CLI
Concrete Layer Innovations

ACCROPODE ™ II

EXTRACT OF THE TECHNICAL INFORMATION DOCUMENT

ACCROPODE ™ II

Presentation

Contents

Introduction

The artificial units that the above document refers to are known under the trademark “ACCROPODE™ II”.

Thanks to its original shape, ACCROPODE™ II units are sufficiently strong and stable to be placed in a single layer, thus achieving considerable savings.

The methods for fabricating and placing ACCROPODE™ units have been determined on the basis of tests carried out on site and in the laboratory.

The CONTRACTOR, having signed a contract with CLI for the use of ACCROPODE™ II, is under obligation to comply with all the conditions related to the contract.

The conditions can be obtained from CLI, using the contact details given in this document.

After signature of the contract for the use of ACCROPODE™ II, the successful CONTRACTOR is then able to benefit from technical assistance.

Technical assistance to the CONTRACTOR has been essential for the success of projects in the past. On-site training accelerates the learning process and leads to greater productivity and higher quality of completed work.

CLI acts as the official representative of the ACCROPODE™ II technique owner to defend its industrial property.

Legal provisions

This document forms an EXTRACT of the TECHNICAL INFORMATION DOCUMENT (T.I.D.) referred to in the contract granting the right to use the ACCROPODE™ II technique for a specific project.

To achieve the usual intrinsic performance levels of the ACCROPODE™ II technology, the CONTRACTOR is required to comply with the SPECIFICATIONS, his works contract and the legal provisions in force in the country concerned.

ACCROPODE™ II is a separate TRADEMARK registered internationally by ARTELIA. This technique is marketed exclusively by CLI (Concrete Layer Innovation).

This document is made available to companies and designers before the start of the construction works to allow them to carry out preparation tasks. The complete TID will be sent to the successful CONTRACTOR once the contract is in effect.

A time limit applies to the validity of this document and updates are available on request. These can be obtained from CLI.

Presentation and aim of the T.I.D.

Presentation

1. SPECIFICATIONS

The SPECIFICATIONS section of the present document corresponds to the fundamentals of the ACCROPODE™ II unit technique. The specifications are the minimum requirements that must be followed to achieve the recognised performance levels of the ACCROPODE™ II technology, both in terms of the reliability of the STRUCTURE built and the efficiency of the work carried out by the CONTRACTOR. The works contract specifications apply provided that any variations from the present "specifications" are justified and approved by the STRUCTURE DESIGNER.

2. DATA SHEETS

The **DATA SHEETS** are appendices designed to provide the CONTRACTOR with additional information on particular aspects of the STRUCTURE or on the working methods used. **They are supplied to the CONTRACTOR on request**.

3. TECHNICAL INFORMATION

The TECHNICAL INFORMATION section is based on feedback that CLI has received from many different construction sites supervised over the years.

The content in the TECHNICAL INFORMATION is given for guidance, illustrating the conceptual aspects of the techniques that have been used on site. This information is not binding, but given simply to assist the CONTRACTOR in making the right choices when using the technique.

4. VIDEOS

Videos that illustrate particular aspects of the armour STRUCTURE or specific implementation methods can also be supplied to the CONTRACTOR on request.

Aim

Construction of an ACCROPODE™ II armour in compliance with the ACCROPODE™ trademark, to ensure that the hydraulic stability characteristics defined by the DESIGNER are achieved and that the work is implemented as efficiently as possible. The final objective can only be achieved if attention is paid to quality and safety at all times.

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Provisions concerning safety

A CONTRACTOR who has signed a contract giving him the right to use the ACCROPODE™ II technique is fully responsible for implementing the said contract in conformity with the safety requirements stipulated by the laws in force in the country where the technique is used.

Neither CLI nor its representative can be held responsible for any failure to comply with the said safety regulations. The CONTRACTOR is fully responsible for applying all safety regulations.

The technical documentation provided by CLI only describes conceptual aspects of the use of the technique and must always be adapted by the CONTRACTOR to ensure the complete safety of people on site in conformity with international regulations and the regulations in force in the country where the units are fabricated or used.

Sub-licence agreement reminder

CLI's role is to assist the CONTRACTOR in implementing the ACCROPODE™ II technique through technical assistance tailored to the specific site.

