

FIXING APPLICATIONS IN TUNNELS



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INFLUENCES ON CONSTRUCTION FIXINGS IN TUNNELS

Fire



A fire inside a tunnel represents an enormous challenge for the material used. The fire load may be very high due to traffic passing through the tunnel. Temperatures may also rise to very high levels due to tight spaces in the tunnel.

As fire fighting is extremely difficult, it is important for fastening material not to fail in case of a fire event before a certain time has passed. In general, the standard temperature curve according to DIN 4102 is not sufficient for the structural design of exposed fastening material.

The Würth anchors W-FAZ/HCR, W-FA/HCR M6, W-NA/HCR and W-VIZ/HCR have therefore been tested according to the time-temperature profile of the "Additional technical terms of contract and guidelines for civil engineering works (ZTV-ING), part 5 Tunnel Construction" and thus comply with all requirements of fire protection in tunnels. Our W-NA/HCR has also been tested according to the more stringent and demanding RWS (RijksWaterstaat) curve, which assumes the worst-case scenario of an oil tanker catching fire while carrying 50 m³ of fuel and results in a fire load of 300 MW lasting up to 120 minutes.

Fatigue loading



Trains and trucks passing through tunnels cause fatigue loading on construction fixings. In particular, this includes wind pressure and suction. Continuously repeating periodic loads on anchors may lead to the fatigue failure of the fastener. This may already occur after approx. 10,000 load changes (e.g., in the case of 10 load changes per day, there will be more than 10,000 load changes within 3 years).

Therefore, many of the applications in tunnels may be fixed with anchors approved for fatigue loading. Only this prevents the failure. This also applies to dynamically loaded operational structures, such as jet ventilators. The resin bonded anchor system W-VIZ dynamic is approved for fatigue loading and is generally used for such applications.

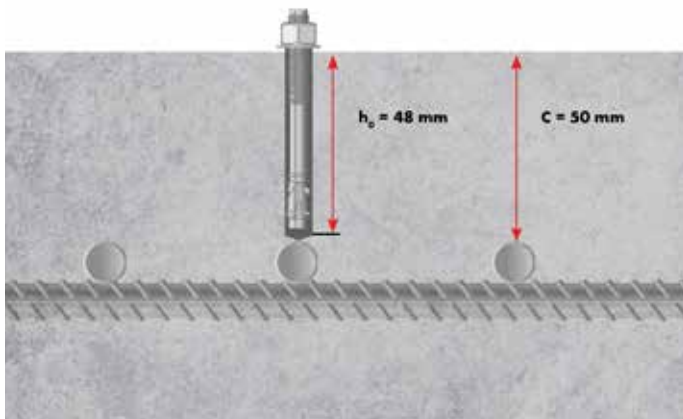
Corrosion

Environmental conditions inside road tunnels regularly represent increased challenges for fasteners and their corrosion resistance. This includes humidity, de-icing salts and exhaust gases. According to the stainless steel approval Z-30.3-6, a steel quality in accordance with corrosion resistance class V is required in road tunnels due to the high pollution caused by sulfur dioxide (SO₂). This class includes highly corrosion-resistant steel (HCR steel), which is also required according to "ZTV-ING, part 5 Tunnel Construction". A4 stainless steel must not be used in road tunnels since this material may fail due to stress corrosion cracking.

With its product range of anchors made of highly corrosion resistant (HCR) steel and all other popular steel qualities, Würth covers all applications in tunnels. On the following pages you will find a selection of fastening solutions made of HCR steel.



Shallow Embedment Depth










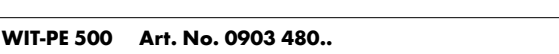








Concrete cover thickness is sometimes a restriction on the construction site when it comes to fixing solutions. Fixings with large embedment depths often come with the risk of drilling into rebar. Würth's anchor solutions include specifically designed products that ensure rebar is undamaged during the installation process. Our top-line mechanical anchor W-FAZ Pro/HCR is a high performance anchor which is designed to sustain large tension loads up to 5.8 kN for a metric thread diameter of 8 mm in cracked concrete with drill-hole depths under 50 mm. As a chemical injection mortar alternative, our WIT-VIZ can achieve the same load in tension without exceeding the 50 mm marker for adequate concrete cover.

