

# **End-Point Assessment Plan**

## **Construction Steel Fixer Level 2**

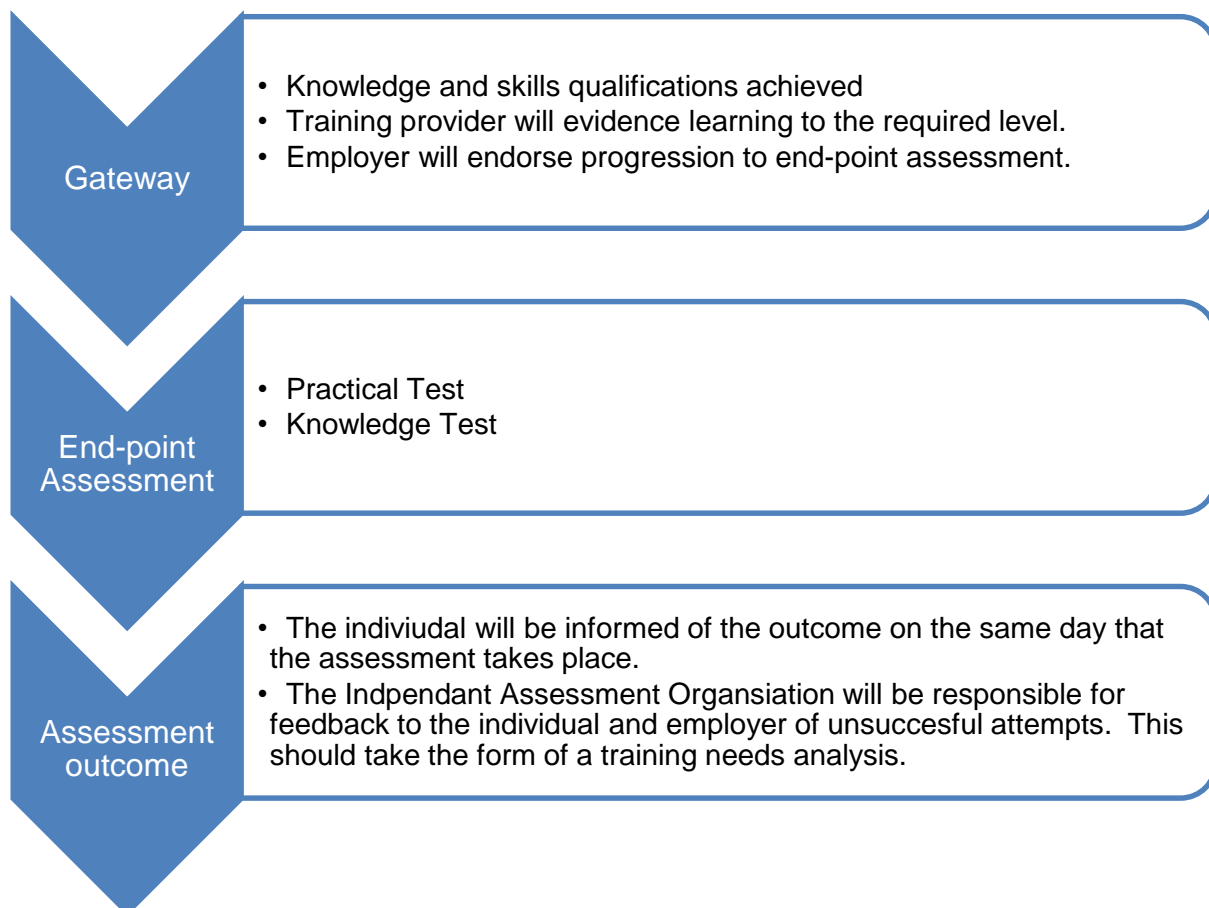
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## Summary of Assessment

The end point – assessment (EPA) will confirm that the individual has the knowledge and competence to carry out the role of steel fixer in a construction environment. The steel fixer is required to strengthen reinforced concrete structures such as bridges, culverts, docks, industrial plants, power stations, railway stations and water treatment plants such as sewerage plants. Successful completion of the EPA will allow the individual to upgrade the recommended regulated industry card certification scheme such as *Apprentice Card* (Red) to a *Skilled Worker Card* (Blue).

