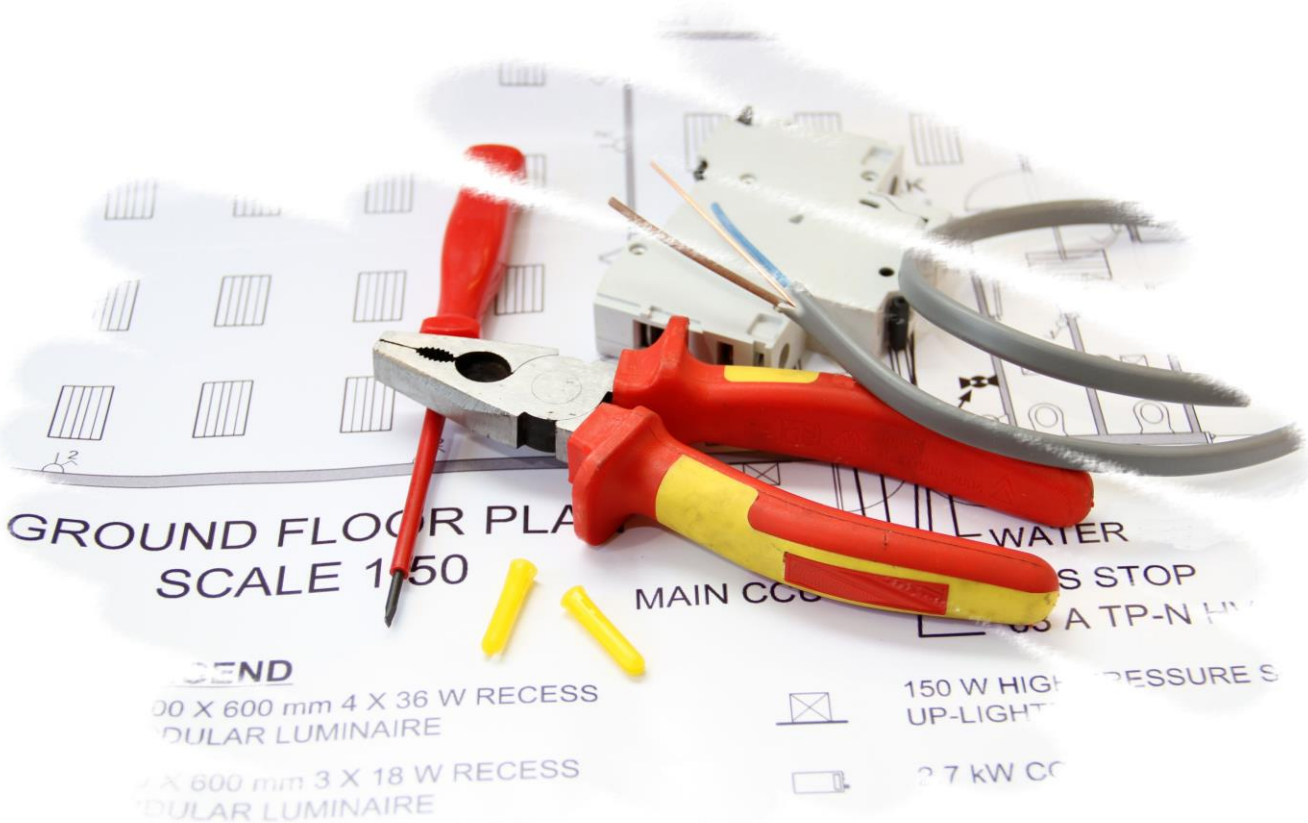


2396-402 Level 4 Principles, Design, Erection and Verification of Electrical Installations.

Chief Examiner's report – March 2022



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1 Introduction

The purpose of this document is to provide centres with feedback on the performance of candidates in the March 2022 examination for 2396-402 Design, Erection and Verification of Electrical Installations.

The Chief Examiners' Report has been reintroduced as a result of feedback from centres, to give them guidance in preparing candidates for the written examination.

2 Feedback on candidate performance

General feedback

The following comments are intended to help students prepare for the examination by having a better understanding of what is expected of them. The feedback within this report would also be valuable to tutors in understanding candidates' difficulties in answering questions and the areas where more guidance is required.

The March 2022 question paper was found to be in accordance with the scheme requirements.

The examination entry for this series was approximately 142.

This examination contained no errors and was considered to be correctly levelled.

Questions in this series covered a wide range of subjects across the assessment criteria of BS 7671. A good knowledge of BS 7671, as well as an understanding of its requirements and where they are applicable, would have been an advantage to many candidates.

It seems to be a growing trend that candidates can calculate to a set procedure, but if that procedure requires adaption because of the need to use different data, this throws candidates. Candidates should be taught how to use different items of data and how they fit together rather than following one set procedure.