The objective of this technical assistance is to provide the CONTRACTOR with the know-how required to implement the ACCROPODE™ II technique correctly. For this purpose, CLI takes part in the works through several actions stipulated in the sub-licence agreement, which are generally speaking as follows:

- Provision of technical documentation.
- Provision of theoretical ACCROPODE™ II unit placing drawings.
- Site visits at key moments for the ACCROPODE™ II technique.
- Staff training (theoretical and practical) during the fabrication and placing of the units.
- Remote technical support at the CONTRACTOR's request (video conference, e-mail exchanges).

As regards on-site assistance, CLI sends a technical advisor to the site to train and assist the CONTRACTOR by sharing feedback on the experience acquired during many previous projects. This technical assistance aims to complement the requisite on-site training, and to provide information ensuring successful completion of the project. During site visits, CLI uses examples observed on the STRUCTURE to illustrate specific situations and provide the CONTRACTOR with suitable information. These short site visits, spaced out in time, cannot in any way be equated with supervision of execution of the work.

CLI's role is therefore to assist the CONTRACTOR within the scope of the sub-licence agreement. For this sub-licence agreement, CLI does not participate in the dimensional design of the STRUCTURE under any circumstances. Under this sub-licence agreement, CLI is therefore not in a position to give an overall opinion on the STRUCTURE, as it has only a very fragmented and incomplete view of it. Nor is CLI in a position to provide any approval or validation of the works that has been carried out. This task is the responsibility of other parties present on-site.

If approval of the armour is requested, CLI can provide a Final Inspection Certificate as an additional service, carried out under the framework of a separate contract.

ACCROPODE™ II

Extract of the Technical Specifications

1. Characteristics of the ACCROPODE™ II unit

1.1. Geometrical characteristics

The shape of the unit is perfectly defined and must be scrupulously reproduced in order to achieve the required hydraulic performance in terms of armour stability and durability defined through laboratory testing and from feedback from previous applications of the technique. This document refers to the second-generation ACCROPODE™ unit (ACCROPODE™ II), which was developed in continuity with the first-generation ACCROPODE™ unit patented in 1980. The following table gives the characteristic dimensions for different unit volumes:

Volume V (m^3)	$V = 0.2926\ H^3$	1	2	3	4	5	6	7	8	9	11	12	15	20	26
Unit height H (m)	H = (V/ 0.2926)1/3	1.51	1.90	2.17	2.39	2.58	2.74	2.88	3.01	3.13	3.35	3.45	3.71	4.09	4.46
Armour thickness T (m)	T = 0.9 H	1.36	1.71	1.96	2.15	2.32	2.46	2.60	2.71	2.82	3.01	3.10	3.34	3.68	4.02

Intermediate sizes are available on request.

