Sikafloor® LIFE SCIENCES FLOORING

PHARMACEUTICAL PRODUCT ENVELOPE SYSTEMS

BUILDING TRUST

PHARMACEUTICAL PRODUCT ENVELOPE SYSTEMS

Production of pharmaceuticals require exceptional dedication to quality, consistency and, in many cases, sterility of the drugs and medical devices being produced. These facilities and individual room envelopes are designed to maintain the necessary level of cleanliness for process and product safety, as well as worker safety. Selection of surfaces finishes including floors, walls and ceilings varies by the facility design, level of cleanliness required within the process, and the demands of the production process itself. Maintaining a clean environment throughout the process requires floors, walls and ceiling to be "easily cleaned", hard, smooth, non-porous surfaces, and appropriate for the area operation. This overview provides a comparative review of several surface finish options that can be utilized through the upstream and downstream process.

Regulatory Guidance and Design to Compliance

Pharmaceutical production is the most regulated industry throughout the world with facilities designed and validated based upon the products produced, the flow of production and use of individual spaces. Facilities must be designed to protect the integrity of the product throughout the specialized stages of research, development, production and distribution (Table 1). The production process requirements, levels of cleanliness and production regulations will vary by the type of products produced (Table 2) and the intended administration (parenteral or non-parenteral). In many cases, the workers themselves must also be protected from the process. Facilities working active biologics such as viruses and other infectious agents must control viable particle counts as designated by BioSafety Levels (BSL) 1-4. [1]

There are over 200 country specific regulatory agencies [2] throughout the world overseeing the production, labeling and distribution of medicines and medical devices. International organizations (Table 3) provide additional guidance and harmonization. In the Unites States the design and construction of facilities to meet current Good Manufacturing Practices for finished pharmaceuticals is governed by Title 21 of the Code of Federal Regulations Subpart C Section 211.42. [3] Aseptic processing requires walls, ceilings and floors to be smooth, hard surfaces that are easily cleanable. The European Union regulation for Good Manufacturing Practices [4] mirrors the FDA requirements in Chapter 3 where "...interior surfaces (walls, floors and ceilings) should be smooth, free from cracks and open joints, and should not shed particulate matter and should permit easy and effective cleaning and, if necessary, disinfection."

The International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use provides guidance regarding good manufacturing practice (GMP) for the manufacturing of active pharmaceutical ingredients (APIs) detailing facility and specific process operation coverage (Table 4).[5] Depending upon the product being produced, the process may include controlled environment cleanroom(s). International cleanroom standards have been adopted under ANSI/IEST/ISO 14644.[6] This classification system provides guidance for design, construction, monitoring and maintenance of cleanrooms. Levels of cleanliness are based upon particle count, controlled (during operation) primarily through air handling. (Table 5) lists the ISO levels and the relative correlation to other classifications that are still in use today.

Table 1. Pharmaceutical Production Room Functions

PHARMACEUTICAL PRODUCTION ROOM FUNCTIONS	
ISO Cleanroom Classified	Room Functions
Unclassified	Ancillary Areas (Hallways, Restrooms, Change Rooms, Cafeteria, Lobby)
	Laboratories/QC
	Packaging
	Solvent Storage
	Vivarium
	Warehousing/Quarantine
	Water Treatment
	Pilot Plants
	Purification/Filtration/Separation
ISO Classified	Aseptic Formulation/Filling
	Compounding
	Drying
	Fermentation/Cell Culture
	Synthesis/Reaction

Table 2. Classification of Types of Pharma Products Produced

TYPES OF PRODUCTS PRODUCED	Small Molecule Chemical API (Active Pharmaceutical Ingredient)
	Large Molecule Biologics API (Monocional Antibodies, Vaccines, Blood Fractions)
	Bulk Drug Substance
	Specialty (Oligonucleotides, Peptides, ADCs (Antibody Drug Conjugate), Cell Therapy
	Medical Devices
	Sterile Packaging

