ANNEX 3

INSTALLATION AND ON-SITE TESTING OF POST–INSTALLED ANCHORAGE TO CONCRETE – CODE OF PRACTICE

FOREWORD

Various fastening techniques are used extensively for the transfer of loads into concrete structural elements. One such technique that is, post-installed anchors, installed in hardened structural concrete elements, has become quite common in the last two decades in India. Despite the extensive use of post-installed anchors in construction, the level of adequate knowledge regarding their behaviour is only increasing now.

Failure of connections poses risk to human life and considerable economic consequences. Hence, they should be designed, assessed and evaluated in accordance with the well-established engineering principles. Suitable guidance is therefore required for proper design of such system to ensure safety.

This standard has, therefore, been formulated to fulfill the above requirements. It addresses the right installation technique for different types of post-installed anchors in new concrete construction as well as for their use in the repair and strengthening of existing concrete structures. This standard would provide thus the requisite guidance regarding installation and on-site inspection and would be of help to the designers, contractors and users alike.

In this standard, it has been assumed that the installation of anchorages to concrete is carried out under the direction of a qualified and experienced supervisor.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall he rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

INSTALLATION AND ON-SITE TESTING OF POST–INSTALLED ANCHORAGE TO CONCRETE – CODE OF PRACTICE

1 SCOPE

1.1 The standard deals with the installation and on-site inspection of post-installed mechanical anchors and post-installed adhesive anchors in concrete. It gives a general recommendation about the methodology to be adopted for installation of different types of post-installed anchors covered under the scope of CED2 25733. It also highlights the requirement of proof testing of anchors after installation to validate the quality of installation.

1.2 It is to be noted that testing of anchors on-site is required to validate the quality of installation. Proof testing to validate the suitability of anchors conforming to the test regime of CED2 25734 and CED2 25735 is not required prior to selection of anchors qualified for use in concrete.

1.3 Proof load tests performed to verify proper installation shall not be used to develop design values.

Note –

The performance and suitability of the anchor shall be reviewed and checked from the assessment report (AR) for the exposure conditions such as temperature and environmental effects to the anchor during its lifetime.

2 REFERENCES

The standards (and documents) given in Annex E contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on these standards are encouraged to investigate the possibility of applying the most recent editions of the standards given in Annex E.

3 TERMINOLOGY

3.1 The terminologies in this document shall be read in conjunction with the definition of terms given in CED2 25733, CED2 25734 and CED2 25735.

4 POST-INSTALLED ANCHORS

It is a type of anchor in which the anchor is installed into cured and hardened concrete. For details related to the different types of post-installed anchors, CED2 25733 may be referred to.

5 INSTALLATION OF POST-INSTALLED ANCHORS

5.1 General requirement – The anchor installation shall be undertaken by installers who have been adequately trained by the manufacturer to install the specific type of anchor. The installer should be familiar with the correct installation procedures and ensure that the correct drilling and setting tools are available for the proper installation of the anchor.

The installer shall produce a certificate of training issued by the manufacturer to the individual, having a validity of not more than one year. The installer personnel shall carry a copy of the training certificate, to be furnished at the time of installation. The installer shall submit a check list of equipment to be used for the application, in conformity with the manufacturer's installation instructions (MPII) and shall be checked by the concerned site engineer/ supervisor. A sample format for check list is provided in Annex B.

A certificate of completion must be provided by the installer after installation of the anchors stating that installation has been done as per MPII and submitted to the concerned engineer/ supervisor. A typical format is provided in Annex C

Following are the general guidelines for installation of post-installed anchors –

(i) The first step is to identify the safe drilling locations using an appropriate rebar scanner.
(ii) The drill holes shall be drilled perpendicular to the surface of the concrete (tolerance of 5 degree) unless specifically required otherwise by the MPII.
(iii) The drill holes shall be cleaned according to MPII.
(iv) The post-installed anchors shall be installed in drilled and cleaned holes according to MPII.
(v) Unused holes shall be filled with non-shrinkage mortar with a strength at least equal to the base material.
(vi) Inspection and approval of the correct installation of the post-installed anchors shall be carried out by the supervisor.
(vii) Reinforcement near the drill hole locations should not be damaged during drilling. In prestressed concrete elements, adequate distance between the drill hole and the prestressing tendon shall be maintained. For determining the position of the reinforcement bars in the structure, a reinforcement scanner may be used.

5.2 Adhesive anchor - The detailed installation instructions for post-installed adhesive anchor are as follows -

(i) The safe drilling locations are to be identified.
(ii) The hole is to be drilled to the required embedment depth using a hammer drill machine with an appropriate carbide drill bit. The drilling depth shall depend on the requirement as per design. The diameter of the drill hole shall be as per MPII.

Note - Diamond coring is permissible with use of suitable diamond coring machines and corresponding bits if the performance of the anchor has been

tested and assessed in accordance with that. This is dependent on the recommendation of the manufacturer and the MPII. Proper measures shall be adopted to ensure surface preparation in case of diamond drilled holes, otherwise suitable reduction factor shall be applied to the anchor capacity.

(iii) Just before setting the steel element, the drill hole must be free of dust and debris. Care shall be taken to clean the hole with compressed air and wire brush as per MPII. Alternatively, the drilling may be carried out using a hollow drill bit with vacuum attachment, according to MPII.

Note – Water filled holes shall be cleaned with an appropriate wire brush soon after drilling. the holes shall be flushed by inserting a water hose to the bottom of the hole until the water runs clear, which shall be followed by cleaning again with a wire brush. Compressed air shall be applied over the whole length until return air stream is free of noticeable dust and water.

(iv) The volume of adhesive required for each anchor shall be calculated and appropriately recorded. Injection of calculated quantity of adhesive shall be done using injection nozzle with its tip kept at bottom of the hole and slowly withdrawing to avoid air voids.

