

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION E-90-01

DRAWING FOR ELECTRICAL & INSTRUMENTATION EQUIPMENT

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1 **GENERAL**

1.1 **Standards**

The drawing shall comply with the latest version of relevant British or other International Standards. The following British Standards, in particular, shall apply where appropriate:

BS 308	Engineering drawing practice
BS 1553	Specification for graphical symbols for general engineering
BS 1635	Recommendations for graphic symbols and abbreviations for fire protection drawings
BS 1646	Symbolic representation for process measurement control functions and instrumentation
BS 2917	Graphic symbols and circuit diagrams for fluid power systems and components
BS 3939	Graphical symbols for electrical power, telecommunications and electronics diagrams
BS 5070	Engineering diagram drawing practice
BS 5536	Recommendations for preparation of technical drawings for microfilming
BS EN 60617	Graphical symbols for diagrams
BS EN 61082	Preparation of documents used in electrotechnology
BS EN ISO 5457	Sizes and layout of drawing sheets

Computer-Aided-Drafting (CAD) drawings shall be prepared conforming to the latest version of CAD Standard for Works Projects (CSWP) as posted on the Environment, Transport and Works Bureau (ETWB) web site.

1.2 **General Considerations**

The drawing shall provide information in the simplest practical way for the managing, commissioning, use and maintenance of an installation or a system. It should:

- (a) Describe all presentable and useful information of the installation, system or equipment;
- (b) To be accurate and concise;
- (c) To be easy to understand;
- (d) Suit the purpose for which it is intended; and

- (e) To be easy to handle and maintain such as photo copying, electronic data files (AutoCAD) and microfilming.

1.3 Sizes

The selection of the drawing size shall take account of legibility, the composition and complexity of the design. The final presentation of drawings on paper or equivalent media shall conform to the sheet sizes in BS EN ISO 5457. The preferable drawing sizes are B1, A1, A2 and A3. Sizes smaller than A3 will only be accepted if they are mass manufactured equipment of Clause 2.1.

1.4 Lines and Text

The lines and text minimum requirements shall be as follows for the final drawing prepared by manual drafting:

	<i>Manual Drafting</i>
<i>Line (min. thickness)</i>	0.25 mm
<i>Line Spacing (min.)</i>	1 mm
<i>English Text (min. height)</i>	2.5 mm
<i>Chinese Text (min. height)</i>	1 mm higher than English Text

The lines and text minimum requirements for the final drawing prepared by CAD drawing shall follow the CSWP as posted on the ETWB web site.

1.5 Layout

The layout of a drawing shall be clear for easy understanding. For circuit diagram, the signal flow direction shall be from left to right or, alternatively, from top to bottom. The arrangement of symbols and circuits shall emphasise either functional relationship or physical location. The functionally related circuits shall arrange in the groups of power supply, tripping, closing, alarm and indication etc. Numbered scale bar in metric unit shall be provided.

1.6 Graphical Symbols

The graphical symbols shall conform in order of priority to CSWP, BS 3939, BS EN 60617, BS 1553, BS 1635, BS 1646 and BS 2917 that are appropriated for their applications. Non-standard symbols shall be defined in a legend table shown on the drawing.

1.7 Reproductives

Drawing reproductives are preferably prepared by the computer using 'AutoCAD' software. The Contractor shall supply a CD-R containing 'AutoCAD' data files and one hard copy in their final drawing submission.

2 PARTICULAR REQUIREMENTS

2.1 Drawing for Mass Manufactured Equipment

For mass manufactured items e.g. instruments, motors below 100 kW and electric valve actuators, offset prints of standard drawings from the manufacturers shall normally be acceptable. However, quality of these drawings shall comply with the requirements of this specification. Electronic copy of these drawings shall be in image files of Adobe Acrobat format.

2.2 Drawing for Non-mass Manufactured Equipment

For non-mass manufactured items e.g. specially assembled electrical and instrumentation control or switchgear panel, power transformers, motors of 100 kW & above and generators of 150 kVA & above, offset prints of standard drawings would not be acceptable. Drawing reproductives complying to Clause 1.7 shall be submitted.

In the circuit diagram, small wiring shall be identified by one-digit prefix, two to three digit numerals and one-digit suffix.

Small wiring prefix is as follows:

- | | |
|--------------------------------------|--------------------------------|
| A – Pilot Wire Relaying (Switchgear) | B – Busbar Protection C.T. |
| – Alarms (Instrument) | |
| C – Protective / Measuring C.T. | D – Precision Metering C.T. |
| E – Voltage Transformer | F – Voltage Control |
| G – Synchronising | H – A.C. Power Supply |
| J – D.C. Power Supply | K – Closing / Tripping Control |
| L – Indication and Alarm | M – Motor Auxiliary. Devices |
| N – Tap Changer Control | P – Busbar Protection Trip |
| R – Interlock Circuits | S – D.C. Instruments / Exciter |
| T – Pilot Conductors | U – Spares |
| W – Process / Instrument / Control | X – Analogue Signals |
| Y – Telephone / Telemetry | |

The two to three digit numerals shall follow same format as those in Water Supplies Department Electrical /Instrument Standard Drawings. These drawings can be issued to the Contractor for reference upon request.

The use of suffix letters shall be as follows:

- | | | |
|--------------------|----|--------------|
| No. 1 – 6 Motor | -- | Suffix A – F |
| Station Protection | -- | M |

Using the ‘closing and tripping control circuit of motor no.2’ as an example, the small wiring marking of first line shall be “K11B”, second line “K21B” and third line “K31B” etc.

2.3 Equipment Data

Data such as schedule of fuses, limit switches, equipment particulars, component labels, parts number, alarms and protection settings, component labels etc. shall be clearly entered in the drawing and tabulated in alphanumeric order.