Table 3. International Pharmaceutical and Medical Regulatory Organizations

INTERNATIONAL PHARMACEUTICAL AND MEDICAL REGULATORY ORGANIZATIONS
International Organizations
International Standards Organization (ISO)
EudraLex (European Commission): Chapter 3 Premise and Equipment
Organization for Economic Co-operation and Development (OECD)
United Nations - Global Issues Health
International Medical Device Regulators Forum
International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use: Good Manufacturing Practices Guideline for Active Pharmaceutical Ingredients: Q7
World Health Organization (WHO)
Pan American Health Organization (PAHO)
World Trade Organization (WTO)
World Intellectual Property Organization (WIPO)
Pharmaceutical Inspection Convention and Pharmaceutical Inspection Cooperation Scheme (PIC/S)

Table 4. API Manufacturing by increasing GMP Requirements

Type of Manufacturing	Application of this Guide to steps (shown in grey) used in this type of manufacturing				
INCREASING GMP REQUIREMENTS		→			
Chemical Manufacturing	Production of the API Starting Material	Introduction of the API Starting Material into process	Production of Intermediate(s)	Isolation and Purification	Physical processing, and packaging
API derived from animal sources	Collection of organ, fluid, or tissue	Cutting, mixing, and/or initial processing	Introduction of the API Starting Material into process	Isolation and Purification	Physical processing, and packaging
API extracted from plant sources	Collection of plants	Cutting and initial extraction(s)	Introduction of the API Starting Material into process	Isolation and Purification	Physical processing, and packaging
Herbal extracts used as API	Collection of plants	Cutting and initial extraction(s)		Further extraction	Physical processing, and packaging
API consisting of comminuted or powdered herbs	Collection of plants and/or cultivation and harvesting	Cutting/comminuting			Physical processing, and packaging
Biotechnology: fermentation/cell culture	Establishment of master cell bank and working cell bank	Maintenance of working cell bank	Cell culture and/or fermentation	Isolation and purification	Physical processing, and packaging
"Classical" Fermentation to produce an API	Establishment of cell bank	Maintenance of the cell bank	Introduction of the cells into fermentation	Isolation and purification	Physical processing, and packaging

Table 5. Cleanroom Class Ratings

EU GPM[a] (At Rest)	EU GPM[a] (In Operation)	US Fed Std 209E Class[b]	maximum particles/ft^3					ISO equivalent[c]
			≥0.1 µm	≥0.1 µm	≥0.1 µm	≥0.1 µm	≥0.1 µm	
		1	35	7.5	3	1	0.007	ISO 3
		10	350	75	30	10	0.07	ISO 4
Grade A/B	Grade A	100	3,500	750	300	100	0.7	ISO 5
		1,000	35,000	7,500	3,000	1,000	7	ISO 6
Grade C	Grade B	10,000	350,000	75,000	30,000	10,000	70	ISO 7
Grade D	Grade C	100,000	$3.5x10^6$	750,000	300,000	100,000	700	ISO 8
		Room Air				$1x10^6$	7,000	ISO 9

[a]EU GMP guidelines are more stringent than others, requiring cleanrooms to meet particle counts at operation (during manufacturing process) and at rest (when manufacturing process is not carried out, but room air handling unit is on).

[b]US FED STD 209E was a United States federal standard. It was officially canceled by the General Services Administration on November 29, 2001, but is still widely used. 7

[c]ISO 14644-1 and ISO 146988 guidelines are non-governmental standards developed by the International Organization for Standardization (ISO). The former applies to clean rooms in general; the latter to cleanrooms where biocontamination may be an issue.

ISO 14644 Part 4 specifies requirements for the design and construction of cleanroom installations but does not prescribe specific technological or contractual means to meet these requirements. Although originally the pharmaceutical industry took its lead from the electronics and semiconductor manufacturers with respect to cleanrooms, the current state-of-the-art provides a variety of construction models. (Table 6) Cost and time to service vary by method. No one method serves all applications. Some medical device manufacturers may choose to utilize cleanroom production (ISO 7-9) simply for product quality and reliability. Based upon the production process there are usually several levels of cleanroom classified space and isolation units through the process flow.