De-installation

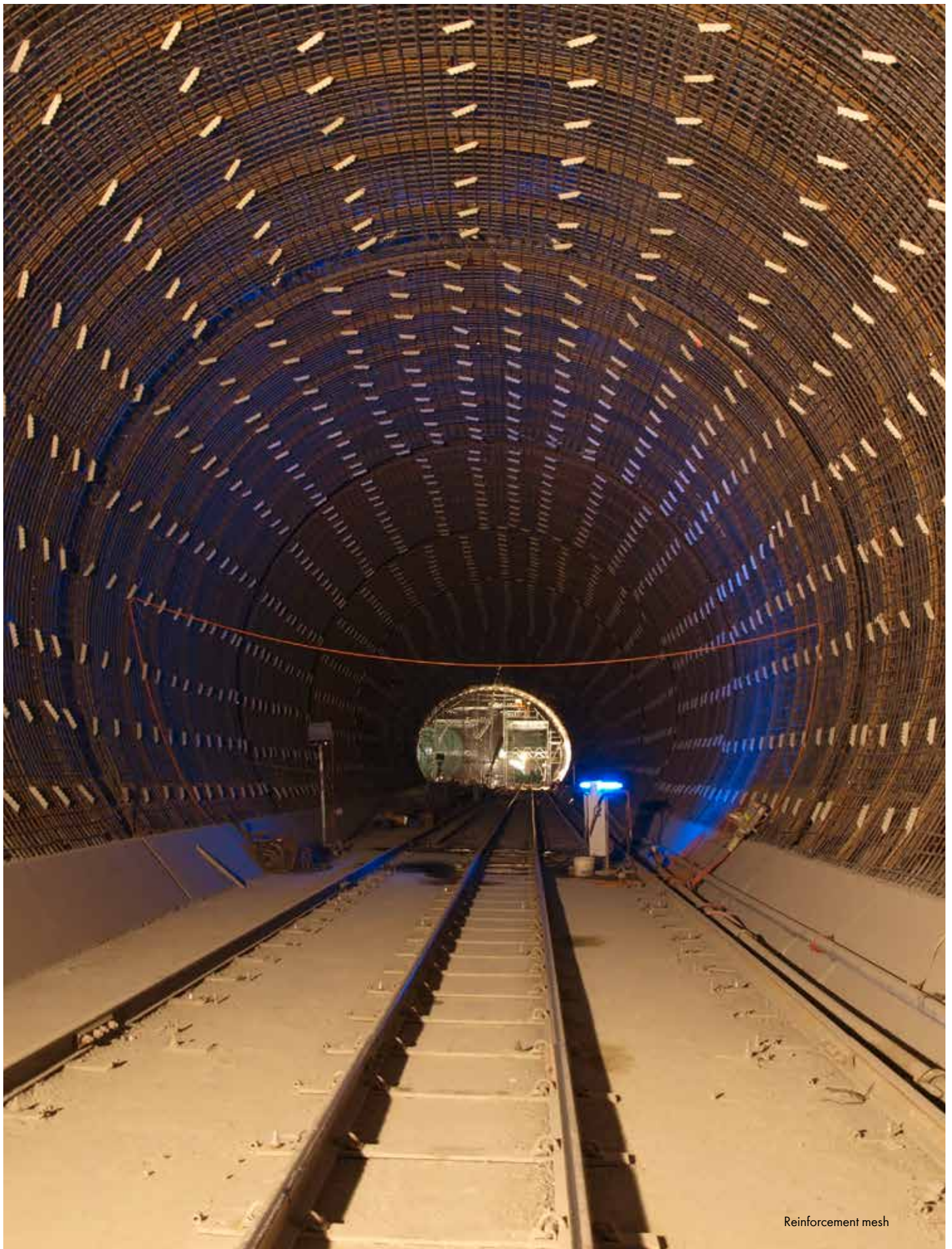


During the construction phase, equipment is installed for temporary use to aid in the construction process. Removing this equipment without damage to the substructure is necessary to be able to commission the project for final use. In addition, tunnel refurbishment often requires that old equipment is safely and easily de-installed and replaced with new equipment. Such equipment include ventilation pipes, temporary lighting and temporary rail-tracks. As a solution, Würth provides its heavy duty concrete screw W-BS as a high performance anchor in terms of load capacity which has a European Technical Approval for multiple reuse.

Selection Matrix

Anchor/Screw	Load				Galvanized
	Static	Seismic C1	Seismic C2	Fatigue	
WIT-VIZ Art. No. 0905 440.. 	✓	✓	✓	—	✓
WIT-VIZ Dynamic Art. No. 0905 481.. 	✓	—	—	✓	✓
WIT-BS Art. No. 0905 450.. 	✓	—	—	—	✓
WIT-UH 300 Art. No. 5918 500.. 	✓	✓	✓	—	✓
WIT-VM 250 Art. No. 0903 450.. 	✓	✓	—	—	✓
WIT-PM 200 Art. No. 5918 24.. 	✓	—	—	—	✓
WIT-PE 1000 Art. No. 5918 605.. 	✓	✓	✓	—	✓
WIT-PE 500 Art. No. 0903 480.. 	✓	✓	✓	—	✓
W-BS Art. No. 5929.. 	✓	✓	✓	—	✓
W-FAZ Pro Art. No. 5930.. 	✓	✓	✓	✓	✓
W-FAZ Art. No. 5928.. 	✓	✓	✓	—	✓
W-HAZ Art. No. 0905 2.. 	✓	✓	✓	—	✓
W-FA Art. No. 5932.. 	✓	—	—	—	✓
W-ED Art. No. 0904.. 	✓	—	—	—	✓
W-NA Art. No. 0905 361.. 	✓	—	—	—	✓
Shark pro Art. No. 5906 2.. 	✓	—	—	—	✓

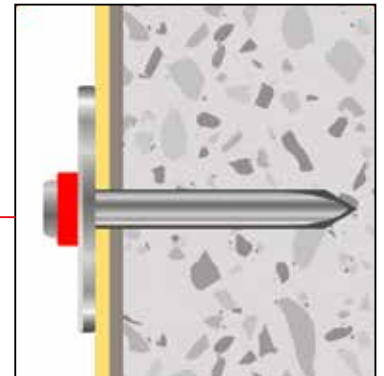
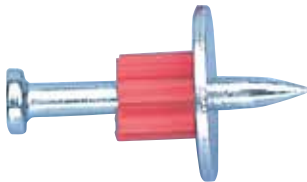
Corrosion Resistance			Fire Resistance			
Hot-dipped	A4	HCR	R 120	ZTV-ING		RWS
				A4	HCR	
✓	✓	✓	✓	-	✓	-
-	✓	✓	-	-	✓	-
-	✓	-	-	-	-	-
✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	-	-	-
✓	✓	✓	-	-	-	-
✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	-	-	-
-	✓	-	✓	-	-	-
-	✓	✓	✓	-	✓	-
-	✓	✓	✓	-	✓	-
-	✓	-	✓	-	-	-
✓	✓	✓	-	-	✓	-
-	✓	✓	✓	-	-	-
-	✓	✓	✓	✓	✓	✓
-	✓	-	-	-	-	-



Reinforcement mesh

SEALING MEMBRANE

UNS Nail 104
Art. No. 0864 104 ...



