

Freedom and safety

fischer Zykon anchor offering more design options

Ultimate performance and freedom of design – the fischer Zykon anchor combines both these planning and design requirements. The FZP Zykon anchor is a form-locking anchor, installed mechanically in an undercut drillhole without any expansion pressure. As early as 1997 the Deutsche Institut für Bautechnik (DIBt) has approved the fischer development for fixing ventilated natural stone facades with slab thicknesses above 20 mm and for reveals.

When it comes to retaining power, the undercut technique offers a great deal more than conventional fixings – it also allows the facade panels to be optimised: smaller panel thicknesses and smaller panel bending moments. Placing the anchor in the optimised position can reduce the tension by 50 percent compared with conventional systems. Undercut anchors can also be used to compensate any tolerances in the panel thickness.

The FZP excels both in its technical values and its design options. Invisible fixing points in the facade surface, the anchor can be positioned anywhere on the inward facing side of the panel, and the panels can be replaced easily. The reason? The undercut anchor makes no connection between panel and wall, but between the SystemOne subconstruction and the panel.

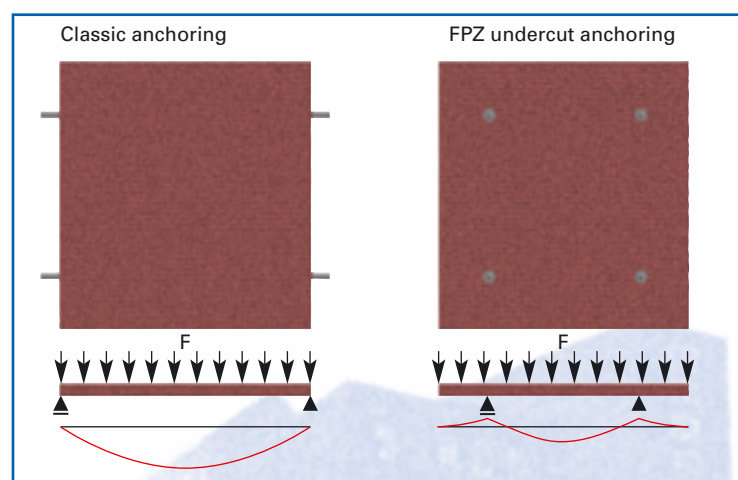
The SystemOne subconstruction has been designed for high loads, large-sized heavy natural stone panels, and for bridging non-load-bearing building substances. This type of construction reduces the installation on the building site and keeps noise levels down, for instance during reconstruction work.

The fischer Zykon panel anchors are also approved for fixing reveal panels. Although non-compliant with building standards, most reveal panels are still fixed by gluing. fischer offers planning engineers and craftsmen an economical and efficient solution for mechani-

cally anchoring reveal panels to what is commonly called the mother panels. The natural stone panels to be connected are bolted with reveal angle pieces.

This anchoring solution provides a number of advantages over conventional techniques. Compared with gluing, for instance, there is no long curing or waiting time to be observed. As the position of the reveal angles can be freely chosen, reveal and mother panels of different lengths can be used. The anchor bolting technique also allows the natural stone panels to expand and bend under the influence of high temperatures.

fischer's anchoring experts have not only invested a lot of know-how in the development of undercut anchors and the subconstruction, but also in drilling engineering. This drilling device for setting the undercut drillholes is an indispensable component of the whole FZP system. The machines, developed by fischer, allow drillholes to be made fast and economically.



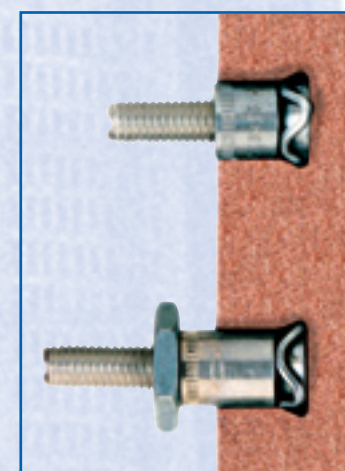
Bending torque enhancement through free positioning of the plate anchors

Earthquake-proof

Zykon anchors meeting Chinese and American earthquake standards

Safety in earthquake-prone zones is a crucial factor for high-rise buildings. To prove the point, earthquakes with maximum deformations of the facade elements of 10 cm were simulated in Peking. The facade anchorings by fischer withstood 30 earthquake simulations with as much as 9.4 on the Richter scale. This meant that the fischer facade anchorings met the stringent Chinese and American earthquake standards.