Table 6. Cleanroom Construction Models

CLEANROOM CONSTRUCTION MODELS		
Construction Design Method	Typical ISO Class	Description
Brick & Mortar	ISO 6-9, Non-classified areas	Traditional Dedicated Facilities Typically product dedicated
Stick-Built	ISO 6-8	Utilize standard building components
Stick-Built Modular	ISO 5-8	Incorporates modular wall and/or ceiling panels
Autonomous POD	ISO 5-8	Off-site built, includes HVAC
Modular Container	ISO 5-8	Off-site built, Multi-unit connectivity option, may contain mechanicals
Isolator/Isolator Module	ISO 1-5	Usually utilized within a lower controlled environment

Industry Trends

Risk mitigation and emphasis on safety have driven the high cost of research, development and production of pharmaceuticals. In the future there will be fewer mega volume drugs which had allowed for economies of scale. Smaller scale facilities utilizing flexible multi-product operations and regionalized production are likely to increase. This trend will minimize transportation costs, maximize local supply and reduce capital expense risk. Where possible, processes are trending toward reducing risk and increasing reliability by minimizing human interaction through the use of closed systems and automation.

Surface Finish Performance Requirements

Although the pharmaceutical production industry is heavily regulated, monitored and controlled; the selection of the surface finishes is relatively straight forward. Knowing that all surfaces must be easily cleaned, non-porous, non-shedding and, in some cases, subject to stringent decontamination regiments, the practical options are limited. Performance requirements dictated by the process environment, installation limitations, and chemical (process, cleaning and disinfection) limit the selection options.

Chemical Resistance

Floors, walls and ceilings may be exposed to a variety of process chemicals, especially during the upstream production process. Chemical concentration, temperature, duration of exposure, and potential chemical interactions will limit selection options. The decontamination and routine cleaning frequently present the highest level of chemical exposures.

Abrasion and Impact Resistance

Cleanroom operating procedures and footwear requirements generally limit the abrasion resistance and in most cases, impact exposure. Other areas within the process and process support facility, however, will more closely reflect industrial production environments with heavy wheeled traffic, potential tool and component impacts. Floor surfaces must be designed for these conditions to avoid damage and potential plant shutdown for repairs.

Thermal Shock Resistance

Steam cleaning is a sanitation method most frequently used in the food processing industry. In some cases, the upstream pharmaceutical production area will utilize steam cleaning. The floors and walls must be able to accommodate this rapid change in temperature without blistering or disbonding from the substrate.

Slip Resistance

Worker safety is always a consideration within production environments. Whether the facility experiences wet conditions or is constantly dry, the texture and traction of the floor must be slip resistant.

Specialty Requirements

Production processes involving volatile liquids and sensitive medical device electronics may require a flooring system that dissipates static electricity to avoid harm to workers or products. Other special operations that impact the performance requirements of the floors are the existing conditions of the substrate with respect to resurfacing and moisture vapor emissions.

Aesthetics & Lighting

Finally when the performance requirements have been defined and the floor, wall, and ceiling options have been qualified, attention can be paid to the aesthetic. It is recommended that light colored finishes are used to support a clean environment and high light reflectivity. Color blends and designs may be used to identify specific work flows and safety areas. Some resinous flooring options and vinyl sheet goods provide a resilient finish that improves workers comfort.

Surface Finish Selection Process

Flooring

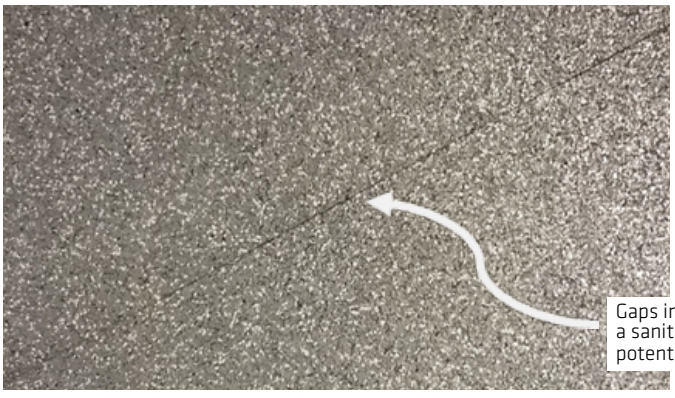
The flooring system must be specific for the each identified room based upon the performance, aesthetics and cleaning requirements. Within this industry category there have been a few options that have proven performance and are highlighted here.[9]

