DYWIDAG Strand Anchors

Basic Concept

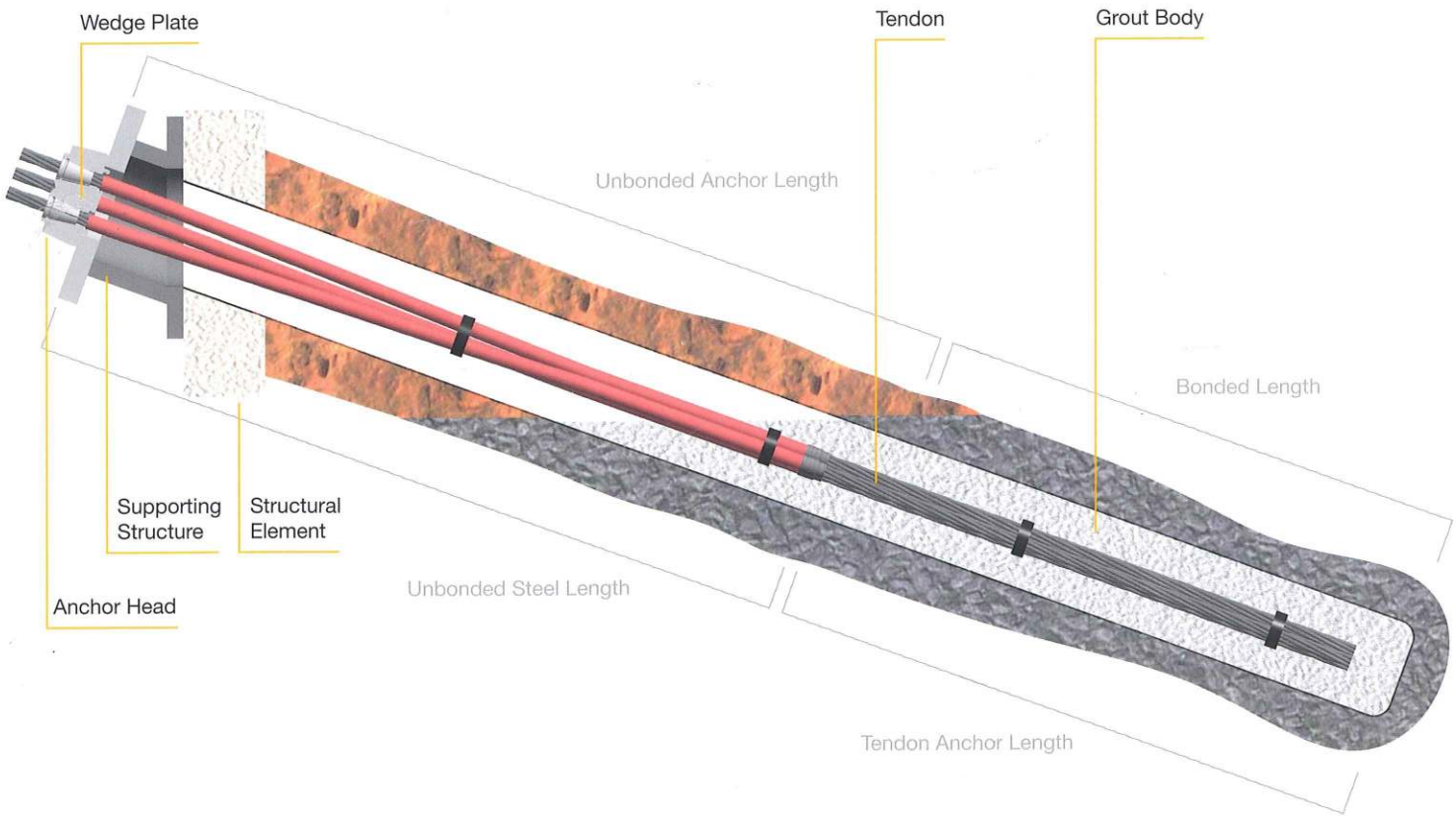
DYWIDAG Strand Anchors are an actively tensioned ground anchor system and correspond to DIN 4125 and EN 1537 specifications. Tensioning minimizes or eliminates anticipated deformations of the system and deformations at the civil engineering measure. This applies both to temporary structures (e.g. pit support systems) and permanent tie backs. The strand anchors are produced with double corrosion protection (DCP): each individual strand is covered by corrosion protection compound and inserted into an individual duct in the factory. As long as the grout used for anchoring is load-bearing, the anchor force is unlimited because the number of strands that can be combined in the anchorage is variable at will.

