

We provide you  
**SMART  
SOLUTION**





# Limca

## Book of Records

### National Record

**Indo Spark Construction Services**, Kolhapur, Maharashtra, headed by Sandeep Ingale, organised the fastest rebar fixing event in which six workers successfully fixed 1,021 TMT bars of 8×100 mm on a concrete cube in 38 min 52 sec from 7.32 pm to 8.11 pm on May 28, 2015. The team of workers included Balaso Tukaram Bidkar, Deepak Dewba Gawkar, Mukesh Madyappa Sutar, Ramesh Basappa Reddi, Parshuram Ningappa Biradar and Sardar Ganpati Desai.



**Vijaya Ghose**

*Editor, Limca Book of Records*

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**Mr. Tilakchand Ingale**  
Chairperson

Dear Friends,

Every Crises throws up opportunities. Year 2018 has witness and will continue to witness significant shifts in the geo-political landscape across the world. Capital markets, Business and micro economic situation is undergoing unprecedented changes across the world. I am sure the events unfolding across Europe ,USA and Asia will consume a lot of our attention. But large,successful business also grab these opportunities to cement strong partnerships and be ready for next economic growth cycle.

It must be common knowledge by now that Construction Fastening Systems (United Kingdom) has entered into a strategic partnership with Indo Spark Construction Services. From the obscure, tiny automotive workshop employing just 2 in 1978 to what we are today a known, successful, respectable, one of the leading business houses in India. It was a long journey. A journey full of challenges, hardships, bottlenecks.. But we came out intact grew many folds- vertical and horizontal. Now keep on growing on and on.. The best assets of ours, I think are our reputation for honesty, fair dealing, timely delivery and quality.

As I look back there are two main factors which made Indo Spark blossom. First is the wisdom and honesty of our chairperson Mr. Tilakchand Ingale along with his trust in the employees and second is whole hearted, sincere, hard work put up by the employees - senior and junior, young and old including those technicians and workmen. Many have left, many continue.

We have never stopped growing.

Thank you.

**Mr. Sandeep T. Ingale**  
CEO, Indo Spark Group



## About us

- ICFS is an Anchor Fastener Brand offering comprehensive solutions with a range of products, with International Approvals.
- We have chemical and mechanical anchors usable for installing furniture at site. Based on the design load parameters, we even suggest correct type of chemical, Diameter of anchor bolts and consumption per hole.

### ICFS Company Profile – Anchor fastening systems

INDO-SPARK is 40+ years young Enterprise, having expertise and operations in the following three Verticals :

- Construction services – for any challenge in cutting and fixing of civil structures in concrete, brick masonry, rock and even under water. We have been providing solutions in cutting & fixing since last 29 years.
- ICFS anchor fastening system – comprehensive range of solution in mechanical and chemical anchoring with international approvals.
- ICFS branded power tools for professional and personal use.

ICFS Anchor fastening system – Comprehensive range of solution in Mechanical and chemical anchoring.

- Chemical anchors in Pure Epoxy, Vinylester and Polyester along with appropriate anchor bolts with Zinc coating or SS 304, SS316. A capability to fix on site. Also a range of accessories like guns, cleaning brushes, blow pumps and hammer drills. Technical training to fix or a pull-out test to validate the tensile load on site.
- ETA approved range of chemicals and anchor bolts. Drop in anchors and also heavy duty nylon plugs with screws as set, PU Foam for crack sealing, giving a comprehensive choice from a single window

### ICFS Anchor Designer –

A mobile app to validate and design chemical and mechanical anchoring system – an application support available for android and I phone.

- Our Head office is in Kolhapur & branches in Islampur, Pune, and Mumbai.
- Our dealer network – Rajasthan, Gujarat, Maharashtra, Goa & Karnataka.
- We provide complete solution (End to End) package to customer.































# ICFSS<sup>®</sup>

INDO CONSTRUCTION FASTENING SYSTEMS



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## Technical Guide

### Introductory Guidance on fixing methods

These guidance notes were designed to provide a helping hand for people working in the fixing products field, from planners to sales people and ultimately to end users. The technical knowhow conveyed in what follows is intended to help you in the very important selection of the right anchor for each specific requirement and in identifying the conditions that can influence the final results. ICFS has over 25 years of experience in the area and can therefore offer an ideal solution for every technical fixing problem. If you have any more far reaching questions about fixing applications or the selection of relevant anchors,

Please contact our technical department. Anchoring Equipments - Methods of calculating load bearing values and other sundry details

#### A. Factors that affect the load bearing capacity of the anchor.

- Consistency of the building structure and type of base material.
- Depth of anchorage.
- Distances between the shaft centers of each anchor.
- Distances from edge to edge
- Structure and any movement of the load

#### B. Breaking load

#### C. Permitted Load

- Calculating permitted load
- Permitted load assuming seismic conditions
- Loads at a distance from the wall and bending moment
- Linear Interaction

#### D. Calculating reductions in permitted load

- To shorten the distance between anchor shaft centers
- To shorten the distance from edge to edge
- To shorten the distance between anchor shaft centers and edge to edge at the same time
- To reduce the specific resistance of the concrete

#### E. Initial Load and screw movement

#### F. Metal Corrosion

#### G. Anchor Classification

- In relation to the installation method
- In relation to the functionality of the anchor

#### H. Conditions and methods for attaching anchors

- Drilling
- Cleaning out the drill hole
- Attaching the anchor
- Applying the load
- Improper or incorrect attachment.

## I. Technical Tables

Norm FNV206 classifies and defines concrete by strength and resistance based on the following tables

Strength Category	Specific Compressive Strength of a cylinder 15 - h30 cm fck,cyl(N/mm2)	Specific Compressive Strength of a cube 15 - h30 cm fck,cyl(N/mm2)
L16/20	16	20
C20/25	20	25
C25/30	25	30
C30/37	30	37
C35/45	35	45
C40/50	40	50
C45/55	45	55
C50/50	50	60

Example : Concrete identified with the code C25/30 has a compressive strength of 25/ Nmm2 based on the cylinder test and a compressive strength of 30N/mm2 based on the cube test.



### 2. Plaster

Plaster is defined as the coating(s) applied to a wall to achieve a smooth, consistant surface. It can consist of lime, sand, cement and water and contain additives and resinous bonding agents. Its compressive strength can fluctuate between 2 and 10 N/mm2 . Before the anchor is inserted, you should ascertain what sort of plaster the coating is made of, as if this is too thick or brittle, it could lead to the anchor expanding wrongly and could cause abnormal bending.



### 3.A Joint Plaster

Joint Plaster is a mixture of additives (usually sand), bonding agents(for example cement or gypsum) and water, which are used to hold bricks together and block stones or even also full stones. The various types of plaster are then classified according to the composition of the mixture and the specific mechanical characteristics.



### 3.c Half Brick

Half Bricks are defined as being such bricks in which the percentage of holes accounts for between 15 and 45% of the volume. The compression strength of this building material is



### 3. Masonry in general

Masonry work consist of a building material(bricks or breeze blocks) and plaster. Naturally the different types of building material used give walls different properties. As a result they have different recommended loads. Normally cavity wall made of brick of breeze blocks offer only limited strength and therefore only allow anchors for medium/minor load. Let us now look below at some of the types of materials that we can come across in masonry block.



### 3.B solid Brick

Solid Bricks are connecting materials made of clay or clay earth, sometimes enriched with addiives. Their most common dimensions are 12 x 6 and 5 x 25 cm. Holes and hollow parts must not exceed 15% in solid brick. The compression strength of this building material is approximately 18-20N/mm2.



### 3.D Hole Concrete Stone

This building material consist of a mixture on a concretebasis with an increased proportion of hollow parts. It is found in different forms and dimensions. The compression strength





approximately 9-10N/mm<sup>2</sup>. Its measurements are usually 12 x 25 x 20cm or 12 x 25 x 12cm.

of this building material fluctuates between 5 and 10N/mm<sup>2</sup>. Some of the frequently used forms measure 12 x 20 x 25 cm, 20 x 18 x 25cm, and 20 x 25 x 30cm.



### 3.E Poroton hole stone

A composite clay material with added,expanding polystyrene. After baking, it comes as a block stone full of holes and small cavities which account for no more than 45% of its volume. The compression strength of this building material fluctuates between 7-10N/mm<sup>2</sup>. Standard dimensions include 12 x 20 x 25 cm, 20 x 18 x 25cm, and 20 x 25 x 30cm.



### 3.F Leca Hole Stone

This is a light additive with cellular structure and with special clay forms which are characterised by a grainy form. It is marketed in very different forms and dimensions. The compression strength varies between 5 and 10N/mm<sup>2</sup>.



### 3.G Hollow Brick

Hollow Bricks are defined as having a hollow portion of over 55% of its volume. The compression strength is 1.5-2N/mm<sup>2</sup>. In general they measure 8 x 50 x 25cm and are used mainly to install partition and intermediate walls inside buildings.



### 4. Cellular Concrete

This is defined as being a combination of finely ground cement ,lime, gypsum and sand with additives of aluminium powder and other additives apart from water. It has a cellular structure (therefore the definition) which is extremely rich in small cavities. Accordingly it is 65 % lighter than normal concrete. The compression strength ranges from 2.5 to 6 N/mm<sup>2</sup>.



### 5. Compact Stone

Full and compact stone is used primarily in old buildings. In view of the fact that the characteristic features of the used stones differ considerably. It is difficult to specify average values for compression strength. However with the exception of the point between the stones, compact stones can be seen as a good building material for anchoring.



### 6. Wood

Chestnut, conifer, oak and lamella wood, which is made up of these types of wood are used generally in construction. The technical data refers to pine wood (conifer) with a weight of 380-520kg/m<sup>3</sup> and a moisture level of 15-20%.



### 7. Plasterboard

This material is found as gypsum board with board lamellas. It is generally quite thin (10-15cm) and is generally used to construct blind ceilings (hidden ceilings), inside partition walls and structures and products for decorative purposes.



### 8. Panels and Boards

These are materials of low density that do not offer favourable characteristics for anchoring as they are not particularly strong and have low consistency. The most familiar and most frequently used are panel made of Masonit, plywood and clipboard.



## A factors that affect load bearing capacity of the anchorage in concrete

The Factors that affect the load bearing capacity of the anchorage in concrete are :

- Consistency of the building structure
- Depth of anchorage
- Applied axes gap i.e. the gap between the individual anchors
- Gap to the edges and corners of the building structure
- Static and dynamics of the load

In particular, it is important to emphasize that one should actually speak of a “load bearing capacity of the anchor points” instead of “anchor holding”

Indeed, if applied correctly the anchorage forms a single body with the building structure, whereby a zone is created that is defined in technical parlance as a “tension zone”

After we have now clarified this concept, we believe it useful and appropriate to consider the aforementioned factors individually for a better understanding of the installation data.

### A.1 Consistency of the building structure

This factor is of the utmost significance, especially when installing loads of moderate weight. In a simplified sense we can say that quite apart from the selection of dimension for the anchorage, the structure must itself be able to carry the intended load with the required safety coefficient simply because it forms a “Single Body” with the anchorage and is therefore itself a “supporting element”. accordingly it is important to clarify that unless otherwise specified, the failure loads from which the permissible loads for the anchorage must be derived refer to the structures made of reinforced or prestressed concrete with strength classification of 250 Kgf/m<sup>3</sup>.

#### Important

The complete structure of the supporting masonry sometimes necessitates the implementation of the load bearing tests on the structure in order to define the recommended reference loads (atleast 5 tests) In the following we list the categories into which the supporting masonry is generally classified

#### 1. Concrete

Concrete is a composite material that generally consist of enough additives (gravel or crushed stone), fine additives(sand), cement and water.



A general distinction is made between

- Normal Concrete (composition described above)
- Lightweight concrete (is manufactured by adding light additives such as expanding clay to the normal concrete)
- Reinforced concrete (concrete that is reinforced with steel rods, metal cages or electrically welded meshes in order to make the compound stronger).

The compression strength of the concrete is the defining factor in determining the load bearing capacity of the concrete. This strength is not only closely dependent on the composition of the concrete, but also on the degree of its setting(hardening). Therefore the hold of an anchor that is installed in lightweight concrete or concrete that did not set properly is lower than its potential. Normal concrete has the best results provided that it is compact, homogeneous and resistant to pressure and if there was only negligible shrinkage during the setting phase(hardening phase).





## Information of Styrene and Chemical Mortar

### What is styrene?

Styrene is mainly a synthetic material which is produced in industrial quantities from benzene and ethylene and classified as a toxin, an irritant and a potential carcinogen. To some extent oily colourless liquid form, it easily evaporates and has a sweet smell although this odour often changes once mixed with other components. It can dissolve in some liquids but is not easily dissolved in water. It is also produced naturally at low levels from some fruits and vegetables.

### Where is it used?

Styrene is heavily used, mostly in what is termed a linked form as a monomer to produce plastic based products such as polystyrene, ABS, SBR rubber, unsaturated polyesters. Which in turn are then used in industry to produce items such as vehicle parts, food containers and general plastic products. In our industry it is used a great deal in polyester and vinylester based resin systems, adhesives and some sealant type products in its unlinked liquid form.

### What happens when styrene enters the environment?

For the most part, inert products such as plastic part and packaging etc. bring in styrene into the environment through the manufacture and disposal processes with proof of styrene contamination being found in air, water and ground soils. However, in unlinked liquid form it penetrates the environment quickly and in larger quantities through evaporation and is also further broken down by bacteria found in water and soils allowing further rapid entry. It is not expected to enter the food chain by grazing animals.

### How does it affect humans?

Surprisingly, for a frequently used industrial product, little is known about the effects of styrene on us, what we do know to date is that although exposure may not lead to any symptoms at all, breathing high levels of styrene for short periods can lead to possible respiratory problems and nervous system effects such as depression, tiredness, nausea, muscle weakness, ENT irritation. There is presently no test data on the consequences of breathing low levels for a long time, nor are any records available on the consequences of ingestion or absorption although animal studies revealed a range of symptoms such as damage to the brain, kidneys, liver and lung along with some reproductive effects.

The international Agency for Research on Cancer and the Environmental Protection Agency has also now determined that styrene could be a possible carcinogen to humans in airborne form and a number of studies of workers have revealed that breathing styrene may cause leukemia. There is no present evidence to support any cancer or health risks for final finished products containing styrene where skin contact or ingestion has occurred.

### To summarize

Clearly, styrene is a toxic, dangerous product in its raw form. It finds its way into the market in either solid form e.g. plastic parts, packing etc. or in liquid form. It is not damaging to humans in its inert solid form although it is damaging to the environment if not disposed of appropriately. It is harmful to humans in liquid form both as a finished product and during manufacture.

### So where do we fit in

In the chemical anchor market styrene has always been used in resin systems by most manufactures as it is both a readily available product and is the cheapest





method of formulation. Clearly, styrenated chemical anchor products are high risk as they are always in liquid or certainly semi solid format when supplied. They are harmful to both humans and the environment during the installation phase when operators may breath in fumes and semi solid or liquid resins are placed in direct contact with ground and construction elements (drilled holes etc.), it should be noted however that they are regarded as non hazardous in a cured state. Discarding of used cartridges also has an impact environmentally through soil entry of the broken down materials.

It would have been entirely irresponsible to keep manufacturing and supplying a potentially dangerous product to customers when there are substitutes available and therefore we took the decision some time ago to eliminate all styrene from our cartridge resin products, this has been accomplished by reformulating our resin blends using other components and manufacturing processes to produce an anchor range which is now not harmful to the operators or the environment whilst still maintaining the properties of a high performance chemical anchor i.e. high strength, fast cure, pumpable etc.

You will now find our polyester, epoxy acrylate and vinylester products totally styrene free, we have also made our pure epoxy product as safe as possible by formulating it in a low odour format and as inert as possible in order to pass WRAS approval for use in drinking water, pure epoxy based systems by nature, are not styrene based but do contain some harmful chemical, unfortunately if these were totally removed the product would then cease to function as an epoxy anchoring system. It is perfectly safe product when used properly.

Our chemical capsules do still currently contain styrene as this is a requirement for product performance and not simply due to the manufacturing process and we are presently limiting the amounts used where possible whilst maintaining high performance function. We are committed to removing styrene from our total product range and therefore we hope to have alternative formulations available in the near future.

#### **How do I recognize a styrenated product**

A chemical anchor or resin based product containing liquid styrene will always have a very strong petroleum type odour whereas styrene free products have practically no smell, the product will also carry a flammable symbol on the label and of course styrene will be listed in the manufactures MSDS. Styrene free products are usually classed as an irritant only.

#### **What's in it for us?**

Nothing ! Clearly it is more expensive to manufacture styrene free resins, however we compensate the increased costs by the logistical savings on storage, handling and transport of a now non inert and non flammable product no longer needing special transport certification or storage facilities etc. therefore there is no cost increase to our customers over standard styrene product. Also we normally take our environmental and customer responsibilities seriously and we are tremendously proud that we doing the best we can in real terms rather than just talking about it.





CHEMICAL  
**CAPSULE**



## Chemical Capsule CCS



### Description

The chemical capsule CCS is a high performance rapid cure spin-in chemical anchor system based on optimum measured proportions of high strength resin, chemical activator and quartz aggregate sealed in a glass capsule. It is a fast install, simple to use system requiring no special tools and provides high strength stress free anchoring in concrete and solid masonry. The system operates by spinning a chisel ended anchor stud using the required drive adaptor through the capsule using a rotary hammer drill which crushes and mixes the contents in the drill hole and initiates the curing process, the stud is left in position to fully cure and form a high strength bond which is stronger than the base material. Capsule sizes are drill hole specific from M8 to M30 diameters. The system can be used with longer than standard threaded bars combined with multiple down hole capsules, studs should be cut chisel ended and separate drive adapters are available for connection to a drilling machine.

### Base Material

The system is designed for static and dynamic heavy duty anchoring of anchor studs into vertical and horizontal drill holes in reinforced and non-reinforced concrete, solid masonry, rock and stone.

### Advantages

- Rapid cure.
- Consistent load behavior.
- Suitable for static and dynamic loading.
- Fast and simple to install.
- Vibrant Resistant
- Imparts no expansion stresses on the base material.
- Usable in wet drill holes ( requires longer cure time).
- Drill hole cleanliness not as critical as injection systems.
- High-performance resin guarantees high loads in the base material.
- The resin anchoring is free of expansion forces and permits low axial spacing and edge distances.
- Flush finish, no projecting bolt after dismantling the fixture.

### Typical Curing Time\*

Base Material Temperature(°C)	30+	20-30	5-20	5	-5
TYPICAL CURE TIME(mins) DRY HOLES	10	20	60	300	300
TYPICAL CURE TIME(mins) DAMP HOLES	20	40	120	600	600

Approval :



DIBt





## Applications

Primarily used where anchor consistency is required and injection resin use would be prohibitive or inconvenient. Due to the viscous nature chemical capsule CCS is not suitable for overhead installations or perforated and hollow substrates.

### CHEMICAL CAPSULE CCS

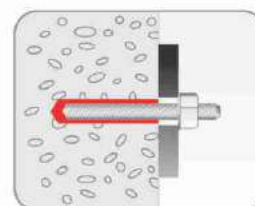
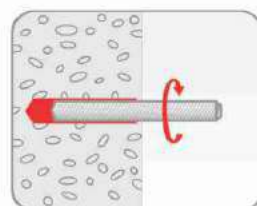
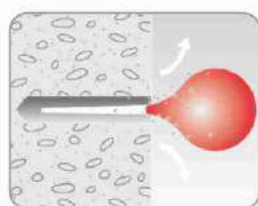
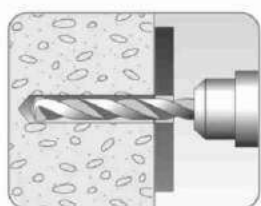


**Variant** spin-in two component glass capsule  
**Material** epoxy acrylate

Product code	Capsule Size	Hole Diameter (mm)	Hole Depth (mm)	Anchorage Depth (mm)	Fits Threaded Rods	Package content
CCS08	M08	10	80	80	M08	10
CCS10	M10	12	90	90	M10	10
CCS12	M12	14	110	110	M12	10
CCS16	M16	18	125	125	M16	10
CCS20	M20	25	170	170	M20	6
CCS24	M24	28	210	210	M24	6
CCS30	M30	35	280	280	M30	6

## Advice

Larger Anchoring depths are possible with the use of more than one capsule.



