

# Australian/New Zealand Standard™

AS/NZS 2341.10:2015

## Methods of testing bitumen and related roadmaking products

### Method 10: Determination of the effect of heat and air on a moving film of bitumen (rolling thin film oven (RTFO) test)

#### PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CH-025, Bitumen and Related Products for Roadmaking, to supersede AS/NZS 2341.10:1994.

The most significant changes are the addition of a procedure to determine the mass change of a sample after rolling thin film oven (RTFO) treatment and inclusion of a formula to calculate the percentage change in viscosity of a material after RTFO treatment.

#### METHOD

##### 1 SCOPE

This Standard sets out a treatment of bituminous binders which is intended to simulate the conditions obtained when the binders are used to manufacture hot-mixed asphalt. The change in the binder properties prior to and after treatment as specified by this test method may be determined in several ways. This method determines the change in mass of the sample under test and in addition makes a treated residue available for further testing.

This method is applicable to bitumens used in the construction and maintenance of pavements (as specified in AS 2008) and polymer modified binders (PMBs) as specified in AGPT-T190.

##### 1.1 SAFETY DISCLAIMER

**WARNING: THE USE OF THIS STANDARD MAY INVOLVE HAZARDOUS MATERIALS, OPERATIONS AND EQUIPMENT. THIS STANDARD DOES NOT PURPORT TO ADDRESS ALL OF THE SAFETY PROBLEMS 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.**

## 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

2008 Bitumen for pavements

AS/NZS

2341 Methods of testing bitumen and roadmaking products

2341.1 Part 1: Precision data—Definitions

2341.21 Part 21: Sample Preparation

ASTM

E1 Standard Specification for ASTM Liquid-in-Glass thermometers

Austroroads

AGPT-T102 Protocol for Handling Modified Binders in Preparation for Laboratory Testing

AGPT-T190 Specification Framework for Polymer Modified Binders

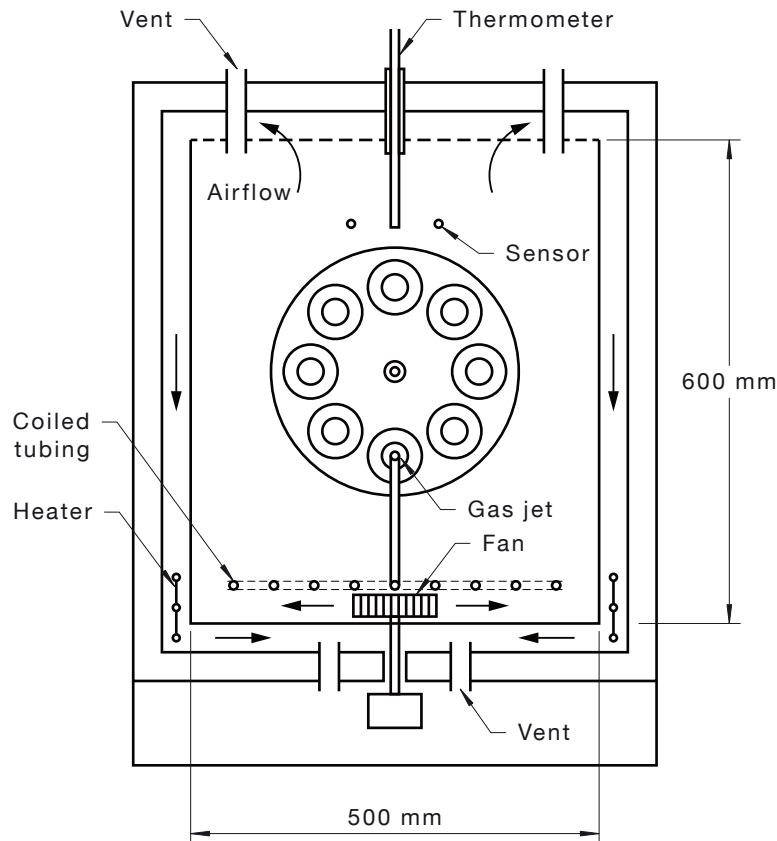
## 3 PRINCIPLE

A moving film of binder is exposed to heat and air. Selected properties are measured before and after treatment.

## 4 APPARATUS

The following items of apparatus are required:

- (a) *Oven*—an electrically heated oven with fan-forced air circulation. Figure 1 shows details of dimensions and directions of airflow. The internal dimensions of the oven shall be nominally 600 mm high 500 mm wide 500 mm deep.



NOTE: Where no tolerances are given, dimensions are nominal.

FIGURE 1 CROSS-SECTION OF TEST OVEN

The door shall be fitted with a symmetrically located inspection window,  $300 \pm 10$  mm wide and  $200 \pm 10$  mm high, consisting of sheets of heat-resistant glass separated by a sealed air space.

Ventilation of the oven is provided at the top by two symmetrically placed circular openings, 25 mm in diameter, and at the bottom by one or two openings of the same total area.

The oven shall be provided with a circular carriage, with openings and clips for firmly holding eight glass sample bottles in a horizontal position parallel to the shaft (see Figure 2). This carriage is rotated in a vertical plane at a speed of  $15.0 \pm 0.5$  rpm by a shaft which is preferably supported by external ball bearings.

The oven shall be fitted with a temperature controller capable of maintaining the temperature at  $163.0 \pm 0.5^\circ\text{C}$  as indicated by the thermometer shown in Figure 2. The controller and heaters shall be such that the oven temperature is regained within 10 min of closing the door after inserting the binder samples. Sensing elements of the temperature controller shall be placed above and near to the circular carriage.

The oven shall be equipped with an air jet positioned to blow heated air centrally into the mouth of each bottle as it passes the lowest point of rotation of the carriage. The air jet, with an outlet orifice of  $1.0 \pm 0.2$  mm diameter, is connected to a  $7.5 \pm 0.5$  m length of 8 mm nominal outside diameter thin-walled copper tubing. This tubing is coiled to lie flat near the bottom of the oven and is provided with a suitable coupling through the oven wall for connection to the air supply.