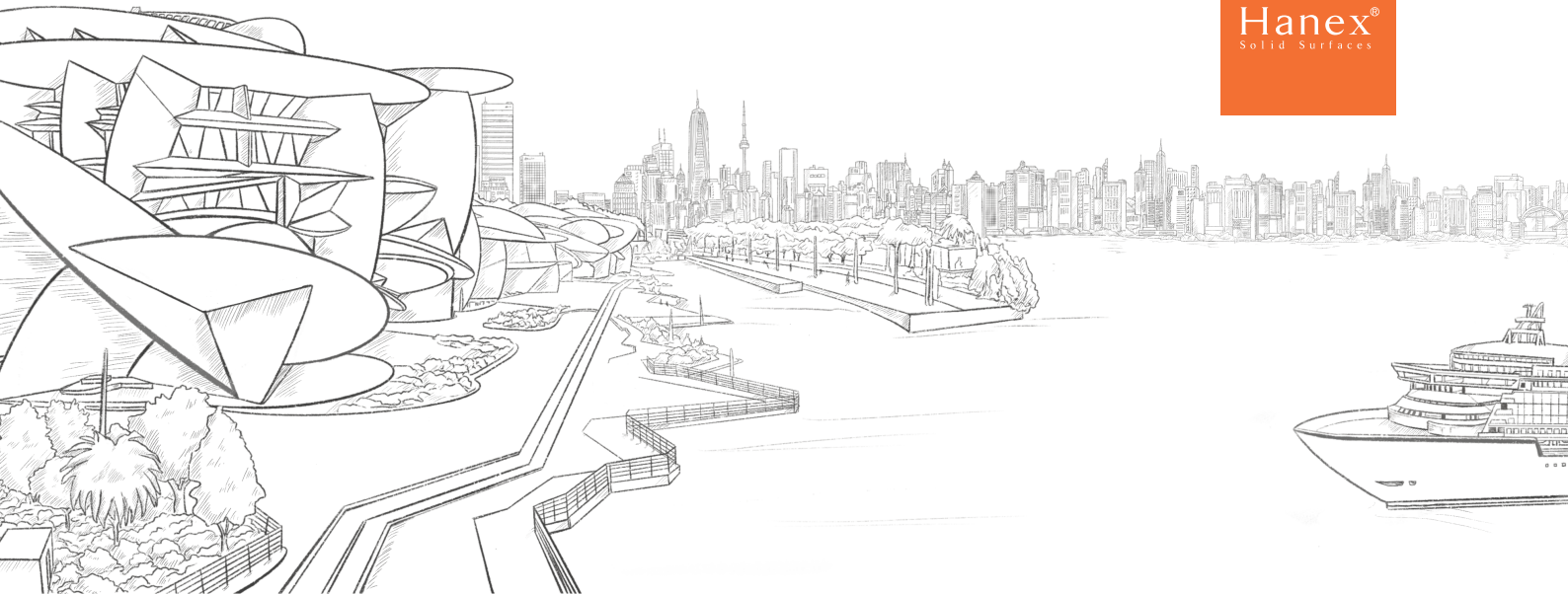




HANEX® 10-YEAR LIMITED WARRANTY FOR EXTERIOR APPLICATIONS

Hyundai L&C warrants, based on many years of practical experience and knowledge, that limited colors (only the decors listed here) under the Hanex® Solid Surfaces brand are suitable for exterior use against moisture, UV radiation and temperature fluctuations, in compliance with all Hyundai L&C / Hanex guidelines and instructions.

This Warranty applies to the exterior application for following Hanex® colors in 12mm thickness only for these colors change of less than or equal to 5 ΔE units in 10 years under normally predictable circumstances:

Code	Color	Code	Color
S-001	R-White	D-003	Gold Brown
S-002	White	T-021	Pure Arctic
S-004	Ivory	T-050	Ice Queen
S-008	N-White		

1. Gloss loss shall not exceed 40% of the matte finish and the paint shall not leach more than the specified delta value for each color for the first 10 years after initial installation. In addition, Hyundai L&C warrants that the Hanex color will remain free of: Flaking, swelling and peeling when the product has been stored, handled, applied and maintained in accordance with Hyundai L&C's technical instructions and all applicable building codes.
2. If, during the above period, a Hanex sheet (if it meets the required local or national European construction standards) shows signs of a defect (subject to the limitations set forth herein), Hyundai L&C will, at its option, either provide a free replacement Hanex sheet or refund the original purchase price of the Hanex sheet that Hyundai L&C determines to have one of the above conditions. In order for Hyundai L&C to respond under this warranty, Hyundai L&C must have the opportunity to inspect the product and subsequently provide its warranty services. All decisions regarding the existence of any of the above conditions or manufacturing defects, or in any case concerning this warranty, shall be made by Hyundai L&C and shall be final and binding on the parties.

3. This Limited Warranty applies only to defects occurring within ten (10) years from the date of permanent installation. The Limited Warranty shall apply only if Hyundai L&C is notified in writing within sixty (60) days after such defects either occurred or should have been discovered through the exercise of reasonable care.

Failure of the claimant to notify Hyundai L&C within such period shall automatically relieve Hyundai L&C of any responsibility and/or liability under this Limited Warranty. Hyundai L&C makes no warranty, express or implied (including, but not limited to, warranties of merchantability, fitness for a particular purpose, even if such purpose is known to Seller or arises from a course of dealing) with respect to the Product. Buyer assumes all risk and liability for results obtained from the use of products covered by this limited warranty, whether used singly or in combination with other materials. The warranty contained herein does not apply to Hyundai L&C joint adhesives; it applies only to Hanex sheets.

4. This warranty does not apply to damage caused by physical or chemical abuse, vandalism, fire, excessive heat, storm damage, floods, earthquakes, accidents, wars, other forms of acts of God, improper design or installation of Hyundai L&C products, a particular application or selection of products for a particular project or design, parts, components or sealants of other manufacturers used with Hyundai L&C products, or failure of Hyundai L&C products caused as a result of such matters and Hyundai L&C hereby disclaims all liability therefor.

5. Hyundai L&C's obligation shall be limited solely to refunding the purchase price of the Hanex sheets or replacing the Hanex sheets for which the claim is made, excluding any costs associated with the manufacture, replacement or installation. In no event shall Hyundai L&C be liable for any special, indirect, incidental, punitive, consequential or similar damages (including, without limitation, damages for lost profits, business interruption or other loss), whether or not caused by Hyundai L&C's negligence, even if Hyundai L&C has been advised of the possibility of such damages.

6. This is the only limited warranty made in connection with the sale of Hanex sheets used in exterior application projects. No agent, dealer or other person is authorized to make any warranties, representations or promises with respect to these products. No terms and conditions other than those set forth herein and no oral or written agreements or understandings modifying this Limited Warranty shall be binding upon Hyundai L&C unless set forth in writing and signed by an authorized representative of Hyundai L&C.

7. Laws, building codes and safety regulations governing the design, construction and building of equipment vary widely. Hyundai L&C assumes no responsibility or obligation with respect to the selection of the product for installation or the design, engineering and construction of the installation.

8. This warranty is conditioned upon the above product being supplied by a Hyundai L&C / Hanex authorized supplier.

*This published document loses its validity when a new document is published.



L & C

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CARE & MAINTENANCE INFORMATION

Unlike other surfacing materials which are produced by laminating or coating, acrylic solid surface is non-porous and solid through the entire material. These features make Hanex® Solid Surfaces virtually maintenance free and repairable. To ensure long lasting beauty, follow these guidelines to prevent damages and care for your investment.



EVERYDAY CLEANING

- Wipe clean with a damp cloth or sponge.
- Basic stains: Clean with mild detergents or general purpose cleaners.
- Periodically go over entire surface with an abrasive cleanser or wet white Scotch Brite™ pad to maintain a uniform appearance.



HEAT DAMAGE

The innate feature of Hanex® Solid Surfaces gives it excellent heat resistant properties compared to other surfacing materials in the market. However, to prevent any damages from heat, never place hot items directly on Hanex® Solid Surfaces. Always use trivets with rubber feet when placing hot items on the countertop. Remember, placing hot pans or heat-generating appliances directly on Hanex® Solid Surfaces may cause damages to your countertop. Avoid direct and indirect heat with temperatures over 80°C (170°F).

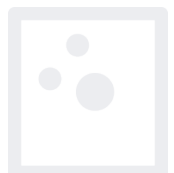


CHEMICAL DAMAGES

Avoid strong chemicals that can cause damages to your surfaces such as oven cleaners, acetone, paint removers and others. If exposed, promptly flush with water. Remember, prolonged contact with harsh chemicals can cause serious damage to your countertop.

SIMPLE STEPS TO AVOID DAMAGES

- Avoid cutting directly on Hanex® Solid Surfaces, use a cutting board.
- Never place hot pans directly on the countertop. Even though Hanex® Solid Surfaces can withstand higher temperatures, prolonged or extreme heat could cause permanent damage.
- Strong acids, such as those found in drain cleaners, should be flushed with water immediately. Some of these items, when left on the surface may cause whitening, which can be difficult to remove.

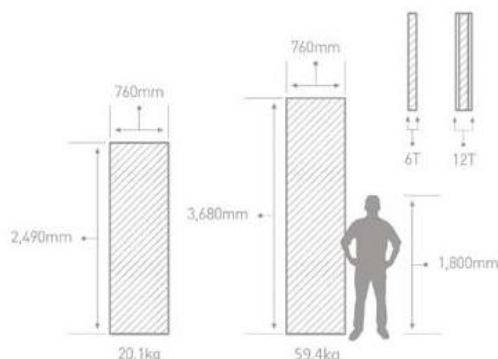


REMOVING PERSISTENT STAINS

For deep scratches and /or other damages which may require expert repair, please contact your authorized and certified Hanex® Solid Surfaces fabricator.

Product Technical Data

The product technical data sheet discusses the performance of Hanex Solid Surfaces. Performance results are specific to the standard tested. The standards may be used as product specifications in other regions other than what is stated below.



About Hanex Solid Surfaces

Hanex Solid Surfaces are made with a composition of Methyl Methacrylate (MMA), Poly Methyl Methacrylate (PMMA) resin filled with Alumina Trihydrate (ATH), and other specialized formats to give timeless beauty and quality.

Hyundai L&C is able to produce solid surface sheets up to 1,520mm wide. These wide sheets allow for a much higher degree of flexibility and efficiency in fabrication and installation. Wide sheets for most available colors require custom orders and minimum order quantity.

* LEED Credit: You can get points for LEED v4.1 BD+C and ID+C from USGBC (American Green Building Council) for building projects using Hanex.

Plant Management System

System	Standard
Quality Management Systems	ISO 9001
Environmental Management Systems	ISO 14001
Occupational Health & Safety Management Systems	ISO 45001

Product Declaration

Declaration	Expiry Date
EPD (Environmental Health Product Declaration)	2026 Jul 01
HPD (Health Product Declaration)	2023 Oct 20

Physical Test

Test	Standard	Result
Tensile Strength	ASTM D638	43.1 Mpa
Tensile Modulus of Elasticity	ASTM D638	12.1 Gpa
Flexural Strength	ASTM D790	65.3 Mpa
Flexural Modulus of Elasticity	ASTM D790	10.8 Gpa
Rockwell Hardness	ASTM D785	88
Izod Impact	ASTM D256	17 J/m
Water Absorption	ASTM D570	0.03 g/cm ³
Density (23°C)	ASTM D792	1.81 g/cm ³
Deflection Temperature	ASTM D648	106 °C
Thermal Expansion	JIS K 6911	3.5x10 ⁻⁵ /°C
Heat Resistance	JIS K 6902	No Defects
Heat Water Resistance	JIS K 6902	No Defects

Test	Standard	Result
Contact with Foods	NSF 51	Pass
Light Resistance	NEMA LD3	Pass
Boiling Water	NEMA LD3	Pass
Ball Impact Resistance	NEMA LD3 ISO 4586-2	Pass (Max Height 2.5m) Pass (Max Height 2.0m)
Point Impact Resistance	ANSI Z124.3	Pass
Stain Resistance	ANSI Z124.3	Pass
Wear and Cleanability	ANSI Z124.3	Pass
Cigarette Burn	ANSI Z124.3	Pass
Chemical Resistance	ANSI Z124.3 ISO 19712-3	Pass
Weatherability	ASTM G155	No Visual Change (1,000 hours)
Compressive Strength	ISO 604	118 MPa

Healthcare Environment Compliance

Test	Standard	Result	Description
VOC Emission	UL 2818	Greenguard, Greenguard Gold	Gold standard for chemical emissions for building materials, finishes and furnishings
TVOC Emission	ISO 16000-9	0.015 mg/m ² ·h	Emission of volatile organic compounds from building products and furnishing
SVHC	SGS in House	Pass	Substances of very high concern for authorization by European Chemicals Agency
Phthalate Content	KS M 1991	Not Detected	Determination of phthalates content in polymer materials
Fungi Resistance	ASTM G21	No Growth	Standard practice for determining resistance of synthetic polymeric materials to fungi
Bacteria Resistance	ASTM G22	No Growth	Standard practice for determining resistance of plastics to bacteria

Fire Performance

Test	Standard	Region	Class
Surface Burning	ASTM E84	United States	Class A (Smoke developed index : 10, Flame spread index : 20)
Euroclass Reaction to Fire	EN 13501-1	Europe (CEN Members)	Class B (Smoke production : s1, Flaming droplets : d0)
Railway	EN 45545	Europe (CEN Members)	R1 for HL3

Though the information contained herein is believed to be reliable, Hyundai L&C cannot and does not warrant that this information is to be understood as implying any legal liability of fitness or suitability for any purpose. Hyundai L&C shall not be liable for any damages, including claims relating to the specification, design, fabrication, installation, or any other indirect damages. Hyundai L&C reserves the right to make changes to this information.

For more information, please visit www.hanex.com or contact your sales rep or service.

SAFETY DATA SHEET

Safety Data Sheet

Version 4.0

Revision Date: 07/01/2020

This document is for information only, provided voluntarily and not subsequent to regulatory requirement

1. Product and Company Identification

A) Product Name: HANEX SOLID SURFACES

B) Recommended use of the chemical and restrictions on use:
Interior finishing materials (Kitchen Surfaces, Counter Surfaces, Inner wall finishing)

C) Manufacturer/Supplier/Distributor Information

- Name: Hyundai L&C Corporation
- Address
- 1) H.Q: 13F, East Central Tower, 1077, Cheonho-daero, Gangdong-gu, Seoul, Korea
- 2) Plant: #37 Bukanggeumho-ro, Bukang-myun, Sejong, Korea

2. Hazards Identification

A) Hazard Risk Classification: N/A

B) Label elements including precautionary statements

Symbol: N/A
Signal Word: N/A
Hazard Risk Statement: N/A
Precautionary Statement: N/A

C) Other Hazard Risk which is not included in the classification criteria (NFPA)

Health: 1
Fire: 1
Reactivity: 0

3. Composition/Information on Ingredients

Chemical Name	Other Name	CAS No.	Content (%)
Poly Methyl Methacrylate	-	9011-14-7	10
Aluminium Trihydrate	-	21645-51-2	60
Methyl Methacrylate	-	80-62-6	25
Copolymer Colorants	Toner	-	< 5

※ Hanex is produced through the chemical combination of under ingredients, and the individual possibility for bareness of each ingredient is rare.

SAFETY DATA SHEET

Hanex®
Solid
Surfaces
ELEVATE LIFE™

4. First Aid Measures

- A) Eye contact: Wash with large amounts of water until no evidence of chemical remains (at least 15-20 minutes).
Get medical attention, if needed
- B) Skin contact: Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains
- C) Ingestion: If vomiting occurs, keep head lower than hips to help prevent aspiration.

Get medical attention, if needed

5. Fire-Fighting Measures

- A) Flammable properties: "HANEX" can be combusted only with difficulty
- B) Extinguishing media: Water, Dry chemical, CO2
- C) Hazardous gases/vapors produced in fire are carbon monoxide, methyl methacrylate, aldehydes
- D) Fire fighting instructions
 - 1) Wear self-contained breathing apparatus
 - 2) Keep personnel removed and upwind of fire

6. Accidental Release Measures

- A) Safeguard (Personnel): Use appropriate personal protective during clean up
- B) Spill cleanup: Recover undamaged and minimally contaminated material for reuse and reclamation

7. Handling and Storage

- A) Handling (Personnel):
 - Avoid breathing dust.
 - Avoid breathing fumes generated during sawing, routing or drilling
- B) Storage: Store in a dry and cool place

8. Exposure Controls and Personal Protection

- A) Chemical exposure standard, biological exposure standard: No information is available
- B) Engineering controls (ventilation):
 - Use ventilation that is adequate to keep employee exposure to air borne concentration below exposure limits
- C) Personal protection
 - Protective equipment: Eye/Face Protection
 - Wear safety glasses during operations such as sawing, sanding, drilling or routing

SAFETY DATA SHEET

Use safety gloves, earplug and safety shoes

9. Physical and Chemical Properties:

- A) Appearance: A board
- B) Smell: Nothing
- C) pH: N/A
- D) Melting Point/Freezing point: N/A
- E) Boiling point and range: N/A
- F) Specific Gravity: 1.6 ~ 1.8
- G) Vapor Pressure: N/A
- H) Vapor Density: N/A
- I) Solubility: Insolubility
- J) Odor Threshold: N/A
- K) Evaporation rate: N/A
- L) Explosive: N/A

10. Stability and Reactivity

- A) Pyrolysate: Acrylate vapor release because of frictional heat(Saw)
- B) Toxic decomposition product: CO, Acrylate monomers, smog
- C) Toxic reaction: N/A
- D) Other information: In the presence of an ignition source is a potential dust explosion hazard
 - 1) Breath equipment: Use breathing equipment when it's poorly ventilated
 - 2) Safety gloves: Use safety gloves
 - 3) Personal protection: Use earplug and safety shoes

11. Toxicological Information

- A) Possible exposed path
 - 1) Acute breathe toxic: Yes (Dust)
 - 2) Acute oral toxic: No
 - 3) Skin contact: Yes
 - 4) Eye contact: Yes
- B) Physical, chemical and toxicological symptom: No information is available

SAFETY DATA SHEET

C) Influence by short-term and Long-term exposure

1) Acute toxic

- Oral: N/A
- Skin: N/A
- Inhalation: Inhalation irritant caused by heated acrylate vapor

2) Skin: Skin irritant caused by heated acrylate vapor

3) Eye: Eye irritant caused by heated acrylate vapor

4) Inhalation irritant: No information is available

5) Skin irritable substance: No information is available

6) Carcinogenic substance

- IARC: 3 (non-classified)
- ACGIH: non-classified

7) Reproductive substance: No information is available

8) Organ, whole body toxic substance (once exposure): No information is available

9) Organ, whole body toxic substance (repeated exposure): No information is available

12. Ecological Information

A) Biodegradation: N/A

B) Bioaccumulation: N/A

C) Aquatic Toxicity: N/A

13. Disposal Considerations

A) Dispose in accordance with federal, state and local regulation.

B) The owner of the material is responsible for proper waste disposal

C) Caution: Use breathing equipment to avoid breathing dust

14. Transport Information

A) Product is not classified for any mode of transportation

B) Caution: Flat-Pallet Stacking

15. Regulatory Information

A) Not classified as hazardous according to criteria of occupation safety and health acts

B) Not classified as hazardous according to criteria of toxic chemicals control act

SAFETY DATA SHEET

C) National regulatory information

1) USA regulation: TSCA registration

2) Maleficence: N/A

16. Other Information

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. The information given is intended only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification.

It is the exclusive responsibility of the recipient of our product to find out the applicable laws and regulations prior to using the product and to comply with them in all respects. Please note that applicable national and international laws and regulations may change and it is the responsibility of the recipient to follow such changes.

This information is based on technical information deemed reliable and is subject to revision as additional information is made available.

ENVIRONMENTAL PRODUCT DECLARATION

HANEX

ACRYLIC SOLID SURFACES



HYUNDAI

L & C

Hyundai Living & Culture is dedicated to protecting the environment and reducing our energy footprint by creating eco-friendly products that reflect the beauty of nature. From product research and development, to manufacturing and recycling, we take every step to safeguard the environment and protect its future for generations to come. As part of that effort, the Hyundai Department Store Group is a proud member of the U.S. Green Building Council, and we adhere to its Leadership in Energy and Environmental Design™ (LEED®) green building guidelines.

Hanex continually pushes the boundaries of what is possible in order to meet the demands of today's diverse applications. Hanex's goal is to enrich the lives of the people who encounter these spaces by understanding what really matters beyond aesthetics alone. With an exclusive manufacturing process using high-tech equipment, Hanex's next-generation products are meticulously crafted to withstand even the most rigorous treatment, making it the ideal material for residential and commercial applications.



ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment	
DECLARATION HOLDER	Hyundai L & C Corporation	
DECLARATION NUMBER	4789966215.101.1	
DECLARED PRODUCT	HANEX Acrylic Solid Surfaces	
REFERENCE PCR	NSF PCR for Residential Countertops Extended per PCRExt 2021-103	
REFERENCE PCR STANDARD	☒ ISO 14025	
DATE OF ISSUE	July 1, 2021	
PERIOD OF VALIDITY	5 Years	
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by:		PCR Review Committee
		ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL		<i>Grant R. Martin</i>
		Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		<i>James H. Mellentine</i>
		James Mellentine, Thrive ESG

ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

Company Information

Hyundai L&C is one of the world's leading manufacturers of premium building materials and an industry leader in the market of Acrylic Solid Surface. Hyundai L&C being a total interior enterprise of Hyundai Department Store Group has grown as a representative enterprise in Korea specializing in building materials since its foundation in 1965.

It runs the business of various building materials including high-class interior stones and various surface finishing materials based on eco-friendly interior film manufacturing technology, trendy style wallpapers and flooring materials, and up to windows & doors of grade 1 energy saving technology. It is strengthening the status as the 'total living interior enterprise' by providing one-stop services from counseling to delivery, construction and after-sales service through operation of directly managed interior store. Under the belief that simple imitation achieves nothing, Hyundai L&C's strong global network, excellent human resources, and leading technologies will create the new living culture of the future.

Product Information

Description of Product

Hanex is an acrylic solid surface material that is resistant to stains and chemicals and can be molded in a variety of designs with unique combinations of acrylic resin and natural materials. It is an ideal material for residential and commercial applications because of its beauty, durability, aesthetics, design flexibility, and color choices.