Note –
1. The injection can be done either through a manual dispenser or by means of a mechanized system, ensuring correct volume of adhesive being dispensed into the hole.

2. To ensure right amount of adhesive has been injected in the holes, the total number of emptied foil packs shall be compared to the theoretical volume of injected holes.

3. In case of manual dispensing, where volume of adhesive dispensing cannot be controlled, prior to injection in the actual hole, it must be recorded in presence of the supervisor, the quantum of adhesive dispensed per trigger pull to ensure quality of installation. The dispenser tool shall be validated at regular interval (as decided by the supervisor) to ensure consistency of dispensing is maintained throughout the application.

(v) After injecting the adhesive, the steel element (threaded rod) shall be inserted into the hole by gently rotating the same in the hole, while the adhesive is still green. This is necessary to ensure proper bond between the steel element and the adhesive.

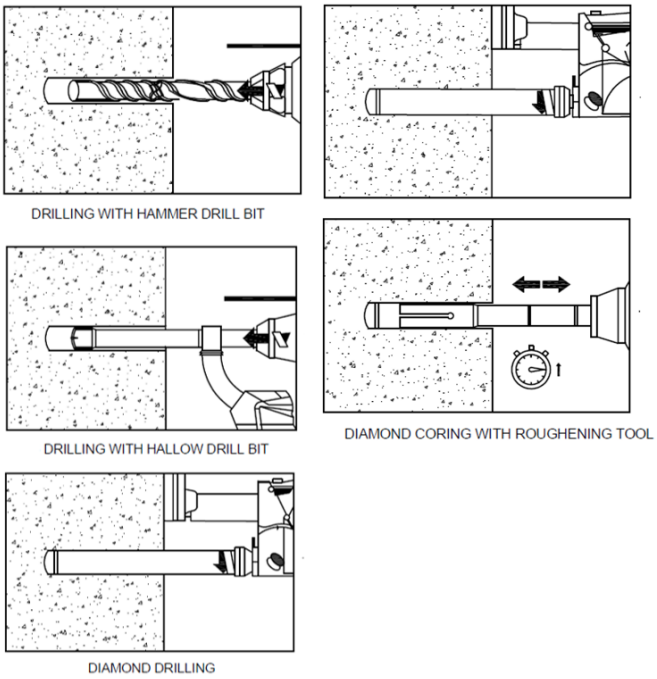


FIG. 1A DRILLING OF HOLES

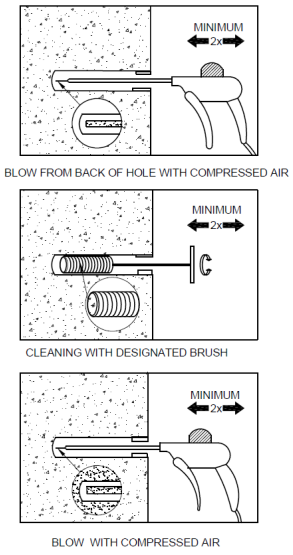


FIG. 1B CLEANING WITH COMPRESSED AIR

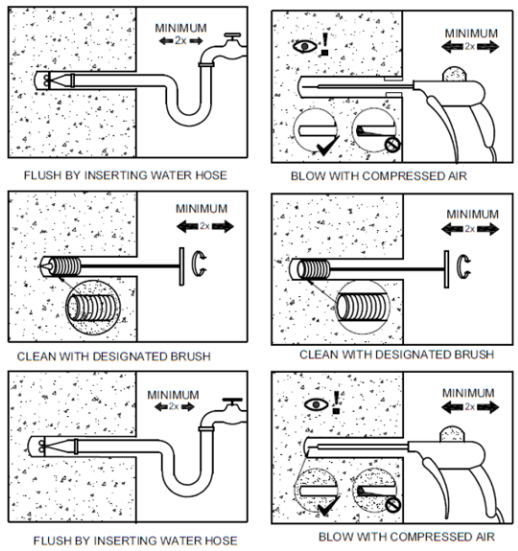
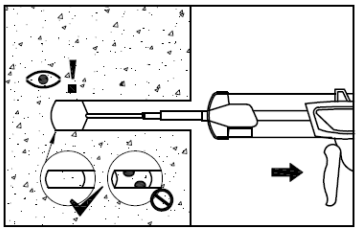
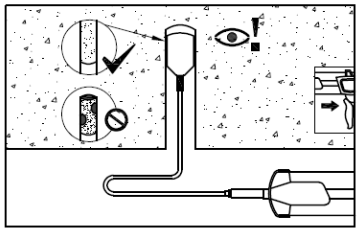


FIG. 1C CLEANING OF WATER FILLED HOLES

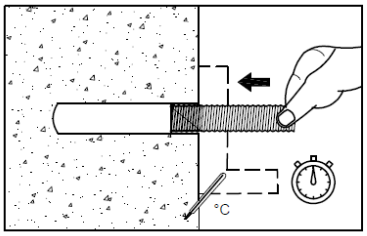


INJECT ADHESIVE FROM BACK OF HOLE

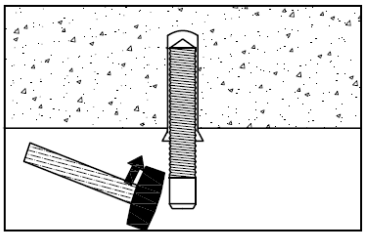


OVERHEAD INJECTION OF ADHESIVE

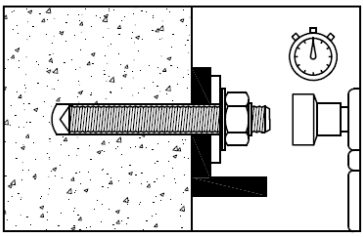
FIG. 1D INJECTION OF ADHESIVE



SET STEEL ELEMENT TO REQUIRED EMBEDMENT DEPTH



OVERHEAD INSTALLATION OF ANCHORS



ANCHOR TO BE LOADED AFTER CURING TIME

FIG. 1E INSTALLATION AND SETTING OF ANCHOR

FIG. 1 INSTALLATION INSTRUCTION FOR POST-INSTALLED ADHESIVE ANCHORS

Note – For capsule type adhesive anchor, the capsule shall be kept in the hole with its pointed end towards the bottom of the hole and the anchor rod shall be driven with a rotary hammer tool to reach the embedment depth. The applied installation torque shall not exceed the maximum value as per the manufacturer's recommendations (see Fig. 2)