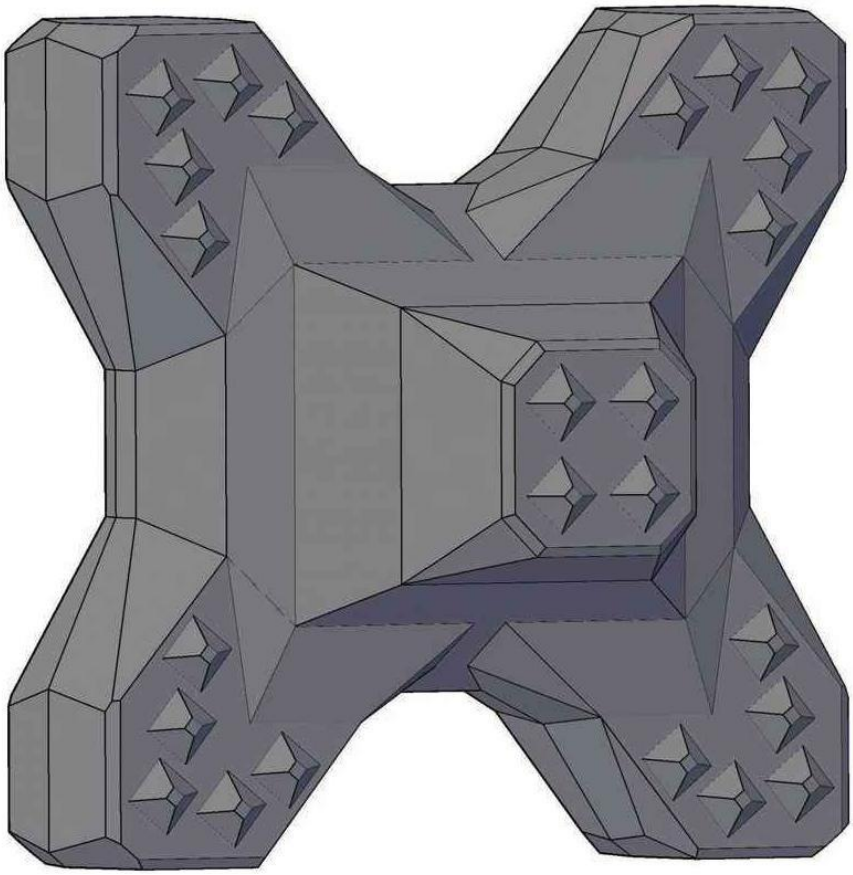

Figure 1: General shape of the ACCROPODE™ II unit

1.2. ACCROPODE™ II unit drawings

The drawings indicated in the following table are supplied by CLI in accordance with the sub-licence agreement. These unit drawings, along with the simplified formwork drawings, enable the CONTRACTOR to prepare his own formwork drawings. The unit shape and dimensions must be scrupulously reproduced so as not to undermine the structural capability and stability of the ACCROPODE™ II unit.

Drawings provided by CLI:

001	**Shape definition drawing**
002	**Drawings of individual facets**
003	**Simplified formwork drawing (this is not a working drawing). An example is given below. A document providing information about the formwork can be obtained from the CLI on request.**

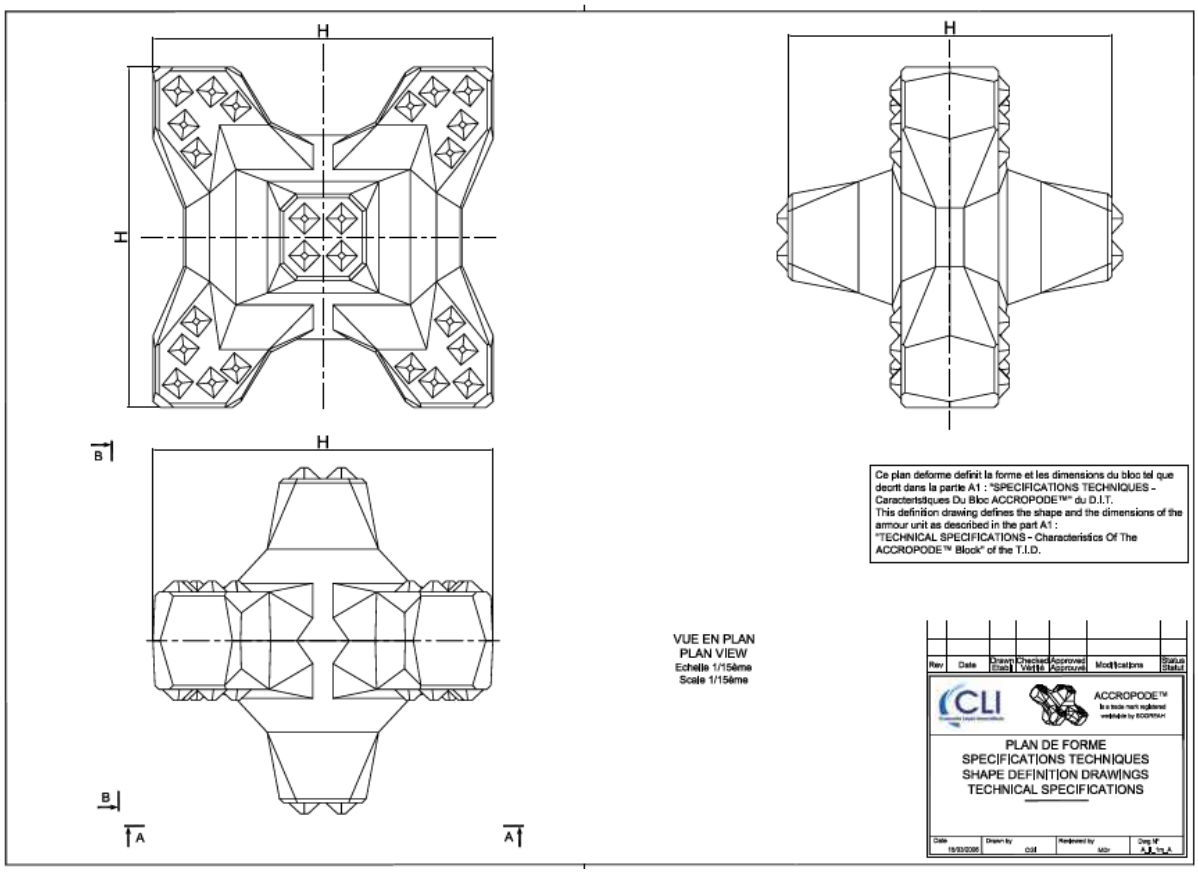

Figure 2: ACCROPODE™ II unit drawings

2. ACCROPODE™ II unit formwork

2.1. Formwork principle

The ACCROPODE™ II formwork consists of two symmetrical, bottomless half-shells that can be separated. They are assembled to create a mould into which the concrete is poured.