For the test setup it was assumed that the epicentre of the earthquake was located directly underneath the building and that panels had been attached at heights between 150 and 200 meters. The granite panels, 30 mm thick, 2 square meters in area and weighing 180 kg, were fixed with just four (4) FZP 13 x 24 anchors.



The FZP is suitable both for spaced installations for compensating plate differences and for flush installations.

The Deutsche Institut für Bautechnik (DIBt) has broadened the approval for the fischer Zykon panel anchor to include other stone grades. Next to natural stone panels, it is now also panels made of other magmatic igneous rock such as granite, syenite or diorite which can be anchored with the fischer Zykon anchor. The FZP has been approved by the DIBt also for anchoring metamorphic with hardstone character, among these quartzite, granulite, gneiss and migmatite.

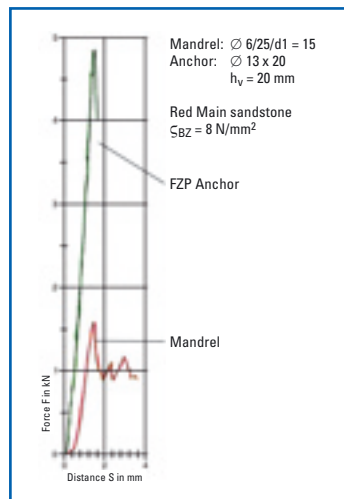
Shanghai has certainly one of the most exiting skylines to offer. fischer know-how is found in many facades.

A | C | T Competence Centre

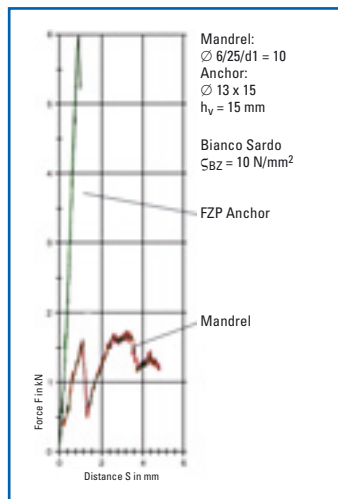
fischer's Number One address for façade anchorings

Competence all round – no mean claim by fischer's ACT façade experts. ACT stands for Advanced Curtain Wall Technique. The anchoring specialists "not only" offer innovative fixings for vented facades, but in fact every conceivable service which design engineers, planners, architects and contractors may expect. To be able to offer these services in the most direct way, ACT focuses on all areas ranging from development to production under one roof.

The range of services begins as early as the planning sta-



Comparison of fracture forces in soft stone between mandrel bearing and undercut anchoring



Comparison of fracture forces in granite between mandrel bearing and undercut anchoring



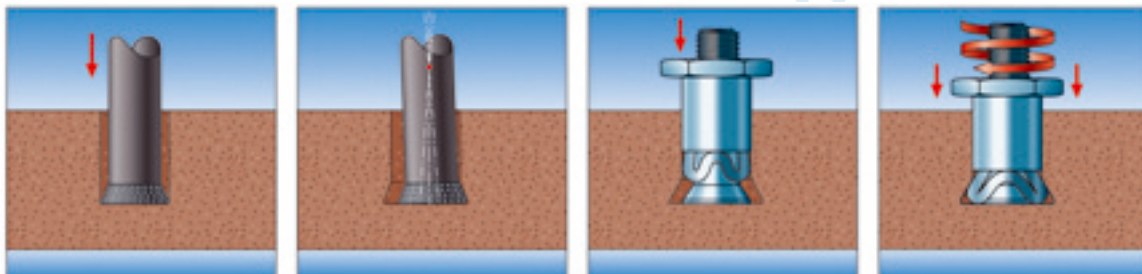
All under one roof at ACT: from development to production

ges, involving consulting and advice, and continues with design proposals, tests and structural calculations. Far from considering the job "done" at this stage, the ACT team then looks after itemised piece lists, the preparation of the subconstructions and the delivery on time to the building site.