By definition, an anchor consists of three main components:

- Bonded length: The anchor is fixed in the borehole using grout (cement mortar) and can transfer the forces to the load-bearing soil via bond and skin friction
- Unbonded length: Each strand is uncoupled from the borehole using individual ducts so that it can freely extend in the unbonded length. This way, tension can be applied to the anchor system
- Anchor head: The anchor head transfers the anchor force to the substructure and thus to the structure that needs to be anchored

Once the grout has sufficiently hardened, the load bearing capacity of each anchor is tested during an approval test.

If required, anchors can be supplied retensioned or detensionable. Permanent control of anchor forces can be realized by installing load cells. Alternatively, permanent controls can also be carried out at the anchor head or in the borehole using the contactless force measuring system DYNA Force® that has been specially developed together with DSI.



Fields of Application

- Excavations (deformation resistant)
- Tiebacks
- Uplift control
- Positional stability
- Rock stabilization

Key Features

- Large degree of flexibility: Force, length, transport, installation
- There are practically no restrictions in terms of length – 150m
- Small pack size for transportation
- Amount of required space is very small during installation
- Retensioning or detensioning thanks to exterior thread at the wedge plates
- Permanent strand anchor can be supplied in many variations (standard, EI-Iso, TWIN-Corr)

Additional Information

German Approval DIBt Z-20.1-53 / DIBt Z-20.1-64 / Austrian Approval BMVIT-327.120/0054-IV/ST2/2011

Technical Data

DYWIDAG Prestressing Steel, 140 mm² Ø 15.3 mm (0.6") Strand

Number	Cross-sectional area A [mm²]	Weight [kg/m]	Y1770 Standard			Y1860 High Grade		
			Load at yield $F_{p0,1k}$ [kN]	Ultimate load F_{pk} [kN]	Approval	Load at yield $F_{p0,1k}$ [kN]	Ultimate load F_{pk} [kN]	Approval
1	140	1.09	218	248	○	230	260	
2	280	2.19	437	496	○ × △	459	521	△
3	420	3.28	655	743	○ × △	689	781	△
4	560	4.37	874	991	○ × △	918	1,042	△
5	700	5.47	1,092	1,239	○ × △	1,148	1,302	△
6	840	6.56	1,310	1,487	○ × △	1,378	1,562	△
7	980	7.65	1,529	1,735	○ × △	1,607	1,823	△
8	1,120	8.74	1,747	1,982	○ × △	1,837	2,083	△
9	1,260	9.84	1,966	2,230	○ × △	2,066	2,344	△
10	1,400	10.93	2,184	2,478	○ × △	2,296	2,604	△
11	1,540	12.02	2,402	2,726	○ × △	2,526	2,864	△
12	1,680	13.12	2,621	2,974	○ × △	2,755	3,125	△
13	1,820	14.21	2,839	3,221	○ △	2,985	3,385	△
14	1,960	15.30	3,058	3,469	○ △	3,214	3,646	△
15	2,100	16.40	3,276	3,717	○ △	3,444	3,906	△
16	2,240	17.49	3,494	3,965	○	3,674	4,166	
17	2,380	18.58	3,713	4,213	○	3,903	4,427	
18	2,520	19.67	3,931	4,460	○	4,133	4,687	
19	2,660	20.77	4,150	4,708	○	4,362	4,948	
20	2,800	21.86	4,368	4,956	○	4,592	5,208	
21	2,940	22.95	4,586	5,204	○	4,822	5,468	
22	3,080	24.05	4,805	5,452	○	5,051	5,729	

