CERAMIC TILES IN ARCHITECTURE: SPECIAL SYSTEMS AND SOLUTIONS

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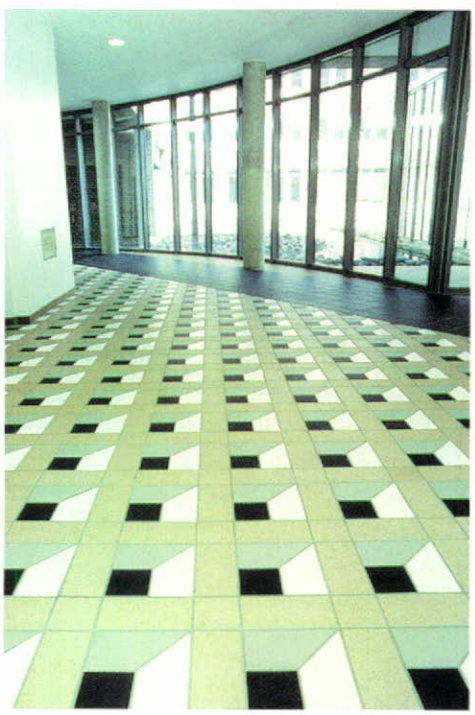
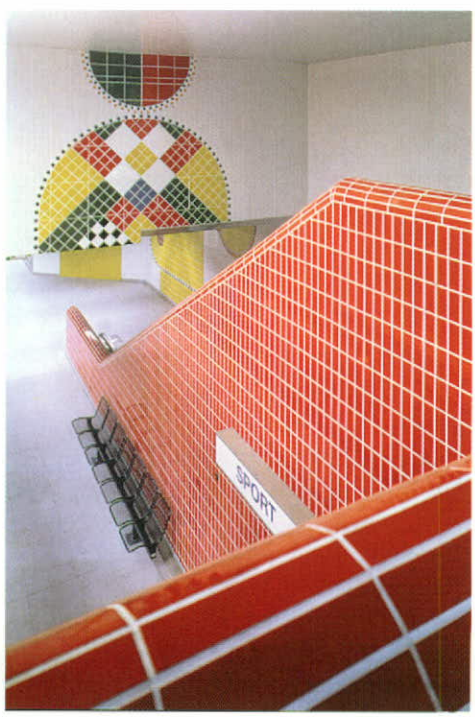
INTRODUCTION

Ceramic tiles and panels offer numerous possibilities in terms of architectural designing, and, thanks to their material properties, stand for a wide spectrum of possible applications - both in private and public areas. Some examples are: living rooms and bathrooms, kitchens, corridors and foyers, balconies, terraces, facades, swimming pools of all kinds, administration and representative buildings, hotels, historic and sacral buildings, museums, kindergartens, schools, shops, etc...



Example for application 1



Example for application 2

Example for application 3

Example for application 4

In addition to these classic fields of application, there are also some special ceramic developments and systems. The proven and yet for ever young material ceramics is predestined for such innovations in so far as ceramics - apart from its fundamental physical properties - is ideal for modifications in detail and can be provided with specific properties in order to find the optimum problem solution for the application in question. I am pleased about having the opportunity of presenting to you the following special systems and solutions today:

CERAMIC TILES IN ARCHITECTURE:

SPECIAL SYSTEMS AND SOLUTIONS

1) Static electricity conducting tiles

2) Special glazes for rooms where lasers are used

3) Ceramic shower tub system

4) Orientation aid for the visually impaired

1. STATIC ELECTRICITY CONDUCTING TILES

Already at the beginning of the 50ies, the ceramic industry was trying to develop tiles and panels conducting static electricity. At that time, newspaper reports according to which explosions due to the combustion of narcotic gases had occurred in operating rooms were the cause. Meanwhile, the spectrum of applications has become considerably wider. The permanently growing sector of microchip production is only one of many examples. The starting point, however, has remained almost the same: there are materials which have an electric insulating effect and which are charged under certain conditions such as e.g. friction. In case of a sudden discharge of these materials, persons (clothing, shoes ...), floating dusts, gases, liquids etc. charged with static electricity, combustions or major explosions may be the result in areas exposed to explosion hazards. Therefore, it is necessary to discharge static electricity **right at the moment it occurs without any risk**. This aim can be reached by means of static electricity conducting floor covering materials in conjunction with an appropriate constructional conception. Ceramic tiles and panels **per se** are considered as conductive up to an electrical leakage resistance (R_A) of 10^8 Ohm, although a value of 10^6 Ohm may be regarded as ideal, as many fields of application can be covered by this value. Products are normally classified as non-conductive, if the electrical leakage resistance (R_A) is greater than 10^9 Ohm.