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	-

Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
UNS Nail 104 0864 104 ...	✓	-	-	-	✓	-	-	-	-	-	-	-
WIT-VM 250 0903 450..	✓	✓	-	-	✓	✓	✓	✓	✓	-	-	-

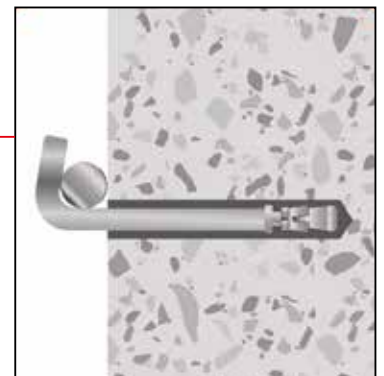
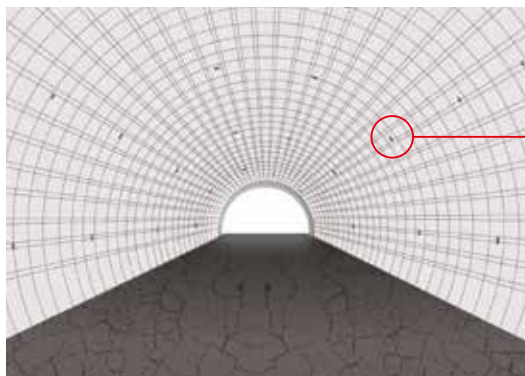
Also suitable:

WIT VM 250
Art. No. 0903 450..



REINFORCEMENT MESH

Fixanchor B-W
Special Request



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	-

Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
Fixanchor B-W Special request	✓	-	-	-	✓	-	-	-	-	-	-	-
WIT-PE 500 + Rebar 0903 480..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-

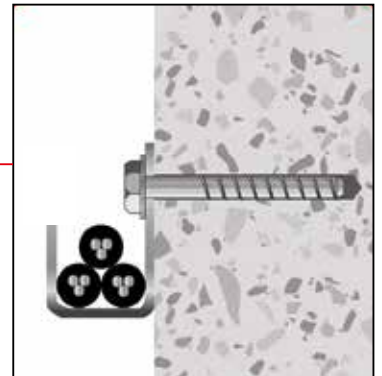
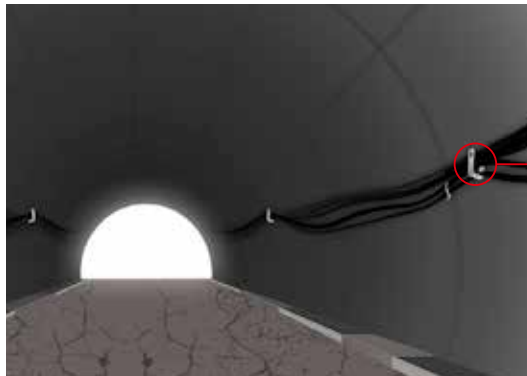
Also suitable:

WIT-PE 500 + Rebar
Art. No. 0903 480..



POWER SUPPLY CABLE

Concrete Screw W-BS
Art. No. 5929..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	-

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-FA 5932..	✓	-	-	-	✓	✓	✓	✓	-	-	✓	-

Also suitable:

W-FAZ
Art. No. 5928..

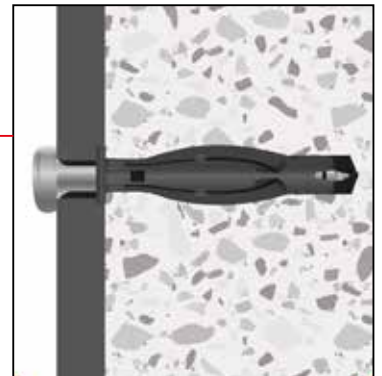
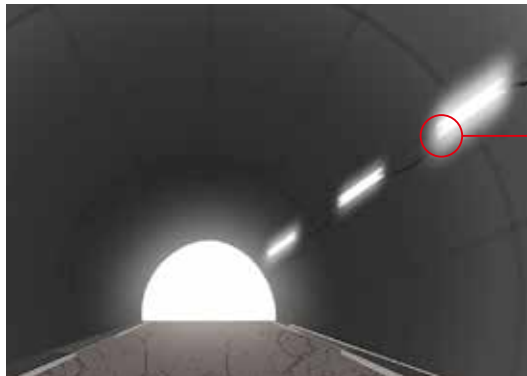


W-FA
Art. No. 5932..



TEMPORARY LIGHTING

Shark Pro
Art. No. 5906 2..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	-

Approvals and certificates*



Also suitable:

W-BS
Art. No. 5929..



W-FA
Art. No. 5932..



