

TWEED SHIRE COUNCIL

**ELECTRICAL
DESIGN
SPECIFICATION**

EL18

OPERATING AND MAINTENANCE MANUALS

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1 CITATION

This document is named “Tweed Shire Council, Electrical Design Specification EL18 - Operating and Maintenance Manuals”

2 ORIGIN OF DOCUMENT, COPYRIGHT

This document was originally produced for Tweed Shire Council. This document is copyright to Tweed Shire Council.

3 VERSIONS

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original version		1 November 2005	

4 PURPOSE AND SCOPE

4.1 General

This Specification covers the preparation and supply of Operations and Maintenance Manuals to Tweed Shire Council (TSC) when specified in a sub-contract or supply agreement.

The Contractor shall provide three (3) printed and bound copies and one (1) CD copy of an Operations and Maintenance Manual (the Manual). The Manual shall be divided into five Parts to identify and separate information that comprises:

1. Introduction and background knowledge.
2. Installation through to Commissioning processes and procedures.
3. Appropriate records which will include test certificates, completed inspection and test plans, as constructed drawings, etc.
4. Operational and maintenance procedures for all plant, equipment and services, including that of sub-contractors.
5. Appendices for hard copy catalogues.

Note: The 5 Parts could be one to five volumes depending on the quantity of information and the scope of the works.

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The contents of the Manual shall comprise the Sections, and in the same sequence, as listed in [Clause 7.3 Ray, don't know which part of spec this should relate to](#) of this Specification. Acceptance criteria for the information to be supplied within each Section will be in accordance with [Clause 7.5 Ray, don't know which part of spec this should relate to](#) of this Specification. The Contractor is required to liaise with Council to ensure that appropriate information is provided on time.

5 MANUAL PREPARATION AND CONTENT

5.1 Word Processing

The Manual shall be written in English using Microsoft Word as the Word Processing package and Microsoft Excel for the Spreadsheet application.

5.2 Printing

The Manual shall be printed on size A4 pages on bond white paper of 70 to 106 g/m² weight. Font shall be CG Times or New Roman and size 12 for all text. The use of italics, bold or underlines will not be used in the text. The exception for the use of bold, underlines, and size 12 font will be for headings, subheadings, Tables and Figures. An Arial or Universal font is acceptable for Tables and Forms.

5.3 Page Layout

Each page shall have right and left margins of 2cm. Headers and footers shall have margins of 1.5cm. Each section, sub-section and paragraph shall be numbered. The format for numbering shall be consistent throughout the whole Manual. Numerical numbering will be used for sections, subsections and paragraphs. Alphabetical numbering will be used for sub-paragraphs. Dot points shall only be used for breakdown of the document structure after the sub-paragraph stage.

5.4 Headers

Each Page shall contain a page header as follows:

TWEED SHIRE COUNCIL
Specific Plant Site/Project Name

Contract/Agreement No.
Sub-system Description

5.5 Footers

Each page shall contain a Footer that provides the following information in the layout as shown:

Issue and Revision Status No: eg. "Draft: A", B, etc. or "Issue: 1" when approved. Revision numbering will be used for page replacement purposes rather than amending the whole document or section.,	Section-Page number: eg. Section 3, Page 5 of 21" (Page 5 indicates fifth page out of the 21 pages that make up Section 3).	Date: In the format: "11 OCT 04"
Word Processor Filename,		

5.6 Backup Files

The software copy of all information supplied in the Manual shall be saved into individual files that represent each Section of the Manual.

5.7 Standard Terminology

Standard key words and terminology normally used by, or acceptable to Council shall be used. Terminology shall be consistent both throughout the Manual and with other supplied documents.

Units of measurement shall be in metric using standard terminology, abbreviations and acronyms.

5.8 Condition of Material

Only original printed material, such as equipment brochures shall be allowed as inserts. Where these are not practically available, good photocopies will be acceptable. Copies of faxes shall not be acceptable under any circumstances.