Hanex Solid Surfaces are made with a composition of Methyl Methacrylate (MMA) and Poly Methyl Methacrylate (PMMA) resin filled with Alumina Trihydrate (ATH) and other specialized formats to give them timeless beauty and quality. Hanex sheets are made using DBCU (Double Belt Casting Unit) process and SBCU (Single Belt Casting Unit) process to produce superior products.

Table 1 Material Composition

Chemical Name	CAS No.	Content (%)
Poly Methyl Methacrylate (PMMA)	9011-14-7	10
Aluminium Trihydrate	21645-51-2	60
Methyl Methacrylate	80-62-6	25
Copolymer Colorants	-	< 5

Application of Product

Hanex Solid Surfaces is an ideal hygienic material for kitchens and baths due to its resistance to heat, moisture,

Environment



ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

pollutants, bacteria, and other harmful agents. With a wide selection of colors and design applications, Hanex Solid Surfaces can transform any space into a beautiful environment. The unlimited design flexibility of Hanex Solid Surfaces makes it a perfect material for commercial applications. Many commercial builders are using solid surfaces in hospitals, restaurants, hotels, schools, banks, and other areas because of all the advantages a solid surface has to offer.



Manufacturing Location

Hanex is manufactured in both Republic of Korea and the United States. During the raw material acquisition and construction stage, the data was collected only from the Sejong Plant which located in Korea. However, the results include the worldwide transport and disposal after the construction stage.

Characteristics of Product

- Thermal Stability: The resistance without change in color and shape when heat is applied to the material from an

Environment



ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

outside source, including direct and/or indirect heat source. Hanex Solid Surfaces has been tested and passed the following tests:

- Heat Resistance
- Hot Water Resistance
- Weatherability
- UV Stability
- Flame Resistance
- Chemical Resistance: The resistance to certain acid, alkali and organic solvent without change in color and composition. Hanex Solid Surfaces has been tested under the strictest guidelines.
- Maintenance/Repairability: Unlike other surfacing materials which are produced by laminating or coating, Hanex is nonporous and solid through the entire material. These features make Hanex Solid Surfaces virtually maintenance free and fully repairable.
- Seamless Design: Sheets can be bonded together with inconspicuous seams. Smooth integration allows large areas without joints.
- Recyclable: Hanex is an eco-friendly material, as it is renewable and can be used again in its production process.
- No Radon Detected: Hanex is a safe product with no first-class carcinogen radon detected.
- Anti-Bacteria: Hanex is capable of withstanding the spread of other harmful germs and bacteria.
- Translucent: Various thickness of Hanes exhibit a special translucency when exposed to light.
- Thermoform: Sheets can be thermoformed to create curves of shapes of any designs.
- Other Product Benefits:
 - Stain resistant
 - Mildew resistant
 - Class A fire rating
 - Nonporous
 - Repairable
 - Custom edge details
 - Industry's best warranty
 - Durable

Table 2. Technical specifications for Hanex (engineered stone)

Characteristic	Value	Unit
Primary Material Thickness	12 (1/2")	mm (inch)
sheet/slab length	2500~3680 (98~144")	mm (inch)
sheet/slab width	760 (30")	mm (inch)
primary material weight	20.4 (1.27)	kg/m ² (lb/ft ²)
Underlayment Included	None	
Underlayment Type	None	

ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

VOC Emissions Test Method	UL 2818 - 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings. Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment. Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2. GREENGUARD - Indoor Air Quality Certified Building materials are determined compliant in accordance with an Office environment with an air change of 0.68 hr⁻¹ and a loading of 3.20 m2. Products tested in accordance with UL 2821 test method to show compliance to emission limits in UL 2818, Section 7.1.
Other Characteristics	GREENGUARD Gold certification ANSI/NSF 51-2012 Food equipment materials

Table 3. Additional technical specifications for Hanex (engineered stone)

Additional Characteristic	Value	Test Standard
Specific Gravity	1.7	ASTM D792-08
Rockwell Hardness	90	ASTM D785-08
Tensile Strength	43.8 MPa	ASTM D638-10
Tensile Modulus of Elasticity	12.6 GPa	
Flexural Strength	58.8 MPa	ASTM D790-10
Flexural Modulus of Elasticity	10.6 GPa	
Izod Impact Strength	16 J/m	ASTM D256-10
Water Absorption	0.036 % (24hr Immersion)	ASTM D570-98
Density	1.7 g/cm ²	ASTM D792-08
Heat Resistance Test	No Defects	JIS K 6902 : 2008
Hot Water Resistance Test	No Defects	
Deflection Temperature Under (1.82MPa)	115 °C	ASTM D648-07
Thermal Expansion	3.93 x 10 ⁻⁵ 1/°C	JIS K 6911 : 2006
Compressive Strength	118 MPa	ISO 604 : 2002



ENVIRONMENTAL PRODUCT DECLARATION



HANEX

ACRYLIC SOLID SURFACES

According to ISO 14025

Light Resistance	No Effect	NEMA LD3 3.03
Boiling Water	No Effect	NEMA LD3 3.05
Ball Impact Resistance	No Fracture on 3 Impacts	NEMA LD3 3.08
Resistance to Impact by Large Diameter Ball	Max Impact Height : 2m	ISO 4586-2
Point Impact Resistance	No Cracks or Chips	ANSI Z124.3 4.3
Stain Resistance Test	Pass	ANSI Z124.3 5.2
Wear and Cleanability Test	Pass	ANSI Z124.3 5.3
Cigarette Test	Pass	ANSI Z124.3 5.4
European Railway Standard for Fire Safety	R1, HL3	EN 45545
Resistance to Bacteria	No Growth	EN 45545
Resistance to Fungi	No Growth	ASTM G21
European Classification Standard	B-s1, d0	EN 13501-1
Façade Panel	ETA (European Technical Assessment)	DIBT
Weatherability (1,000 hr) - Special Color Only	No Visual Change	ASTM G155

Modelling of Life Cycle Assessment

The analysis represents the weighted average of Hanex from the Sejong plant, based on production and sales volume in 2020. The whole LCA process was conducted according to ISO 14044.

Reference PCR

This LCA study was conducted according to the requirements in the Product Category Rule (PCR) for Environmental Product Declarations "PCR for Residential Countertops" published by NSF International and valid through September 17, 2021.

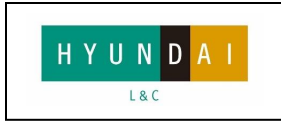
Functional Unit

The functional unit is one square meter (10.76 square ft) of countertop for a period of 10 years in residential use. The

Environment



ENVIRONMENTAL PRODUCT DECLARATION



HANEX
ACRYLIC SOLID SURFACES

According to ISO 14025

functional unit includes a front edge and a backsplash.

Table 4 Characteristics of Hanex per functional unit

Characteristic	Value	Unit
Functional Unit	1	m ²
Service Life	10	years
Weight	20.4	kg

System Boundary

The figure 1 describes the system boundary of Hanex for the LCA report.

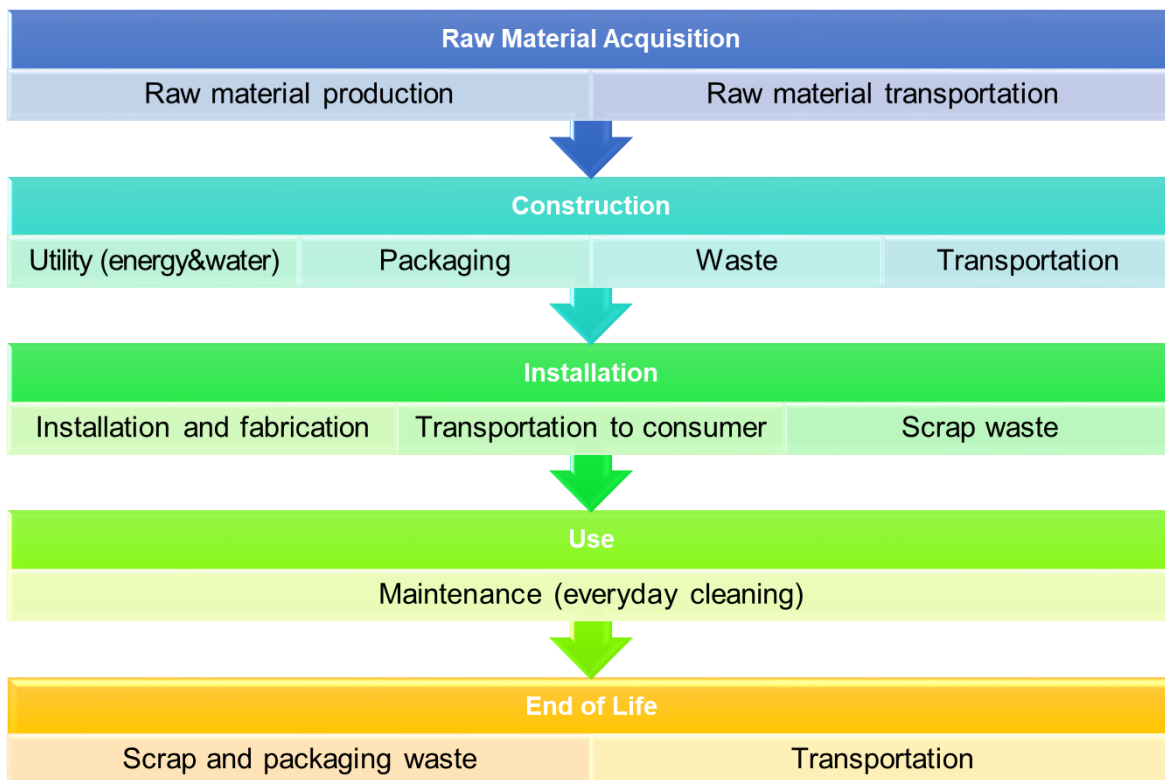
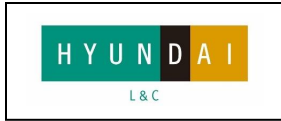


Figure 1 System Boundary of Hyundai L&C Hanex

- Material acquisition and pre-processing: This stage includes the material extraction from nature, pre-processing, intermediate processing, and the transportation within and between all processing stages and ends when the material

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reaches the gate of the construction facility. The stage also considers the transportation of the raw materials to the construction site.

- Countertop construction: The stage starts with the product components entering the construction gate and ends with the final countertop leaving the construction gate. This stage is intended to be “gate-to-gate”. The construction stage includes production processes such as material and energy use, inbound transport of semi-finished products, waste and scrap, and packaging materials.
- Installation: The stage starts from the gate of facility and ends when the product is arrived and installed to the final consumer. During the distribution stage, all the domestic and foreign transport via truck and container ship was considered. The fabrication scenario including cutting, sanding and securing the surface with adhesive is based on the fabrication manual of Hanex solid surfaces. Since the countertops are customized by the fabricator, a 10% scrap rate is assumed.
- Use and maintenance stage: The stage refers to Care & Maintenance Information from the fabrication manual of Hanex solid surfaces. It includes everyday cleaning with tap water and soap over 10-year reference service life. No sealing or grouting is needed.
- End-of-life stage: The stage includes the disposal of the product and packaging, a 90% scrap rate. The product scrap is not typically recycled or reused at the end of life. In the absence of primary data, it is modeled as 80% landfill and 20% incineration according to the latest US EPA WARM model.

※ The LCA study took into account all the transport of waste materials.

Cut-off Rules

To avoid the need to calculate trivial inputs and outputs in the system, cut-off criteria was applied as follows;

- Mass and energy flows that consist of less than 1% may be omitted from the inventory analysis
- Cumulative omitted mass or energy flows shall not exceed 5%.
- Mass or energy flows that contribute more than 10% to an impact category shall be included.

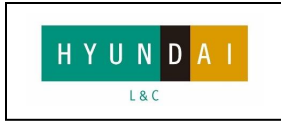
According to the cut-off criteria, excluded Inputs are additional agents for antifoaming, cross-linking, coupling and dispersing and decorative elements such as pattern chips, glitters and colorings. Hanex products have different color, pattern and design for each collection but those differences does not affect the major results of LCA.

Allocation Rules

Allocation was conducted based on a mass basis and production amount of Hanex compared to the other products produced in the Sejong plant, Seoul.

Calculation Rules and Data Quality Requirements

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SimaPro ver.9.1, a LCA modeling software program, was used for life cycle assessment. In the absence of primary data, secondary datasets were used from Ecoinvent version 3.

For the data quality assessment, the following requirements are considered;

- Time related coverage: Primary data from on-site was collected during the fiscal year of 2020
- Geographical coverage: Primary data was collected from the Sejong plant, Republic of Korea.
- Technology coverage: Primary data was collected from Single Belt Casting Unit (SBCU) and Double Belt Casting Unit (DBCUs) in the Sejong plant.
- Source of the data: All input and output data was collected in the enterprise resources planning (ERP) system.
- Uncertainty of the Information: The relative uncertainty associated with this study has been minimized. However, there are few assumptions and limitations as mentioned below. The production location is only limited to Sejong city in Republic of Korea. The geography of the secondary data for the construction stage is rest of world (RoW) instead of Republic of Korea due to the applicable range of LCI data. That from the use stage to the end-of-life stage is US (the United States of America) as the most selling country of Hanex is the USA. There are also some scenarios for the use stage and transportation overall adapted in the study stated in the assumptions and limitations.

The data used in this study meets all data quality requirements as outlined in the PCR. Secondary data was evaluated with regard to precision, completeness, consistency, reproducibility, representativeness and uncertainty. The above indicators were considered in accordance with ISO 14044.

Life Cycle Impact Assessment (LCIA) Method

IPCC 2013 GWP 100 was used for global warming potential (GWP). For other impact categories, US TRACI 2.1 ver. 1.05 and CML baseline v3.06 were used.

Assumptions and limitations

The following assumptions and limitations are adapted.

- Geography of secondary data: The geography of secondary data is based on the rest of world (RoW).
- Distribution transport distance: The transport distance from facilities to selling agents was calculated as weighted average of more than 90% sales volume.
- Product thickness: The thickness of Hanex is unified as 12mm, the standard thickness. The production with the different thickness is calculated to the standard thickness based on the production volume.
- Waste treatment: According to the PCR, The waste treatment of Hanex during the installation and end-of-life stage follows the most current version of the US EPA WARM model. All waste treatment after construction is considered as happened in the United States, the country with the largest export volume. The average municipal solid waste disposition is 80% landfill and 20% incineration. According to the WARM model, the average transport distance at the end of life is 32 kilometers (20 miles). A 10% scrap rate is used during the installation stage.
- Production site: The LCA results represent the average production of Hanex at the Sejong Plant in Republic of Korea, not from the other countries.

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Life Cycle Assessment Results

Life cycle assessment results of Hanex are presented per the functional unit. The analysis represents the weighted average of Hanex from the Sejong plant, based on the production and sales volume in 2020. The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceedance of thresholds, safety margins or risks.

Life Cycle Inventory Results

Table 5 Material resources results of Hanex per functional unit

Inventory	Material Acquisition	Construction	Install	Use	Disposal	Total
Material resources (kg)						
Virgin renewable resources	0.00E+00	0.00E+00	0.00E+00	1.10E+02	0.00E+00	1.10E+02
Recycled resources	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Virgin non-renewable resources	2.53E+01	1.10E+00	3.50E-01	2.91E+00	0.00E+00	1.39E+02

Table 6 Inventory results of Hanex per functional unit

Inventory	Material Acquisition	Construction	Install	Use	Disposal	Total
Energy type and usages (MJ)						
Primary energy demand	1.30E+03	2.14E+02	5.48E+01	9.78E+01	8.39E+00	1.67E+03
Fossil fuel based energy	1.22E+03	1.93E+02	5.09E+01	3.10E+01	7.79E+00	1.50E+03
Nuclear energy	7.11E+01	2.00E+01	1.61E+00	2.27E+00	1.66E-01	9.52E+01
Biomass energy	5.05E+00	2.59E-01	7.71E-01	6.32E+01	3.72E-02	6.94E+01
Wind, Solar, Geothermal energy	0.00E+00	8.30E-01	7.15E-01	1.35E-01	3.17E-01	2.00E+00
Hydro energy	6.70E+00	4.70E-01	8.41E-01	1.08E+00	8.18E-02	9.17E+00
Emissions to air (kg)						
SO _x	3.21E-04	1.26E-06	1.02E-06	6.12E-06	2.09E-06	3.31E-04

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NO _x	1.62E-01	1.49E-02	3.31E-02	1.07E-02	4.27E-03	2.25E-01
CO ₂ *	6.14E+01	4.51E+00	3.01E+00	2.29E+00	9.01E+00	8.03E+01
Methane	2.99E-03	1.99E-03	1.15E-03	2.27E-08	1.42E-04	6.27E-03
N ₂ O	3.69E-04	2.23E-04	1.38E-04	2.09E-03	3.53E-04	3.17E-03
CO*	1.02E-01	3.94E-03	3.78E-03	5.68E-03	1.24E-03	1.17E-01
Emissions to water (kg)						
Phosphates	2.56E-02	7.91E-03	1.18E-03	3.50E-03	1.63E-04	3.84E-02
Nitrates	3.73E-03	4.44E-03	1.35E-03	1.53E-01	8.89E-03	1.71E-01
Dioxin	1.19E-17	7.39E-19	1.99E-17	1.16E-17	1.10E-18	4.53E-17
heavy metals, arsenic	3.99E-04	2.12E-05	6.62E-06	9.61E-06	3.31E-05	4.70E-04
heavy metals, lead	3.35E-04	1.38E-03	8.38E-04	2.03E-04	7.18E-03	9.94E-03
heavy metals, mercury	2.44E-06	3.11E-06	1.50E-06	7.30E-07	1.18E-05	1.96E-05
heavy metals, cadmium	1.08E-05	2.38E-04	1.27E-04	5.69E-06	1.13E-03	1.52E-03
heavy metals, chromium	1.58E-06	9.20E-07	6.41E-07	6.28E-06	1.40E-07	9.56E-06
Water consumption (kg)						
Water Input	1.48E+01	7.76E-01	1.74E+00	1.15E+01	5.78E-01	2.94E+01
Waste management (kg)						
Incineration with energy recovery	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Incineration without energy recovery	0.00E+00	0.00E+00	4.08E-01	0.00E+00	3.67E+00	4.08E+00
Landfill (non-hazardous solid waste)	0.00E+00	2.46E+00	1.63E+00	0.00E+00	1.47E+01	1.88E+01
Hazardous waste	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Landfill avoidance (recycling)	0.00E+00	3.78E+00	0.00E+00	0.00E+00	0.00E+00	3.78E+00

*The source of carbon dioxide and carbon monoxide is fossil.

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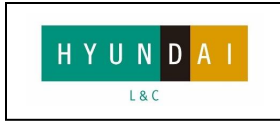
According to ISO 14025

Life Cycle Impact Assessment Results

Table 6 Characterization results of Hanex per functional unit

Inventory		Material Acquisition	Construction	Install	Use	Disposal	Total
IPCC 2013 GWP 100							
Global Warming	kg CO ₂ -eq.	7.59E+01	1.01E+01	4.54E+00	7.20E+00	1.04E+01	1.08E+02
TRACI 2.1 v.1.05							
Acidification	kg SO ₂ -eq.	4.00E-01	1.80E-02	4.12E-02	3.09E-02	3.92E-03	4.94E-01
Photochemical Ozone Creation (Smog)	kg O ₃ -eq.	4.09E+00	1.33E+00	8.26E-01	2.89E-01	1.07E-01	6.64E+00
Eutrophication	kg N-eq.	1.23E-01	6.09E-02	2.64E-02	5.06E-02	1.93E-01	4.54E-01
Ozone Layer Depletion	kg CFC11-eq.	1.70E-06	6.70E-07	9.26E-07	4.90E-07	7.37E-08	3.86E-06
Abiotic resource Depletion	MJ surplus	1.63E+02	2.32E+01	6.46E+00	2.76E+00	1.02E+00	1.97E+02
CML-IA baseline v3.06							
Abiotic resource Depletion	kg Sb-eq.	2.19E-04	9.16E-06	2.05E-05	2.03E-04	4.61E-06	4.56E-04
Abiotic fossil Depletion	MJ	1.12E+03	1.75E+02	4.75E+01	2.88E+01	7.28E+00	1.38E+03
Global Warming	kg CO ₂ -eq.	7.48E+01	1.00E+01	4.51E+00	7.18E+00	1.03E+01	1.07E+02
Ozone Layer Depletion	kg CFC ₁₁ -eq.	1.49E-06	5.34E-07	8.53E-07	4.45E-07	5.78E-08	3.38E-06
Photochemical oxidation	kg C ₂ H ₄ -eq.	2.60E-02	7.67E-04	1.37E-03	4.01E-03	3.09E-04	3.24E-02
Acidification	kg SO ₂ -eq.	4.19E-01	1.53E-02	3.77E-02	2.80E-02	3.06E-03	5.03E-01
Eutrophication	kg PO ₄ -eq.	6.83E-02	2.53E-02	1.37E-02	2.52E-02	7.14E-02	2.04E-01

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Other Environmental Information and independent verification

Hanex is highly regarded in the environment-friendly materials market with various environmental related certifications such as NSF, Greenguard. From recycling 100% of the water used in the production process, to installing air purification systems and collecting and removing all dust within our plants, we strive to ensure a healthy workplace and promote an eco-conscious approach to product development and waste management.



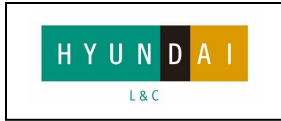
Please visit the following link to find our sustainability efforts, <https://hyundailnc.athena.dev-applied3.com/sustainability>.