Resinous flooring systems have been the most frequently utilized system for the pharmaceutical industry. System design options can vary the chemistry, aesthetics, application techniques, thickness and surface finish to meet the desired criteria. Resinous flooring systems provide a seamless floor to wall transition required for controlled environments in addition to providing the ability to slope to drains (ISO 8 & 9). When steam cleaning is required for production area sanitation, high-build resinous mortar systems provide thermal shock resistance and can be textured for slip resistance.

The resin base chemistry can provide a high degree of chemical resistance for the most stringent disinfecting process and standard systems work well with vaporized hydrogen peroxide. Specialty systems are available to meet the needs of static dissipative or conductive requirements. Most recently the resinous flooring industry has provided solutions to substrate moisture related problems with mitigation systems and breathable flooring systems. Page 9 and 10 outlines a representative sample of recommended resinous flooring and wall systems by work area.

Rubber or vinyl sheet good products (PVC) have been used in cleanroom applications. These products supplied 4-6 foot wide rolls and are glued to the concrete substrate. Seams are the critical component to this flooring. The seams are heat or chemically welded to provide a sealed seamless finish. In cleanroom environments no gaps can be tolerated as these can harbor contaminants and mircrobes. (Figure 1) The vinyl sheet can be coved to connect with the wall panels. These products are best limited to dry foot traffic areas. Heavy instrument point loading or wheeled traffic may result in damage.

Figure 1. Sheet Good Seams



Epoxy terrazzo provides some of the advantages of an industrial resinous flooring system being a seamless, non-porous and easily cleaned surface. The life cycle of terrazzo can easily be 3-4 decades. Terrazzo must be highly holed and surface waxes cannot be used in clean controlled space. In pharmaceutical applications granite is substituted for the marble aggregate to provide higher performance properties. It is not recommended for wet areas due to the lack of texture. The cost of terrazzo installation limits its application to the highest volume applications or to the facility public access areas such as lobbies or cafeterias.

Over the past decade polished concrete has become a floor finish option, primarily in retail applications. This finish has been used in the pharmaceutical sector as an economical alternative.[10] The polishing process densifies the concrete surface reducing the porosity and hardening the surface. It is not recommended for cleanroom applications because it does not seal the concrete completely and with wear, will require repeated polishing. In some dry upstream production areas, it may be an option but in wet, high abrasion or impact areas it is not a good long term solution.

Wall and Ceiling Finish Options

Coatings

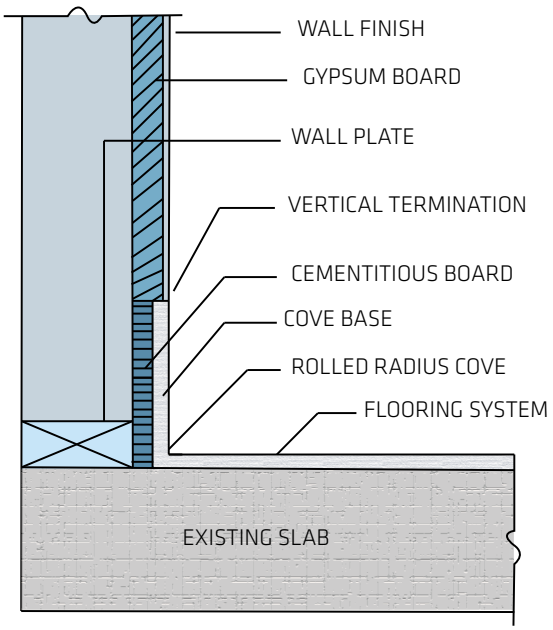
Pharmaceutical production areas clean with harsh cleaning and conventional wall paints are not acceptable. Epoxy and polyurethane wall coatings are a practical, relatively inexpensive solution for GMP production areas.[11] In cleanrooms environments epoxy wall systems tie in seamlessly with the floor and ceiling systems with radius cove. (Figure 2) When gypsum wall board is used, a fiberglass reinforced wall coating is recommended to prevent damage exposing the gypsum to moisture. Concrete masonry block walls typically utilize a block filler prior to applying the wall coatings. The ultimate finish for the coating should be high gloss smooth or egg shell finish for ease of cleaning.