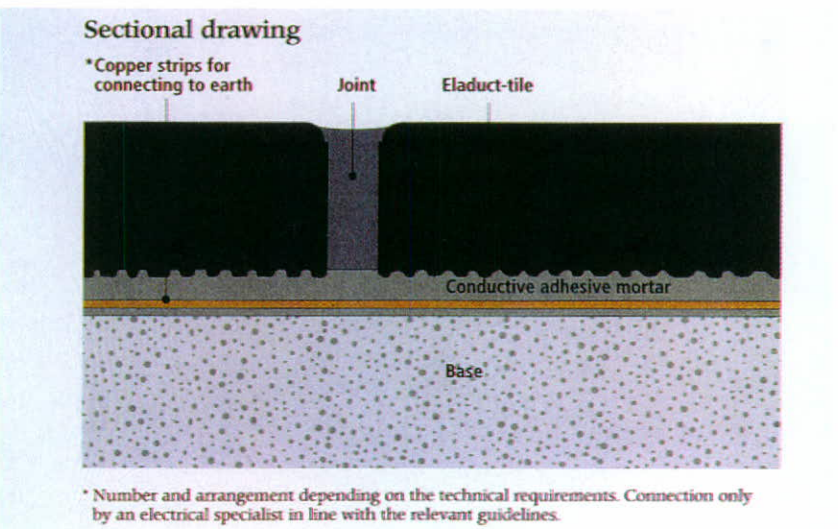
The relevant parameter for practical application, however, is the earth leakage resistance (R_E) according to DIN 51953 of the **finished floor covering**. The earth leakage resistance required for a specific application depends on the local conditions and/or the guidelines of the appropriate institutions such as e.g. trade associations. Here are some examples together with the limiting values applicable in Germany:

	Minimum value (Ohm)	Maximum value (Ohm)
Solvent storage areas:	10^4	10^8
Storerooms for packaged explosives:	10^4	10^8
Electronics industry:	10^4	10^7

Depending on the intended purpose, further criteria such as e.g. resistance to abrasion, chemical resistance, slip resistance, easy cleaning etc. also have to be taken into account apart from the derivation ability of static electricity. Bearing these requirements in mind, a leading German ceramics manufacturer even offers two possibilities of producing static electricity conducting ceramic floor coverings

*a) **Unglazed** stoneware tiles according to DIN EN 121 A I*

In the case of ELADUCT, static electricity is discharged **through the tile body**. Available in red-brown colour, based on model size 25x12,5cm in thicknesses of 11



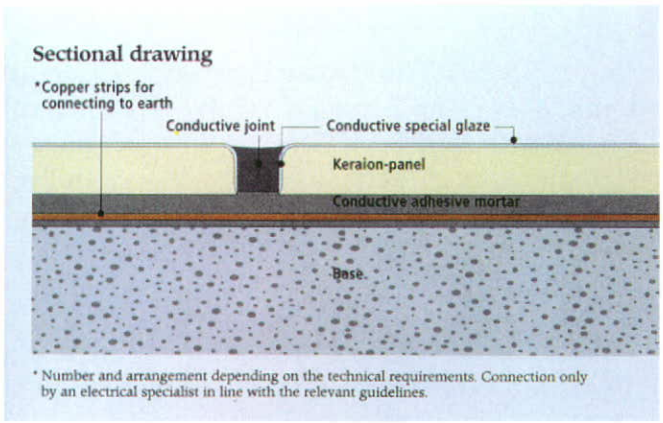
Functional principle of ELADUCT.

or 20mm, classified in slip-resistance valuation group "R10" according to the German Code of practice "ZH 1/571". Predestined for those areas where the discharge of static electricity is desired together with the advantages of an unglazed surface, i.e. high mechanical-chemical stress resistance. Examples: munitions dumps, flexographic printing areas, laboratories, rooms for lacquer production, etc.