References

- ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
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- Leiden University CML IA Characterisation Factors
- US EPA Waste Reduction Model (WARM)3
- World Business Council for Sustainable Development's Global Water Tool
- World Resources Institute (WRI) Draft Product Life Cycle Accounting and Reporting Standard
- LCI Databases: Ecoinvent 3
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- LCI Databases: Agri-footprint
- UL General Program Instructions, v.2.5 March 2020



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According to ISO 14025

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Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamts

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts



Europäische Technische Bewertung

ETA-18/0390
vom 15. Juli 2019

Allgemeiner Teil

Technische Bewertungsstelle, die
die Europäische Technische Bewertung
ausstellt

Handelsname des Bauprodukts

Produktfamilie,
zu der das Bauprodukt gehört

Hersteller

Herstellungsbetrieb

Diese Europäische Technische Bewertung
enthält

Diese Europäische Technische Bewertung
wird ausgestellt gemäß der Verordnung (EU)
Nr. 305/2011, auf der Grundlage von

Deutsches Institut für Bautechnik

Ventilated cladding kit comprising "Hanex facade panel"
and associated fixing

Hinterlüftetes Fassadensystem aus Hanex-Platten mit
Hinterschnittbefestigung

Hyundai L & C Europe GmbH
Düsseldorfer Straße 13
65760 Eschborn
DEUTSCHLAND

Werk 1
Plant 1

17 Seiten, davon 12 Anhänge, die fester Bestandteil
dieser Bewertung sind.

EAD 090062-00-0404

Die Europäische Technische Bewertung wird von der Technischen Bewertungsstelle in ihrer Amtssprache ausgestellt. Übersetzungen dieser Europäischen Technischen Bewertung in andere Sprachen müssen dem Original vollständig entsprechen und müssen als solche gekennzeichnet sein.

Diese Europäische Technische Bewertung darf, auch bei elektronischer Übermittlung, nur vollständig und ungekürzt wiedergegeben werden. Nur mit schriftlicher Zustimmung der ausstellenden Technischen Bewertungsstelle kann eine teilweise Wiedergabe erfolgen. Jede teilweise Wiedergabe ist als solche zu kennzeichnen.

Die ausstellende Technische Bewertungsstelle kann diese Europäische Technische Bewertung widerrufen, insbesondere nach Unterrichtung durch die Kommission gemäß Artikel 25 Absatz 3 der Verordnung (EU) Nr. 305/2011.

Besonderer Teil

1 Technische Beschreibung des Produkts

Der HANEX Fassadenbausatz für hinterlüftete Außenwandbekleidungen entspricht der Produktfamilie B gemäß EAD 090062-00-0404. Der Bekleidungsbausatz besteht aus weißen acrylgebundenen Bekleidungselementen (Fassadenplatten), die mechanisch mittels in hinterschnittenen Bohrlöchern eingesetzten Spezialankern (mindestens 4 Anker), wie in Abschnitt 2 dieses Dokuments aufgeführt, an der Unterkonstruktion befestigt und formschlüssig verankert werden.

Die "HANEX Fassadenplatte" ist eine massive Mineralwerkstoffplatte aus einem Drittel Acrylharz und zwei Dritteln natürlichem mineralischem Aluminiumhydroxid mit weißer Farbe und einer Dicke von 12 mm.

Die Produktbeschreibung ist Anhang A zu entnehmen.

Der HANEX Fassadenbausatz für hinterlüftete Außenwandbekleidungen umfasst:

- Bekleidungselement: HANEX-Fassadenplatte (HANEX Premium Surface, S-008 N-Weiß), weiß, max. Standardformate der acrylgebundenen Fassadenelemente 930 x 3680 x 12 mm (Verwendung kleinerer Plattenformate möglich).
- Befestigungsmittel für die Bekleidung: KEIL Hinterschnittanker KH 7,0 aus Edelstahl nach ETA-06/0253 (KH 7).
- Mechanisches Befestigungselement: Der KEIL Hinterschnittanker KH 7,0 nach ETA-06/0253 (KH 7,0) ist ein Spezialanker aus nichtrostendem Stahl, der aus einer kreuzweise geschlitzten Ankerhülse mit Innengewinde M6, an deren oberen Ende ein Sechskant angeformt ist, und einer zugehörigen Sechskantschraube mit angerollter Sperrzahlkopf-Scheibe.

Detaillierte Informationen und Angaben zu allen Komponenten sind den Anhängen dieser Europäischen Technischen Bewertung und den zugehörigen Prüfberichten zu entnehmen.

Die Unterkonstruktion und deren Verankerung (Wandhalter, Verankerungsmittel) am Bauwerk sind nicht Gegenstand dieser Europäischen Technischen Bewertung.

2 Spezifizierung des Verwendungszwecks gemäß dem anwendbaren Europäischen Bewertungsdokument

Der HANEX Fassadenbausatz ist für die Verwendung als Außenwandbekleidung in vorgehängten hinterlüfteten Fassaden vorgesehen. Als Untergründe dienen Wände aus Mauerwerk (Ziegel, Beton, Stein), Beton (Ortbeton oder Fertigteil-Platten), Holz-/Metallrahmenbauweise in Neu- und Bestandsbauten (Sanierung).

Der Anker wird in ein hinterschnittenes Bohrloch gesetzt und durch Eindrehen der Schraube formschlüssig gesetzt und wegkontrolliert verankert.

Die vertikalen und horizontalen Tragprofile mit den zugehörigen Agraffenelementen müssen aus Metall sein.

Die Wandeigenschaften sind vor Verwendung des HANEX Fassadenbausatzes zu prüfen, insbesondere hinsichtlich der Brandschutzklassifizierung und der Eignung für die mechanische Befestigung des HANEX Fassadenbausatzes.

Von den Leistungen in Abschnitt 3 kann nur ausgegangen werden, wenn der Anker entsprechend den Angaben und unter den Randbedingungen nach Anhang B verwendet wird.

Die Prüf- und Bewertungsmethoden, die dieser ETA zu Grunde liegen, führen zur Annahme einer Nutzungsdauer des HANEX Fassadenbausatzes von mindestens 25 Jahren. Die Angabe der Nutzungsdauer kann nicht als Garantie des Herstellers verstanden werden, sondern ist lediglich ein Hilfsmittel zur Auswahl des richtigen Produkts in Bezug auf die angenommene wirtschaftlich angemessene Nutzungsdauer des Bauwerks.

Der HANEX Fassadenbausatz besteht aus nichttragenden Konstruktionselementen. Diese leisten keinen direkten Beitrag zur Standsicherheit der Wand, auf der sie angebracht werden, können jedoch durch den erhöhten Schutz vor Witterungseinflüssen zu einer größeren Dauerhaftigkeit beitragen.

Der HANEX Fassadenbausatz ist nicht dafür vorgesehen, die Luftundurchlässigkeit der Gebäudehülle zu gewährleisten.

3 Leistung des Produkts und Angabe der Methoden ihrer Bewertung

3.1 Brandschutz (BWR 2)

Wesentliches Merkmal	Leistung
Brandverhalten (Fassadenplatte)	B-s1, d0 gemäß EN 13501-1
Brandverhalten der Fassade	keine Leistung bewertet
Bereitschaft zum kontinuierlichen Schwelen	keine Leistung bewertet

Anmerkung: Ein europäisches Referenzszenario für das Brandverhalten von Fassaden steht noch aus. In einigen Mitgliedstaaten ist die Klassifizierung von Außenwandbekleidungen nach EN 13501-1 für die Verwendung an Fassaden möglicherweise nicht ausreichend. Um die Anforderungen in diesen Mitgliedstaaten zu erfüllen, kann eine zusätzliche Beurteilung der Außenwandbekleidungen nach nationalen Bestimmungen (z. B. auf der Grundlage eines Bauteilversuchs) erforderlich sein, bis das europäische Klassifizierungssystem ergänzt worden ist.

3.2 Hygiene, Gesundheit und Umweltschutz (BWR 3)

Wesentliches Merkmal	Leistung
Wasserdichtigkeit der Verbindungen	keine Leistung bewertet
Wasserabsorption	irrelevant
Wasserdampfdurchlässigkeit	irrelevant
Entwässerbarkeit	keine Leistung bewertet
Inhalt, Emission und/oder Freisetzung gefährlicher Stoffe	keine Leistung bewertet

3.3 Sicherheit und Barrierefreiheit bei der Nutzung (BWR 4)

Wesentliches Merkmal		Leistung
Widerstand gegen Windlasten (Bausatz im Einbauzustand)		keine Leistung bewertet
Beständigkeit gegen horizontale Punktbelastung		keine Leistung bewertet
Schlagfestigkeit		keine Leistung bewertet
Mechanische Widerstands- fähigkeit Familie B	Bekleidungselement	siehe Anhang C 1
	Verbindung zwischen den Bekleidungs- element und Befestigungsmittel	siehe Anhang C 1
	Befestigung der Bekleidung	siehe Anhang C 1

3.4 Schallschutz (BWR 5)

Wesentliches Merkmal	Leistung
Luftschalldämmung	Nicht relevant

3.5 Energieeinsparung und Wärmeschutz (BWR 6)

Wesentliches Merkmal	Leistung
Wärmedurchlasswiderstand	keine Leistung bewertet

3.6 Dauerhaftigkeitsaspekte

Wesentliches Merkmal	Leistung
Pulsierende Beanspruchung	siehe Anhang C 1
Maßbeständigkeit des Außenbekleidungselements	keine Leistung bewertet
Eintauchen in Wasser	siehe Anhang C 1
Frost-Tau-Wechsel	siehe Anhang C 1
Chemische Einflüsse und biologischer Befall	keine Leistung bewertet
Korrosion	keine Leistung bewertet
UV-Strahlenbeständigkeit	keine Leistung bewertet
Hygrothermisches Verhalten	keine Leistung bewertet

4 Angewandtes System zur Bewertung und Überprüfung der Leistungsbeständigkeit mit der Angabe der Rechtsgrundlage

Gemäß dem Europäischen Bewertungsdokument EAD 090062-00-0404, Juli 2018, gilt folgende Rechtsgrundlage: [2003/640/EC].

Für den Bekleidungsbausatz ist folgendes System zur Bewertung und Überprüfung der Leistungsbeständigkeit (AVCP) anzuwenden: 2+ für alle Verwendungszwecke, in denen keine Anforderungen an das Brandverhalten¹ gestellt werden.

Für Verwendungszwecke, in denen Anforderungen an das Brandverhalten gestellt werden, ist für das Brandverhalten in Abhängigkeit von den in der oben genannten Entscheidung aufgeführten Rahmenbedingungen AVCP-System 1, 2 oder 4 anzuwenden.

5 Für die Durchführung des Systems zur Bewertung und Überprüfung der Leistungsbeständigkeit erforderliche technische Einzelheiten gemäß anwendbarem Europäischen Bewertungsdokument

Technische Einzelheiten, die für die Durchführung des Systems zur Bewertung und Überprüfung der Leistungsbeständigkeit notwendig sind, sind im Bestandteil des Kontrollplans, der beim Deutschen Institut für Bautechnik hinterlegt ist.

Ausgestellt in Berlin am 15. Juli 2019 vom Deutschen Institut für Bautechnik

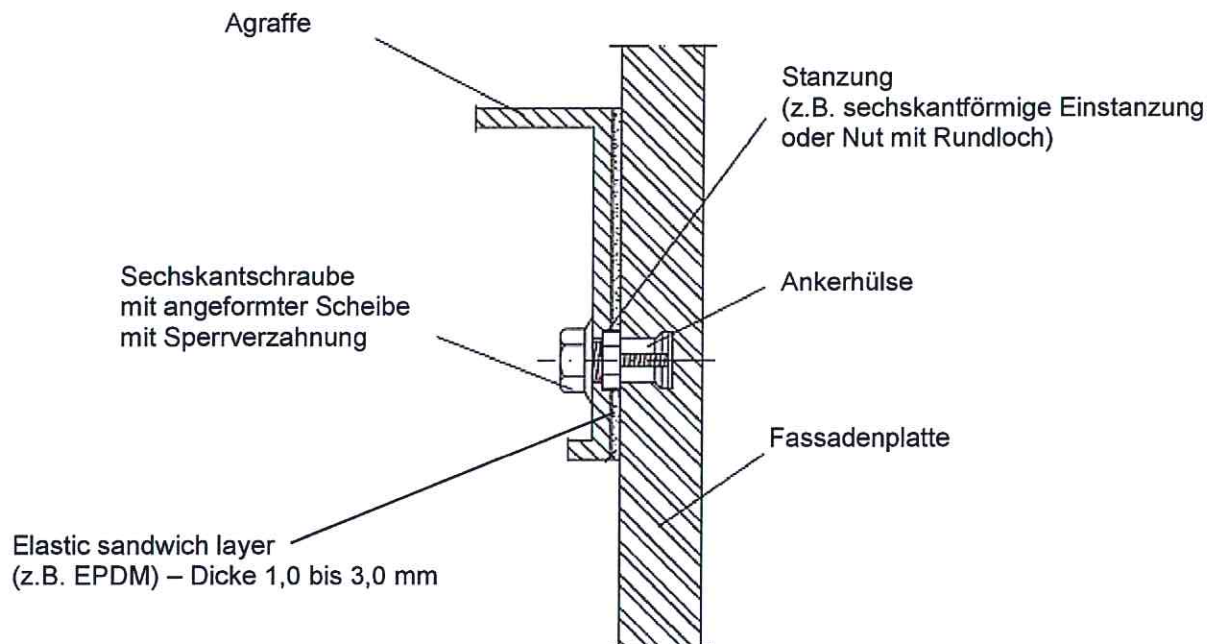
BD Dipl.-Ing. Andreas Kummerow
Abteilungsleiter

Beglaubigt.

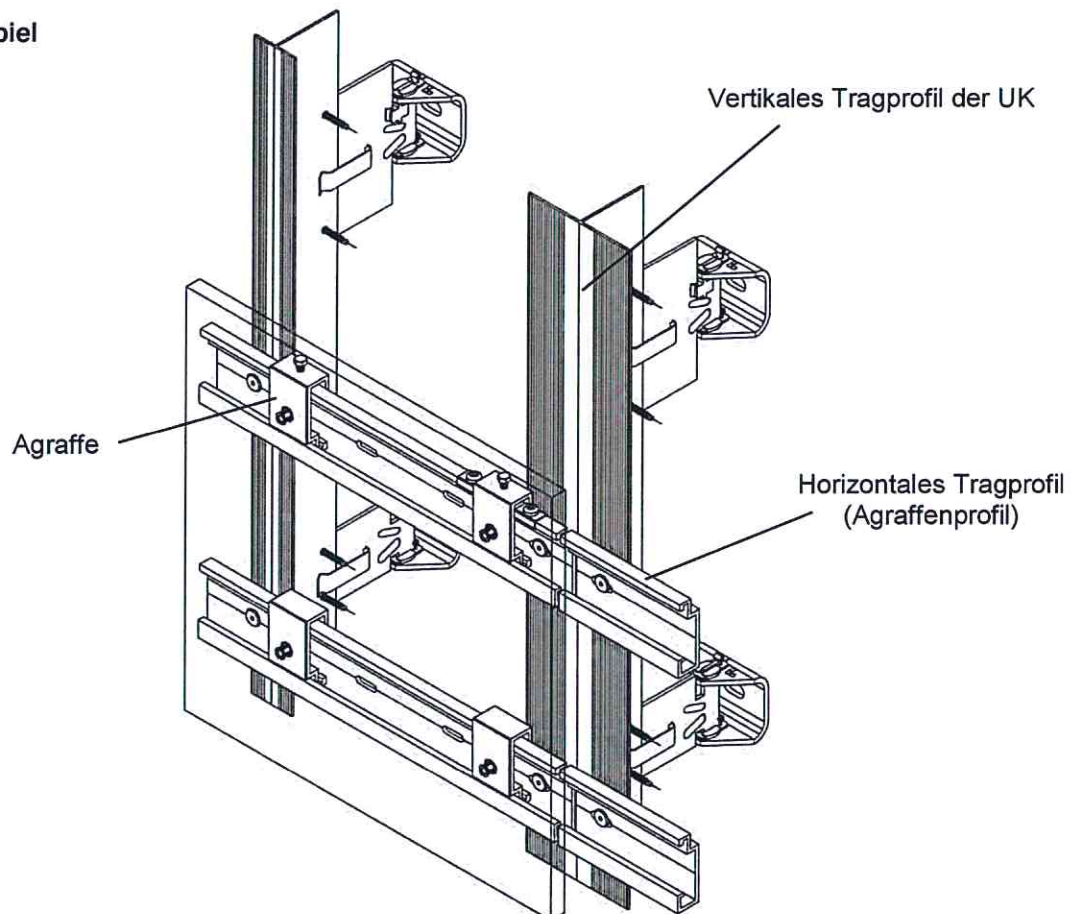


¹ Einschließlich Glimmverhalten, sofern erforderlich.

Einbauzustand



Einbaubeispiel

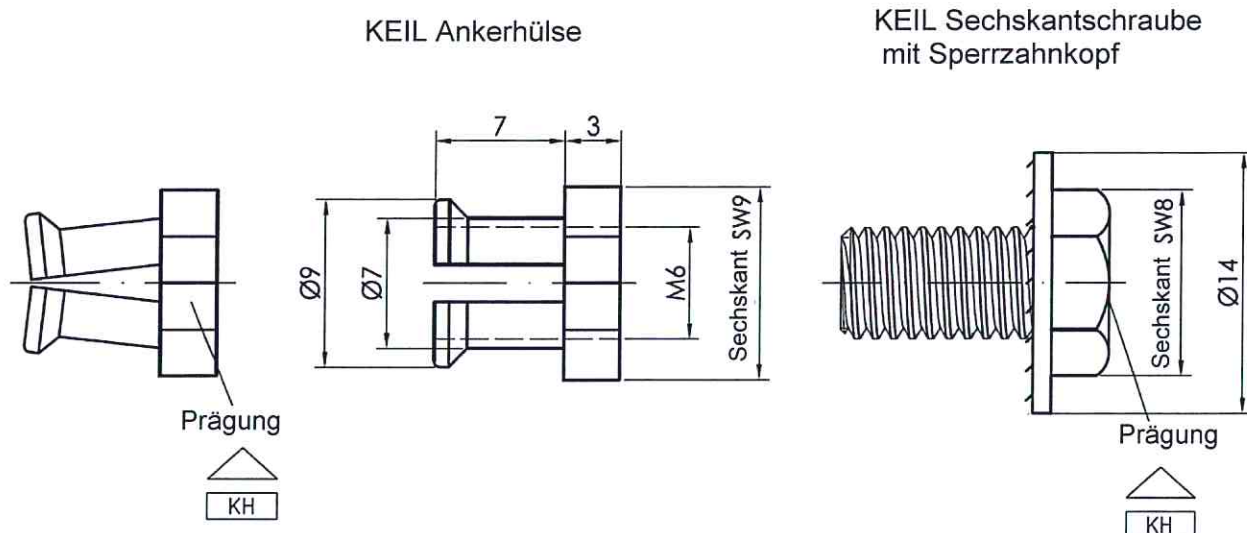


Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Produktbeschreibung
Einbauzustand und Einbaubeispiel

Anhang A 1

Befestigungselement für Hanex-Fassadenplatte (Keil KH 7,0 and Sechskantschraube mit Sperrzahnkopf)



Hanex Fassadenverkleidung (Maße in mm)

Tabelle A2: Abmessungen, Materialien und physikalische Eigenschaften

Hanex Fassadenverkleidung			Hanex Festkörperoberflächen
Dicke	t =	[mm]	12*
Länge	l =	[mm]	3680*
Breite	w =	[mm]	760*
Farberkennung			S-008 N-Weiß
Schüttdichte	$\rho =$	[KN/m ³]	18
Wärmeoeffizient ³⁾	$\alpha_T =$	[1/K]	$30,4 \times 10^{-6}$
Mittelwert des Elastizitätsmoduls	$E_{\text{mean}} \geq$	[N/mm ²]	9500
Biegefestigkeit (nach EN ISO 178:2013-09)	$\sigma_{u5\%}^{1)} \geq$	[N/mm ²]	62
Biegefestigkeit (nach EN ISO 178:2013-09)	$\sigma_{B,\text{min}}^{2)} =$	[N/mm ²]	60

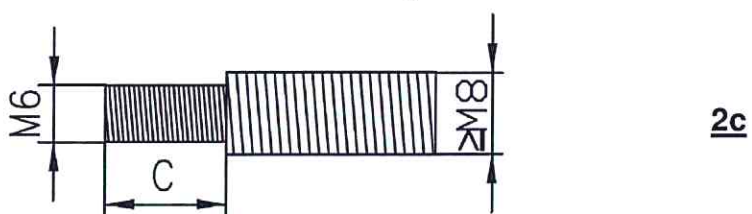
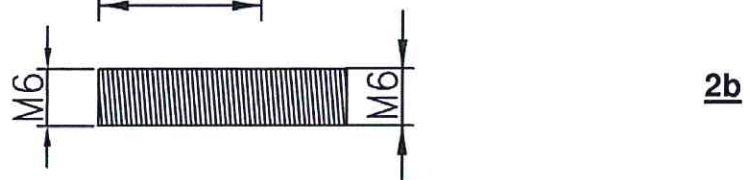
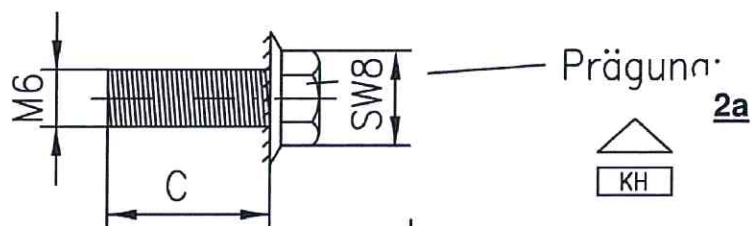
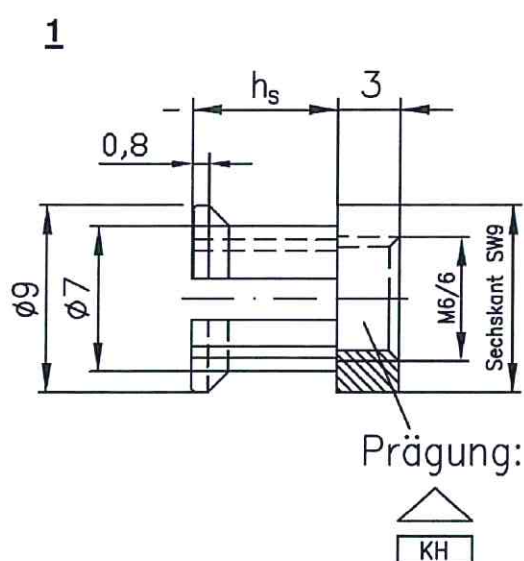
* Breiten- und Längentoleranzen +0,5 mm; Dickentoleranzen $\pm 0,3$ mm
¹⁾ 5%-Quantil bei einem Konfidenzniveau von 75 % und unbekannter Standardabweichung
²⁾ der minimale Einzelwert der Fassadenplatte
³⁾ Nach den Angaben des Herstellers