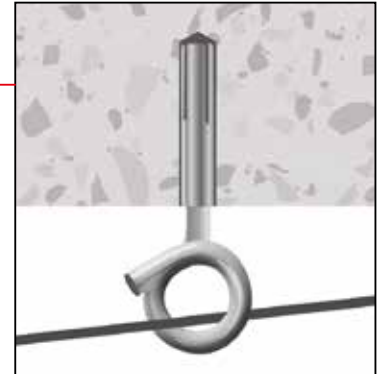
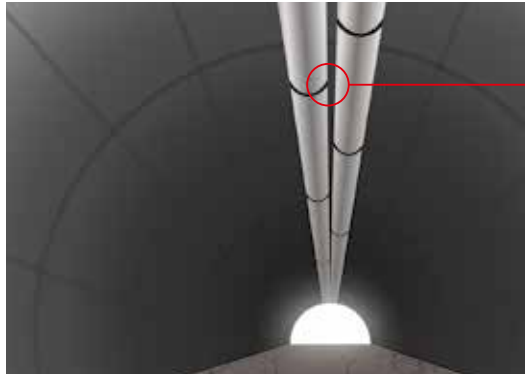
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
Shark Pro 5906 2..	✓	-	-	-	✓	-	✓	-	-	-	-	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FA 5932..	✓	-	-	-	✓	✓	✓	✓	-	-	✓	-



* see page 26

VENTILATION PIPES

Drop-in Anchor W-ED
Art. No. 0904..



Type of installation

Pre-positioned	In-place	Stand-off
✓	-	-

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
W-ED 0904..	✓	-	-	-	✓	-	✓	✓	✓	-	-	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
WIT-VM 250 + W-VI-IG 0903 450..	✓	✓	-	-	✓	✓	✓	✓	✓	-	-	-

Also suitable:

W-BS + internal thread
Art. No. 5929..

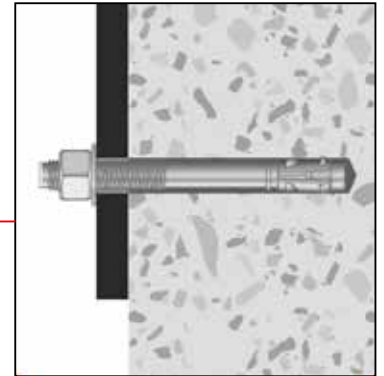
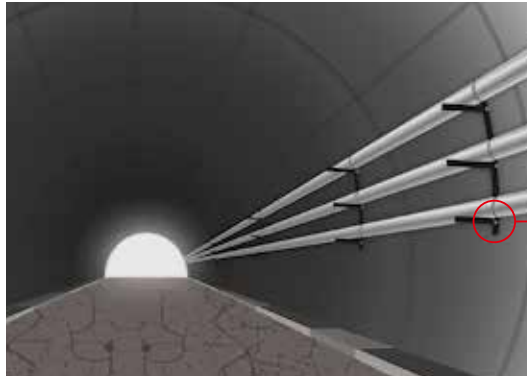


WIT-VM 250 + W-VI-IG
Art. No. 0903 450..



UTILITY PIPES

Fixanchor W-FAZ
Art. No. 5928..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	✓

Approvals and certificates*



Also suitable:

W-BS
Art. No. 5929..



W-FA
Art. No. 5932..



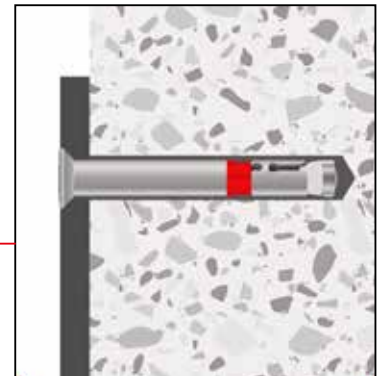
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FA 5932..	✓	-	-	-	✓	✓	✓	✓	-	-	✓	-



* see page 26

EXIT NICHE

High-performance Anchor W-HAZ
Art. No. 0905 2..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	-

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
W-HAZ 0905 2..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-NA 0905 362..	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓

Also suitable:

W-BS
Art. No. 5929..

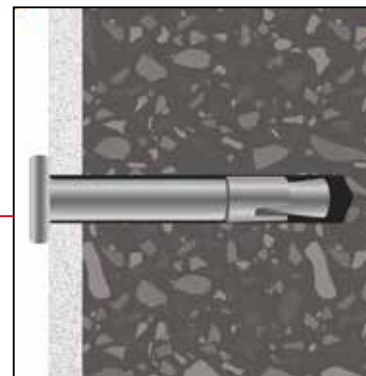


W-NA
Art. No. 0905 361..



FIRE PROTECTION BOARDS

Hammer-in Anchor W-NA
Art. No. 0905 361..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	-

Approvals and certificates*



Also suitable:

W-BS
Art. No. 5929..