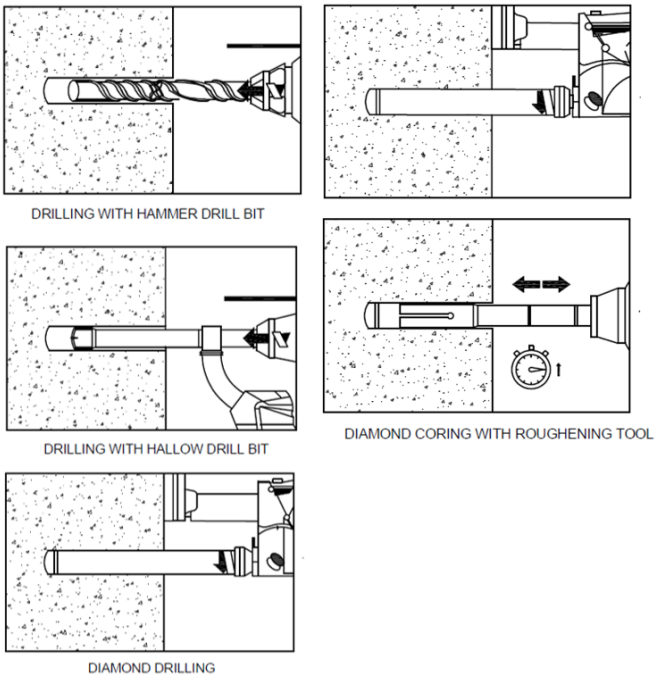


FIG. 2A DRILLING OF HOLES

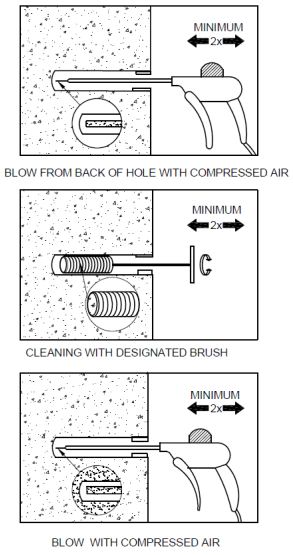


FIG. 2B CLEANING WITH COMPRESSED AIR

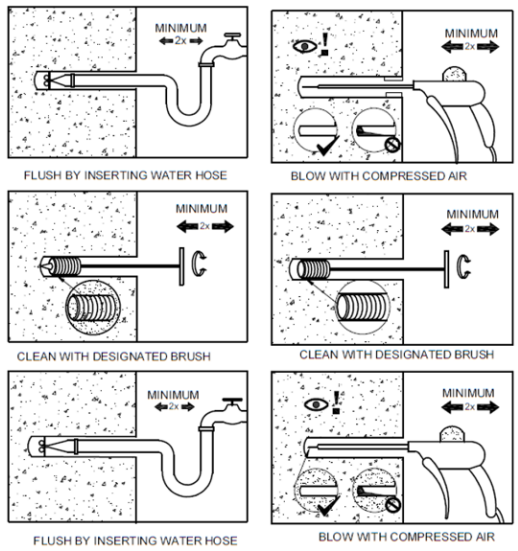


FIG. 2C CLEANING OF WATER FILLED HOLES

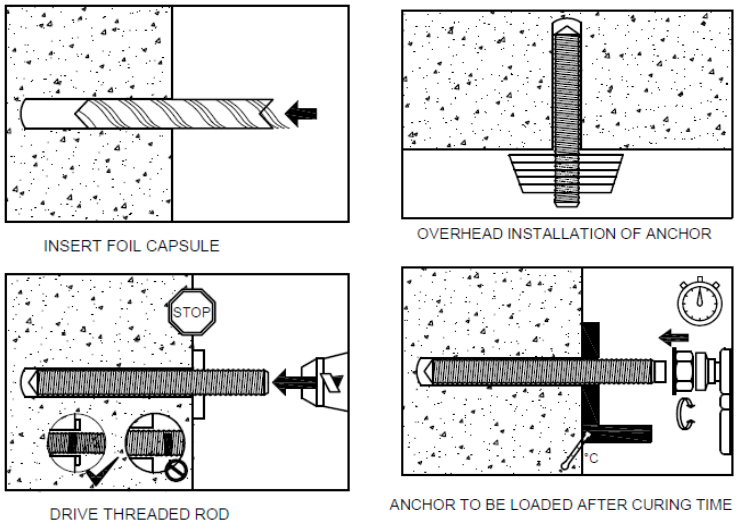


FIG. 2D INSTALLATION AND SETTING OF ANCHOR

FIG. 2 INSTALLATION INSTRUCTION FOR POST-INSTALLED CAPSULE ADHESIVE ANCHORS

5.2.1 **Torque-controlled adhesive anchor** - The detailed installation instructions for torque-controlled post-installed adhesive anchor are as follows -

(i) The safe drilling locations are to be identified.

(ii) The hole is to be drilled to the required embedment depth using a hammer drill machine with an appropriate carbide drill bit. The drilling depth shall depend on the requirement as per design. Alternatively, the drilling may be carried out using a hollow drill bit with vacuum attachment, according to MPII. The diameter of the drill hole shall be as per MPII.