*b) **Glazed** "KERAION" large-size panels according to DIN EN 121 A 1*

In the case of the series ELA 10.6, static electricity is discharged **via the four overglazed panel edges**. Available in the representative large model size of

60x60cm, with neutral-grey glaze, either "normal" or with the non-slip properties of group "R9" according to the German Code of practice "ZH 1/571". Recommended for areas where the discharge of static electricity is desired in connection with the advantages of a glazed surface, especially with regard to easy cleaning. The large model size of 60x60cm does not only create an elegant look, but is also advantageous in respect of cleaning and hygiene. The panels are predestined above all for representative applications such as e.g. offices, rooms for microchip manufacture, medical areas (operating theatres etc.), sales areas for electronic equipment etc.



Functional principle of ELA 10.6.

2. SPECIAL GLAZES FOR ROOMS WHERE LASERS ARE USED (E.G. OPERATING THEATRES)

Laser technology has been continuously further developed in the course of the years, and today the use of lasers in almost all fields of medicine is common practice: from eye medicine or the treatment of adenoids in the nose right through to applications in the cancer therapy and the field of dangerous modifications of the coronary vessels, which are still on the experimental stage, but very promising.

Already in 1917, Albert Einstein had made his first observations on the subject of lasers. Very simplified, one can talk of "bundled light". Unlike in the case of conventional light sources - no matter whether sun or filament bulb - the laser irradiation is bundled to such a high extent that a beam sent out from the earth reaches the moon at a distance

of approx. 400.000 km with a scatter of only around 200 metres. This example demonstrates the high precision of the laser in comparison with all conventional instruments. The motto in medicine is: "The laser helps where the scalpel fails". Meanwhile, lasers with different wavelengths and powers for almost all applications are available: devices for the CD player at home, high-performance lasers for welding or the cutting of metals, or "low-power" devices for the medical sector.

Due to this multitude of advantages, operating theatres where lasers are used have become rather the rule than the exception in the meantime. However, the **uncontrolled** reflection of the laser beam can be detrimental to the human organism and, for example, injure the eye under adverse conditions or even involve the risk of fire or explosion.

Therefore, a renowned German manufacturer developed a tailor-made solution: "Keraion OP special glazes", available in 3 colours, all in the large model size of 60x60cm. This special glaze intentionally "splits up" the incident laser beams and in this way protects medical staff as well as patients against uncontrolled reflections.

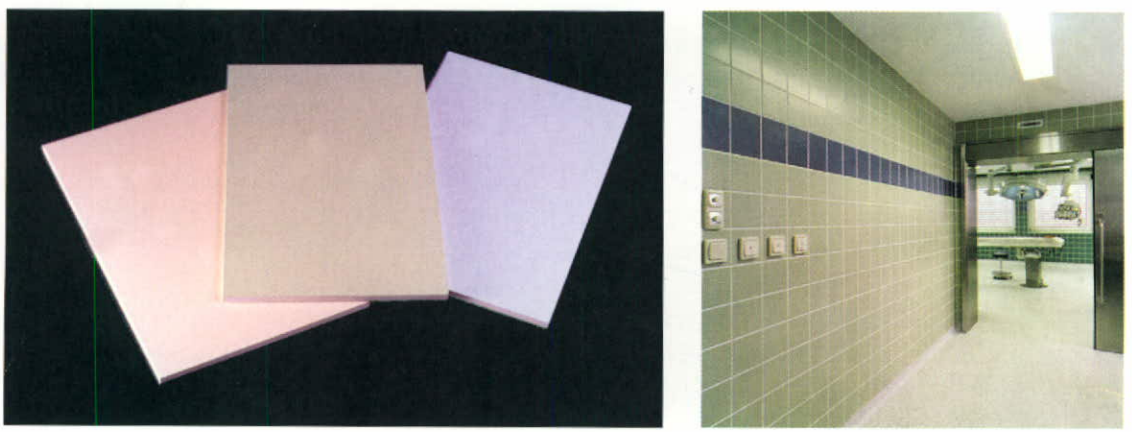


Photo of OP special glaze.

