TOBSLAK
Überall Schutz

Coating systems for cleanroom and clean manufacturing areas- Floor,Wall,Ceiling

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Contents:

Essential of Cleanrooms and clean manufacturing areas

Essential for a growing number of companies, in order that they can safeguard their process operations and the quality of their components.

The requirements of the various industrial sectors differ significantly. Cleanrooms and clean manufacturing areas are used primarily in the following industrial sectors:

Clean rooms

- Biotechnology
- Semiconductor industry
- Photovoltaic
- Microsystem technology
- Food industry
- Pharmaceutical industry
- Aviation and space industry

Clean manufacturing areas

- Automobile and supplier industries
- Machine engineering

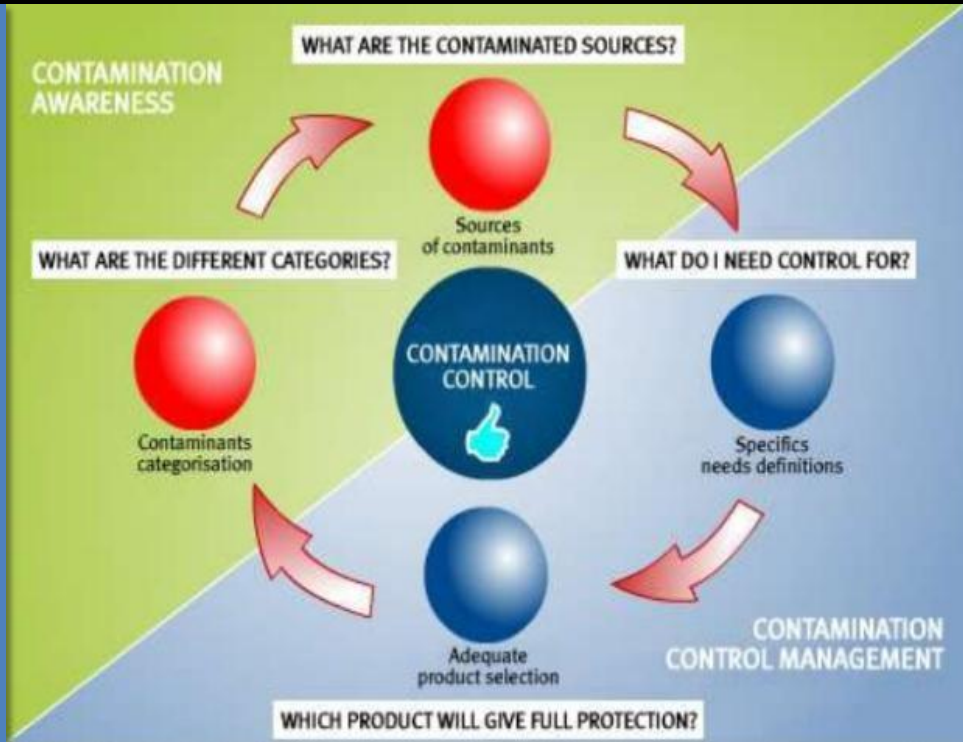
Cleanliness areas

Cleanliness areas are set up to protect sensitive surfaces and items. The purpose of a cleanliness area is to maintain as far as possible the specified cleanliness quality of components, ancillary materials and assemblies during processing. The cleanliness level should not be reduced by the influence of environ- mental factors. Bringing contamination into a cleanliness area must be avoided.
Any contamination, which is incurred there, is to be kept in check and then eliminated. The design, required measures and method of use for cleanliness areas are based on cleanliness requirements, which are related to the particular product. The critical particle sizes are generally between 5 µm and 1,000 µm.

The classification of the cleanliness levels in accordance with VDA 19

Part 2 is in 4 levels:

- Cleanliness level 0 (SaS0): Non-controlled area
- Cleanliness level 1 (SaS1): Clean zone
- Cleanliness level 2 (SaS2): Clean manufacturing area
- Cleanliness level 3 (SaS3): Cleanroom



Classifications bring safety - Regulations & standards

The requirements of different industrial sectors vary considerably. While a low level of outgassing from equipment is mandatory for the manufacture of semiconductors, this has mostly played no role as yet in the manufacture of pharmaceutical products. this has mostly played no role as yet in the manufacture of pharmaceutical products.

There are similarly differences in the particle cleanliness classes between DIN EN ISO 14644-1 and GMP (Good Manufacturing Practice) or cGMP, which applies to the manufacture of human and veterinary medical products. The particle cleanliness classes for air in accordance with DIN EN 14644-1 are divided into Classes 1 to 9, whereby the highest permitted particle count is the lowest in Class 1. In GMP the division is made into Classes A to D, whereby Class A corresponds approximately to ISO Class 5.

