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Cleanroom energy – Code of practice for improving energy efficiency in cleanrooms and clean air devices

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 30, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2013. It was prepared by Technical Committee LBI/30, *Cleanroom technology*. A list of organizations represented on this committee can be obtained on request to its secretary.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

Cleanroom cleanliness can be classified by the concentration of specific contaminants in the air or on surfaces in the cleanroom. Cleanrooms use a considerable amount of energy to provide large amounts of filtered and conditioned air to achieve the specified levels of cleanliness. A considerable amount of energy is also used to achieve:

a) the necessary temperature and relative humidity for the process in the cleanroom and for personnel comfort;

b) the necessary pressurization of the space; and

c) in some cases, the necessary airflow volume flow rate for unidirectional airflow and to a reduced extent non-unidirectional airflow.

Some firms using cleanrooms report that heating and ventilating systems consume up to 80% of the total energy used in their manufacturing facility simply to deliver clean, conditioned air to critical operations. This energy is consumed by heating, cooling, humidification and fan power. Of this, fans required to move air can account for 35% to 50%, much of this being due to the extra energy required to overcome the high pressure differential required for the high efficiency filters and other ventilation components used in cleanrooms. There is therefore a significant potential for energy saving by diligent design in the installation of new cleanrooms and by retrofit improvements and upgrades to existing facilities.

This British Standard lists and explains measures that can be taken to reduce energy consumption in cleanrooms and applies to the whole range of "cleanroom technology", from cleanrooms to clean air devices, including isolators, glove boxes and mini-environments as described in BS EN 14644-7. Cleanroom technology is used by organizations within the life-sciences, micro-electronics, aerospace and nuclear fields. The life-sciences sector includes hospital, pharmaceutical and medical device activities.

This British Standard does not address related production processes such as water treatment, oven, autoclave and stress cycling operations that can also create significant energy demands.

1 Scope

This British Standard gives recommendations on reducing energy consumption and maintaining energy efficiency in new and existing cleanrooms and clean air devices classified by BS EN ISO 14644-1.

The standard is not applicable to the energy efficiency of process equipment, except where it affects the cleanroom environment.

NOTE 1 Further guidance on the use of energy management systems is given in BS EN ISO 50001.

NOTE 2 Energy saving opportunities are listed in Annex A and detailed in Annex B.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 1886, *Ventilation for buildings – Air handling units – Mechanical performance*

BS EN 14799, *Air filters for general air cleaning – Terminology*