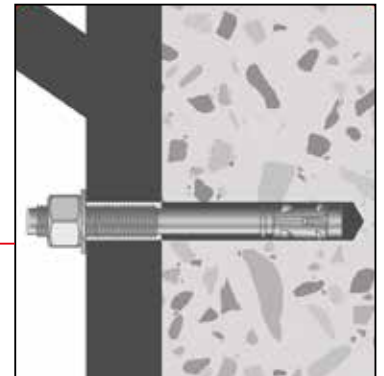
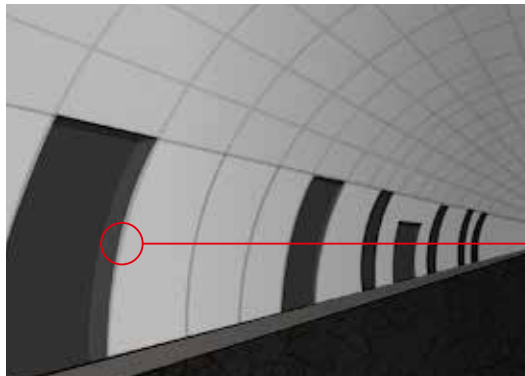
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
W-NA 0905 362..	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-



* see page 27

WALL CLADDINGS

Fixanchor W-FAZ
Art. No. 5928..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	✓

Approvals and certificates*



Also suitable:

W-BS
Art. No. 5929..



W-FA
Art. No. 5932..

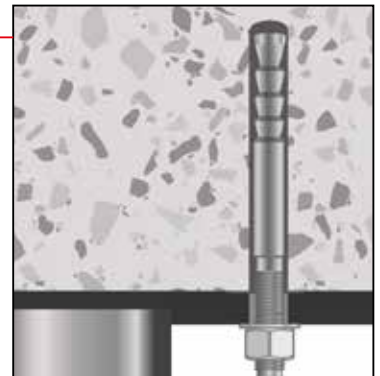
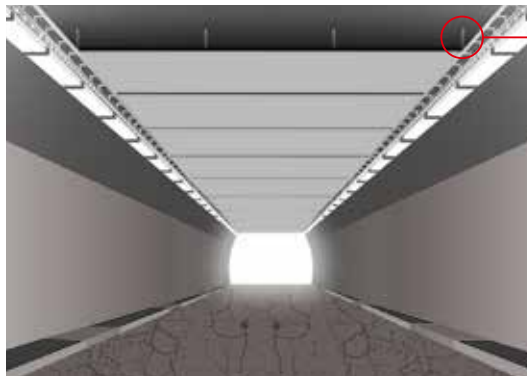


Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FA 5932..	✓	-	-	-	✓	✓	✓	✓	-	-	✓	-



FALSE CEILING

WIT-VIZ
Art. No. 0905 440..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
WIT-VIZ 0905 440..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
WIT-PE 1000 5918 605..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-
WIT-UH 300 5918 500..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-

Also suitable:

WIT-PE 1000
Art. No. 5918 605..



WIT-UH 300
Art. No. 5918 500..

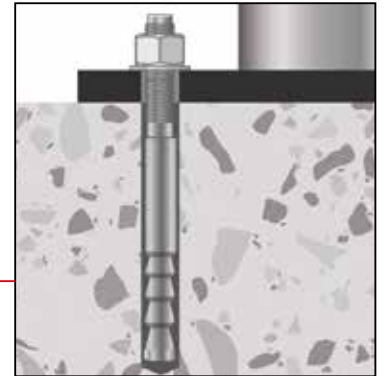


* see page 26

HANDRAILS

WIT-VIZ

Art. No. 0905 440..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

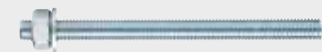
Approvals and certificates*



Also suitable:

WIT-UH 300

Art. No. 5918 500..



W-B5

Art. No. 5929..

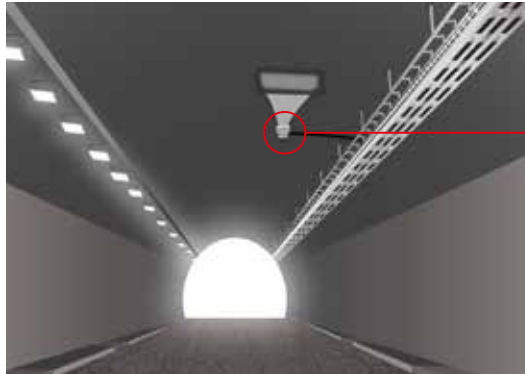


Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
WIT-VIZ 0905 440..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
WIT-UH 300 5929..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-
W-B5 5918 500..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-



LIGHTING / CABLE TRAYS / LOUDSPEAKERS

Fixanchor W-FAZ
Art. No. 5928..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	✓

