



NON-CLEANING AND OPTIMIZED FOR CORROSIVE ENVIRONMENTS

Hilti HIT-Z-F and HIT-HY 200 ultimate
performance chemical anchor system



ULTIMATE PERFORMANCE THAT LASTS

Hilti HIT-Z-F corrosion-resistant anchor rod

Fewer installation steps for extremely reliable anchoring.

Hilti HIT-HY 200 injectable mortar and the new HIT-Z-F anchor rod for improved corrosion protection in moderate outdoor conditions raise the bar in chemical anchor innovation.

With anchor fastening systems, reliability even in the toughest jobsite conditions is key. This is why we have introduced our latest HIT-HY 200 injectable mortar and the new HIT-Z-F anchor rod – for improved corrosion protection in moderate outdoor conditions.

Both are part of the SafeSet system which ensures a productive and reliable fastener installation process.

The HIT-Z family of anchor rods is part of Hilti's non-cleaning installation solutions, which allow dust to be left in the drilled hole without impacting holding values. Together with HIT-HY 200 injectable mortar, the HIT-Z-F anchor rod, with its cone-shaped helix, works as a torque-controlled bonded anchor. Thanks to their unique design, these rods are not affected by uncleaned hammer-drilled holes.

APPLICATIONS

- Indoor applications with temporary condensation
- Outdoor fastenings in moderately corrosive environments (see secure solutions table)

HIGHLIGHTS

The HIT-Z-F is made of a carbon steel base with zinc-nickel coatings in accordance with DIN 50979 plus an additional organic top coat containing metal flakes for extra corrosion protection.

TESTING

We work closely with renowned universities and laboratories in extensive field testing to assess the expected lifetime and technical safety aspects of various Hilti anchors. The new coating of HIT-Z-F was tested in neutral salt spray in accordance with DIN EN ISO 9227, which is the most commonly used accelerated corrosion test for corrosion assessment.

ADVANTAGES

- Double-layer protection for optimal corrosion resistance
- Cost-effective alternative to stainless steel in low pollution environments
- No hole cleaning required (above 5° C/41° F) with HIT-HY 200 for maximum time saving
- Very high load performance in cracked concrete in combination with HIT-HY 200
- Variable embedment depth to fully utilize load-bearing capacity and minimize mortar usage
- Can be set in dry or wet concrete – suitable for a wide range of applications



Cyclic corrosion tests such as ISO 16701 reproduce and accelerate corrosion mechanisms that occur under real environmental conditions. This test is well adapted to lifetime assessment under moderate atmospheric conditions. The anchors are subjected to cycled climatic conditions such as temperature variations, humidity and dry periods as well as corrosion attack through salt. Results of laboratory tests are verified by mid- and long-term field tests in natural climatic conditions.

HIT-Z-F showed comparable results to hot-dip galvanized (HDG) systems in the cyclic corrosion test but performed better in the neutral salt spray and atmospheric long-term corrosion test.



Neutral salt spray test

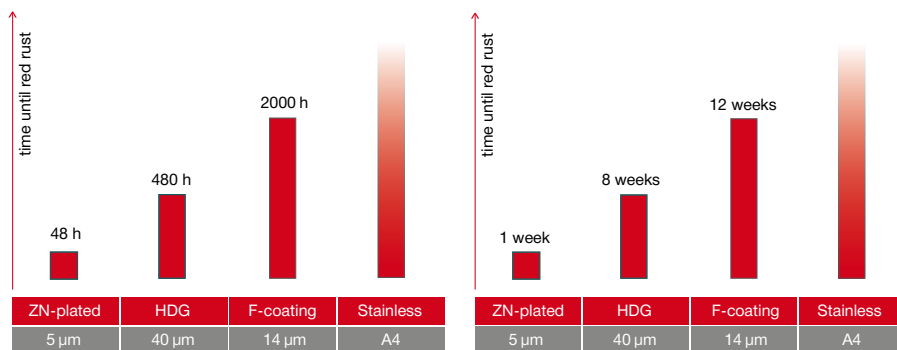
In a neutral salt spray test (in accordance with EN ISO 9227 and ASTM B-117) the HIT-Z-F coating performs better than HDG products with a coating thickness of 45 μm (EN ISO 1461 and/or ASTM A153). Grade A4 stainless steel systems remain stable in this test and withstand corrosion due to a passive surface.

Cyclic corrosion

The cyclic corrosion test gives a more realistic assessment of corrosion resistance in natural environments. In this test, the corrosion resistance of HIT-Z-F is comparable to or even higher than HDG systems. Grade A4 stainless steel systems also remain stable under the conditions of this cyclic corrosion test.

Atmospheric long-term corrosion test

The multilayer coating used on the new HIT-Z-F is tested for a period of 3 years in very aggressive coastal environments. This test confirms the higher corrosion resistance of the multilayer coating as compared to HDG.



