

Australian/New Zealand Standard™

AS/NZS 2891.14.5:2014

Methods of sampling and testing asphalt

Method 14.5: Field density tests—Density ratio and percentage air voids of compacted asphalt

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing, to supersede AS/NZS 2891.14.5:1999, *Methods of sampling and testing asphalt*, Method 14.5: *Field density tests—Density ratio of compacted asphalt*.

The objective of this revision is to introduce a method for expressing asphalt compaction by in-situ air void content.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

METHOD

1 SCOPE

This Standard sets out the method for determining the density ratio and percentage air voids of in-situ compacted asphalt. It is applicable to asphalt having a nominal size not exceeding 40 mm.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

2150 Hot mix asphalt—A guide to good practice

2891 Methods of sampling and testing asphalt

2891.1.2 Method 1.2: Sampling—Coring method

AS/NZS

2891 Methods of sampling and testing asphalt

2891.1.1 Method 1.1 Sampling—Loose asphalt

2891.7.1 Method 7.1: Determination of maximum density of asphalt—Water displacement method

2891.7.3 Method 7.3: Determination of maximum density of asphalt—Methylated spirits displacement

2891.9.1 Method 9.1: Determination of bulk density of compacted asphalt—Waxing procedure

2891.9.2 Method 9.2: Determination of bulk density of compacted asphalt—Presaturation method

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2891.9.3 Method 9.3: Determination of bulk density of compacted asphalt—
Mensuration method
- 2891.14.1.1 Method 14.1.1: Field density tests—Determination of field density of
compacted asphalt using a nuclear surface moisture-density
gauge—Direct transmission mode
- 2891.14.1.2 Method 14.1.2: Field density tests—Determination of field density of
compacted asphalt using a nuclear surface moisture-density
gauge—Backscatter mode
- 2891.14.2 Method 14.2: Field density tests—Determination of field density of
compacted asphalt using a nuclear thin-layer density gauge

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 2891.1.1 and AS 2150 apply.

4 PROCEDURE

The procedure shall be as follows:

- (a) Determine the bulk or field density (ρ) of the asphalt using one of the following methods:
 - (i) *Coring* Unless otherwise specified, obtain a core from the asphalt in accordance with AS 2891.1.2.

The diameter of the core shall be equal to or greater than 95 mm or four times the nominal size of the asphalt, whichever is the greater. The height of the core shall be not less than twice the nominal size of the asphalt.

Determine bulk density (ρ) of the core in accordance with AS/NZS 2891.9.1, AS/NZS 2891.9.2 or AS/NZS 2891.9.3, as appropriate.
 - (ii) *Nuclear gauge* Determine the field density of the compacted asphalt in accordance with AS/NZS 2891.14.1.1, AS/NZS 2891.14.1.2 or AS/NZS 2891.14.2, as appropriate to the asphalt layer thickness and the gauge to be used.
- (b) Record the mix identification and other mix details, as required.
- (c) Ascertain the reference density (ρ_a) of the asphalt mix used.
NOTE: For information on the reference density of the asphalt mix, see Appendix A.

5 CALCULATIONS

Calculate the following as appropriate:

- (a) Density ratio (DR), using the following equation:

$$DR = \frac{\rho}{\rho_a} \times 100 \quad \dots (5.1)$$

where

DR = density ratio of the asphalt, as a percentage

ρ = bulk or field density of the asphalt, in tonnes per cubic metre

ρ_a = reference density of the asphalt mix, in tonnes per cubic metre

- (b) Percentage air voids (AV), using the following equation:

$$AV = \frac{\rho_{\max} - \rho}{\rho_{\max}} \times 100 \quad \dots (5.2)$$

where

AV = air voids, as a percentage

ρ = bulk or field density of the asphalt, in tonnes per cubic metre

$\rho_{\max}$ = reference maximum density of the asphalt mix, in tonnes per cubic metre determined in accordance with AS/NZS 2891.7.1 or AS/NZS 2891.7.3

6 TEST REPORT

6.1 Test results

The following test results, as applicable, shall be reported:

- (a) The density ratio, as a percentage, to the nearest 0.5%.
- (b) The air voids, as a percentage, to the nearest 0.1%.

6.2 General information

The following general information, as applicable, shall be reported:

- (a) Method used for bulk or field density measurement.
- (b) Source, nominal size, type and nominal layer thickness of the asphalt tested.
- (c) Location of the test site.
- (d) Reference density, in tonnes per cubic metre, of the asphalt mix, to the nearest 0.001 t/m³.
- (e) The method used to determine and the identification of the appropriate report from which the bulk, field or reference density was obtained.
- (f) Bulk or field density, in tonnes per cubic metre, at the test site, to the nearest 0.01 t/m³ or 0.001 t/m³ and the identification of the appropriate report.
- (g) Reference to this Standard, i.e. AS/NZS 2891.14.5.