## Installation

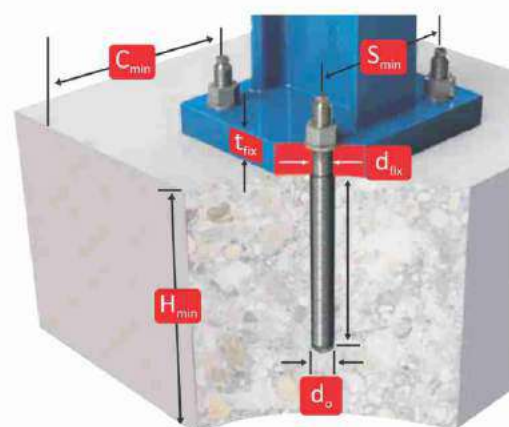
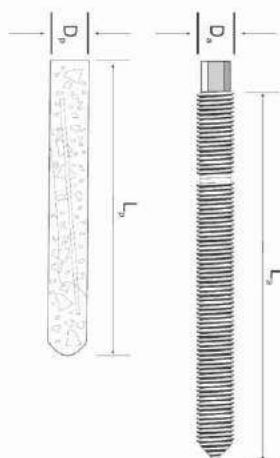
- Drill hole to correct diameter and depth, diamond cored drill holes should be roughened prior to installation.
- Clean drill hole thoroughly using wire brush / blow and remove all dust using a blow out pump or airline.
- Place the capsule in the drill hole ensuring fitting is below the surface.
- Attach the driver to the anchor stud, fit the drill and drive through the capsule until the stud reaches the base of the hole or the depth marker on the stud is reached.
- Detach the drive tool and leave stud undisturbed until cured and then attach fixture and torque to required setting.



## Typical Performance data at standard Embedment Depth

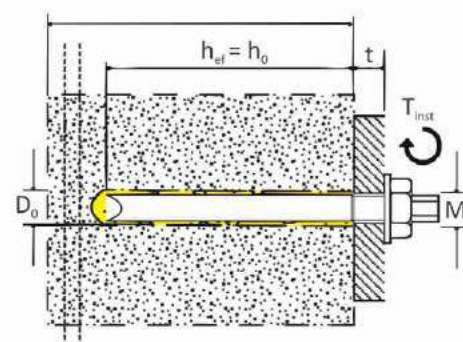
Size	Concrete, $f_{ck, cube} = 25 \text{ N/mm}^2 (\text{C20/25})$									SETTING DATA IN SOLID SUBSTRATE			
	Characteristic Resistance(kN)			Recommended Load(kN)			Characteristic Edge distance(mm)		Characteristic Spacing(mm)	Hole Diameter in concrete (mm)	Hole Diameter in Fixture (mm)	Standard embedment in concrete (mm)	Recommended Torque (Nm)
	Tension ( $N_u$ )	Shear 5.8 ( $V_u$ )	Shear 8.8 ( $V_u$ )	Tension ( $N_u$ )	Shear 5.8 ( $V_u$ )	Shear 8.8 ( $V_u$ )	Tension ( $C_u$ )	Shear 5.8 ( $C_u$ )					
M08	20.0	9.0	15.0	7.9	5.1	8.5	80	100	160	10	09	80	10
M10	30.0	14.0	23.0	11.9	8.0	13.1	90	130	180	12	11	90	20
M12	40.0	21.0	33.0	15.9	12.0	19.4	110	150	220	14	13	110	40
M16	50.0	39.0	63.0	19.8	22.3	36.0	125	170	250	18	17	125	80
M20	75.0	61.0	98.0	29.8	34.9	56.0	170	190	340	24	22	170	120
M24	90.0	88.0	141.0	37.7	50.3	80.6	210	240	420	28	26	210	180
M30*	150.0	140.0	224.0	60.0	60.0	—	280	350	560	35	33	280	400

## Super Cap Glass Capsule with Threaded Rod Applications



## Dimensions

$D_a$	$d_o$ (mm)	$h_o$ (mm)	$d_r$ (mm)	$h_{min}$ (mm)	$t_{fix}$ (mm)	$T_{inst}$ Nm
M08	10	80	9	110	20	10
M10	12	90	12	120	30	20
M12	14	110	14	140	37	40
M16	18	125	18	160	49	80
M20	25	170	22	220	75	120
M24	28	210	26	260	67	180
M30*	35	280	33	350	52	300



## Installation








## SDS Plus Adaptor With 13mm Chuck & Setting Tools



Capsule	Stud	Adaptor	Chuck Adaptor	Machine
				





CHEMICAL  
**ANCHOR**  
**STUD**  
CAS





## Chemical Anchor Stud CAS

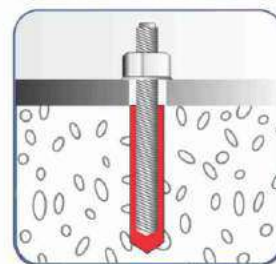
Steel, zinc plated/stainless steel A4-316



Chemical anchor CAS-E

### Description

The chemical anchor CAS is a chisel ended anchor for use with any of our injection systems and glass capsules in masonry and concrete. On installation the stud becomes chemically bonded to the base material. Notably the fixing method imposes no expansion stress on the base material and is ideal for shock or vibratory loading and for softer or low density building materials where expansion stresses would normally result in failure. The method also gives exceptional performance for close centre and close to edge fixing. The nut may be removed and replaced without affecting the anchorage. The chemical anchor CAS is supplied complete with high tensile hex nut and plain washer in addition to one external hex drive adapter in each box.

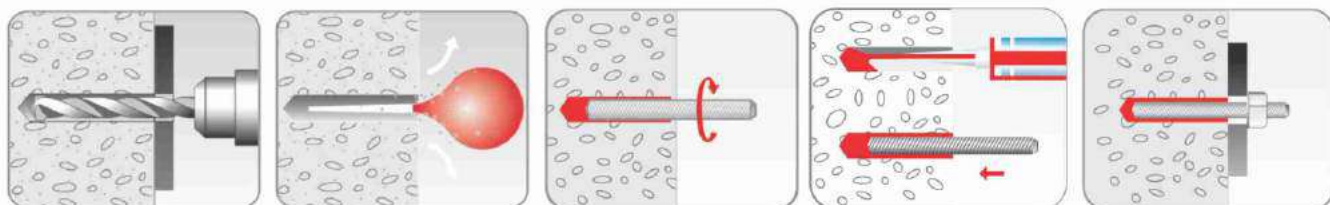
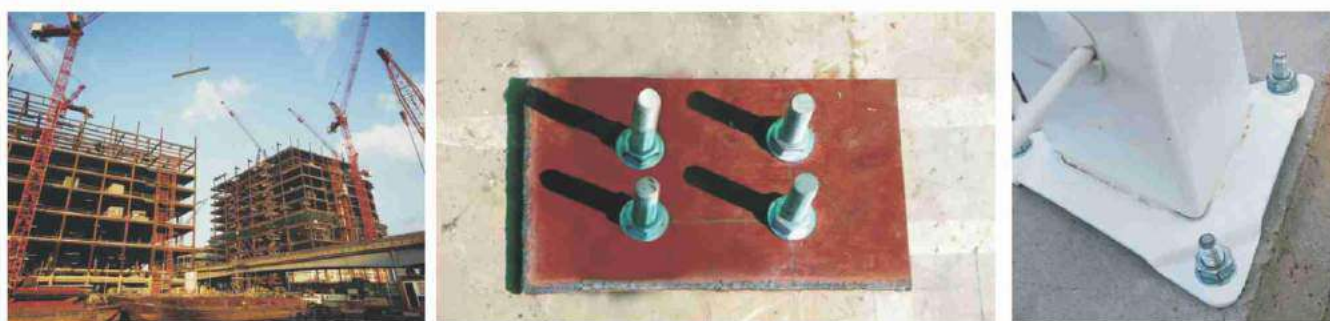


Product code Zinc plated 5.8 Grade	Anchor thread size(mm)	Anchor Length ( mm )	Hole Diameter ( mm )	Effective anchoring depth (mm)	Max.usable Length ( mm )	Width across nut (mm)	Hex nut (mm) SW	Washer in dia (mm)	Washer outer dia (mm)	Washer thickness (mm)	Package content pcs per Box
CAS08110E	M 08	110	10	80	13	5	13	9	15	1	25
CAS10130E	M 10	130	12	90	20	7	17	11	19	2	25
CAS10160E	M 10	160	12	90	52	7	17	11	19	2	25
CAS12160E	M 12	160	14	110	25	8	19	13	19.5	3	20
CAS12220E	M 12	220	14	110	90	8	19	13	19.5	3	20
CAS12250E	M 12	250	14	110	120	8	19	13	19.5	3	20
CAS16165E	M 16	165	18	125	13	12	24	17	29	4	10
CAS16190E	M 16	190	18	125	35	12	24	17	29	4	10
CAS16250E	M 16	250	18	125	98	12	24	17	29	4	10
CAS16300E	M 16	300	18	125	148	12	24	17	29	4	10
CAS16380E	M 16	380	18	125	235	12	24	17	29	4	10
CAS16500E	M 16	500	18	125	355	12	24	17	29	4	10
CAS20170E	M 20	170	25	125	135	12	30	21	30	4	10
CAS20260E	M 20	260	25	170	105	12	30	21	36	4	10
CAS20350E	M 20	350	25	170	155	12	30	21	36	4	10
CAS20500E	M 20	500	25	170	305	12	30	21	36	4	10
CAS24300E	M 24	300	28	210	65	16	36	26	43	5	5
CAS24400E	M 24	400	28	210	165	16	36	26	43	5	5
CAS24600E	M 24	600	28	210	365	16	36	26	43	5	5
CAS27400E	M 27	400	32	210	165	18	41	28	49	5	5
CAS30380E	M 30	380	35	280	65	25	46	33	55	5	5
CAS30500E	M 30	500	35	280	185	25	46	33	55	5	5





## Chemical Anchor Stud Application







CHEMICAL MORTAR  
**CM350P**  
**CM350VESF**  
**CM400PE**  
**CM385/585PE**



## Chemical Mortar CM 350P

Polyester Styrene Free



A two component chemical anchoring injection system. A formulation derived from polyester resin with high bond strength, developed principally to anchor threaded rods into concrete, and for masonry and hollow wall installations.

### Characteristics

- Suitable for medium loads for non-critical applications.
- Fast working times for early loading in time sensitive applications.
- Use in outdoor environments and fixing holes.
- Extremely versatile in masonry, hollow, aerated concrete.
- Crack and gap filling repairs in concrete vertical or horizontal.
- 10:1 resin available in a variety of cartridge types.

### CHEMICAL MORTAR CM350P



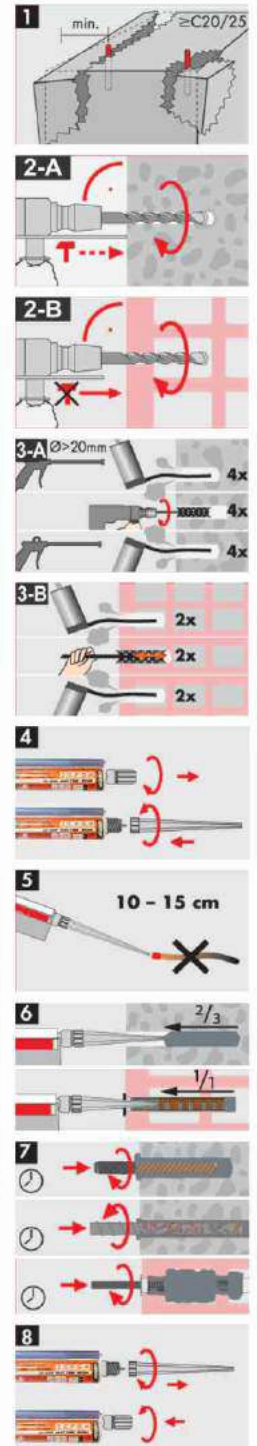
**Variant** 350ml co-axial 10:1 ratio cartridge  
**Material** Polyester Styrene Free

°C	Typical Gel Time
$\geq 0^{\circ}\text{C}$	45 min
$\geq +5^{\circ}\text{C}$	25 min
$\geq +10^{\circ}\text{C}$	15 min
$\geq +20^{\circ}\text{C}$	6 min
$\geq +30^{\circ}\text{C}$	4 min
$\geq +35^{\circ}\text{C}$	2 min
$\geq +40^{\circ}\text{C}$	1,5 min

Product code	Content (ml)	Colour when mixed	Package content
CM350 P	350	grey	6



ICFS Chemical Production Unit







## Anchorage in concrete with Rebar CM350P

High bond Reinforcing Bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>rd</sub> )														Steel failure load (kN)
		(kN)														
8	10-12	4.3	5.6	6.1	7.1	8.1	9.2	10.5	12.1	13.9	15.8					21.9
10	12-14	5.1	6.9	7.1	8.2	9.3	10.7	12.4	14.2	16.4	18.8	20.2	22.8			34.1
12	14-16	6.3	7.2	9.6	10.1	11.1	12.2	13.3	14.8	17.2	19.7	21.5	24.7	27.2	29.8	49.2
Depth (mm)		70	80	90	100	110	120	130	140	150	160	200	240	280	320	
16	18-20	10.6	12.9	14.2	17.4	20.1	24.5	26.9	29.6	32.6	35.9					87.4
20	25	11.4	13.5	15.9	18.7	22.1	26.5	29.1	31.9	35.2	38.8	42.7				136.6
25	30			17.5	20.5	24.2	28.5	33.6	40.3	48.3	58.1	69.6	83.6			196.5
Depth (mm)		80	100	120	140	160	200	240	280	300	320	400	480	540		

High bond Reinforcing Bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Recommended Resistance (N <sub>rd</sub> )													
		(kN)													
8	10-12	1.1	3.2												
10	12-14	2.7	3.8	4.8	5.7	6.8	7.7	8.9							
12	14-16	3.1	4.1	5.1	5.9	7.1	8.2	9.1							
Depth (mm)		70	80	90	100	110	120	130	140	150	160	200	240	280	
16	18-20	5.8	7.2	9.1	10.9	13.1	15.7	18.8	20.9	22.8	27.3				
20	25	6.5	8.2	10.3	11.5	14.4	16.2	19.4	21.7	23.5	28.4	32.8			
25	30			11.1	12.2	15.3	17.1	20.6	22.8	25.1	30.2	34.4	41.2		
Depth (mm)		80	100	120	140	160	200	240	280	300	320	400	480	540	

## Anchorage in concrete with Threaded rod 5.8 grade CM350P

5.8 Grade Studing

Stud Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>td</sub> )														Steel failure load (kN)
		(kN)														
8	10	5.3	6.1	7.3	8.7										12.7	
10	12		6.9	9.1	11.5										20.1	
12	14		7.2	9.6	12.1	15.6	19.5								29.2	
Depth (mm)		70	80	90	100	110	120	130	140	150	160	200	240	280		
16	18	9.6	12.9	17.2	21.5	26.8	29.8								54.4	
20	24		16.7	20.9	24.1	27.1	31.1	35.7	41.3						84.9	
24	28		19.8	23.7	28.8	30.9	34.5	39.5	45.4	51.1	56.8	62.5			122.4	
Depth (mm)		80	100	120	140	160	200	240	280	300	320	400	480	540		

5.8 Grade steel Studing

Stud Diameter (mm)	Drill Hole Diameter (mm)	Recommended Resistance (N <sub>w</sub> )														
		(kN)														
8	10	3.5	4.4													
10	12		5.8	6.6	7.3											
12	14		6.4	7.28	8.01	8.9										
Depth (mm)		70	80	90	100	110	120	130	140	150	160	200	240	280		
16	18	6.9	9.2	12.3												
20	24	7.8	10.1	13.1	15.3	18.1	21.7	26.4								
24	28		11.3	14.2	16.6	19.6	23.1	27.7	33.2	39.9	47.8	57.4				
Depth (mm)		80	100	120	140	160	200	240	280	300	320	400	480	540		



## Chemical Mortar CM 350VESF

Vinylester Styrene Free



### Description

The CM350VESF is a high performance rapid curing styrene free low odor two-component. Chemical injection anchoring system based on high reactivity unsaturated vinylester resin in methacrylate monomers. The co-axial cartridge format comprises of a resin and hardening agent in separate internal compartments which are mixed to the correct proportions in the delivery nozzle when triggered using the required manual dispenser.

### Base Material

Recommended for use in reinforced and non-reinforced concrete, rock and stone. It also provides a higher grade bond than standard epoxy acrylate resin in solid masonry, hollow brick-work and pre-cast (requires suitable sleeve) with minimal shrinkage.

### Feature

- Non Flammable.
- Non hazardous environmentally friendly low odor.
- Extreme heat and high chemical resistance.
- High load values in concrete and masonry for medium to heavy duty applications.
- Imparts no expansion stresses on the base material.
- Suitable for close to edge and reduced anchor center fixing.
- Usable in damp and wet environment and submerged drill holes.
- Rapid cure.
- Vibration resistant.
- Corrosion resistant.

### Approval :

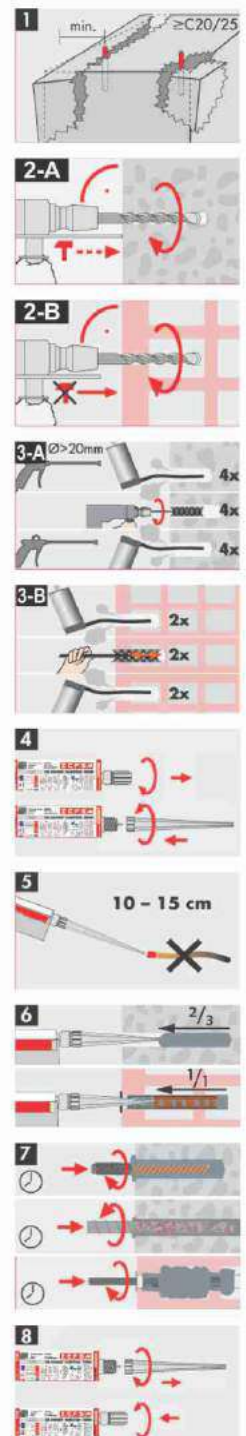


### Tested by :



°C	Typical Gel Time
≥ 0 °C	45 min
≥ +5 °C	25 min
≥ +10 °C	15 min
≥ +20 °C	6 min
≥ +30 °C	4 min
≥ +35 °C	2 min
≥ +40 °C	1,5 min

ICFS Chemical Production Unit







## Anchorage in concrete with Threaded rod 5.8 grade CM350VESF

### 5.8 Grade Studing

Stud Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>m</sub> )												hef failure (mm)	Steel failure load (kN)
		(kN)													
8	10	9.6	12.7											77	12.7
10	12		14.0	16.0	20.1									98	20.1
12	14		16.8	19.2	21.6	24.0	29.2							118	29.2
16	18			24.6	27.7	30.8	33.9	37.0	40.0	43.1	54.4			173	54.4
20	24			25.8	29.0	32.3	35.5	38.7	41.9	45.2	51.6	64.6	84.9	256	84.9
Depth (mm)		70	80	90	100	110	120	130	140	160	200	240	280		
24	28	33.5	36.9	40.2	43.6	47.0	53.7	67.1	80.5	94.3	122.4			357	122.4
27	32		41.5	45.3	49.1	52.8	60.4	75.5	90.6	105.8	120.8	159.1		412	159.1
30	35			50.4	54.5	58.7	67.1	83.9	100.7	117.5	134.3	194.5		453	194.5
33	38				57.2	61.7	70.4	88.1	105.7	123.4	141.0	176.2	188.8	534	240.6
36	40					64.6	73.8	92.3	110.7	129.2	147.6	184.6	221.5	600	283.2
Depth (mm)		110	120	130	140	160	200	240	280	320	400	480	540		

### A4-80 Stainless Steel Studing

Stud Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>d</sub> )												hef failure (mm)	Steel failure load (kN)
		(kN)													
8	10	9.6	11.2	12.8	15.7									95	15.7
10	12		14.0	16.0	17.9	20.0	24.8							121	24.8
12	14		16.8	19.2	21.6	24.0	26.4	28.8	36.1					147	36.1
16	18			24.6	27.7	30.8	33.9	37.0	40.1	43.1	49.3	67.2		213	67.2
20	24			25.8	29.0	32.3	35.5	38.7	41.9	45.2	51.6	64.6	77.5	317	104.8
Depth (mm)		70	80	90	100	110	120	130	150	180	200	240	280		
24	28	33.5	36.9	40.2	43.6	47.0	53.7	67.1	80.5	94.0	132.1			384	132.1
27	32		41.5	45.3	49.1	52.8	60.4	80.2						208	80.2
30	35			50.4	54.5	58.7	67.1	98.1						229	98.1
33	38				57.2	61.7	70.4	88.1	121.3					269	121.3
36	40					64.6	73.8	92.3	110.7	142.8				302	142.8
Depth (mm)		110	120	130	140	160	200	240	280	320	400	480	540		