Centres must be reminded that permitted materials for this examination must comply with the requirements within the permitted materials document on the qualification webpage. This means that notes or sheets giving design calculation procedures should not be allowed. Publications permitted include BS 7671, IET GN3 and the IET On-site guide. This series has been marked against amendment 1 of BS 7671 (Blue cover) as amendment 2 was published after the examination date. Please see section 5 of this report for the impact of amendment 2 of BS 7671 and forthcoming dated examinations.

Cable Design Calculations

Most candidates were able to deal with most of the calculations and data linked to the sizing of the distribution circuit live conductors. Many candidates however didn't seem to fully read the questions as many seemed to overlook that a suitable device rating and type was required with **reasons**. Many candidates did not provide these reasons and therefore dropped marks as a result.

Whilst many candidates demonstrated the procedure for calculating circuit earth fault loop impedances, many did not seem to see that the question had a further section relating to the final circuits from the DB fed by the distribution circuit.

Knowledge of BS 7671 (Design)

In this series, some questions in this area were poorly answered with a minority of candidates displaying the required level of understanding. Areas of weakness shown included the following:

- Understanding the purpose of Part 3 of BS 7671 and how it supports the design process. Candidates need to consider how these assessments are undertaken and how they affect the design.
- Understanding where and why additional protection is required in specified types of installations. Many candidates still consider additional protection as meeting disconnection times. Designers need to have an understanding of the risks leading to the need for additional protection.
- Attempting questions that are specific to a commercial installation but instead providing answers relating to domestic installations.
- Understanding the purpose of Main Protective Bonding. Many candidates seem to think this is provided to give lower loop impedances and this simply is not acceptable in terms of understanding at this level. With the advent of amendment 2 of BS 7671 placing more importance on the ability to assess the need for this to be installed, understanding why it is there is becoming even more important.
- Providing good clear reasoning why a circuit meets, or does not meet, the requirements of disconnection under earth fault conditions.

The majority of candidates were able to correctly determine short circuit current for a given situation but still the justification on whether the given situation is satisfactory or not generally lack key understanding.

Knowledge of BS 7671 (Selection and Erection)

Like the knowledge of design above, this series again had many candidates who were unable to demonstrate a sufficient understanding of selection and erection. Areas of weakness shown included the following:

- A detailed understanding of the effects of electromagnetic induction when AC circuits enter ferromagnetic enclosures.
- Lack of understanding of the factors that affect the csa of an earthing conductor depending on the earthing arrangement. This is seen as a fundamental and basic area of understanding.
- Factors that affect the csa of Main Protective Bonding conductors.

Candidates need to have a full understanding of what effects the cross-sectional area of earthing and bonding conductors. Designers are faced with crucial choices on how and why they select a particular csa and these must be justified in terms of safety as well as on economic grounds.

Verification

Most responses to the question relating to testing continuity of cpc were generally answered well.

The question relating to the testing of insulation resistance, and why all circuit protective conductors should be connected during the test, attracted a range of answers, many of which did not demonstrate sufficient enough understanding for full marks.

Special Locations and Appendices

The question relating to marinas attracted mixed responses with high achieving candidates being able to identify the risks. Others however gave very brief one-word responses that lacked in key detail or suitable examples. Many provided good responses to the requirements for caravan parks. Some candidates just stated what was not allowed, rather than what could be used instead.

Few candidates understood the terms relating to circuit design even though these terms are very common in the process and are contained in tables and data.

3 National pass rate

The national pass rate for the 2396-402 March 2022 examination is as follows:

Exam series	Distinction	Merit	Pass	Fail rate
March 2022	6.60%	16.04%	33.02%	44.34

Past examination series

Exam series	Distinction	Merit	Pass	Fail rate
March 2021	1.67%	13.33%	41.67%	43.33%
March 2020	3.42%	9.40%	17.09%	70.09%
March 2019	0.87%	12.17%	22.61%	64.35%

4 Forthcoming Exam Dates

09 June 2022

01 December 2022

5 Note regarding 18th Edition of IET Wiring Regulations 2022

Amendment 2 of BS 7671 was published at the end of March 2022. The March 2022 series was marked to amendment 1 of BS 7671 as amendment 2 was published after the examination.

The June 2022 series may be sat using either amendment 1 of BS 7671 (blue cover) or amendment 2 (brown cover) and the examination will be marked with both versions in mind. From December 2022 onwards, examinations will only permit BS 7671 (2018) 2022 amendment 2 (brown) and will be marked to that version only until the next amendment is published.

Projects may reflect either version of BS 7671 until September 2022 where all project work must reflect changes relating to BS 7671:2018(2022).

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