The EPA will take up to 7.5 hours and will be delivered according to a given specification which will be made available through the appointed Independent Assessment Organisation. The EPA will be delivered in two parts, a practical task and knowledge assessment; both parts will be completed individually by the candidate. (Figure 1.) The EPA is portable providing the proposed venue meets the criteria set by the Independent Assessment Organisation.



**Figure 1: An illustration of the overall Construction Steel fixer assessment cycle through to expected outcome, including assessment gateway and end-point assessment.**

## Assessment Overview

Assessment Method	Area Assessed	Assessed By
Practical (advanced) timed test that requires the candidate to position and fix pre-assembled elements and reinforcing steel to a stated specification.	Steel fixing (practical) skills, knowledge and behaviours specified by the apprenticeship standard; Problem solving ability; Capability to read and interpret detailed drawings; Safe and appropriate work methods; Effective communication; Reflect and evaluate their work i.e. comment on viable lifting or transport methods.	Independent Assessment Organisation
Knowledge Test	Health and Safety; Managing risk; Sector specific knowledge; legislation; communication; Steel fixing techniques, methodology and materials.	

## On-programme Assessment

The following qualifications will be achieved as a pre-requisite to consideration of the gateway to EPA. The recommended specification based on expected learning outcomes is expressed in the unit titles and assessed on-programme to ensure the individual is prepared and capable of meeting the expected standard at the EPA.

### Professional Qualifications

- QAN: 601/2022/8 Level 2 Diploma in Steel fixing Occupations (Construction) (QCF).
- QAN: 601/0953/1 Level 2 NVQ Diploma in Steel fixing Occupations.
- English Level 1, Maths Level 1. (The test for English and Maths at Level 2 will also be completed).
- Recommended regulated industry card certification scheme such as Apprenticeship Card (Red).

## Assessment Gateway

- Training provider will evidence learning to the level of knowledge, skills and behaviours specified by the Apprenticeship Standard for Construction Steel fixer.
- All mandatory knowledge and skills qualifications achieved: QAN: 601/2022/8 Level 2 Diploma in Steel fixing Occupations (Construction) (QCF); QAN: 601/0953/1 Level 2 NVQ Diploma in Steel fixing Occupations; plus English and Maths Level 1 + Level 2 tests.

- Employer will endorse progression to EPA based on a review of all of the above and assessment of the individual's professional portfolio.

## End-Point (Assessment)

### *What*

Individuals will complete the practical and knowledge test(s) demonstrating the following skills, knowledge and behaviours specified by the Apprenticeship Standard for Construction Steel fixer:

### *Practical test*

<p>Health and Safety (Knowledge and practical application)</p>	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>Apply general workplace health, safety and welfare requirements when undertaking construction steel fixing activities.</i></p> <p><i>Apply safe working techniques for moving, lifting and handling pre-assembled and manufactured elements, working at heights and using access equipment.</i></p> <p><i>Apply safe use, storage and maintenance of hand tools, power tools and ancillary equipment.</i></p>
<p>Productivity</p>	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>Plan and undertake work practise productively.</i></p>
<p>Knowledge, Application and Quality</p>	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>Read, interpret and work to drawings, schedule, specifications and construction information.</i></p> <p><i>Assemble position and fix manufactured elements.</i></p> <p><i>Position and fix pre-assembled elements and reinforcing steel according to specification.</i></p> <p><i>Use a range of reinforcing steel products to shape and assemble structures to specification.</i></p> <p><i>Cut, bend and connect reinforcing steel.</i></p>
<p>Behaviours</p>	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>Effective Communication</i></p> <p><i>Independent working</i></p> <p><i>Logical thinking</i></p> <p><i>Working effectively</i></p>

	<i>Time management</i>
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## Knowledge test