### 5.8 Grade steel Studying

Stud Diameter (mm)	Hole Diameter (mm)	Recommended Resistance ( $N_d$ )											
		(kN)											
8	10	8.3	9.0										
10	12	10.0	11.7	13.5	14.3								
12	14	14.1	16.1	18.2	20.2	20.8							
16	18		20.7	23.3	25.9	28.5	31.1	33.7	36.2	38.8			
20	24		21.7	24.4	27.1	29.8	32.6	35.2	38.0	43.4	54.2	60.6	
Depth (mm)		70	80	90	100	110	120	130	140	160	200	240	280
24	28	28.2	31.0	33.8	36.7	39.5	45.1	56.4	67.7	79.0	87.4		
27	32	34.9	38.0	41.2	44.4	50.7	63.5	76.2	88.9	101.5	113.6		
30	35		42.3	45.8	49.3	56.4	70.5	84.6	98.7	112.9	138.9		
33	38			48.1	51.8	59.2	74.0	88.8	103.7	118.5	148.1	171.8	
36	40				54.2	62.0	77.5	93.0	108.5	124.0	155.1	186.1	202.2
Depth (mm)		110	120	130	140	160	200	240	280	320	400	480	540



## Anchorage in concrete with Rebar CM350VESF

Concrete Strength Class : C20/25, (25N/mm<sup>2</sup> Cylinder : 30N mm<sup>2</sup> 150mm cube )

High bond Reinforcing Bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>ed</sub> )															hef failure (mm)	Steel failure load (kN)
		(kN)																
8	10-12	8.3	9.5	10.7	11.9	13.1	14.2	15.4	16.6	18.6	21.9						180	21.9
10	12-14	10.3	11.9	13.3	14.8	16.3	17.7	19.2	20.7	23.7	28.9	34.1					225	34.1
12	15-16	11.2	12.8	14.4	16.0	17.5	19.2	20.8	22.4	25.6	32.0	38.4	41.8	49.2			300	49.2
16	18-20		16.1	18.1	20.1	22.1	24.2	26.2	28.2	32.3	40.3	48.4	56.5	64.6			423	87.4
20	22-25		17.3	19.4	25.2	23.8	26.0	28.1	30.3	34.6	43.3	52.0	60.9	69.30	86.7		616	136.6
Depth (mm)		70	80	90	100	110	120	130	140	160	180	230	280	320	400	500		
25	30	27.9	30.5	33.0	35.6	40.7	50.8	61.0	71.2	81.4	101.7	127.1					755	196.5
28	35	29.4	32.0	34.6	37.4	42.7	53.3	64.0	74.8	85.4	106.8	133.5	149.6				980	267.8
32	40			39.1	42.7	48.8	61.0	73.2	85.4	97.6	122.0	152.5	170.9	195.3			1120	349.7
36	44				48.1	54.9	68.6	82.4	96.1	109.9	137.3	171.7	192.2	219.7	247.2		1263	443.5
40	50					56.9	71.2	85.4	99.7	113.9	142.4	178.0	199.4	227.8	256.3	284.8	1500	546.3
Depth (mm)		110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

High bond Reinforcing Bars FYK = 420N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>ed</sub> )															hef failure (mm)	Steel failure load (kN)
		(kN)																
8	10-12	7.1	8.3	9.5	10.7	18.4											102	18.4
10	12-14	8.9	10.3	11.9	13.3	14.8	16.3	28.7									127	28.7
12	15-16	11.2	12.8	14.4	16.0	17.5	19.2	20.8	22.4	25.6	41.3						168	41.3
16	18-20		16.1	18.1	20.1	22.1	24.2	26.2	28.2	32.3	40.3	48.4	73.4				236	73.4
20	22-25		17.3	19.4	21.6	23.8	26.0	28.1	30.3	34.6	43.3	52.0	60.0	69.3	114.8		362	114.8
Depth (mm)		70	80	90	100	110	120	130	140	160	180	200	280	320	380	450		
25	30	27.9	30.5	33.0	35.6	40.7	50.8	61.0	71.2	81.4	101.7	165.1					417	165.1
28	35	29.4	32.0	34.6	37.4	42.7	53.3	64.0	74.8	85.4	106.8	133.5	149.6	225.0			537	225.0
32	40			39.6	42.7	48.8	61.0	73.2	85.4	97.6	122.0	152.5	170.9	195.3	293.7		614	293.7
36	44				48.1	54.9	68.6	82.4	96.1	109.9	137.3	171.7	192.2	219.7	247.2	372.5	735	372.5
40	50					56.9	71.2	85.4	99.7	113.9	142.4	178.0	199.4	227.8	256.3	284.8	815	458.9
Depth (mm)		110	120	130	140	160	200	240	280	320	400	450	500	550	650	800		

High bond Reinforcing Bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Recommended Resistance (N <sub>ed</sub> )														
		(kN)														
8	10	2.3	6.7	7.6	8.5	9.3	10.1	11.0	11.8	13.2	15.6					
10	12	7.3	8.5	9.5	10.5	11.6	12.6	13.7	14.7	16.9	20.6	24.3				
12	14	8.0	9.1	10.2	11.4	12.5	13.7	14.8	16.0	18.2	22.8	27.4	29.8	35.1		
16	18		11.5	12.9	14.3	15.7	17.2	18.7	20.1	23.0	28.7	34.5	40.3	46.1		
20	24		12.3	13.8	18.0	17.0	18.5	20.0	21.6	24.7	30.9	37.1	43.5	49.5	61.9	
Depth (mm)		70	80	90	100	110	120	130	140	160	180	230	280	320	400	500
25	30	19.9	21.7	23.5	25.4	29.0	36.2	43.5	50.8	58.1	72.6	90.7				
28	35	21.0	22.8	24.7	26.7	30.5	38.0	45.7	53.4	61.0	76.2	95.3	106.8			
32	40			27.9	30.5	34.8	43.5	52.2	61.0	69.7	87.1	108.9	122.0	139.5		
36	44				34.3	39.2	49.0	58.8	68.6	78.5	98.0	122.6	137.2	156.9	176.5	
40	50					40.6	50.8	61.0	71.2	81.3	101.7	127.1	142.4	162.7	183.0	203.4
Depth (mm)		110	120	130	140	160	200	240	280	320	400	500	560	640	720	800



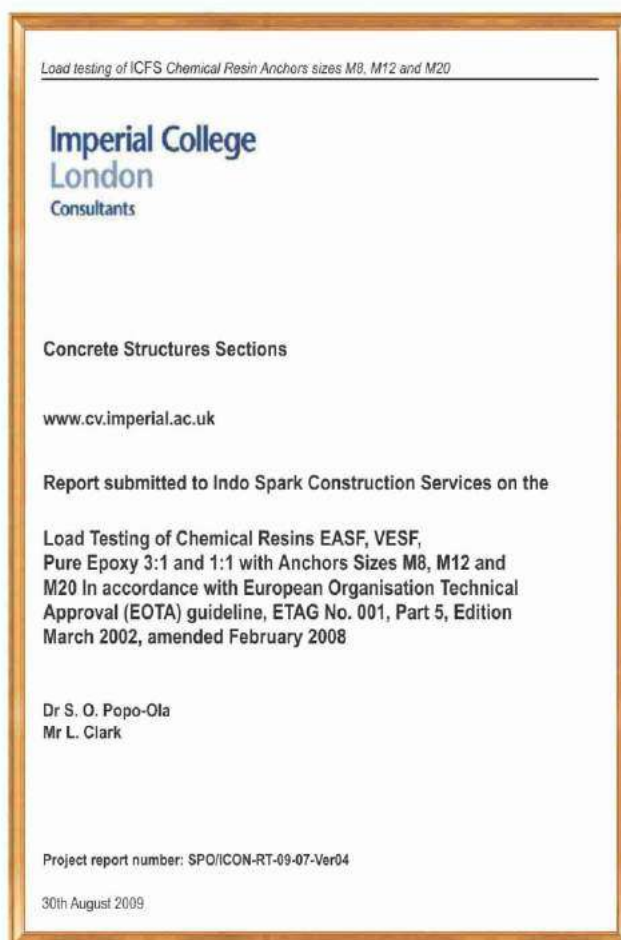


## CHEMICAL MORTAR CM350VESF



**Variant** 350ml co-axial 10:1 ratio cartridge  
**Material** Vinylester Styrene Free

Product code	Content (ml)	Colour when mixed	Package content
CM350 VESF	350	grey	6



**Performance Data for Various Stud Strengths, Material and Rebar**  
**Concrete Strength Class :** C20/25, (25N/mm<sup>2</sup> Cylinder : 30N mm<sup>2</sup> 150mm cube )  
**Reinforcement Bar :** Minimum Yield Strength fyk 460N/mm<sup>2</sup>

### Important Note :

Performance based on clean holes;  
 HAMMER DRILLED - blown and then brushed with a still metal brush & blown again.


**Effect of Anchor Spacing - Tension**

Anchor Spacing	Stud Diameter										
(mm)	8	10	12	16	20	24	27	30	33	36	40
40	0.64										
50	0.67	0.63									
60	0.70	0.65	0.63								
70	0.73	0.67	0.64								
80	0.76	0.69	0.66	0.63							
90	0.79	0.72	0.68	0.64							
100	0.82	0.74	0.70	0.65	0.63						
120	0.87	0.79	0.74	0.68	0.65	0.63	0.63				
150	0.96	0.86	0.80	0.73	0.68	0.65	0.64	0.63			
160	1.00	0.88	0.82	0.74	0.70	0.66	0.65	0.63	0.63	0.63	0.63
175		0.92	0.85	0.76	0.71	0.67	0.66	0.64	0.63	0.63	0.63
200		1.00	0.90	0.80	0.74	0.69	0.69	0.66	0.65	0.65	0.65
225			0.95	0.84	0.77	0.72	0.71	0.68	0.67	0.67	0.66
240			1.00	0.86	0.79	0.73	0.72	0.69	0.68	0.68	0.67
250				0.87	0.80	0.74	0.73	0.70	0.69	0.68	0.68
275				0.91	0.83	0.76	0.75	0.72	0.71	0.70	0.69
280				0.92	0.84	0.77	0.76	0.73	0.71	0.70	0.69
300				0.95	0.86	0.79	0.78	0.74	0.73	0.72	0.71
320				1.00	0.88	0.81	0.80	0.76	0.74	0.73	0.72
350					0.92	0.83	0.82	0.78	0.77	0.75	0.73
400					1.00	0.88	0.87	0.82	0.80	0.78	0.76
440						0.92	0.91	0.85	0.83	0.81	0.79
480						1.00	0.94	0.88	0.86	0.84	0.81
540							1.00	0.93	0.91	0.88	0.84
600								1.00	0.96	0.92	0.88
660									1.00	0.96	0.91
720										1.00	0.95
800											1.00

**Effect of Edge Distance - Tension**

Edge Distance	Stud Diameter										
(mm)	8	10	12	16	20	24	27	30	33	36	40
40	0.64										
50	0.73	0.63									
60	0.82	0.70	0.63								
70	0.90	0.77	0.68								
80	1.00	0.84	0.74	0.63							
90		0.91	0.80	0.67							
100		1.00	0.86	0.71	0.63						
110			0.92	0.76	0.66						
120			1.00	0.80	0.70	0.64					
140				0.89	0.77	0.67	0.63	0.63			
160				1.00	0.84	0.72	0.70	0.65	0.63	0.67	
180					0.91	0.78	0.75	0.70	0.66	0.71	0.68
200					1.00	0.84	0.81	0.76	0.71	0.74	0.71
220						0.89	0.86	0.81	0.75	0.78	0.75
240						1.00	0.92	0.86	0.80	0.82	0.78
270							1.00	0.94	0.87	0.87	0.83
300								1.00	0.94	0.93	0.88
330									1.00	0.98	0.93
360										1.00	0.98
400											1.00

**Effect of Edge Distance - Shear**

Edge Distance	Stud Diameter										
(mm)	8	10	12	16	20	24	27	30	33	36	40
40	0.25										
50	0.44	0.30									
60	0.63	0.48	0.30								
70	0.81	0.65	0.44								
80	1.00	0.83	0.58	0.40							
90		1.00	0.72	0.53							
100			0.86	0.67	0.35						
110			1.00	0.80	0.44						
125				1.00	0.58	0.35					
140					0.72	0.46	0.35	0.30			
160					0.91	0.62	0.51	0.35	0.32	0.33	
180					1.00	0.77	0.63	0.46	0.37	0.43	
200						0.92	0.75	0.57	0.46	0.50	0.32
220						1.00	0.88	0.68	0.56	0.56	0.53
240							1.00	0.78	0.65	0.63	0.59
280								1.00	0.84	0.77	0.72
310									1.00	0.90	0.82
330										1.00	0.89
400											1.00

**Effect of Anchor Spacing - Tension**

Rebar Spacing	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.64										
50	0.67	0.63									
60	0.70	0.65	0.63								
70	0.73	0.67	0.64								
80	0.76	0.69	0.66	0.63							
90	0.79	0.72	0.68	0.64							
100	0.82	0.74	0.70	0.65	0.63						
120	0.87	0.79	0.74	0.68	0.65	0.63	0.63				
150	0.96	0.86	0.80	0.73	0.68	0.65	0.64				
160	1.00	0.88	0.82	0.74	0.70	0.66	0.65	0.63	0.63	0.63	
175		0.92	0.85	0.76	0.71	0.67	0.66	0.63	0.63	0.63	
200		1.00	0.90	0.80	0.74	0.69	0.69	0.65	0.65	0.65	
225			0.95	0.84	0.77	0.72	0.71	0.67	0.67	0.66	
240			1.00	0.86	0.79	0.73	0.72	0.68	0.68	0.67	
250				0.87	0.80	0.74	0.73	0.69	0.68	0.68	
275				0.91	0.83	0.76	0.75	0.71	0.70	0.69	
280				0.92	0.84	0.77	0.76	0.71	0.70	0.69	
300				0.95	0.86	0.79	0.78	0.73	0.72	0.71	
320				1.00	0.88	0.81	0.80	0.74	0.73	0.72	
350					0.92	0.83	0.82	0.77	0.75	0.73	
400					1.00	0.88	0.87	0.80	0.78	0.76	
440						0.92	0.91	0.83	0.81	0.79	
480						1.00	0.94	0.86	0.84	0.81	
540							1.00	0.91	0.88	0.84	
600								0.96	0.92	0.88	
660								1.00	0.96	0.91	
720									1.00	0.95	
800										1.00	

**Effect of Edge Distance - Tension**

Edge Distance	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.64										
50	0.73	0.63									
60	0.82	0.70	0.63								
70	0.90	0.77	0.68								
80	1.00	0.84	0.74	0.63							
90		0.91	0.80	0.67							
100		1.00	0.86	0.71	0.63						
110			0.92	0.76	0.66						
120			1.00	0.80	0.70	0.64					
140				0.89	0.77	0.67	0.63				
160				1.00	0.84	0.72	0.70	0.63	0.67		
180					0.91	0.78	0.75	0.66	0.71	0.68	
200					1.00	0.84	0.81	0.71	0.74	0.71	
220						0.89	0.86	0.75	0.78	0.75	
240						1.00	0.92	0.80	0.82	0.78	
270							1.00	0.87	0.87	0.83	
300								0.94	0.93	0.88	
330								1.00	0.98	0.93	
360									1.00	0.98	
400										1.00	

**Effect of Edge Distance - Shear**

Edge Distance	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.25										
50	0.44	0.30									
60	0.63	0.48	0.30								
70	0.81	0.65	0.44								
80	1.00	0.83	0.58	0.40							
90		1.00	0.72	0.53							
100			0.86	0.67	0.35						
110			1.00	0.80	0.44						
125				1.00	0.58	0.35					
140					0.72	0.46	0.35				
160					0.91	0.62	0.51	0.32	0.33		
180					1.00	0.77	0.63	0.37	0.43		
200						0.92	0.75	0.46	0.50	0.32	
220						1.00	0.88	0.56	0.56	0.53	
240							1.00	0.65	0.63	0.59	
280								0.84	0.77	0.72	
310								1.00	0.90	0.82	
330									1.00	0.89	
400										1.00	

**Notes :**

All grades shown for information. M30 for A4-70 tensile strength of 500N/mm<sup>2</sup>, instead of 700N/mm<sup>2</sup>.

Safety factor is 1.25 for all carbon steel. Safety Factor is 1.56 for stainless steel, up to M24, M30 is 2.0 Safety Factor is 1.5 for BS500 rebar



## Chemical filling volume chart for reinforcing bars in ml

For the change of mixers and cartridges on additional quantity has to be calculated

Rebar Diameter (mm)	Hole Diameter (mm)	Chemical filling volume chart for reinforcing bars in ml															
8	12	4.56	5.32	6.08	6.84	7.60	8.36	9.12	9.88	10.64	12.16	15.20	18.24	21.28	24.32	30.40	37.99
10	14	5.47	6.38	7.29	8.21	9.12	10.03	10.94	11.85	12.77	14.59	18.24	21.88	25.53	29.18	36.47	45.59
12	16	6.38	7.45	8.51	9.57	10.64	11.70	12.77	13.83	14.89	17.02	21.28	25.53	29.79	34.04	42.55	53.19
16	20	8.21	9.57	10.94	12.31	13.68	15.05	16.41	17.78	19.15	21.88	27.36	32.83	38.30	43.77	54.71	68.39
20	25	12.82	14.96	17.10	19.23	21.37	23.51	25.65	27.78	29.92	34.19	42.74	51.29	59.84	68.39	85.49	106.86
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500
25	30	26.12	28.73	31.35	33.96	36.57	41.79	52.24	62.69	73.14	83.59	104.48	130.60	146.28	167.17	188.07	208.97
28	35	41.89	46.08	50.27	54.45	58.64	67.02	83.78	100.53	117.29	134.04	167.55	209.44	234.57	268.09	301.60	335.11
32	40	54.71	60.18	65.65	71.12	76.60	87.54	109.42	131.31	153.19	175.08	218.85	273.56	306.38	350.15	393.92	437.69
36	44	60.79	66.87	72.95	79.03	85.11	97.26	121.58	145.90	170.21	194.53	243.16	303.95	340.43	389.06	437.69	486.32
40	50	85.49	94.04	102.58	111.13	119.68	136.78	170.97	205.17	239.36	273.56	341.95	427.43	478.72	547.11	615.50	683.89
Anchorage length(mm) $l_{b,ext}$		100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800

Volume =  $(3.14/4 \cdot D^2) - (3.14/4 \cdot d^2) \cdot \text{depth} / 1000 \cdot 1.21$  (D= Hole diam.; d=Rebar/Stud Diam.)

Material lost for proper mixing and wastage while using already considered.

## Chemical filling volume chart for studs in ml.

For the change of mixers and cartridges on additional quantity has to be calculated

Stud Diameter (mm)	Hole Diameter (mm)	Chemical filling volume chart for studs in ml.															
8	10	2.05	2.39	2.74	3.08	3.42	3.76	4.10	4.45	4.79	5.47	6.84	8.21	9.57	10.94	13.68	17.10
10	12	2.51	2.93	3.34	3.76	4.18	4.60	5.02	5.43	5.85	6.69	8.36	10.03	11.70	13.37	16.72	20.90
12	14	2.96	3.52	3.95	4.45	4.94	5.43	5.93	6.42	6.91	7.90	9.88	11.85	13.83	15.81	19.76	24.70
16	18	3.88	4.52	5.17	5.81	6.46	7.10	7.75	8.40	9.04	10.33	12.92	15.50	18.09	20.67	25.84	32.29
20	24	10.03	11.70	13.37	15.05	16.72	18.39	20.06	21.73	23.40	26.75	33.43	40.12	46.81	53.50	66.87	83.59
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500
24	28	19.76	21.73	23.71	25.68	27.66	31.61	39.51	47.42	55.32	63.22	79.03	98.78	106.69	118.54	146.20	158.06
27	32	28.02	30.82	33.62	36.43	39.23	44.83	56.04	67.25	78.46	89.67	112.08	140.10	151.31	166.12	207.35	224.16
30	35	30.87	33.96	37.04	40.13	43.22	49.39	61.74	74.09	86.44	98.78	123.48	154.35	166.70	185.22	228.44	246.96
33	38	33.72	37.09	40.46	43.84	47.21	53.95	67.44	80.93	94.42	107.90	134.88	168.09	182.09	202.32	249.53	269.76
36	40	28.88	31.76	34.65	37.54	40.43	46.20	57.75	69.30	80.85	92.40	115.50	144.38	155.93	173.25	213.68	231.00
Anchorage length(mm) $l_{b,ext}$		100	110	120	130	140	160	200	240	280	320	400	500	540	600	740	800

Volume =  $(3.14/4 \cdot D^2) - (3.14/4 \cdot d^2) \cdot \text{depth} / 1000 \cdot 1.21$  (D= Hole diam.; d=Rebar/Stud Diam.)

Material lost for proper mixing and wastage while using already considered.