The two half-shells are separated by being struck using a jack that presses on the end of the noses, thus detaching the form from the ACCROPODE™ II unit without exerting any tensile forces on the concrete.

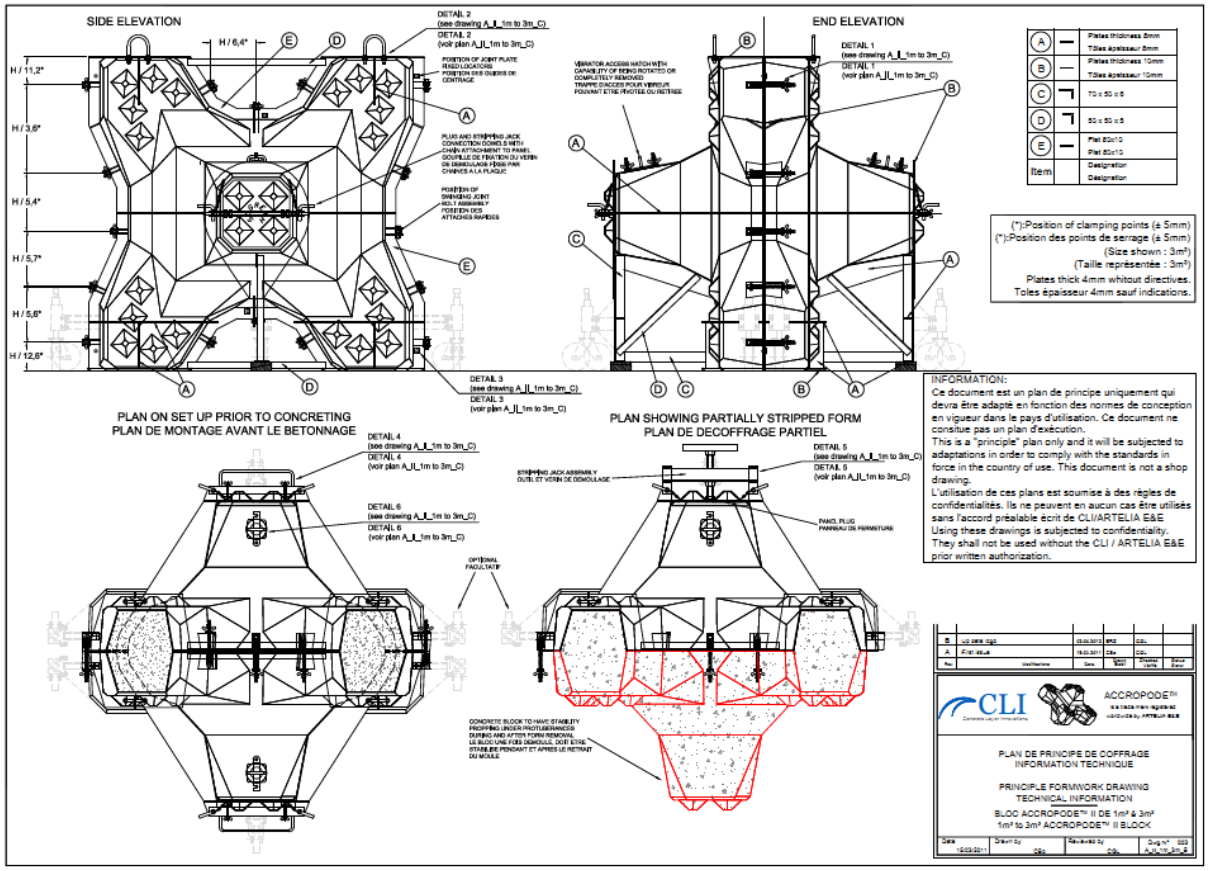

Figure 3: Example of drawing of the formwork principle for an ACCROPODE™ II unit

2.2. Design

The CONTRACTOR is responsible for designing the formwork and all ancillary parts. The design must comply with all standards in force.

