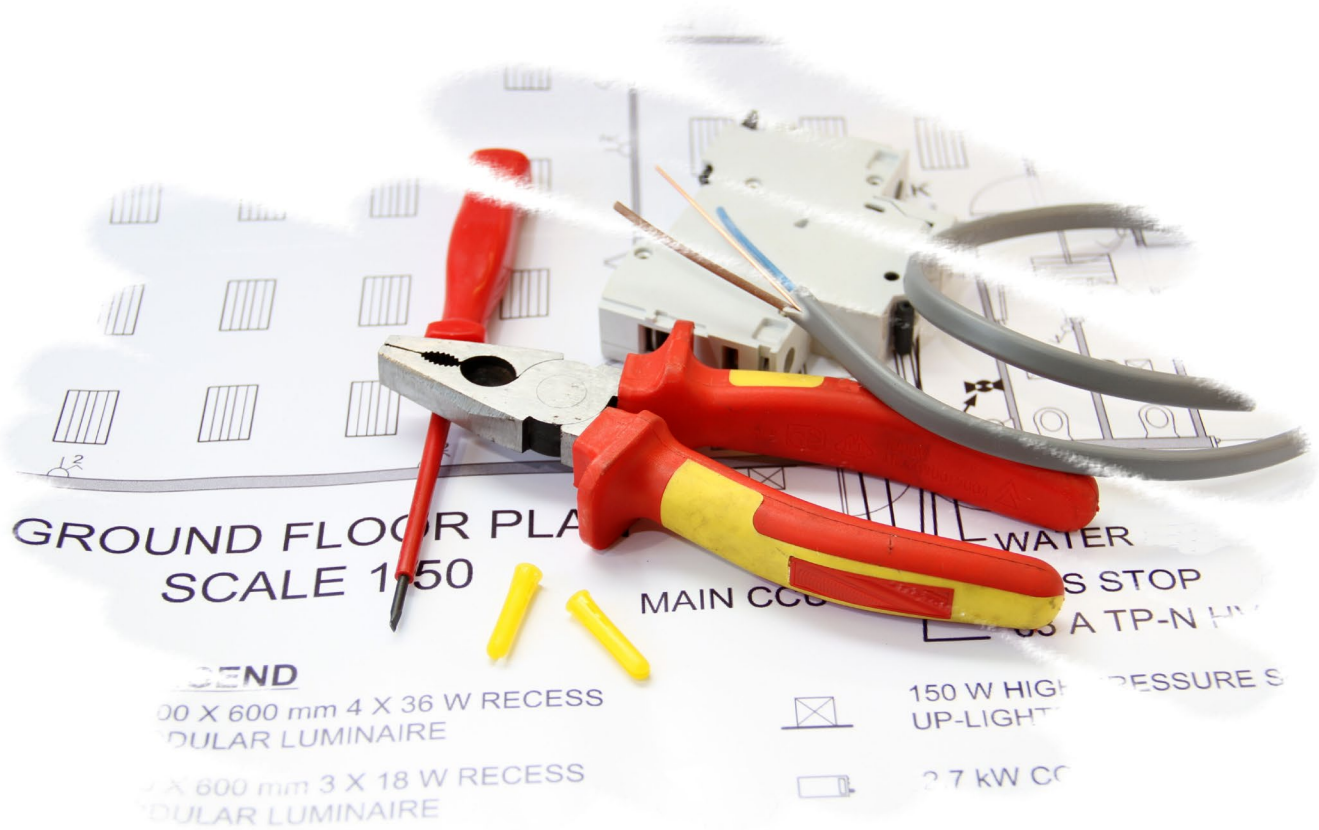


2396-402 Level 4 Principles, Design, Erection and Verification of Electrical Installations.

Chief Examiner's report – **March 2024**



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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 2024** examination for 2396-402 Design, Erection and Verification of Electrical Installations.

The Chief Examiners' Report is intended to give centres and candidates guidance in preparing 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 2024** question paper was found to be in accordance with the scheme requirements.

The examination entry for this series was approximately **170**.

This examination was considered to be correctly levelled and compared as being very similar to other recent series.

Questions in this series covered a wide range of subjects across the assessment criteria and BS 7671.

Strengths demonstrated in this series included research of Fundamental Principles in BS 7671 as well as the requirements for the Assessments of General Characteristics.

Where questions contained scenarios, it is essential that responses by candidates reflect this. Many responses to questions having scenarios were very general lacking the specific detail meaning marks were not maximised.

As with many previous series, candidates need to scrutinise questions to ensure they are picking out the key details within the question. Equally, a common theme of these reports is that where questions require candidates to explain or describe 'why' a situation provides a risk or challenge, candidates too often responded to with 'how' type answers such as requirements from BS 7671. This demonstrates either a lack of thorough understanding of the risk or challenge, or an indication that candidates are not fully reading the question.