This ceramic solution for **wall** claddings satisfies all the requirements in terms of safety technology for this special purpose. It perfectly complies with the accident prevention regulation ("laser irradiation") with regard to **diffusely reflecting surfaces**. Ceramic large-size panels with OP-glazes meet the requirements of accident prevention regulation VBG 93. Evidence of these qualities was produced in a convincing manner: the Laser Medical Centre at the 'Freie Universität Berlin' confirms that this material is ideal for application in medical areas where quite usual types of lasers are used, which are:

- Argon - a typical visible laser
- Excimer - a typical UV-laser
- Nd:YAG - a typical laser in the close-infrared range
- CO_2 - a typical laser in the mid-infrared range

Advantages and functions in detail:

- Incident radar beams are "split up" in such a way that a damaging reflection is avoided.
- The ceramic surface heats up only minimally.
- The three pastel colours available give rooms a pleasant atmosphere.
- The large model size of 60x60cm does not only create an elegant look, but is also

advantageous with regard to hygiene and cleaning thanks to the reduced number of joints.

- The perfect solution for the floor: static electricity conducting "Keraion" panels of the series "ELA 10.6", also available in model size 60x60cm, together with the matching skirtings.

3. CERAMIC SHOWER TUB SYSTEM

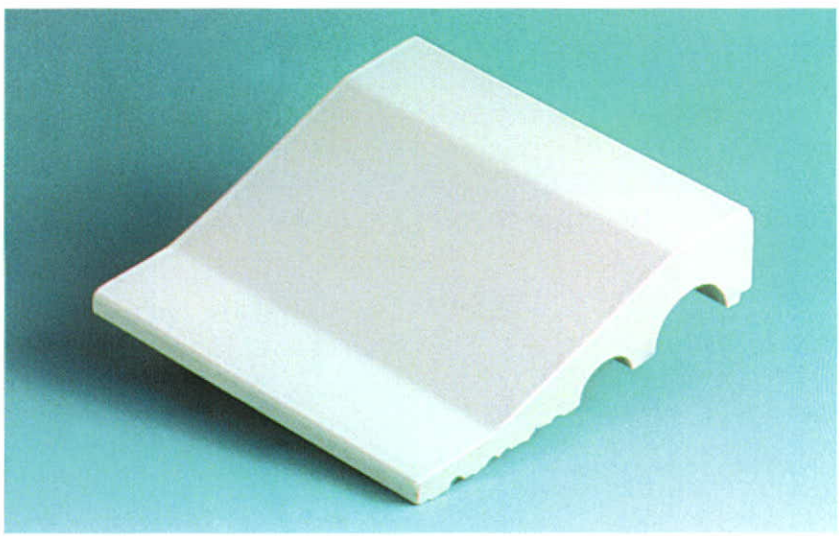
In our fast-moving days only little time is left for thorough personal hygiene. In addition, both the economic (water costs!) and the ecological aspects (saving of drinking water, relief of sewage treatment plants) have to be borne in mind. These are the reasons for the "triumph" of the shower over the bathtub, although the latter offers more convenience and an ideal place for relaxation.

Over and above that, the shower is the preferred solution for unproblematic, "safe" and comfortable personal hygiene for many older and handicapped people. The share of older people in the total population is growing in many countries according to the "age pyramid". In the Federal Republic of Germany, for example, the number of citizens above the age of 60 years is approx. 17 million at present, and until the year 2000 this number will rise to 20 million.

However, not only in private areas, but also in public institutions such as e.g. swimming pools, sanatories, old people's homes, hospitals and sport facilities showers are taken as a matter of course in our days.

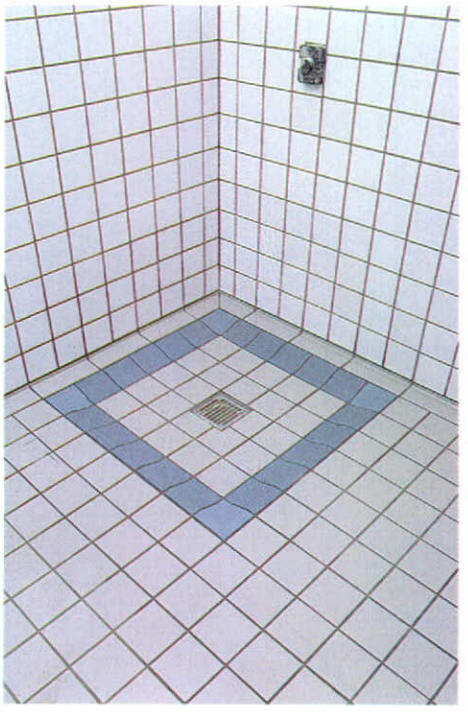
These barefoot areas have always been domains for ceramic coverings. Now, this traditional field of application is perfectly supplemented by the new ceramic shower tub system of AGROB BUCHTAL KERAMIK GmbH.