Note – Diamond coring is permissible with use of suitable diamond coring machines and corresponding bits if the performance of the anchor has been tested and assessed in accordance with that. This is dependent on the recommendation of the manufacturer and the MPII. Proper measures shall be adopted to ensure surface preparation in case of diamond drilled holes, otherwise suitable reduction factor shall be applied to the anchor capacity.

(iii) The volume of chemical required for each anchor shall be calculated and appropriately recorded. The injection shall start from the back of the hole, with slowly withdrawing the mixture with each trigger pull. This is done to avoid formation of air void.

Note –
1. The injection can be done either through a manual dispenser or by means of a mechanized system, ensuring correct volume of adhesive being dispensed into the hole.

2. To ensure right amount of adhesive has been injected in the holes, the total number of emptied foil packs shall be compared to the theoretical volume of injected holes. .

3. In case of manual dispensing, where volume of adhesive dispensing cannot be controlled, prior to injection in the actual hole, it must be recorded

in presence of the supervisor, the quantum of adhesive dispensed per trigger pull to ensure quality of installation. The dispenser tool shall be validated at regular interval (as decided by the supervisor) to ensure consistency of dispensing is maintained throughout the application.

(iv) The steel element shall fit into the hole at the required embedment depth.

(v) After the adhesive has cured, predefined torque shall be applied to the anchor, in accordance with the recommendation of the manufacturer.

The detailed installation instructions are provided in Fig. 3.

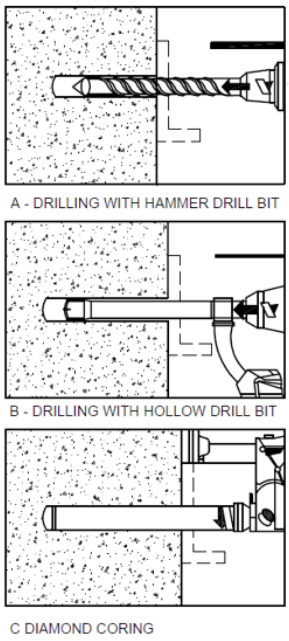


FIG. 3A DRILLING

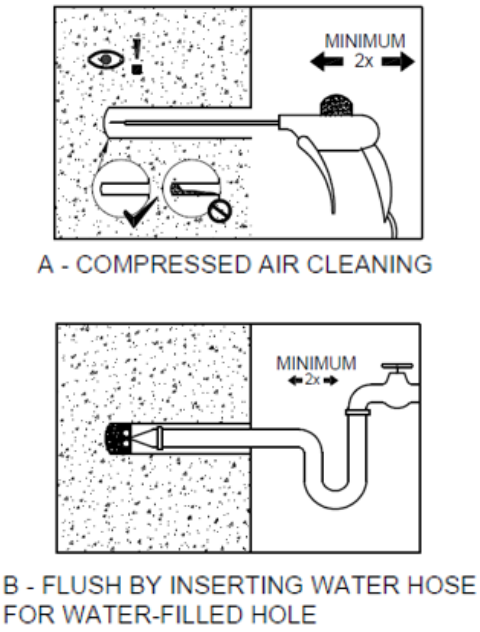


FIG. 3B CLEANING OF HOLES

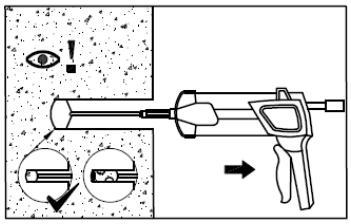


FIG. 3C INJECTION OF ADHESIVE

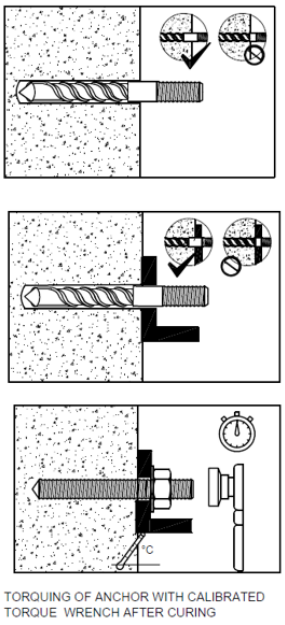


FIG. 3D INSTALLATIO AND SETTING OF ANCHOR

FIG. 3 INSTALLATION INSTRUCTION FOR TORQUE CONTROLLED ADHESIVE ANCHORS

5.3 Mechanical Anchors

5.3.1 **Concrete screws –** Some of the general steps for installation of concrete screws are as follows

(i) The safe drilling locations are to be identified.

(ii) The hole is to be drilled to the required nominal embedment depth using a hammer drill machine with an appropriate carbide drill bit. The drilling depth shall depend on the requirement as per design. The diameter of the drill hole shall be as per MPII.

Note – Alternatively, the drilling may be carried out using a hollow drill bit with vacuum attachment, according to MPII. Diamond coring is permissible with use of suitable diamond coring machines and corresponding bits if the performance of the anchor has been tested and assessed in accordance with that. This is dependent on the recommendation of the manufacturer and the MPII.

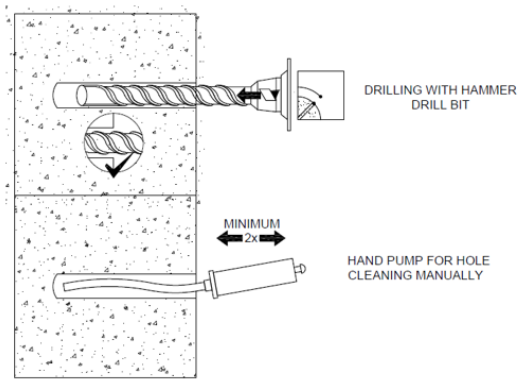
(iii) Proper measures shall be taken to clean the hole.