Airborne particles represent the largest problem for most production processes. AMC (= Airborne Molecular Contamination) is also playing an ever greater role. These are molecular (chemical, non-particulate) substances in a gas or vapour phase within the atmosphere of a cleanroom area, which could have a harmful effect on the product, process, equipment or personnel. Outgassing from equipment materials, such as for example wall/ceiling/floor coatings, can have negative effects to a significant degree. Examples of this are corrosion effects on metallic conductor strips, defects in lithographic processes, shortened service intervals and life cycles of optics, and the alteration of electrical properties of wafers due to undesirable effects.

In accordance with DIN EN ISO 14644-1 and VDI 2083 Page 1: “A room, in which the concentration of airborne particles is controlled, and which is designed and used in such a way, that the number of particles, which have been brought into the room or which have arisen and been deposited in the room, is as small as possible, and where other parameters relevant to cleanliness, such as temperature, humidity and pressure are controlled as required.” In contrast to the particle sizes in cleanliness areas, particle sizes of 0.1 µm to 5 µm are relevant here. In order to keep the share of more or less severely contaminated outside air as small as possible, normally rooms or storeys outside the actual cleanroom are used for air circulation. This means that it is also necessary there, that floors, walls and ceilings, which mostly consist of reinforced concrete , have a cleanroom-compatible surface. These measures have a significant influence on the lifespan of the filter elements for the cleanroom.

In addition to the quality of the supply air and method of introducing it as well as to the surfaces and personnel, the other critical influencing factor in the cleanliness of a clean-room is the equipment in the room. The equipment includes internal fixtures and fittings such as walls, doors, ceilings and floors. Significant factors in the cleanroom compatibility of equipment are:

- Cleanability
- Emission of airborne particles
- Outgassing behaviour
- Electrostatic discharge properties
- Resistance to chemicals and disinfectants
- Metabolising potential and microbicidity
- Smooth and crack-free surface

Depending on the area of application, the following requirements are placed on wall & floor coating systems:

- Dissipative
- Crack-bridging
- Good abrasion resistance (low particle formation)
- Good mechanical resistance
- Good chemical resistance
- Low outgassing
- Smooth, easily cleanable surface
- Resistant to disinfectants
- Biostatic or microbicidal

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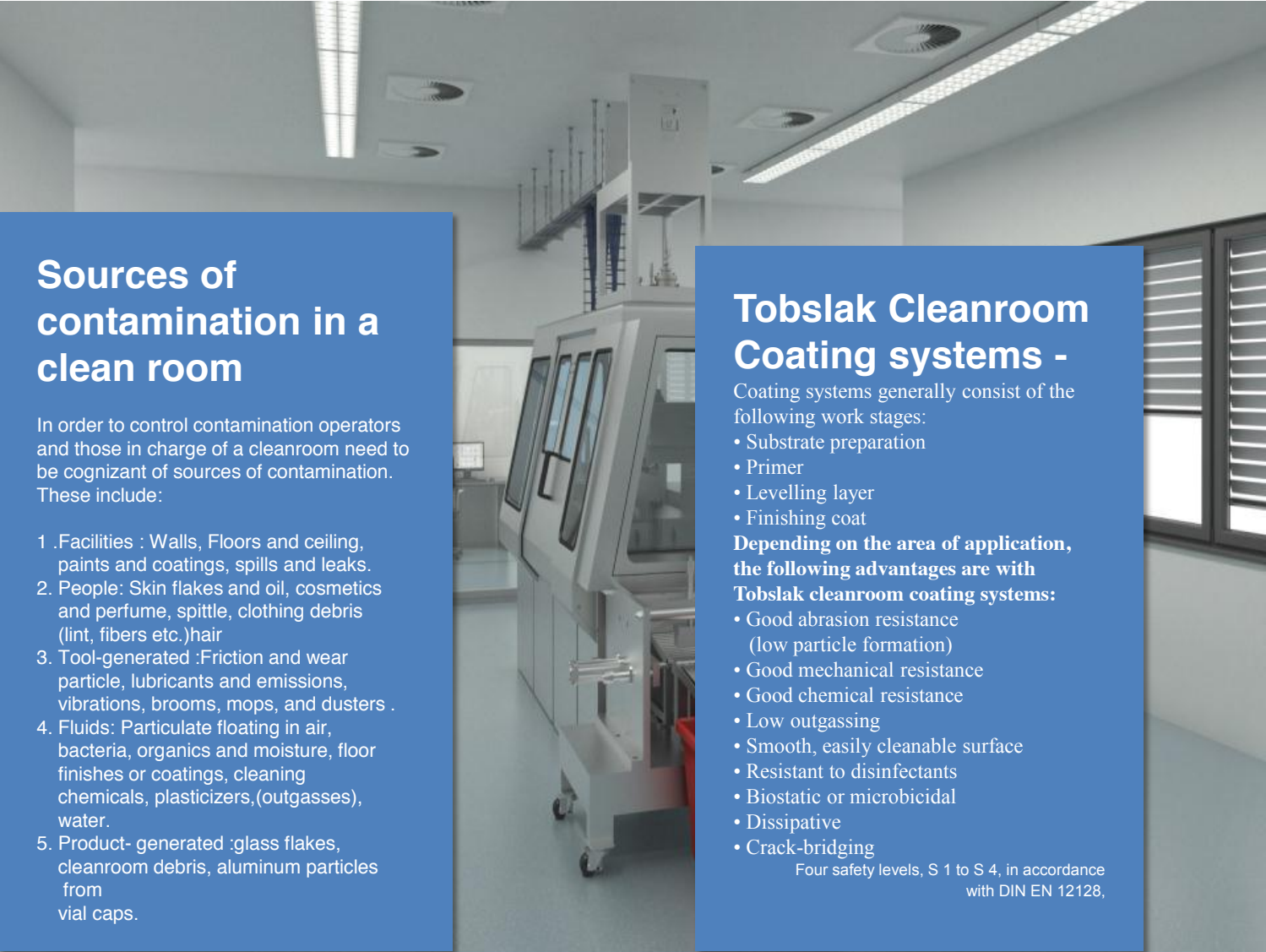
Tobslak Tobage Floor Coating System