DYWIDAG Prestressing Steel, 150 mm² Ø 15.7 mm (0.62") Strand

Number	Cross-sectional area A [mm²]	Weight [kg/m]	Y1770 Standard			Y1860 High Grade		
			Load at yield $F_{p0,1k}$ [kN]	Ultimate load F_{pk} [kN]	Approval	Load at yield $F_{p0,1k}$ [kN]	Ultimate load F_{pk} [kN]	Approval
1	150	1.17	234	266	○	246	279	
2	300	2.34	468	531	○ × △	492	558	△
3	450	3.52	702	797	○ × △	738	837	△
4	600	4.69	963	1,062	○ × △	984	1,116	△
5	750	5.86	1,170	1,328	○ × △	1,230	1,395	△
6	900	7.03	1,404	1,593	○ × △	1,476	1,674	△
7	1,050	8.20	1,638	1,859	○ × △	1,722	1,953	△
8	1,200	9.38	1,872	2,124	○ × △	1,968	2,232	△
9	1,350	10.55	2,106	2,390	○ × △	2,214	2,511	△
10	1,500	11.72	2,340	2,655	○ × △	2,460	2,790	△
11	1,650	12.89	2,574	2,921	○ × △	2,706	3,069	△
12	1,800	14.06	2,808	3,186	○ × △	2,952	3,348	△
13	1,950	15.24	3,042	3,452	○ △	3,198	3,627	△
14	2,100	16.41	3,276	3,717	○ △	3,444	3,906	△
15	2,250	17.58	3,510	3,983	○ △	3,690	4,185	△
16	2,400	18.75	3,744	4,248	○	3,936	4,464	
17	2,550	19.92	3,978	4,514	○	4,182	4,743	
18	2,700	21.10	4,212	4,779	○	4,428	5,022	
19	2,850	22.27	4,446	5,045	○	4,674	5,301	
20	3,000	23.44	4,680	5,310	○	4,920	5,580	
21	3,150	24.61	4,914	5,576	○	5,166	5,859	
22	3,300	25.78	5,148	5,841	○	5,412	6,138	

○ Germany: Z-20.1-53 SUSPA Rock Anchors
× Germany: Z-20.1-64 SUSPA Compact Anchors
△ Austria: BMVIT-327.120/0054-IV/ST2/2011

Additional Information

German Approval DIBt Z-20.1-53 / DIBt Z-20.1-64 / Austrian Approval BMVIT-327.120/0054-IV/ST2/2011