Approvals and certificates*



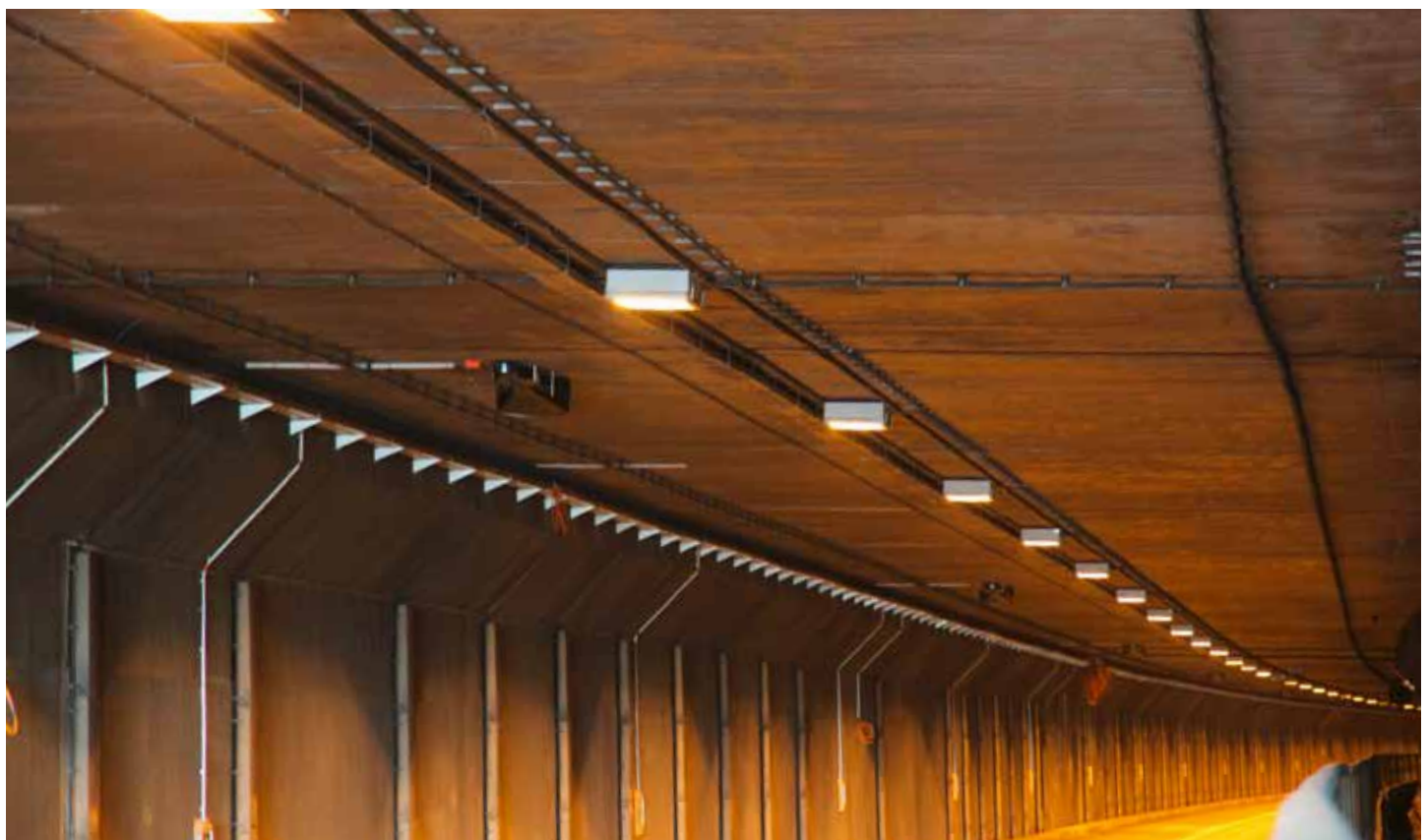
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
WIT-VIZ 0905 440..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-

Also suitable:

W-BS
Art. No. 5929..



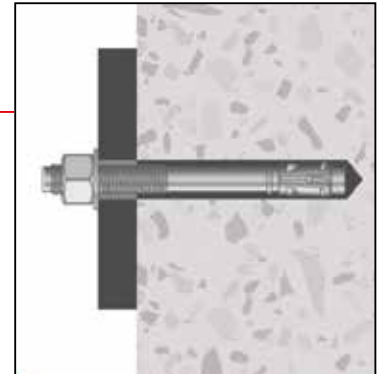
WIT-VIZ
Art. No. 0905 440..



* see page 26

TRAFFIC SIGNS / EMERGENCY APPARATUS

Fixanchor W-FAZ
Art. No. 5928..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	✓

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FA 5932..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-

Also suitable:

W-BS
Art. No. 5929..



W-FA
Art. No. 5932..



JET FANS

WIT-VIZ Dynamic
Art. No. 0905 481..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

Approvals and certificates*



Also suitable:

W-FAZ Pro +
Filling Washer WIT SHB
Art. No. 5930..



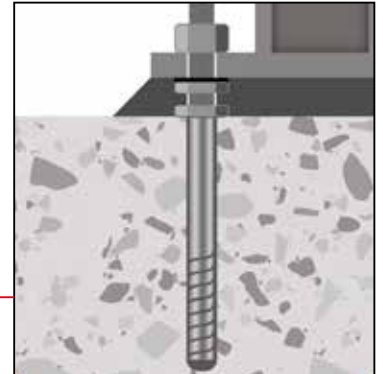
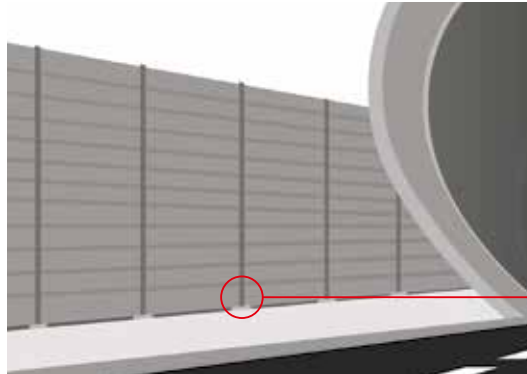
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING		RWS
										A4	HCR	
WIT-VIZ Dynamic 0905 481..	✓	-	-	✓	✓	-	✓	✓	-	-	✓	-
W-FAZ Pro + Filling Washer WIT SHB 5930..	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-



* see page 26

NOISE BARRIERS

WIT-BS Stud Screw Type ST Art. No. 0905 450..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
WIT-BS 0905 450..	✓	-	-	-	✓	-	✓	-	✓	-	-	-
WIT-UH 300 5918 500..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-
WIT-VIZ 0905 440..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-

Also suitable:

WIT-UH 300 Art. No. 5918 500..