Classification of air purity on the basis of chemical concentration (ACC)

ISO ACC class	Concentration g/m3	Concentration µg/m3	Concentration ng/m3
0	10^{0}	10^{-6} (1 000 000)	10^{9} (1 000 000 000)
-1	10^{-1}	10^{-5} (100 000)	10^{8} (100 000 000)
-2	10^{-2}	10^{-4} (10 000)	10^{7} (10 000 000)
-3	10^{-3}	10^{-3} (1 000)	10^{6} (1 000 000)
-4	10^{-4}	10^{-2} (100)	10^{5} (100 000)
-5	10^{-5}	10^{-1} (10)	10^{4} (10 000)
-6	10^{-6}	10^{-0} (1)	10^{3} (1 000)
-7	10^{-7}	10^{-1} (0.1)	10^{2} (100)
-8	10^{-8}	10^{-2} (0.01)	10^{1} (10)
-9	10^{-9}	10^{-3} (0.001)	10^{0} (1)
-10	10^{-10}	10^{-4} (0.000 1)	10^{1} (0.1)
-11	10^{-11}	10^{-5} (0.000 01)	10^{2} (0.01)
-12	10^{-12}	10^{-6} (0.000 001)	10^{3} (0.001)

Source: DIN EN ISO 14644-8:2013-06



Sources of contamination in a clean room

In order to control contamination operators and those in charge of a cleanroom need to be cognizant of sources of contamination. These include:

1 .Facilities : Walls, Floors and ceiling, paints and coatings, spills and leaks.
2. People: Skin flakes and oil, cosmetics and perfume, spittle, clothing debris (lint, fibers etc.)hair
3. Tool-generated :Friction and wear particle, lubricants and emissions, vibrations, brooms, mops, and dusters .
4. Fluids: Particulate floating in air, bacteria, organics and moisture, floor finishes or coatings, cleaning chemicals, plasticizers,(outgasses), water.
5. Product- generated :glass flakes, cleanroom debris, aluminum particles from vial caps.

Tobslak Cleanroom Coating systems -

Coating systems generally consist of the following work stages:

- Substrate preparation
- Primer
- Levelling layer
- Finishing coat

Depending on the area of application, the following advantages are with Tobslak cleanroom coating systems:

- Good abrasion resistance (low particle formation)
- Good mechanical resistance
- Good chemical resistance
- Low outgassing
- Smooth, easily cleanable surface
- Resistant to disinfectants
- Biostatic or microbicidal
- Dissipative
- Crack-bridging

Four safety levels, S 1 to S 4, in accordance with DIN EN 12128,

Cleanroom coating systems for floors - An overview of the floor systems

System structure

	Cleanroom Floor System 1 & 2	Cleanroom Floor System 3 & 4	Cleanroom Floor System 5 & 6
Prime coating	Tob Sauber Primer	Tob Sauberpoxy 2000	Tob Sauburethane 5000
Scratch coat	Tob Sauber Primer and quartz sand	Tob Sauberpoxy 2000 and quartz sand	Tob Sauburethane 5000 and quartz sand
Conductive intermediate		Tob Sauburethane Active	
Coating	Tob Sauber Paint 2050	Tob Sauberpoxy 4000	Tob Sauburethane 4
Sealing		Tob Aqua 1K PU	Tob Aqua 1K PU

Cleanroom coating systems for Wall and ceiling - An overview of the wall & ceiling systems

System structure

	Cleanroom Floor System 1 & 2	Cleanroom Floor System 3 & 4	Cleanroom Floor System 5 & 6
Prime coating	Tob Sauber Primer	Tob Sauberpoxy 2000	Tob Sauburethane 5000
Scratch coat	Tob Sauber Primer and quartz sand	Tob Sauberpoxy 2000 and quartz sand	Tob Sauburethane 5000 and quartz sand
Conductive intermediate		Tob Sauburethane Active	
Coating	Tob Clean Paint	Tob Sauber Paint 2050	Tob Sauburethane 4
Sealing		Tob Aqua 1K PU	Tob Aqua 1K PU

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