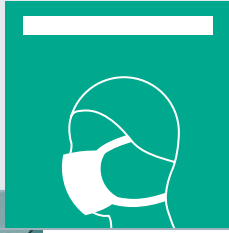
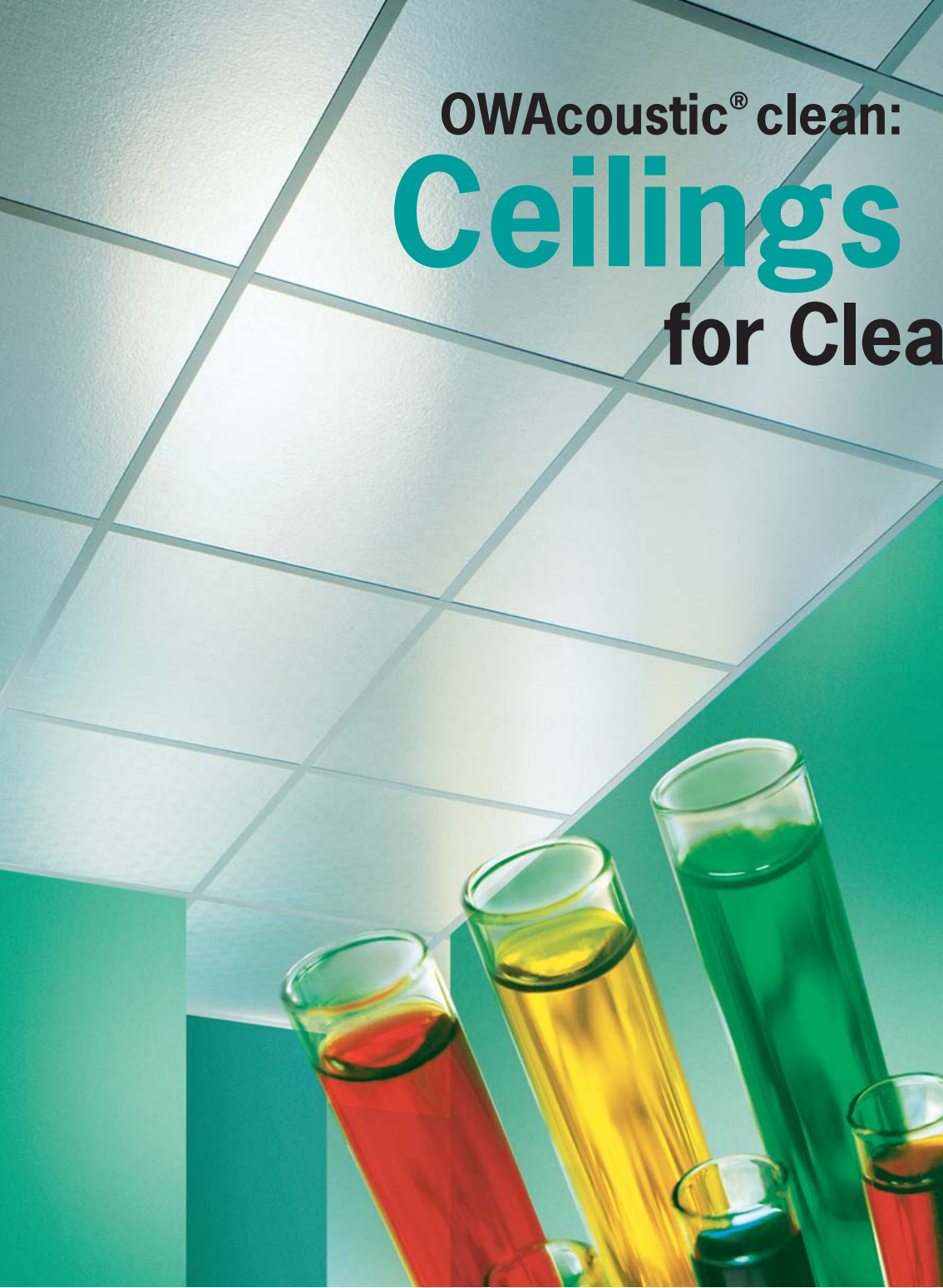




**OWAcoustic®
premium**



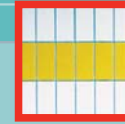
OWAcoustic® clean:
Ceilings
for Clean Rooms



OWA



Air purity in Clean Rooms



The contamination of products and production processes caused by airborne particles is monitored up to a certain reasonable degree in clean rooms and associated clean room areas. The aerospace, microelectronics, pharmaceutical, and food industries in particular use such clean rooms for sensitive production processes.