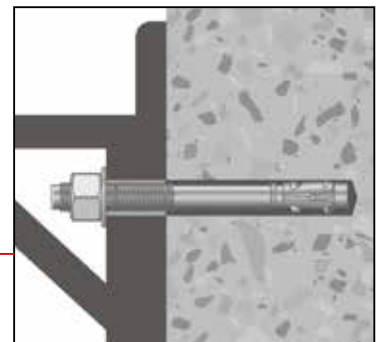


WIT-VIZ Art. No. 0905 440..



CATWALK

Fixanchor W-FAZ Art. No. 5928..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	✓

Approvals and certificates*



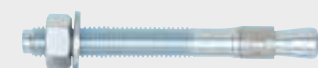
Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
W-FAZ 5928..	✓	✓	✓	-	✓	-	✓	✓	✓	-	✓	-
W-BS 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
W-FA 5932..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-

Also suitable:

**W-BS
Art. No. 5929..**

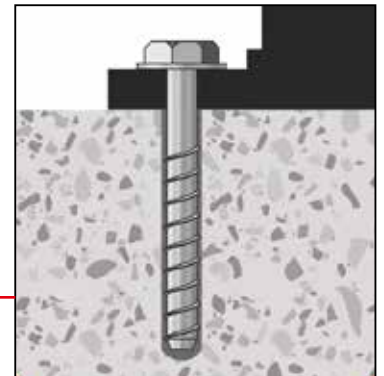


**W-FA
Art. No. 5932..**



TEMPORARY RAIL-TRACK

WIT-BS Concrete Screw
Art. No. . 0905 450..



Type of installation

Pre-positioned	In-place	Stand-off
-	✓	-

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
WIT-BS 0905 450..	✓	-	-	-	✓	-	✓	-	-	-	-	-
W-BS Stud Screw 5929..	✓	✓	✓	-	✓	-	✓	-	✓	-	-	-
WIT-UH 300 5918 500..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-

Also suitable:

W-BS Stud Screw
Art. No. 5929..



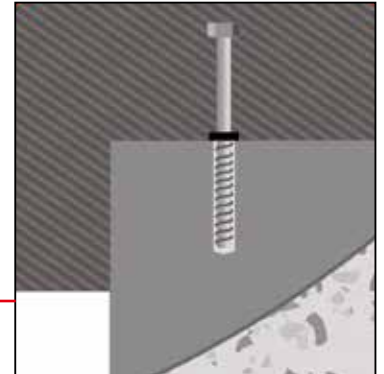
WIT-UH 300
Art. No. 5918 500..



* see page 26

EDGE BEAM

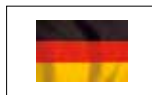
Edge Beam Anchor
Art. No. 0905 450 ...



Type of installation

Pre-positioned	In-place	Stand-off
✓	-	-

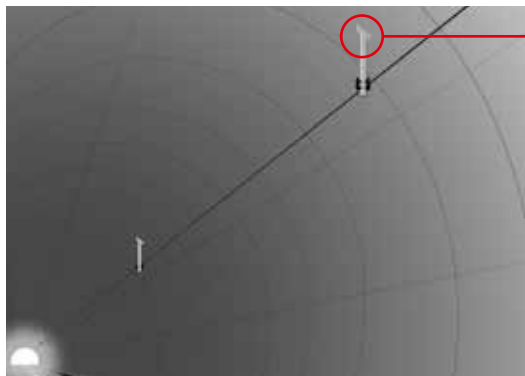
Approvals and certificates



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
Edge beam anchor 0905 450 ...	✓	-	-	-	✓	-	✓	✓	✓	-	-	-

COMMUNICATION ANTENNAS

WIT-VIZ
Art. No. 0905 440..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
WIT-VIZ 0905 440..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
W-FAZ Pro 5930..	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-
WIT-UH 300 5918 500..	✓	✓	✓	-	✓	✓	✓	✓	✓	-	-	-

Also suitable:

W-FAZ Pro
Art. No. 5930..

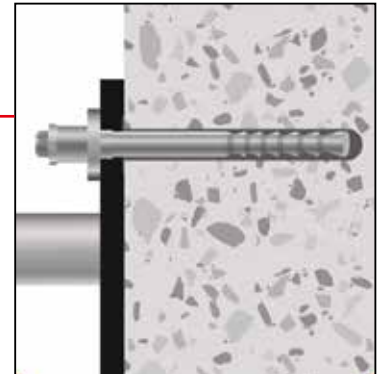
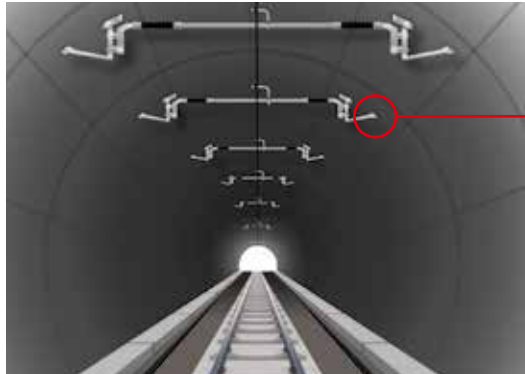


WIT-UH 300
Art. No. 5918 500..



OVERHEAD LINES

WIT-VIZ Dynamic
Art. No. 0905 481..