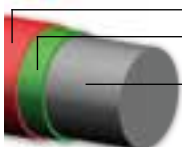

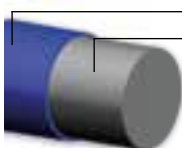



F-coating










HDG



HIT-Z anchors and corrosion resistance

Corrosion resistance	Category	Anchors	Material and corrosion protection	Appearance
High	A4 stainless steel	HIT-Z-R M8-M20	 <p>Stainless steel A4 (e.g. 1.4401)</p>	
Medium	Multilayer coating	HIT-Z-F M16-M20	 <p>Top coat for chemical resistance 8µm Zn-alloy electroplating for cathodic protection Cold-formed carbon steel</p>	
Low	Zinc-plated	HIT-Z M8-M20	 <p>5µm Zn-electroplating Cold-formed carbon steel</p>	

SECURE SOLUTIONS

HIT-Z corrosion-resistant anchor rods	HIT-Z	HIT-Z-F	HIT-Z-F	HIT-Z-R
Approval	ETA-12/0006 ETA-12/0028	ETA-12/0006 ETA-12/0028	Hilti recommendation*	ETA-12/0006 ETA-12/0028
Expected lifetime	50 years	50 years	25 years	50 years
Environmental conditions				
 Dry indoor	■	■	■	■
 Indoor with temporary condensation	-	-	■	■
 Outdoor with low pollution e.g. ventilated facade	-	-	■	■
 Outdoor with moderate concentration of pollutants 1-10km	-	-	-	■
 Coastal areas 0-1km	-	-	-	■
 Outdoor, areas with heavy industrial pollution	-	-	-	■
 Close proximity to roads	-	-	-	■
 Special applications	-	-	-	-
				

■ Suitable - Not recommended

* From a technical point of view, HIT-Z-F anchors rods are suitable for indoor applications with temporary condensation as well as outdoors with low pollution (similar to category C3 according to EN ISO 9223) with certain lifetime and application restrictions. This is based on Hilti internal and external corrosion tests performed in laboratories as well as exposure tests performed outdoors under real environmental conditions. The use of HIT-Z-F in these environments however is currently not covered by the European Technical Approval (ETA) for anchors, where it is stated that only anchors made of stainless steel grade A4 or higher can be used in structures subject to outdoor conditions based on an assumed working life of the anchor of 50 years.

ENVIRONMENT CATEGORIES

Applications can be classified in various environment categories, taking the following main factors into account:

Indoor applications



Dry indoor environments

(heated or air-conditioned areas) without condensation, e.g. office buildings, schools



Indoor environments with temporary condensation

(unheated areas without pollutants), e.g. storage sheds

Outdoor applications



Outdoor, rural or urban environment with low pollution

Large distance 10 km from the sea



Outdoor, rural or urban environment with moderate concentration of pollutants

and/or salt from sea water

Distance from the sea 1-10 km



Coastal areas

Distance from the sea 1 km



Outdoor, areas with heavy industrial pollution

Close to plants 1km (e.g. petrochemical, coal industry)



Close proximity to roadways treated with de-icing salts,

Distance from roadways 10 m

Special applications



Special applications

Areas with special corrosive conditions, e.g. road tunnels with de-icing salt, indoor swimming pools, special applications in the chemical industry (exceptions possible).



Important notes

The ultimate decision on the required corrosion protection must be made by the customer. Hilti accepts no responsibility regarding the suitability of a product for a specific application, even if informed of the application conditions. The tables are based on an average service life for typical applications. For metallic coatings, e.g. zinc layer systems, the end of lifetime is the point at which red rust is visible over a large fraction of the product and widespread structural deterioration can occur – the initial onset of rust may occur sooner.

National or international codes, standards or regulations, customer and/or industry-specific guidelines must be independently considered and evaluated. These guidelines apply to atmospheric corrosion only. Special types of corrosion, such as crevice corrosion or hydrogen assisted cracking must be independently evaluated. The tables published in this brochure describe only a general guideline for commonly accepted applications in typical atmospheric environments.

Suitability for a specific application can be significantly affected by local conditions, including but not limited to:

- Elevated temperatures and humidity
- High levels of airborne pollutants
- Direct contact with corrosive products, such as found in some types of chemically-treated wood, waste water, concrete additives, cleaning agents, etc.
- Direct contact with fresh / young concrete (less than 28 days old)
- Electrical current
- Contact with dissimilar metals
- Confined areas, e.g. crevices
- Physical damage or wear
- Extreme corrosion due to combined effects of different influencing factors
- Enrichment of pollutants on the product
- Nature of fastening part: fastener must be made of a more noble material or the same material as the fastened part; HUS3-HF is suitable for fastening materials such as HDG, aluminum, or painted carbon steel.