



Cleanrooms with certainty
ESD protection guaranteed
nora[®] rubber floor coverings

nora[®]

All About Flooring. **All About You.**



Cleanrooms – it's all down to the floor!

Global competition and more stringent quality standards on the part of customers and consumers mean that manufacturing without cleanroom technology is no longer conceivable in many branches of industry. Not only that, but legislation also stipulates constant improvements in the cleanliness levels of production plants, processes and environments. Even the slightest degree of contamination in the manufacturing process has a direct effect on the product quality and production reject rate, and consequently on the economic effectiveness and competitiveness of industrial companies.

State-of-the-art technology and certified materials for cleanrooms are used to satisfy these demands.



nora® rubber floor coverings in cleanrooms and GMP areas

- **Particle emission behaviour:**
up to ISO Class 2 / GMP Class A
- **Outgassing behaviour:**
up to ISO AMC Class -6.3
- **Resistance to biological contamination:**
excellent
- **Resistance to disinfectants and chemicals:**
very good
- **Extremely dense and closed surface – without coating**
- Available in **rolls** and **tiles**
- Comprehensive **range of accessories** for hygienic transitions between floor and wall
- **Dynamic load capacity** up to 6 N/mm²
- **Walking and standing comfort** due to permanent resilience
- Excellent **fire safety characteristics**
- **Do not contain PVC**, halogens (e.g. chlorine) or plasticizers (phthalates)
- **Future-oriented environmental compatibility**
- **Body voltage generation:** <10 V
- **ESD protection:** 10-year warranty on the electrostatic properties





Floor coverings installed in Life Science industry cleanrooms, which are subject to GMP guidelines, have to comply with particularly stringent statutory and normative regulations.

Methods for containing particulate and microbial contamination, the biological resistance of the materials, good cleaning characteristics and chemical resistance to cleansing agents and disinfectants are the decisive factors in achieving a consistently high product quality and thus assuring consumer protection.

**norament® 928 grano ed –
the specialist for particularly high loads**

- **Particle emission behaviour:**
ISO Class 4 / GMP Class A
- **Outgassing behaviour:**
ISO AMC Class -6.2
- **Excellent biological resistance**
- **Body voltage generation:**
<10 V compliant with IEC 61340-4-5
- **Equipment protection:**
Resistance to EPA ground $10^6 - 9 \times 10^7 \Omega$
compliant with IEC 61340-4-1
- **Personal protection:**
Insulation resistance $\geq 5 \times 10^4 \Omega$
compliant with DIN VDE 0100-600
- High **dynamic load capacity** up to 6 N/mm²
- **Improvement in football sound absorption**
of 10 dB
- Available in tiles for **surface installation** and
raised-access floors



**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. NO 1101-543

norament 928 grano ed
Particle Emission: PA6 Nylon; ISO 4

Flooring & Coating

**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. NO 1101-543

norament 928 grano ed
TVOC (23°C/60%): ISO -6.2 / tested

Flooring & Coating

**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. NO 1101-543

norament 928 grano ed
Biol. Resistance: excellent

Flooring & Coating

**noraplan® sentica ed and noraplan® signa ed* –
the proven cleanroom all-rounder in rolls and tiles**

- **Particle emission behaviour:**
ISO Class 3 / GMP Class A
- **Outgassing behaviour:**
ISO AMC Class -6.3
- **Very good biological resistance**
- **Body voltage generation:**
<10 V compliant with IEC 61340-4-5
- **Equipment protection:**
Resistance to EPA ground $10^6 - 9 \times 10^7 \Omega$
compliant with IEC 61340-4-1
- **Personal protection:**
Insulation resistance $\geq 5 \times 10^4 \Omega$
compliant with DIN VDE 0100-600
- Available in **rolls** and **tiles** for **surface installation**
and **raised-access floors**



* noraplan® mega ed was tested. On account of the identical manufacturing process and substances, it can be assumed that the same results apply to noraplan® sentica ed and noraplan® signa ed.



**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. FR 0302-287

noraplan sentica ed
Particle (vs. PA6 Nylon): ISO 3

Flooring & Coating



**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. NO 1101-543

noraplan sentica ed
Outgassing VOC (23°C/90°C):
ISO-AMC_m class -6.3 / tested

Flooring & Coating



**Cleanroom®
Suitable
Materials**

nora systems GmbH
Report No. NO 1101-543

noraplan sentica ed
Biol. Resistance: very good

Flooring & Coating





In the microelectronics and nanotechnology industries, particulate contaminations, airborne molecular contamination and even the slightest electrostatic charges in particular have to be minimized since they can lead to damage and functional failures of the sensitive components.