Section A: Cable Design Calculations

Generally, most candidates undertook the design calculation procedure for Live conductors well with common errors being;

- using design current (I_b) instead of nominal rating of protective device (I_n) when applying rating factors to determine a minimum tabulated current (this is acceptable providing other relevant calculations are performed)
- using single-phase voltage drop values either from tables in BS 7671 within calculations, or as a comparison value for the maximum permissible

- not using power factor in the voltage drop calculation
- not concluding or justifying why a value is correct.

It is surprising how many candidates undertake a full design procedure for live conductors, but do not actually provide a conductor csa as part of their answers.

When determining a minimum protective conductor csa, few candidates did this by using the available information such as deducting the Z_e from the maximum permitted Z_s to leave a maximum R_1+R_2 to work with and size a suitable **minimum** cpc cross-sectional area.

Knowledge of BS 7671 (Design)

Most candidates performed well to questions relating to the Fundamental Principles in BS 7671 as well as questions relating to the Assessment of General Characteristics in Part 3.

It was disappointing to see the level of responses to questions regarding Earthing or Bonding to meet the requirements of Automatic Disconnection of Supply (ADS).

A question regarded as being quite simple and asking candidates to identify 'electrical equipment that would require earthing' attracted responses that were extraneous parts, that would require bonding, such as metallic pipes.

A poor level of understanding overall was demonstrated around the requirements for protective earthing conductors, in the given installation, with many candidates providing a minimal account of requirements for earthing, instead straying into general requirements for Main Protective Bonding conductors. Candidates at this level need to understand the difference between earthing and bonding.

Questions relating to the potential dangers of applying Main Protective Bonding in some situations provided a range of responses with very few demonstrating a full understanding.

Whilst candidates have, over many series, demonstrated an ability to recall the procedure for calculating the adequacy of Live conductors under short circuit conditions, very few could explain **why** it should be done, with many candidates referring to the need to meet disconnection times for ADS. In addition, few candidates can evaluate results of calculations from a set procedure indicating poor understanding. Centres are advised to clarify the requirements of Section 434 and 435 of BS 7671 as distinct from Chapters 41 and 54.

In another question, a disappointing number of candidates confused the maximum disconnection time for final circuits complying with ADS, instead of that for RCDs used for additional protection.

Few demonstrated an understanding of the effects of DC currents on Type AC RCDs with most simply stating that AC RCDs would not detect or disconnect DC faults.

Knowledge of BS 7671 (Selection and Erection)

The question which related to standby systems such as battery backed lighting and standby generators attracted weak responses if responded to at all.

Whilst it could be argued that this is a specialised area, the scope of Section 551 of BS 7671 actually covers a much wider range than most expect, meaning exposure to these situations is much greater than many think.

Given that surge protection is more commonplace in electrical installations, the responses linked to questions relating to these were mixed. Having an understanding of the loads that create switching surges, and equipment vulnerable to these, leads to a better understanding of where surge protection, other than in distribution boards, should be located.

Verification

Candidates generally didn't maximise marks in the question linked to inspection and testing. This was mainly due to the following factors;

- responses did not link to the scenario and use specific test methods suited to the scenario
- responses were generic and at times simply copied text from IET GN3 without context or elaboration
- responses were on the whole poorly structured leading to an illogical process.

It was also surprising how many candidates quoted 20 MΩ as the minimum permissible value of insulation resistance for a circuit, rather than a guidance value recommending the subdividing of circuits for testing.

Special Locations and Appendices

Candidates gave some good responses to the question relating to prosumers' installations which is encouraging given this is a reasonably new area in BS 7671.

The item relating to risks associated with swimming pool locations was not responded to well and seems to be a common theme each series for questions relating to Special Locations.

Whilst candidates may start well describing one or maybe two risks, the responses quickly evolve into requirements from BS 7671. It is an essential skill for designers of electrical installations to fully understand the risks electricity can create in many different locations including factors that increase risk making an area a designated Special Location.

Again, this may also be a result of candidates not properly reading the question and responding accordingly.

National pass rate

The national pass rate for the 2396-402 **March 2024** examination is as follows:

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
March 2024	0	3.70	34.07	62.22

Past examination series

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
March 2023	0.88	11.50	30.09	57.52
March 2022	6.96	16.52	33.91	42.61

3 Forthcoming Exam Dates

13th of June 2024

5th of December 2024

13th of March 2025

4 Note regarding 18th Edition of IET Wiring Regulations 2022

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. The permitted publications for this exam are BS 7671, IET GN3 and the IET On-site Guide **only**.

As Amendment 2 of BS 7671 is now established. This must be used for all assessments within this qualification.

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