



Stanger Science & Environment
The Lansdowne Building
Lansdowne Road, Croydon CR2 2BX
Telephone: (0)181 255 4800
Fax: (0)181 255 4862

Report

Assessment of Mist Levels Generated by Cirro Cracked Oil Machines

Prepared By



Beatriz Garcia

Approved By



Jon Pullen

Prepared for Mr J.P. Coppen
Cirro Lite Ltd
3 Star Works
Salter Street
London
NW10 6UN

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1 Introduction

At the request of J. Coppen from Cirro Lite Ltd, Stanger Science and Environment has carried out an assessment of the levels of mist generated by the range of cracked oil machines manufactured by Cirro Lite Europe Ltd. The assessment was carried out on Tuesday 20 November 1996.

Mist machines are used to create special atmospheres in different situations (e.g. film and TV shooting, theatre, live music, etc). They are designed to produce a mist which allows the diffusion of light and creates the special sense of depth required in certain situations.

The five machines manufactured by Cirro Lite comprise the same basic instrumentation which consists of a compressor and an oil reservoir. The action of passing air under pressure through several small jets and filters in a manifold and then through the oil, produces the mist. All the Cirro machines operate under the same principle; pharmaceutical grade mineral oil is atomised as a fine mist which is distributed (with the aid of a fan) homogeneously across the room. As a result of the low density of the oil and the small diameter of the droplets, the mist remains in suspension for prolonged periods of time and the machine only needs to be run for a few minutes to create the desired effect.

The first Cirro machine, the **Cirrus System** was introduced

Since then, further machines have been developed based on the original Cirrus system: the **Cirro Mark 3**, the **Cirro Micro**, the **LE100**, the **LE200** and the **Cirro Strata**. The new machines are of smaller size and generate less volume of mists.

Levels of mist generated by each individual cracked oil machine have been assessed visually. The visual assessment has been compared with workplace air monitoring results carried out as part of the COSHH assessment of the Cirrus Lite model undertaken in 1991 by London Scientific Services (Report Ref RSE/OHS/152). This has enabled an estimation of compliance with Occupational Exposure Limits (OEL) as defined by the Health and Safety Executive (HSE) to be made.



2 Method of Assessment

Mist generated from the Cirro Micro (Mark 4) cracked oil machine was assessed visually, and further interpretations were made based on comparisons with levels measured in the COSHH assessment undertaken by London Scientific Services (LSS) on 28 June 1991.

On that occasion, monitoring was carried out using relevant guidance taken from the HSE MDHS 14. The Cirrus System machine was run for about 5 minutes in a large room (approximately 3520 m³) to give the mist effect normally required in studios, theatres or concerts. Background mist concentrations inside the studio were then measured using four personal pumps over a period of between 2.5 and 4.5 hours. Concentrations of mist varied between 0.06 and 0.4 mg m⁻³ and were categorised as low.

The present survey was carried out at Cirro Lite premises by running the Cirro Micro machine and the original Cirrus System machine, over a period of time until the conditions used in the previous assessment (e.g. the mist density) were fully recreated. The test room was partially occupied by equipment and the available volume of air for the dispersion of the mist was therefore substantially reduced. On this basis, the machines were run for three minutes instead of five to achieve the same mist level used in the 1991 assessment and most commonly required in working situations. The tests were run consecutively and the room was thoroughly ventilated between tests until the mist from the previous test was fully dissipated.

After the three minutes, the machines were switched off and the mist concentrations were visually assessed. In order to further characterise mist intensities, the lights were then switched off and a hand held light similar to those used in the theatre and cinema was used to give a beam of light. The mist level was then further assessed by looking at the definition of the light beam. Denser mists result in more defined beams and vice versa.

3 Legislation

The Health and Safety Executive in its Guidance Note EH 40/95 stipulates an Occupational Exposure Limit (OEL) for total mist of 5 mg m⁻³. This is based on an 8-hour weighed average reference period.

The OEL is the concentration of an airborne substance, averaged over a reference period, that should not be exceeded. If it is exceeded, the employer must promptly identify the reasons and take appropriate steps to reduce exposures as soon as reasonably possible.



4 Results and Discussion

4.1 Cirro Micro (Mark 4)

The Cirro Micro cracked oil machine produces approximately 50% less mist than the earlier Cirro design, the Cirrus System. The oil consumption has been halved to approximately 100 ml every four hours.

This machine generated a much thinner mist than the previous model. The visual estimation is that the background levels of mist were approximately 50% lower. The spotlight given by the light beam, was substantially softer. It was pointed out by the client that this machine need to be run for longer periods of time in order to achieve thicker sustained oils mists.

The mist generated by the Cirro Micro machine was observed to be of lower concentration than that given by the Cirrus System cracked oil machine. Since the concentrations of mist generated by the Cirrus System machine have been shown to be well below the permissible level of 5 mg m^{-3} , it can be concluded that the Cirro Micro machine is clearly acceptable if is used to produce standard mist effects using the same time durations as the other machines.



5 Conclusions

The mist produced by the Cirro Micro cracked oil machines is considered to be as acceptable in terms of its use to produce the mist effects normally required and outlined above.

The Cirro Micro was observed to produced levels of mist comparable to those generated by the original Cirrus System when used for the same intended purpose of producing a light beam illumination effect. On this basis, the mist concentrations generated by the Cirro Micro cracked oil machine are though to be lower than the OEL of 5 mg m^{-3} considered as acceptable by the HSE.

6 Disclaimer

We confirm that in preparing this report we have exercised all reasonable skill and care