Building materials for clean rooms are therefore subject to special air purity requirements that are expressed in a minimum emission of airborne particles. The highest permissible limits are defined in EN ISO 14644-1, which we comply with in six of nine classes (ISO classes 4 – 9) with OWAcooustic® clean ceilings. This qualifies these ceilings for many clean room areas. Here is an overview in this regard:

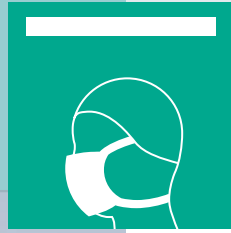
Comparative classifications, according to EN ISO 14644-1 and other current specifications.

The following is a comparison of EN ISO 14644-1 and the EG-GMP rule group as well as the US Federal Standard 209E. The US standard was withdrawn in 2001, and is only used for orientation purposes.

Nomenclature				Permitted upper limits of particle number according to EN ISO 14644-1, corresponding to different particle sizes	
DIN EN ISO 14644-1	EG-GMP „at rest“	EG-GMP „in operation“	US Fed. Standard 209E*	for 0,5 µm	
				per m ³	per cbf
1					
2				4	0,1
3				35	1
			1	35	1
4			10	352	9,9
				353	10
5				3.520	100
	A	A		3.520	100
	B			3.520	100
			100	3.530	100
6				35.200	997
			1.000	35.300	1.000
7				352.000	9.972
	C			352.000	9.972
		B		352.000	9.972
			10.000	353.000	10.000
8				3.520.000	99.716
	D			3.520.000	99.716
		C		3.520.000	99.716
			100.000	3.530.000	100.000
9				35.200.000	997.167



OWAcoustic®
premium



OWAcoustic® clean Testing and Certification

OWAcoustic® clean is a mineral wool ceiling panel in the OWAcoustic® range which is faced with a high grade aluminium foil. This provides a high performance panel with an easily cleaned surface that inhibits the adhesion of airborne particles, which is precisely one of the requirements to be met in clean rooms.

In order to ascertain the suitability of OWAcoustic® clean ceiling systems for clean rooms, Fraunhofer IPA in Stuttgart conducted extensive tests. The measurements were carried out in a Class 1 clean room (in accordance with EN ISO 14644-1) which meant that a reference volume of one m³ of air was permitted to contain no more than two 0.2 µm particles.

In order to simulate the vibration environments similar to those which may be expected in practical applications, a woofer was used, which subjected the ceiling panels to a sinusoidal oscillation of $f = 50$ Hz. Using an optical particle counter, the emission-related behaviour was tested on versions of OWAcoustic® clean mineral wool ceiling panels.

Test passed:

Class 4 attained



All OWAcoustic® clean-Ceilings were shown to comply with “Class 4 according to EN ISO 14644-1 (class 10 according to US Federal Standard 209E)”. This result was also attained by the OWAtecta - Metal ceiling (System S 31) in a plain (un-perforated) version (L0).

The “Universal 65/1” version in System S 3 provides good sound absorption as well, due to a light perforation.

OWAcoustic® clean panels	Building class	Edge detail	Sound absorption
greywhite 64/12	A2-s1,d0 EN 13501-1	Square Edges painted	$\alpha_w = 0.15$ NRC = 0.15
silver 64/14	A2-s1,d0 EN 13501-1	Square Edges painted	$\alpha_w = 0.15$ NRC = 0.15
white 64/18	A2-s3,d0 EN 13501-1	Square Edges painted	$\alpha_w = 0.15$ NRC = 0.15
Universal 65/1	A2-s1,d0 EN 13501-1	Square Edges painted	$\alpha_w = 0.50$ NRC = 0.55

Testing with and without sealing

Given the different requirements for clean rooms, a variety of measurements were conducted, in which the tile support surfaces were closed, both without any additional sealing measures as well as with a circumferential sealing strip and an acrylic seal. Both configurations achieved class 4.

The sealing measures must be performed in particular if there are requirements to clean the ceilings, which may be necessary in the food industry for example, as well as for requirements for negative or positive pressure on the ceiling.





Ceiling design with OWAcoustic® clean

Sealing measures

Tile support surfaces, ceiling fittings and connections to adjoining components must be sealed in accordance with the specifications. A closed-cell, cross-linked irradiated polyurethane foam strip must be used that is white and self-adhesive on one side and measures 3 x 9 mm (No. 8900). All OWAcoustic® clean tiles must be equipped with retaining clips (No. 819). The wall abutment must be constructed with perimeter trim No. 57, wall spring clip No. 5210, as well as the seal given below.

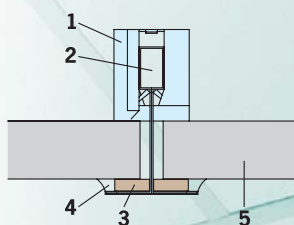
If there will be any pressure loading on the ceiling, then the constant negative or positive pressure must not exceed a maximum of 40 Pa. The suspension must be carried out using nonius hangers. The quality of the sealing measures is dependent on the care taken by the workers.