Health and Safety	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>The principles of health, safety and welfare and how they must be applied in relation to their own work and others.</i></p> <p><i>The different and safe techniques to move, lift and handle pre-assembled and manufactured elements, and move, handle and store resources.</i></p>
Legislation	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>The responsibilities under current legislation, (including Health and Safety at Work Act 1974, Provision and Use of Workplace Equipment 1998, Working at Height Regulations 2005, Lifting Operations and Lifting Equipment Regulations 1998, Manual Handling Operations Regulations 1992) and official guidance, (risk assessments, method statements and manufacturers guidance), to undertake work.</i></p>
Communication	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>How to communicate with others and follow organisations procedures to conform to productive work practices.</i></p>
Method and Equipment	<p>Construction Steel fixer Apprenticeship Standard:</p> <p><i>How to interpret information from drawings, schedules and specifications.</i></p> <p><i>How to comply with specifications and drawings when assembling, positioning and fixing elements.</i></p> <p><i>The principles of working at height and the use of access equipment.</i></p> <p><i>The different types of reinforcing bars and how they work together including joining and fixing.</i></p> <p><i>The methods for installing prefabricated and manufactured elements.</i></p> <p><i>How to install reinforcing steel insitu.</i></p> <p><i>The different methods and risks associated with working with reinforcing steel.</i></p> <p><i>How off site construction projects operate as components are brought to site.</i></p> <p><i>The implications of working with offsite manufactured components and the severity of potential outcomes if health and safety is not followed.</i></p>

## How

### Multiple Choice Knowledge Test

- The one hour test will be used to determine that the individual has the underpinning knowledge such as legislation, safe techniques, principles and practices of Steel fixing, Health & Safety and Site Safety to be able to move onto the practical exercise. The pass mark will be a minimum of 85%. If unsuccessful, the individual may apply for re-assessment on no more than one occasion.

### The Practical (advanced) test:

- A timed test (3.5 hours max.) using a set of drawings and schedule that the individual must follow and build to specification in the given time. The individual will be required to build one of three structures: 'Prefabricated pile cap', 'Prefabricated column' or 'Insitu wall'. (Annex B: Steel fixer apprenticeship EPA practical test ) The practical exercise will have critical marking points that must be achieved. To achieve a pass, the individual will need to complete the task safely; within the allocated time; demonstrate they meet the criteria above and meet the required specification within tolerance (Ref. British Standards – BS 8666/05). For example, this will mean the individual has produced an output that matches the drawings and specifications provided, using the stated materials, assembled in the correct positions, with the correct fixings and within the stated tolerances.
- The overall test duration will last approximately 7.5 hours; timetable and guidance will be the responsibility of the Independent Assessment Organisation.

## Who

It is recommended that the Independent Assessment Organisation refer to the '*Consolidated Assessment Strategy for Construction and the Built Environment*<sup>1</sup>' to appoint suitable assessors and internal quality assurance measures.

The recommended assessment specification for the EPA must be developed by a representative group of Steel fixer employers or approved Independent Assessment Organisations and occupationally competent steel fixer assessors. A library of variations for the practical tasks should be developed in conjunction with the question bank for the knowledge test component of the synoptic EPA. This should be made available for external quality assurance and standardisation.

Assessors must have:

- Occupational Competence deemed as having sufficient, verifiable, relevant current industry experience, knowledge and understanding of the occupational working area at, or above, the level being assessed. This must also be of

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<sup>1</sup> [https://www.citb.co.uk/documents/awards/centres/con-sector\\_skills\\_council\\_consolidated\\_assessment\\_strategy.pdf](https://www.citb.co.uk/documents/awards/centres/con-sector_skills_council_consolidated_assessment_strategy.pdf)



sufficient depth to be effective and reliable when judging candidates' competence.

- Hold valid Level 3 award in Assessing Competence in the workplace or (A1 or D32).
- Be registered with the Independent Assessment Organisation that is carrying out the end-point assessment.

The independent assessment organisation will be expected to conduct the EPA according to the following criteria in an area that conforms to the specified conditions.

### Test Structure

The synoptic EPA will consist of a knowledge, skills competence and behaviour(s) assessment undertaken in one day.

A suggested timetable would be:

Early morning:       Arrival and housekeeping  
                              Knowledge test (1 hour)

Break

Late morning:       Task briefing  
                              Practical test (knowledge/skills/behavior) (3.5 hours)

Break

Afternoon:           Final Assessment (assessor checks and balances)  
                              Feedback

Individuals must pass both the knowledge and practical assessment to pass the EPA (overall). Consideration may be given for no more than one failed attempt of only the knowledge test component based on a pass on the practical task.

### Knowledge test

This will be a one-hour test that will consist of at least 50 multiple choice questions randomly selected from a question bank and will focus on all competence (knowledge) areas specified by the Apprenticeship Standard for Construction Steel fixer. It can be delivered either as an on-line or paper-based test and must be delivered under exam conditions with centre requirements as detailed below.