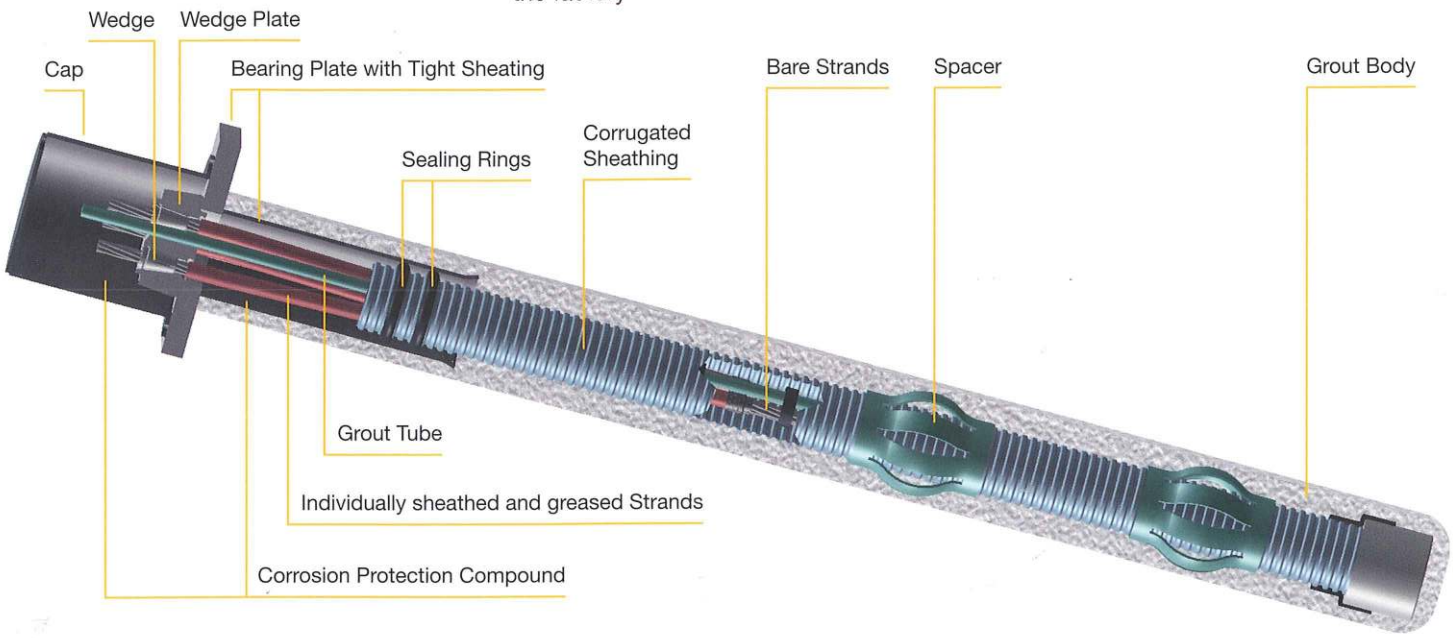
DYWIDAG Strand Anchors

Permanent (DCP) Anchors

- Long-lasting system for permanent use (more than 100 years)
- DYWIDAG Strand Post-Tensioning System Anchor components
- Bonded length can be pregrouted at the factory – partial grouting is also possible
- Approved, Double Corrosion Protection (DCP) achieved by strands that are greased, individually sheathed and covered by one corrugated sheathing at the factory

Fields of Application

- Permanent tiebacks
- Uplift control
- Positional stability
- Rock stabilization

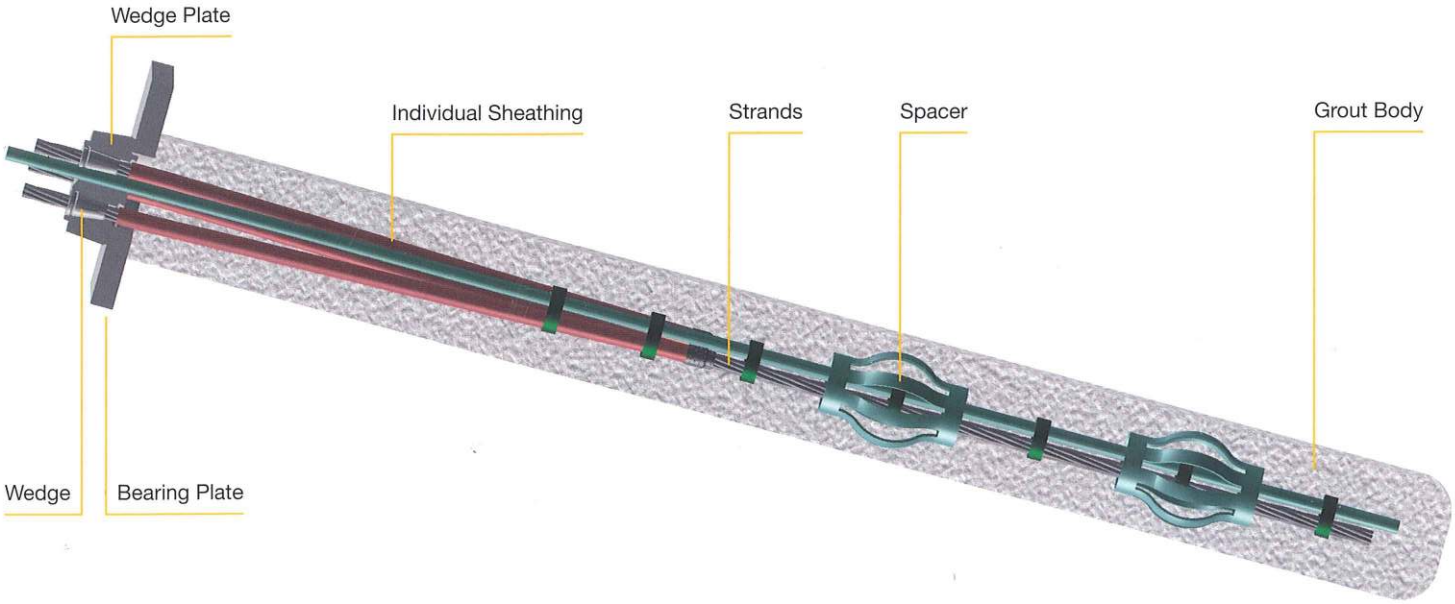


Temporary Anchor

- Temporary System for preliminary use of up to two years
- Extended use after prior agreement of involved experts
- Individual sheathing can be tightly sealed to the anchor head
- DYWIDAG Strand Post-Tensioning System Anchor components
- Can be designed for pressing water