## Chemical Mortar CM 400PE

### Pure Epoxy



### Description

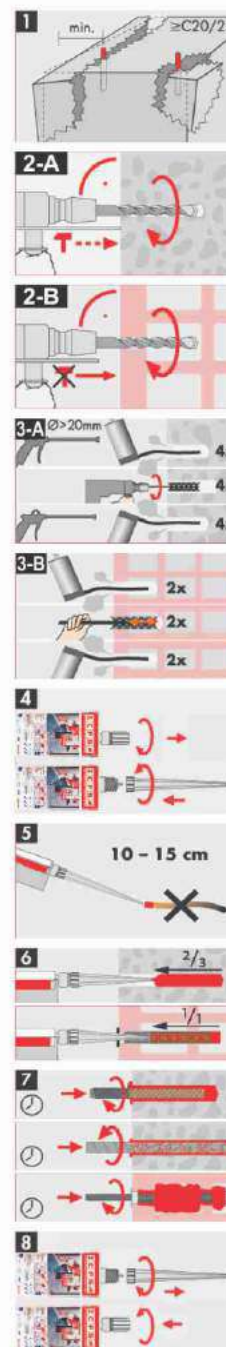
The CM400PE is a high performance high strength premium grade solvent free pure epoxy based chemical injection anchoring system for heavy duty structural application. The dual cartridge format comprises of a resin and hardening agent which are mixed to the correct proportions in the nozzle when triggered using the required manual dispenser. It's non shrink, non sag and extended gel time formula make this resin the ideal choice for large diameter, deep and oversized drill holes with variable embedment depths and is also suitable for underwater use and in submerged drill holes.

### Base Material

Recommended for use in reinforced and non-reinforced concrete, rock and stone.

### Feature

- Premium grade resin for application requiring high load values.
- One of the strongest injection systems especially suitable for big diameters rebar and rods.
- No expansion forces allow for secure applications even close to the edges and reduced space fixing
- Ideal solution for diamond drilled holes and wet bore holes - can be used in all weather conditions.
- Low sensitivity to oversized, wet holes due to negligible shrinkage and adhesive property thus less risk of installation failure.
- Long gel time, enough time for aligning work and installation of big diameters at deep embedment.
- Easy setting in a wide range of temperature and long working time even at elevated temperature.
- Dispensing system reduces the possibility of contact making it safer to use.
- Bonds almost any material (except rubber or flexible pvc.)
- Solvent free low odor recipe for convenient working also indoors.
- Vibration resistant.
- Corrosion resistant.
- Very high chemical resistance.



### TYPICAL GEL AND CURING TIME

Base Material Temperature (°C)	5	15	25	35	45
Typical Gel Time (mins)	180	60	40	20	15
Minimum Load time (mins)	960	300	180	180	180

Figures are based on M12 fixings. Full cure is achieved after 24 hours. All specifications are based on ICFS mixer 14.

### Tested by :

**Imperial College  
London**  
Consultants  
SP0/CON-RT-09-07-Ver04

### Approval

**ITE**  
(Instytut Techniki Budowlanej)  
Approve Techniczny ITB nr AT-15-0895/2009

**WRAS**  
Water Regulations  
Advisory Scheme  
BS6920 Approved



# Anchorage in Concrete with Rebar CM 400 PE - Epoxy Concrete Strength Class : C20/25, (25N/mm<sup>2</sup> Cylinder : 30N mm<sup>2</sup> 150mm cube )

High bond Reinforcing bars FYK = 420N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>d</sub> )																Steel failure load (kN)	
																			hef failure (mm)
8	10-12	8.4	9.8	11.2	12.6	14.0	15.4	18.4										120	18.4
10	12-14	10.5	12.2	14.0	15.7	17.5	19.2	20.9	22.7	24.4	28.7							149	28.7
12	15-16		13.2	15.1	17.0	18.9	20.7	22.6	24.5	26.4	30.2	41.3						197	41.3
16	18-20			19.0	21.4	23.7	26.1	28.5	30.9	33.2	38.0	47.5	57.0	73.4				277	73.4
20	22-25			20.4	22.9	25.5	28.0	30.6	33.1	35.7	40.8	51.0	61.2	71.4	81.6	102.0		426	114.8
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500		
25	30	29.9	32.9	35.9	38.9	41.9	47.9	59.8	71.8	83.8	95.8	119.7	165.1					490	165.1
28	35		34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	100.5	125.7	157.1	176.0				632	225.0
32	40				46.7	50.3	57.5	71.8	86.2	100.5	114.9	143.6	179.5	201.1	229.8			722	293.7
36	44					56.6	64.6	80.8	97.0	113.1	129.3	161.6	202.0	226.2	258.5	290.9		865	372.5
40	50						67.0	83.8	100.5	117.3	134.1	167.6	209.5	234.6	268.1	301.6	335.1	959	458.9
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

High bond Reinforcing bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>d</sub> )																Steel failure load (kN)	
																			hef failure (mm)
8	10-12	8.4	9.8	11.2	12.6	14.0	15.4	16.8	18.2	19.6	21.9							157	21.9
10	12-14	10.5	12.2	14.0	15.7	17.5	19.2	20.9	22.7	24.4	27.9	34.1						196	34.1
12	15-16		13.2	15.1	17.0	18.9	20.7	22.6	24.5	26.4	30.2	37.7	45.2	49.2				261	49.2
16	18-20			19.0	21.4	23.7	26.1	28.5	30.9	33.2	38.0	47.5	57.0	66.5	76.0			368	87.4
20	22-25			20.4	22.9	25.5	28.0	30.6	33.1	35.7	40.8	51.0	61.2	71.4	81.6	102.0		536	136.6
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500		
25	30	29.9	32.9	35.9	38.9	41.9	47.9	59.8	71.8	83.8	95.8	119.7	149.6					657	196.5
28	35		34.6	37.7	40.8	44.0	50.3	62.8	75.4	88.0	100.5	125.7	157.1	176.0				852	267.8
32	40				46.7	50.3	57.5	71.8	86.2	100.5	114.9	143.6	179.5	201.1	229.8			974	349.7
36	44					56.6	64.6	80.8	97.0	113.1	129.3	161.6	202.0	226.2	258.5	290.9		1098	443.5
40	50						67.0	83.8	100.5	117.3	134.1	167.6	209.5	234.6	268.1	301.6	335.1	1304	546.3
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

High bond Reinforcing bars FYK = 500N/mm<sup>2</sup>

Rebar Diameter (mm)	Drill Hole Diameter (mm)	Recommended Resistance (N <sub>m</sub> )																	
		(kN)																	
8	10-12	6.0	7.0	8.0	9.2	10.0	11.0	12.0	13.2	14.0	15.6								
10	12-14	7.5	8.7	10.0	11.2	12.5	13.71	14.9	16.1	17.4	19.9	24.4							
12	15-16		9.4	10.8	12.1	13.5	14.7	16.1	17.5	18.8	21.5	26.9	32.2	35.14					
16	18-20			13.5	15.2	16.9	18.6	20.3	22.0	23.7	27.1	33.9	40.7	47.5	54.2				
20	22-25			14.5	16.3	18.2	20.0	21.8	23.6	25.5	29.14	36.4	43.7	51.0	58.2	72.8			
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500		
25	30	21.3	23.5	25.6	27.7	29.9	34.2	42.7	51.2	59.8	68.4	85.5	106.8						
28	35		24.7	26.9	29.1	31.4	35.9	44.8	53.8	62.8	71.7	89.7	112.2	125.7					
32	40				33.3	35.9	41.0	51.2	61.5	71.7	82.0	102.5	128.2	143.6	164.1				
36	44					40.4	46.1	57.7	69.2	80.7	92.3	115.4	144.2	161.5	184.6	207.7			
40	50						47.8	59.8	71.7	83.7	95.7	119.7	149.6	167.5	191.5	215.4	239.3		
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

## Anchorage in Concrete with Threaded Rod CM 400 PE - Epoxy

Concrete Strength Class : C20/25, (25N/mm<sup>2</sup> Cylinder : 30N mm<sup>2</sup> 150mm cube )

## 5.8 Grade Studing

Stud Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>td</sub> )													hef failure (mm)	Steel failure load (kN)
		(kN)														
8	10	11.3	12.7											67	12.7	
10	12	14.1	16.5	18.9	20.1									85	20.1	
12	14		21.8	22.6	25.5	28.3	29.2							103	29.2	
16	18			29.0	32.7	36.3	39.9	43.6	47.2	50.8	54.4			150	54.4	
20	24			30.4	34.2	38.0	41.8	45.6	49.4	53.2	60.8	76.0	84.9	123	84.9	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280		
24	28	39.5	43.5	47.4	51.4	55.3	63.2	79.0	94.8	110.6	122.4				310	122.4
27	32		48.9	53.3	57.8	62.2	71.1	88.9	106.7	124.5	142.2	159.1			358	159.1
30	35			59.3	64.2	69.1	79.0	98.8	118.5	138.3	158.1	194.5			394	194.5
33	38				67.4	72.6	82.9	103.7	124.4	145.2	165.9	207.4	240.6		464	240.6
36	40					76.0	86.9	108.6	130.3	152.0	173.7	217.2	260.6	283.2	522	283.2
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	480	540		

## 5.8 Grade steel Studying

Stud Diameter (mm)	Hole Diameter (mm)	Recommended Resistance (N <sub>td</sub> )												
		(kN)												
8	10	8.3	9.0											
10	12	10.0	11.7	13.5	14.3									
12	14		14.1	16.1	18.2	20.2	20.8							
16	18			20.7	23.3	25.9	28.5	31.1	33.7	36.2	38.8			
20	24			21.7	24.4	27.1	29.8	32.6	35.2	38.0	43.4	54.2	60.6	
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280
24	28	28.2	31.0	33.8	36.7	39.5	45.1	56.4	67.7	79.0	87.4			
27	32		34.9	38.0	41.2	44.4	50.7	63.5	76.2	88.9	101.5	113.6		
30	35			42.3	45.8	49.3	56.4	70.5	84.6	98.7	112.9	138.9		
33	38				48.1	51.8	59.2	74.0	88.8	103.7	118.5	148.1	171.8	
36	40					54.2	62.0	77.5	93.0	108.5	124.0	155.1	186.1	202.2
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	480	540

## A4-80 Stainless Steel Studying

Stud Diameter (mm)	Drill Hole Diameter (mm)	Design Resistance (N <sub>td</sub> )													hef failure (mm)	Steel failure load (kN)
		(kN)														
8	10	11.3	13.2	15.1	15.7										83	15.7
10	12		16.5	18.9	21.1	23.6	24.8								105	24.8
12	14		19.8	22.6	25.5	28.3	31.1	33.9	36.1						128	36.1
16	18			29.0	32.7	36.3	39.9	43.6	47.2	50.8	58.1	67.2			185	67.2
20	24			30.4	34.2	38.0	41.8	45.6	49.4	53.2	60.8	76.0	91.2	104.8	276	104.8
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280		
24	28	39.5	43.5	47.4	51.4	55.3	63.2	79.0	94.8	110.6	126.4	132.1			334	132.1
27	32		48.9	53.3	57.8	62.2	71.1	80.2							181	80.2
30	35			59.3	64.2	69.1	79.0	98.1							199	98.1
33	38				67.4	72.6	82.9	103.7	121.3						234	121.3
36	40					76.0	86.9	108.6	130.3	142.8					263	142.8
Depth (mm)		100	110	120	130	140	160	200	240	280	320	400	480	540		





## APPLICATIONS

As a pure epoxy resin, CM400PE offers excellent adhesion to both steel and concrete and has highest load values of all our systems, it is primarily designed for heavy duty bonding of rebar, starter bars and dowels, anchor studs, bolts, threaded bars and sockets.

### CHEMICAL MORTAR CM400PE



**Variant** 400ml dual action side by side 1:1 ratio cartridge  
**Material** pure epoxy

**Product code**

CM400PE

**Content (ml)**

400

**Colour when mixed**

red

**Package content**

10

Load testing of ICFS Chemical Resin Anchors sizes M8, M12 and M20

**Imperial College  
London  
Consultants**

Concrete Structures Sections

[www.cv.imperial.ac.uk](http://www.cv.imperial.ac.uk)

Report submitted to Indo Spark Construction Services on the

Load Testing of Chemical Resins EASF, VESF, Pure Epoxy 3:1 and 1:1 with Anchors Sizes M8, M12 and M20 In accordance with European Organisation Technical Approval (EOTA) guideline, ETAG No. 001, Part 5, Edition March 2002, amended February 2008

Dr S. O. Popo-Ola  
Mr L. Clark

Project report number: SPO/ICON-RT-09-07-Ver04

30th August 2009

INDO SPARK CONSTRUCTION SERVICES

Importer & Distributor for Construction Fixing Systems  
 B-1, 198 E. Taramani Chowk, Nr. Ganga Mandir, Kottapet-600 083 (Chennai, India)  
 Ph No: 022-2622196, 2622206, 2622709 Fax: 022-6681805 Mobile: 9923170302  
 E-Mail: [indospark@gmail.com](mailto:indospark@gmail.com), [service@indospark.com](mailto:service@indospark.com)  
 Website: [www.indospark.com](http://www.indospark.com), [www.cfsindia.net](http://www.cfsindia.net)



Branches: Pune, Mumbai, Calcutta, Orissa

### ICFS CHEMICAL LOAD TEST CERTIFICATE

Chemical used:	Date: 06/08/13		
Name of Project:	Kallurupadi Dam		
Address:	Executive Engineer, Kallurupadi Dam, Mamankudi Division, Alwar, Tal. Chiplan, Dist. Kottayam		
Landmark:	Mamankudi, M-10, E-35, 606	Site Ph No:	022555230034
Load Test Recommended by:	SS. Sothe, CIVIL ENGINEER	Cell no:	8888807401
Project of:	Kallurupadi Dam, Mamankudi Division, Alwar, Tal. Chiplan, Dist. Kottayam		
Building Name & Add.:	Executive Engineer, Kallurupadi Dam, Mamankudi Division, Alwar, Tal. Chiplan, Dist. Kottayam		
Office Address:	Executive Engineer, Kallurupadi Dam, Mamankudi Division, Alwar, Tal. Chiplan, Dist. Kottayam		
Chief Engineer Name:	D.N. Muralidhar	Cell:	
Site Engineer Name:	P.R. Baban	Cell:	09404155788
Details of Chemical as per Catalogue:	Ultimate Load Values in kN		
Chemical Details:	Recommended Load in kN		
Testing Observation found:			
Chemical Description	Recommended Load As per Catalogue	Drill Hole Dia in MM	Load Values in kN
CM400PE	50.6 kN	Ø 30mm x D. 300mm	60.5 kN
CM400PE	71.2 kN	Ø 30mm x D. 750mm	40.0 kN
CM400PE	91.2 kN	Ø 30mm x D. 600mm	40.0 kN
Following officers were present for ICFS Chemical Load Testing:			
Name	Designation	Company Name	Signature
P.R. Baban	S.O.	ADARSH	
D.S. Dargadar	Junior Engineer	ADARSH	

For Indo Spark Construction Services

Author Sign

Sub Division Officer  
 Mamankudi Division, Kottayam  
 Sub Division Office

## Performance Data for Various Stud Strengths, Material and Rebar

**Concrete Strength Class** : C20/25, (25N/mm<sup>2</sup> Cylinder : 30N mm<sup>2</sup> 150mm cube)

**Reinforcement Bar** : Minimum Yield Strength fyk 460N/mm<sup>2</sup>

### Important Note :

Performance based on clean holes;

HAMMER DRILLED - blown and then brushed with a still metal brush & blown again.






**Effect of Anchor Spacing - Tension**

Anchor Spacing	Stud Diameter											
(mm)	8	10	12	16	20	24	27	30	33	36	40	
40	0.64											
50	0.67	0.63										
60	0.70	0.65	0.63									
70	0.73	0.67	0.64									
80	0.76	0.69	0.66	0.63								
90	0.79	0.72	0.68	0.64								
100	0.82	0.74	0.70	0.65	0.63							
120	0.87	0.79	0.74	0.68	0.65	0.63	0.63					
150	0.96	0.86	0.80	0.73	0.68	0.65	0.64	0.63				
160	1.00	0.88	0.82	0.74	0.70	0.66	0.65	0.63	0.63	0.63	0.63	
175		0.92	0.85	0.76	0.71	0.67	0.66	0.64	0.63	0.63	0.63	
200		1.00	0.90	0.80	0.74	0.69	0.69	0.66	0.65	0.65	0.65	
225			0.95	0.84	0.77	0.72	0.71	0.68	0.67	0.67	0.66	
240			1.00	0.86	0.79	0.73	0.72	0.69	0.68	0.68	0.67	
250				0.87	0.80	0.74	0.73	0.70	0.69	0.68	0.68	
275				0.91	0.83	0.76	0.75	0.72	0.71	0.70	0.69	
280				0.92	0.84	0.77	0.76	0.73	0.71	0.70	0.69	
300				0.95	0.86	0.79	0.78	0.74	0.73	0.72	0.71	
320				1.00	0.88	0.81	0.80	0.76	0.74	0.73	0.72	
350					0.92	0.83	0.82	0.78	0.77	0.75	0.73	
400					1.00	0.88	0.87	0.82	0.80	0.78	0.76	
440						0.92	0.91	0.85	0.83	0.81	0.79	
480						1.00	0.94	0.88	0.86	0.84	0.81	
540							1.00	0.93	0.91	0.88	0.84	
600								1.00	0.96	0.92	0.88	
660									1.00	0.96	0.91	
720										1.00	0.95	
800											1.00	

**Effect of Edge Distance - Tension**

Edge Distance	Stud Diameter											
(mm)	8	10	12	16	20	24	27	30	33	36	40	
40	0.64											
50	0.73	0.63										
60	0.82	0.70	0.63									
70	0.90	0.77	0.68									
80	1.00	0.84	0.74	0.63								
90		0.91	0.80	0.67								
100		1.00	0.86	0.71	0.63							
110			0.92	0.76	0.66							
120			1.00	0.80	0.70	0.64						
140				0.89	0.77	0.67	0.63	0.63				
160				1.00	0.84	0.72	0.70	0.65	0.63	0.67		
180					0.91	0.78	0.75	0.70	0.66	0.71	0.68	
200					1.00	0.84	0.81	0.76	0.71	0.74	0.71	
220						0.89	0.86	0.81	0.75	0.78	0.75	
240						1.00	0.92	0.86	0.80	0.82	0.78	
270							1.00	0.94	0.87	0.87	0.83	
300								1.00	0.94	0.93	0.88	
330									1.00	0.98	0.93	
360										1.00	0.98	
400											1.00	

**Effect of Edge Distance - Shear**

Edge Distance	Stud Diameter											
(mm)	8	10	12	16	20	24	27	30	33	36	40	
40	0.25											
50	0.44	0.30										
60	0.63	0.48	0.30									
70	0.81	0.65	0.44									
80	1.00	0.83	0.58	0.40								
90		1.00	0.72	0.53								
100			0.86	0.67	0.35							
110			1.00	0.80	0.44							
125				1.00	0.58	0.35						
140					0.72	0.46	0.35	0.30				
160					0.91	0.62	0.51	0.35	0.32	0.33		
180					1.00	0.77	0.63	0.46	0.37	0.43		
200						0.92	0.75	0.57	0.46	0.50	0.32	
220						1.00	0.88	0.68	0.56	0.56	0.53	
240							1.00	0.78	0.65	0.63	0.59	
280								1.00	0.84	0.77	0.72	
310									1.00	0.90	0.82	
330										1.00	0.89	
400											1.00	

**Effect of Anchor Spacing - Tension**

Rebar Spacing	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.64										
50	0.67	0.63									
60	0.70	0.65	0.63								
70	0.73	0.67	0.64								
80	0.76	0.69	0.66	0.63							
90	0.79	0.72	0.68	0.64							
100	0.82	0.74	0.70	0.65	0.63						
120	0.87	0.79	0.74	0.68	0.65	0.63	0.63				
150	0.96	0.86	0.80	0.73	0.68	0.65	0.64				
160	1.00	0.88	0.82	0.74	0.70	0.66	0.65	0.63	0.63	0.63	
175		0.92	0.85	0.76	0.71	0.67	0.66	0.63	0.63	0.63	
200		1.00	0.90	0.80	0.74	0.69	0.69	0.65	0.65	0.65	
225			0.95	0.84	0.77	0.72	0.71	0.67	0.67	0.66	
240			1.00	0.86	0.79	0.73	0.72	0.68	0.68	0.67	
250				0.87	0.80	0.74	0.73	0.69	0.68	0.68	
275				0.91	0.83	0.76	0.75	0.71	0.70	0.69	
280				0.92	0.84	0.77	0.76	0.71	0.70	0.69	
300				0.95	0.86	0.79	0.78	0.73	0.72	0.71	
320				1.00	0.88	0.81	0.80	0.74	0.73	0.72	
350					0.92	0.83	0.82	0.77	0.75	0.73	
400					1.00	0.88	0.87	0.80	0.78	0.76	
440						0.92	0.91	0.83	0.81	0.79	
480						1.00	0.94	0.86	0.84	0.81	
540							1.00	0.91	0.88	0.84	
600								0.96	0.92	0.88	
660								1.00	0.96	0.91	
720									1.00	0.95	
800										1.00	

**Effect of Edge Distance - Tension**

Edge Distance	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.64										
50	0.73	0.63									
60	0.82	0.70	0.63								
70	0.90	0.77	0.68								
80	1.00	0.84	0.74	0.63							
90		0.91	0.80	0.67							
100		1.00	0.86	0.71	0.63						
110			0.92	0.76	0.66						
120			1.00	0.80	0.70	0.64					
140				0.89	0.77	0.67	0.63				
160				1.00	0.84	0.72	0.70	0.63	0.67		
180					0.91	0.78	0.75	0.66	0.71	0.68	
200					1.00	0.84	0.81	0.71	0.74	0.71	
220						0.89	0.86	0.75	0.78	0.75	
240						1.00	0.92	0.80	0.82	0.78	
270							1.00	0.87	0.87	0.83	
300								0.94	0.93	0.88	
330								1.00	0.98	0.93	
360									1.00	0.98	
400										1.00	

**Effect of Edge Distance - Shear**

Edge Distance	Rebar Diameter										
(mm)	8	10	12	16	20	25	28	32	36	40	
40	0.25										
50	0.44	0.30									
60	0.63	0.48	0.30								
70	0.81	0.65	0.44								
80	1.00	0.83	0.58	0.40							
90		1.00	0.72	0.53							
100			0.86	0.67	0.35						
110			1.00	0.80	0.44						
125				1.00	0.58	0.35					
140					0.72	0.46	0.35				
160					0.91	0.62	0.51	0.32	0.33		
180					1.00	0.77	0.63	0.37	0.43		
200						0.92	0.75	0.46	0.50	0.32	
220						1.00	0.88	0.56	0.56	0.53	
240							1.00	0.65	0.63	0.59	
280								0.84	0.77	0.72	
310								1.00	0.90	0.82	
330									1.00	0.89	
400										1.00	

**Notes :**

All grades shown for information. M30 for A4-70 tensile strength of 500N/mm<sup>2</sup>, instead of 700N/mm<sup>2</sup>.