5.8.1 Warnings and Notes

Throughout [Sections 11 and 12](#), *Ray*, *according to section 4.1 of this spec, there are only 5 sections in the manual – what is the story?* attention shall be drawn to relevant safety and environmental requirements and other critical information. This shall be carried out by ensuring appropriate impacts and resources are identified at the front of each relevant procedure and by appropriate headings throughout the procedure. Headings shall use the terms: "Danger", "Caution", or "Note" as applicable. These terms shall be used in a consistent and easily recognised manner and be prominently positioned prior to the text to which it applies. Warnings and Notes shall be used as follows:

- Danger: Shall call attention to mandatory instructions (those which must be followed) to ensure personal safety and/or prevent environmental damage.
- Caution: Shall call attention to mandatory instructions (those which must be followed) to avoid damage to plant and equipment only.
- Note: Shall be used for identifying supplementary information.

5.8.2 Drawings and Diagrams

Prints of engineering drawings that are part of the deliverables and may be required for maintenance purposes shall be included in the Manual. Diagrams and drawings inter-leaved with text shall be size A4 or, where the original is A3, folded to A4 with a left margin such that the manual does not have to be turned to read them. Full size engineering drawings are folded to A4 size with the Title block showing. Drawings shall also be included as PDF files on the supplied disk.

Illustrations, Diagrams, Tables, Schedules and other non-text pages shall be numbered to fit into the Section and Page sequence in which they are located.

6 COMPILATION AND SUBMISSION OF MANUALS

6.1 Initial Template and Section Division

The template for the Manual shall consist of a detailed contents page of Sections and Sub-sections which shall be submitted at the beginning of the contract in accordance with the Deliverables Schedule.

6.2 Draft Issues of Manual

A draft issue of the Manual (both hard copy and electronic format) shall be submitted to the Tweed Shire Council for review no later than specified in the Deliverables Schedule. Each hard copy Section shall be separated by thumb tabbed cardboard dividers with the Section No. and Title printed on each tab.

6.3 Final Manual

Once the information contained in the Manual is sufficient for the Manual to be approved, (or approved subject to changes), the Sub-Contractor/Supplier shall issue complete hard copies and one complete electronic copy of the approved version of the Manual ([Section 1 to 12 inclusive](#)) to the Tweed Shire Council no later than the date specified in Deliverables Schedule.

Prior to the issue of the Practical Completion Certificate, the latest version of the Manual of all computer generated text and graphics shall be supplied.

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6.4 Supply of Revised Manuals and Disk Copy

During the period of the Sub-Contract/Supply Agreement, (up to the Final Completion Certificate) the Contractor shall be responsible for making any further revisions to the Manual and providing replacement pages to the Tweed Shire Council along with a compact disc containing the electronic copies.

7 ARRANGEMENT AND EXPLANATION OF SECTIONS

7.1 Title Page

The Title Page and matching cover insert shall be formatted as shown in the Attachment and containing the following information:

TWEED SHIRE COUNCIL
Location and title of the plant
Title of the system or sub-system
Title of Manual
Contractor's name
Sub-Contract/Supply Agreement No.

7.2 Revisions

This page (or pages) shall list each page revised after the Manual's initial approval. The list shall show each page number that was revised, new revision status, revision date, approval signature and verification signature to indicate that the changes were implemented.

7.3 Contents

The contents page shall list in tabular form, subsequent pages of content of the manual. In general it will be page 3 of the manual. The manual shall be divided into Parts/Sections. All parts and sections shall be outline numbered as detailed below:

Part/Section	Title	Explanation of contents
Part 1	Introduction and Background Information	
1.1	Introduction	A general description of the purpose and scope of the plant, system or equipment supplied. It shall include a scope of works summary for the entire project. This information will be partially made available by TSC.
1.2	Description of Equipment and Process	This shall list and provide a brief description of each major item of equipment supplied.
1.3	Design Details	This will include details of design criteria, process description and operational modes.
1.3.1	Design Criteria	This section shall provide the original design criteria and parameters, operational modes and performance data. For completeness, this is to repeat relevant data contained in the specification as well as that provided by the equipment supplier. Such data will be used