Ceiling and Wall Panels

Modular wall panels are frequently used in cleanroom construction. These products provide a strong durable and easily cleaned surface. Seams must be sealed in the cleanest environments (ISO 1-5). Typically these systems will incorporate a transition detail that allows the floor cove to terminate flush with the lower panel.

Ceilings can be finished using the same materials as the selected wall system in most cases. Transition to the ceiling is seamless with a radius cove. Walk-able ceilings are a good option in cleanrooms for easy maintenance of the HVAC system.

Figure 2. Flush Floor to Wall Cove Detail



Specification and Planning

In order to avoid installation problems and facilitate a rapid commissioning and validation process, the specification of the finish surfaces must be exact and detailed. Working through the floor, wall and ceiling options, the best selection for each room envelope needs to be detailed within the specifications and drawings. It is recommended that "or equal" options not be permitted.

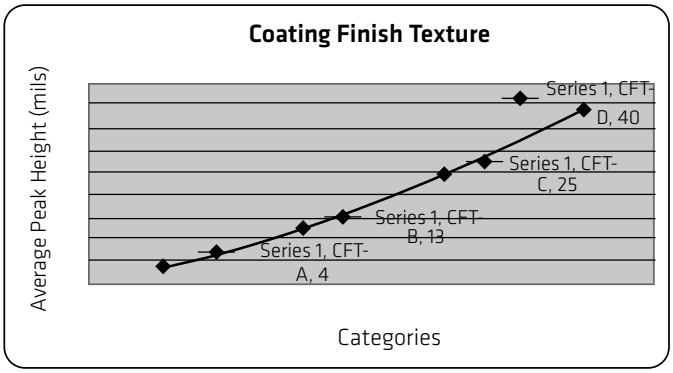
Regardless of the systems selected for the surface finishes, but most critically for bonded resinous systems, the surface preparation is critical to the long-term performance and uninterrupted production operation. The substrates must be inspected and qualified as clean and sound. Surface preparation profile is based upon manufacturer's recommendation for the intended flooring system. ICRI provides visual and tactile standards to monitor and qualify the concrete profile. [12] Concrete and CMU are porous substrates. Moisture vapor transition must meet the acceptable limits of the finish to be applied. Repairs and remediation must be completed prior to installations. SSPC and NACE provide a detail guide for preparation of concrete prior to coatings. [13]

Transitions, texture and porosity are extremely important within controlled and clean environments. Floor to wall cove bases details must show a minimum or four inches with a smooth, sealed interface between the wall system and the floor cove. The cove must not have a textured finish. Inside and outside corners require more skill to install and must be smooth and consistent with the rest of the base. Wall to ceiling junctions must also have a radius cove (ISO 7 and cleaner). Floor drains (ISO 8-9 and non-classified areas) must be keyed without feathering. Trough drains and slope to drains should flow completely with no puddling. Protrusion transitions must be smooth and sealed. Observation windows and pass-thru's must be finished flush with no ledges. Light fixers and HVAC vent transitions must be completely sealed. Floor system terminations and transitions to other flooring systems are ideally avoided within the clean envelope.

When utilizing resinous systems, the final topcoat can be applied in a single application over contiguous systems creating a seamless transition. Termination of higher build systems to coatings or concrete must be keyed to avoid feathering or trip hazard.

The flooring finish texture will depend upon conditions of operation. Texture can be minimize slips in cleanrooms areas where sanitary footwear is used and in GMP wet environments. The Society of Protective Coating Committee C7.5 has drafted a classification system for concrete coating finish texture descriptions with tactile comparators to more accurately describe, install and qualify degree of texture (Figure 3). [14]

Figure 3. Coating Finish Texture (CFT) Classes



Installation

The selection of the installing contractor is as important as selecting the right system. Specifications should require an contractor that has pharmaceutical industry experience with similar scale projects and references of previous work. Installation certification programs are available that help owners and specifiers "pre-qualify" contractors. The Society of Protective Coatings, SSPC, provides concrete coating training and a detailed certification process for coating contractors (QP 8 Certification). [15] The International Training and Standards Alliance also provides a flooring training and certification program called INSTALL. System manufacturers may also be able to recommend qualified installers for the systems selected. Independent inspectors utilized during the installation process can verify performance and prevent problems from arising after installation. Project specifications must detail key stop points and outline responsibility for inspection and acceptance.