Safety devices such as access gangways must be sized in accordance with local legislation.

2.3. Formwork fabrication tolerance

All parts of the formwork must be welded together using a jig, the dimensions of which must be checked before any assembly takes place.

The tolerances to be applied are as follows:

- Jig: ± 1 mm
- Dimensions of facets: ± 1mm
- Dimensions of H (mm) =± [5mm + (H/1000)] (the dimensions of H are indicated on the unit's formwork drawings).
- The volume of the unit produced must be at least equal to the stipulated theoretical volume and within the limits specified by the STRUCTURE DESIGNER.

3. Fabrication of ACCROPODE™ II units

3.1. Concretes

The formulations of the concretes produced by the CONTRACTOR must comply with the standards in force in the country where the STRUCTURE is being built and the provisions of the Works Contract.

To determine the formulations of the specific concretes for armour facing units, the CONTRACTOR must take into account the fact that armour facing units are not reinforced and will be subjected to impacts during unit handling and placing and subsequently during the working life of the STRUCTURE. Given that the strict normative approach concerning the formulation of conventional concretes is not sufficient for these artificial units, CLI advises the CONTRACTOR to seek the assistance of an unreinforced concrete specialist.

If allowed by the Works Contract, the CONTRACTOR is entitled to use a concrete formulation with specified properties that comply with the provisions given below in section 3.2 *Concrete – Specified Properties* and section *3.4 Additional characteristics*. The formulation and its characteristics must be approved by the ENGINEER.

Otherwise, or if the Works Contract does not authorise a performance-based method, the CONTRACTOR shall use a concrete formulation with a specified composition that complies with the provisions of the Works Contract, complemented by the provisions below in section *3.3 - Concretes – Prescribed Composition* and *3.4 Additional precautions*.

Any significant discrepancy with the properties specified in 3.2 and 3.3 shall be justified in order to demonstrate that the mechanical and long-term durability characteristics are maintained.

3.2. Concretes – specified properties

The following specifications apply when the Works Contract authorises a performance-based approach.

The concrete formulation chosen by the CONTRACTOR must guarantee that the mechanical properties of the concrete are maintained throughout the working life of the STRUCTURE.

The CONTRACTOR must provide evidence that the concrete he is proposing achieves the prescribed performance levels for the composition stipulated below in section 3.3.

Criteria	Specifications
28-day characteristic strength for units ≤ 4 m^3	C25/30(25 Mpa on cylinder and 30 Mpa on cube)
28-day characteristic strength for units > 4 m^3	C30/37 (30 Mpa on cylinder and 37 Mpa on cube)
Minimum 28-day tensile strength – Units ≤ 4 m^3 Brazilian test/Fct,sp	2.5 MPa
Minimum 28-day tensile strength – Units > 4 m^3 Brazilian test/Fct,sp	3.0 MPa
Exposure class (unless specified otherwise by the OWNER)	XA1: mild chemically aggressive environment – as per NA.4.1.5 of EN NF 206/CN
Maximum W/C ratio C	0.50
Minimum density	As per the specifications in the Works Contract
Additional durability criteria	As per the specifications in the Works Contract

3.3. Concretes – Prescribed composition

Criteria	Specifications
28-day characteristic strength for units ≤ 4 m^3	C25/30(25 Mpa on cylinder and 30 Mpa on cube)
28-day characteristic strength for units > 4 m^3	C30/37 (30 Mpa on cylinder and 37 Mpa on cube)
Exposure class	XA1: mild chemically-aggressive environment – as per NA.4.1.5 of EN NF 206/CN
Minimum 28-day tensile strength – Units ≤ 4 m^3 Brazilian splitting test/Fct,sp	2.5 MPa
Minimum 28-day tensile strength – Units > 4 m^3 Brazilian splitting test/Fct,sp	3.0 MPa
Density	As per STRUCTURE DESIGNER'S requirements
Maximum W/C ratio	0.50
Minimum equivalent binder content (cement + additives). To be adapted depending on the size of aggregates. Cf: table EN NF 206/CN Tab NA F1	From 297 Kg/m^3 to 363 Kg/m^3 depending on the aggregate sizes May vary in relation to durability criteria
Maximum temperature of concrete on placing (indicative only)	30°C
Maximum hydration temperature (indicative only)	65°C (variable in relation to cement quality). See TECHNICAL INFORMATION section 3.2.7.1
Aggregate quality as per EN NF 12620 and see recommendations in section 3.1.2 of TECHNICAL INFORMATION	Not frost-riven, alkali-reactive or aggressive for the other constituents of the concrete. Aggregates may be crushed or rounded. Category LA 35 or Micro Deval 25
Maximum diameter of aggregates (recommended	40 mm for units ≤ 6 m^3 and 60 mm for units > 6 m^3
Workability: consistency	S2 to S4

The present specifications are provided in accordance with standard EN NF 206/CN.