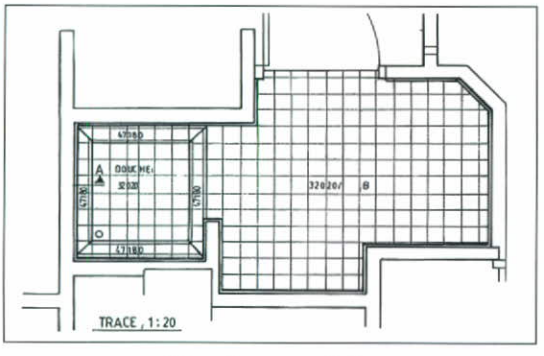
This interesting innovation is based on a special shower trim piece, whose outstanding feature is the integrated slope with a difference in height of 20mm.



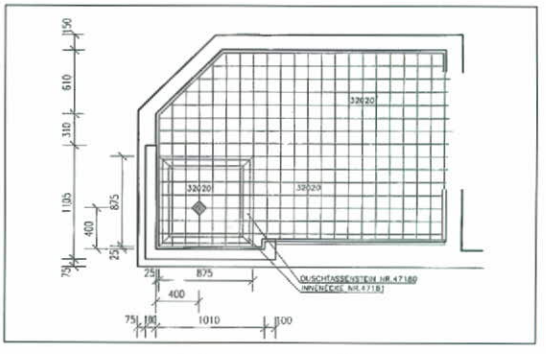
Shower trim piece.

A matching one-piece internal angle, i.e. without mitred joint, is also available. As

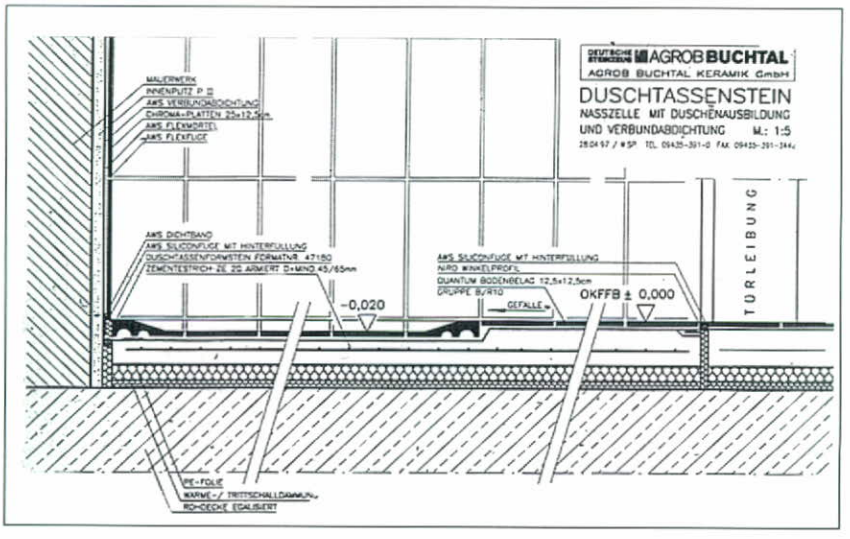




Planning example 1



Planning example 2



Application technology (cross section).

the system consists of these two parts only, it is logical and allows uncomplicated laying. Nevertheless, it opens up a wide design scope and offers many advantages:

Thanks to the integrated slope and the even lower side, works for adapting the laying base in the edge area of the shower tub are no longer necessary. The system's grid size of 12,5x12,5cm was chosen intentionally to ensure dimensional flexibility by small steps. This, on the other hand, offers the possibility of realizing solutions perfectly matched to the ground plan or room proportions.

As these examples show, the manufacturer also offers a project-specific planning service in addition to the product, which also includes support with regard to application technology.

The ceramic shower tubs produced with this system are ideal both for wheel-chairs ("into" the tub as well as "out" of it) and for walking, as there is no "stumbling trap" or threshold to overcome.

With regard to the material properties, the shower tub system is based on the "Quantum" series. These unglazed stoneware tiles are provided with a surface upgrading in-plant and therefore stain-resistant. In this way, cleaning and care are facilitated.