Safety factor is 1.25 for all carbon steel. Safety Factor is 1.56 for stainless steel, up to M2





## Chemical filling volume chart for reinforcing bars in ml

For the change of mixers and cartridges on additional quantity has to be calculated

Rebar Diameter	Hole Diameter	Chemical filling volume chart for reinforcing bars in ml															
(mm)	(mm)																
8	12	4.56	5.32	6.08	6.84	7.60	8.36	9.12	9.88	10.64	12.16	15.20	18.24	21.28	24.32	30.40	37.99
10	14	5.47	6.38	7.29	8.21	9.12	10.03	10.94	11.85	12.77	14.59	18.24	21.88	25.53	29.18	36.47	45.59
12	16	6.38	7.45	8.51	9.57	10.64	11.70	12.77	13.83	14.89	17.02	21.28	25.53	29.79	34.04	42.55	53.19
16	20	8.21	9.57	10.94	12.31	13.68	15.05	16.41	17.78	19.15	21.88	27.36	32.83	38.30	43.77	54.71	68.39
20	25	12.82	14.96	17.10	19.23	21.37	23.51	25.65	27.78	29.92	34.19	42.74	51.29	59.84	68.39	85.49	106.86
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500
25	30	26.12	28.73	31.35	33.96	36.57	41.79	52.24	62.69	73.14	83.59	104.48	130.60	146.28	167.17	188.07	208.97
28	35	41.89	46.08	50.27	54.45	58.64	67.02	83.78	100.53	117.29	134.04	167.55	209.44	234.57	268.09	301.60	335.11
32	40	54.71	60.18	65.65	71.12	76.60	87.54	109.42	131.31	153.19	175.08	218.85	273.56	306.38	350.15	393.92	437.69
36	44	60.79	66.87	72.95	79.03	85.11	97.26	121.58	145.90	170.21	194.53	243.16	303.95	340.43	389.06	437.69	486.32
40	50	85.49	94.04	102.58	111.13	119.68	136.78	170.97	205.17	239.36	273.56	341.95	427.43	478.72	547.11	615.50	683.89
Anchorage length(mm) lb <sub>int</sub>		100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800

$$\text{Volume} = (3.14/4 \cdot D^2) - (3.14/4 \cdot d^2) \cdot \text{depth} / 1000 \cdot 1.21 \quad (D = \text{Hole diam.}; d = \text{Rebar/Stud Diam.})$$

Material lost for proper mixing and wastage while using already considered.

## Chemical filling volume chart for studs in ml.

For the change of mixers and cartridges on additional quantity has to be calculated

Stud Diameter	Hole Diameter	Chemical filling volume chart for studs in ml.															
(mm)	(mm)																
8	10	2.05	2.39	2.74	3.08	3.42	3.76	4.10	4.45	4.79	5.47	6.84	8.21	9.57	10.94	13.68	17.10
10	12	2.51	2.93	3.34	3.76	4.18	4.60	5.02	5.43	5.85	6.69	8.36	10.03	11.70	13.37	16.72	20.90
12	14	2.96	3.52	3.95	4.45	4.94	5.43	5.93	6.42	6.91	7.90	9.88	11.85	13.83	15.81	19.76	24.70
16	18	3.88	4.52	5.17	5.81	6.46	7.10	7.75	8.40	9.04	10.33	12.92	15.50	18.09	20.67	25.84	32.29
20	24	10.03	11.70	13.37	15.05	16.72	18.39	20.06	21.73	23.40	26.75	33.43	40.12	46.81	53.50	66.87	83.59
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500
24	28	19.76	21.73	23.71	25.68	27.66	31.61	39.51	47.42	55.32	63.22	79.03	98.78	106.69	118.54	146.20	158.06
27	32	28.02	30.82	33.62	36.43	39.23	44.83	56.04	67.25	78.46	89.67	112.08	140.10	151.31	168.12	207.35	224.16
30	35	30.87	33.96	37.04	40.13	43.22	49.39	61.74	74.09	86.44	98.78	123.48	154.35	166.70	185.22	228.44	246.96
33	38	33.72	37.09	40.46	43.84	47.21	53.95	67.44	80.93	94.42	107.90	134.88	168.09	182.09	202.32	249.53	269.76
36	40	28.88	31.76	34.65	37.54	40.43	46.20	57.75	69.30	80.85	92.40	115.50	144.38	155.93	173.25	213.68	231.00
Anchorage length(mm) lb <sub>int</sub>		100	110	120	130	140	160	200	240	280	320	400	500	540	600	740	800

$$\text{Volume} = (3.14/4 \cdot D^2) - (3.14/4 \cdot d^2) \cdot \text{depth} / 1000 \cdot 1.21 \quad (D = \text{Hole diam.}; d = \text{Rebar/Stud Diam.})$$

Material lost for proper mixing and wastage while using already considered.

## ICFS Chemical Production Unit







# Chemical Mortar CM385/585PE

## Pure Epoxy



### Description

The CM385/585 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: 385ml Cartridge or 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
- Diamond drilled holes
- Zero shrinkage
- European approved
- Fire approved
- Studs and Rebar
- A+ Rating VOC content

### Approvals

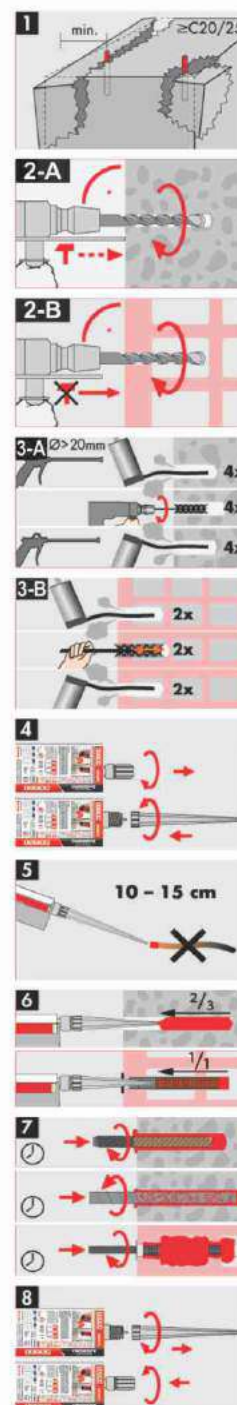
- ETA Option 1 ETAG 001 for cracked concrete with studs and rebar TR029
- ETA Option 1 ETAG 001 for rebar TR023 : Approved for Seismic Loads C2
- F120 Fire Test report • ICC-ES Approval ESR 3853
- BS6920 for use with potable water WRAS Approved 1309522
- ETA approved in flooded holes, wet and dry concrete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



### TYPICAL GEL AND CURING TIME

T	Gel	Cure
40°C	10 min	150 min
35°C	16 min	240 min
25°C	25 min	480 min
15°C	60 min	1200 min
5°C	120 min	3000 min
0°C	N/A	N/A

For installation at -10°C cartridge must be 20°C







Typical characteristic and design resistance performance with 5.8 grade studding and associated installation data

Stud Ø (mm)	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Distances (kN)			Min Edge & Spacing (mm)	Nominal Embedment (mm)	Hole Diameter concrete (mm)	Hole Diameter fixture (mm)	Max. Torque (Nm)
	Tension	Shear	Tension	Shear	Tension	Shear	Edge	Spacing	Edge					
	N <sub>ck</sub>	V <sub>ck</sub>	N <sub>ed</sub>	V <sub>ed</sub>	N <sub>res</sub>	V <sub>res</sub>	C <sub>0.8</sub>	S <sub>0.8</sub>	C <sub>0.8</sub>					
M 8	19.00	9.00	12.70	7.20	9.07	5.14	80	160	80	40	80	10	09	10
M 10	30.20	15.00	20.10	12.00	14.36	8.57	100	200	90	50	90	12	12	20
M 12	43.80	21.00	29.20	16.80	20.86	12.00	120	240	110	60	110	14	14	40
M 16	81.60	39.00	54.40	31.20	38.86	22.29	160	320	125	80	125	18	18	80
M 20	127.40	61.00	84.90	48.80	60.64	34.86	200	400	180	100	170	24	22	120
M 24	183.60	88.00	122.40	70.40	87.43	50.29	240	480	220	120	210	28	26	160
M 27	238.00	115.00	159.10	92.00	109.52	65.71	270	540	240	135	240	32	30	180
M 30	292.00	142.50	194.50	114.00	133.33	81.43	300	600	280	150	280	35	32	200
M 33	342.12	173.50	162.91	138.80	116.36	99.14	330	660	310	165	300	37	36	250
M 36	396.07	212.50	188.60	170.00	134.72	121.43	360	720	330	180	340	40	38	300

### High bond reinforcing bars Fyk=500N/mm<sup>2</sup>

Rebar Diameter	Hole Diameter	Embedment Depth hef																				h <sub>ef</sub> failure	Steel failure load (kN)
(mm)	(mm)	60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800	(mm)	(kN)
8	10	11.7	13.7	15.6	17.6	19.6	21.5	23.5	25.2													129	25.2
10	12	14.7	17.1	19.6	22.0	24.4	26.9	29.3	31.8	34.2	39.1	39.3										161	39.3
12	15		19.1	21.8	24.5	27.2	30.0	32.7	35.4	38.1	43.6	54.5	56.6									208	56.6
16	20			26.8	30.2	33.5	36.9	40.2	43.6	46.9	53.6	67.0	80.4	93.8	100.6							300	100.6
20	25			28.7	32.3	35.9	39.5	43.1	46.7	50.3	57.5	71.9	86.2	100.5	114.9	143.6						438	157.1
25	30					41.1	45.3	49.4	53.5	57.6	65.8	82.3	98.7	115.2	131.7	164.6	205.7					549	226.0
28	35						50.7	55.3	59.9	64.5	73.7	92.2	110.6	129.0	147.5	184.3	230.4	258.1				668	308.0
32	40								68.5	73.7	84.3	105.3	126.4	147.5	168.5	210.7	263.3	294.9	337.1			763	402.1
36	44									79.2	90.5	113.1	135.7	158.4	181.0	226.0	282.8	316.7	362.0	407.2		902	510.0
40	50										95.8	119.7	143.6	167.6	191.5	239.4	299.2	335.1	383.0	430.9	478.8	1050	628.3
Depth (mm)		60	70	80	90	100	110	120	130	140	160	200	240	280	320	400	500	560	640	720	800		

### Characteristic and Design Load resistances based on characteristic bond strengths for hef 4d (minimum embedment) to 20d

Stud Ø (mm)	Non Cracked Concrete						Cracked Concrete						Nominal Embedment (mm)
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	
	N <sub>ck</sub>	V <sub>ck</sub>	N <sub>ed</sub>	V <sub>ed</sub>	N <sub>res</sub>	V <sub>res</sub>	N <sub>ck</sub>	V <sub>ck</sub>	N <sub>ed</sub>	V <sub>ed</sub>	N <sub>res</sub>	V <sub>res</sub>	
M 8	30.16	9.00	16.76	7.20	11.97	5.14	Not Applicable		Not Applicable		Not Applicable		80
M 10	42.41	15.00	23.56	12.00	16.83	8.57							90
M 12	62.20	21.00	34.56	16.80	24.68	12.00	31.10	21.00	17.28	16.80	12.34	12.00	110
M 16	87.96	39.00	48.87	31.20	34.91	22.29	42.22	39.00	23.46	31.20	16.75	22.29	125
M 20	138.86	61.00	66.12	48.80	47.23	34.86	63.90	61.00	30.41	48.80	21.72	34.86	170
M 24	190.00	88.00	90.48	70.40	64.63	50.29	85.50	88.00	40.71	70.40	29.10	50.29	210
M 27	244.29	115.00	116.33	92.00	83.09	65.71	107.49	115.00	51.18	92.00	36.56	65.71	240
M 30	316.67	142.50	150.80	114.00	107.71	81.43	133.00	142.50	63.33	114.00	45.24	81.43	280
M 33	342.12	173.50	162.91	138.80	116.37	99.14	140.27	173.50	66.80	138.80	47.71	99.14	300
M 36	396.07	212.50	188.60	170.00	134.72	121.43	154.47	212.50	73.56	170.00	52.54	121.43	340





## Bond Strength Factors

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm <sup>2</sup> (Mpa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
fc =	0.98	1.00	1.02	1.04	1.06	1.08	1.09	1.10

Characteristic and Design Load resistance for Rebar based on characteristic bond strengths for hef 10d (min. embedment)

Rebar Ø (mm)	Non Cracked Concrete						Cracked Concrete						Nominal Embedment (mm)
	Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		Characteristic Resistance (kN)		Design Resistance (kN)		Recommended Load (kN)		
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	
	N <sub>ck</sub>	V <sub>ck</sub>	N <sub>ed</sub>	V <sub>ed</sub>	N <sub>rec</sub>	V <sub>rec</sub>	N <sub>ck</sub>	V <sub>ck</sub>	N <sub>ed</sub>	V <sub>ed</sub>	N <sub>rec</sub>	V <sub>rec</sub>	
8	22.12	13.95	12.29	9.30	8.78	6.64	Not Applicable		Not Applicable		Not Applicable		80
10	31.10	21.45	17.28	14.30	12.34	10.21							100
12	41.47	31.05	23.04	20.70	16.45	14.79	22.81	31.05	12.67	20.70	9.05	14.79	110
16	59.69	55.50	33.16	37.00	23.69	26.43	28.05	55.50	15.58	37.00	11.13	26.13	125
20	96.13	86.55	45.78	57.70	32.70	41.21	42.30	86.55	20.14	57.70	14.39	41.21	170
25	148.44	135.00	70.69	90.00	50.49	64.29	63.83	135.00	30.40	90.00	21.71	64.29	210
28	209.36	168.75	99.69	112.50	71.21	80.36	87.93	163.75	41.87	112.50	29.90	80.36	280
32	273.44	220.95	130.21	147.30	93.01	105.21	112.11	220.95	53.39	147.30	38.13	105.21	320

## Bond Strength Factors - Rebar

Influence of concrete strength on combined pull out and concrete cone resistance

Concrete Strength N/mm <sup>2</sup> (Mpa)	C15/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60	C55/67	C60/75
fc =	0.98	1.00	1.02	1.04	1.06	1.08	1.09	1.10	1.10	1.12

Rebar Diameter (mm)	Rebar Bst 500 to DIN 488		Rebar Bst 500 to DIN 488	
	N <sub>rk,s</sub>	N <sub>rd,s</sub>	V <sub>rk,s</sub>	V <sub>rd,s</sub>
8	28.0	20.0	14.0	9.3
10	43.0	30.7	21.5	14.3
12	62.0	44.3	31.0	20.7
14	85.0	60.7	42.5	28.3
16	111.0	79.3	55.5	37.0
18	140.0	100.0	70.0	46.7
20	173.0	123.6	86.5	57.7
22	209.0	149.3	104.5	69.7
25	270.0	192.9	135.0	90.0
28	339.0	242.1	169.0	112.7
32	442.0	315.7	221.0	147.3
36	563.2	443.5	281.6	187.7
40	693.8	546.3	346.9	231.3

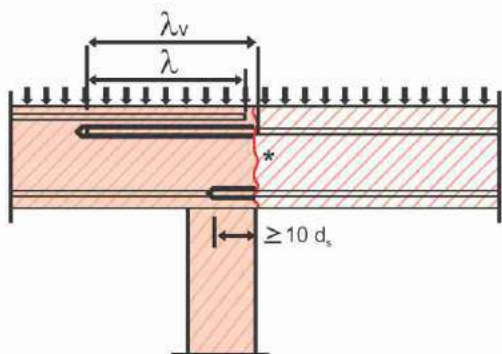




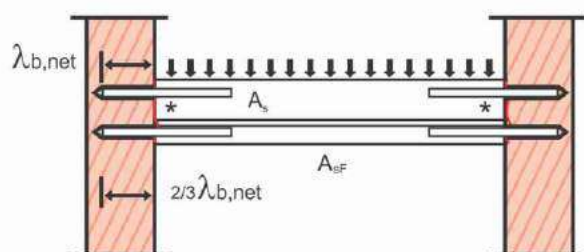
## Post installed Rebar schematics

### Application examples of Post-installed Rebar

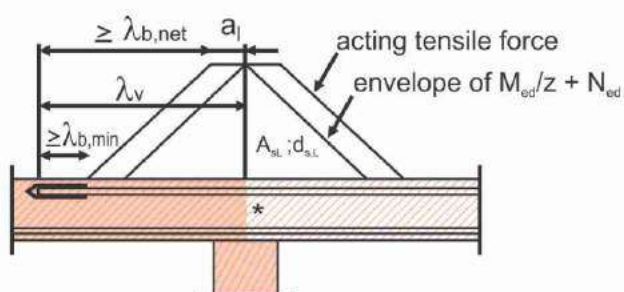
**Figure 1 :** Overlap joints in slabs and beams.



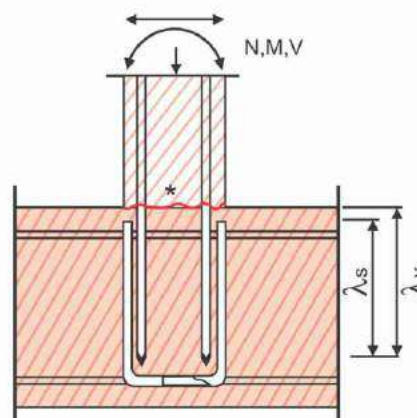
**Figure 3 :** End anchoring of slabs or beams, designed as simply supported.



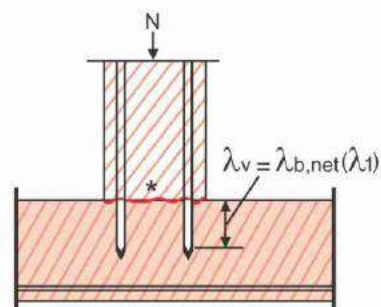
**Figure 5 :** Anchoring of reinforcement to cover the line of acting tensile force.



**Figure 2 :** Overlap joint in foundation of a column or wall where the rebars are stressed in tension.



**Figure 4 :** Rebar connection of components stressed primarily in compression. The rebar are stressed in compression.



#### Note to Figure 1 to 5 :

In the figures no transverse reinforcement is plotted, the transverse reinforcement as required by EC 2 shall be present. The shear transfer between old and new concrete shall be designed according to EC2. Description of the bonded-in rebars and overlap joints see Annex 4 and 5.