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Produktbeschreibung
HANEX Fassadenplatte – Abmessungen, Werkstoffe, physikalische Eigenschaften

Anhang A 2

Anker (Maße in mm)



c: die Schraubenlänge ist auf die jeweilige Unterkonstruktion und Setztiefe des Ankers abzustimmen

Tabelle A1: Abmessungen und Werkstoffe

Ankertyp			KH 7,0
Setztiefe	$h_s =$	[mm]	7,0
Schraubenlänge	$c =$	[mm]	$h_s + 3\text{mm} + t_{\text{fix}}$
Anzugsdrehmoment der Sechskantschraube	T_{inst}	[Nm]	$2,5 \leq T_{\text{inst}} \leq 4,0$
Werkstoffe			
1	Ankerhülse	nichtrostender Stahl 1.4404 gemäß EN 10 088:2014	
2a	Sechskantschraube mit Sperrzahnkopf	nichtrostender Stahl 1.4401, 1.4404 oder 1.4578 gemäß EN 10 088:2014	
2b	Gewindestift	nichtrostender Stahl 1.4401, 1.4404 oder 1.4578 gemäß EN 10 088:2014	
2c	Gewindebolzen	nichtrostender Stahl 1.4401, 1.4404 oder 1.4578 gemäß EN 10 088:2014	

Produktbeschreibung
KEIL KH 7,0 - Abmessungen und Materialien

Anhang A 3

Anwendungsbereich

Produktfamilie B gemäß EAD 090062-00-0404

Beanspruchung der Verankerung:

Statische und quasi-statische Belastung

Bemessung

Bei der Bemessung eines Außenwandbekleidungssystems für hinterlüftete Fassaden mit dem HANEX Fassadenbausatz und den zugehörigen Befestigungsmitteln ist Folgendes zu beachten:

- Es wird angenommen, dass der Untergrund (Wand) den jeweiligen Anforderungen an die mechanische Festigkeit (Widerstand gegen statische und dynamische Lasten) sowie an die Luftdichtheit, Wasserdichtheit und Wasserdampfdurchlässigkeit erfüllt.
- Rechnerischer Nachweis des geplanten Systems unter Berücksichtigung der mechanischen Kennwerte der Bausatzkomponenten, damit der Bausatz den am jeweiligen Bauwerk auftretenden Einwirkungen (Eigengewicht, Windlasten) standhält. Nationale Sicherheitsbeiwerte und andere nationale Bestimmungen sind dabei zu beachten.
- Die Bemessung der Fassadenplatten und deren Befestigung kann nach den Vorgaben der Anhänge B 2 bis B 4 erfolgen. Die nationalen Bestimmungen sind zu beachten.
- Auswahl und Nachweis der Wandhalter für die Vertikalprofile der Unterkonstruktion unter Berücksichtigung der Werkstoffverträglichkeit (z.B. Aluminiumlegierung) und der mechanischen Festigkeit (vertikale und horizontale Widerstandsfähigkeit) entsprechend den zu erwartenden Einwirkungen gemäß der statischen Berechnung für das geplante System. Die Tragfähigkeit der Wandhalter sollte nach den in EAD 090062-00-0404 genannten Bewertungsverfahren nachgewiesen werden.
- Auswahl und Nachweis der Befestigungsmittel zwischen den Wandhaltern und Außenwänden (Untergrund) unter Berücksichtigung des Untergrundmaterials und des erforderlichen Mindestwiderstands (Ausreiß- und Scherfestigkeit) entsprechend den zu erwartenden Einwirkungen gemäß der statischen Berechnung für das geplante System.
- Berücksichtigung möglicher Bewegungen des geplanten Systems gegenüber dem Untergrund bzw. Berücksichtigung möglicher Tragwerksbewegungen
- Ausführung einzelner Teile der Fassade; einige Beispiele für konstruktive Details sind Anhang A 1 zu entnehmen.
- Korrosionsschutz für Metallteile, die in dem System verwendet werden, unter Berücksichtigung der Korrosionskategorie, der das Bauwerk ausgesetzt ist (z.B. nach ISO 9223).
- Entwässerbarkeit des belüfteten Zwischenraums (Hinterlüftung) zwischen der Fassadenbekleidung und der Außendämmung bzw. Außenwand.
- In der Regel wird an der Außenwand eine Dämmung angebracht. Diese sollte einer harmonisierten Norm oder einer Europäischen Technischen Bewertung entsprechen, wobei Abschnitts 3.1 dieser ETA zu beachten ist.
- Da die Fugen zwischen den Fassadenelementen nicht wasserdicht sind, sollte die auf den belüfteten Zwischenraum folgende Schicht (z.B. Dämmschicht) aus Materialien mit geringer Wasserabsorption bestehen.
- Für die Brandschutzklassifizierung der Fassadenplatte im eingebauten Zustand sind die folgenden Anwendungsparameter zu berücksichtigen:

Plattenfarbe S-008 N-Weiß; Plattendicke 12mm; Rohdichte ca. 1750 kg/m³; hinterlüftete Außenwandbekleidungen mit Luftspalt ≥ 20 mm, mechanisch befestigt auf Unterkonstruktion in Rahmenbauweise aus Holz oder Metall, Untergrund entsprechend Klasse A1 oder A2-s1-d0 nach EN 13501-1 ($d \geq 20$ mm, $\rho = 35$ kg/m³), offene Fugen ≤ 12 mm, geschlossene Fugen müssen mit Metallprofilen abgedeckt werden.

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck

Technische Daten – Verwendungszweck und Bemessung

Anhang B 1

Montage des Bausatzes vor Ort

Die Montage ist gemäß den Vorgaben des Inhabers der ETA und unter Verwendung der speziellen Bausatzkomponenten auszuführen.

Die Montage ist von entsprechend qualifiziertem Personal und unter Aufsicht des technisch Verantwortlichen auf der Baustelle durchzuführen.

- Die Herstellung der Bohrungen erfolgt im Werk oder auf der Baustelle unter Werkstattbedingungen; bei Herstellung auf der Baustelle wird die Ausführung durch den verantwortlichen Bauleiter oder einen fachkundigen Vertreter des Bauleiters überwacht.
- Die Hinterschnittbohrungen werden mit dem Spezialbohrer nach Anhang B 6 und einem Spezialbohrgerät, entsprechend den beim Deutschen Institut für Bautechnik hinterlegten Angaben, hergestellt.
- Das Bohrmehl ist aus dem Bohrloch zu entfernen.
- Bei einer Fehlbohrung ist ein neues Bohrloch im Abstand von mindestens 2 x Tiefe der Fehlbohrung anzuordnen.
- Die Geometrie der Bohrlöcher ist an 1 % aller Bohrungen zu überprüfen. Dabei sind folgende Maße nach den Angaben und Prüfanweisungen des Herstellers mit der Messhilfe nach Anhang B 6 zu prüfen und zu dokumentieren:
 - Volumen des hinterschnittenen Bohrloches
 - Tiefenposition des Hinterschnittes. Der Abstand zwischen dem unteren Rand des Messkalibers und der Fassadenplatte (siehe Anhang B 5) beträgt zwischen 0,0 und 0,3 mm

Bei Überschreitung der angegebenen Toleranzen ist die Geometrie des Bohrlochs an 25 % der erstellten Bohrungen zu kontrollieren. Bei keinem weiteren Bohrloch dürfen dann die Toleranzen überschritten werden, anderenfalls sind alle Bohrlöcher zu kontrollieren. Bohrlöcher mit über- oder unterschrittenen Toleranzen sind zu verwerfen.

Anmerkung: Die Kontrolle der Geometrie des Bohrlochs an 1 % aller Bohrungen bedeutet, dass an einer von 25 Platten (dies entspricht 100 Bohrungen bei Platten mit 4 Hinterschnittankern) eine Bohrung zu kontrollieren ist. Bei Überschreitung der in Anhang A 3, Tabelle A3 angegebenen Toleranzen ist der Kontrollumfang auf 25 % der Bohrungen zu erhöhen, d.h. an allen 25 Platten ist je eine Bohrung zu kontrollieren.

- Die Fassadenplatten werden bei Transport und Lagerung auf der Baustelle vor Beschädigungen geschützt; die Fassadenplatten werden nicht ruckartig eingehängt (erforderlichenfalls werden zum Einhängen der Fassadenplatten Hebezeuge verwendet); Fassaden- bzw. Leibungsplatten mit Anrissen werden nicht montiert.
- Die Montage der Fassade erfolgt durch Fachpersonal und die Verlegeanleitung des Herstellers ist zu beachten.
- Die Fassadenplatten sind in "liegender" oder "stehender" Position angeordnet, sie können auch an Fassadenuntersichten befestigt werden.
- Die Profile und Agraffen müssen wie in diesem Dokument (s. Anhang A/B) spezifiziert und beschrieben befestigt werden.

Nutzung, Unterhalt und Wartung

Die Wartung der montierten Systeme bzw. Bausatzkomponenten beinhaltet Kontrollen vor Ort unter Berücksichtigung der folgenden Aspekte:

- Hinsichtlich der HANEX-Fassadenplatte: sichtbare Schäden wie Risse oder Ablösungen
- hinsichtlich der Befestigungselemente: Auftreten von Korrosion oder Verformung

Erforderliche Instandsetzungsarbeiten sind rasch unter Verwendung derselben Bausatzkomponenten und unter Beachtung der Instandsetzungsanweisungen des Inhabers der ETA durchzuführen.

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck

Technische Daten - Installation und Verwendung

Anhang B 2

Bemessung

Allgemeines

Die Bemessungswerte der Einwirkenden errechnen sich auf Basis von EN 1990 unter Berücksichtigung aller auftretenden Lasten. Die Lastkombinationen sind entsprechend EN 1990 zu bilden. Für die Belastungen sind die Angaben aus EN 1991-1-1 bis EN 1991-1-7 zu Grunde zu legen. Entsprechende nationale Vorschriften sind zu berücksichtigen. Die ungünstigste Kombination ist maßgebend. Gegebenenfalls sind mehrere Kombinationen getrennt für Anker- und Spannungsbemessung zu untersuchen.

Die typische Grundkombination für Fassadenplatten berücksichtigt die Einwirkung von Eigengewicht $F_{Ek,G}$ (ständige Last) und Wind $F_{Ek,w}$ (veränderliche Last).

Nach EN 1990 ergeben sich somit folgende Grundkombinationen für eine senkrecht stehende Fassadenplatte abhängig von der Lastrichtung:

Grundkombination für Lasten parallel zur Platte:

$$F_{Ed||} = F_{Ek,G} \cdot \gamma_G$$

Grundkombination für Lasten senkrecht zur Platte:

$$F_{Ed\perp} = F_{Ek,w} \cdot \gamma_Q$$

$$\text{mit } \gamma_G = 1,35; \gamma_Q = 1,50$$

Für hängende Platten (Überkopfmontage) bzw. Leibungen sind die Lastrichtungen zu beachten und Lastkombinationen entsprechend EN 1990 zu bilden.

Die Berechnung ist linear elastisch durchzuführen. Für den jeweiligen Anwendungsfall ist die Steifigkeit der Unterkonstruktion zu berücksichtigen.

- Jede Fassadenplatte ist mit mindestens vier Anker in Rechteckanordnung über Einzelagraffen oder Doppelagraffen auf der Unterkonstruktion befestigt (bei sehr schmalen Platten oder kleinen Pass-, Differenz- und Einfügestücken sind Anzahl und Anordnung der Anker konstruktiv zu wählen).
- Die Unterkonstruktion ist so ausgebildet, dass die Fassadenplatten technisch zwängungsfrei über Gleitpunkte (freie Lager) und einen Festpunkt (festes Lager) befestigt sind. Der Festpunkt darf am Plattenrand oder im Plattenfeld angeordnet werden.
- Zwei Befestigungspunkte der Fassadenplatte sind so bemessen, dass sie die Eigenlasten der Fassadenplatte aufnehmen können.
- Bei Verwendung von Agraften auf horizontalen Tragprofilen sind die horizontalen auf gleicher Höhe liegenden Befestigungspunkte einer Fassadenplatte jeweils am gleichen Tragprofil befestigt.
- Die Fugen zwischen den Fassadenplatten sind mit einem Fugenprofil hinterlegt oder werden offen gelassen. Es ist sichergestellt, dass zusätzliche Beanspruchungen (z. B. durch Temperatur) zu keinen nennenswerten zusätzlichen Belastungen führen.
- Unter Berücksichtigung der zu verankernden Lasten, der Art und Festigkeit des Verankerungsgrundes, der Bauteilabmessungen und Toleranzen sind prüfbare Berechnungen und Konstruktionszeichnungen anzufertigen. Die Position der Dübel ist in den Konstruktionszeichnungen anzugeben.
- Die Fassadenplatten, deren Befestigungen sowie die Unterkonstruktion einschließlich ihrer Verbindung an Wandhaltern und deren Verankerung am Bauwerk werden für den jeweiligen Anwendungsfall unter der Verantwortung eines auf dem Gebiet des Fassadenbaus erfahrenen Ingenieurs bemessen.

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck

Technische Daten - Installation und Verwendung

Anhang B 3

Nachweis der Ankerlasten

Zusätzlich zu den Lasten aus Wind und Eigengewicht sind folgende Lasten als ständige Last in Richtung der Achse des Ankers zu berücksichtigen:

- bei Bündigmontage des Ankers und Einsatz von horizontalen Tragprofilen: infolge Torsion des Tragprofils aus Eigengewicht der Fassadenplatte ist folgende Last $N_{V,Ek}$ zu berücksichtigen:

$$N_{V,Ek} = V_{Ek} \cdot e/z$$

mit V_{Ek} = Querzuglast infolge Eigengewicht; e und z [mm] (siehe Bild 2)

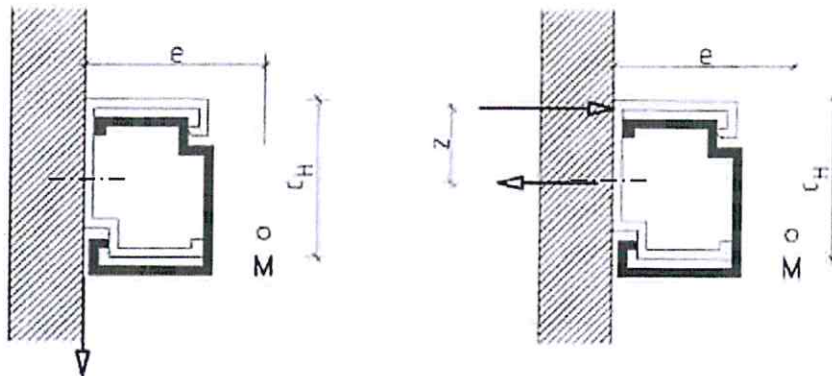


Bild 2: Torsion horizontaler Tragprofile aus Eigengewicht der Fassadenplatte

Für die ermittelten Ankerkräfte ist nachzuweisen, dass folgende Gleichungen eingehalten sind:

Gleichung 1: $\frac{\Sigma N_{Ed}}{N_{Rd}} \leq 1$

Gleichung 2: $\frac{V_{Ed}}{V_{Rd}} \leq 1$

Gleichung 3: $\frac{\Sigma N_{Ed}}{N_{Rd}} + \frac{V_{Ed}}{V_{Rd}} \leq 1,2$

mit:

ΣN_{Ed} = Bemessungswert der vorhandenen Ankerzugkraft

$\Sigma N_{Ed} = N_{Ed} + N_{V,Ed}$

V_{Ed} = Bemessungswert der vorhandenen Ankerquerkraft

N_{Rd} = Bemessungswert der Tragfähigkeit für zentr. Zug: $N_{Rd} = N_{Rk} / \gamma_M$ (mit N_{Rk} und γ_M nach Anhang C 1)

V_{Rd} = Bemessungswert der Tragfähigkeit für Querzug: $V_{Rd} = V_{Rk} / \gamma_M$ (mit V_{Rk} und γ_M nach Anhang C 1)

Nachweis der Biegespannungen

Für die ermittelten Biegezugspannungen ist nachzuweisen, dass folgende Gleichung eingehalten ist.

Gleichung 4: $\sigma_{Ed} \leq \sigma_{Rd}$

mit:

σ_{Ed} = Bemessungswert der vorhandenen Biegezugspannung in der Fassadenplatte

σ_{Rd} = Bemessungswert der Biegezugfestigkeit: $\sigma_{Rd} = \sigma_{Rk} / \gamma_M$ (mit σ_{Rk} und γ_M nach Anhang C 1, Tabelle C1)

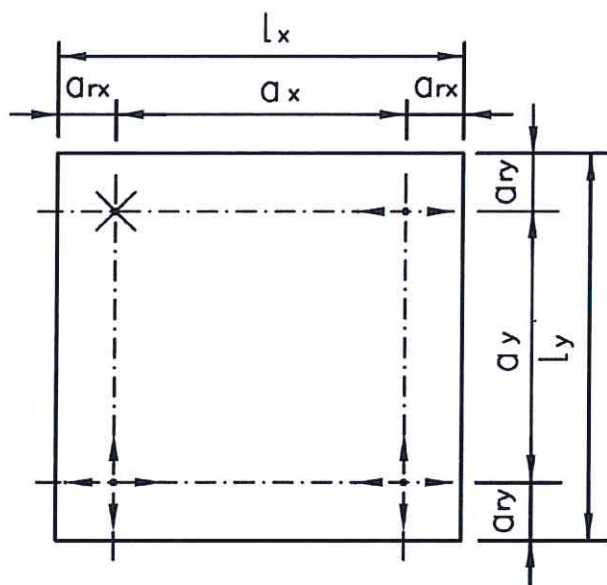
Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck

Technische Daten - Installation und Verwendung

Anhang B 4

Definition Rand- und Achsabstände

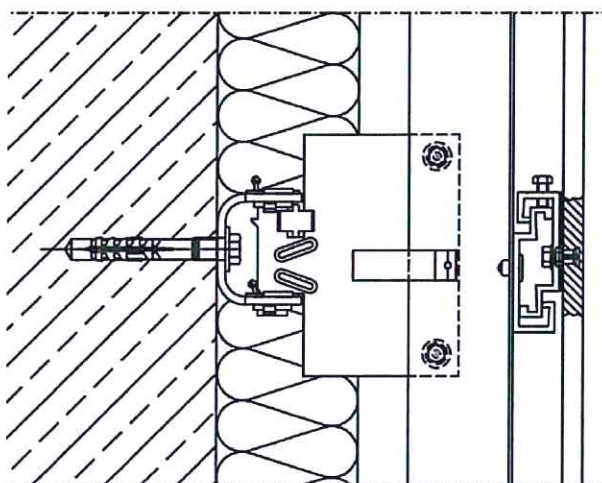


Legende

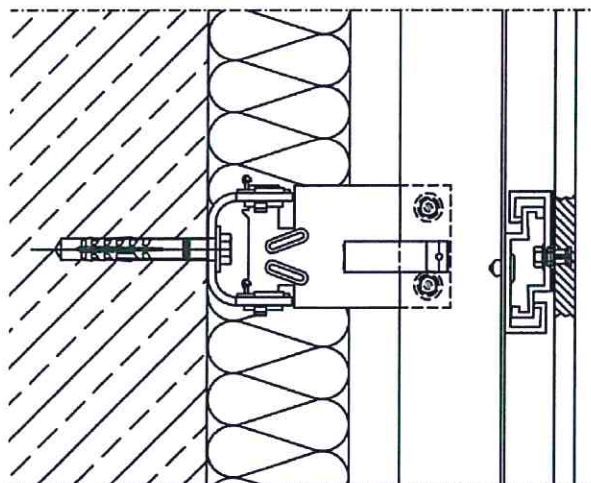
- $a_{rx,y}$ = Randabstand - Abstand der Anker zum Plattenrand
- $a_{x,y}$ = Achsabstand - Abstand zwischen benachbarten Ankern
- L_x = größere Länge der Fassadenplatte
- L_y = kleinere Länge der Fassadenplatte
- $\times$ = Festpunkt (stares Lager)
- $\leftrightarrow$ = horizontaler Gleitpunkt (freies Lager)
- $\leftrightarrow \updownarrow$ = horizontaler und vertikaler Gleitpunkt (freies Lager)

Beispiel Fest- und Gleitpunkt

festes Lager (Festpunkt)



freies Lager (Gleitpunkt)

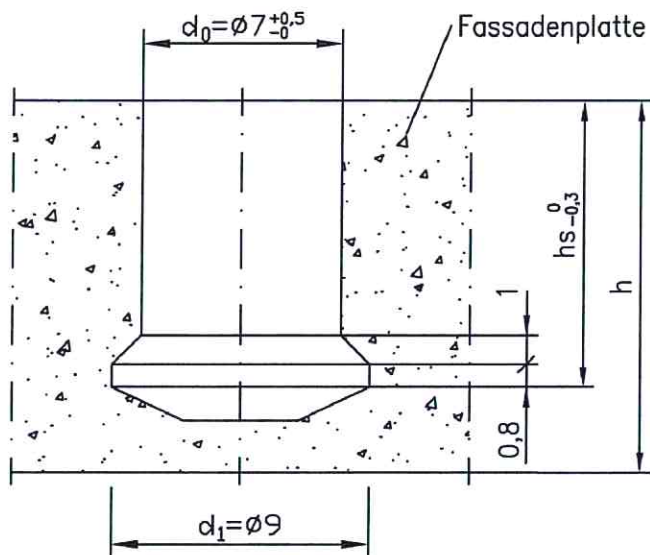


Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck
Technische Daten - Installation und Verwendung