The choice of cement is left to the CONTRACTOR in accordance with his Works Contract. However, he must ensure that the cement chosen is compatible with the environment in which the units will be placed and with the other concrete ingredients.

The concrete formulation chosen by the CONTRACTOR must guarantee that the minimum mechanical properties of the concrete are maintained throughout the working life of the STRUCTURE.

3.4. Additional precautions

3.4.1. REFERENCE VALUES

The values in the table below are the result of successful experience on ACCROPODE™ II sites. The CONTRACTOR may, subject to justification, propose different values to the ENGINEER.

N.B.: beyond merely referring to compressive strength, the CONTRACTOR shall pay particular attention to concrete curing.

When recently fabricated units (up to 28 days) are handled, their structural integrity must not be affected. Precautions must therefore be taken to avoid impacts that could damage them.

	Units ≤ 4 m³	Units between 4 m³ and 15 m³	Units above 15 m³
Minimum strength for form striking Fck Cyl	6 MPa	7 MPa	10 MPa
Minimum strength for handling Fck Cyl	15 Mpa	20 MPa	25 MPa
Minimum strength for placing Fck Cyl	25 MPa	30 Mpa	30 Mpa
Unit weight	At least equal to the weight taken into account in the studies or given by the STRUCTURE DESIGNER.	At least equal to the weight taken into account in the studies or given by the STRUCTURE DESIGNER.	At least equal to the weight taken into account in the studies or given by the STRUCTURE DESIGNER.

The compressive strength values specified above are provided for cylinder values.

3.4.2. COMPRESSIVE STRENGTH

CLI's experience has shown that the concrete grades given in TECHNICAL SPECIFICATIONS section 3.2 are satisfactory for fabrication of ACCROPODE™ II units of a sufficient quality to withstand the stresses during the construction phase and throughout the lifetime of the STRUCTURE. The same experience indicates that a risk of unit fragility and a decrease in resilience appear when the specified grades are exceeded by a significant increase in concrete strength.

3.5. Unit fabrication

3.5.1 GENERAL

The fabrication and handling of units shall be organised and carried out in such a way that the non-reinforced concrete is not subjected to any forces or impacts that could be detrimental to the concrete matrix by weakening the units and/or reducing their working life.

3.5.2 FORMWORK INSTALLATION

The formwork must be positioned so that its stability and tightness can be guaranteed throughout the operations.

3.5.3 CONCRETE POURING

Concrete must be poured in layers of a suitable thickness in order to ensure adequate compaction. The concrete must not fall from a height of more than two metres.

3.5.4 CONCRETE VIBRATION

Each layer of concrete must be vibrated to remove air bubbles and ensure adequate compaction. The degree and duration of vibration must be adapted to ensure that it fulfils its role, but special care must be taken to avoid any segregation of the concrete constituents.

3.5.5 SETTING AND HARDENING

Weather conditions (temperature, wind, sun and rain) that affect non-reinforced concrete during setting and hardening must be taken into account in order to limit their impacts. If necessary, protective measures must be taken.

3.5.6 FORM STRIKING

Forms are struck when the concrete has reached the strength specified in section 3.4 of this document. Forms are struck by applying a horizontal and axial force to the nose with the jack. No tensile stress must be exerted on the unit. This force must not result in damage to the unit structure.

3.5.7 CURING TREATMENT

Units must receive a chemical or water-based curing treatment after being removed from the forms, in order to guarantee that the development of concrete strength and durability complies with the specifications in the Works Contract.

3.5.8 TRANSPORT OF UNITS

Units are to be tilted or transported once they have reached a structural strength at least equivalent to that given in section 3.4 of this document. The tilting, transport and handling methods must guarantee that the units will not be subjected to any impacts that could affect their structural integrity.

3.5.9 STORAGE

Units are to be stored resting on three points or vertically, and their stability must be maintained. Units smaller than 6 m³ can be stored in two (2) tilted layers. In this case, the ground must be able to support the weight without any differential settlement or scouring that could destabilise the units.

