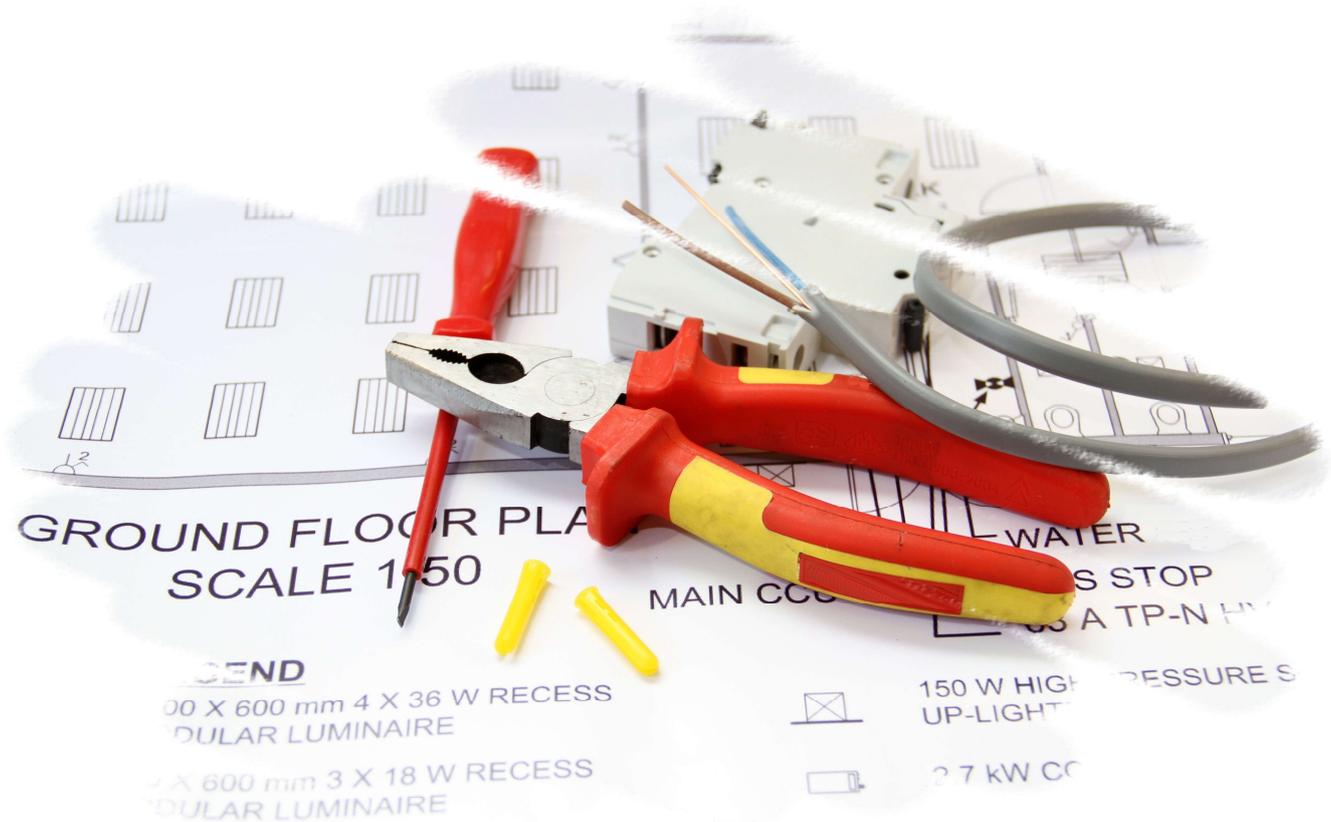


2396-402 Level 4 Principles, Design, Erection and Verification of Electrical Installations.

Chief Examiner's report – **June 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 **June 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 **June 2022** question paper was found to be in accordance with the scheme requirements.

The examination entry for this series was approximately **134**.

This examination contained no errors and was considered to be correctly levelled and compared as being similar to other recent series.

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.

Once again, it seems that many candidates simply follow a set procedure when calculating current-carrying capacity and voltage drop. Candidates at this level need to be able to understand what each step represents and to be able to adjust procedures to suit changing requirements. This can only be achieved if candidates understand the relationship between each stage of the design process and how to adapt these figures or processes to find specific values.

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**.

This series has been marked against amendment 1 of BS 7671 (Blue cover) and amendment 2 (brown cover) as both are currently compliant. Please see section 5 of this report for the impact of amendment 2 of BS 7671 and forthcoming dated examinations.

Cable Design Calculations

When undertaking calculations for current carrying capacity and voltage drop, it is very important for candidates to validate and justify each stage. If a capacity or value is determined, what makes it the correct or suitable value?

Candidates are reminded that in circumstances where overload protection is omitted, or where it is provided remote from the origin of a circuit, short circuit thermal constraints must also be confirmed.

It is also important for candidates to be able to understand what limits the current carrying capacity of a circuit and most candidates were not able to understand this, or the factors that impact on it.

The majority of candidates suitably demonstrated the procedure for calculating circuit earth fault loop impedances, as well as the thermal constraints. Some candidates, however, are applying factors which are only applicable to measured resistances. Candidates are reminded to read any associated notes that are given relating to tables in reference materials.

Knowledge of BS 7671 (Design)

Few candidates were able to match the correct protective measure from Chapter 41 of BS 7671 with the fundamental principles for protection. Most candidates seemed to confuse basic and fault protection.

Candidates in general, did not seem to know the permitted voltage range for supply nominal voltages to earth.

When asked to explain the purpose of basic protection, many simply listed requirements demonstrating a lack of understanding for what is, as the name suggests, a fundamental means of protecting against electric shock. Similarly, poor understanding was generally shown when asked to explain the key criteria of basic protection.

The question relating to reasons for additional protection attracted very basic responses and did not, again, demonstrate the level of understanding required. Learners at this level need to understand the risks involved, not just that a requirement is there.

Whilst many candidates could list the general causes of electromagnetic disturbances, very few were able to understand how the bonding networks given in BS 7671 provide protection.

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 lacks key understanding. Some candidates still confuse short circuits and ADS disconnection times.

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:

- An understanding of what premature collapse means in relation to wiring systems and the building structure.
- What a final temperature relates to in terms of a cable's construction.

- Factors affecting the selection and erection of earthing and bonding conductors.

One area of understanding that was lacking across most candidates was establishing if metallic services were considered extraneous or not.

Verification

Most responses to the question relating to testing earth electrode resistances demonstrated some understanding with many being able to undertake some calculations, such as whether the reading was within maximum tolerances. A significant number of candidates did not know what value must be recorded as R_A , however. Fewer seemed able to demonstrate how to determine the maximum value of RCD suitable for the scenario.

Special Locations and Appendices

The question relating to electric vehicle charging installations attracted mixed responses with high achieving candidates being able to identify the risks. Others however simply quoted extracts from BS 7671 with attempts at reasoning their purpose.

Reasons for not having PME supplies for pitch supplies in a caravan park was answered somewhat more successfully.

3 National pass rate

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

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
June 2022	1.54%	6.15%	24.62%	67.69%

Past examination series

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
June 2021	4.58%	15.69%	30.07%	49.67%
June 2019	0.0%	4.51%	30.08%	65.41%

4 Forthcoming Exam Dates

1st December 2022

9th March 2023

8th June 2023

7th December 2023

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 the December 2022 series 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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