The demands placed on the floor coverings used in these sectors are correspondingly stringent.

noraplan® astro ec – the solution for high conductivity

- **Particle emission behaviour:**
ISO Class 2 / GMP Class A
- **Outgassing behaviour:**
ISO AMC Class -5.8
- **Very good biological resistance**
- **Body voltage generation:** <10 V compliant with IEC 61340-4-5
- **Equipment and explosion protection:**
Resistance to EPA ground <math><10^6 \Omega</math> compliant with IEC 61340-1
- Available in **rolls** and **tiles** for **surface installation** and **raised-access floors**

Cleanroom® Suitable Materials
nora systems GmbH Report No. NO 1101-543
noraplan astro ec
Particle Emission: ISO 2

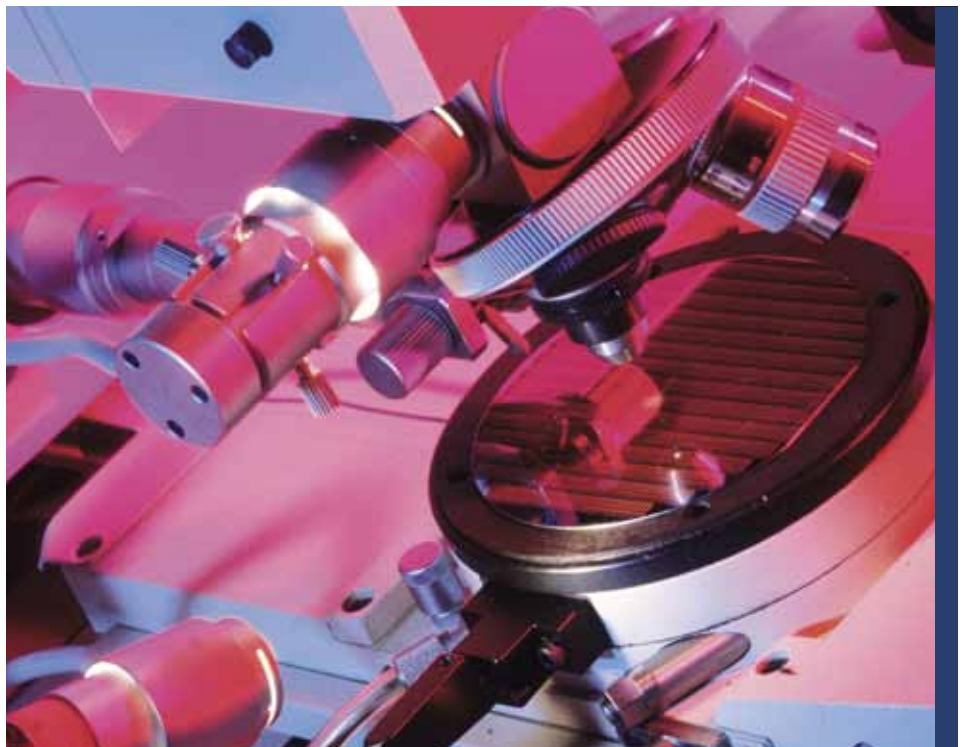
Flooring & Coating

Cleanroom® Suitable Materials
nora systems GmbH Report No. NO 1101-543
noraplan astro ec
TVOC (23°C/50%): ISO -5.8 / tested

Flooring & Coating

Cleanroom® Suitable Materials
nora systems GmbH Report No. NO 1101-543
noraplan astro ec
Biol. Resistance: very good

