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To: Export Sales Department
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Report on Verification of CANECO Calculation Software

1. Background

In early 2000, Applications Logiciels Pour l'Ingénierie (ALPI) requested the UK Institution of Electrical Engineers (IEE) to recommend a consultant who could validate their CANECO computer design calculation package for compliance with BS 7671:1992, the UK national standard for low voltage electrical installations.

The IEE's recommendations included P E Donnachie, an independent Electrical Consultant who is also an IEE nominated member of the Joint BSI/IEE Technical Committee JP/EL/64 which is responsible for the technical content of BS 7671.

A preliminary meeting took place between ALPI and P E Donnachie at the IEE, Savoy Place, London on 20 September 2000, following which ALPI decided to engage P E Donnachie to carry out the validation exercise.

2. What was validated

P E Donnachie visited ALPI's offices at Rueil Malmaison on 15 and 16 January 2001 and, together with M. J Le Manach, ALPI Export Sales Manager, carried out detailed checks on CANECO data and design outputs.

2.1 Data

The accuracy of stored program information relating to installation methods of cable wiring systems (Table 4A of BS 7671) was checked and corrections were made where required in order to achieve full compliance.

The CANECO method of calculating current-carrying capacities of cables and conductors using the IEC simplified formula $I = A \cdot S \cdot m$ was investigated and found to produce data which were acceptably close to those given in the BS 7671 Tables. The method actually picked up two (printer's) errors in the

process, which were subsequently checked with ERA Technology Ltd in the UK. These errors will be corrected in BS 7671:2001, due for publication in mid-2001:

Table 4E1A, col 8, 50 mm² value should be 239

Table 4L3A, col 10, 380 mm² value should be 693.

† Excepting in the case of some larger cable sizes.

The sizing of armoured cables and mineral-insulated cables were not included in the CANECO program but, due to the widespread use of such cables in UK installations, ALPI intended to add them into the program.

2.2 Design calculations and outputs

A series of design exercises based on BS 7671:1992 were provided by P E Donnachie and were performed on CANECO. These were produced originally for a design course which took place in May 2000 and had been worked through in full using manual calculation methods.

Outline details of the exercises are attached to this Report as Appendix A.

The scope of the exercises included:

- Current-carrying capacity/sizing of cables for compliance with overload protection and voltage drop requirements;
- Short-circuit protection;
- Discrimination;
- Protection against indirect contact by automatic disconnection within prescribed maximum permitted time limits.

To ensure that proper consideration is given by CANECO users to installation conditions such as cable grouping and high ambient temperatures, correction factors were required to be entered manually into the program.

Findings:

It was found that the results of the CANECO computations were in good agreement with the manual results. Also, in using CANECO an error was identified in one of the manually obtained voltage drop results. However, CANECO was unable to readily design a ring final circuit to BS 7671 and ALPI stated that they would be addressing this problem.

3. Conclusion

The CANECO program produced acceptable results for compliance with the technical requirements of BS 7671:1992 in all the areas tested, with the exception of the ring final circuit.



P E Donnachie