2394-302 Level 4 Principles, Design, Erection and Verification of Electrical Installations.

Chief Examiner's report – June 2018

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Contents

1 Introduction

The purpose of this document is to provide centres with feedback on the performance of candidates in the June 2018 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 2018 question paper was found to be in accordance with the scheme requirements.

The examination entry for this series was approximately 150.

This examination contained no errors and was suitable for the qualification specification and Level.

Candidates who simply quote text from permitted publications, such as BS 7671, will not score well where questions require an explanation or description. Candidates must interpret the requirements to suit any scenario within the question.

Candidates are encouraged to study the detail within each question and provide responses specific to that detail. Where candidates state a range of requirements, and not those specific to the question, marks will be lost.

Where questions are seeking **why** particular regulations or measures are required, candidates must take care to explain 'why' as opposed to 'what' the requirements are or 'how/where' they are applied.

Candidates and centres are also encouraged to understand the risks associated with PME supplies including why these supplies are not permitted in certain circumstances and why installations connected to these systems require more stringent bonding requirements. With more DNOs utilising these types of networks, the risks associated with them becomes more common.

Cable Design Calculations

Candidates on the whole show a good ability in the application of circuit design for both live conductors and cpc. A few candidates oversized the conductors as they did not determine the design current correctly. Some marks were still awarded, in this situation, for procedure.

Once again, a large number of candidates did **not** show **all** of their calculations when justifying the cable **current capacity** but instead simply sized for voltage drop and simply compared design current with tabulated current values without utilising rating factors. As the process carries marks, these candidates would not have scored the maximum available.

In addition, quite a number of candidates still provide a detailed set of calculations but totally forget to actually state the conductor size selected. This mistake seems to be happening more frequently.

In this question, many candidates failed to take into account voltage drop restrictions and as a result undersized the conductor size which resulted in fewer marks being obtained.

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. Once again, candidates are not justifying their calculations with published data or previously determined data and consider it suitable to simply show a string of calculations with no justification.

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 be made aware of the two forms of adiabatic equation and where it is suitable to apply each. Incorrect use of the equation requires a candidate to perform more calculations than is required for justification and, if looking at the wrong Chapter in BS 7671, incorrect values of 'k' may be used. Marks will be lost if the wrong data or calculation is utilised.

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 or content only is not a suitable response unless a question requires a candidate to **state** a requirement.

Most candidates were able to state the requirements from Fundamental Principles or General Characteristics. However, few could identify suitable protective measures that applied to the fundamental principles for electric shock protection.

It was very disappointing to see how few candidates could demonstrate a Level 3 understanding of the reasons for earthing and bonding let alone a Level 4 understanding with many candidates showing any suitable understanding of the differences between the two.

When determining suitable short circuit protection for a circuit, many candidates confused earth fault current with short circuit current and used cpc resistance values when determining short circuit values. In addition, many used the adiabatic equation and k values from Chapter 54 instead of that from Chapter 43. Whilst some candidates seemed able to recall the procedure for calculating short circuit currents and the suitability of the circuit cables, few were able to show an understanding by comparison of data.

Knowledge of BS 7671 (Selection and Erection)

Most responses given in relation to wiring systems and equipment in escape routes were simply quoted from BS 7671 with little or no understanding of the risks involved with certain systems and equipment.

Once again, where candidates were asked to explain suitable protection for particular external influences, the vast majority of candidates simply listed the codes used in BS 7671 instead of displaying any knowledge or understanding of design considerations.

Verification

Whilst many candidates were able to find or recall information relating to initial verification, few could demonstrate a full understanding which is required at this level. Most responses were brief and recited from permitted publications.

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 reasonably good standard in relation to a agricultural locations. Where some candidates starting to identify and describe the risks, their descriptions soon turned into the requirements given in BS 7671 which was not required by the question.

Most candidates who attempted to answer the question relating to Conductive locations with restricted movement were able to provide suitable answers in relation to the requirements..

3 National pass rate

The national pass rate for the 2396-402 June 2018 examination is as follows:

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
June 2018	5	17	24	54

Past examination series

Exam series	Distinction (%)	Merit (%)	Pass (%)	Fail rate (%)
March 2018	3	8	37	52
December 2018	7	24	29	40
June 2017	9	18	26	47

4 Forthcoming Exam Dates are:

Thursday 6th December 2018
Thursday 14th March 2019

5 Note regarding 18th Edition of IET Wiring Regulations

Please note that the December 2018 series of the 2396-402 examination will accept either version of BS 7671 as permitted material and answers to questions will be marked based on the versioned responses given to questions.

The March 2019 series will only accept answers versioned to the 18th Edition of the IET Wiring Regulations (BS 7671:2018)