

**Quotation for**

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**Subject**

**Tests of material samples in a rotating drum  
with filters according to EN 15051**

**Reference**

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## 1 Introduction

TNO has tested the Imdex A/S sample (TNO code 22-7-2020), according to EN15051 with the rotating drum.

## 2 Samples

On the 12th of July 2020, the sample was received from the Imdex A/S company.

### 3 Experimental procedures

Dustiness, i.e. the propensity of materials to produce airborne dust, is a relative term and the measurement obtained will depend on the properties of the dust in the sample, on the test apparatus used and various environmental variables. A CEN standard has been developed (EN 15051 "Workplace atmospheres Measurements of dustiness of bulk materials- Requirements and reference methods", CEN 2006), that provides reference methods to classify the dustiness of bulk solid materials in terms of health-related aerosol fractions defined by EN 481 ("Workplace atmospheres- Size fraction definitions for measurement of airborne particles").

Dustiness of the powder sample provided by Imdex, was determined at ambient conditions with a rotating drum tester (EDT 38 L, JS Holdings, United Kingdom), provided with porous metal size-selective foams. The dustiness tester consists of the following sections (CEN 2006): a dust generation section, consisting of a stainless steel drum with eight blades on the internal wall, a transfer section, and a sampling section. Standard volumes of 35 ml powder were used. After reception, the samples were stored at room conditions. The test substance was placed in the dust generation section and agitated for 64 seconds by rotation of the drum (approximately 4.5 rpm). The generated airborne dust was transferred from the generation section into the sampling section (air flow  $38 \pm 1$  L/min, RH  $\pm 50\%$ ), which separates the dust by aerodynamic particle size. The dust is deposited on two nickel coated PE foams of 20 ppi (pores per inch), one foam of 80 ppi. ( $\varnothing$  80 mm, thickness 10 mm, Dunlop Equipment, Coventry, United Kingdom) and one Millipore, glass fibre filter fitted to space ( $\varnothing$  80 mm, Millipore, Amsterdam, The Netherlands) for gravimetric analysis. To test the performances of the rotating drum, one test was conducted with talc as a reference substance. To prevent surface adhesion, one conditioning run was performed prior to actual testing, to allow part of the test product to coat the inner wall of the drum. After that, three test runs were conducted to measure the dustiness of the test product and one test run was rejected, because the glass fiber has a negative mass weight.

Weighing was performed with a calibrated balance with an accuracy of  $\pm 0.01$  mg (Mettler Toledo AX205 Deltarange, Tiel, The Netherlands). The foams and filters were stored for acclimatization for at least 24 hours prior to weighing. Storage and weighing were performed at 20°C and 50% RH. Weighing was done three times before and after the test. The average weight is reported. Pre- and post-sampling weights were determined by averaging the results, and dustiness is expressed as dustiness mass fractions (mg/kg), i.e. inhalable (WI), thoracic (WT) and respirable (WR) (CEN, 2006).

## 4 Results

The performance of the rotating drum tester during the test series was tested in advance with Talc. Subsequently, the dustiness of the Imdex sample was determined. The results of those measurements are shown in Table 1. Table 2 shows the classification table from CEN 2006.

Table 1. Average dustiness mass fractions and standard deviation (std) according to the gravimetric test.

Imdex (TNO 22-7-2020)	Average [mg/kg]	std
Inhalable fraction	55.6	12.8
Thoracic fraction	20.2	7.7
Repirabele fraction	6.9	2.8

Table 2. Classification table for dustiness measurements from CEN 2006.

Dustiness	Inhalable fraction (mg/kg)	Thoracic fraction (mg/kg)	Respirable fraction (mg/kg)
Very low	<200	<40	<10
Low	200-1000	40-200	10-50
Moderate	1000-5000	200-1000	50-250
High	>5000	>1000	>250

## 5 Conclusions

The dustiness of the tested sample can be qualified as “very low” for all the fractions, inhalable and thoracic and respirable. This qualification is not influenced by the standard deviation of the tests.