

# CALCULATION OF ODOUR LEVELS

## CERC

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*In this document 'ADMS' refers to ADMS 6.0, ADMS-Roads 5.1, ADMS-Urban 5.1 and ADMS-Airport 5.1. Where information refers to a subset of the listed models, the model name is given in full.*

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### 1. Introduction

Odours are typically measured in 'odour units'. The Odours option in ADMS uses the odour unit ' $ou_E$ ' defined in the European standard (EN 13725:2003<sup>1</sup>). One  $ou_E$  is the mass of pollutant that, when evaporated into 1 m<sup>3</sup> of odourless gas at standard conditions, is at the detection limit.

For non-odours calculations, ADMS calculates mass concentrations in g/m<sup>3</sup> from mass emission rates e.g. g/s for point sources. Since  $ou_E$  are a mass measure, they can be treated identically to g. The user specifies emissions in  $ou_E$  /s for point sources and results are obtained in  $ou_E$  /m<sup>3</sup>. **Table 1** gives the standard and odours emissions rates for all source types available in ADMS.

Source type	Standard emission units	Emission units when modelling odours
Point	g/s	$ou_e$ /s
Jet	g/s	$ou_e$ /s
Line	g/m/s	$ou_e$ /m/s
Road	g/km/s	$ou_e$ /km/s
Area	g/m <sup>2</sup> /s	$ou_e$ /m <sup>2</sup> /s
Volume	g/m <sup>3</sup> /s	$ou_e$ /m <sup>3</sup> /s
Grid	g/m <sup>2</sup> /s	$ou_e$ /m <sup>2</sup> /s
Aircraft	g/s	$ou_e$ /s

**Table 1** – Emission rates for source types available in ADMS

For some pollutants, data giving the odour unit strength for a particular g/s release rate are readily available. However, these data are not available for all pollutants, and are not generally available for mixes of pollutants (note that the odour levels for different pollutants should not be summed, as the effects of different pollutants are not additive). If odour unit strength data are not available for the pollutant(s) to be modelled, it may be necessary to use olfactometry to specify the source strength.

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<sup>1</sup> Title: 'Air quality – determination of odour concentration by dynamic olfactometry'

## **2. Advanced odour modelling**

In addition to the calculation of concentrations in odour units ADMS 6 includes a facility to determine the number of odour hours. An hour is defined as an odour hour for a location if the odour concentration within that hour at that location exceeds a user defined threshold for a certain fraction of the hour. ADMS uses the fluctuations module to calculate the fluctuation of concentrations within an hour and thus if each hour is an odour hour, further details of these calculations are given in Section 2.1.

In addition to the full odour hours calculation using the fluctuations module a simpler peak-to-mean method can also be used to compare peak concentrations against a threshold, details of these calculations are given in Section 2.2.

### **2.1 Odour hour calculation using fluctuations**

When using the fluctuations module to calculate odour hours an averaging time and percentage of hour to exceed,  $\alpha$ , are specified. The fluctuations module is then run using the specified averaging time to calculate a short-term percentile of  $100-\alpha$  for each hour. The hour is then classified as an odour hour if this calculated percentile is higher than the specified threshold. These calculations are carried out for each output location.

More details on the fluctuations module can be found in technical specification documents P13/01, P13/03 and P13/07.

### **2.2 Peak-to-mean ratio method**

When the peak-to-mean ratio method is used the standard hourly mean concentration is multiplied by the user specified peak-to-mean ratio to obtain the peak hourly concentration. The hour is then classified as an odour hour if this calculated peak concentration is higher than the specified threshold. These calculations are carried out for each output location.