\*Roughened joint



## CHEMICAL MORTAR CM385/585



**Variant** 385/585ml side by side 3:1 ratio cartridge.

**Material** Pure Epoxy

**Product  
code**

CM385/585

**Content  
(ml)**

385/585

**Colour when  
mixed**

red

**Package  
content**

10

Deutsches Institut für Bautechnik **DIBt**

Agencies body for construction products and types of construction  
Bautechnisches Prüfamt  
An institution established by the Federal and Länder Governments

Member of **ETA**  
www.dibt.de

Designed according to Article 28 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

**European Technical Assessment** **ETA-17/0129**  
**of 29 March 2017**

English translation prepared by DIBt - Original version in German language

**General Part**

Technical Assessment Body issuing the European Technical Assessment.	Deutsches Institut für Bautechnik
Trade name of the construction product	ICFS Injection system CM 385 PE / CM 585 PE for concrete
Product family to which the construction product belongs	Bonded anchor for use in concrete
Manufacturer	Indo Spark Constructions services 168 E Tararani Chowk Near Geeta mandir KOLHAPUR Maharashtra 416003 INDIEN
Manufacturing plant	Indo Spark Construction services Plant 1
This European Technical Assessment contains	27 pages including 3 annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 5: "Bonded anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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21-012-17 6-09-01-2017







## PULL OUT TEST

- Pull out test establishes the strength or the resistance of an anchor to withstand a tensile (Pull out) Load.
- Pull out test is carried out for both Mechanical and Chemical anchors and also for rebars.
- ICFS has capacity to undertake pull out tests from Dia 8mm to Dia 40mm bar and stud.
- The test unit could be either KN or TON. ICFS have equipment to do a pull out test of upto 75 ton load on site.
- Pull out test is carried out using an hydraulic equipment with provision to hold and exert a tensile load to try and extract the rebar/ stud from its anchored position.
- Pull out test is either done to establish the performance of anchor for a recommended load or to decide on ultimate load value at which the substrate or the bonding of the anchor starts to fail.
- Thus a pull out test establishes the quality of anchoring and suitability of the base material for a pre determined load.
- ICFS uses calibrated gauges and equipment to carry out pull out tests.

## PULL OUT TESTING PROCEDURE

- Test is conducted on customer site, in the presence of customer/ consultant.
- ICFS have personnel trained in doing Pull out tests and only trained persons are sent for pull out test.
- No of anchors to be tested and the load at which pull out test is to be carried out, is as decided by the customer.
- On completion, a test report with result Data filled in and co-signed both by the customer and the ICFS person carrying out the test is prepared and handed over.

## ICFS ADVANTAGE

- Trained Personnel
- Calibrated equipment
- Tests on site at customer Location
- Establishes the strength of anchor at a particular load
- Establishes the structural strength of Base

**INDOSPARK CONSTRUCTION SERVICES**

**ICFS**

**ICFS Product Load Test Certificate**

Date: 22/10/2016

Client Name: **NERIST**  
Address: **NORTH EASTERN REGIONAL INSTITUTE OF SCIENCE & TECHNOLOGY**  
Site Address: **NERIST, NIGUNJI KHOWACHAL, PRADASH (OORISSA) UNIVERSITY**  
Person Name: **Godrej & Boyce (Pradash Pradesh)**

Chemical Details	Stud size mm	Drill Hole Dia	Drill Hole Depth	Recommended Load As per Catalog (KN)	Load Value Observation
ICFS 350	10x130mm	12 mm	90mm	Smart classroom	5.2 KN
ICFS 350	10x165	12 mm	120 mm	—	7.4 KN
ICFS 350	10x130	12 mm	90 mm	Ground floor	6.9 KN
ICFS 350	10x165	12 mm	120 mm	—	12.9 KN
ICFS 350	10x130	12 mm	90 mm	Netral classroom	4.2 KN
ICFS 350	10x165	12 mm	120 mm	—	7.5 KN

Suggested Anchor: **ICFS 350 VESF Chemical Anchors 10x165 mm/OK**

Test was Carried out in the presence of following officers

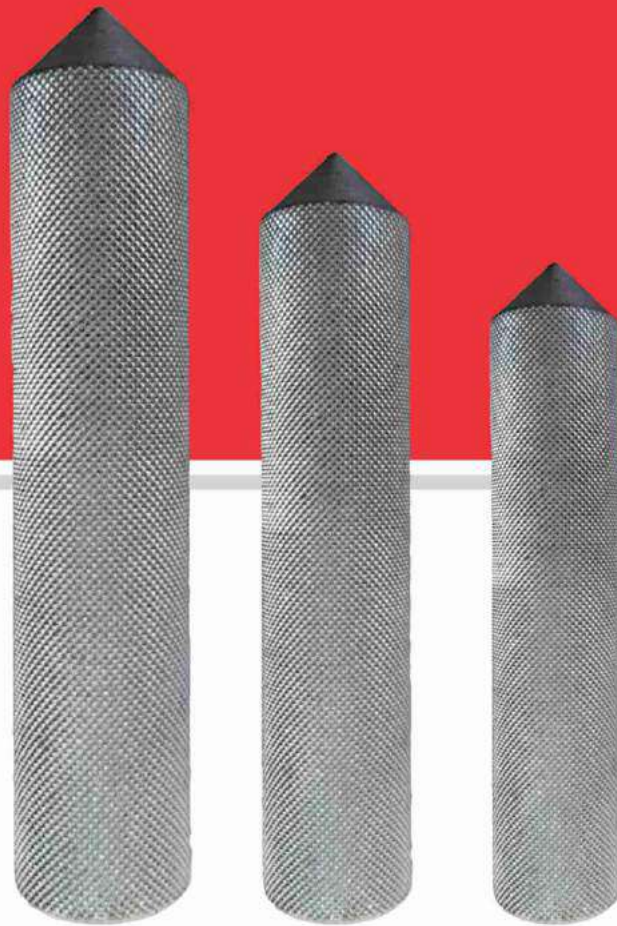
Designation	Name	Company	Signature
Chief	Robin Pattnay	Green valley civil	
main	Shoban Khatun	GREEN VALLEY CIVIL	
Self	Amol Khatun	ICFS	

What do you think about ICFS Service-----

For: **Indo Spark Construction Services.**

9544 693332





EXTRA LONG  
**DROP IN ANCHOR**





## Extra Long

### Drop In Anchor EL-DIA

#### Description

The internal threaded anchor is made of zinc-plated steel. The internal threaded anchor is a systems accessory for various ICFS mortar cartridges or injection mortars. Application with pre-portioned mortar cartridges is especially cost-effective for individual fixings. During mounting with the resin capsule, set the EL-DIA through rotating and hitting motions with a hammer drill. The capsule is destroyed during the setting process, which mixes and activates the mortar compound. During mounting with injection mortars, the internal threaded anchor is pushed into the drill hole manually by lightly rotating it. The various mortars bond the entire surface of the EL-DIA with the drill hole wall. The internal threaded anchor can be removed when surface-flush and is, for example, mainly suitable for temporary fixings such as for machines in internal areas.

#### Features

- Surface flush removal enables fixing point to be reused.
- Conventional screws and threaded rods can be used. This lowers costs and complexity.
- Approved for anchorage in cracked and non-cracked concrete in combination with various mortar
- cartridges or injection mortars.

#### Advantages

- The internal threaded anchor EL-DIA is suitable for use with resin capsules or injection mortars in concrete. The internal threaded anchor EL-DIA allows for the surface-flush removal and reuse of the fixing point. It therefore offers great flexibility.
- The metric internal thread allows for the use of standard metric screws or threaded rods, which enables ideal adaptation in line with the intended use.

#### Application

- Removable and temporary job fixings.
- Anchoring with resin capsules.
- Anchoring with injection mortars in concrete.

#### Building material

1. Cracked concrete.
2. Non-cracked concrete C20/25-C50/60



### Available in Diameters

Diameter (mm)	Length (mm)
M08	125
M10	125
M12	125
M16	125
M20	125

### Base material

Zinc-plated steel 5.8

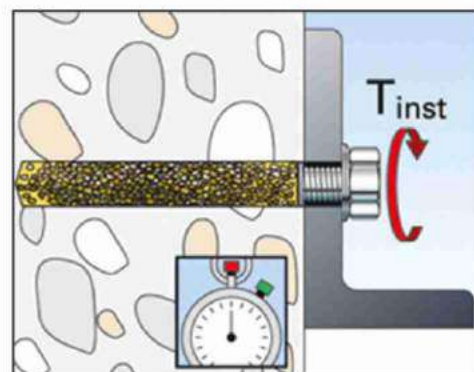
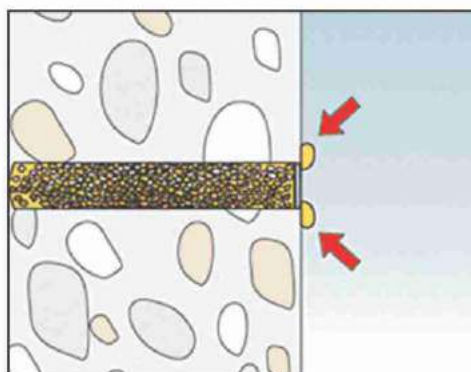
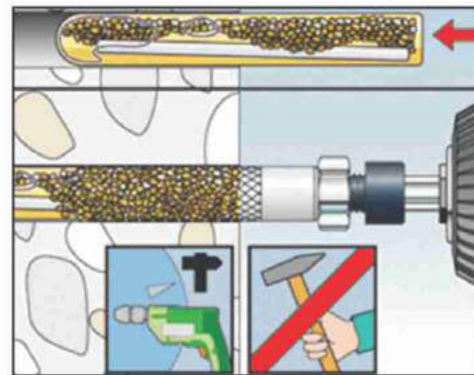
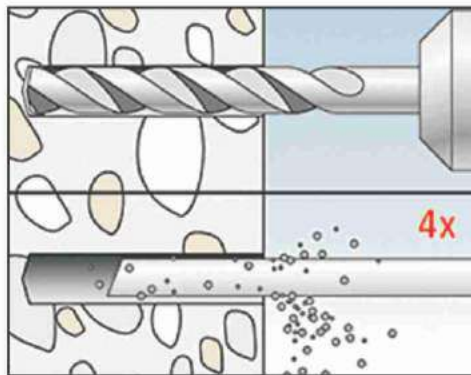
### Installation

**For use in conjunction with resin capsules:**

- The internal threaded anchor (EL-DIA) is set using a hammer drill and the accompanying setting tool in rotating and hitting motions.
- During setting, the oblique edge of the internal threaded anchor destroys the capsule, and mixes and activates the mortar.

**For use in conjunction with injection mortars:**

- The EL-DIA is set manually by lightly rotating it until it reaches the drill hole base. The mortar bonds the entire surface of the internal threaded anchor with the drill hole wall and seals the drill hole.



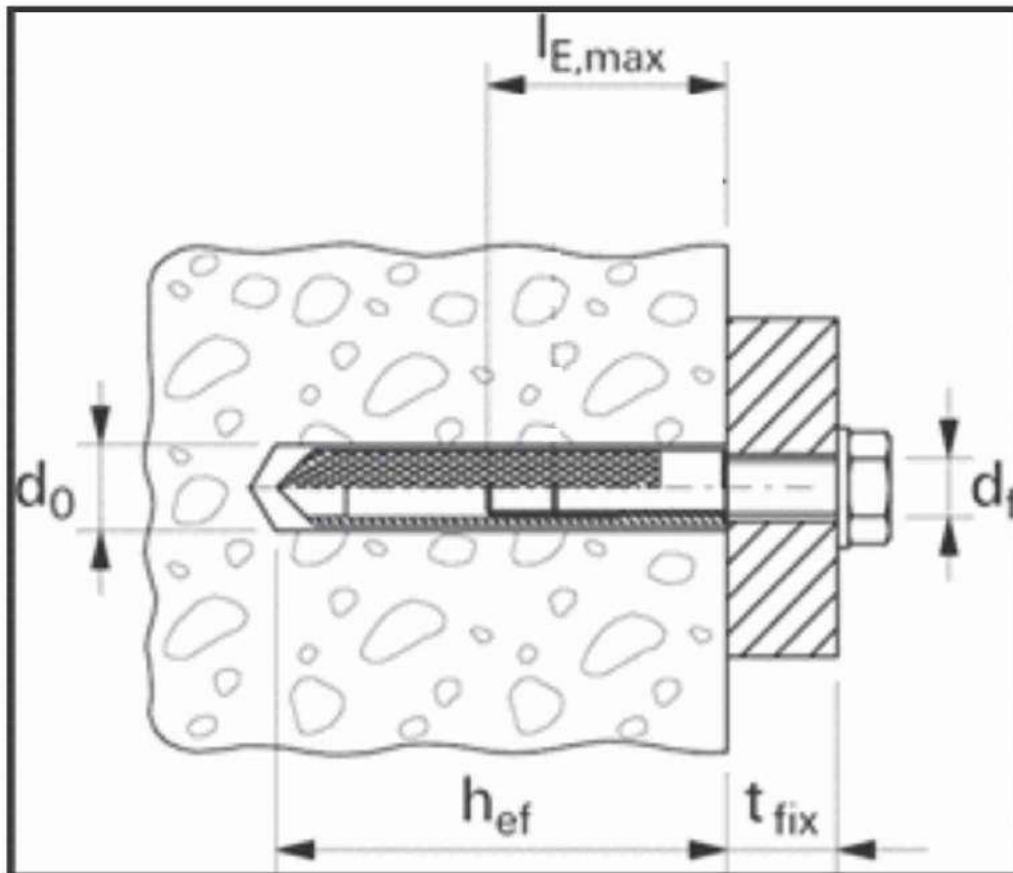




## Temp range

-40 to +80 deg. Celsius.

## Technical Data



$d_1$	$d_0$	Drill Ø	$h_{ef}$	$t_{fix}$	$l_{E,MAX}$	$T_{inst} (Nm)$
08	12	14	125	25	30	20
10	14	16	125	25	30	35
12	16	18	125	30	35	60
16	20	22	125	35	50	120
20	26	28	125	35	65	240
All dimensions are in mm						



CHEMICAL ANCHOR  
**ACCESSORIES**





## Accessories for drill hole cleaning

### Blow out pump **BP**

#### Description

The hand operated blow out pump BP is for drill hole cleaning prior to anchor installation.



Blow out pump

Variant Hand Operated  
Material ABS

Product code	Overall length (mm)	Package content
BP280	280	1

#### Important Note :

Performance based on clean holes;

HAMMER DRILLED- blown and then brushed with a still metal brush & blown

### Cleaning brush **CB**



Cleaning brush CB



#### Description

Wire brush CB is for thorough cleaning and hole preparation.

Variant Hand Operated  
Material Steel body & head

Product code	Overall length (mm)	Overall length (mm)	Package content
CB0816	13	8-16	1
CB1824	18	18-24	1
CB2636	28	26-36	1

### Mixer Nozzle **MN**

PLASTIC



Mixer nozzle MN

#### Description

Spare mixer nozzle for use with chemical mortar cartridges  
CM350VESF, CM350P, CM400PE

Variant Co-axial  
Material Plastic

Product code	Suitable for chemical mortar cartridge	Package content
MN300	CM350VESF	1
MN400	CM400PE	1



## Dispenser **DM 300** Steel body and mechanism

Dispenser DM300

### Description

The Professional Dispenser DM300 for use with chemical mortar cartridge CM300P & CM350VESF.

Product code	Cartridge size (ml)	Package content
DM300	300	1



**Variant** 300ml 10:1 ratio cartridge.  
**Material** steel body and mechanism

## Dispenser **DM 400** Steel body and mechanism

Dispenser DM400

### Description

The Professional Dispenser DM400 for use with chemical mortar cartridge CM400PE.

Product code	Cartridge size (ml)	Package content
DM400	400	1



**Variant** 400ml side by side 1:1 ratio cartridge.  
**Material** steel body and mechanism

## Dispenser **DM 585** Steel body and mechanism

Dispenser DM585

### Description

The Professional Dispenser DM585 for use with chemical mortar cartridge CM385/585PE

Product code	Cartridge size (ml)	Package content
DM500	385/585	1



**Variant** 385/585ml side by side 3:1 ratio cartridge.  
**Material** steel body and mechanism





PU FOAM

**1K Assembly**

**1K Assembly PRO**

**1K Fire Rated Foam B1**

**1K Fire Rated Foam B1 PRO**

**Gun & Foam Cleaner**



## 1K Assembly Foam

High performance one-component expanding PU foam

### Description

ICFS FOAM 1K is a one-component, self expanding, ready to use polyurethane foam with CFC - free propellants, which are completely harmless to the ozone layer.

### Features

- Excellent adhesion on most substrates (except Teflon, PE and PP)
- High thermal and acoustical insulation.
- Very good filling capacities.
- Excellent stability (no shrink or post expansion)
- Excellent mounting capacities.

### Application

- Installation of window and door frames.
- Filling of cavities.
- Sealing of all openings in roof constructions.
- Creation of a soundproof screen.
- Mounting and sealing of window and door frames.
- Connecting of insulation materials and roof constructions.
- Application of soundproofing layers on motors.
- Improving thermal insulation in cooling systems.



750ml

One time  
use only



Color

Light yellow

Package

Aerosol can 12 pcs in a box

Shelf Life

18 months when seal not opened

Property	Unit	Value
Tack free time	minute	12–16
Cutting time (30 mm bead)	minute	30–40
Completely cured in joint (at +23 °C)	hour	up to 18
Completely cured in joint (at +5 °C)	hour	up to 24
Density	kg/m <sup>3</sup>	25–30
Fire class of cured foam (DIN 4102-1)		B3
Volume decrease	%	up to 2
Post expansion	times	2–2,5
Flash point of cured foam	°C	400
Tensile strength (BS 5241)	N/cm <sup>2</sup>	11
Compression strength at 10% deformation (DIN 53421)	N/cm <sup>2</sup>	3
Thermal conductivity	W/(m·K)	0,036
Temperature resistance of cured foam	°C	long term: -50 to +90 short term: -65 to +110

### HOW TO USE



The values specified were obtained at +23 °C and 50% relative humidity, unless otherwise specified.

### IMPORTANT NOTE

- Read all instructions and safety information prior to use of any product. The product contains no formaldehyde. Cured foam is non-toxic.
- Contents are under pressure.
- Do not puncture or incinerate.
- Do not place in hot water or near radiators, stoves or other sources of heat.
- Use only in well-ventilated areas.
- Wear impervious gloves, protective eyewear, and suitable work clothes when using.

### SAFETY ADVICE

- Keep out of children's reach.
- Keep upright Shelter from direct sunlight. Do not expose to temperatures exceeding 50°C.
- Do not pierce or burn even after use.
- No smoking during the whole spraying procedure.
- For safety reasons, please wear protective gloves as well as goggles before using Spray PU foam, and do not draw them off until the whole procedure is finished.





## 1K Assembly Foam PRO

High performance Gun-Grade expanding PU foam

### Description

ICFS FOAM PRO with CFC-free propellant is a one-component, self expanding, ready to use polyurethane foam. It contains CFC-free propellants, which are completely harmless to the ozone layer.

### Features

- Excellent adhesion on most substrates (except Teflon, PE and PP)
- High thermal and acoustical insulation
- Very good filling capacities
- Excellent mounting capacities
- Excellent stability (no shrink or post expansion)
- Very precise application due to the foam gun system resulting in controlled expansion
- Low expansion

### Application

- Installing of window and door frames.
- Filling of cavities.
- Sealing of all openings in roof constructions.
- Creation of a soundproof screen.
- Mounting and sealing of window and door frames.
- Connecting of insulation materials and roof constructions.
- Application of a soundproofing layer on motors.
- Improving thermal isolation in cooling systems.



750ml



#### Color

Light yellow

#### Package

Aerosol can 12 pcs in a box

#### Shelf Life

18 months when seal not opened

Property	Unit	Value
Tack free time	minute	12–16
Cutting time (30 mm bead)	minute	30–40
Completely cured in joint (at +23 °C)	hour	up to 12
Completely cured in joint (at +5 °C)	hour	up to 24
Density	kg/m <sup>3</sup>	25–30
Fire class of cured foam (DIN 4102-1)		B3
Volume decrease	%	up to 2
Flash point of cured foam	°C	400
Tensile strength (BS 5241)	N/cm <sup>2</sup>	10
Compression strength at 10% deformation (DIN 53421)	N/cm <sup>2</sup>	3
Thermal conductivity	W/(m·K)	0,034
Dimensional stability (TM1004)	%	approx 5
Cutting time (TM1005)	min	30-35

**Remark :** For gun/professional foam, an additional foam gun dispenser is needed to spray (Needs to buy separately). In such case, you may also need to buy foam cleaner to clean the gun adapter after use.

