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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 25915.16-2024

**Cleanrooms and associated controlled environments - Part 16:
Energy efficiency in cleanrooms and separative devices**

洁净室及相关受控环境 第16部分：提升洁净室和空气净化装置的能效
(English Translation)

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Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative references	
3 Terms and Definitions	
4 Energy saving assessment and implementation process	
5 Impact of user technical requirements on energy consumption	
6 Air volume and compensation factor	
7 Energy Management. Slowdown, Shutdown and Recovery	
8 Adaptive Control	
9 Heating and cooling loads	
10 Fan and filter selection	
11 Lighting Level	
12 Training	
13 Run	
14 Maintenance	
15 Deactivate	
Appendix A (Informative) Source Strength. Wind Volume and Example	
Appendix B (Informative) Energy Saving Opportunities	
Appendix C (Informative) Impact Assessment	
Appendix D (Informative) Benchmark comparison. Cleanroom energy performance parameters	
Appendix E (Informative) Measures to reduce heating and cooling losses	
Appendix F (Informative) Example of Reducing Critical Areas	
Reference	

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is part 16 of GB/T 25915 Cleanrooms and Related Controlled Environments. GB/T 25915 has been published for the following part.

- Part 1: Classification of air cleanliness levels according to particle concentration;
- Part 2: Monitoring of particle concentration in clean room air;
- Part 3: Detection methods;
- Part 4: Design, construction and start-up;
- Part 5: Operation;
- Part 6: Vocabulary;
- Part 7: Isolation devices (clean air hoods, glove boxes, isolators, microenvironments);
- Part 8: Classification of air cleanliness (ACC) by chemical concentration;
- Part 9: Classification of surface cleanliness levels according to particle concentration;
- Part 10: Classification of surface cleanliness levels according to chemical concentration;
- Part 12: Technical requirements for monitoring the concentration of nanoparticles in the air;
- Part 13: Surface cleaning to meet particle and chemical cleanliness requirements;
- Part 14: Assessment of equipment suitability according to particle concentration;
- Part 15: Assessment of suitability of equipment and materials according to concentration of gaseous chemicals;
- Part 16: Improving the energy efficiency of clean rooms and air purification equipment.

This document is equivalent to ISO 14644-16:2019 "Cleanrooms and related controlled environments Part 16: Improved cleanroom and air purification Energy Efficiency of Devices.

Introduction

GB/T 25915 adopts the ISO 14644 series of international standards. The settings of each part are consistent with the international standards. It is planned to consist of 16 parts. constitute.

- Part 1: Classification of air cleanliness levels according to particle concentration. The purpose is to distinguish the degree of particle contamination.
- Part 2: Monitoring of particle concentration in clean room air. The purpose is to guide the monitoring of particle contamination to avoid possible contamination risk.
- Part 3: Detection methods. The purpose is to guide the detection of various pollution and related environmental factors in clean rooms.

- Part 4: Design, construction and startup. The purpose is to guide the design, construction and startup of clean rooms.
- Part 5: Operation. The purpose is to guide the operation of the clean room.
- Part 6: Vocabulary. The purpose is to unify and standardize technical terms.
- Part 7: Isolation devices (clean hoods, glove boxes, isolators, microenvironments). The purpose is to propose basic this requirement.
- Part 8: Classification of air cleanliness (ACC) levels by chemical concentration. The purpose is to distinguish the degree of chemical pollution in the air.
- Part 9: Classification of surface cleanliness levels according to particle concentration. The purpose is to distinguish the degree of surface particle contamination.
- Part 10: Classification of surface cleanliness levels according to chemical concentration. The purpose is to distinguish the degree of chemical contamination on the surface.
- Part 12: Technical requirements for monitoring the concentration of nanoparticles in the air. The purpose is to propose the detection of nano-scale particle pollution Require.
- Part 13: Surface cleaning to achieve particle and chemical cleanliness requirements. The purpose is to provide cleaning requirements for surfaces within clean rooms to Avoid the risk of possible particle and chemical contamination.
- Part 14: Assessment of equipment suitability by particle concentration. The purpose is to assess the possible particle contamination that may be generated in the clean room by the relevant equipment.

Tests to determine the suitability of the equipment.

- Part 15: Assessment of the suitability of equipment and materials according to the concentration of gaseous chemicals. The purpose is to assess the suitability of equipment and materials by assessing...

Tests that generate gaseous chemical contamination in clean rooms to determine the suitability of equipment and materials.

- Part 16: Improving the energy efficiency of clean rooms and air purification equipment. The goal is to reduce clean room energy consumption and the resulting global impact.
- Part 17: Application of particle deposition rate reduction. The purpose is to provide a method for evaluating the particle cleanliness of sensitive surfaces of products and to provide Classification standards related to surface large particle sedimentation pollution.

Cleanrooms and related controlled environments are widely used in many industrial fields, such as life sciences (including pharmaceuticals, medical devices, hospitals), micro Electronics, aerospace, nuclear industry. The operating area of clean rooms ranges from

tens to tens of thousands of square meters, and they have different designs depending on their functions.

Cleanrooms have experienced rapid development and progress over the past few decades, and their increasing energy demands also reflect their rapid development.

The document contains the accumulated experience and practices in cleanroom design, operation and maintenance, aiming to reduce cleanroom energy consumption and the global impact it brings.

The reader is also referred to ISO 14644-4 for the detailed description of the design work.

Although cleanrooms vary widely in function and size, their energy consumption can generally be more than 10 times higher than that of a similar-sized office.

To achieve the required cleanliness level, filtering and conditioning large amounts of air consumes considerable energy, of which fans can account for 35% to 50%. This is the energy consumption required for high-efficiency filters and other air circulation links working under high pressure difference in clean room systems.

The energy consumed by moving air can account for 80% of the total energy consumption of general manufacturing facilities.

In order to maintain the temperature and humidity required for process requirements and personnel comfort in the clean room and to achieve the required pressure in the clean room space, there are other energy. Therefore, there is huge potential for energy saving, both in the careful design of new cleanrooms and in the renovation of existing facilities.

The clean room technical measures applicable to all clean room from clean room to clean air device are introduced and introduced, including GB/T 25915.7 this document is based on actual experience, practice, testing, and theoretical calculations.

Make a clear and scientific explanation of the energy-saving effect.

It should be noted that the energy-saving methods and technologies used in this document are universal and suitable for different environments and situations. They are not for specific processes, and does not include related production processes, such as water treatment, furnaces, autoclaves, stress cycle operation, etc. Supply and demand parties and installation the actual conditions under which the cleanroom operates, as agreed upon by the engineers, determine the specific application of these energy-saving methods.

At every stage of the cleanroom life cycle, there are opportunities to optimize system performance and save energy.

It is most effective to build a clean room, but similar energy saving effects can be achieved in an operating clean room.

It can be used individually or in groups.