



**ROCK ANCHORING - RELIABLE SOLUTION**

ETA APPROVED | HIGH LOAD CAPACITY | PRECISION INSTALLATION

## Rock Anchoring in Indian Conditions Using ICFS CM585 Pure Epoxy Mortar : A Field Study in Collaboration with COEP and Viraj Engineers

### Objective :

To determine the safe pull-out capacities and bonding performance of steel rebars anchored in rock strata using ICFS CM585 Pure Epoxy, under realistic site conditions in India.

### Background & Challenge :

With growing demand for high-rise construction, deeper foundations often reach rock strata where hydrostatic uplift pressures become significant. Traditional anchoring methods are slow, costly, and poorly suited for wet, uneven surfaces. There's been a lack of documented performance data under Indian conditions.



**Methodology:**

■ **Sites:** Two live construction sites in Pune with different rock types intact bold and bold rock.

■ **Testing Parameters:**

| Parameter        | Values                                                |
|------------------|-------------------------------------------------------|
| Rebar Diameters  | 16 mm, 20 mm, 24 mm, 32 mm                            |
| Embedment Depths | 800 mm, 900 mm, 1000 mm                               |
| Orientation      | Vertical and Horizontal Installation                  |
| Product Used     | ICFS <b>CM585PE - PRO</b> Pure Epoxy Injection Mortar |

■ **Testing Oversight:** Dr. Inshwar Sonar (Assistant Professor, COEP), with certified calibrated equipment.

■ **Data Captured:** Pull-out strength, elongation, failure modes.

**Test Set Up : Horizontal Rebar Vs Vertical Rebar**



**For Basalt Rock - (Based On Field Test & Tabulation)**

| Bar Diameter mm | Average Stiffness T/mm | Average Bond Stress MPa |
|-----------------|------------------------|-------------------------|
| 16              | 7.124                  | 2.015                   |
| 20              | 6.972                  | 2.362                   |
| 24              | 6.807                  | 2.534                   |
| 32              | 5.713                  | 3.379                   |

## Key Findings

- **Bond Stress:** Decreased with bar diameter (e.g., 16mm: 7.2 T/mm, 32mm: 5.71 T/mm)
- **Max Stress:** 32mm bars showed highest bond strength (3.38 MPa) due to greater surface area
- **Rock Influence:** Intact basalt out performed fragmented rock by **15–20%**
- **Failure Modes:** Predominantly failures found of rock breakage and no bar fractures
- **Anchor Orientation:** Vertical and horizontal anchors showed comparable performance with proper installation technique

## Design Recommendations

- Account for rock type, bar diameter, moisture levels and orientation
- Use site-specific pull-out values to design anchor embedment depths
- ICFS CM585PE is suitable for demanding conditions like uneven, water-exposed rock surfaces

## Conclusion :

For structural rock anchoring using pure epoxy injectable mortars, this first of its kind field study validates the application in Indian geology. ICFS CM585PE provides a reliable, tested alternative to conventional systems, ensuring both speed and safety in modern foundation engineering.

Presented by ICFS Anchor Fasteners – Strength You Can Trust.



# Chemical Mortar CM585PE-PRO

## EPOXY INJECTION RESIN



### Description

CM585 is a 2 component high strength pure epoxy chemical anchoring resin system. It is designed for deep embedment and large diameter holes due to its zero shrinkage and longer working times. For diamond drilled holes, with rebar, and in areas of high chemical exposure eg. Seasalt and swimming pools.

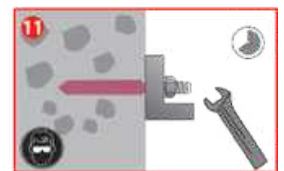
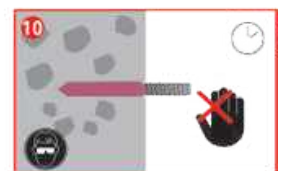
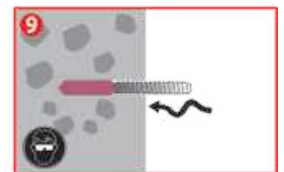
Available in Sizes: 585ml Cartridge.

### Specific Benefits

- Long working times
- High loads possible
- High chemical resistance
- Use with potable water
- Fixing studs in wood
- 24 Month shelf life
- Corrosion resistance
- Diamond drilled holes
- Zero shrinkage
- European approved
- Fire approved
- Studs and Rebar
- A+ Rating VOC content
- ICFS Anchor design software
- Cracked-Noncracked concrete
- Hammer Drilled holes
- Small edge distance and spacing
- Variable embedment depth
- Static quasi load

### Approvals

- ETA Option 1 ETAG 001 for cracked concrete with studs and rebar TR029
- ETA Option 1 ETAG 001 for rebar TR023 : Approved for Seismic Loads C2
- F120 Fire Test report • ICC-ES Approval ESR 3853
- BS6920 for use with potable water WRAS Approval 1309522
- ETA approved in flooded holes, wet and dry concrete
- Tested according to LEED 2009 EQ c4.1, SCAQMD rule 1168 (2005)



Concrete (non-cracked)



Concrete (cracked)



Hammer drilled holes



Diamond drilled holes



Small edge distance and spacing



Variable embedment depth



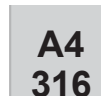
Static/quasi-static



Corrosion resistance



ICFS Anchor design software



A4 316 Corrosion resistance

Rock Anchoring by ICFS using CM585PE-PRO Pure Epoxy Injection Mortar



## Our Clientele



CHANNEL PARTNER



## INDO SPARK CONSTRUCTION SERVICES

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