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Part/Section	Title	Explanation of contents
		<p>during commissioning and for comparative tests of performance to be done in subsequent years. The following parameters are typical of those that should be included:</p> <ul style="list-style-type: none"> • Technical reference sources (eg. Standards); • Design objectives, outputs and performance targets; • Design input assumptions; • Physical measures; weights, masses, forces, etc.; • Plant capacities, pressures (max/min), flow rates, etc.
1.3.2	Process Design	Description of the process or operational functional elements
1.3.3	Operational Mode	What operational modes (i.e. Remote-Auto, Remote-Manual or Local) are available and their use.
1.3.4	Modifications to existing plant - technical interfaces	Changes required to existing plant to accommodate, or interface with, the equipment to be supplied by the Contractor.
Part 2	Installation and Commissioning	
2.1	Installation and Pre-commissioning Procedure	
2.1.1	Required Services	Where applicable, requirements for services such as electricity, compressed air, water supply and other interfaces required before the equipment may be installed and operated
2.1.2	Handling, Unpacking and Storage	Details of any special precautions needed in handling, unpacking or storage of equipment prior to installation or an overhaul.
2.1.3	Installation Process	Detailed installation procedures for the equipment, even when undertaken by the others.
2.1.4	Pre-commissioning Test Procedures	Details of those inspections and tests necessary after delivery and/or installation of equipment ensure that transit damage or deterioration after dispatch has not occurred.
2.2	Commissioning Procedure	<p>Detailed instructions for commissioning the plant or equipment by the Commissioning Engineer after installation and all pre-commissioning inspections and tests have been completed.</p> <p>Procedures for re-commissioning after a major overhaul or shutdown where these differ from</p>

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Part/Section	Title	Explanation of contents
		commissioning.
2.3	Training Program	In this Section, list any training assistance, programs or materials (eg. manuals, videos) that are available for the equipment; and provide a training needs analysis on those topics and activities that are considered essential for the safe, reliable and effective operations and maintenance of the equipment and systems installed. This information is required whether training is included in the scope or not.
Part 3	Appropriate Records	
3.1	Inspection and Test Plans	This shall include copies of all inspection and test plans listed completed during the course of the contract.
3.2	Commissioning Report	The report shall include all commissioning data and test reports gathered during commissioning.
3.3	As Constructed Drawings	A complete list (in alpha-numeric sequence) of all applicable drawings giving the TSC drawing number, issue status, full title, size of the original, and the Sub-Contractor's/Supplier's drawing reference. Where the TSC drawing number is not known provision should be made for up to 18 characters.
3.4	List of Contract Variations and Plant Modifications	The Manual shall be continually updated, as necessary, by the Sub-Contractor/Supplier to reflect changes due to any necessary modifications during the defects liability period to achieve satisfactory performance. In addition to revising the Manual, all modifications should be listed in this Section, such that the "as-built" status of the contract is fully and accurately documented.
Part 4	Operation and Maintenance	
4.1	Operation	
4.1.1	Operational Procedures	These procedures shall be segmented into the various disciplines in order to provide readily available access for staff. For example, electrical, mechanical and information technology. A complete description of day-to-day operating procedures shall be provided and include: <ul style="list-style-type: none"> • Step-by-step Start and Stop procedures for each Operational Mode. • Recommended target parameters and set points.