Anhang B 5

Bohrlochgeometrie

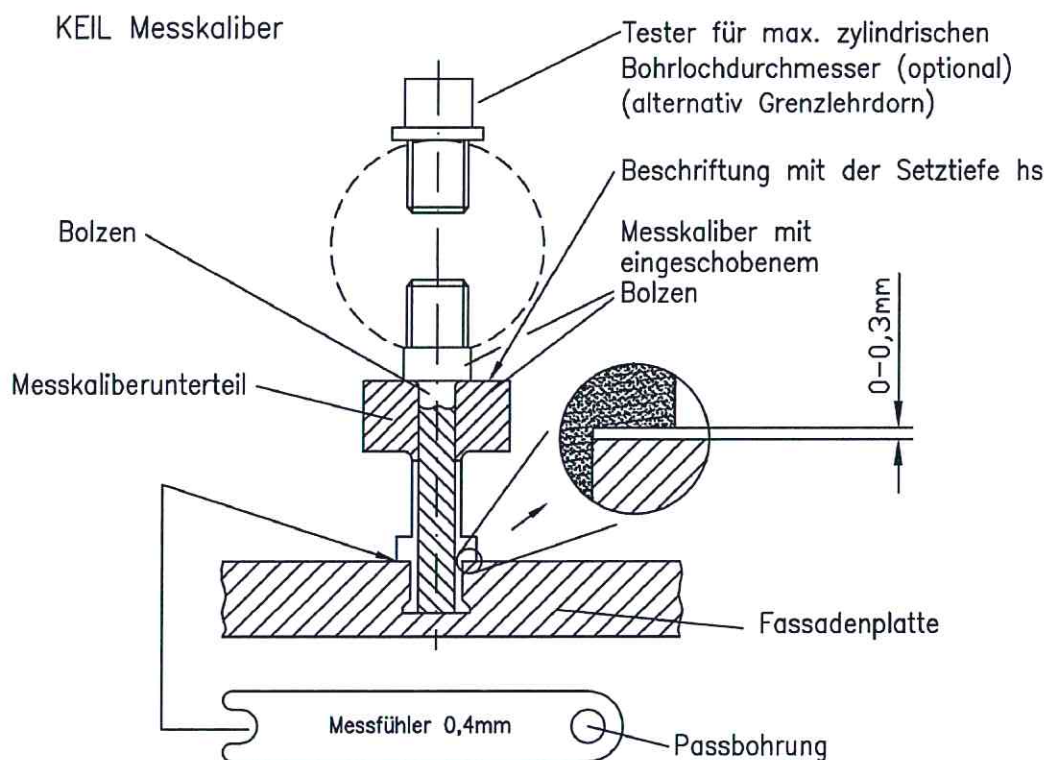
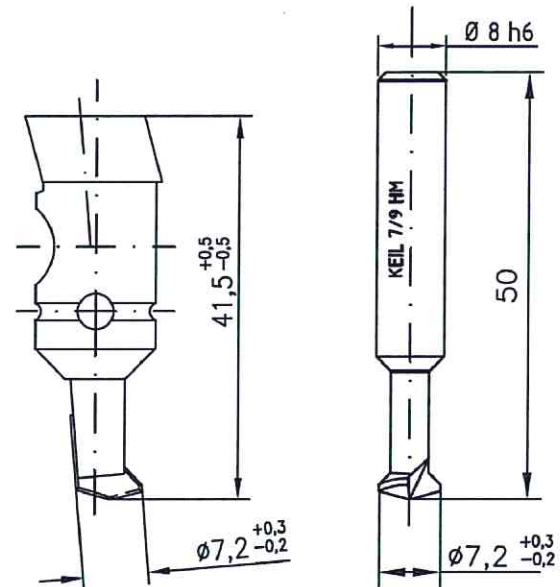


Bohrergeometrie

für KEIL-Fassadenbohrer 7/9

HM 12/0,8

HM CNC 13/0,8



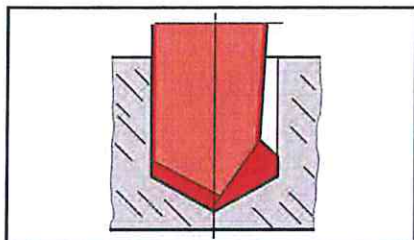
Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck
Fassadenbohrabmessung
Einstellwerkzeuge und Prüfgeräte

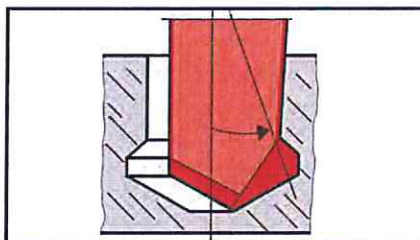
Anhang B 6

Montageanleitung

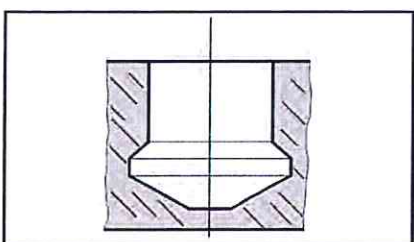
1. Bohren des Hinterschnittes



a) zylindrisch bohren

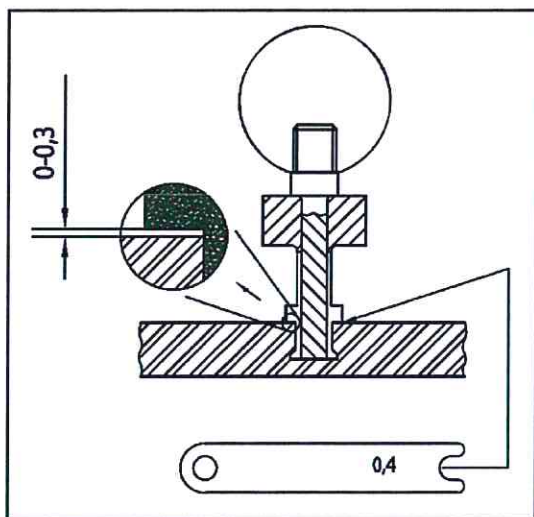


b) hinterschneiden und reinigen



c) fertiger Hinterschnitt

2. Überprüfung des Bohrloches



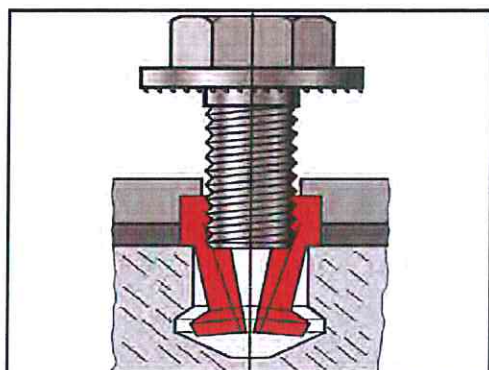
mit KEIL Meßkaliber

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

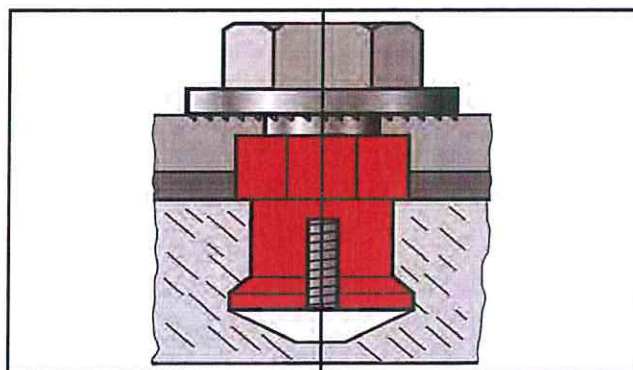
Verwendungszweck
Montageanleitung

Anhang B 7

3. Montage des Ankers (Hülse und Schraube)

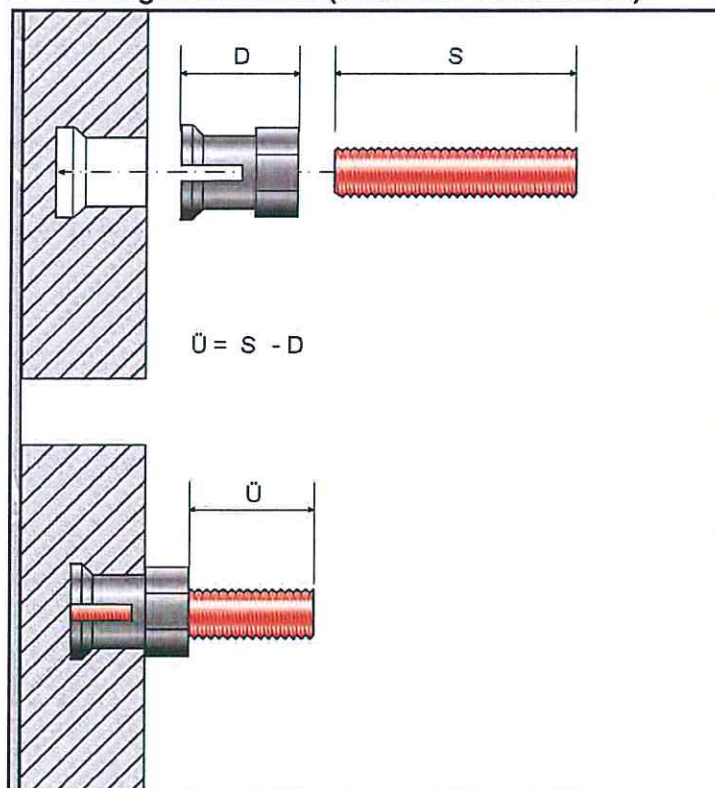


a) einführen der Hülse in den Hinterschnitt und eindrehen der Schraube in die Hülse



b) eingebauter Hinterschnittanker

4. Montage des Ankers (Hülse und Gewindestift)



a) einführen der Hülse in den Hinterschnitt

b) eindrehen des Gewindestiftes in die Hülse

c) eingebauter Hinterschnittanker

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Verwendungszweck
Montageanleitung

Anhang B 8

Tabelle C1: charakteristische Kennwerte des Ankers und der Platte

Kennwerte charakteristische der Fassadenplatte	Tafelnenndicke	$h \geq$	[mm]	12,0	
	Bemessungs-Biegespannung	$\sigma_{Rk} =$	[N/mm ²]	37,5	
	mittlerer E-Modul	$E_{mean} =$	[N/mm ²]	9500	
	Wärmeausdehnungskoeffizient	$\alpha_T =$	[1/K]	$36,0 \times 10^{-6}$	
	Eigenlast	$g_k =$	[kN/m ²]	0,22	
	Teilsicherheitsbeiwert ¹⁾	$\gamma_M =$	[-]	1,8	
charakteristische Kennwerte des Ankers	Verankerungstiefe	$h_s =$	[mm]	7	
	Bemessungswider- stand	zentr. Zug ²⁾	$N_{Rk} =$	[kN]	2,5
		Querzug ²⁾	$V_{Rk} =$		2,6
					2,6
	Randabstand ³⁾	$a_r \geq$	[mm]	50	100
	Achsabstand	$a \geq$	[mm]	100	
	Doppelagraffe	$a_D \geq$	[mm]	45	
	Teilsicherheitsbeiwert ¹⁾	$\gamma_M =$	[-]	1,8	

¹⁾ sofern keine anderen nationalen Regelungen bestehen

²⁾ bei gleichzeitiger Beanspruchung des Ankers durch zentrischen Zug und Querzug sind die Gleichungen im Anhang B 3 zu beachten

³⁾ Bei kleinen Pass-, Differenz- und Einfügestücken ist der Rand- und Achsabstand konstruktiv zu wählen

Ventilated cladding kit comprising "Hanex facade panel" and associated fixing

Leistungen

Charakteristische Kennwerte des Ankers und Hanex facade panel

Anhang C 1

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment of

ETA-18/0390

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Hanex facade panel

Product family
to which the construction product belongs

Ventilated cladding kit comprising "Hanex facade panel"
and associated fixing

Manufacturer

Hyundai L & C Europe GmbH
Düsseldorfer Straße 13
65760 Eschborn
DEUTSCHLAND

Manufacturing plant

Plant 1

This European Technical Assessment
contains

17 pages including 12 annexes which form an integral
part of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 090062-00-0404

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

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Specific Part

1 Technical description of the product

Hanex Façade kit for ventilated external wall claddings complies with the family B of EAD 090062-00-0404. The cladding kit consist of white acrylic-based cladding elements (façade panel) mechanically fastened to the subframe by a specific anchor placed in an undercut hole and anchored by mechanical interlock (at least 4 anchors) as listed in section 2 of this document.

The "Hanex façade panel" is a solid surface made of one-third of acrylic resin and two-third of natural mineral aluminium hydroxide with white colour and a thickness of 12 mm.

The product description is given in Annex A.

Hanex Façade kit for ventilated external wall claddings consists of:

- Cladding element: Hanex façade panel (Hanex Premium Surface element, S-008 N-White), white, max. standard formats of acrylic-based cladding elements 930 x 3680 x 12 mm (smaller tiles may be used).
- Cladding fixing: stainless steel KEIL undercut anchor KH 7,0 according to ETA 06/0253 (KH 7)
- Mechanical fastener: The KEIL undercut anchor KH 7,0 according to ETA 06/0253 (KH 7,0) is a special anchor made of stainless steel, consisting of a crosswise slotted anchor sleeve with an M6 internal thread, at the upper edge of which a hexagon is formed to it and a respective hexagon bolt with an integrated tooth lock washer.

Detailed information and data of all the components are given in the annexes of this ETA and in the associated test reports to this ETA.

The subframe, brackets and other fixings between brackets and substrate are not part of the kit assessed in this ETA.

2 Specification of the intended use in accordance with the applicable European Assessment Document

Hanex Façade kit is intended to be used as external wall claddings in ventilated façades (rainscreens). The walls are made of masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), timber or metal frame in new or existing buildings (retrofit).

The anchor is put into an undercut drill hole and by driving-in the screw it is placed form-fitted and deformation-controlled.

The vertical load-bearing profiles and horizontal profiles with associated agraffe elements must be metallic elements.

The characteristics of the walls shall be verified prior to use of Hanex Façade kit, especially regarding conditions for reaction to fire classification and for mechanical fixing of Hanex Façade kit.

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of at least 25 years for Hanex Façade kit. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

Hanex Façade kit is made of non-load bearing construction components. They do not contribute directly to the stability of the wall on which they are installed, but they can contribute to its durability by providing enhanced protection from the effect of weathering.

Hanex Façade kit is not intended to ensure the airtightness of the building envelope.

3 Performance of the product and references to the methods used for its assessment

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire (façade panel) ¹	B-s1, d0 accord. to EN 13501-1
Façade fire performance	No performance assessed
Propensity to undergo continuous smouldering	No performance assessed

Note: A European reference fire scenario has not been laid down for façades. In some Member States, the classification of external wall claddings according to EN 13501-1 might not be sufficient for the use in façades. An additional assessment of external wall claddings according to national provisions (e.g. on the basis of a large-scale test) might be necessary to comply with Member State regulations, until the existing European classification system has been completed.

3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Watertightness of joints	No performance assessed
Waterabsorption	Not relevant
Water vapour permeability	Not relevant
Drainability	No performance assessed
Content, emission and/or release of dangerous substances	No performance assessed

3.3 Safety and accessibility in use (BWR 4)

Essential characteristic		Performance
Wind load resistance (for the assembled kit)		No performance assessed
Resistance to horizontal points load		No performance assessed
Impact resistance		No performance assessed
Mechanical resistance Family B	Cladding element	See Annex C 1
	Connection between the cladding element and its fixing	See Annex C 1
	Cladding fixing	See Annex C 1

¹ If the conditions mentioned in Annex B1 are fulfilled

3.4 Protection against noise (BWR 5)

Essential characteristic	Performance
Airborne sound insulation	Not relevant

3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	No performance assessed

3.6 Aspects of durability and serviceability

Essential characteristic	Performance
Behaviour after pulsating load	See Annex C 1
Dimensional stability of external cladding element	No performance assessed
Behaviour after Immersion in water	See Annex C 1
Freeze-thaw resistance	See Annex C 1
Chemical and biological resistance	No performance assessed
Corrosion	No performance assessed
UV radiation resistance	No performance assessed
Hygrothermal behaviour	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD 090062-00-0404, July 2018 the applicable European legal act is: [2003/640/EC].

System of attestation of conformity applicable to cladding kit is: 2+ for any use except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire² the applicable AVCP systems regarding reaction to fire are 1, or 3, or 4 depending on the conditions defined in the said Decision.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

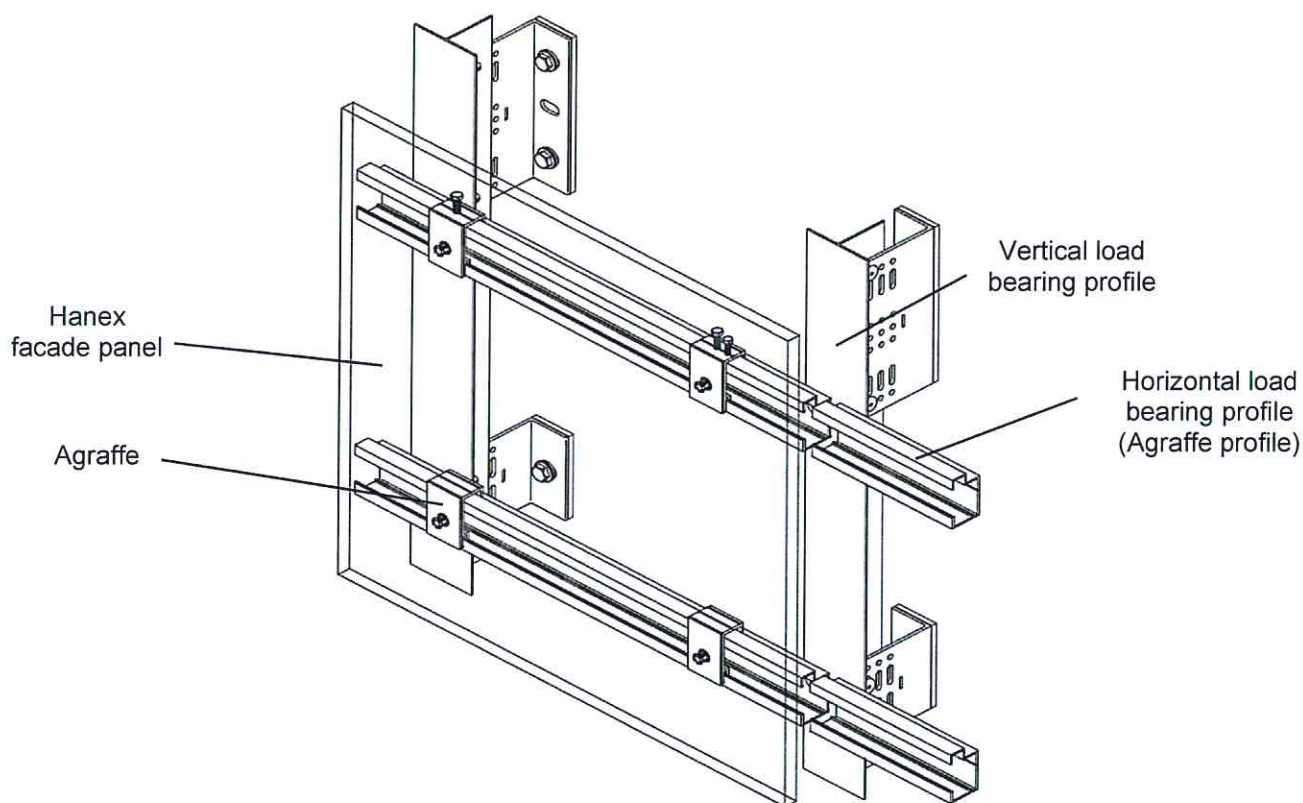
Issued in Berlin on 15 July 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

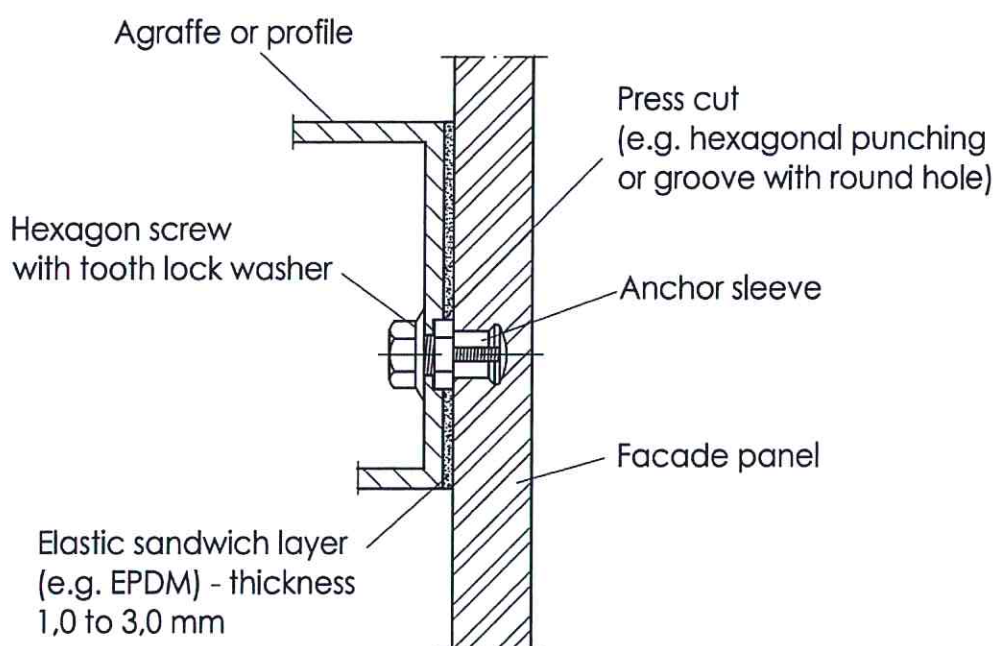


² Including propensity to undergo continuous shouldering, where relevant.