Note – In special cases, cleaning of holes for horizontal and downward direction may be avoided if 3 times ventilation (moving the drill bit in and out of the hole 3 times) is achieved after drilling the hole to the desired depth. However, this is applicable only if the anchor performance has been assessed for this robustness to cleaning mechanism and is reflected in the MPII.

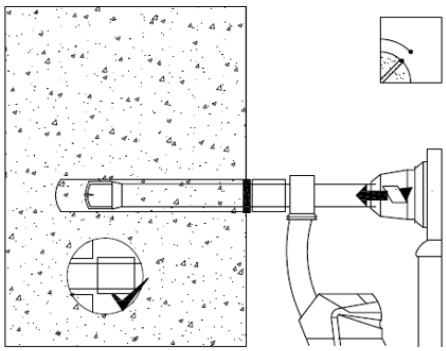
(iv) The concrete screws shall be fixed in position using a calibrated torque wrench or impact screwdriver as per MPII.

Note – A gauge shall be used to check the adequacy of diameter of the screw for its reuse in different holes, in case of temporary applications.

The detailed installation instructions are provided in Fig. 4



DRILLING WITH HAMMER DRILL AND CLEANING



DRILLING WITH HOLLOW DRILL BIT (AUTOMATIC CLEANING)

FIG. 4A DRILLING AND CLEANING OF HOLES

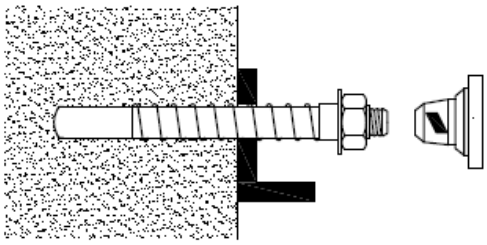


FIG. 4B SETTING OF ANCHOR BY IMPACT SCREW

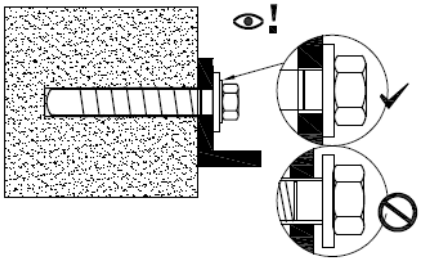


FIG. 4C SETTING CHECK

FIG. 4 INSTALLATION INSTRUCTION FOR CONCRETE SCREWS

5.3.2 **Expansion anchors –**

5.3.2.1 **Displacement controlled expansion anchors –** Some of the general steps for installation of displacement-controlled expansion anchors are as follows -

(i) The safe drilling locations are to be identified.

(ii) The hole is to be drilled to the design embedment depth using a hammer drill machine with an appropriate carbide drill bit. The diameter of the drill hole shall be as per MPII.

(iii) Proper measures shall be taken to clean the hole as per MPII.

(iv) The anchor shall be installed by hammering. Setting tool shall be selected based on the diameter of the anchor. Hammering shall be done at the top of the setting tool till full expansion is achieved according to MPII.

(v) The steel element shall be installed and fixed with a calibrated torque wrench.

The detailed installation instructions are provided in Fig. 5

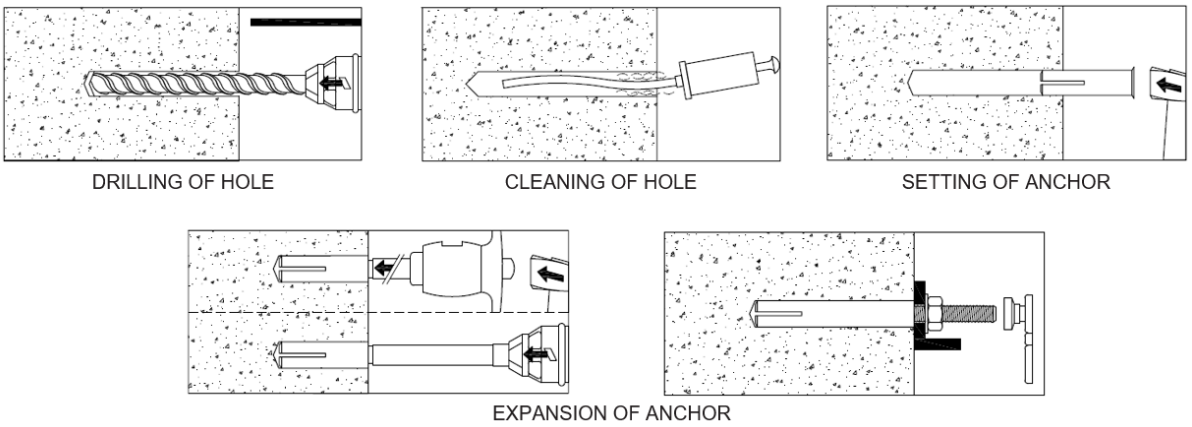


FIG. 5 INSTALLATION INSTRUCTION FOR DISPLACEMENT CONTROLLED EXPANSION ANCHORS

5.3.2.2 **Torque controlled expansion anchors –** Some of the general steps for installation of torque-controlled expansion anchors are as follows –

(i) The safe drilling locations are to be identified.

(ii) The hole is to be drilled to the required embedment depth using a hammer drill machine with an appropriate carbide drill bit. The drilling depth shall depend on the requirement as per design. The diameter of the drill hole shall be as per MPII.

Note – Alternatively, the drilling may be carried out using a hollow drill bit with vacuum attachment, according to MPII. Diamond coring is permissible with use of suitable diamond coring machines and corresponding bits if the performance of the anchor has been tested and assessed in accordance with that. This is dependent on the recommendation of the manufacturer and the MPII.

(iii) Proper measures shall be taken to clean the hole as per MPII.

(iv) The anchor shall be inserted into the hole and installed either by hammer setting or by machine setting (setting tool) as per MPII.

(v) They shall be fixed in position with a calibrated torque wrench or through machine torquing to a predefined torque shall, in accordance with the recommendation of the manufacturer as per MPII.