Type of installation

Pre-positioned	In-place	Stand-off
✓	✓	✓

Approvals and certificates*



Anchor/ Screw Art. No.	Load				Corrosion Resistance				Fire Resistance			
	Static	C1	C2	Fatigue	Galva- nized	Hot- dipped	A4	HCR	R 120	ZTV-ING A4	HCR	RWS
WIT-VIZ Dyn. 0905 481..	✓	-	-	✓	✓	-	✓	✓	-	-	✓	-
W-FAZ Pro + Filling Washer WIT SHB 5930..	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-

Also suitable:

**W-FAZ Pro +
Filling Washer WIT SHB
Art. No. 5930..**



* see page 26

SYMBOLS



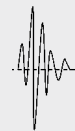
ETA – European Technical Assessment

Key document for designing an anchorage. It contains the performance parameter of the anchor.



German Technical Assessment

Key document for designing an anchorage. It contains the performance parameter of the anchor.



Seismic actions

The seismic category (C1 or C2) of the fastener is stated in the relevant ETA



Fire resistance classification



For sprinkler systems

REFERENCE PROJECTS

Chengdu Metro Line 7, China (2017)

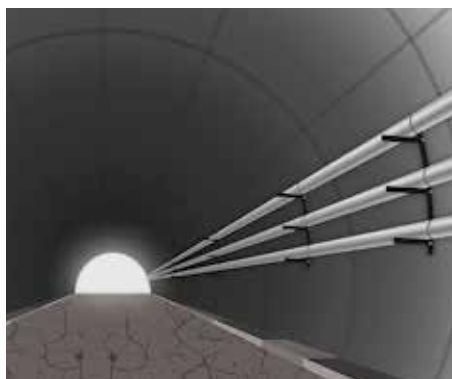


Applications

Cable Trays



Utility Pipes



Anchor solution

WIT-PE 500
Art. No. 0903 480



Related items

Cordless application gun
Art. No. 0891 003 420



Mixer nozzle
Art. No. 0903 488 101



Infrared laser thermometer
Art. No. 0715 53 110



REFERENCE PROJECTS

Ursulabergtunnel, Pfullingen, Germany (2017)



Applications

Cable Trays



Lighting



Anchor solutions

W-FAZ

Art. No. 5928..



W-FA

Art. No. 5932..



Related items

Cordless hammer drill

Art. No. 5700 801



Hammer drill bit box

Art. No. 0648 050 001



Setting tool

Art. No. 0904 908 016



Terzo Valico Die Giovi, Italy (2019)

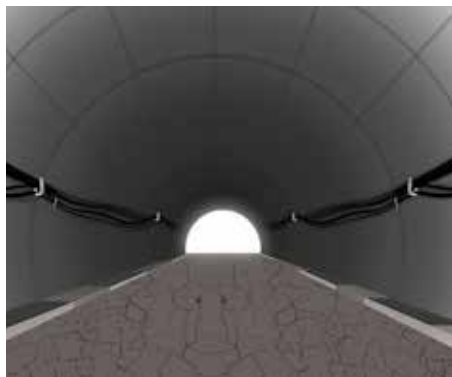


Applications

Emergency Equipment



Power Cables



Anchor solutions

W-FAZ

Art. No. 5928..



W-BS

Art. No. 5929...



Related items

**Industrial
vacuum cleaner**
Art. No. 0701 143 0



Vacuum drill set
Art. No. 0648 450 003



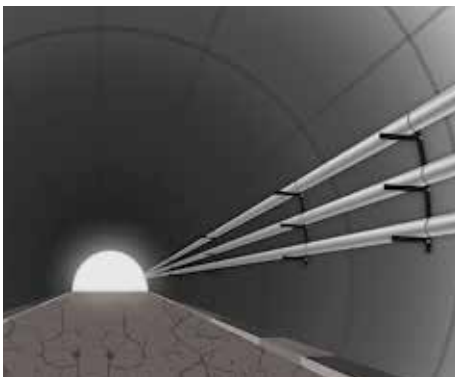
REFERENCE PROJECTS

Brenner Base Tunnel, Italy (2019)

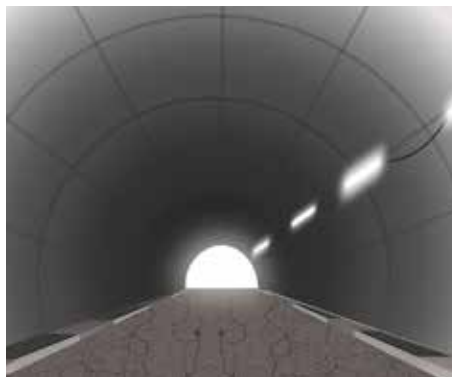


Applications

Utility Pipes



Temporary Lighting



Anchor solutions

W-FAZ

Art. No. 5932..



WIT-VM 250

Art. No.0903 450...



Related items

Blow out pump

Art. No. 0903 990 001



Torque wrench

Art. No. 0714 71 23



Cleaning brush

Art. No. 0903 489 51



Flirsch Tirol, Austria (2016)



Applications

Jet Fans



Anchor solutions

WIT-VIZ Dynamic
Art. No. 0905 481..



Related items

Safety goggles
Art. No. 0899 102 270



Protective glove, multi-fit, nitrile
Art. No. 0899 405 ...



Ear defenders, pocket
Art. No. 0899 300 230



FIXING APPLICATIONS IN TUNNELS

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