Kit for external wall cladding



Installed fastener Keil KH 7,0



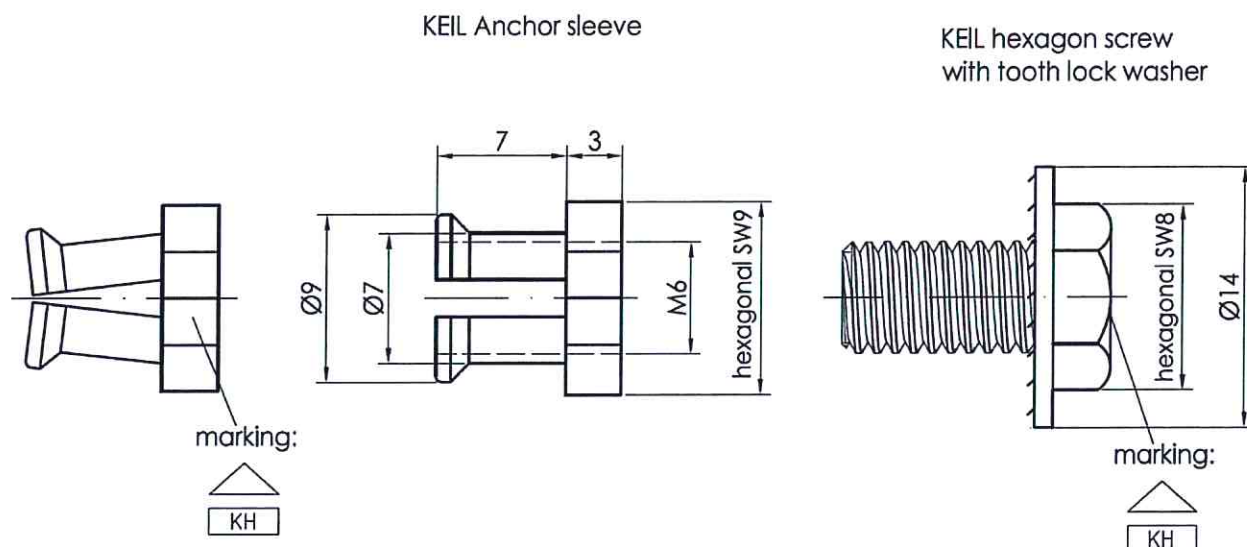
Hanex facade panel

Product description

Installed kit for external wall cladding and fixing

Annex A 1

fastener for Hanex facade panel (Keil KH 7,0 and Flat-head screw with coiled washer)



Hanex Facade panel (dimension in mm)

Table A2: Dimensions, materials and physical properties

Hanex Facade panel type			Hanex Solid Surfaces
thickness	t =	[mm]	12*
lengths	l =	[mm]	3680*
width	w =	[mm]	760*
colour identification			S-008 N-White
bulk density	$\rho =$	[KN/m ³]	18
thermal coefficient ³⁾	$\alpha_T =$	[1/K]	$30,4 \times 10^{-6}$
Mean value of modulus of elasticity	$E_{\text{mean}} \geq$	[N/mm ²]	9500
bending resistance (acc. EN ISO 178:2013-09)	$\sigma_{u5\%}^{1)} \geq$	[N/mm ²]	62
bending resistance (acc. EN ISO 178:2013-09)	$\sigma_{B,\text{min}}^{2)} =$	[N/mm ²]	60

* width and lengths tolerances +0,5 mm; thickness tolerances $\pm 0,3$ mm

¹⁾ 5%-Quantil by a confidence level of 75 % and unknown standard deviation

²⁾ the minimum single value of the façade panel

³⁾ According to the information of the manufacture

Hanex facade panel

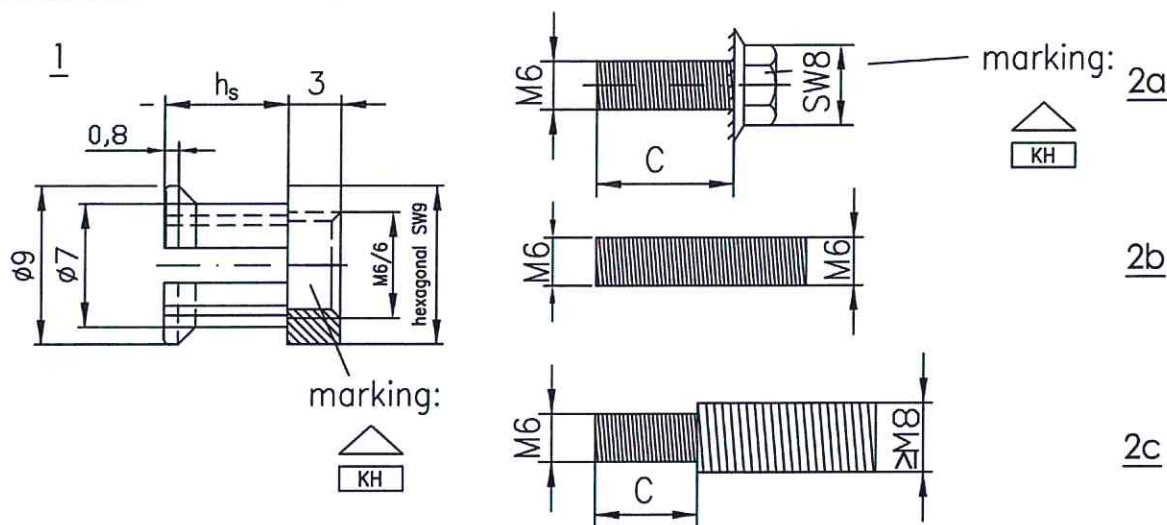
Product description

Hanex Façade panel - dimensions, materials and physical properties

Annex A 2

Cladding fixings:

Fastener (dimension in mm)



c: The screw must be adjusted to the respective design

Table A3: Dimensions and Materials

Fastener type			KEIL KH 7,0
embedment depth	$h_s =$	[mm]	7,0
screw length	$c =$	[mm]	$h_s + 3\text{mm} + t_{\text{fix}}$
installation torque moment	T_{inst}	[Nm]	$2,5 \leq T_{\text{inst}} \leq 4,0$
Materials			
1	anchor sleeve	Stainless steel 1.4404 according to EN 10088:2014	
2a	hexagon screw with tooth lock washer	stainless steel 1.4401, 1.4404 or 1.4578 according to EN 10088:2014	
2b	threaded pin		
2c	threaded bolt		

Hanex facade panel

Product description
KEIL KH 7,0 - dimensions and materials

Annex A 3

Specifications of intended use

Scope

According to the EAD 090062-00-0404 / Cladding family B

Anchorage subject to:

- Static and quasi-static loads

Design

The design of the external wall claddings for ventilated façades using Hanex Façade kit comprising "Hanex façade panels" and the associated fixings should take into account:

- It is assumed that the substrate wall meets the necessary requirements regarding the mechanical strength (resistance to static and dynamic loads) and the airtightness, as well as the relevant resistance regarding watertightness and water vapour.
- The verification of the designed system by means of calculation, taking into account the mechanical characteristic values of the kit components in order to resist the actions (dead loads, wind loads, etc.) applying on the specific works. National safety factors and other national provisions must be followed.
- The design of the façade panels and their fixing can be carried out according to the conditions given in Annex B 2 to Annex B 4, the national regulations must be considered.
- The selection and verification of the brackets which support the subframe vertical profiles considering compatible materials (e.g. aluminium alloy) and the mechanical resistance (vertical and horizontal resistance) according to the envisaged actions obtained from the mechanical calculation of the designed system. Bracket resistance should be verified according to assessment given in EAD 090062-00-0404.
- The selection and verification of the anchors between the brackets and the external walls (substrate), taking into account the substrate material and the minimum resistance required (pull-out and shear resistance) according to the envisaged actions obtained from the mechanical calculation of the designed system.
- The accommodation of the designed system movements to the substrate or structural movements.
- The execution of singular parts of the façade; some examples of construction details are indicated in Annex A1.
- The corrosion protection of the designed system metallic components taking into account the category of corrosivity of the atmosphere of works (e.g. acc. ISO 9223).
- The drainability of the ventilated air space between the cladding elements and the insulation layer or the external wall accordingly.
- An insulation layer is usually fixed on the external wall and should be defined in accordance with a harmonized standard or an European technical assessment and taking into account the section 3.1 of this ETA.
- Because the joints are not watertight, the first layer behind ventilated air space (e.g. insulation layer) should be composed by materials with low water absorption.
- For the classification of the Reaction to fire for the façade panel in end use conditions the following application parameters must be considered:
panel colour S-008 N-White; panel thickness 12mm; bulk density approx. 1750 kg/m³; rear-ventilated outside wall claddings with air gap ≥ 20 mm, mechanical fixed on bar shaped subframe of wood or metal, substrate with class A1 or A2-s1-d0 acc. EN 13501-1 ($d \geq 20$ mm, $\rho = 35$ kg/m³), open joints ≤ 12 mm, closed joints must be covered with metallic profiles

Hanex facade panel

Intended use

Specifications – scope and design

Annex B 1

Installation of the kits in works

Installation should be carried out according to the ETA holder's specifications and using the specific kit components. Installation should be carried out by appropriately qualified staff and under the supervision of the technical responsible of the site.

- The drillings are done at the factory or on site under workshop conditions; when making the drillings on site the execution is supervised by the responsible project supervisor or a skilled representative of the project supervisor.
- Making of the undercut drilling is done with the drill bit according to Annex B 6 and a special drilling device in accordance with the information deposited with Deutsches Institut für Bautechnik.
- The drillings are removed from the drill hole
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole.
- the geometry of the drill hole is checked on 1 % of all drillings. The following dimensions shall be checked and documented according to manufacturer's information and testing instructions by means of a measuring device according to Annex B 6:
- Volume of the undercut drill hole.
- Depth position of the undercut; the distance between the lower edge of the measuring device and the façade panel is between 0,0 and 0,3 mm (see Annex B 6).

If the tolerances are exceeded, the geometry of the drill hole shall be checked on 25% of the drillings performed. No further drill hole may exceed the tolerances otherwise all the drill holes shall be controlled. Drilling holes falling below or exceeding the tolerances shall be rejected.

Note: Checking the geometry of the drill hole on 1 % of all drillings means that on one of the 25 panels (this corresponds to 100 drillings in façade panels with four anchors) one drilling shall be checked. If the tolerances given in Annex A 3, Table A3 are exceeded the extent of the control shall be increase to 25 % of the drillings, i.e. one drilling each shall be checked on all the 25 panels.

- During transport and storage on site the façade panels are protected from damages; the façade panels are not be hung up jerkily (if need be lifters shall be used for hanging up the façade panels); façade panels and reveal panels respectively with incipient cracks are not be installed.
- The façade are installed by skilled specialists and the laying instructions of the manufacturer shall be paid attention to.

The façade panels are arranged in a "reclined" or "upright" position, they also may be fixed at façade soffits.

The profiles or agraffes must be fixed as defined and set out in this document (see Annex A/B)

Use, maintenance and repair of the works

Maintenance of the assembled systems or kits components includes inspections on site, taking into account the following aspects:

- regarding the Hanex façade panel: appearance of any damage such as cracking or detachment
- regarding the fasteners (fixing): presence of corrosion or deformation

Necessary repairs should be done rapidly, using the same kit components and following the repair instructions given by ETA holder.

Hanex facade panel	Annex B 2
Intended use Specifications – installation and use	

Design method

General

The design values of the actions shall be calculated on basis of EN 1990 in consideration of the existing loads. The combinations of actions shall be equal to EN 1990. The actions shall be specified according to EN 1991-1-1 to EN 1991-1-7. Corresponding national regulations shall be taken into consideration. The unfavourable combination is decisive. Where necessary for the design of the anchor and the façade panel several combinations shall be analysed separately.

The typical fundamental combination for façade panels considers actions from dead load $F_{Ek,G}$ (permanent action) and wind $F_{Ek,w}$ (leading variable action).

According to EN 1990 the following fundamental combination depending on the load direction results for a vertical façade panel:

Fundamental combination for loads parallel to the panel:

$$F_{Ed||} = F_{Ek,G} \cdot \gamma_G$$

Fundamental combination for loads perpendicular to the panel:

$$F_{Ed\perp} = F_{Ek,w} \cdot \gamma_Q$$

$$\text{with } \gamma_G = 1,35; \gamma_Q = 1,50$$

For hanging panels (over head mounting) or reveals respectively the load direction shall be taken into consideration and the combinations of actions shall be based on EN 1990.

The calculation shall be carried out in a linear elastic manner. The stiffness of the substructure shall be considered for the respective case of application.

- Each façade panel is fixed with at least four anchors in a rectangular arrangement via single agraffes or double agraffes on the substructure (for small panels or small fitted pieces, differential or fill- in pieces the number and position of the anchors shall be chosen constructively).
- The substructure is constructed such that the façade panels are fixed technically strain-free via skids (loose bearings) and one fixed point (fixed bearing) - the fixed point may be placed at the panel edge or in the panel field.
- Two fixing points of the façade panel are designed such that they are able to carry the dead load of the façade panel.
- When using agraffes on horizontal load-bearing profiles the fixing points of a façade panel situated horizontally at the same height are fastened in each case to the same load-bearing profile.
- Joint construction between the façade panels is done by a joint filler or are kept open; it is ensured that additional stresses (e.g. by temperature) do not lead to important additional loadings.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- The façade panels, their fixings as well as the substructure including its connection to wall brackets and their connection to the construction works are designed for the respective case of application under the responsibility of an engineer skilled in the field of façade construction.

Hanex facade panel

Intended use

Specifications – installation and use

Annex B 3

Verification of the anchor loads

In addition to the actions from dead load and wind load the following actions shall be considered as permanent loads in direction to the anchor axes:

- in case of flush fixing of the anchor and when using horizontal load-bearing profiles: due to torsion of the load-bearing profile resulting from dead load of the façade panel the following load $N_{Ek,V}$ shall be considered:

$$N_{V,Ek} = V_{Ek} \cdot e/z$$

with V_{Ek} = shear load due to dead load of the façade panel; e and z [mm] (see Figure 2)

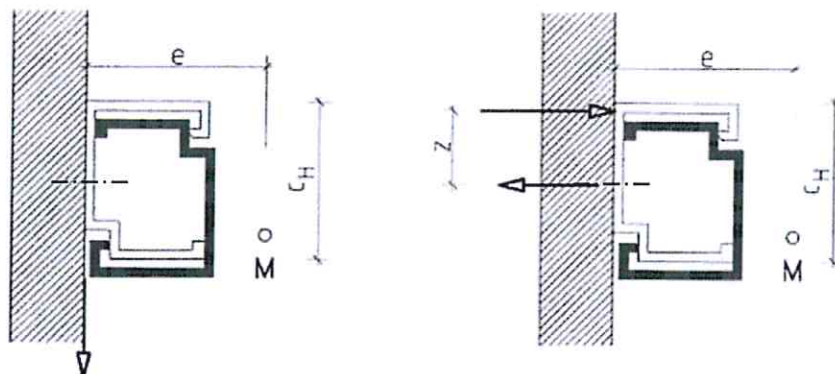


Figure 2: torsion of horizontal load-bearing profiles resulting from dead load of the façade panels

For the determined anchor forces it shall be verified that the following equation are met:

Equation 1: $\frac{\Sigma N_{Ed}}{N_{Rd}} \leq 1$

Equation 2: $\frac{V_{Ed}}{V_{Rd}} \leq 1$

Equation 3: $\frac{\Sigma N_{Ed}}{N_{Rd}} + \frac{V_{Ed}}{V_{Rd}} \leq 1,2$

With:

ΣN_{Ed} = design value of existing anchor tension load

$$\Sigma N_{Ed} = N_{Ed} + N_{V,Ed}$$

V_{Ed} = design value of existing anchor shear load

N_{Rd} = design value of anchor load-bearing capacity for tension load: $N_{Rd} = N_{Rk} / \gamma_M$ (with N_{Rk} and γ_M according to Annex C 1)

V_{Rd} = design value of anchor load-bearing capacity for shear load: $V_{Rd} = V_{Rk} / \gamma_M$ (with V_{Rk} and γ_M according to Annex C 1)

Verification of the bending stresses

For the determined bending stresses it shall be verified, that the following equation is met:

Equation 4: $\sigma_{Ed} \leq \sigma_{Rd}$

With

σ_{Ed} = design value of existing bending stress in the façade panel

σ_{Rd} = design value of bending strength: $\sigma_{Rd} = \sigma_{Rk} / \gamma_M$ with σ_{Rk} ; γ_M according to Annex C 1, Table C1

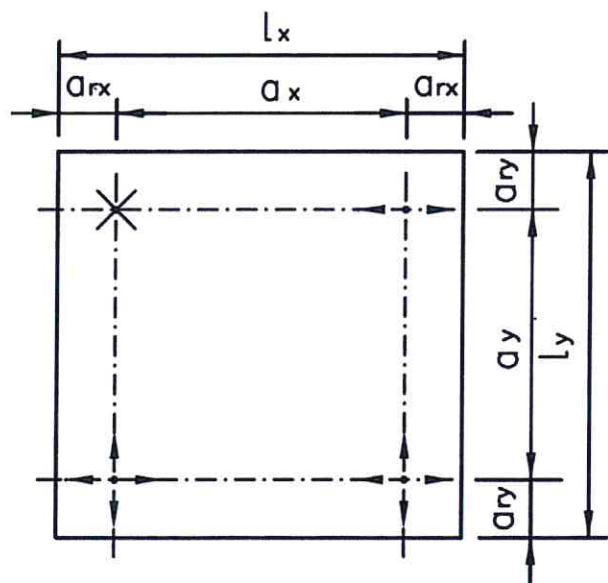
Hanex facade panel

Intended use

Specifications – installation and use

Annex B 4

Definition of edge distance and spacing

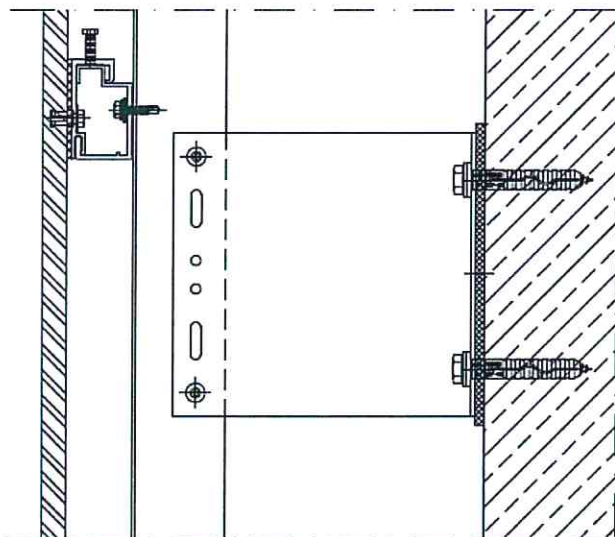


Legend:

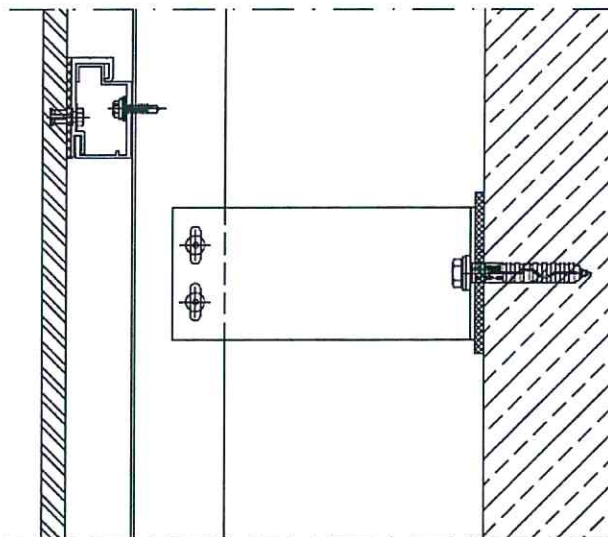
- $a_{Rx,y}$ = edge distance – distance of an anchor to the panel edge
- $a_{x,y}$ = spacing – distance between anchors
- L_x = greater length of the façade panel
- L_y = smaller length of the façade panel
- $\times$ = fixed point (fixed bearing)
- $\text{---}+$ = horizontal skid (loose bearing)
- $\text{---}+$ = horizontal and vertical skid (loose bearing)

Example for fixed point and loose bearing

fixed bearing (fixed point)



loose bearing (skid)



Hanex facade panel

Intended use

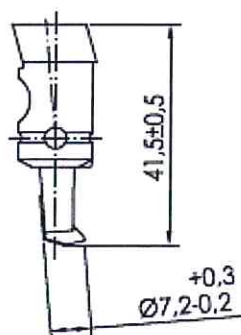
Specifications – installation and use

Annex B 5

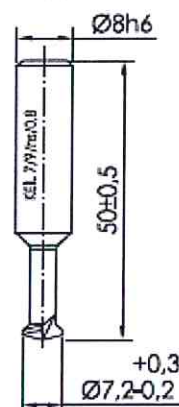
Geometry of the KEIL facade drill

for KEIL facade drill bit 7/9

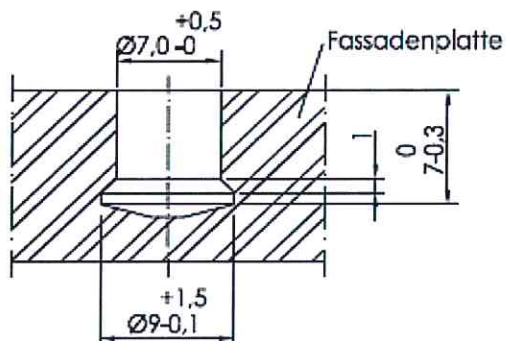
Carbide tipped facade drill bit



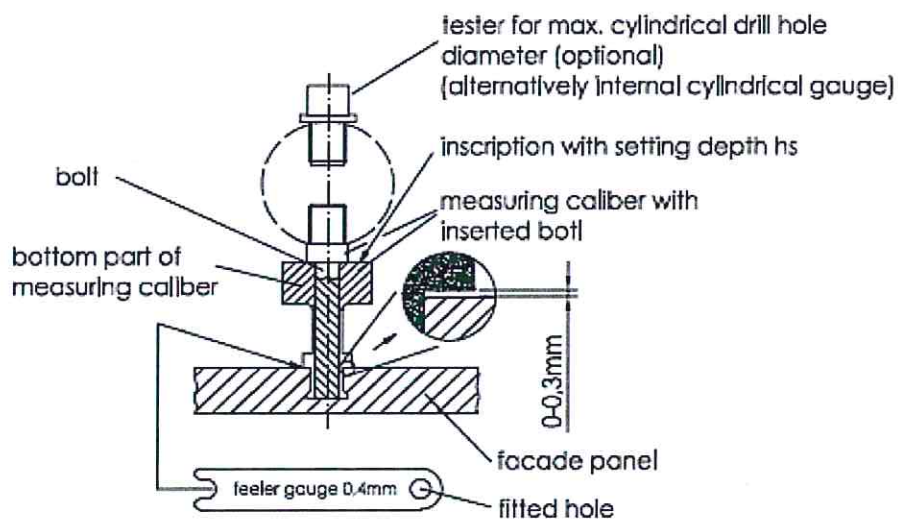
Carbide tipped drill bit / CNC



Geometry of the drill hole



KEIL measuring device



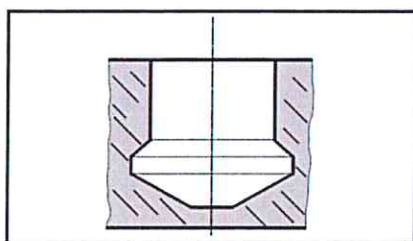
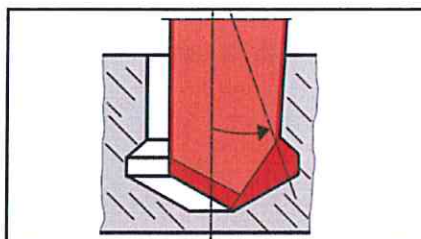
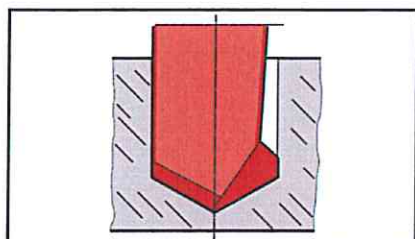
Drawing scale not true to real scale