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Part/Section	Title	Explanation of contents
		<ul style="list-style-type: none"> • Operating guidelines including any additional knowledge gained during commissioning. • Describe which operator checks and records need to be made at regular intervals (eg. hourly, daily) and provide examples of any forms found useful in monitoring equipment performance.
4.1.2	Fault Protection and Rectification	<p>These shall include when applicable:</p> <ul style="list-style-type: none"> • Alarm, Protection and Safety Devices. Specifically identify each alarm, protection or other safety device that is included in the equipment or system supplied. For each item state its description, where it is installed, its operation, and any maintenance requirements. • Consequences of Power Failure. Describe what actions (such as the re-setting of control devices) are necessary, and any adverse consequences that could result, in the event of a power failure. • Trouble Shooting. Describe whatever fault finding and trouble shooting experience has been gained in the operation of similar equipment. This should incorporate causes of breakdown or failure and recommended remedial action.
4.1.2.1	Start Up and Shut Down Procedures	<p>Detailed step-by-step instructions for starting and running the equipment after restoration of power supplies; and detailed step-by-step instructions for shutting down the equipment upon completion of operations to the point it can be isolated if required.</p> <p>For large plant with complex operating requirements a separate comprehensive and dedicated Operations Manual shall be provided. Where such an Operations Manual is provided the operation procedures described in this section of the Operations and Maintenance Manual need be only those applicable to commissioning and maintenance personnel (eg. local-manual control).</p>
4.1.2.2	Isolation and Restoration Procedures	<p>Detailed isolation or lock-out procedures for the equipment to be taken from an in-service situation where all supplies connected and energised.</p> <p>Detailed procedures for restoring the equipment to service from an out-of-service situation with all energy states reduced to zero.</p>

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Part/Section	Title	Explanation of contents
4.2	Maintenance	
4.2.1	Preventive Maintenance	Describe what preventative maintenance tasks must or should be done, and at what intervals (eg. hours, cycles). This shall be further divided into the various types of equipment and function such as electrical and mechanical.
4.2.2	Corrective Maintenance	<p>Detailed maintenance instructions for all items of supplied equipment separating the mechanical and electrical maintenance. Safety warnings and cautions will be included and any necessary protective clothing and equipment listed. Where applicable, the following shall be supplied for each item:</p> <ul style="list-style-type: none"> • Lubrication Schedule with oil/grease specifications. • Fastener torque settings, loadings. • Allowable tolerances, clearances, wear limits, etc. • Component electrical ratings (minimum, normal, maximum). • Weld procedures and consumables used.
4.2.3	List of Sub-Contractor and Proprietary Equipment	Listing of all proprietary equipment supplied likely to require replacement during the life of the asset. For each item the list shall state: model, serial number, brief description, and the manufacturer's name and address.
4.2.4	Recommended Spare Parts and Special Tools	List of all available spare parts and special tools including, and in addition to, those provided as part of the scope. For each item the manufacturer's reference number, correct description and recommended quantity used shall be stated. Any special storage, environmental protection, shelf-life restrictions, handling or routine maintenance of spare parts shall be included.
4.2.5	List of manufacturer and Supplier Details	List of all manufacturers and suppliers who supplied equipment, components and materials and/or also spare parts distributors for all the equipment supplied. The list will include personal details of the company and business name, Email address, business address, postal address, contact name, phone number, fax number, scope of products. Where any of the above details do not refer to a local address, the local distributor or closest distributor shall be identified.

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Part/Section	Title	Explanation of contents
Part 5	Appendices	<p>Should the Manual require the inclusion of standard printed materials for proprietary items (eg., gear-motors, pumps, controllers, electrical devices) then these shall be placed in Appendices - one Appendix for each item.</p> <p>Where available only original printed materials should be included. Only where these are not locally obtainable will good photocopies be acceptable. Faxed documents shall not be acceptable.</p> <p>Where a number of items are contained in the one document (e.g. a catalogue) the specific contract item(s) shall be referenced on a Title Page to that Appendix listing the following:</p> <ul style="list-style-type: none">• Manufacturer's description• Manufacturer's name.• Type, Model and Serial No. <p>The item(s) shall also be identified in the document by suitable marking or highlighting and the crossing-out of those items not applicable.</p> <p>The use of catalogues and standard printed materials does not nullify the need to provide individual portions of information within Sections and 11 and 12 of the Operational and Maintenance Manual. Where such information is not possible, they shall be suitably referenced to the appendices.</p>

7.4 Non-Applicable Sections

In order to ensure consistency with other Manuals for the projects, the above numbering and sequence of Sections shall be complied with. Should any Section not be applicable to the particular Manual, it shall be reserved by the insertion of a page containing the words "Not Applicable".