Flooring & Coating



Parameter	Test method	Requirements	Average test results from running production		
			noraplan® astro ec	noraplan® sentica ed noraplan® signa ed*	norament® 928 grano ed
CE conformity	EN 14 041		← Manufacturer: nora systems GmbH, D-69469 Weinheim →		
Dynamic coefficient of friction	EN 13 893	DS	← Fulfilled →		
Electrical behaviour	EN 1081	ed = ≤10° Ohm	-	← Fulfilled →	
		ec = ≤10° Ohm	Fulfilled	-	-
Reaction to fire	EN 13 501-1	Not bonded	← C _{fi} -s1 →		C _{fi} -s1, bonded
Reaction to fire	EN 13 501-1	Bonded on mineral subfloor	C _{fi} -s1	B _{fi} -s1	B _{fi} -s1
Stipulated material properties compliant with ISO 14644-4 and EC GMP guidelines					
Smooth, dense, pore-free surface			Extremely dense and closed surface without coating		
Surface must be free of cracks and open joints			Joint sealing using nora® 1-K joint sealing compound.		
High abrasion resistance and low particle emission behaviour respectively	ISO 4649, procedure A		150 mm ³	150 mm ³	80 mm ³
	VDI 2083-17	Air cleanliness class compliant with ISO 14644-1	2	3	4
		GMP class compliant with EU GMP Annex 1, in operation	A	A	A
Biological resistance	ISO 846	Overall result	ISO / CSM: 1/very good	ISO / CSM: 1/very good	ISO / CSM: 0/excellent
	ISO 846, method A	Biological resistance to fungi	ISO / CSM: 0/excellent	ISO / CSM: 0/excellent	ISO / CSM: 0/excellent
	ISO 846, method C	Biological resistance to bacteria	ISO / CSM: 1/very good	ISO / CSM: 1/very good	ISO / CSM: 0/excellent
Outgassing behaviour (TVOC at 23 °C / 90 °C)	VDI 2083-17	ISO AMC class compliant with ISO 14644-8	ISO -5.8	ISO -6.3	ISO -6.2
		Amines	6.3 x 10E-6 g/m ² s	Not detectable	3.4 x 10E-5 g/m ² s
		Organo phosphates	Not detectable	Not detectable	Not detectable
		Siloxane	Not detectable	Not detectable	Not detectable
		Phthalates	Not detectable	Not detectable	Not detectable
Optimum cleaning and disinfection properties			Resistant to surface disinfectants listed by the Disinfectant Commission of the Association for Applied Hygiene (VAH) and the German Robert Koch Institute (RKI)		
Effect of chemicals	EN 423		Resistance dependent upon the concentration and exposure time ¹⁾		
Slip resistance	DIN 51 130		R9	R9	R9
Dynamic load capacity			Up to 4 N/mm ²	Up to 4 N/mm ²	Up to 6 N/mm ²
Toxicity of fire gases	DIN 53 436		Carbonisation gases are non-toxic.		
Electrical behaviour²⁾					
Resistance to earth	DIN EN 1081		<10 ⁶ Ω	10 ⁶ - 9 x 10 ⁷ Ω	10 ⁶ - 9 x 10 ⁷ Ω
Resistance to EPA ground	ESD STM 7.1 / IEC 61340-4-1	Measuring the installed floor at 23 °C (± 2 °C) and ≥ 25% r.h.	<10 ⁶ Ω	10 ⁶ - 9 x 10 ⁷ Ω	10 ⁶ - 9 x 10 ⁷ Ω
		Measuring the installed floor at 23 °C (± 2 °C) and < 25% r.h. installed on an appropriate subfloor build up	<10 ⁶ Ω	10 ⁶ - 10 ⁹ Ω ³⁾	10 ⁶ - 10 ⁹ Ω ³⁾
Operator system - Resistance to ground	ESD STM 97.1 / IEC 61340-4-5	For the system floor / conductive footwear (R < 5 x 10 ⁵ Ω) measuring the installed floor at 23 °C (± 2 °C) and ≥ 25% r.h.	<3,5 x 10 ⁷ Ω	≤3,5 x 10 ⁷ Ω	≤3,5 x 10 ⁷ Ω
Body voltage generation	ESD STM 97.2 / IEC 61340-4-5	Tested with defined conductive footwear with 21 °C and 20% r.h.	← <10 V →		
Insulation resistance	VDE 0100-600		-	≥5 x 10 ⁴ Ω	≥5 x 10 ⁴ Ω

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¹⁾ In case of increased impact of oils, grease, acids, alkalis and other aggressive chemicals please contact us.

²⁾ If installed electrically dissipative and conductive in conformity with our installation instruction and according to the recommendations of the adhesive manufacturer. The used adhesive has to have a permanent resistance of R < 3 x 10⁵ Ω according to EN 13 415.

³⁾ If extremely low humidity values (< 25 %) relative air humidity (=r.h.) are expected for a longer period, please contact nora systems GmbH, Technical Service, for advice.

Colour variations due to different production batches as well as technical alterations to improve the product have to be accepted.

nora systems Shanghai Co. Ltd.

10 A/B, Long Life Building
1566 Yan An Road West
200052 Shanghai · PR China
Phone: + 86 - 21 - 3226 0077
Fax: + 86 - 21 - 5258 1958
E-Mail: info-cn@nora.com
Internet: www.nora.com/cn

nora flooring systems UK Ltd.

4-5 Allerton Road,
Rugby, CV23 0PA · Great Britain
Direct Dial Numbers:
01788 - 513 160 - 513 169
Telefax: 01788 - 55 28 12
E-Mail: info-uk@nora.com
Internet: www.nora.com/uk

nora systems GmbH

Höhnerweg 2 - 4
69469 Weinheim · Germany
Phone: +49 - 6201 - 80 66 33
E-Mail: info@nora.com
Internet: www.nora.com