In addition, Quantum offers "multi-functional slip resistance", i.e. the covering can be walked on both barefoot and with shoes. The advantage: even larger sanitary blocks

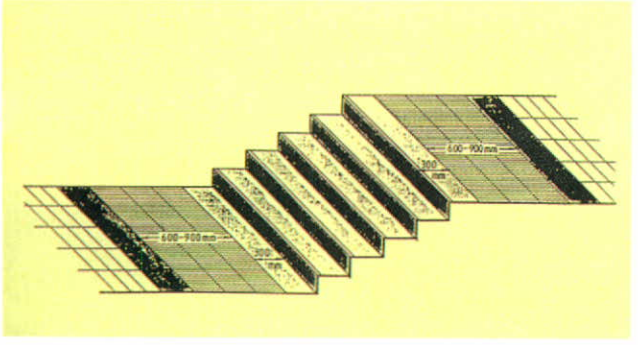
Example for application 1

Example for application 2

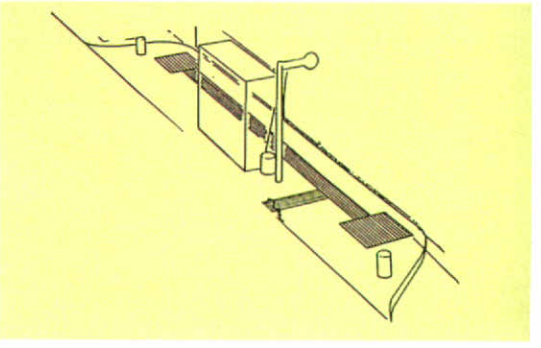
or shower facilities can be designed as a visually unified whole and with the required slip resistance, as the floor covering of the shower tub (walked on barefoot) and the adjoining floor surface of the sanitary block (walked on barefoot and/or with shoes) can be laid with tiles from one series. Further highlight: the shower tub system is available in different colours. Thanks to this, the edge of the shower tub can be executed in the same colour as the tub itself or in a colour contrasting to the adjoining surface covering, which

helps visually impaired people to find their way easier. The following figure underlines the importance attached to such safety aspects: in 1995 more than 5500 persons died because of falls in private households in the Federal Republic of Germany.

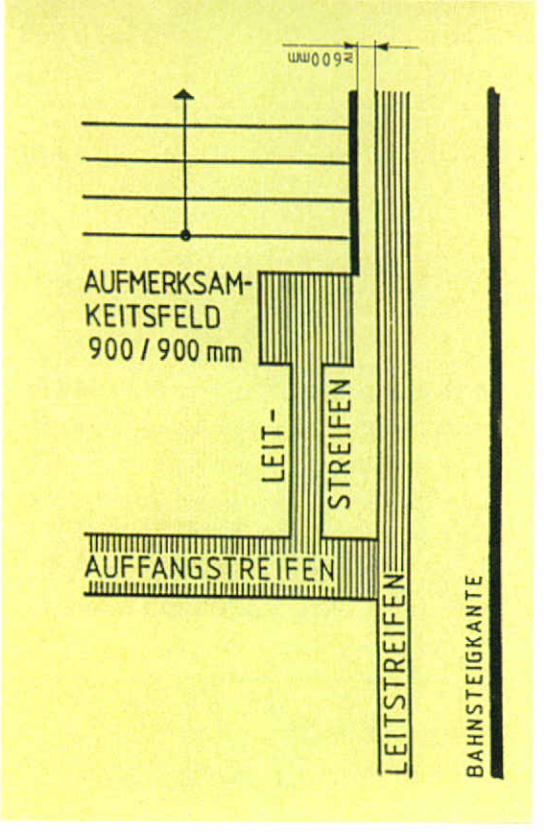
As already mentioned, typical fields of application of the shower tub system are sanitary blocks in hospitals, sanatories, rehabilitation centres, old people's and nursing homes, sport facilities, but also in hotels and private homes.