Comment:

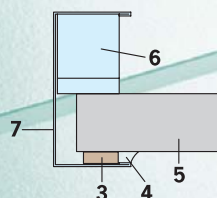
The use of sealing materials may lead to a change in the building material classification in accordance with EN 13501-1. The sealing type must be adapted to the application demands of the respective clean room.

Requirements as to one single particular emission behaviour render the sealing strip and acrylic seal void.

Cut for construction with sealing:



Wall abutment for construction with sealing:

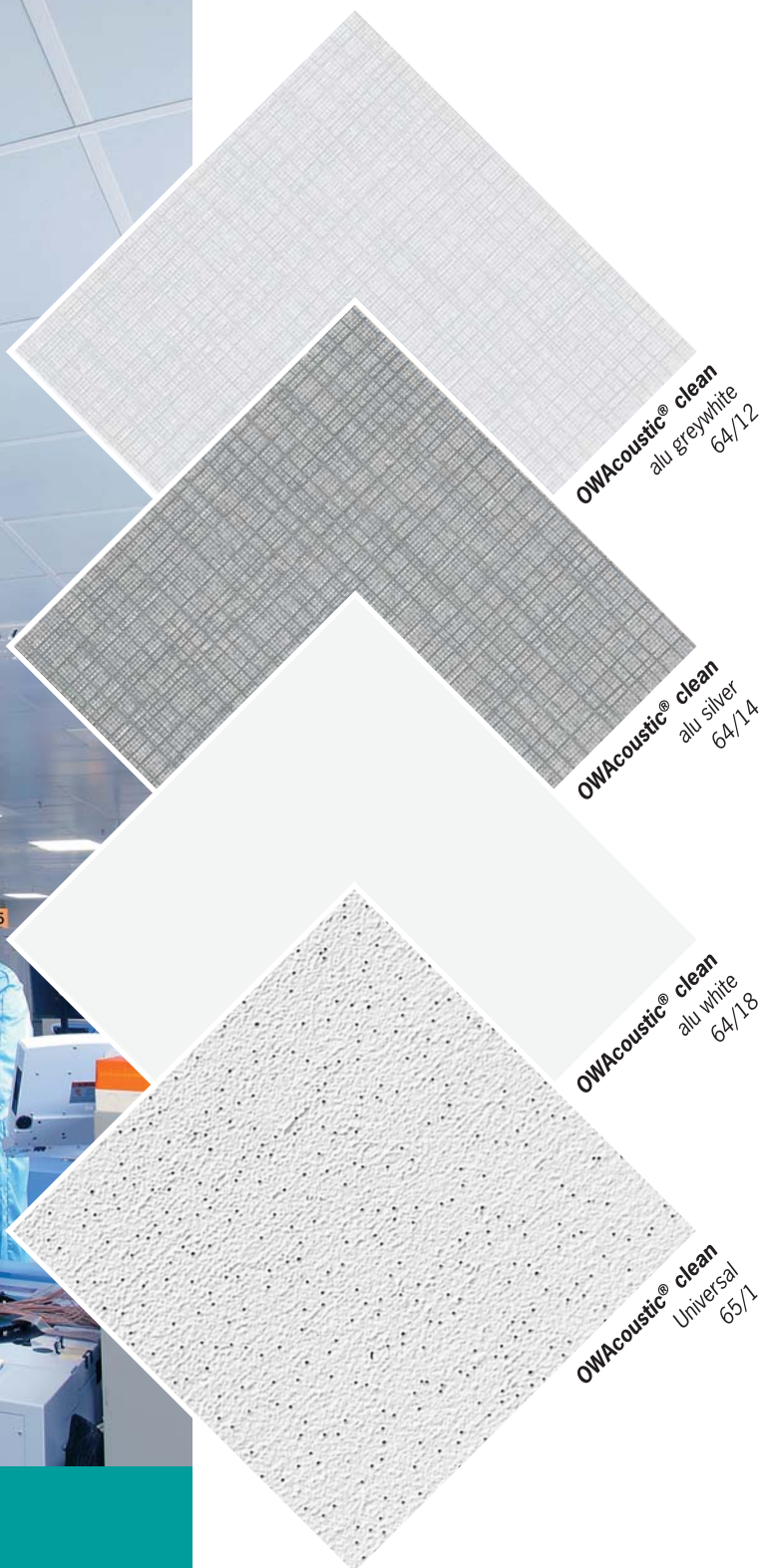
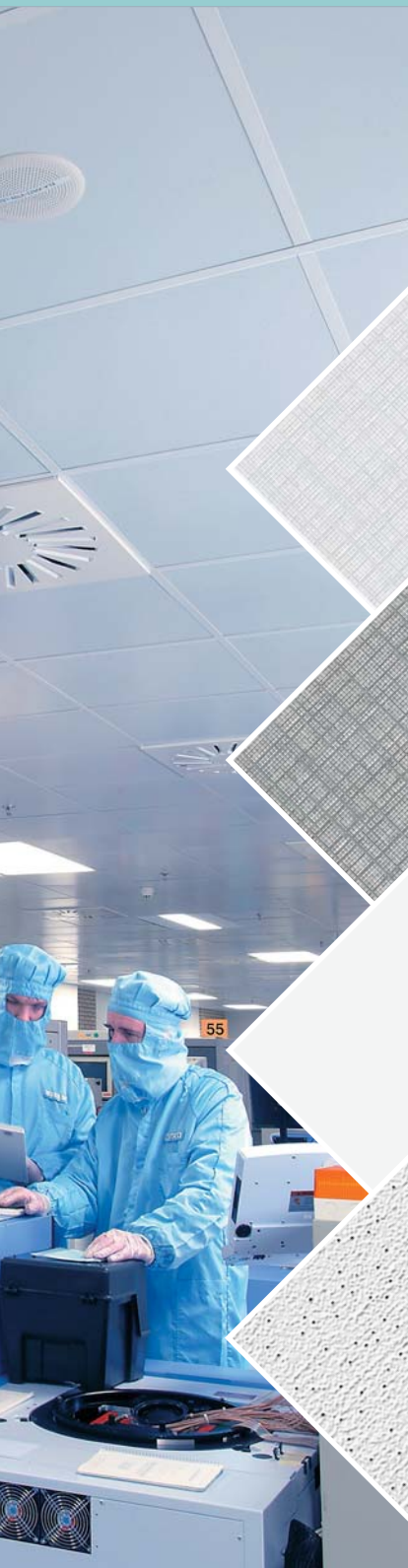
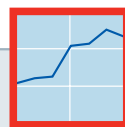