Note –

1. It is essential to maintain the value of the torque as under torquing may lead to reduced performance of the anchor while over torquing may damage the anchor or the surrounding concrete.

2. To ensure consistency of installation torque for all anchors under consideration, appropriate documentation may be provided by the installer to the supervisor or the concerned engineer.

The detailed installation instructions are provided in Fig. 6.

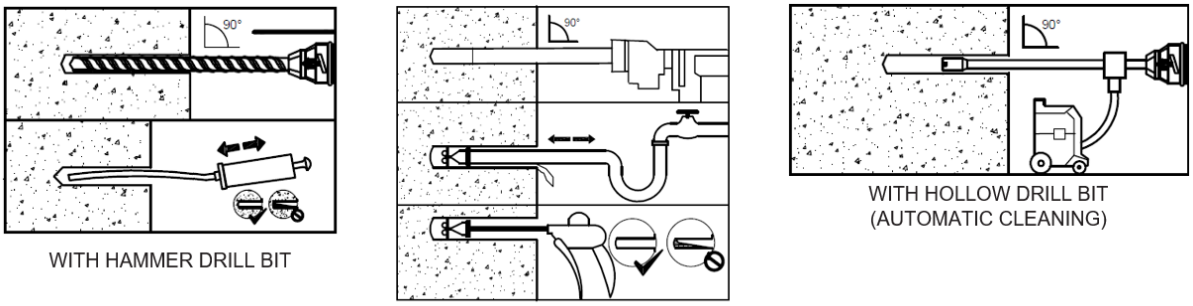


FIG. 6A DRILLING AND CLEANING OF HOLE

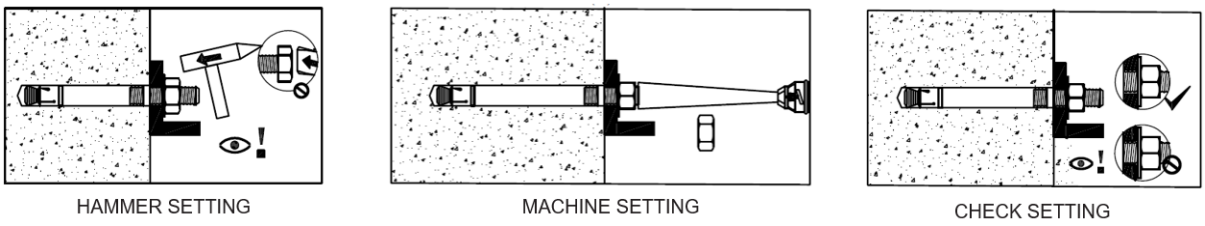


FIG. 6B SETTING OF ANCHOR

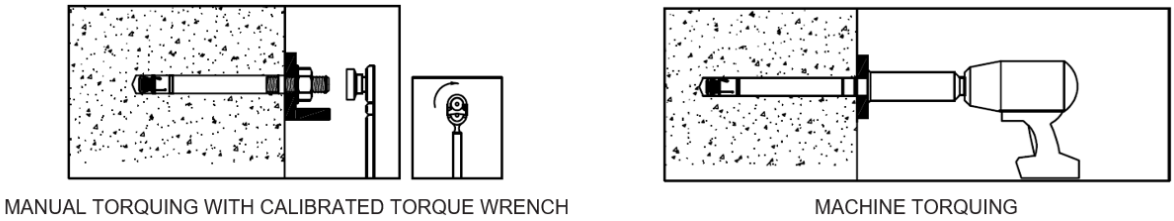


FIG. 6C TORQUING OF ANCHOR

FIG. 6 INSTALLATION INSTRUCTION FOR TORQUE CONTROLLED EXPANSION ANCHORS

5.3.3 **Undercut anchors –** The general steps for installation of undercut anchors are as follows –

(i) The safe drilling locations are to be identified.

(ii) The hole is to be drilled to the required embedment depth using a hammer drill machine with a stopping drill bit. The diameter of the drill hole shall be as per MPII.

(iii) Proper measures shall be taken to clean the hole as per MPII.

(iv) The anchor shall be installed in the hole with the help of setting tools as per MPII.

(v) They shall be fixed in position with a calibrated torque wrench or through machine torquing to a predefined torque, in accordance with the recommendation of the manufacturer as per MPII.