Fields of Application

- Excavations
- Temporary tiebacks
- Stabilization of states of construction



Additional Information

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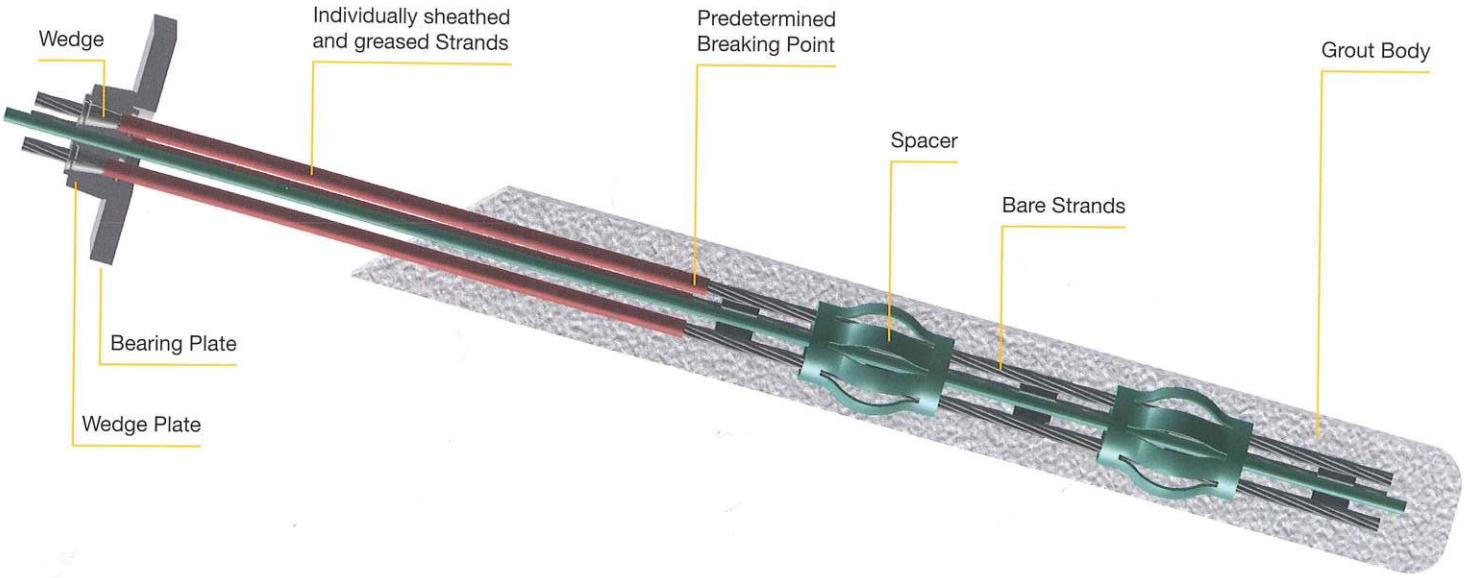
Temporary Anchor with Removable Free Length

- Anchor is partly removable – only the bonded length remains in the soil
- Slender system – high forces despite small boreholes
- Predetermined breaking point at each strand in the transition from bonded to free length – weakened strand
- Individually sheathed, greased strands in the free length ensure trouble-free removal
- Special equipment for removing broken strands

Fields of Application

- Excavations
- Temporary tiebacks
- Stabilization of states of construction
- Intra-urban construction