Hanex facade panel

Intended use

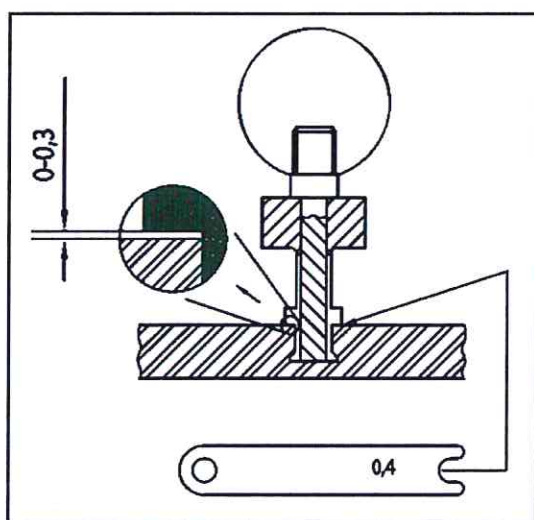
Drill hole dimensions
Setting tools and testing equipment

Annex B 6



Installation instructions fastener

1. Drilling the undercut hole



a) Cylindrical drilling
clearing

b) Undercutting and
clearing

c) Finished undercut hole

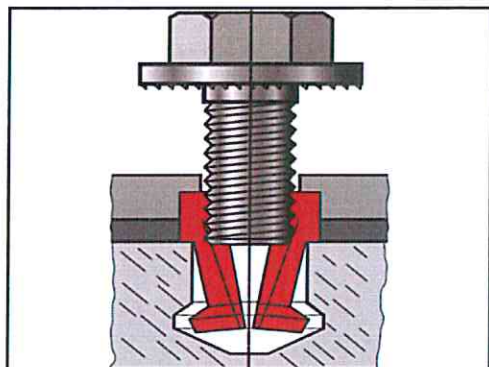
2. Checking the undercut hole

with KEIL depth control guide

Hanex facade panel

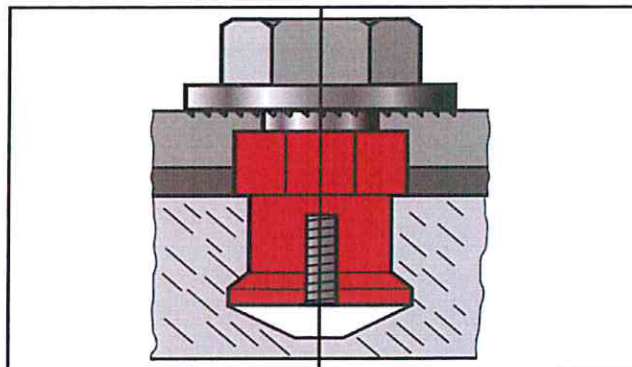
Intended use
Installation instructions fastener

Annex B 7



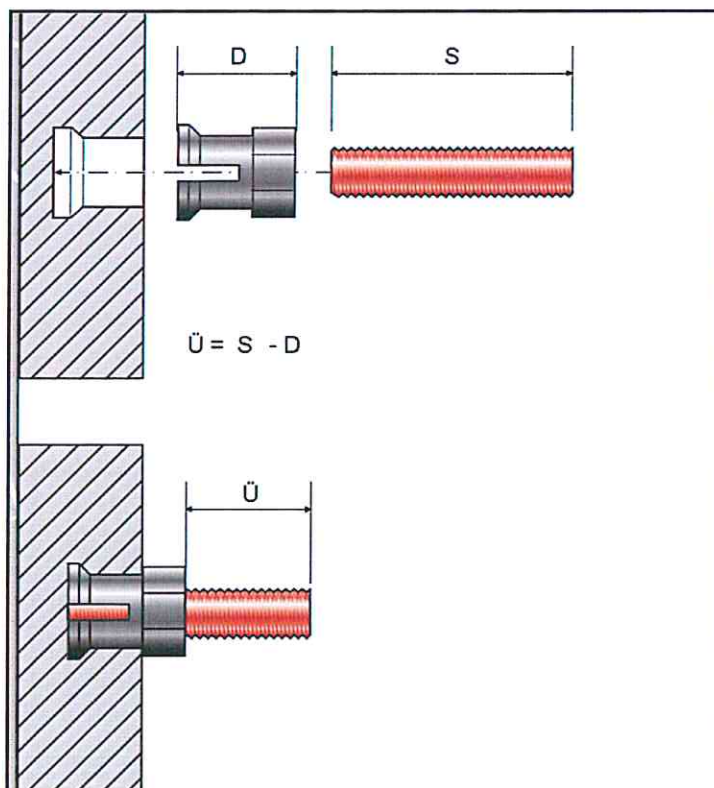
3. Installation of fastener (sleeve and screw)

- a) Insert the sleeve in the undercut hole
and drill the screw in the sleeve



b) Installed undercut anchor

4. Installation of fastener (sleeve and grub screw)



- a) Insert the sleeve in the undercut hole

- b) Drill the grub screw in the sleeve

- c) Installed undercut anchor

Hanex facade panel

Intended use
Installation instructions fastener

Annex B 8

Table C1: Characteristic values and performances of the anchor and Hanex façade panel

characteristic values of Hanex façade panel	panel thickness	$h \geq$	[mm]	12,0	
	char. resistance to bending stress	$\sigma_{Rk} =$	[N/mm ²]	46,0	
	Mean value of modulus of elasticity	$E_{mean} =$	[N/mm ²]	9000	
	thermal coefficient	$\alpha_T =$	[1/K]	$30,4 \times 10^{-6}$	
	dead load	$g_k =$	[kN/m ²]	0,23	
	partial safety factor ¹⁾	$\gamma_M =$	[-]	1,8	
characteristic values of KEIL KH 7,0 anchor	anchorage depth	$h_s =$	[mm]	7	
	characteristic resistance to	tension load ²⁾	$N_{Rk} =$	2,20	2,20
		shear load ²⁾	$V_{Rk} =$	3,00	3,30
	edge distance ³⁾	$a_r \geq$	[mm]	50	100
	spacing	$a \geq$	[mm]	100	
	double agraffe	$a_D \geq$	[mm]	45	
	partial safety factor ¹⁾	$\gamma_M =$	[-]	1,8	

¹⁾ In absence of other national regulations.

²⁾ in case of coincident stress of an anchor due to tension and shear load the equation according to Annex B 4 shall be observed

³⁾ For small fitted pieces, differential and fill-in pieces the edge distance and spacing shall be chosen constructively

Aspects of durability and serviceability

Characteristic values and performances of the anchor and Hanex façade panel

characteristic values of Hanex façade panel	Behaviour after pulsating load	[kN]	2,65
	Behaviour after Immersion in water	[kN]	2,74
	Freeze-thaw resistance	[kN]	2,32

Hanex facade panel

Performances

Characteristic values of the anchor and Hanex façade panel

Annex C 1

TEST REPORT



APPLICANT : HYUNDAI L&C

REPORT NO. : D213-20-00296

SAMPLE RECEIVED DATE : 2020-02-28

TEST STARTED DATE : 2020-02-28

REPORT ISSUED DATE : 2020-03-10

PAGE : 1 OF 2

DESCRIPTION : ONE(1) PIECE OF SUBMITTED CUTTING SAID TO BE TILE.

=====

ITEM : HANEX

=====

TEST CONDUCTED : AS REQUESTED BY THE APPLICANT, FOR DETAILS PLEASE SEE ATTACHED PAGES.

=====

PREPARED AND CHECKED BY
FOR FITI



GANG WEON, JEUNG
QUALITY MANAGER

AUTHORIZED BY
FOR FITI



JE-GOO JUN
PRESIDENT

※ Report Verification No.: QG3S-DLZV-VJIA ※

(You can see the authenticity of your test report through the above "Report Verification No." at FITI homepage.)

e-DOCUMENT SERVICE

The test results contained in this report are limited to results on the sample(s) that is provided by client and are not necessarily indicative or representative of the qualities of the lot from which the sample(s) was taken or of all products. Results contained in this report are not based on the quality certification of sample by the FITI quality certification program unless specifically requested by the client. Further use of the results of this report is prohibited unless allowed under a separate agreement set forth in an official document that is established between the client identified on this letter and the FITI.

REPORT NO.: D213-20-00296

PAGE : 2 OF 2

01. CONTAMINATION RESISTANCE (JIS K 6902 : 2007) : RATING

	#1
BLACK TEA	5
COFFEE	5
MILK	5
VINEGAR	5
10 % CITRIC ACID SOLUTION	5
GASOLINE	5
ACETONE	5
OLIVE OIL	5
10 % AQUEOUS AMMONIA SOLUTION	5
CRAYON	4
SODIUM BISULFITE(NaHSO ₃) SATURATED SOLUTION	5
SOY SAUSE	5

NOTE) TEST METHOD : B

CHEMICALS WERE APPLIED TH THE CLIENT'S SUGGESTED.

1. BLACK TEA : TARRA – ENGLISH BREAKFAST
2. COFFEE : SUPREMO AMERICANO
3. MILK : MAEIL MILK ORIGINAL
4. CRAYON : DONG-A(RED)

RATING

RATING 5 : NO CHANGE

RATING 4 : THE SLIGHT CHANGE IN COLOR OR GLOSS AT A SPECIFIC ANGLE

RATING 3 : SIGNIFICANT CHANGE OF COLOR, GLOSS

RATING 2 : VERY SIGNIFICANT CHANGE OF COLOR, GLOSS

RATING 1 : DAMAGE TO THE SURFACE AND SWELLING OCCURS

**** End of The Report ****



e-DOCUMENT SERVICE

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TEST REPORT



APPLICANT : HYUNDAI L&C

REPORT NO. : D213-20-00295

SAMPLE RECEIVED DATE : 2020-02-28

TEST STARTED DATE : 2020-02-28

REPORT ISSUED DATE : 2020-03-10

PAGE : 1 OF 2

DESCRIPTION : ONE(1) PIECE OF SUBMITTED CUTTING SAID TO BE TILE.

=====

ITEM : HANEX

=====

TEST CONDUCTED : AS REQUESTED BY THE APPLICANT, FOR DETAILS PLEASE SEE ATTACHED PAGES.

=====

PREPARED AND CHECKED BY
FOR FITI



GANG WEON, JEUNG
QUALITY MANAGER

AUTHORIZED BY
FOR FITI



JE-GOO JUN
PRESIDENT

※ Report Verification No.: 6HWQ-87WD-R57A ※

(You can see the authenticity of your test report through the above "Report Verification No." at FITI homepage.)

e-DOCUMENT SERVICE

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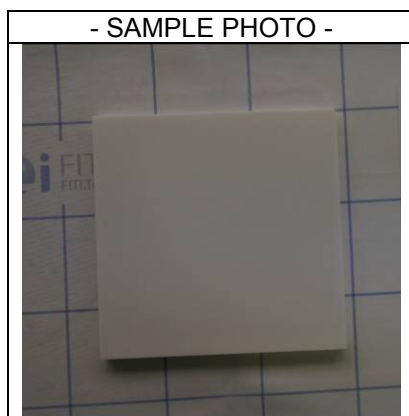
REPORT NO.: D213-20-00295

PAGE : 2 OF 2

01. HEAVY METAL'S CONTENT : mg/kg

ITEMS	TEST RESULT	TEST METHOD	DETECTION LIMIT
	#1		
CADMIUM (Cd)	LESS THAN 1	IEC 62321-5 : 2013	1
LEAD (Pb)	LESS THAN 10		10
MERCURY (Hg)	LESS THAN 0.1	IEC 62321-4 : 2013	0.1
CHROMIUM VI (Cr VI)	LESS THAN 0.1	IEC 62321-7-2 : 2017	0.1

** End of The Report **



e-DOCUMENT SERVICE

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TEST REPORT



APPLICANT : HYUNDAI L&C

REPORT NO. : D213-19-00066

SAMPLE RECEIVED DATE : 2019-01-18

REPORT ISSUED DATE : 2019-01-28

PAGE : 1 OF 2

DESCRIPTION : ONE(1) PIECE OF SUBMITTED CUTTING SAID TO BE ARTIFICIAL STONE.

=====

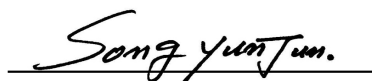
ITEM : HANEX

=====

TEST CONDUCTED : AS REQUESTED BY THE APPLICANT, FOR DETAILS PLEASE SEE ATTACHED PAGES.

=====

PREPARED AND CHECKED BY
FOR FITI



YUN JUN, SONG
QUALITY MANAGER

AUTHORIZED BY
FOR FITI



JE-GOO JUN
PRESIDENT

※ Report Verification No.: 151Y-MB9D-FXED ※

(You can see the authenticity of your test report through the above "Report Verification No." at FITI homepage.)

e-DOCUMENT SERVICE

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REPORT NO.: D213-19-00066

PAGE : 2 OF 2

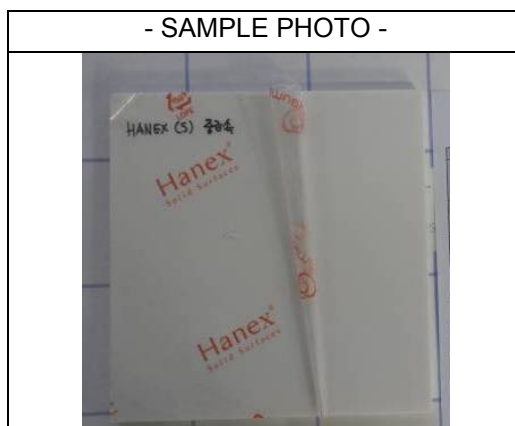
01. PHTHALATES CONTENT (KS M 1991 : 2016) : %

	#1
DEHP(DI(2-ETHYLHEXYL)-PHTHALATE)	LESS THAN 0.01
DINP(DI-ISO-NONYLPHTHALATE)	LESS THAN 0.01
BBP(BENZYL BUTYLPHTHALATE)	LESS THAN 0.01
DIDP(DI-ISO-DECYLPHTHALATE)	LESS THAN 0.01
DNOP(DI-n-OCTYLPHTHALATE)	LESS THAN 0.01
DBP(DIBUTYLPHTHALATE)	LESS THAN 0.01
DIBP(DIISOBUTYLPHTHALATE)	LESS THAN 0.01

NOTE) DETECTION LIMIT : 0.01 %

** End of The Report **

- SAMPLE PHOTO -



e-DOCUMENT SERVICE

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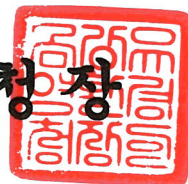
녹색기업 지정서

1. 사업장명 : (주)현대엘앤씨 세종사업장
2. 소재지 : 세종특별자치시 부강면 부강금호로 37/
세종특별자치시 부강면 금호안골길 79-20
3. 대표자 : 유 정 석
4. 지정기간 : `20. 4. 4. ~ `23. 4. 3.

귀 사업장은 전 직원의 녹색경영 실천 의지를 바탕으로
사업활동 전 과정에서 사전 예방적인 환경관리를
수행함은 물론 지속적인 환경개선을 실천하고 있으므로
녹색기업으로 지정합니다.

2020년 6월 19일

금강유역환경청장





Certificate of Designation Green Company

Name of the Company : HYUNDAI L&C Sejong Plant

Address : 37, Buganggeumho-ro, Bugang-myeon &
79-20, Geumhoangol-gil, Bugang-myeon,
Sejong-si, Republic of Korea

Designation Period : '20. 4. 4. ~ '23. 4. 3.

The Ministry of Environment hereby designates HYUNDAI L&C Sejong Plant as a Green Company in recognition of its commitment to sustainable entrepreneurship by performing precautionary environmental management and contributing to environmental improvement.

Geum River Basin Environmental Office





TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea

TEL 82-43-211-6144

FAX 82-43-211-6148

Report No : TAK-2020-036599

Representative : YOO JUNG SEUK

Company name : HYUNDAI L&C

Address : 26, Eulji-ro 5-gil, Jung-gu, Seoul, Republic Korea

Receipt Date : 2020.03.02.

Test Completion Date : 2020.03.23.

Sample name : HANEX(D)

Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Specific Gravity((23/23) °C)(Method A)	-	-	1.73	ASTM D792-13
Rockwell Hardness(HRM)(Procedure A)	-	-	87	ASTM D785-08(2015)
Tensile Strength(*)	MPa	-	32.8	ASTM D638-14
Tensile Modulus of Elasticity(*)	GPa	-	10.0	ASTM D638-14
Flexural Strength(**)	MPa	-	59.4	ASTM D790-17
Flexural Modulus of Elasticity(**)	GPa	-	9.67	ASTM D790-17
Izod Impact Strength(Method A)	J/m	-	15	ASTM D256-10(2018)
Water Absorption(24 h Immersion)	%	-	0.03	ASTM D570-98(2018)
Density(23 °C)(Method A)	g/cm ³	-	1.73	ASTM D792-13
Heat Resistance(Appearance)	-	-	No Defects	Referencing JIS K 6902 : 2007(Method B)
Heat Water Resistance(Appearance)	-	-	No Defects	Referencing JIS K 6902 : 2007(Method B)
Deflection Temperature Under Load(1.82 MPa)	°C	-	107	ASTM D648-18(Method B)
Thermal Expansion	1/°C	-	4.1×10^{-5}	Referencing KS M 3015 : 2003

* Specimen: Type III, Speed of Testing: 5 mm/min(Modulus: 1 mm/min)

** Support Span: 190 mm, Speed of Testing: 5.0 mm/min

- Usage of Report : QUALITY CONTROL

- Next Page -

Cho Hyeong-gil

Prepared by Cho Hyeong-gil

Tel : 02-2092-3698

You Seok

Reviewed by You Seok

Tel : 1577-0091(ARS ①→④)

2020.03.23

Korea Testing & Research Institute

President



QR Code for forgery



TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea

TEL 82-43-211-6144

FAX 82-43-211-6148

Report No : TAK-2020-036599

Representative : YOO JUNG SEUK

Company name : HYUNDAI L&C

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Sample name : HANEX(D)

Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
-----------	------	--------	--------	-------------

- Note : 1. The test results of this test report are only limited in to the samples and sample names provided by the client and do not guarantee the quality of all products of the client. You Can check website (www.ktr.or.kr) or QR code to verify the authenticity of the certificate.
2. This test report shall be used only within the purpose of its defined usage and shall not be used for public relation, advertisement and lawsuit.
3. This test report is only valid when printed on KTR original report paper with hologram and when re-issued by KTR. The copy and the electronic file of the test report are only for reference.

Cho Hyeong-gil

Prepared by Cho Hyeong-gil

Tel : 02-2092-3698

You Seok

Reviewed by You Seok

Tel : 1577-0091(ARS ①→④)

2020.03.23

Korea Testing & Research Institute

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TEL 82-43-211-6144

FAX 82-43-211-6148

Report No : TAK-2020-036598

Representative : YOO JUNG SEUK

Company name : HYUNDAI L&C

Address : 26, Eulji-ro 5-gil, Jung-gu, Seoul, Republic Korea

Receipt Date : 2020.03.02.

Test Completion Date : 2020.03.23.

Sample name : HANEX(S)

Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Specific Gravity((23/23) °C)(Method A)	-	-	1.78	ASTM D792-13
Rockwell Hardness(HRM)(Procedure A)	-	-	87	ASTM D785-08(2015)
Tensile Strength(*)	MPa	-	46.7	ASTM D638-14
Tensile Modulus of Elasticity(*)	GPa	-	10.6	ASTM D638-14
Flexural Strength(**)	MPa	-	67.1	ASTM D790-17
Flexural Modulus of Elasticity(**)	GPa	-	11.2	ASTM D790-17
Izod Impact Strength(Method A)	J/m	-	17	ASTM D256-10(2018)
Water Absorption(24 h Immersion)	%	-	0.02	ASTM D570-98(2018)
Density(23 °C)(Method A)	g/cm ³	-	1.78	ASTM D792-13
Heat Resistance(Appearance)	-	-	No Defects	Referencing JIS K 6902 : 2007(Method B)
Heat Water Resistance(Appearance)	-	-	No Defects	Referencing JIS K 6902 : 2007(Method B)
Deflection Temperature Under Load(1.82 MPa)	°C	-	103	ASTM D648-18(Method B)
Thermal Expansion	1/°C	-	3.2×10^{-5}	Referencing KS M 3015 : 2003

* Specimen: Type III, Speed of Testing: 5 mm/min(Modulus: 1 mm/min)

** Support Span: 190 mm, Speed of Testing: 5.0 mm/min

- Usage of Report : QUALITY CONTROL

- Next Page -

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Prepared by Cho Hyeong-gil

Tel : 02-2092-3698

You Seok

Reviewed by You Seok

Tel : 1577-0091(ARS ①→④)

2020.03.23

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Address : 26, Eulji-ro 5-gil, Jung-gu, Seoul, Republic Korea

Receipt Date : 2020.03.02.

Test Completion Date : 2020.03.23.

