

## **DRI - DYNAMIC RESPIRATION INDEX RESPIROMETER**

### **Norms**

#### **UNI 11184**

*Waste and refuse derived fuels – Determination of biological stability by dynamic respirometric index.*

#### **UNI 15590**

*Solid recovered fuels - Determination of the current rate of aerobic microbial activity using the real dynamic respiration index.*

#### **DIN EN 15590**

*Solid recovered fuels - Determination of the current rate of aerobic microbial activity using the real dynamic respiration index; German version EN 15590:2011*

#### **BS EN 15590:2011**

*Solid recovered fuels. Determination of the current rate of aerobic microbial activity using the real dynamic respiration index.*

### ***Countries using this standard method.***

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

### **Introduction of Echo Respirometer 15590 system.**

Respirometer system using method for the determining the current rate of aerobic microbial activity of solid recovered fuels using the real dynamic respirator index (RDI). The current rate of aerobic microbial activity measures the biological stability under the actual chemical and physical properties of the solid recovered fuels. The biological stability determines the extent to which readily biodegradable organic matter has decomposed. Therefore, the RDRI identifies the actual point reached in the decomposition process and represents a gradation on a recognized scale of values.

Echo respirometer is complied with European standard method to determine the current rate of aerobic microbial activity of a solid recovered fuel. The methods indirectly estimate the potentiality of odors production, vectors attraction etc. The current rate of biodegradability can be expressed in milligrams O<sub>2</sub> kg<sup>-1</sup> dm h<sup>-1</sup>.

Solid Recovered Fuels (SRF, also named “Refuse Derived Fuels” – RDF) are solid fuels prepared from non-hazardous waste to be utilized for energy recovery in incineration or co-incineration plants. “Prepared” here means processed, homogenized and up-graded to a quality that can be traded amongst producers and users. They can be derived from household waste, commercial waste, industrial waste and other combustible waste streams. They are already used to substitute fossil fuels in cement kilns, power stations and industrial boilers.

## Principle

The method for determining the current rate of aerobic microbial activity specified in this European Standard is based on measuring the oxygen uptake rate by micro-organisms to biodegrade easily degradable organic matter of the sample itself under defined continuous airflow and adiabatic conditions. The test involves keeping the sample under observation in the respirometer (dynamic test system) for 1 day to 4 days according to the duration of the lag phase (if present), taking the index value at hourly intervals (RDRI h ). Moreover, if at the end of the fourth day, the RDRI trend is constant or growing, the respirometric test is prolonged with the acquisition of at least others 24 values (RDRI h ).

## Continuous flow aerobic respirometer, composed of: (according to standard)

- hermetically sealed adiabatic reactor with the minimum operating volume expressed in litres, equal to or less than the average sample size expressed in millimeters and not greater than 30 mm (for example, for a sample of average size less than 10 mm, the reactor volume is 10 l); the reactor structure must force the input air to cross the entire sample before leaving the reactor, avoiding mixing the of input air and exhaust air;
- reactor air-tightness verification system;
- aeration system provided with flow regulator and capacity gauge;
- system for sampling oxygen concentration in exhaust air (% / v );
- system of data acquisition continuously memorizing the measured parameters at 1 h intervals; the data memorized must be the average of all values read (at least 60) during the interval considered.

## Advantages of Echo Instruments respirometer:

- plug and play set-up for fast and easy assembly
- comes with touch screen computer with installed and tested software
- all components mounted in compact rack for easy accessing all parts of respirometer
- mass flow controllers for each channel with flow setting for each channel individually
- multi channel 3,6,12 or 24 channels. High accuracy of measurement by simultaneous measurement different samples in three parallels for statistical evaluation
- condensate removal for oxygen sensor protection
- additional sensors like carbon dioxide or methane for in detail process analyzing and monitoring
- two operation modes with on-line calculation of DRI and RDRI with graphical support
- generating report for fast administration processing
- various reactor size 2, 10 or 30l for different samples and sample activity

- automatic oxygen calibration
- possible remote control and monitoring via Internet connection to respirometer

**Technical data:**

- adiabatic reactors vol.: 2, 10 or 30l
- flow controllers
  - principle: thermal mass flow controller
  - setting flow range:
  - measuring range:
- oxygen sensor
  - principle: electrochemical
  - measuring range: 0 – 25%
- temperature sensor
  - principle: Pt 100
  - measuring range: 0 – 200°C
- pressure sensor
  - principle: semiconductive
  - measuring range: mbarr
- power supply: 220V / 50Hz AC