Individuals will not be permitted to use any support material during the test and all mobile phone/tablets etc. must be secured away before entering the testing room. Individuals must not confer with each other during the test.

Online tests will generate automated results and paper-based tests will be marked during the assessment day following a marking template either by the assessor or the support technician. The results will be given to individuals during the feedback session at the end of the day.

### (Practical) Competence test

This test will require the individual to complete a steel fixing task by following an approved drawing, schedule and using other information such as risk assessments, method statements etc. The test will last for a maximum of three hours thirty minutes during which time they will be expected to complete the task to the required standard and within the given tolerances. There will be technical support available during the initial (set up) period of the task, approximately the first thirty minutes, but their role will be limited to following individual's instructions to hold materials in position while the individual fixes them in position.

Throughout the task the assessor can question individuals on how they are carrying out the task and why they have selected their chosen method, Individuals will not be permitted to confer with each other.

The test will end once the task has been completed, at the end of the three hours and thirty minutes allowed or, where it is clear to the assessor that the individual will not be able to complete the task to the expected standard to pass or where the individual's work poses a risk to themselves or others - both of these will result in a fail.

At the end of the three hours and thirty minutes the assessor will carry out assessment of the task, checking that it conforms to the drawings, the correct materials have been used and fixed as specified and all are within the given tolerances using a critical marking sheet. Once marked the assessor will feedback to each individual on the outcome (pass/fail) of their knowledge and practical tests, providing feedback on areas where the individual has failed if this is the case. The assessor should ensure that individuals are clear that the outcome is pending moderation.

### Test Conditions (Venue)

#### Knowledge assessment requirements

The knowledge test will require a room where individuals can undertake the assessment without disturbance.

It must be set up so that each candidate is unable to see the work of another and in a way that the invigilator is able to observe all learners throughout the test.

There must be a clock in the room and the start and finish times clearly displayed so individuals can monitor the time they have.

Notices should be placed around the immediate area to inform others that an exam is being taken and request that noise is kept to a minimum.

For online tests, the computer stations must be set up with appropriate restrictions for example, ensure internet access disabled or disqualifying tests once the individual exits the programme, clear instructions should be provided to candidates at the start to avoid disqualification.

If a candidate needs to take a toilet break during the assessment the support technician must accompany them and ensure that they only visit the bathroom.

### Practical test assessment requirements

To carry out the practical test each individual will require an area of at least 4 meters X 4 meters, with screens to restrict candidate's view to their own workspace alone but set up so that the assessor is able to observe all individuals at all times.

Each assessment must not exceed four individuals per assessor. All materials must be provided for each individual as well as tools and consumables such as wire, gloves, and cutters.

There must be a clock in the area and the start and finish times clearly displayed so individuals can monitor the time they have. Notices should be placed around the immediate area to inform others that an exam is being taken and request that noise is kept to a minimum.

Where the drawings for the task are provided electronically and displayed on tablets these must be provided by the test centre and set up to ensure that individuals are unable to access other information except that required to complete the task.

If a candidate needs to take a toilet break during the assessment the support technician must accompany them and ensure that they only visit the bathroom.

### Assessment centre requirements (general)

As well as those detailed above each centre must have toilet and washing facilities and a clear, dry area for breaks. Each candidate must be provided with a secure locker to leave personal belongings in at the start of the day including any electronic mobile devices.

## **End-Point (final judgement)**

The Independent Assessment Organisation will make the final judgement on competence. This is based upon the following criteria:

- The individual has achieved a pass mark for the knowledge test.
- The individual has met all of the requirements of the test specification for the practical timed test.
- The practical timed test critical marking scheme.
- Performance evidence throughout the test.
- Questioning at various stages within the test as part of the overall practical assessment.

Successful completion of the EPA will voucher formal completion of the apprenticeship.

## Independence

The approved Independent Assessment Organisation will be responsible for the final judgement and moderation of the EPA. To ensure independence:

- Meet the requirements detailed above.
- Approved and listed on the Register of Apprentice Assessment Organisations (R.o.A.A.O).
- Ensure the assessor is entirely independent of and not involved with the delivery of training and assessment during the on-programme element of the apprenticeship.
- Ensure the assessor is entirely independent of employer.