The detailed installation instructions are provided in Fig. 7

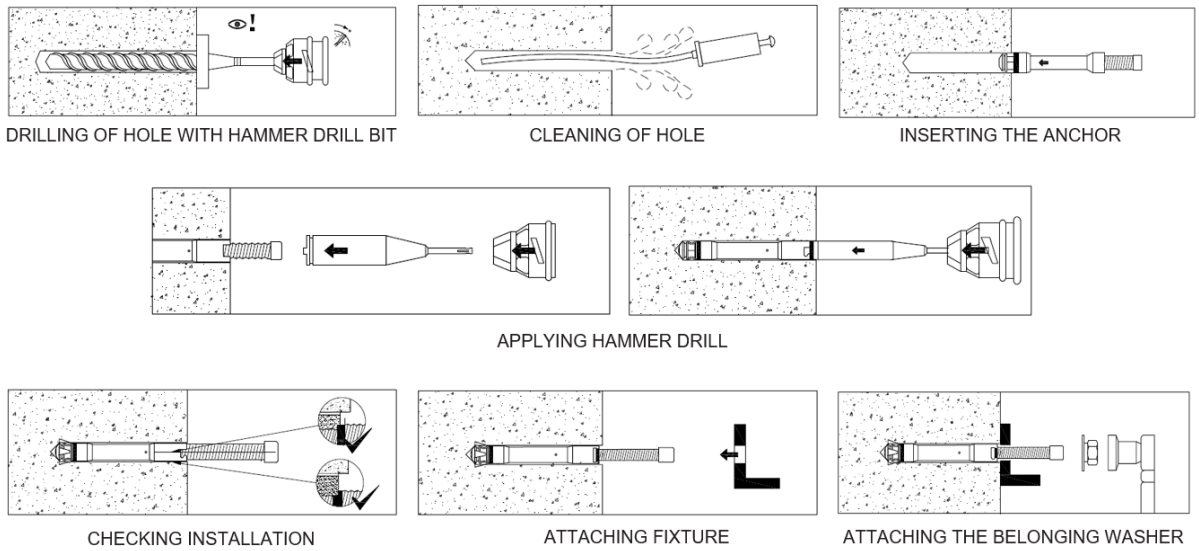


FIG. 7 INSTALLATION INSTRUCTION FOR UNDERCUT ANCHORS

Note - The manufacturer's recommendations for the specific anchor type should take precedence over all other guidelines. The installation procedures for products of a similar type but from different manufacturers may be different, so it should not be assumed that the same procedure is applicable for different products.

6 INSPECTION AND CERTIFICATION OF INSTALLED ANCHORS

The installation of anchors shall be supervised by an authorized member of the site management team. The supervisor should be appropriately qualified.

It is to be ensured by the supervisor that the following issues are adequately addressed –

(i) The anchor type being used satisfies the design requirements of the structural engineer in terms of make, type, material, embedment depth, diameter, and length.

(ii) Anchor location.

(iii) The concrete condition and hole dimensions are as specified.
(iv) Anchor hole diameters and depths are in accordance with manufacturer's recommendations.
(v) Locations of anchors are as per design (to ensure edge distance and spacing)
(vi) The anchor is installed using correct equipment and as per MPII including drill bits, hole cleaning, setting tools, correct installation torque, curing times respected where relevant.
(vii) If modifications are required due to hitting of reinforcement, quality of concrete base material, etc., a revised installation procedure should be agreed with the concerned structural engineer and then communicated to the installer in writing.

The anchors shall be inspected by the supervisor immediately after installation but prior to loading. During this inspection, any issue related to rotation, movement, deformation, cracking, other damage, etc. shall be recorded and communicated to the concerned structural engineer. Further installation shall be stopped, if the supervisor has any concern related to safety of installation. However, the work shall be further carried out, only subject to remarks of the structural engineer.

7 PROOF TESTING OF ANCHORS

Unless approved anchors have been installed by trained operators working under authorized supervision, proof (pull-out) testing of anchors shall be necessary after the installation to validate the quality of workmanship. These proof tests shall be carried out on a sample of anchors for safety-critical applications, after the anchors have been installed, to ensure that they have been installed correctly. The anchor groups to be proof tested shall be designated with identifiable marking before carrying out the test.

Note: 1. The proof tests shall not be used to replace the design carried out as per CED225733.

2. Proof tests shall not be used to determine equivalency of performance of alternate anchors.

7.1 Sampling for proof testing

Proof testing of anchors to the design load shall be carried out randomly on representative anchor samples installed at the location of actual application. A minimum number of 3 anchors shall be tested for the purpose. In case additional tests need to be conducted, the same should be, as mutually agreed by the parties.

When the number of fixing points is more, one percent of the total number of anchors, subject to a minimum of three anchors, shall be tested. However, anchors for which issues had been reported by the supervisor at the time of installation, such anchors shall be additionally included amongst the anchors to be proof tested.

Note: In some cases, working anchors may not be accessible for proof testing e.g., anchors installed for façade brackets in high rise buildings. In such cases on-site pull-

out test shall be conducted on sample anchors after these are installed as per the MPII in identical conditions.

7.2 Equipment for proof testing

The test equipment should meet the test objectives and produce accurate and reliable results while being safe in use. The necessary equipment shall necessarily comprise of (1) a mechanical or hydraulic mechanism, to be able to apply a pull-out load on the test anchor and measure the same accurate to 0.1 kN (2) a displacement measuring device to be able to record displacement accurate to 0.01 mm. Gauges shall be calibrated directly in units of load i.e. in kN, with calibration certificates from an accredited agency. The gauges shall be capable of indicating the maximum load reached during the test even after the load has declined.

Note: The calibration certificate shall be renewed at intervals not exceeding 12 months and whenever equipment is dropped or shows signs of inaccurate readings e.g. needles not returning to zero.

The test carried out shall give information on the load-displacement behavior of the anchor during the test.

Schematic drawings of the testers and adaptors for clamping anchor heads are depicted in Fig. 8.

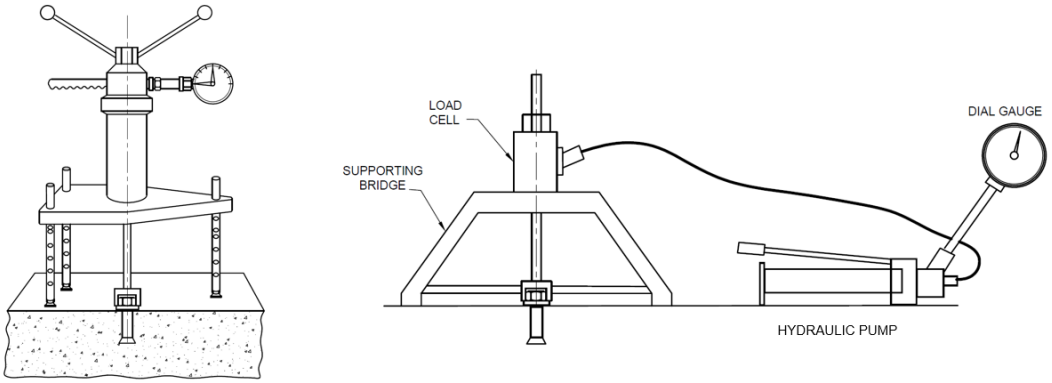


FIG. 8 TYPICAL TESTING ARRANGEMENT

7.3 On-site testing procedure

The following is a general procedure for carrying out the proof tests. Any deviations from this procedure shall be recorded in the test report. All testing operations shall be carried out with due regard to safety of the operator and the bystanders.