Construction Costs

The cost of constructing a controlled environment facility including individual cleanrooms is high compared to other facilities. This cost is relatively insignificant to the cost of failure to validate a process. Costs escalate with the degree of cleanliness required due to the increasing requirements for air handling and reduction of particle count. Construction costs for ISO 7-8 cleanrooms range from $250 - $1,500 per square foot.16 Pavlotsky has estimated that the cost of the base building, including architectural, civil and structural, is less than 25% of the total cost of building, equipping and validating a cGMP facility.[17] Therefore, when selecting the floor, wall and ceiling finishes priority must be given to performance.

Maintenance and Repair

Controlled environments require the highest level of maintenance. Cleanrooms in particular must maintain surfaces to avoid contaminating particles and microbial growth conditions. Surfaces must be routinely inspected and repaired under Standard Operating Procedures to avoid forced shutdown or failed inspections. Although no system is completely without risk, the best maintenance programs avoid damage by protecting surfaces and selecting the best system for the conditions of use.

Summary

The selection of the surface finishes for GMP pharmaceutical and biopharmaceutical facilities is driven by long term, low maintenance performance as dictated by the individual processes. Seamless integrated systems are the best option for controlling the environment and cleanliness of the room envelope. Selecting the right system and a qualified installer will save time and money bringing a facility online and minimizing operational interruptions.

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SIKA® INDUSTRIAL FLOORING

BIO-PHARMACEUTICAL
FLOOR SYSTEM SELECTION GUIDE

BUILDING TRUST **Bio-Pharm Flooring**	**DECORATIVE SYSTEMS**	EPOXY TERRAZZO	Sika TERRAZZO		PURCEM SLQ	QUARTZITE 6000	EPO-ROK QUARTZ	PRONTO QUARTZ	QUARTZITE 1000	DECOFLOOR	**DECORATIVE FLAKE**	DECOFLAKE	DECOFLAKE - UEF	EPO-ROK EEF	COMFORTFLOOR DEC	COMFORTFLOOR DEC PRO	PRONTO FLAKE	**SOLID COLOR SYSTEMS**	PURCEM	110 EPO-ROK	MORRITEX	COMFORTFLOOR	COMFORTFLOOR PRO	PRONTO SMOOTH	**WATERPROOFING**	MERFLEX	**ESD/CONDUCTIVE**	ESD CONDUCTIVE
AREA TYPE																												
Production			1		1	2	2	2	2	2		2	1	2	2	2	2		1	2	2	2	3	2		2		1
Corridors			1		1	2	2	2	2	2		2	1	2	3	3	2		1	2	2	2	3	2		2		2
Laboratories			1		2	1	2	1	1	1		1	1	2	1	1	1		2	2	2	1	1	2		2		1
Loading Docks			X		3	3	3	3	3	X		3	3	3	X	X	3		1	1	2	X	X	3		1		2
Maintenance			3		2	3	2	3	3	X		2	2	2	2	2	3		3	2	1	2	2	3		1		2
Warehouse			3		3	3	3	3	3	X		3	3	3	X	X	3		3	3	1	X	X	3		2		2
Equipment Wash			X		1	2	X	2	3	X		3	2	3	X	X	1		1	3	3	X	X	2		X		X
Lobbies			1		2	1	2	3	1	1		1	2	2	1	2	2		3	3	3	2	3	3		3		X
Packaging			1		2	2	2	2	1	1		2	1	2	1	1	1		2	2	2	1	1	2		2		1
Locker/Change Rooms			2		2	1	3	2	2	1		1	2	3	2	2	2		3	3	2	2	2	3		2		X
Mechanical Equip Rooms			3		3	3	3	3	3	X		3	3	3	X	X	3		3	3	2	X	X	3		1		X
Central Utilities			X		1	2	2	2	3	X		3	2	3	X	X	2		1	1	2	X	X	2		2		3
Water Room			3		1	2	2	2	3	X		3	1	3	X	X	2		1	2	3	X	X	2		3		X
Powders Charging			1		3	2	2	3	3	2		3	3	3	2	3	2		3	2	2	2	3	2		2		1
Solvent Storage			X		X	X	X	X	X	X		X	X	X	X	X	X		2	3	2	X	X	X		X		1
Data Center			1		3	3	3	3	1	X		X	2	2	2	2	2		3	3	2	2	2	2		2		1