### IMPORTANT NOTE

- Read all instructions and safety information prior to use of any product. The product contains no formaldehyde. Cured foam is non-toxic.
- Contents are under pressure.
- Do not puncture or incinerate.
- Do not place in hot water or near radiators, stoves or other sources of heat.
- Use only in well-ventilated areas.
- Wear impervious gloves, protective eyewear, and suitable work clothes when using.

### SAFETY ADVICE

- Keep out of children's reach.
- Keep upright. Shelter from direct sunlight. Do not expose to temperatures exceeding 50°C.
- Do not pierce or burn even after use.
- No smoking during the whole spraying procedure.
- For safety reasons, please wear protective gloves as well as goggles before using Spray PU foam, and do not draw them off until the whole procedure is finished.

### HOW TO USE





## 1K Fire Rated Foam B1

High performance one-component expanding  
Fire Rated PU foam

### Description

ICFS High-quality fire insulation foam with straw applicator with low post expansion for demanding users. The new and narrower straw applicator ensures good foam structure and high output. The new trigger is suitable for temporary airtight sealing of the straw during work

### Features

- Good resistance to moisture & mould.
- Great results at low temperatures.
- Good adhesive & filling properties.
- Good insulator of temperature & sound.
- Good adherence on various building materials.
- Usable with the delivered straw applicator.
- Easy to use & Fast curing.
- The new and narrower straw ensures better foam structure and higher output.
- The new trigger is suitable for temporary air-tight sealing of the straw during work pauses

### Application

- Installation of fire-proof doors & windows.
- Sealing of joints in fire rated walls.
- Insulation of feed through of pipes and cables.
- Sealing and fixation of pipes as well as thermal insulation – any place where high fire-proof ness is required.



750ml

One time  
use only

#### Color

Light yellow

#### Package

Aerosol can 12 pcs in a box

#### Shelf Life

18 months when seal not opened



Property	Unit	Value
Tack free time	minute	12–16
Cutting time (30 mm bead)	minute	30–40
Completely cured in joint (at +23 °C)	hour	up to 18
Completely cured in joint (at +5 °C)	hour	up to 24
Density	kg/m <sup>3</sup>	25–30
Fire class of cured foam (DIN 4102-1)		B1
Volume decrease	%	up to 2
Post expansion	%	up to 30
Flash point of cured foam	°C	400
Tensile strength (BS 5241)	N/cm <sup>2</sup>	8
Compression strength at 10% deformation (DIN 53421)	N/cm <sup>2</sup>	2,5
Thermal conductivity	W/(m·K)	0,034
Temperature resistance of cured foam	°C	long term: -50 to +90 short term: -65 to 110

### HOW TO USE



#### IMPORTANT NOTE

- Read all instructions and safety information prior to use of any product. The product contains no formaldehyde. Cured foam is non-toxic.
- Contents are under pressure.
- Do not puncture or incinerate.
- Do not place in hot water or near radiators, stoves or other sources of heat.
- Use only in well-ventilated areas.
- Wear impervious gloves, protective eyewear, and suitable work clothes.

#### SAFETY ADVICE

- The product is flammable.
- Protect from overheating and keep away from ignitions sources.
- Avoid direct sunlight and do not smoke during work.
- May cause sensitisation by inhalation and skin contact.
- Ensure sufficient ventilation during application.
- Wear safety glasses and gloves.
- Keep out of the reach of children.
- Cured foam can be handled without any danger to health.





## 1K Fire Rated Foam B1 Gun Grade PRO

High performance Gun-Grade expanding  
Fire Rated PU foam

### Description

ICFS High-quality fire insulation foam with low post expansion for demanding users. Fire class meets the European standards EN 1366-4 and DIN 4102-1.

### Features

- Good resistance to moisture & mould.
- Great results at low temperatures.
- Good adhesive & filling properties.
- Good insulator of temperature & sound.
- Good adherence on various building materials.
- Easy to use & Fast curing.
- Very good adherence on various building materials.
- High-quality result under various weather conditions.
- Application with foam gun.

### Application

- Installation of fire-proof doors & windows.
- Sealing of joints in fire rated walls.
- Insulation of feed through of pipes and cables.
- Sealing and fixation of pipes as well as thermal insulation any place where high fire-proof ness is required.



750ml



#### Color

Light yellow

#### Package

Aerosol can 12 pcs in a box

#### Shelf Life

18 months when seal not opened

Property	Unit	Value
Tack free time	minute	12–16
Cutting time (30 mm bead)	minute	30–40
Completely cured in joint (at +23 °C)	hour	up to 18
Completely cured in joint (at +5 °C)	hour	up to 24
Density	kg/m3	25–30
Fire resistance class of cured foam (EN1366-4)		El 45 - El 180
Fire class of cured foam (DIN 4102-1)		B1
Volume decrease	%	up to 2
Post-Expansion	%	up to 30
Flash point of cured foam	°C	400
Tensile strength (BS 5241)	N/cm2	8
Compression strength at 10% deformation (DIN 53421)	N/cm2	2.5
Thermal conductivity	W/(m·K)	0,034
Temperature resistance of cured foam	°C	long term: -50 to +90 short term: -65 to +110

### IMPORTANT NOTE

- Read all instructions and safety information prior to use of any product. The product contains no formaldehyde. Cured foam is non-toxic.
- Contents are under pressure.
- Do not puncture or incinerate.
- Do not place in hot water or near radiators, stoves or other sources of heat.
- Use only in well-ventilated areas.
- Wear impervious gloves, protective eyewear, and suitable work clothes

### SAFETY ADVICE

- The product is flammable.
- Protect from overheating and keep away from ignitions sources.
- Avoid direct sunlight and do not smoke during work.
- May cause sensitisation by inhalation and skin contact.
- Ensure sufficient ventilation during application.
- Wear safety glasses and gloves.
- Keep out of the reach of children.
- Cured foam can be handled without any danger to health.

### HOW TO USE





## Gun & Foam Cleaner

Cleaning Spray for removal of uncured Construction Foam tools and surfaces

### Description

Gun & Foam Cleaner is a ready to use cleaning can for ICFS Gun and PU Foam Pro.

### Features

- Gun & Foam cleaner used in cleaning cans for use on ICFS PU Foam Gun and foams.
- By Gun & Foam cleaner Cleaning of the valves of the ICFS PU Foam
- By Gun & Foam cleaner Removal of uncured foam.
- Gun & Foam cleaner Used in conjunction with ICFS PU Foam Gun and the foam Applicator as cleaning fluid.



### Application

- Cleaning of the gun.
- Cleaning of the valves of the PU Foam.
- Removal of uncured foam.

#### IMPORTANT NOTE & SAFETY ADVICE

- Extremely flammable aerosol.
- Keep out of reach of children.
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
- Do not spray on an open flame or other ignition source.
- Do not pierce or burn, even after use.
- Use only outdoors or in a well-ventilated area.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Store in a well ventilated place.
- Dispose of the contents/containers in accordance with the current legislation on waste treatment.
- Repeated exposure may cause skin dryness or cracking.
- No Smoking.

### How to Use



#### ⚠ Caution for all Foam range

- Wear gloves & safety goggles.
- Moisten the surface.
- Firmly shake the canister at least 20-30 times.
- Attach the adapter / gun to the canister. Use the set screw to adjust the foam yield. (For gun foam)
- Turn the canister & apply the foam.
- Cut any surplus foam after curing.





## Foam Applications



Foam Applications

## Accessories



Straw



Gun





**TBA**

Through bolt anchor  
for heavy loads.

**IWA**

Indo Wedge Anchor





# TBA

Through bolt anchor



<div>TBA</div>				
	Diameters	Applications / Use	Advantages	Coating
	M6, M8, M10, M12, M14, M16, M20, M24	Urban furniture Shelves Fences General fixings	Wide range of sizes and lengths Full thread Fast installation of the anchor Reliable and cheap solution	Zinc-plated

Approvals	CE mark	Fire resistant	Material base					Utilisation				
			Non-cracked concrete	Cracked concrete	Natural dense stone	Solid brick	Hollow brick	Regular depth	Reduced depth	Direct load	Through installation	Resistant to corrosion
			●		●	●		●		●	●	

## CHARACTERISTICS

- Easy installation.
- For use in cracked and non-cracked concrete.
- For medium-high loads.
- Previous installation, or at the drilling of the material to be fixed.
- Wide range of lengths and diameters available; installation flexibility.
- For static or almost static loads.

## APPLICATIONS-USE

- Anchoring sheets
- Metallic structures
- Bridges
- Traction concrete
- Urban furniture
- Protection fences
- Overhead power cabling
- Elevators
- Pipe supports



## CHARACTERISTIC RESISTANCE

Characteristic resistances\* in concrete C20/25\*\* for an isolated anchor (without spacing and edge distances effects) are as per this table :

METRIC	M6	M8	M10	M12	M14	M16	M20
Minimum anchor length for which these data are applicable	60	75	90	110	120	125	170
$N_{R,k}$ : tension [KN]	7.7	12.0	16.0	25.0	30.0	35.0	50.0
$N_{R,k}$ : shear [KN]	<u>5.1</u>	<u>9.3</u>	<u>14.7</u>	<u>20.6</u>	<u>28.1</u>	<u>38.4</u>	<u>56.3</u>

## RECOMMENDED SAFETY FACTORS

SAFETY COEFFICIENTS		REDUCTION COEFFICIENT FOR RESISTANCES		INCREASING COEFFICIENT FOR LOADS
		CONCRETE FAILURE	STEEL FAILURE	
Zinc plated	Tension	1.80	1.40	1.4
	Shear	--	1.25	

## APPLICATION / USE




**TBA**

Zinc plated.



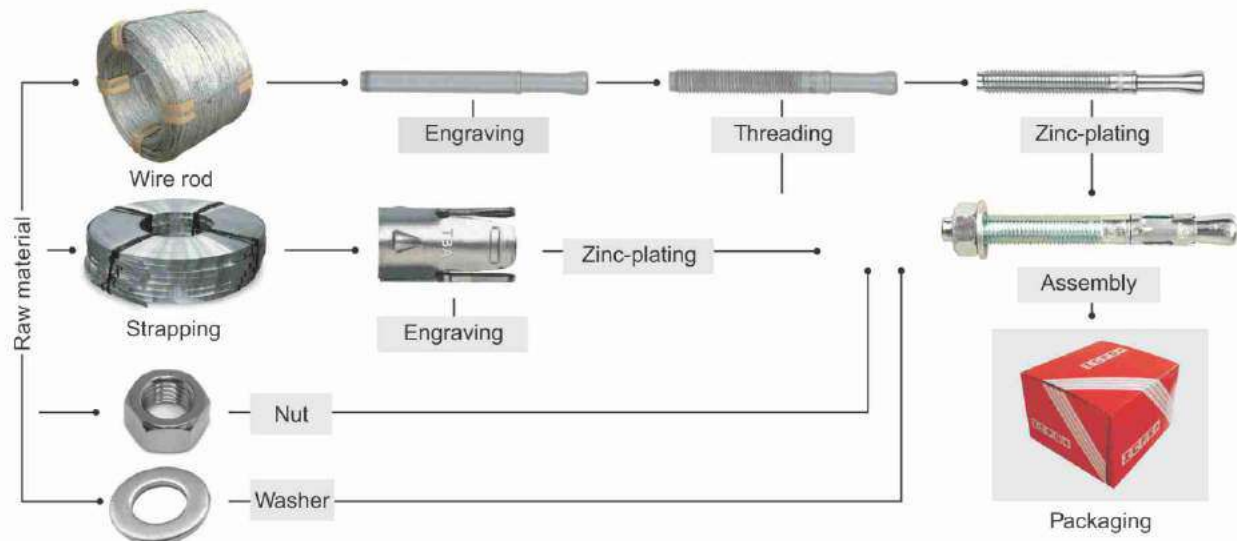
CODE	SIZE	MAX. FIXTURE THICKNESS	QUANTITY	
<b>TBA875</b>	M-8 x 75	5	100	600
<b>TBA890</b>	M-8 x 90	20	100	600
<b>TBA8115</b>	M-8 x 115	45	100	400
<b>TBA1080</b>	M-10 x 80	–	100	400
<b>TBA1090</b>	M-10 x 90	10	100	400
<b>TBA10100</b>	M-10 x 100	20	100	400
<b>TBA10120</b>	M-10 x 120	40	50	300
<b>TBA10150</b>	M-10 x 150	60	50	200
<b>TBA1275</b>	M-12 x 75	5	50	300
<b>TBA12100</b>	M-12 x 100	8	50	200
<b>TBA12120</b>	M-12 x 120	28	50	200

#### Stainless Steel 304 (A2)

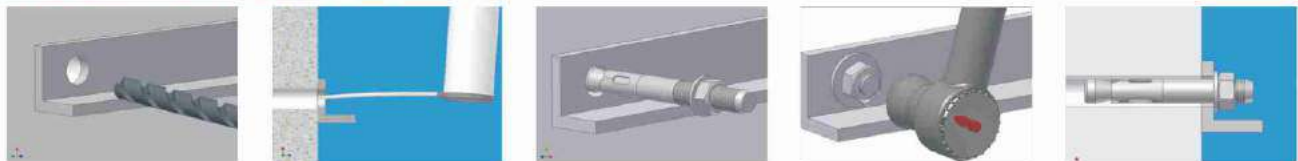
<b>TBA1090 (A2)</b>	M-10 x 90	10	100	400
<b>TBA12130 (A2)</b>	M-12 x 130	28	50	200

<b>TBA12150</b>	M-12 x 150	48	50	200
<b>TBA16100</b>	M-16 x 100	–	25	150
<b>TBA16125</b>	M-16 x 125	5	25	100
<b>TBA16145</b>	M-16 x 145	25	25	100
<b>TBA16170</b>	M-16 x 170	48	25	75
<b>TBA16200</b>	M-16 x 200	98	25	50
<b>TBA16250</b>	M-16 x 250	128	25	50
<b>TBA20170</b>	M-20 x 170	23	20	40
<b>TBA20220</b>	M-20 x 220	73	20	40
<b>TBA20270</b>	M-20 x 270	123	20	40
<b>TBA24200</b>	M-24 x 200	4	10	20
<b>TBA24250</b>	M-24 x 250	84	10	20

#### MANUFACTURING PROCESS OF THE TBA ANCHOR



#### INSTALLATION PROCEDURE







## TBA Through Bolt Anchor

### Product Technical Specification

Type	Art No.	Nominal Drill Dia	Min drill depth with push-through Installation [mm]	Anchorage depth [mm]	Anchor length [mm]	Max Usable [mm]	Thread length [mm]	Thread	Wide across nut [sw]	Washer outer diameter X thickness [mm]	Installation Torque [Nm]
TBA	TBA0875	8	65	60	75	5	35, 5	8	13	16 X 1.6	20
TBA	TBA0890	8	65	60	90	20	50, 5	8	13	16 X 1.6	20
TBA	TBA08120	8	65	60	120	50	80, 5	8	13	16 X 1.6	20
TBA	TBA1075	10	55	52	75	8	38	10	17	20 X 2	35
TBA	TBA1090	10	70	67	90	10	46	10	17	20 X 2	35
TBA	TBA10100	10	70	67	100	20	56	10	17	20 X 2	35
TBA	TBA10150	10	170	70	150	70	106	10	17	20 X 2	35
TBA	TBA12100	12	75	70	100	23	45	12	19	24 X 2, 5	60
TBA	TBA12120	12	85	77	120	28	65	12	19	24 X 2, 5	60
TBA	TBA12150	12	85	77	150	58	95	12	19	24 X 2, 5	60
TBA	TBA12250	12	85	77	250	158	145	12	19	24 X 2, 5	60
TBA	TBA16100	16	75	69	100	15	32	16	24	30 X 3	120
TBA	TBA16145	16	110	104	145	23	77	16	24	30 X 3	120
TBA	TBA16200	16	110	104	200	78	132	16	24	30 X 3	120
TBA	TBA20170	20	175	125	170	27	99	20	30	37 X 3	240
TBA	TBA20220	20	175	125	220	77	149	20	30	37 X 3	240

IWA

## Indo Wedge Anchor



		Material base					Utilisation		
Approvals	CE mark	Fire resistant	Non-cracked concrete	Cracked concrete	Natural dense stone	Solid brick	Hollow brick	Regular depth	Reduced depth
			●	●	●	●	●	●	●

	Diameters	Applications / Use	Advantages	Coating
<b>IWA</b>	M8, M10 M12, M16, M20	<ul style="list-style-type: none"> <li>Structural applications in non cracked concrete.</li> <li>Safety barriers.</li> <li>Billboards, machinery, boilers, signals, steel beams.</li> <li>Fixing wood structure in concrete.</li> </ul>	Wide range of sizes and lengths Full thread Fast installation of the anchor Reliable and cheap solution	Zinc-plated

## CHARACTERISTICS

- Roughness working principle; installation by controlled torque.
- Use for high loads.
- Assessed for two installation depths.
- Easy installation.
- Use in non-cracked concrete.
- Previous installation, or through the fixture.
- Use for static or quasi-static loads.
- Three versions zinc plated, stainless steel A2 and A4.
- Variety of lengths and sizes, assembly flexibility.
- DIN 440 for fixing wood structures to concrete.

## APPLICATIONS-USE

- Structural applications in non cracked concrete
- Safety barriers.
- Billboards, machinery, boilers, signals, steel beams.
- Fixing wood structure in concrete



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Designed according to  
Annex B of  
Regulation (EU)  
No 305/2011

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**European Technical Assessment**  
ETA 16/0502  
of 22/08/2016

English translation prepared by ETAC. Original version in Spanish language.

**General Part**

**Technical Assessment Body** Issuing the ETA designated according to Art. 29 of Regulation (EU) No 305/2011:  
Instituto de Ciencias de la Construcción Eduardo Torroja (ICTT)

**Trade name of the construction product**  
(ICFS) INDO WEDGE ANCHOR IWA  
(ICFS) INDO WEDGE ANCHOR IWA-A4

**Product family to which the construction product belongs**  
Torque controlled expansion anchor made of galvanized steel or stainless steel of sizes M8, M8, M10, M12, M14, M16 and M20 for use in non-cracked concrete.

**Manufacturer**  
INDO SPARK CONSTRUCTION SERVICES  
128 E Talaravi Chowk Near Geeta Mandir Kallapur  
410003 Maharashtra, India  
website: [www.indospark.com](http://www.indospark.com)

**Manufacturing plants**  
ICFS Plant 1  
ICFS Plant 2

**This European Technical Assessment certifies**  
13 pages including 4 annexes which form an integral part of this assessment. Annex E contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.

**This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of**  
Guideline for European Technical Approval ETAG 001 "Metal anchors for use in concrete", ed. April 2013. Parts 1 and 2 used as European Assessment Document (EAD)

## CHARACTERISTIC RESISTANCE

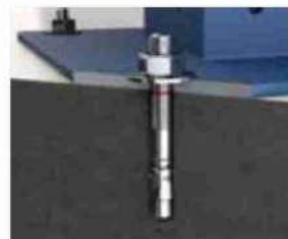
Characteristic resistance\* in concrete C02/25\*\* for an isolated anchor (without spacing and edge distances effects) are as per this table :

METRIC	M8					M10					M12					M16					M20				
Minium anchor length for which these data are applicable	60	75	90	100	115	130	90	100	120	150	100	120	160	180	125	145	220	170	220						
STANDARD INSTALLATION DEPTH																									
NR,K:Tension (KN)	13.0					19.0					26.4					38.8					50				
VR,K:Shear (KN)	9.3					14.7					20.6					38.4					73.5				
NR,K:Tension (KN)	10.0					13.7					17.8					26.4					—				
VR,K:Shear (KN)	10.4					13.4					17.8					26.4					—				

## RECOMMENDED SAFETY FACTORS

SAFETY COEFFICIENTS		REDUCTION COEFFICIENT FOR RESISTANCES		INCREASING COEFFICIENT FOR LOADS
		CONCRETE FAILURE	STEEL FAILURE	
Zinc platted	Tension	1.80	1.40	1.4
	Shear	--	1.25	

## APPLICATION / USE







## **DROP IN ANCHOR**



## Drop in Anchor DIA

Drop in Anchor in zinc plated steel



### Description

The Drop in Anchor DIA is internally threaded to offer a suitable fixing in conjunction with all standard types of metric bolts, set screw and studding. The drop in anchor DIA creating, permanent and reusable female thread in the base material. After inserting the Drop in Anchor.

### Advantages

- Flush surface finish means fixtures can be relocated easily Material.
- Versatile, usable with standard metric bolts sets screws or studding.
- Quick and easy to install.
- No thread damage when hammering the Drop in Anchor into the drilled hole.
- Stainless steel version available for corrosive environments.
- No flared end for easy setting in greater depth.
- Allows for shallow embedment without sacrificing performance.
- Hammer set anchor with internal thread for prepositioned installation.
- Suitable for all screws or studs with metric threads.