Sample name : HANEX(S)

Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
-----------	------	--------	--------	-------------

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Cho Hyeong-gil

Prepared by Cho Hyeong-gil

Tel : 02-2092-3698

You Seok

Reviewed by You Seok

Tel : 1577-0091(ARS ①→④)

2020.03.23

Korea Testing & Research Institute

President



QR Code for forgery

CLIENT: HANWHA L&C CORPORATION
26 Eulji-ro 5-gil Jung-gu
Seoul Korea

Test Report No: TJ3852

Date: June 17, 2016

SAMPLE ID: The client identified the following test material as "HANEX"

SAMPLING DETAIL: Test samples were submitted to the laboratory directly by the client. No special sampling conditions or sample preparation were observed by QAI.

REFERENCE: SGS ref# AYAA16-21871

DATE OF RECEIPT: Samples were received at QAI facilities on May 23, 2016

TESTING PERIOD: June 17, 2016

AUTHORIZATION: Signed work order 16SP042501

TEST REQUESTED: Perform standard flame spread and smoke density developed classification tests on the sample supplied by the Client in accordance with ASTM Designation E84-15, "Standard Method of Test for Surface Burning Characteristics of Building Materials". The foregoing test procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

TEST RESULTS:	<u>Flame Spread</u>	<u>Smoke Developed</u>
	0	0

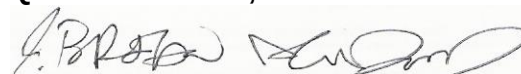
CLASSIFICATION: The material results were a class "A". Detailed test results are presented in the subsequent pages of this report

Prepared By



Jeff Foster
Fire Test Technician

**Signed for and on behalf of
QAI Laboratories, Inc.**



J. Brian McDonald
Operations Manager

PREPARATION AND CONDITIONING: The sample was submitted in eight panels approximately 3 feet long measuring 20 inches wide and approximately 1/4" inch thick. The sample material was placed into conditioning at 73°F (±5°F) and 50% (±5%) relative humidity until day of testing.

E 84 TEST DATA SHEET:

MOUNTING METHOD: The sample was supported during testing by 2" hexagonal mesh poultry netting running the length of the test chamber and 1/4" round metal rods placed at 2' intervals across the width of the test chamber, with cement board place between the sample and tunnel lid.

CLIENT: Hanwha L&C Corporation **DATE:** June 17, 2016

SAMPLE: Hanex

IGNITION: 8 minutes, 00 seconds

FLAME FRONT: 0 feet maximum

TIME TO MAXIMUM SPREAD: 0 minutes, 00 seconds

TEST DURATION: 10 minutes, 00 seconds

SUMMARY: FLAME SPREAD: 0 (0.0 unrounded) **SMOKE DEVELOPED:** 0 (1 unrounded)

OBSERVATIONS:

The first five minutes were uneventful. At 5 minutes 30 seconds sagging could be seen, and at 6 minutes charring was seen. Sustained ignition was witnessed at 8 minutes with dripping seen at 8 minutes 20 seconds. After was self-extinguished at the conclusion of the ten minute test.

CALIBRATION DATA:

Time to Ignition of Last Red Oak (sec):	34
Red Oak Smoke Area (%A* Min):	117.2
Total Fuel Burned (ft ³)	55.0

SUMMARY OF ASTM E84 RESULTS:

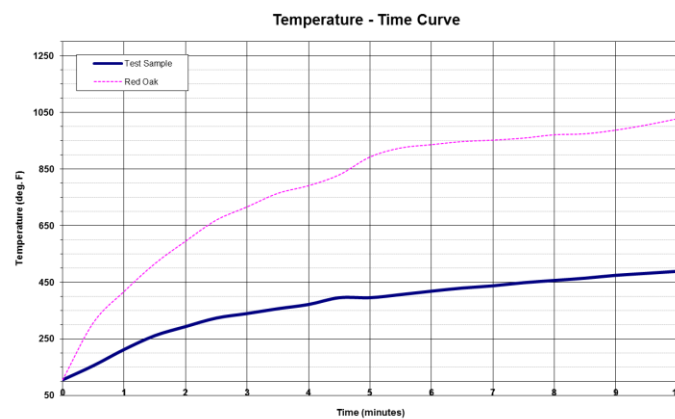
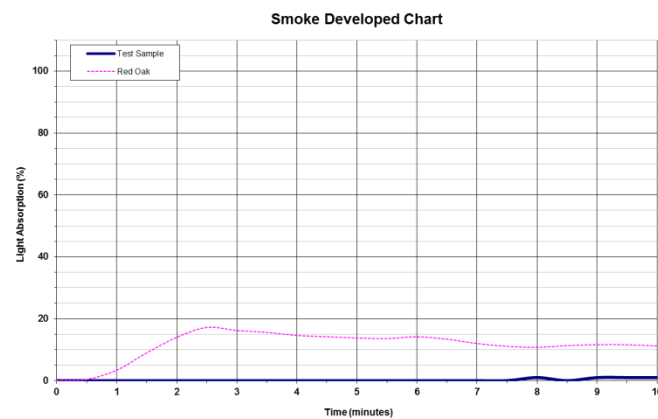
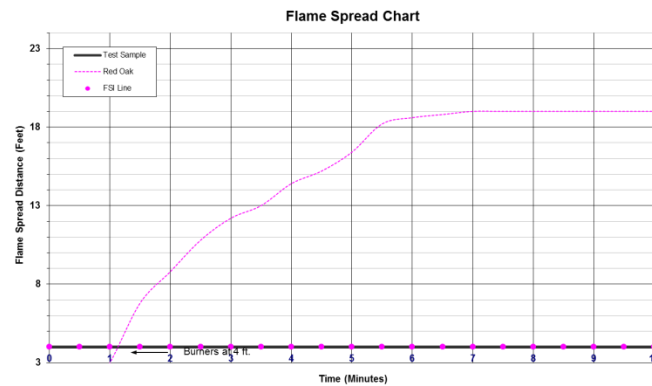
Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5. Smoke Density values over 200 are rounded to the nearest figure divisible by 50.

In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

<u>NFPA CLASS</u>	<u>IBC CLASS</u>	<u>FLAME SPREAD</u>	<u>SMOKE DEVELOPED</u>
A	A	0 through 25	Less than or equal to 450
B	B	26 through 75	Less than or equal to 450
C	C	76 through 200	Less than or equal to 450

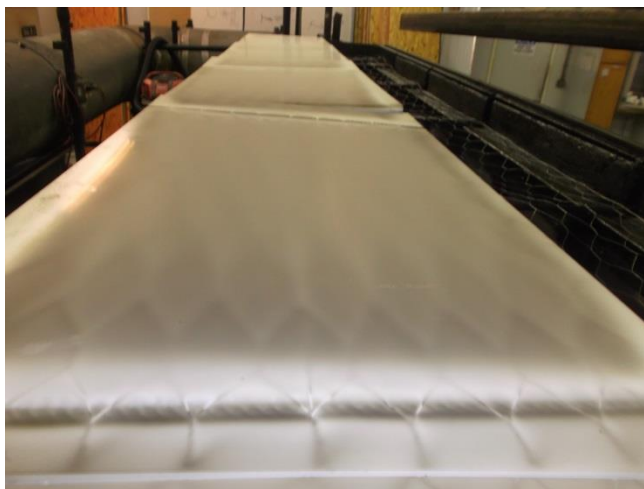
BUILDING CODES CITED:

1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code", 2006 Edition.
2. International Building Code, 2006 Edition, Chapter 8, Interior Finishes, Section 803.



THIS REPORT IS THE CONFIDENTIAL PROPERTY OF THE CLIENT ADDRESSED. THE REPORT MAY ONLY BE REPRODUCED IN FULL. PUBLICATION OF EXTRACTS FROM THIS REPORT IS NOT PERMITTED WITHOUT WRITTEN APPROVAL FROM QAI. ANY LIABILITY ATTACHED THERETO IS LIMITED TO THE FEE CHARGED FOR THE INDIVIDUAL PROJECT FILE REFERENCED. THE RESULTS OF THIS REPORT PERTAIN ONLY TO THE SPECIFIC SAMPLE(S) EVALUATED.

PHOTOS: AFTER TEST IMAGES



*****END OF TEST REPORT*****

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CERTIFICATE OF COMPLIANCE



Hanex

See product list below

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

Commercial furniture and furnishings are tested in accordance with ANSI/BIFMA M7.1-2011 and determined to comply with ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e3-2014e Credit 7.6.1, 7.6.2, and 7.6.3. Panel based workstations are modeled in the open plan environment. Casework systems and individual furniture items are modeled in the private office environment. Seating products are modeled in the seating environment. Classroom furniture is modeled using the standard classroom model in the California Department of Public Health (CDPH) Standard Method v1.2.

Building Products are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.1-2010, using the applicable exposure scenario.



UL evaluated representative samples of the identified product, process or facility to the identified Standard or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Client (collectively "Agreement"). The Client is authorized to use the UL Mark for the identified Product, process or facility covered by this certificate, in accordance with the terms of the Agreement. This Certificate is valid for the identified dates unless there is non-compliance with the Agreement. This certificate is subject to modification, suspension and withdrawal by UL see SPOT.ul.com, to authenticate the certificate.

CERTIFICATE OF COMPLIANCE

UL GREENGUARD Certified Products Listing

Product Name	Certification	Status	Certificate Number	Certification Period	Restrictions
Hanex Solid Surfaces	GREENGUARD Gold Certified	Certified	4186-420	2007.10.09-2026.10.09	
ALASKA	GREENGUARD Gold Certified	Certified	302406-420	2023.04.27-2026.10.09	
AMBER	GREENGUARD Gold Certified	Certified	302407-420	2023.04.27-2026.10.09	
ATHENA	GREENGUARD Gold Certified	Certified	302408-420	2023.04.27-2026.10.09	
BIANCO CLASSICO	GREENGUARD Gold Certified	Certified	302409-420	2023.04.27-2026.10.09	
CARAMEL DRIZZLE	GREENGUARD Gold Certified	Certified	302410-420	2023.04.27-2026.10.09	
CASCADE BEIGE	GREENGUARD Gold Certified	Certified	302411-420	2023.04.27-2026.10.09	
CASCADE BLACK	GREENGUARD Gold Certified	Certified	302412-420	2023.04.27-2026.10.09	
CASCADE CREAM	GREENGUARD Gold Certified	Certified	302413-420	2023.04.27-2026.10.09	
CASCADE GREY	GREENGUARD Gold Certified	Certified	302414-420	2023.04.27-2026.10.09	
CASCADE ICE	GREENGUARD Gold Certified	Certified	302415-420	2023.04.27-2026.10.09	



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CASCADE WHITE	GREENGUARD Gold Certified	Certified	302416-420	2023.04.27- 2026.10.09	
CLARA	GREENGUARD Gold Certified	Certified	302417-420	2023.04.27- 2026.10.09	
COCOA VINE	GREENGUARD Gold Certified	Certified	302418-420	2023.04.27- 2026.10.09	
COLDSTONE	GREENGUARD Gold Certified	Certified	302419-420	2023.04.27- 2026.10.09	
ECLIPSE	GREENGUARD Gold Certified	Certified	302420-420	2023.04.27- 2026.10.09	
EP SAND	GREENGUARD Gold Certified	Certified	302421-420	2023.04.27- 2026.10.09	
EP WHITE	GREENGUARD Gold Certified	Certified	302422-420	2023.04.27- 2026.10.09	
GAIA	GREENGUARD Gold Certified	Certified	302423-420	2023.04.27- 2026.10.09	
GRENICIO	GREENGUARD Gold Certified	Certified	302424-420	2023.04.27- 2026.10.09	
GREY	GREENGUARD Gold Certified	Certified	302425-420	2023.04.27- 2026.10.09	
HAVANA SAND	GREENGUARD Gold Certified	Certified	302426-420	2023.04.27- 2026.10.09	
H-CLOUDY	GREENGUARD Gold Certified	Certified	302427-420	2023.04.27- 2026.10.09	
HELENA	GREENGUARD Gold Certified	Certified	302428-420	2023.04.27- 2026.10.09	
HELSINKI	GREENGUARD Gold Certified	Certified	302429-420	2023.04.27- 2026.10.09	
HIDDEN GLEN	GREENGUARD Gold Certified	Certified	302430-420	2023.04.27- 2026.10.09	



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IVORY	GREENGUARD Gold Certified	Certified	302431-420	2023.04.27- 2026.10.09	
MARELINHO	GREENGUARD Gold Certified	Certified	302432-420	2023.04.27- 2026.10.09	
M-BLACK	GREENGUARD Gold Certified	Certified	302433-420	2023.04.27- 2026.10.09	
MERINO GREY	GREENGUARD Gold Certified	Certified	302434-420	2023.04.27- 2026.10.09	
METAL GREY	GREENGUARD Gold Certified	Certified	302435-420	2023.04.27- 2026.10.09	
MIST	GREENGUARD Gold Certified	Certified	302436-420	2023.04.27- 2026.10.09	
MOUNTAIN FROST	GREENGUARD Gold Certified	Certified	302437-420	2023.04.27- 2026.10.09	
NANTUCKET	GREENGUARD Gold Certified	Certified	302438-420	2023.04.27- 2026.10.09	
NEO WHITE	GREENGUARD Gold Certified	Certified	302439-420	2023.04.27- 2026.10.09	
N-ORANGE	GREENGUARD Gold Certified	Certified	302440-420	2023.04.27- 2026.10.09	
NUBLADO	GREENGUARD Gold Certified	Certified	302441-420	2023.04.27- 2026.10.09	
OMEGA	GREENGUARD Gold Certified	Certified	302442-420	2023.04.27- 2026.10.09	
OSLO WHITE	GREENGUARD Gold Certified	Certified	302443-420	2023.04.27- 2026.10.09	
RHAPSODY	GREENGUARD Gold Certified	Certified	302444-420	2023.04.27- 2026.10.09	
RICECOOKIE	GREENGUARD Gold Certified	Certified	302445-420	2023.04.27- 2026.10.09	



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ROMANO	GREENGUARD Gold Certified	Certified	302446-420	2023.04.27- 2026.10.09	
SANDBANK	GREENGUARD Gold Certified	Certified	302447-420	2023.04.27- 2026.10.09	
SEASHORE	GREENGUARD Gold Certified	Certified	302448-420	2023.04.27- 2026.10.09	
SILVERSTONE	GREENGUARD Gold Certified	Certified	302449-420	2023.04.27- 2026.10.09	
SLATE GREY	GREENGUARD Gold Certified	Certified	302450-420	2023.04.27- 2026.10.09	
SOLARIS	GREENGUARD Gold Certified	Certified	302451-420	2023.04.27- 2026.10.09	
STEEL	GREENGUARD Gold Certified	Certified	302452-420	2023.04.27- 2026.10.09	
TOFFEE CRUNCH	GREENGUARD Gold Certified	Certified	302453-420	2023.04.27- 2026.10.09	
ULTRA-WHITE	GREENGUARD Gold Certified	Certified	302454-420	2023.04.27- 2026.10.09	
VENATO CHAMPAGNE	GREENGUARD Gold Certified	Certified	302455-420	2023.04.27- 2026.10.09	
VENATO SNOW	GREENGUARD Gold Certified	Certified	302456-420	2023.04.27- 2026.10.09	
VENATO SPARKLE	GREENGUARD Gold Certified	Certified	302457-420	2023.04.27- 2026.10.09	
VENATO STELLA	GREENGUARD Gold Certified	Certified	302458-420	2023.04.27- 2026.10.09	
VOLARE	GREENGUARD Gold Certified	Certified	302459-420	2023.04.27- 2026.10.09	
WHEAT FIELD	GREENGUARD Gold Certified	Certified	302460-420	2023.04.27- 2026.10.09	



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WHITE	GREENGUARD Gold Certified	Certified	302461-420	2023.04.27- 2026.10.09	
YURI GREY	GREENGUARD Gold Certified	Certified	302462-420	2023.04.27- 2026.10.09	

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Hanex

See product list below

UL 2818 - 2022 Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Products tested in accordance with UL 2821 test method to show compliance to emission limits in UL 2818, Section 7.1.

Furniture and furnishings are tested in accordance with ANSI/BIFMA M7.1-2011 and determined to comply with ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e3-2014e Credit 7.6.1. Panel based workstations are modeled in the open plan environment. Casework systems and individual furniture items are modeled in the private office environment. Seating products are modeled in the seating environment.



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CERTIFICATE OF COMPLIANCE

UL GREENGUARD Certified Products Listing

Product Name	Certification	Status	Certificate Number	Certification Period	Restrictions
Hanex Solid Surfaces	GREENGUARD Certified	Certified	4186-410	2007.10.09-2026.10.09	
ALASKA	GREENGUARD Certified	Certified	302406-410	2023.04.27-2026.10.09	
AMBER	GREENGUARD Certified	Certified	302407-410	2023.04.27-2026.10.09	
ATHENA	GREENGUARD Certified	Certified	302408-410	2023.04.27-2026.10.09	
BIANCO CLASSICO	GREENGUARD Certified	Certified	302409-410	2023.04.27-2026.10.09	
CARAMEL DRIZZLE	GREENGUARD Certified	Certified	302410-410	2023.04.27-2026.10.09	
CASCADE BEIGE	GREENGUARD Certified	Certified	302411-410	2023.04.27-2026.10.09	
CASCADE BLACK	GREENGUARD Certified	Certified	302412-410	2023.04.27-2026.10.09	
CASCADE CREAM	GREENGUARD Certified	Certified	302413-410	2023.04.27-2026.10.09	
CASCADE GREY	GREENGUARD Certified	Certified	302414-410	2023.04.27-2026.10.09	
CASCADE ICE	GREENGUARD Certified	Certified	302415-410	2023.04.27-2026.10.09	
CASCADE WHITE	GREENGUARD Certified	Certified	302416-410	2023.04.27-2026.10.09	
CLARA	GREENGUARD Certified	Certified	302417-410	2023.04.27-2026.10.09	
COCOA VINE	GREENGUARD Certified	Certified	302418-410	2023.04.27-2026.10.09	
COLDSTONE	GREENGUARD Certified	Certified	302419-410	2023.04.27-2026.10.09	
ECLIPSE	GREENGUARD Certified	Certified	302420-410	2023.04.27-2026.10.09	
EP SAND	GREENGUARD Certified	Certified	302421-410	2023.04.27-2026.10.09	
EP WHITE	GREENGUARD Certified	Certified	302422-410	2023.04.27-2026.10.09	
GAIA	GREENGUARD Certified	Certified	302423-410	2023.04.27-2026.10.09	



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GRENICIO	GREENGUARD Certified	Certified	302424-410	2023.04.27-2026.10.09	
GREY	GREENGUARD Certified	Certified	302425-410	2023.04.27-2026.10.09	
HAVANA SAND	GREENGUARD Certified	Certified	302426-410	2023.04.27-2026.10.09	
H-CLOUDY	GREENGUARD Certified	Certified	302427-410	2023.04.27-2026.10.09	
HELENA	GREENGUARD Certified	Certified	302428-410	2023.04.27-2026.10.09	
HELSINKI	GREENGUARD Certified	Certified	302429-410	2023.04.27-2026.10.09	
HIDDEN GLEN	GREENGUARD Certified	Certified	302430-410	2023.04.27-2026.10.09	
IVORY	GREENGUARD Certified	Certified	302431-410	2023.04.27-2026.10.09	
MARELINHO	GREENGUARD Certified	Certified	302432-410	2023.04.27-2026.10.09	
M-BLACK	GREENGUARD Certified	Certified	302433-410	2023.04.27-2026.10.09	
MERINO GREY	GREENGUARD Certified	Certified	302434-410	2023.04.27-2026.10.09	
METAL GREY	GREENGUARD Certified	Certified	302435-410	2023.04.27-2026.10.09	
MIST	GREENGUARD Certified	Certified	302436-410	2023.04.27-2026.10.09	
MOUNTAIN FROST	GREENGUARD Certified	Certified	302437-410	2023.04.27-2026.10.09	
NANTUCKET	GREENGUARD Certified	Certified	302438-410	2023.04.27-2026.10.09	
NEO WHITE	GREENGUARD Certified	Certified	302439-410	2023.04.27-2026.10.09	
N-ORANGE	GREENGUARD Certified	Certified	302440-410	2023.04.27-2026.10.09	
NUBLADO	GREENGUARD Certified	Certified	302441-410	2023.04.27-2026.10.09	
OMEGA	GREENGUARD Certified	Certified	302442-410	2023.04.27-2026.10.09	
OSLO WHITE	GREENGUARD Certified	Certified	302443-410	2023.04.27-2026.10.09	
RHAPSODY	GREENGUARD Certified	Certified	302444-410	2023.04.27-2026.10.09	
RICECOOKIE	GREENGUARD Certified	Certified	302445-410	2023.04.27-2026.10.09	
ROMANO	GREENGUARD Certified	Certified	302446-410	2023.04.27-2026.10.09	
SANDBANK	GREENGUARD Certified	Certified	302447-410	2023.04.27-2026.10.09	
SEASHORE	GREENGUARD Certified	Certified	302448-410	2023.04.27-2026.10.09	
SILVERSTONE	GREENGUARD Certified	Certified	302449-410	2023.04.27-2026.10.09	



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SLATE GREY	GREENGUARD Certified	Certified	302450-410	2023.04.27-2026.10.09	
SOLARIS	GREENGUARD Certified	Certified	302451-410	2023.04.27-2026.10.09	
STEEL	GREENGUARD Certified	Certified	302452-410	2023.04.27-2026.10.09	
TOFFEE CRUNCH	GREENGUARD Certified	Certified	302453-410	2023.04.27-2026.10.09	
ULTRA-WHITE	GREENGUARD Certified	Certified	302454-410	2023.04.27-2026.10.09	
VENATO CHAMPAGNE	GREENGUARD Certified	Certified	302455-410	2023.04.27-2026.10.09	
VENATO SNOW	GREENGUARD Certified	Certified	302456-410	2023.04.27-2026.10.09	
VENATO SPARKLE	GREENGUARD Certified	Certified	302457-410	2023.04.27-2026.10.09	
VENATO STELLA	GREENGUARD Certified	Certified	302458-410	2023.04.27-2026.10.09	
VOLARE	GREENGUARD Certified	Certified	302459-410	2023.04.27-2026.10.09	
WHEAT FIELD	GREENGUARD Certified	Certified	302460-410	2023.04.27-2026.10.09	
WHITE	GREENGUARD Certified	Certified	302461-410	2023.04.27-2026.10.09	
YURI GREY	GREENGUARD Certified	Certified	302462-410	2023.04.27-2026.10.09	

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