Rating Scale: 3 = Good, 2 = Better, 1 = Best, X = Not Recommended

Note: More than one system may be appropriate for an application environment. Consult Sika's Floor Technical Services for a specific system recommendation.

SIKA® INDUSTRIAL FLOORING

BIO-PHARMACEUTICAL
WALL SYSTEM SELECTION GUIDE

BUILDING TRUST Bio-Pharm Wall Systems	EPOXY	REINFORCED	DESCOGLAS RF	DESCOGLAS RM	FLEXIBLE	DESCOGLAS FE	HYBRID ACRYLIC	REINFORCED	HYGIENIC HB REINFORCED	NON-REINFORCED	HYGIENE HB	STERISEPT
AREA TYPE												
Production			2	1		1			1		2	2
Corridors			2	1		1			1		2	3
Laboratories			1	3		3			2		1	1
Loading Docks			1	2		2			2		1	3
Maintenance			1	3		3			2		1	2
Warehouse			2	3		3			2		1	1
Equipment Wash			2	1		1			2		3	3
Lobbies			3	3		3			2		1	1
Packaging			1	3		3			2		1	2
Chemical Containment			2	1		2			3		3	3
Locker/Change Rooms			2	3		2			2		1	1
Mechanical Equip Rooms			2	3		3			2		1	1
Central Utilities			1	2		3			2		1	1
Water Room			2	1		2			1		2	3
Powders Charging			1	1		2			1		1	3
Solvent Storage			2	1		1			3		3	3
Storage/Warehouse			3	3		3			2		1	1
Autoclave			2	1		2			2		3	3

Rating Scale: 3 = Good, 2 = Better, 1 = Best, X = Not Recommended

Note: More than one system may be appropriate for an application environment. Consult Sika's Floor Technical Services for a specific system recommendation.

Sikafloor® RESINOUS FLOORING
ABOUT THE AUTHOR

JIM HENDLEY

VERTICAL MARKET MANAGER - LIFE SCIENCES

For thirty years, Jim Hendley, Sika's Life Science Vertical Market Manager, has worked with BioPharm, Research and Healthcare owners and their design and construction teams to optimize their hygienic resinous floor and wall systems performance.

He has worked with some of the world's most recognized Healthcare and Life Sciences organizations on major projects both in the United States and abroad. Jim is an industry recognized expert, whose opinions are often sought after by the Life Sciences media. He is a published author and is a frequent speaker on issues relating to hygienic environments at industry forums and conferences.

Jim holds a NACE Level 3 Certified Coatings Inspector (Cert. No. 13504) and is available to share his extensive project planning expertise with your team on your next new installation or retrofitting project next new installation or retrofitting project.

Sikafloor's Industry Expert Panel is on hand to provide free, expert assistance and consultation when designing floor and wall projects for the food and beverage, pharmaceutical, healthcare, life sciences, data center, educational and other specialty industries. Mr. Hendley may be contacted via email at: info.flooring@us.sika.com to arrange a free consultation.

WHO WE ARE

Sika AG is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus truck, rail, solar and wind power plants, facades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing, and protecting load bearing structures. Sika's product lines feature high quality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

GREEN GLOBES

BSI ISO 9000:2000

U.S. GREEN BUILDING COUNCIL MEMBER

Sika Corporation • Flooring
201 Polito Avenue
Lyndhurst NJ 07071
Tel: 800 933 7452
www.SikaFloorUSA.com

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