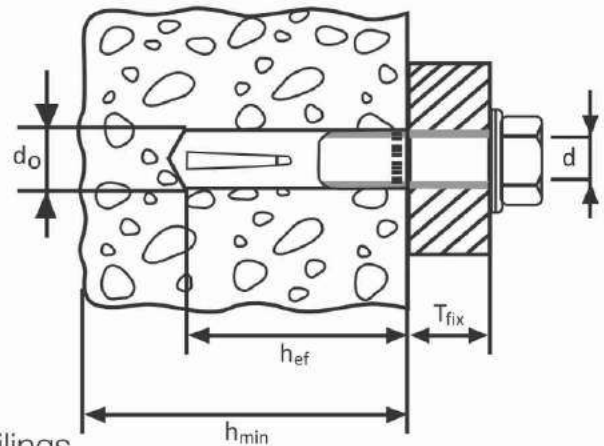
### For Fixing of

- Pipes and Sprinkler systems.
- Steel constructions.
- Cable trays.
- Suspended ceilings.

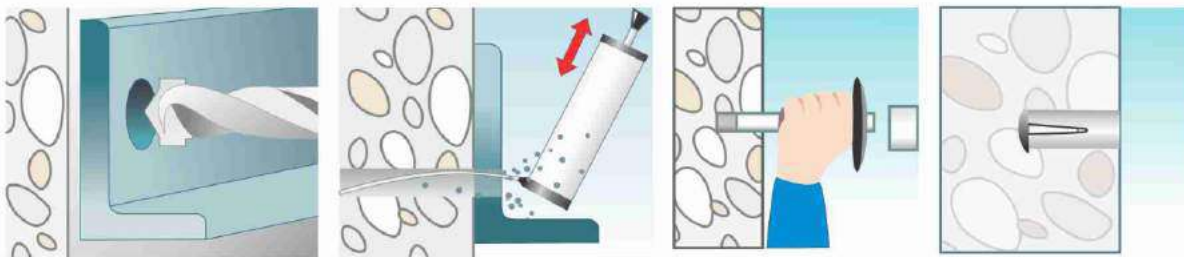
### Suitable for

- Non-cracked concrete=C12/15
- Natural stone with dense structure.
- Anchoring light ceiling lining and suspended ceilings.

### DIA Anchors Installation



### Installation







## Drop In Anchor Sizes

Product Code Zinc Plated	Product A4 -316	Anchor Diameter	Drill- $\phi$	Min hole depth		Min Base thickness	Min. drill hole depth in fixing element	Anchor length	Qty Per Box	
		mm								
		d	d <sub>o</sub>	h1		h min	df	L		
DIA0625	DIA0625S	M06	08	25	25	80	25	25	50	
DIA0830	DIA0830S	M08	10	30	30	80	30	30	50	
DIA1040	DIA1040S	M10	12	40	40	90	40	40	50	
DIA1250	DIA1250S	M12	15	50	50	110	50	50	50	
DIA1665	DIA1665S	M16	20	65	65	140	65	65	25	
DIA2080	DIA2080S	M20	25	80	80	160	80	80	20	

## Technical Specifications

Product Code Zinc Plated	Product Code A4-316	Mechanical Properties of Drop in Anchor's					Recommended load Capacity of Drop in Anchor's				
		Nominal Tensile capacity	Nominal Yield stress	Effective cross section	Sectional modulus	Effective anchor embedment	Tensile Capacity	Shear Load Capacity	Anchor Spacing	Edge distance	Required tightening torque
		f <sub>tk</sub> (N/mm <sup>2</sup> )	f <sub>yk</sub> (N/mm <sup>2</sup> )	A <sub>s</sub> (mm <sup>2</sup> )	W <sub>el</sub> (mm <sup>3</sup> )	h <sub>ef</sub> (mm)	N <sub>ul</sub> (kN)	V <sub>rec</sub> (kN)	S <sub>c</sub> N (mm)	C <sub>e</sub> N (mm)	T inst (Nm)
DIA0625	DIA0625S	520	400	20.10	12.70	25	4.6	3.6	80	40	4.5
DIA0830	DIA0830S	520	400	36.60	31.20	30	5.7	4.5	90	45	11
DIA1040	DIA1040S	520	400	58.00	62.30	40	6.9	5.5	120	60	22
DIA1250	DIA1250S	520	400	84.30	109.20	50	11.9	9.4	150	75	38
DIA1665	DIA1665S	520	400	157.00	277.50	65	15.0	32.7	200	100	95
DIA2080	DIA2080S	520	400	245.00	540.90	80	19.2	51.0	240	120	185

## Drop in Anchor installation products





## **NYLON FRAME PLUG**





## Nylon Frame Plug NFP

Polymide PA6 nylon - steel, zinc plated



### Description

The nylon frame plug NFP provides a professional and secure method for the fixing of doors and window frames. It has an elongated nylon plug body incorporating a countersunk collar and is supplied complete with heavy gauge screw in either countersunk or hexagonal head.

### Advantages

- Special anti-expansion design lets the user drive both plug and screw into the hole together, without the plug expanding before it is fully inserted.
- Side-links stop plug from breaking open during insertion, ensuring positive action when screw is driven in.
- Screw guide stops screw from penetrating sides, by ensuring positive tracking down entire length.
- M-teeth combined with side-links and screw-guide, ensure entire plug face is forced against walls of hole, for enhanced grip in soft materials.
- Offset block profile allows plug to hold firmly against sides of hole when expansion begins.
- Countersunk collar reduces risk of bi-metallic corrosion when fastening non-ferrous fixtures.
- Nylon material absorbs vibration and noise.
- Extended expansion length guarantees maximum load-bearing capacity.

### Advice

For installations in perforated and hollow bricks drill with a rotary action only (hammer switched off)

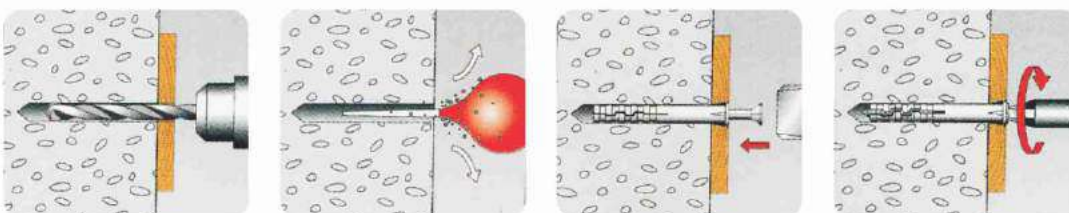
### Base Material

Short expansion plug recommended for use in concrete, natural stone and brick. Extended expansion plug is recommended for use in hollow brick, gypsum aerated concrete and sandstone.

### Applications

Ideal for timber battens, wooden batten, skirting, facade and roof substructures, metal and plastic, window and doorframes, metal profiles, fireproof doors, panels and cladding.

### Installation





Variant short expansion-cskscrew  
Material polyamide PA6 nylon

NFP - SC



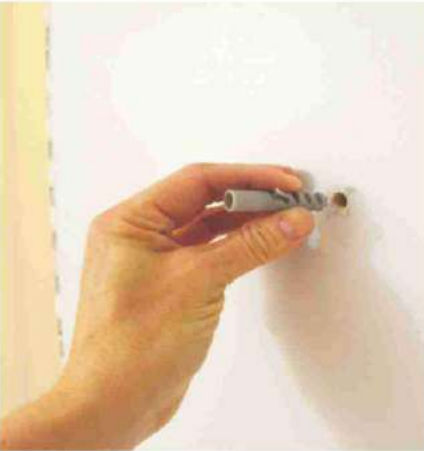
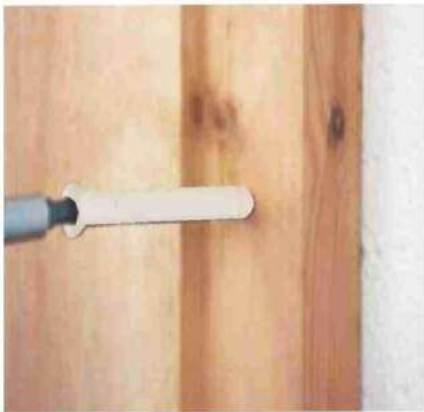
Product code	Plug Size	Plug length (mm)	Screw thread diameter (mm)	Hole depth through work piece	Fastening Thickness (mm)	Package content
NFP08060SC	M08	60	5	70	10	100
NFP08080SC	M08	80	5	90	30	100
NFP08100SC	M08	100	5	110	50	100
NFP08120SC	M08	120	5	130	70	50
NFP08140SC	M08	140	5	150	90	50
NFP10080SC	M10	80	6	90	30	50
NFP10100SC	M10	100	6	110	50	50
NFP10120SC	M10	120	6	130	70	50
NFP10140SC	M10	140	6	150	90	50
NFP10160SC	M10	160	6	170	110	50

Variant short expansion-hex head  
Material polyamide PA6 nylon

NFP - SH



Product code	Plug Size	Plug length (mm)	Screw thread diameter (mm)	Hole depth through work piece(mm)	Fastening Thickness (mm)	Package content
NFP08060SC	M08	60	5	70	10	100
NFP08080SC	M08	80	5	90	30	100
NFP08100SC	M08	100	5	110	50	100
NFP08120SC	M08	120	5	130	70	50
NFP08140SC	M08	140	5	150	90	50
NFP10080SC	M10	80	6	90	30	50
NFP10100SC	M10	100	6	110	50	50
NFP10120SC	M10	120	6	130	70	50
NFP10140SC	M10	140	6	150	90	50
NFP10160SC	M10	160	6	170	110	50







## Nylon Hammer Fixing Plug NHF

Polymide PA6 nylon - steel, zinc plated/ stainless steel / A2-304



### Description

The nylon hammer fixing plug NHF is a time saving hammer-in nylon plug with pre-assembled zinc plated nail-screw. The nylon hammer fixing plug NHF expands when the nail is driven in, and holds by friction in the drill hole. Suitable for most types of base materials. Long expansion area, nail-screw with reinforced neck and pozidrive head. Fixture can easily be removed. The nylon hammer fixing plug NHF is available with two different styles of head. The countersunk head NHF-CK is for countersunk fix in thick materials and the cylindrical head NHF-CY is for round head fix in thin materials also available with 304 stainless nail for corrosive environments.

### Advantages

- Deforming crumple zone allows for quick adjustment of depth on uneven surfaces.
- Brand point allows for quick and easy insertion of the Hammer plug into the pre-drilled hole.
- Long expansion area provides a more efficient fix even in light weight aerated concrete.
- Off-set block profile ensures that as plug expansion commences, it is held firm against the hole.
- Knock in protection prevents premature expansion when driving in the screw, yet makes it possible to adjust the depth of plug in the hole.
- Position of the nail in front of the thread start permits easy drive in facility yet allows excellent screw out qualities for possible removal and re-use.
- Oblique thread using the barbed hook principle achieves good pull out figures without sacrificing speed of application.
- Reinforced screw head facilitates high knock-in loads with the added benefit of grip around the plug neck holding the material firm.

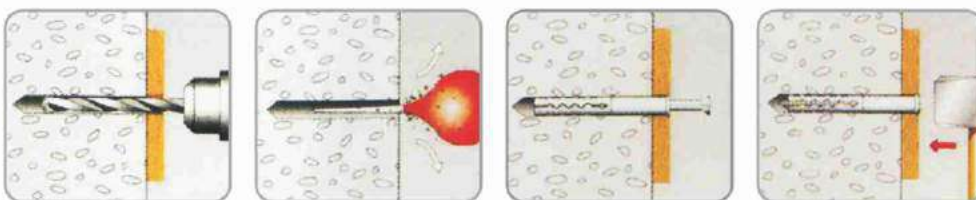
### Base Material

Recommended for use in dense concrete, natural stone, lightweight concrete, brickwork and aerated concrete blocks.

### Applications

Ideal for mounting frames, skirting boards, wood battens, pipe clips, cable ducts, angles, brackets & fittings needing many mounting points.

### Installation





Nylon Hammer Fixing Plug NHF - CK

**Variant** countersunk head  
**Material** polyamide PA6 nylon

NHF - CK



Product code	Plug Size	Plug length (mm)	Hole depth through work piece(mm)	Fastening Thikness (mm)	Package content
NHF5040CK	M05	40	50	15	100
NHF6040CK	M06	40	50	10	100
NHF6060CK	M06	60	70	30	100
NHF6080CK	M06	80	90	50	100
NHF8060CK	M08	60	70	20	50
NHF8080CK	M08	80	90	40	50
NHF8100CK	M08	100	110	60	50
NHF8120CK	M08	120	130	80	50
NHF8140CK	M08	140	150	100	50

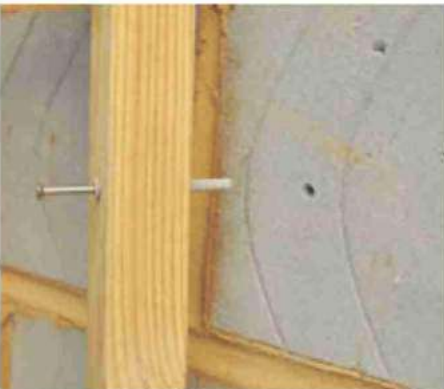
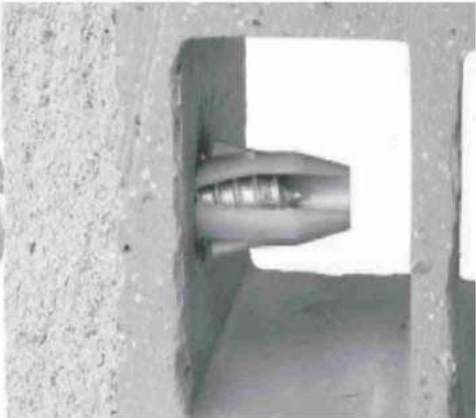
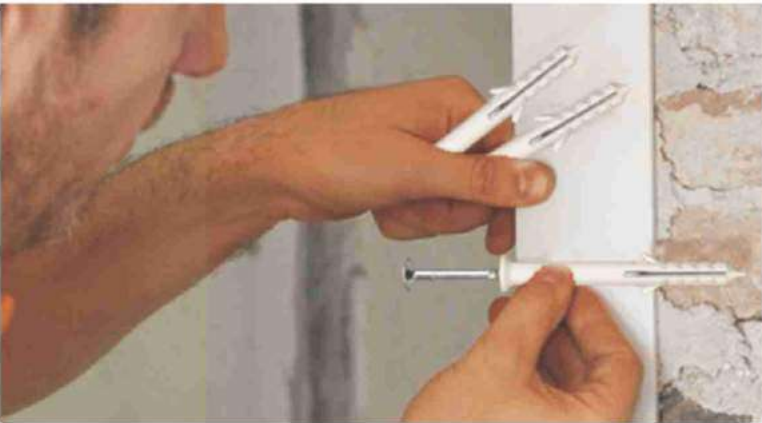
Nylon Hammer Fixing Plug NHF - CY

**Variant** cylindrical head  
**Material** polyamide PA6 nylon  
A2-304 screw

NHF - CY



Product code	Plug Size	Plug length (mm)	Hole depth through work piece(mm)	Fastening Thikness (mm)	Package content
NHF5040CY	M05	40	50	15	100
NHF6040CY	M06	40	50	10	100
NHF6060CY	M06	60	70	30	100
NHF6080CY	M06	80	90	50	100
NHF8060CY	M08	60	70	20	50
NHF8080CY	M08	80	90	40	50
NHF8100CY	M08	100	110	60	50
NHF8120CY	M08	120	130	80	50
NHF8140CY	M08	140	150	100	50







## Nylon Plug FD

Polymide PA6 nylon



### Description

The nylon plug NP is considerably stronger than standard grade plastic expansion plugs, these high quality wall plugs are designed for use with all screw fixings in masonry and concrete. High impact load and knock in protection prevents distortion on installation. Winged to prevent rotation in the drill hole.

### Advantages

- Suitable for wood and chipboard screws.
- Side-links stop plug from breaking open during insertion, ensuring positive action when screw is driven in.
- Screw guide stops screw from penetrating sides, by ensuring positive tracking down entire length.
- M-teeth combined with side-links and screw-guide, ensure entire plug face is forced against walls of hole, for enhanced grip in soft materials.
- Offset block profile allows plug to hold firmly against sides of hole when expansion begins.
- The wide neck is subject to no expansion pressure and prevents surface damage to tiles and plaster.
- Can be used with wood and chipboard screws from 2.5mm to 12mm.

### Base Material

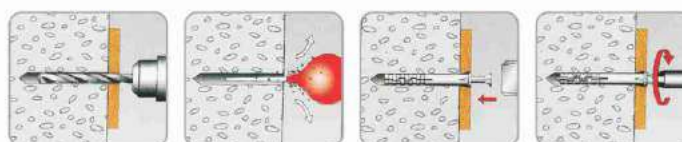
Short expansion plug is recommended for use in concrete, natural stone and brick. Highly recommended for use in all solid materials building including lightweight concrete, brickwork and aerated concrete blocks.

### Applications

Ideal for fixing pictures, motion detector, lamps, skirting, electric switches, small wall-mounted shelves, towel rails, lightweight mirror cabinets, letterboxes, hanging baskets and curtain rails.

**Variant** flush head  
**Material** polyamide PA6 nylon

Nylon plug - FD



Product code	Plug Size	Plug length (mm)	Screw thread diameter (mm)	Screw length (mm)	Hole diameter (mm)	Hole depth (mm)	Package content
FD0420	M04	20	2.5 - 3.0	25	4	25	200
FD0525	M05	25	3.0 - 4.0	30	5	35	200
FD0630	M06	30	4.0 - 5.0	40	6	40	200
FD0840	M08	40	4.5 - 6.0	50	8	55	100
FD1050	M10	50	6.0 - 8.0	60	10	70	50
FD1260	M12	60	8.0 - 10.0	70	12	80	25
FD1470	M14	70	10.0 - 12.0	80	14	90	20



## Nylon Plug (Polyamide 6)

Performance Data



### Testing NFP - Nylon Frame Fixing Plug

#### Material - Nylon (Polyamide 6)

Diameter (mm)	10	10	10	
Length (mm)	100	120	140	
Drilling Diameter (mm)	10	10	10	
Min. Drilling Depth (mm)	110	130	150	
Min. Drilling Depth (mm)	110	130	150	
Min. Installation length (mm)	100	120	140	
Max. Using Length (mm)	20	35	55	
Pull out tension value non cracked concrete (kN)	2.50	2.50	2.50	
Pull out tension value cracked concrete (kN)	1.62	1.62	1.62	
Pull out tension value light concrete (kN)	1.50	1.50	1.50	
Pull out tension value areated concrete (kN)	0.70	0.70	0.70	



### Testing NHF - Nylon Hammer Fixing Plug

#### Material - Nylon (Polyamide 6)

Diameter (mm)	5	6	6	6	8	8	8	8	8
Length (mm)	40	40	60	80	60	80	100	120	140
Drilling Diameter (mm)	5	6	6	6	8	8	8	8	8
Min. Drilling Depth (mm)	50	50	70	90	70	90	110	130	140
Max. using length (mm)	10	10	30	50	20	40	60	80	100
Min. Anchoring Depth (mm)	30	30	30	30	40	40	40	40	40
Pull out tension value non cracked concrete (kN)	0.40	0.60	0.60	0.60	1.00	1.00	1.00	1.00	1.00
Pull out tension value cracked concrete (kN)	0.26	0.39	0.39	0.39	0.65	0.65	0.65	0.65	0.65

### Testing FD-Plug



#### Material - Nylon (Polyamide 6)

Diameter (mm)	4	5	6	8	10	12	14	16
Length (mm)	20	25	30	40	50	60	70	80
Drilling Diameter (mm)	4	5	6	8	10	12	14	16
Min. Drilling Depth (mm)	25	30	40	50	60	70	80	90
Min. Installation Depth (mm)	20	25	30	40	50	60	70	80
Screws (mm)	2-3	2,5-4,0	3,5,-5,5	4,5-6,0	6,0-8,0	8,0-10,0	10,0-12,0	12,0-14,0
Pull out tension value non cracked concrete (kN)	0.42	0.50	0.75	2.18	2.20	2.60	3.00	4.00
Pull out tension value cracked concrete (kN)	0.26	0.32	0.45	1.40	1.43	1.70	1.95	2.60
Sandstone brick (kN)	0.29	0.36	0.84	0.61	5.12	—	—	—

This information should be regarded as general recommendations. More specifically, please note that these plug and anchors may not be used for work subject to building inspections. ( for securing facade substructures roof etc.)

\* Safety factor





## Celebration of 40th anniversary



## Delear Meeting







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## Safety



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