Example 1



Example 2



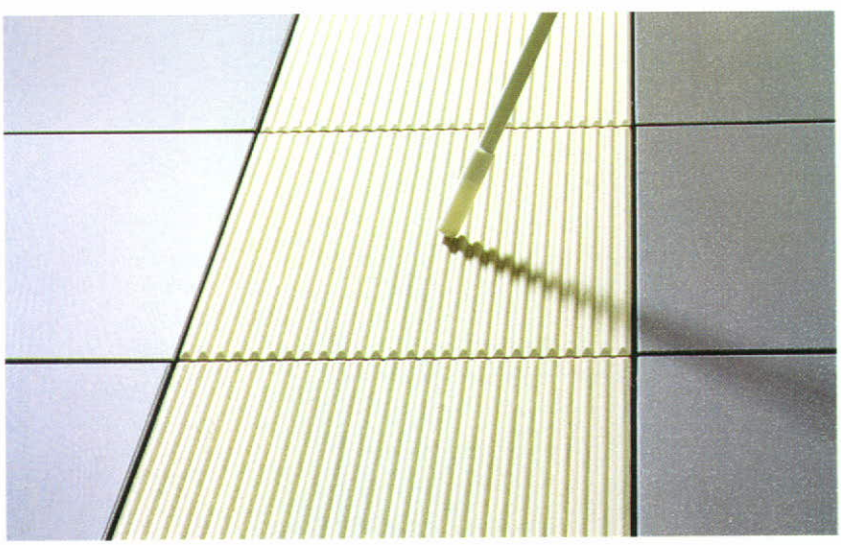
Example 3

4. ORIENTATION AID FOR THE VISUALLY IMPAIRED

People with unimpaired sight orientate themselves by the surrounding conditions. Blind and visually impaired citizens, however, do not have this possibility due to their

missing or reduced powers of vision. Without orien-tation systems they are helpless and excluded from participation in public traffic. Using uniform orientation aids which are independent of the powers of vision, clear signals can be given for blind and visually impaired citizens in public transport facilities (stations, platforms, walkways, stops and the like), and possible problems can be reduced. To meet these requirements is an important and worthwhile task of the whole society. The ideal case would be a uniform solution which is not restricted to a certain region, so that blind and partially sighted people can orientate themselves by the same aids over the whole country. In Germany, several attempts to establish an appropriate standard have already been made. Due to the complexity of the subject, however, the latest version is also still in preparation and exists only as a draft.

In spite of that, the company AGROB BUCHTAL KERAMIK GmbH developed a ceramic "orientation system for the blind and visually impaired". An essential orientation



Motif cane.

aid are the so-called **floor indicators**. These materials clearly differ from the adjoining surface covering tactile, acoustically and visually. Several floor indicators in a row form a so-called **guiding stripe**, which indicates the course of a route and has the function of marking the boundaries of a certain area. Here are some examples from the draft of the standard:

Among other things, these floor indicators must meet the following requirements:

- They must not involve the risk of slipping and stumbling.
- The surface should be easy to clean.
- It must be ensured that the blind can feel the structure with a cane.
- For the visually impaired, reflective blinding (e.g. caused by glazed surfaces due to unfavourable light conditions) must be avoided.
- For wheel-chair drivers, vibrationless driving on all floor coverings must be guaranteed according to DIN 18025.

The ceramic orientation aid for the blind and visually impaired meets these requirements with the following components:

a) a guiding tile (= floor indicator) with a specially grooved surface,
b) a floor tile with even surface for the design of the surfaces adjoining the guiding stripes in contrasting colours.

Thanks to the interplay of these two components, orientation is facilitated in several ways:

- **tactile** by the transfer of the vibrations from the cane moved over the grooves to the arm and by feeling the grooves through the soles of the shoes;
- **acoustically** by the typical noise resulting thereof;
- **visually** by the guiding stripes contrasting in colour and lightness compared to the surface covering.

Apart from the surface and colour, guiding tile and floor tile are also matched to one another with regard to:

- **format** (30 x 30cm.).
- **thickness** (14mm, even stands up to loads caused by transport vehicles, which are frequently used in such areas.
- the **slip resistance** of the guiding tile (R11) and the floor tile (R10) ensures a perceptible transition of the surface without abrupt, disturbing change.

Of course, the practical requirements are also borne in mind: both components of this ceramic orientation aid for the blind and visually impaired are made of robust, high-quality stoneware. The material is unglazed, highly abrasionproof and does not "reflect light", which might be confusing. In addition, it is provided with "Protecta" surface upgrading in-plant in order to facilitate cleaning and clare.

Result: A well thought out solution also convincing in detail.

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