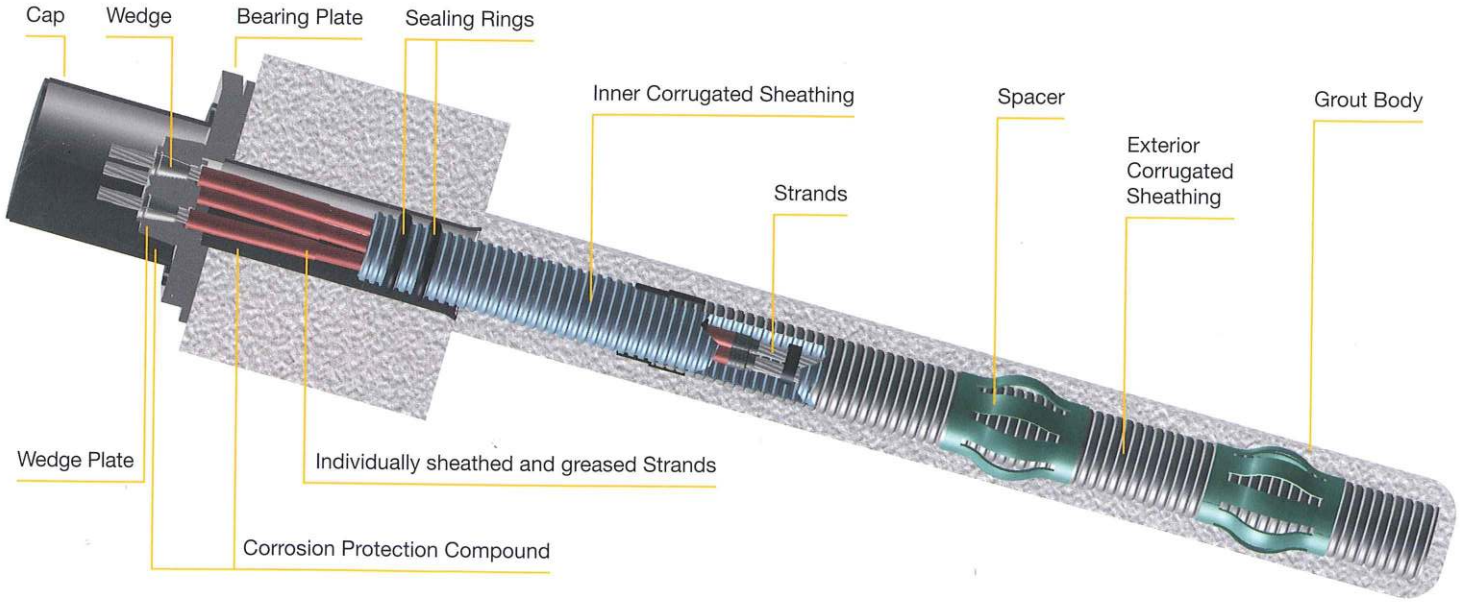


Permanent Anchor with Double Sheathing - TWIN-Corr System

- Long-lasting system for permanent use (more than 100 years)
- Double Corrosion Protection (DCP) achieved by strands that are greased, individually sheathed and covered by one corrugated sheathing at the factory
- Additional protection of the bonded length by a second, concentric corrugated sheathing – two plastic sheathings in the bonded length as well

Fields of Application

- Permanent tiebacks
- Uplift control
- Positional stability
- Rock stabilization



Additional Information

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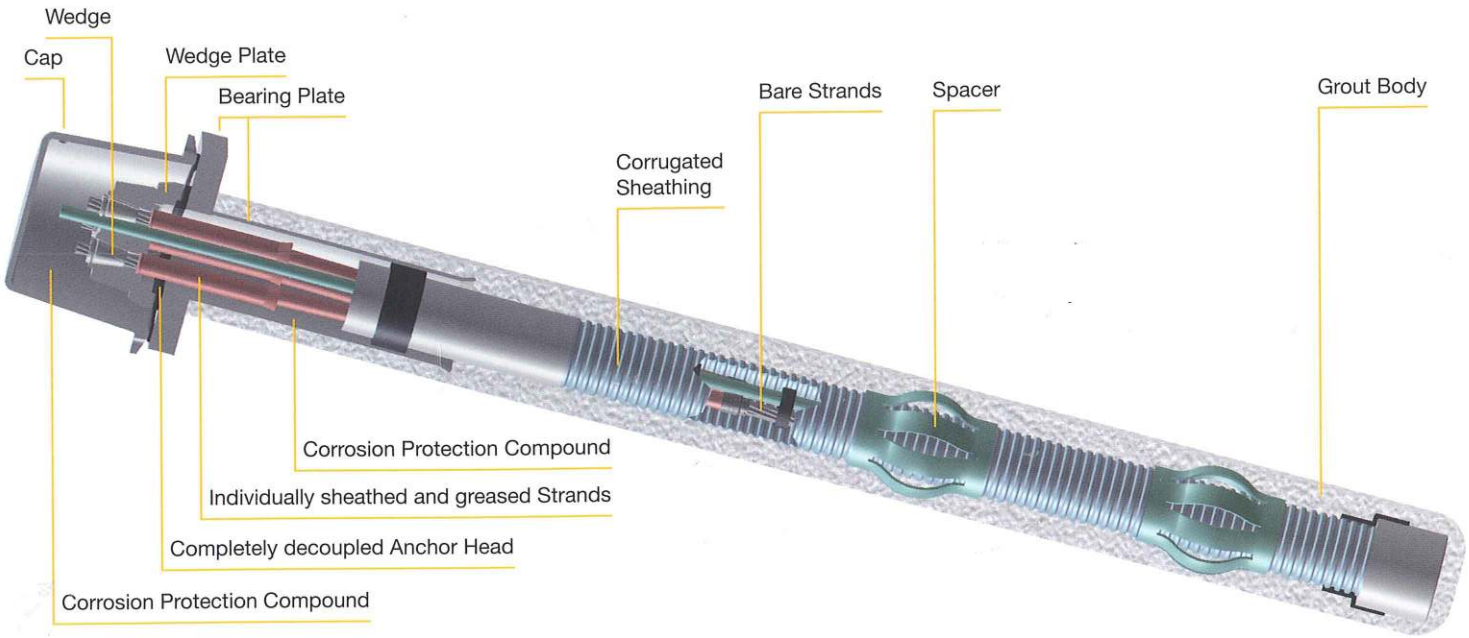
Electrically Testable Permanent Anchors – EI-Iso System