And even then the client is not left alone. For the ACT specialists, instructing the users in the installation procedures for the base construction is as much part of their job as giving instructions in how to make the

scale systems. These automatic drilling machines can also be centrally controlled and monitored via a modem directly from the ACT central station.

Ever since the early nineties, fischer has been dealing intensively with innovative anchorings for vented facades. With an undercut hole set in ceramic facade slabs, Professor Artur Fischer provided the decisive impulse. A team of smart developers then picked up the idea and took it to perfection: the fischer Zykon FZP anchor for ceramic slabs.



Cylindrical drill hole

Undercutting

Inserting the anchor

Expanding the anchor

undercut drill holes. The actual drilling technique is an integral part of the fixing solution involving the fischer Zykon anchor. This is why fischer also offer their own machinery: from single stand-alone site machines to large-

Naturally, the invention aroused the interest of the experts and eventually led to the development of the FZP for natural stone with large dimensions and great weight. Parallel to the completion of major projects, the develop-

ment of undercut drilling techniques with sophisticated feeding mechanisms was rigorously advanced. fischer's new special in-house development impressively demonstrated its capabilities during a major contract in Moscow. For 22,000 m² natural stone facade at the savings bank, a total of 1,000 drillholes were set in granite slabs every day.

And from these "small" beginnings, we now have a team of specialists at fischer ACT who never lose sight of the whole.

Building projects

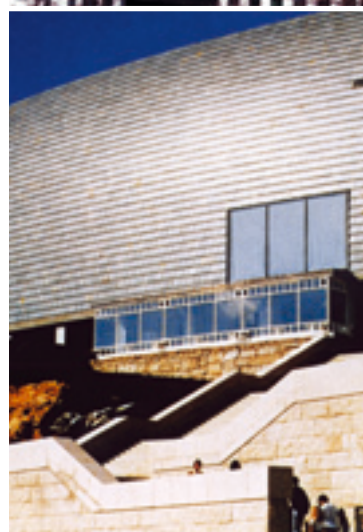
Savings Bank of the Russian Federation, Moscow

Facade material: Granite Bethel White, USA
Facade area: 21,000 m²
Slab size: 1100 x 900 x 20 mm
Anchorings: FZP 11 x 19 M 6
FZP 11 x 12 M 6
Requirement: Compensating differences in slab thickness through spaced installation and suspended installation anchors



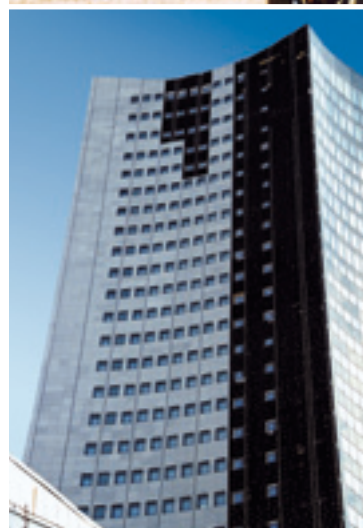
Museo del Hombre, Spain

Facade material: Slate
Facade area: 1,650 m²
Slab size: 500 x 530 x 20 mm
Anchoring: FZP 11 x 10 M 6
Requirement: spatially designed facade



High-rise building, University of Leipzig

Facade material: Padang, China
Facade area: 12,500 m²
Slab size: 1200 x 900 x 20 mm
Anchoring: FZP M 6
Requirement: on-site pre-assembly



Bank of China Tower, Shanghai

Height of building: 226 m
Facade material: Chinese granite
Facade area: 15,000 m²
Anchoring: FZP 13 x 24
M8/6kt/13A 4
Requirement: building height causing high wind suction forces



Theatre, Place des Martyrs, Brussels

Facade material: Lava Auvergne glazed-enamelled
Facade area: 30 m²
Slab size: 500 x 500 x 25 mm
Anchoring: FZP
Requirement: rapid installation/de-installation, fast slab replacement



Zykon in glass



Friendly reception at the "Centro 360"



The "Canyon Wall" – a case for the FZP-G



The fischer Start Solution for new design freedom

opens up new perspectives

The anchor specialist fischer has managed to apply the undercut technology to plate glass. A computer-controlled drilling technique and an advanced design version of the reliable Zykon panel anchor allow this new method of frameless facade glazing. Besides offering more architectural options, it is mainly the significant cost reduction – compared with previous anchoring methods – which planning engineers and architects can reckon with in future. This new method could result in more point-fixed glass to be used in exterior and interior design.