3.6. Monitoring of fabrication

The ACCROPODE™ II unit fabrication process must always include unit quality monitoring procedures. In this context, a fabrication traceability system must be set up.

This traceability must include at least the following aspects:

- Traceability of concrete composition and components,
- Identification of each unit with a unique number,
- Appropriate concrete quality testing, to ensure that the fabrication process complies with all aspects of the standards or specifications,
- A concrete design mix test,
- A trial mix test,
- Concrete quality control tests.

In the event that units break during or after installation, a systematic study of these breakages must be carried out. This study will aim to determine the characteristics of the concrete and the causes of the breakage including the different manipulations of the unit. The complete traceability of each unit is therefore an important factor.

The recommended tests and sampling processes are the ones described in EN NF 206/CN.

4. ACCROPODE™ II unit acceptance criteria

Units with surface or structural defects likely to lead to accelerated deterioration cannot be placed on the STRUCTURE.

Systematic production of a significant number of defective units is unacceptable. If this should be the case, industrial fabrication must cease and the problems must be solved. Industrial fabrication may only resume once tests show conclusively that the cause of the defects has been resolved.

It is highly advisable to set up a system for separating units into categories. This allows units to be handled according to their level of defectiveness.

The various parameters to be taken into account are:

- Concrete conformity,
- Cracks on units,
- Construction joints,
- Unit weight,
- Spalling and broken parts,
- Honeycombing and loss of laitance,
- Bleeding.

5. Armour underlayer and toe

5.1. Presentation

The underlayer of the concrete armour traditionally consists of natural rockfill but other materials such as shattered concrete may be included when the STRUCTURE DESIGNER has clearly specified this.

The size and characteristics of the underlayer rockfill must be defined by the STRUCTURE DESIGNER. However, the following principles are reiterated to ensure that the underlayer is suited to the armour:

- Rocks must comprise straight edges and broken faces to favour the intrinsic friction angle of the underlayer and contact between the underlayer and the armour units.

In addition, rounded rocks have a lower hydraulic stability than angular rocks.

- Rocks must be of a sufficiently large size that they cannot escape through the armour. Should they have large flat surfaces they must not create any slip planes. Underlayer placing tolerances must be observed regardless of the size of the rocks used.

5.2. Geometrical characteristics of the underlayer

Underlayer rockfill:

Category	Item	Values	Note
Grading	Unit weight of rockfill	N.U.L. N.L.L.	Values defined by the STRUCTURE DESIGNER.
	Dimensions	$\frac{(L+G)}{2E} \leq 3$	L: largest dimension. G: largest measurable dimension perpendicular to direction L. E: largest dimension perpendicular to plane LG.
Underlayer tolerance	Local defects in underlayer	+/- H/6	Measured vertically. H is the height of an armour unit valid at all points of the underlayer, or else on berms.
	Generalised deviation of the underlayer	+/- H/10	Mean value calculated from measurements on 3 profiles spaced no more than 10m apart.

The table above defines the main standard characteristics recommended by CLI for the underlayer rockfill. These data comply with the "2007 Rock Manual" published by CIRIA CUR CETMEF. The rockfill quality shall comply with the specifications of the STRUCTURE DESIGNER. The "2009 Rock Manual" is also a reference in this regard.

5.3. Checking the underlayer

5.3.1. PURPOSE

The underlayer must be suited to placing of the armour units. The underlayer must comply in every respect with the tolerances defined in table 5.2 and must be stable during placing. Rockfill must be interlocked and must not be able to become detached from the underlayer when the armour units are being placed.

5.3.2. EQUIPMENT

The CONTRACTOR is free to choose the type of equipment to be used for measuring the geometry of the underlayer. The equipment may be mechanical (soundings along the underlayer) or electronic (single- or multi-beam sonar).

5.3.3. MINIMUM METHOD

- One profile every 10 m along the breakwater. This minimum may be lowered to 5 m in complex areas.
- Each profile will involve at least one sounding every H metres (H = unit height) along the slope, taking care to identify precisely the **foot of the underlayer, the horizontal berm and the crest of the underlayer.**
- The berm at the foot of the STRUCTURE is measured over a minimum distance of 2H from the angle formed by the slope and the flat part of the STRUCTURE.
- The fact that the profile surveys can be spaced up to 10 m apart does not dispense the CONTRACTOR from complying with the applicable tolerances at all points of the underlayer.
- The CONTRACTOR must take all necessary measures to ensure that this tolerance is observed between profiles. If necessary the profiles can be surveyed much closer together.