- Long-lasting system for permanent use (more than 100 years)
- By uncoupling the anchor head and the tendon from the anchor plate, a resistance test from the anchor to the soil can be carried out – the intactness of the corrosion protection sheathing can be tested permanently and at any point of time by resistance tests
- Fulfils SIA requirements
- Special design also applicable for stray currents (railway)

Fields of Application

- Permanent tiebacks
- Uplift control
- Positional stability
- Rock stabilization
- Applicable for stray currents

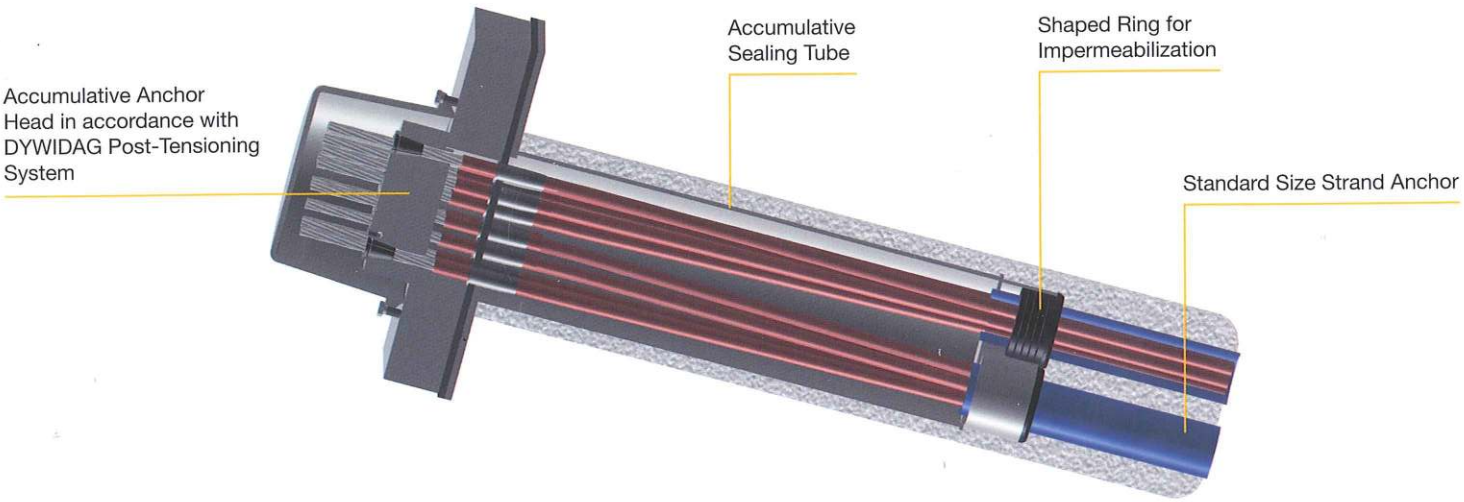


Permanent Anchors with Multiple Head

- Long-lasting system for permanent use (more than 100 years)
- Several standardized permanent strand anchors can be bundled and anchored in one borehole – the transition to the anchor head is specially designed so that all strands end in a single anchorage
- Thanks to the preassembly of standard types in the factory, larger sizes can be manufactured quickly and easily
- High standards of quality
- Patented DYWIDAG System

Fields of Application

- Dam reinforcement
- Permanent tiebacks
- Uplift control
- Positional stability
- Rock stabilization
- Peak performance anchor



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