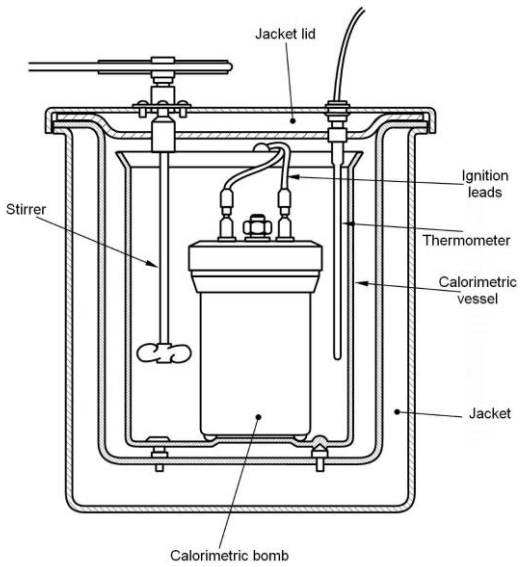
EN ISO 1716:2010
Determination of the heat of combustion

ROLE OF TEST IN THE EUROCLASS SYSTEM

Determination of the heat of combustion of a material (substantial and non-substantial components of a product) is required for classification A2 (or test results from EN ISO 1182), and for a classification A1 (in combination with test results from EN ISO 1182).

TEST PRINCIPLE

In this test, a test specimen of specified mass is combusted completely under standardised conditions, at constant volume, in an oxygen atmosphere, in a high-pressure calometric bomb. The calorific value determined under these conditions is calculated on the basis of the observed temperature rise, taking account of heat losses and the latent heat of vaporisation of water.
3 parallel tests are performed.



TEST REPORT

The report contains information about:

- Water equivalent
  The water equivalent E (MJ/K) of the calorimeter, the bomb and their accessories is determined by making at least five determinations of the gross heat of combustion of pellets of 0.4 g to 1.0 g of certified benzoic acid.
- Correction of the temperature: is necessitated by the exchange of heat with the exterior.
- Calculation of the gross heat of combustion of the specimen:
  $PCS = (E * (T_m - T_i + C) - b) / m$
  PCS = gross heat of combustion [MJ/kg]
  E = water equivalent [MJ/K]
  T_m = maximum temperature [K]
  T_i = initial temperature [K]
  C = temperature correction [K]
  b = correction [MJ] (fuels only)
  m = mass of test specimen [kg]

CRITERIA FOR EVALUATION ACCORDING TO EN 13501-1

The criteria below apply to the average test results from the three parallel tests. A product needs to meet the following criteria for a classification A1.

1. PCS ≤ 2.0 MJ/kg [a] and
2. PCS ≤ 2.0 MJ/kg [b c] and
3. PCS ≤ 1.4 MJ/m^2 [d] and
4. PCS ≤ 2.0 MJ/kg

For a classification A2, the following criteria need to be met:

1. PCS ≤ 3.0 MJ/kg [a] and
2. PCS ≤ 4.0 MJ/m^2 [b] and
3. PCS ≤ 4.0 MJ/m^2 [d] and
4. PCS ≤ 3.0 MJ/kg [e]

[a] For homogeneous products and substantial components of non-homogeneous products.
[b] For any external non-substantial component of non-homogeneous products.
[c] Alternatively, any external non-substantial component having a *PCS* ≤ 2.0 MJ/m^2 , provided that the product satisfies the following criteria of EN 13823:
FIGRA ≤ 20 W/s, and *LFS* < edge of specimen, and THR_{600s} ≤ 4.0 MJ, and s1, and d0.
[d] For any internal non-substantial component of non-homogeneous products.
[e] For the product as a whole.

TEST SPECIMENS

A product shall be evaluated through each of its components, taking into account the rules for non-substantial components. If a non-homogeneous product cannot be delaminated, its components shall be provided separately.

A sample of a minimum mass of 50 g shall be taken at random from the homogeneous product or component of a non-homogeneous product or loose-fill product.
For liquid applied products a sample of a minimum mass of 10 g of dried material shall be prepared.

Three test specimens of 10 g each shall be prepared from the samples taken by grinding and using the preparation methods ‘crucible’ or ‘cigarette’.

TESTING

Testing can be started when order is confirmed in writing, and the test specimens have been conditioned according to the standard. Normally it will take about 4-5 weeks from when we have received the test specimens until the test report is finished.

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Efectis Nederland BV is the centre for fire safety in the Netherlands. The centre has at its disposal a range of services that complement and strengthen each other: testing & certification, special fire testing, calculations & modelling, consultancy & courses and regulations & assessments.

There are three specialities within testing:

- Reaction to fire: testing of materials and objects in the fire development phase;
- Resistance to fire: testing of (parts of) building components and structures during exposure to a fully developed fire;
- Special testing and fire investigation: for example tests on extinguishing systems, and tests on smoke and heat exhaust ventilators including open-close and freeze-thaw cycles. On-site fire investigation into the cause or development of a fire, in addition to small-scale or large-scale reconstructions, for example for use in forensic research.

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