5.3.4. COMPULSORY INSPECTION

The underlayer must be inspected visually both above and under water to ensure that it is compatible with placing of the armour units. The use of underwater video equipment is also acceptable. Armour unit placing must not begin under any circumstances until the underlayer has been approved by the ENGINEER.

6. Placing of ACCROPODE™ II units

6.1. Aim

The aim of placing is to obtain a stable armour that complies with the fundamental principles of the ACCROPODE™ II technique:

- Placing density within the limits set out in section 6.5.
- Units are in a single layer and no unit must be out of profile (less than 1/3 of the unit outside the armour). Each unit is in contact with the underlayer.
- Units are interlocked with one another and not free to move,
- The lozenge-shaped grid is used everywhere. Local exceptions are tolerated,
- The underlayer rockfill cannot escape if there are any gaps between units,
- Units are placed in mostly varied attitudes.

6.2. Theoretical placing drawings

The aim of these theoretical placing drawings, supplied by CLI, is to guide the CONTRACTOR during unit placing. These drawings are based on a grid principle that defines a theoretical packing density.

They also allow the CONTRACTOR to track placing as it progresses.

These drawings are produced by CLI on the basis of theoretical drawings of the STRUCTURE provided by the CONTRACTOR.

6.3. Conditions for placing ACCROPODE™ II units

6.3.1. POSITIONING SYSTEM

ACCROPODE™ II units are to be placed using equipment that can detect and record the position of the centre of gravity of the units in a georeferenced drawing. The equipment may be of DGPS type, an underwater positioner, or a POSIBLOC™ placing assistance system.

System accuracy measured at the unit release hook must be at least H/12.

The system must also record the final position of the unit with the same H/12 accuracy. It must be possible to export the points recorded to an AutoCAD file in order to calculate the density.

Unit placing by sight is authorised above water. Under water, unit placing by sight guided by a diver or an underwater camera is possible provided that visibility is good and compliance with safety rules is ensured. In all cases it is essential to record the actual coordinates of the units.

6.3.2. PLACING UNDER WATER

As the units must be interlocked, it is essential for underwater placing to be checked in real time, either by an underwater viewing system or with the assistance of trained divers. These divers must ensure that the units are perfectly interlocked and that the placing rules have been observed.

6.4. Placing density

The placing density is an important factor in the stability of the armour. This placing density varies depending on how the units interlock on the construction site.

In order to verify the placing density and maintain it within acceptable limits, regular calculations must be made during construction.

6.4.1 CALCULATION OF THE PLACING DENSITY

Density must be calculated zone by zone and all parts of the STRUCTURE must be included in measurements.

A density calculation must also be carried out for the upper berm.

CLI will provide the CONTRACTOR with a calculation method.

6.4.2 TOLERANCES FOR PLACING DENSITY

The placing density on the crest berm must comply with the value given in the pre-sizing tables for ACCROPODE™ II units, available on CLI's website. A local tolerance between 95% and 105% of this value is accepted.

6.5 Validation of the artificial unit armour

The artificial unit armour must be inspected by the OWNER or his representative with a view to completing the acceptance procedures. CLI's remit in the context of its technical assistance does not include approving all or part of the armour. Acceptance of the works concerning the on the STRUCTURE will be performed by the OWNER. **The inspections required in the context of the acceptance procedures will focus on the points referred to in section** Erreur ! Source du renvoi introuvable.**.** For the inspection to go smoothly, the CONTRACTOR shall forward the TECHNICAL SPECIFICATIONS document to the OWNER or his representative.

The OWNER and/ or his representative may ask CLI via the contractor to participate in a training session on the ACCROPODE™ II unit technique.

It is strongly recommended to perform partial acceptance procedures as soon as sections of the STRUCTURE have been completed.

If these procedures are carried out too late and significant remedial works are required, it could be difficult to send the equipment back to the area.

If approval of the armour is requested, CLI can provide a Final Inspection Certificate as an additional service, carried out under the framework of a separate contract.

7. Calculation of the theoretical number of units to be placed

When the works are launched, the CONTRACTOR must estimate the number of units he will need to complete the STRUCTURE. This estimate is based on a theoretical calculation founded on the surface area to be covered and the number of units required for 100 m^2.

The table indicating the theoretical number of units required for 100 m^2 is available on the CLI website: **www.concretelayer.com.**