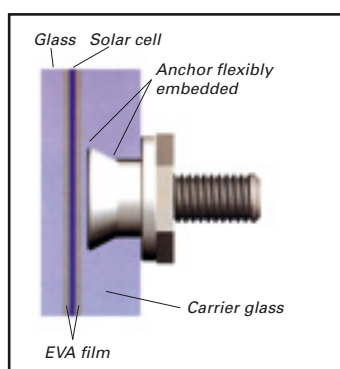
"We have experimented for eight long years, at first against the misgivings of experts", says Stefan Lind of fischer ACT (Advanced Curtain wall Technique). "Undercut anchorings in glass are a totally new field with no theoretical data to fall back on." Most recently, the system has been tested at the glass-makers St. Gobain and Pilkington for its suitability in

practice. "Now we have a fully developed and economical solution which offers many benefits" says the development engineer.

Unlike previous systems for the point-fixing of glass, the panel is no longer drilled and pierced fully. The anchoring is made directly into the glass in an undercut drillhole. The fixing point is sealed, protected from dirt and – unlike in through-type point fixings – does not act as an undesirable thermal bridge. Undercut anchorings introduce no expansion forces into the glass at the fixing point. The anchor holds by form-locking: once set, it adapts to the geometry of the drillhole and fills the undercut.

The special drill holes can be made with glass thickness above 10 mm, with an embedment depth of 6 mm, or 7 mm in 12 mm glass thickness. Small fixing points with a diameter of 20 mm and low edge distances of 50 mm and above guarantee the maxi-

mum transparency of the glass. The undercut drillhole and the bevelled edge is made in a single process. fischer has developed a computer-controlled drilling unit specially for this application.



The FZP-G is also suitable for fixing solar modules

The FZP-G anchor (the "G" stands for "glass") is an advance development of the fischer Zykon panel anchor used for natural stone facade anchorings. The FZP-G is made of A4 stainless steel. It is surrounded by a jacket-type plastic mantle which serves several purposes: It embeds the anchor elastically in

the drillhole, prevents contact between steel and glass, and – due to its bright colouring – reduces the visibility of the anchor inside the glass.

Anchoring of glass facades that are expected to hold enormous loads, should be as small and inconspicuous as possible and should also impair the aesthetic appearance of the surface as little as possible. But, to ensure the adjustment and to account for potential expansion, the demands made on the subconstruction rise dramatically in point-fixed glass systems. This problem is largely eliminated by the novel Star Solution retaining system which, used in connection with the undercut an-

choring, reduces the visible portion of the subconstruction to an absolute minimum.

The "Star Solution", its design reminiscent of a star, allows nodal point and two-point solutions with the greatest of ease: the holders are adjusted using positioning screws, and the panels can be shifted horizontally into the desired position. Tolerances and thermal expansion are absorbed directly in the panel level without any constraining forces.

The benefits at a glance

fischer Zykon plate glass anchor FZP-G

- small fixing points (20 mm diameter)
- no glass penetration
- no dirt on the outside
- no sealing problems
- no contact between A4 steel and glass
- low thermal transfer
- visual facade quality
- system engineering with high quality materials
- automatic drilling system

Star Solution Bracket

- adjustable glass plate position in vertical and horizontal direction during the installation on site
- absorbing thermal expansion
- attachment options to many different profile geometries
- one basic bracket for two-point or four-point fixings
- more architectural design options