## End-Point (Summary of roles and responsibilities)

Responsibility	Role
Employer	Conducts a review of performance and assesses when the individual is ready to take the EPA.
Training Provider (where applicable)	Work collaboratively with the employer to evidence and confirm the individual's eligibility for EPA.
Independent Assessment Organisation	Coordinates the entire EPA process provides moderation of the knowledge test, practical (advanced) test and responsible for the overall judgement of the EPA assessors.  Provide (where appropriate) feedback to unsuccessful individuals and be equipped to manage appeals/disputes.

## Quality Assurance – Internal

To meet the expected internal quality assurances for EPA, Independent Assessment Organisations must have the following procedures and guidance in place:

- Demonstrable and on-going consultation process with current industry and occupational experts in 'live' project/site environments. Proposed strategy to maintain this engagement and cascade through standardisation events for the network of appointed assessors.
- Run standardisation events for assessors at least every six months to ensure consistent application of the guidance and consistency in marking the assessment methods, also to ensure assessors are trained in the relevant assessment and moderation processes and undertake regular continued professional development.
- Maintenance procedures for all material(s) to reflect/ reference current, legislation, safety, techniques, codes of practice and specific industry/project requirements.

- Demonstrable procedure and process to account for and track the progress of each candidate through the EPA cycle, the 'candidate assessment journey' must be the principle consideration of these procedures.
- Traceable network of communication and a viable proposal to manage the communication between the lead training provider, employer, individual (attempting the assessment), and the apprenticeship certification body Standards. If absent, a suitable implementation strategy should be proposed along with benchmarked accepted standards and timeframes through a service level agreement system.
- Propose a suitable mechanism to manage the output, within realistic timeframes of all dependencies to the certification of each individual attempting the EPA i.e. relevant Awarding Organisations for each of the mandatory qualifications, lead training provider, end-point assessors, Certification body. If absent, a suitable implementation strategy should be proposed along with a flag or service level agreement system of accepted standards and timeframes.
- Reference the '*Consolidated Assessment Strategy for Construction and the Built Environment*<sup>2</sup> to appoint occupationally competent assessors.
- Policies and procedures to manage escalated appeals/disputes.
- Establish policies and procedures for the approval of assessment venues.
- Establish policies and procedures for standardisation of assessment and critical marking specification/criteria.
- Capacity to establish procedures to liaise with the proposed external quality assurance process.

## Quality Assurance – External

The proposed responsibility for external quality assurance of the end-point assessments will rest with a representative (non-profit) board convened by the Construction Industry Training Board (CITB). The board will consist of a representative group of Construction Steel fixer employers. All employers will be afforded equal influence as part of this entity. The board should meet bi-annually as a minimum; the frequency of events will increase in proportion to greater demand for Construction Steel fixer apprenticeship end-point assessments.

The recommended composition of this board would be:

- Construction Steel fixer employers (minimum of 25% SME employers) form the majority of members. It will be good practice to ensure that employer membership of this board is accessible across the industry and should be rotated at fixed intervals over an appropriate cycle i.e. 2-3 years.
- Coordination support provided by the Standard Setting Body.

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<sup>2</sup> [https://www.citb.co.uk/documents/awards/centres/con-sector\\_skills\\_council\\_consolidated\\_assessment\\_strategy.pdf](https://www.citb.co.uk/documents/awards/centres/con-sector_skills_council_consolidated_assessment_strategy.pdf)

A publication of events, widely available on the CITB website will ensure all stakeholders are kept apprised. Feedback from the industry will be encouraged in open forum ahead of each event.

The primary function of this board will be to review the assessment specification(s) devised by all (R.o.A.A.O.) approved Construction Steel fixer apprenticeship end-point assessment Independent Assessment Organisations against the criteria of the apprenticeship assessment plan and consistent approach to:

- Technical complexity
- Quality of end-point assessment against the ideal (set by the board)
- Benchmarked of standard of competence
- Range of methods and techniques

The Construction Industry Training Board (CITB) has proposed to provide a Quality Code statement within the Construction Industry for this purpose. The role CITB have proposed is to provide a service that will administer and coordinate the EQA process and draw technical context and expertise support from employer experts and relevant organisations. This activity will be organised under four headings: *Informing, Assessing, Monitoring and Reporting*. The output of the Quality Code process detailed below will be provided to the EQA panel for consideration and direction.

