then a sample of test material is dispersed into a 20litre sphere and ignition attempted using a 100J and 500J chemical igniter (in separate tests with fresh test material over a range of concentrations). If the pressure rise is greater then 0.3bar then the material is classified as Group A, if below 0.3bar then classified as Group B.

Where dusts, classified as Group B in the vertical tube apparatus and sphere may be handled at elevated temperatures further testing is required to confirm that they will not propagate flame at the elevated temperature. This testing is carried out by dispersing the dust in a Godbert Greenwald Furnace at 600°C. If flame propagation is observed, the dust is designated Group A at elevated temperatures, otherwise it is designated Group B.

4. RESULTS

4.1 Particle Size Analysis

Amostra de carvao pulverizado de candiota (as received)

Sieve Size (µm)	Weight on Sieve (g)	% by Weight
>2000	0.6	0.2
>1000	0.6	0.2
>500	0.3	0.1
>250	10.8	4.4
>125	192.0	77.6
>90	8.1	3.3
>63	14.1	5.7
>38	16.7	6.8
Receiver	4.2	1.7

Median Particle size is 125 to 250µm

4.2 Moisture Determination

Amostra de carvao pulverizado de candiota (as received)

	Sample A	Sample B
Weight of Sample (g)	8.7195	10.4251
Dry weight of sample (1)	8.0157	9.5756
Dry weight of sample (2)	8.0157	9.5756

Average Moisture = 8.1%w/w

4.3 Flammability Classification (A/B)

Material: - **Amostra de carvao pulverizado de candiota (as received)**

1 **10kV Continuous Spark**

Ignition: - No propagation

2 **Heated Coil**

Ignition: - No propagation

3 **GG Furnace at 600^{o}C**

Ignition: - propagation

4 **20L Sphere with 1* 100J Igniter**

Ignition: - No propagation

5 **20L Sphere with 1* 500J Igniter**

Ignition: - No propagation

Class B – Non flammable material under at ambient temperature

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Class A –flammable material under elevated temperatures

Material: - **Amostra de carvao pulverizado de candiota (<63µm)**

1 10kV Continuous Spark

Ignition: - No propagation

2 Heated Coil

Ignition: - No propagation

3 GG Furnace at 600^{O}C

Ignition: - propagation

4 20L Sphere with 1* 100J Igniter

Ignition: - No propagation

5 20L Sphere with 1* 500J Igniter

Ignition: - No propagation

Class B – Non flammable material under at ambient temperature

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Class A –flammable material under elevated temperatures