- 1 Retaining clip No. 819
- 2 Main tee or cross tee
- 3 sealing tape No. 8900
- 4 acrylic or equivalent
- 5 OWAcoustic® clean tile
- 6 Wall spring clip no. 5210
- 7 Perimeter trim no. 57

EN ISO 14644-1 deals exclusively with the particle purity of the air. It is part of standard 14644, which in turn is part of a number of standards and sets of rules (e.g. the EG-GMP rule group) that deal with contamination control of clean rooms. Furthermore, there are other requirements on temperature, pressure and humidity conditions in clean rooms, as well as in connection with the planning, operation and monitoring of clean rooms.

In isolated cases, there may be supplemental or restricting specifications from the responsible, legislative authorities that involve special additional testing. The testing presented in this document refers exclusively to the particular emission behaviour of OWAcoustic® clean tiles.

OWAcoustic® clean Four Facings

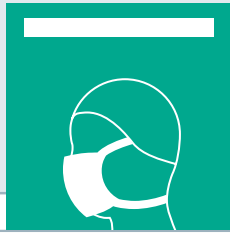


OWAcoustic® clean
alu greywhite
64/12

OWAcoustic® clean
alu silver
64/14

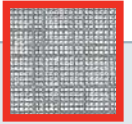
OWAcoustic® clean
alu white
64/18

OWAcoustic® clean
Universal
65/1



OWAcoustic® clean

Technical Data



OWAcoustic® clean tiles have an aluminium foil faced surface in either white, greywhite or silver finish. They are also available with universal 65/1 perforations.

Dimensions:

600 x 600 mm
625 x 625 mm

Other sizes on request.

Thickness: approx. 15 mm

Light reflectance:

on request (white)
approx. 91 (Universal 65/1)

Construction:

OWA-System S 3, Lay in system

Edge:

3

Edges painted

Building material class:

A2-s1,d0 EN 13501-1
64/18
A2-s3,d0 EN 13501-1

Fire resistance:

up to F 120 (DIN 4102)
up to REI 120 (EN 13501-2)

Acoustic absorption:

Average value:
 $\alpha_w = 0.15$ (L) NRC = 0.15
(white/silver)
 $\alpha_w = 0.50$ (L) NRC = 0.55
(Universal 65/1)

All system-related data corresponds to current state-of-the-art. They depend on the exclusive use of OWA products and system components, whose interdependent behaviour is confirmed by internal and external testing. When they are used in combination with non OWA products and system components, any warranty is invalidated. OWA reserves the right to make any technical alterations to improve either product or system development.

This publication is intended to provide technical assistance. The recommendations which it contains are derived from practical experience, but will not necessarily meet particular circumstances in individual cases and therefore carry no warranty.