(i) The location of the anchors to be proof tested shall be identified in consultation with the supervisor.

(ii) It is to be ensured that all the anchors including those identified to be proof tested, have been installed as per the MPII.

(iii) Base concrete shall have minimum compressive strength, as considered by the structural engineer in the design of the anchor.
(iv) The displacement and load measuring devices have to be a part of test equipment.
(v) With load at zero, reading of dial gauge shall be recorded.
(vi) The load has to be applied progressively till the expected load is reached.
(vii) Once proof testing is completed, the entire assembly has to be detached.
(viii) Any damage to the base material has to be rectified.
(ix) Failure of anchor, if observed, shall be recorded.
(x) The test report has to be completed and forwarded to the structural engineer and the parties concerned.

7.4 Reporting of results

Following is the list of comprehensive but not exhaustive information in a test report. Additional information may be required depending on the specific requirement.

A typical test report format is provided in Annex D for reference.

7.5 Acceptance criteria

Failure during proof testing indicates that the right installation instructions as per MPII have not been properly followed at site during installation. If, at any discreet area, one failure is encountered then the reason for failure shall be investigated and communicated to the supervisor. In such a situation, the number of anchors to be proof tested shall be doubled, with a minimum of six anchors to be proof tested. If more than one fails, then 100% of the anchors shall be tested for the design load and the test report shall be submitted to the structural consultant for re-evaluation.

Note: All anchors failing to reach the required proof test load shall be removed or marked such that they are not put into service.

FOR BIS USE ONLY

ANNEX A
SAMPLE FORMAT FOR INSTALLER TRAINING CERTIFICATE

[Certificate to be typed on Manufacturer's Headed Paper]

(This section to be completed by original anchor manufacturer.)

This is to certify that ……, an employee of ……. has been trained in the installation of post-installed mechanical and post installed adhesive anchors.

The training was carried out at ……(Training institution*)……on ……(Date)…… and the named person has been issued with a certificate of competency.

He/ she is competent to install post-installed mechanical anchors using the designated installation equipment/ tools.

The list of anchors for which the above-mentioned personnel has been trained are as follows –

1.
2.
3.
4.
5.

Any anchor which is beyond the list mentioned above shall require a fresh certification to be obtained.

The certificate is valid for a period of one year from the date of issuance.

Photograph of the installer personnel

Signed: _____ (Training Instructor)

Date: _____

Company stamp

*This can be at the jobsite, the manufacturer premises or the installer office premises as per mutual agreement.

ANNEX B
SAMPLE FORMAT FOR INSTALLER CHECK LIST

Job site name	
Purpose	

Installer details		
Name	Organization	Date of installation

Detail of anchor	
Anchor type	
Anchor classification	
Name of the anchor	
Make of the anchor	
Assessment Report (AR) of the anchor	e.g. ETA number, if any
Diameter of the anchor (mm)	
Embedment depth of the anchor (mm)	
Base material & grade	
Condition of drill hole (dry/ wet/ water filled)	

Detail of installation	
Hammer drilling/ diamond drilling	
Diameter of the drill bit	
Depth of drill hole	
For diamond drilling, roughening of the hole surface done (Y/N)	
Hole cleaning (compressed air/ manual cleaning/ hollow drill bit)	
Calibrated torque wrench/ machine torquing	
Installation torque (N-m)	
Manual dispenser/ mechanized dispenser	
Volume of adhesive injected per hole (ml)	

ANNEX C

SAMPLE FORM FOR CERTIFICATE OF COMPLETION OF WORK BY INSTALLER

With respect to the installation of post installed anchor in……Project, on Plot No.....in Colony/Street .....Mohalla/Bazar/Road .....City....., we certify

a) that the post-installed anchoring work has been executed by us according to the structural design and drawings issued to the site by the Structural Engineer and
b) that the work has been completed with high level of workmanship observing due diligence and all the
materials have been used strictly in accordance with the detailed specifications and in compliance with the Manufacturer's Printed Installation Instructions, using the designated installation tools.

The installer checklist containing all information is attached for reference.

Signature of authorized personnel of the installer

Name (in block letters): ……
Address: .....

Date: ……

ANNEX D
SAMPLE FORMAT FOR PROOF TEST REPORT

Job site name	
Type of application	
Date of testing	

Installer details		
Name	Organization	Date of installation

Detail of anchor	
Anchor type	(Mechanical/ adhesive)
Anchor classification	
Name of anchor	
Make of the anchor	
Diameter of the anchor (mm)	
Embedment depth of the anchor (mm)	
Base material & grade	

Detail about the test	
Purpose of the test	Proof test to validate the workmanship
Test type	Pull-out test
Number of anchors to be tested	
Proof load (kN)	

Detail about the testing equipment	
Designation of the equipment	
Maximum capacity of the equipment	
Calibration date of the dial gauge	
Calibration date of the displacement sensor (if applicable)	

Test results			
Test No.	Load (kN)	Displacement	Remarks

Witness		
Name	Organization	Remarks

Test carried out by		
Name	Organization	Remarks

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ANNEX E
REFERENCES

IS No.	*Title*
CED 2(0100)WD	Testing and Assessment of Post-installed mechanical anchoring systems (*under development*)
CED 2(0098)WD	Testing and Assessment of Post-Installed adhesive anchoring systems (*under development*)
CED 2(0126)WD	Design Of Post–Installed Anchorage To Concrete – Code Of Practice *(under development*)
1608 (Part 1)	Mechanical testing of metals - Tensile testing
456 :2000	Plain and reinforced concrete - Code of practice (fourth *revision*)