

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

Chief Examiner's report – **March 2016**



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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 2016** 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 2016** question paper was found to be in accordance with the scheme requirements.

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

In general, responses to questions for this series were to a good standard with good use of BS 7671. Any candidate who either simply quotes regulation numbers or recites the requirements of BS 7671, without interpretation, will not score well.

Candidates should be made aware that examinations are in the form of a combined question and answer book instead of a separate question paper with separate answer book. Each question will have an allocated space where the answer needs to be provided. Although candidates may use additional sheets if they run out of space or feel they need to re-submit an answer, candidates are advised to use the generous space provided efficiently. Candidates must be aware that questions having a stem before the questions a), b), etc., answers must relate to the information in the stem. Some candidates lose marks as they provide answers which do not relate to the installation in the question.

It is **essential** that candidates read a **full** question before attempting as many candidates answered some parts of questions before they were asked to. This led to early spaces becoming cramped and candidates answering later questions stating 'see question earlier'.

Cable Design Calculations

Candidates on the whole show a good ability in the application of circuit design for both live conductors and cpc. Some candidates oversized the conductors as they possibly exercised caution, this was not penalised as long as it was not too excessive.

In contrast, a number of candidates did **not** show **all** of their calculations when justifying the cable current capacity. As the process carries marks, these candidates would not have scored the maximum available.

Candidates generally apply a good understanding of design earth fault loop impedance and the application of the adiabatic equation as Chapter 54 of BS 7671. In contrast to this, a large proportion of candidates are unable to conclude whether their circuit calculations are acceptable or not.

Conclusions to questions are as important as the calculations used to arrive at an answer. A large part of the design process is justification of sizes selected. Candidates are encouraged to conclude their selections by making comparisons to permitted and/or calculated values.

Candidates must also be very careful when applying temperature factors to calculations for maximum earth fault loop impedance values. Candidates are encouraged to apply factors

during the design process then directly use the data within BS 7671 for comparison. In this situation, the application of further factoring as Appendix 14 is not required, as temperature is already compensated for. Care must also be taken when using data within the IET On-site Guide, as these values are also adjusted for temperature. As a result, some candidates made temperature compensations twice.

Knowledge of BS 7671 (Design)

A working knowledge of BS 7671 is required by all candidates. Some candidates are able to recite the requirements of BS 7671 but are unable to demonstrate how these requirements are applied by using examples. Candidates at this level must be able to interpret requirements. Quoting regulation numbers only is not a suitable response.

Once again, a large proportion of candidates did not manage to successfully verify values of short circuit current for a circuit. Instead, many either seemed confused with earth loop impedance values and/or were unable to determine if the circuit was suitably protected against short circuit current. Candidates need to understand that where a circuit relies on an RCD for earth fault protection, the circuit may not have adequate short circuit protection to the requirements of **Chapter 43** of BS 7671. Many, at this point, would refer to disconnection times for earth fault conditions instead of verifying the circuits suitability using requirements from Chapter 43.

The vast majority of candidates answered questions relating to Fundamental Principles and General Characteristics very well.

Whilst most candidates demonstrated partial knowledge of EMI and the requirements for protection against the effects of EMI, few were able to explain the purpose of the protective measures.

Knowledge of BS 7671 (Selection and Erection)

One item relating to the design and selection of equipment in a building constructed of combustible materials divided candidates with many leaving the question unanswered.

Another question relating to isolation and switching was generally very well answered. Some candidates however seem unable to provide examples of such devices for isolation and switching using practical situations. This led to many scoring half the marks on offer as the question clearly requested examples.

Verification

A minority of candidates were unable to explain the correct method of verifying earth electrode resistance despite having Guidance Note 3 as permitted material. Many described the incorrect test method instead by using an earth fault loop impedance tester which indicates that the question was not fully read.

Special Locations

As well as having an understanding of the requirements of BS 7671 for Special Installations or Locations, candidates at this level need to demonstrate a knowledge of the risks which lead to these further measures. A good understanding of the risks enables designers to select suitable measures including a better understanding of why certain requirements must be met.

Many candidates answered these questions to a very good standard.

Appendices

Candidates who attempted questions in relation to Appendix 4 provided answers to a high standard.

3 National pass rate

The national pass rate for the 2396-402 March 2016 examination is as follows:

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
March 2016	15	28	28	29

Past examination series

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
December 2015	5	15	34	46
June 2015	8	16	38	38
March 2015	12	19	31	38

4 Forthcoming Exam Dates are:

- June 2016
- December 2016

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