- *Informing* will involve:
  - Standardisation meetings with all Independent Assessment Organisations (AO).
  - Briefing on best practice to fulfil requirements of the approved assessment plan to AOs.
  - Consideration of the EPA pass/fail rate and any amendments to the EPA that have been identified.
  - Recommend approval processes for EPA assessors aligned to the Consolidated Assessment Strategy.
- *Assessing* will involve:
  - Recommend areas of CPD for EPA assessors across AOs.
  - Desk top evaluation of demand for EPA against AO provision.
  - Verifying adherence of EPA delivery to requirements of the assessment plan.
  - Review capability of AOs with regard to EPA materials, equipment and facilities.
- *Monitoring* will involve:
  - Provide a monitoring service for EPA delivery.
  - Evaluation of procedures and process to ensure standardisation across the AO network.
  - Checking the provision of candidate learning support resources and facilities for EPA.

- Ensure fairness and transparency across EPA decision-making and methodology.
- *Reporting* will involve:
  - Provide reports on levels of compliance against the full requirements of the assessment plan.
  - Collate data and report findings of non-conformance and best practice.
  - Inform the industry and IfA of non-compliance, volumes, success rates, availability of provision and put forward recommendations for cessation of approved status of underperforming AOs.
  - Report to stakeholders on completions, pass/fail rates, grading, provision and review requirements.

The CITB will operate this service on behalf of, and report to, the Institute for Apprenticeships (IfA).

## **End-point –Grading**

The Construction Steel fixer occupation is highly specialist, a high level of competence must be set as a minimum in order to ensure major infrastructure projects are not compromised. In order to minimise the risk and ensure a standardised benchmark of competence and approach to health and safety, the end-point assessment will not be graded above a pass mark. A grading exemption has been approved for this assessment plan. There will be limited allowance for the practical element of the end-point assessment, if failed the individual must apply to re-take the entire end-point assessment. The knowledge test will allow for no more than one more opportunity to re-take if failed at first attempt.

## **Implementation**

### *Affordability*

The practical element of the EPA has been valued with a minimum and maximum group size of 3 to 4 candidates respectively. Every effort must be made to maximise the attendee to assessor ratio whilst maintaining validity of the EPA. The knowledge test element will be delivered through a virtual learning environment which will present the opportunity to optimise delivery and allow for automated moderation.

The estimated value of the EPA is on average, less than 10% of the total cost of the apprenticeship.

### *Consistent end-point assessments*

The Independent Assessment Organisation will show commitment to ensure consistency through effective policy and change management. There should be a

demonstrable, rational and realistic plan to cascade changes to legislation, relevant industry, and assessment criteria updates to assessors. This may take the form of mandated training or standardisation events. A procedure for organisation learning should be in place in response to upheld appeals/disputes or advisory statements issued by the external quality assurance body.

Suitable policies will be in place to endorse the continued professional development of assessors, end-point assessment authors and policy makers within the end-point assessment organisation. (Quality Assurance – Internal)