The "Centro 360" restaurant in Singapore





+++ In just three years, the **Padova Marathon** has become a major sports event and an international celebration for the whole city. This year 2254 athletes, from the USA and Austria, from France and Switzerland, from Nigeria and Kenya, Australia and Japan saw the starter flag come down. But the biggest group of athletes came from Germany, among them **seven fischer**

people from the Tumlingen and Denzlingen locations. During the five kilometre city run – with over 10,000 runners! – the fischer locations from both sides of the Alps entered a mighty contingent of 92 runners, led by company chief Klaus Fischer and Italy's managing director Steffen Zügel (small photo). Representing the major sponsor, Klaus Fischer honoured the fastest marathon runners at the award ceremony: among the women, Giovanna Volpato from Padova (large photo) came first with 2:39'31 hours, ahead of Esther Barmasai from Kenya. Among the men, Douglas Rono from Kenya came first with 2:11'01, ahead of Giacomo Leone from Italy. +++



CEO Klaus Fischer (right) and Steffen Zügel (left)

+++ At the **innovation competition**, held every other year during the **VETECO** specialist trade fair in Spain, fischer ibérica has won second place. The award went to the glass anchoring system "Star Solution" (FZP-G) which the Spanish demonstrated using a photovoltaic system. +++

+++ **fischer UK** has opened new offices in **London**,



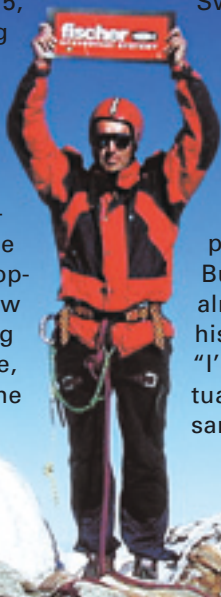
a focal point to better serve the Greater London area. The people at fischer UK focus their commitment on the technical support for planning engineers and designers. +++

+++ Almost 200 guests followed an invitation by fischer and the **Singapore Institute of Architects (SIA)** to attend a **seminar on facade anchorings**. The event, held in Singapore, focused on the **fischer division ACT** (Advanced Curtain Wall Technique, see also pages 12 – 14). The highly innovative fixing solution for natural stone, ceramic, fibre cement or glass panels developed by this division met with overwhelming interest among the assembled architects and planning engineers. +++



At the limits The mountain calls – again and again

"The mountain calls" – this maxim of the great alpinist Luis Trenker has also been fully embraced by Jiří Kyncl. At the tender of 15, Jiří, now managing director of the Czech marketing company fischer international s.r.o. discovered his passion for mountain-climbing. And ever since then he uses every opportunity to face new challenges. Coming from the Italian side, he has climbed the



legendary Matterhorn (4474 meters) in the Valais Alps for the second time via the "Lion Route" to descend on the Swiss side via the "Hörnli Route".

Kyncl's highest peak was in Uzbekistan in the Pamir Mountains: the Pik Lenin, rising to 7134 meters above sea level. "The air up there is pretty thin" says Kyncl. But the intrepid climber is already looking forward to his ultimate challenge: "I'm confident I will eventually tackle an eight thousand meter mountain."

Book tip

"Befestigungstechnik im Beton- und Mauerwerksbau"

(Anchoring Engineering in Concrete and Masonry) is the title of this book, authored by Prof. Dr.-Ing. Rolf Eligehausen, University of Stuttgart, and Dr.-Ing. Rainer Mallée, head of research at fischer. This detailed standard work has been published as part of the Building Engineering Practice series by Ernst & Sohn, Verlag für Architektur und technische Wissenschaften GmbH in Berlin. The book gives a detailed and concise outline of the state of the art in anchoring engineering with insertion components, plugs and setting bolts in concrete and masonry.

The chapter "Befestigungen in Beton" (anchorings in concrete) deals in detail with the anchoring elements and their effective mechanisms, and investigates the load-bearing behaviour in cracked and non-cracked concrete. Other subjects include the performance and behaviour under corrosion exposure, behaviour under fire exposure, and the performance under seismic impact and shock. The design of anchorings is explained in detail by way of practical examples.

The chapter "Befestigungen in Mauerwerk" (anchorings in masonry) deals with masonry work and describes the load-bearing behaviour and the design of plastic and injection-type anchorings. Criteria for selecting the various anchoring means round off the chapters.

Rolf Eligehausen, Rainer Mallée, *Befestigungstechnik im Beton und Mauerwerksbau*, 368 pages, ISBN 3-433-01134-, € 99,-