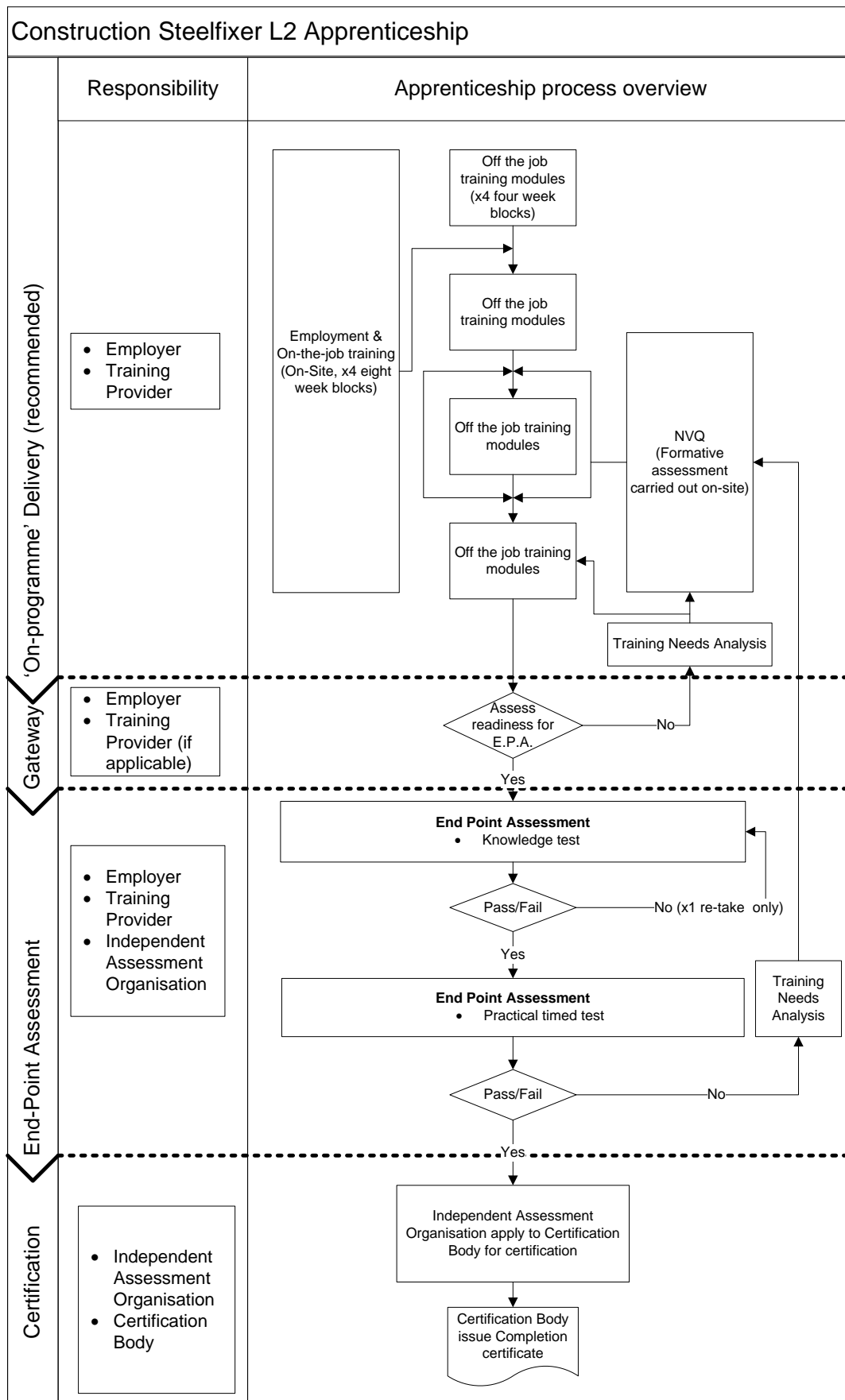
The stated specification for the EPA process provides a straightforward schedule of activity that can be replicated across the country either on training provider or employer premises. Limited personnel will be required to conduct each EPA which will decrease the likelihood of variability.

### *Volumes*

It is expected that the demand for up take on this apprenticeship will be in the region of 80-100 starts per annum. This figure will be subject to the demand of the industry such as major infrastructure projects including Energy, Rail, Port authorities and Highways.



## Annex A: Illustration of Steel fixer apprenticeship (on-programme and EPA)



## Annex B: Steel fixer apprenticeship EPA practical test examples

### *Prefabricated pile cap (insitu)*

The prefabricated base (pile cap) test is to consist of the prefabrication of a 2.5m x 2.5m x 1m deep pile cap with column starter bars for a 400mm x 400mm column in the centre of the pile cap.

Prefab pile cap to consist of the following:

- Main top and bottom reinforcement to be U-bars in each direction of 20mm and 16mm dia. alternate place bars at 200mm centres, with short legs of U-bars lapped on the sides to form the pile cap.
- [Pile cap cage] Incorporate side/lacer L-bars of 16mm dia. at 200mm centres on all sides. Incorporate 4No 25mm dia. column starter bars and 2No 400mm x 400mm 10mm links in the centre of the pile cap at the correct positions/centres for the 400mm x 400mm the column starters will be fixed insitu and not prefabricated.
- Incorporate multiple shear links within the base, position of the of 12mm dia. shear links to be in 3 rows around the whole perimeter of the column:

Distance from the outside edge of the insitu column	Total number of shear links
Row 1: 250mm	12
Row 2: 500 mm	12
Row 3: 750 mm	16

- [Pile cap cage] To incorporate sufficient support chairs.
- To include the fixing of appropriate types/sizes and number of spacer blocks to achieve the correct cover requirements.
- To include the use of appropriate methods of securing the cage reinforcement to allow it to be moved, lifted and positioned e.g. ties, clamps.
- To incorporate lifting arrangements and cast-in lifting items including considering C of G, rigidity and stability to allow the cage to be lifted for installation and positioning.
- To include interfaces with typical items of temporary works e.g. formwork ties and temporary supports.

### *Prefabricated column*

The prefabricated column test is to consist of the prefabrication of a 3m long 500x500mm square column with a 250mm x 250mm boot section on one face. The column section is to be prefabricated horizontally on temporary supports and then prepared for a lift into a vertical position by crane and placed on top of a cast concrete foundation with cast in starter bars of the same dimensions as the column cage to allow it to be spliced with the protruding starter bars insitu to complete the exercise. To test for a pass, the structure must be vertically lifted into position, complete with capping off L-bars to tie into a suspended slab.

#### Prefab column cage to consist of the following:

- Main reinforcement to be 4No 20mm dia. bars in the main link (one in each corner) and 4No 16mm dia. bars (one each face). All main bars to be capped off with L-bar of the same diameter to tie into a suspended slab.
- Main links to be 10mm dia. at 150mm centres.
- The boot is to be formed of 10mm dia. U-Bars spliced onto the main link with 2No 12mm dia. bars (one in each corner) of the U-Bar.
- Internal Shear links 1No per main link to be 10mm to be fixed in the opposite direction to the boot section column to be lapped with starter bars in a concrete foundation using standard lap length of 40 multiplied by bar diameter (i.e.  $16 \times 40 = 640\text{mm}$  lap).
- To include the fixing of appropriate types/sizes and number of spacer blocks to achieve the correct cover requirements.
- To include the use of appropriate methods of securing the reinforcement to form the prefabricated cage and allow it to be turned, moved, lifted and positioned using normal ties, load bearing ties and clamps etc as required.
- To incorporate the installation of all temporary bracing required for prefabrication, turning from horizontal to vertical and for lifting into position.
- Incorporate lifting arrangements and cast-in lifting items including considering C of G, rigidity and stability to allow the cage to be lifted from horizontal to vertical for installation.
- To include interfaces with typical items of temporary works e.g. formwork ties and temporary supports.

### *Insitu wall*

The insitu wall test is to consist of the fabrication of a 3m long, 2m high, and 300mm thick straight section of wall. The wall is to be fixed insitu, with cast in starter bars of the same dimensions as the wall cage to allow it to be spliced with the protruding starter bars insitu to complete the exercise. To test for a pass, the assessor will use a box or measure the required 500mm x 500mm opening.

#### Insitu wall cage to consist of the following:

- Main wall reinforcement to consist of 1No layer of 20mm dia. vertical bars in the far face at 1.9m long and 1No layer of 16mm dia. vertical bars in the near face at 1.2m long at 150mm centres with 16mm capping off U-Bars at 150mm centres with long leg and short leg and 1No layer of 12mm dia. horizontal lacer bars per face at 150mm centres with 12 mm U-Bars capping off both ends of the wall cage to incorporate blast/shear links at 300mm centres, in both directions across the entire wall.
- Wall to incorporate 1No 500mm x 500mm opening with required 12mm dia. trimming steel within it. Also 3No 16mm links above and below the box to form vertical rebar and 12mm side U-Bars splicing onto the lacer bars.
- Main vertical wall bars to be lapped vertically with the wall starter bars cast into the foundation opposite to form the wall cage.
- To include the use of appropriate methods of securing the cage reinforcement insitu using ties, clamps etc.
- To include the fixing of appropriate types/sizes and number of spacer blocks to achieve the correct cover requirements.
- To include temporary bracing/support steel as required to fix the slab cage insitu.
- To include the installation of, and interface with, cast in plates and sleeves – consider incorporating cast in plates and sleeves into the wall to allow the candidates to deal with the interfaces.
- To include interfaces with temporary works e.g. formwork ties and temporary supports.