TECHNICAL SPECIFICATION TEMPLATES AND DOCUMENTATION

TCC-TTS-SPEC-E013

Revision History

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Contents

1. Introduction

1.1. Purpose

This document contains the Appendices for the Electrical Standards Manual.

1.1.1. Appendix A1 - Preferred Suppliers List

Item	Manufacturer
Cubicle Hardware	Emka, Lockwood, Lenlock, L & F
Isolator Switches	Clipsal, S & S, Socomec, Schneider
Circuit Breakers	Terasaki, Schneider
Auto-transfer Switches	Socomec, Terasaki, Schneider
Lightning Protection	NHP, Critec, Novaris, Schneider
Transient Barriers	Critec, Novaris
Surge Reduction Filters	Precision Power, Critec, Novaris
Signal Isolators	APCS, Weidmuller
Selector Switches	K & N, Elektra, Schneider
Pushbuttons	S & S, Schneider, AB
Indicator Lights	S & S, Schneider, AB
Phase Failure Relay	Crompton, Carlo Gavazzi
Meters	Crompton, IME
Current Transformers	Crompton, IME, Schneider
Relays	S & S, Finder, Schneider
Timers	S &S, Carlo Gavazzi, Schneider
Power Supplies	PULS, Siemens
Contactors	S & S, Schneider, AB
Thermal Overloads	S & S, Schneider, AB
Thermistor Relays	S & S, Schneider
Motor Protection Relays	S & S, Schneider
Soft Starters	Schneider Altistart
Variable Speed Drives	Schneider
Terminals	AB, Phoenix, S & S, Schneider
Wire Numbers	Grafoplast, Legrand, Brady
PLC	Siemens S7, Schneider M340
Indicator with Alarms	Yokogawa UM33A

Hydrostatic Level Sensor	Vega Vegawell 52
Float Switch	Flygt, NHP
Decontactors	Marechal, Cutler Hammer, Proconect
Current Transducers	Sentry 200-1-V or 200-2-V
Voltage Monitoring Relay	APCS PA201
Magnetic Reed Switches	Schmersal BN80-10Z / BP10
Sump pump level control	Multitrode MTR
Micro-switches	Schmersal, Telemecanique
Power Monitoring Unit	Schneider PM5320 series

AB-Allen Bradley

K & N-Kraus and Naimer

L & F-Lowe and Fletcher

S &S-Sprecher and Schuh

1.1.2. Appendix A2 - Preferred Suppliers List

This document forms part of the Electrical Installation section of the TCC Electrical Specification Manual (ESM) and shall be read in conjunction with other documents in the ESM and the Job Specification to determine the requirements for a particular project.

The intention of the ESM is to provide consistency in electrical design and installation requirements that will better enable Council to fulfil its duties in the delivery and implementation of their electrical works.

Contractors shall comply with all requirements in this document and the documents referenced in TCC-TTS-SPEC-E001 Introduction to Technical Specifications, unless specified otherwise.

Equipment[1)]	Manufacturer	Cat No.
Telemetry Unit	Schneider Electric	TBUP474-UC56-AB10S [3), 4)]
I/O Expansion Module-no AO	Schneider Electric	TBUX297583S[3)]
I/O Expansion Module-with AO	Schneider Electric	TBUX297585S[3)]
Radio [5) 6) 7)]	Schneider Electric Trio	TBURQR4HH-E00E1L00
Antenna [8)]	RF Industries	Yagi YB6-61
Coax Surge Diverter	Polyphaser	IS-50NX-C1
Power Supply [9)]	PULS	Q Series
DC UPS[10)]	PULS	UB10.242
DC Converter[11)]		
Battery[12)]		

Notes:

1. Certain equipment (shown in italics) is mandatory for system compatibility and no alternatives to manufacturer or model will be accepted. Other equipment has recommended manufacturers/model numbers and is the preferred item for spares inventory compatibility.
2. The supplier list is provided for convenience and does not imply that equipment must be purchased from these suppliers.
3. Dependent on the I/O requirements of the project one or two I/O expansion modules may be required. Refer to Appendix C for I/O allocation tables
4. Blank
5. The Contractor must supply a lead to connect the radio to the telemetry unit-Ethernet Cat5e.
6. Blank
7. Contractor to contact TCC TCC Nominated Electrical Representative prior to ordering the radio to confirm the required frequency.
8. The nominated antenna is typical for most installations however in certain circumstances other types of antennae may be required, e.g., higher gain in low signal strength sites, vandal protection etc. Refer to Job Specification for details.
9. Power supply is typically 240VAC/24VDC.
10. DC-UPS is required for every telemetry RTU
11. DC converter is 12VDC to 24VDC and is used to provide telemetry signalling of instrument loop signal independent of AC supply-12VDC systems only
12. Where the specified DC-UPS is installed, a single 12V Valve Regulated Lead Acid battery is required.

1.1.3. Appendix B - Typical Pumpstation Switchboard Drawings

These drawings are provided to indicate the standard of workmanship required in switchboard construction and are not intended as specific design drawings.

The contractor shall be responsible for the design of the circuits and the selection of equipment to satisfy the requirements of this standard and the Job Specification.

Drawing No.	Rev	Description
TCC24-R15-01	0	TYPICAL PUMPSTATION SWITCHBOARD GENERAL ARRANGEMENT FOR AN OUTDOOR INSTALLATION
TCC24-R15-02	0	TYPICAL PUMPSTATION DISCONNECTION PILLAR GENERAL ARRANGEMENT
TCC24-R15-03	0	ELECTRICAL SCHEMATIC FOR TYPICAL WASTEWATER PUMPSTATION (1 of 2)
TCC24-R15-03A	0	POWER SCHEMATIC FOR TYPICAL WASTEWATER PUMPSTATION WITH ATS (2 of 2)
TCC24-R15-04	0	ELECTRICAL SCHEMATIC FOR TYPICAL WASTEWATER PUMPSTATION CONTROL CIRCUIT SS (1 of 3)
TCC24-R15-05	0	ELECTRICAL SCHEMATIC FOR TYPICAL WASTEWATER PUMPSTATION CONTROL CIRCUIT (2 of 3)
TCC24-R15-06	0	ELECTRICAL SCHEMATIC FOR TYPICAL WASTEWATER PUMPSTATION CONTROL CIRCUIT (3 of 3)
TCC24-R15-07	0	WASTEWATER PUMPSTATION INTERNAL SWITCHBOARD GENERAL ARRANGEMENT
TCC24-R15-08	0	WASTEWATER PUMPSTATION EXTERNAL METER PANEL GENERAL ARRANGEMENT
TCC24-R15-09	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION – TERMINAL STRIP DETAILS 474 (1 OF 2)
TCC24-R15-10	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION – TERMINAL STRIP DETAILS EXPANSION MODULE (2 of 2)
TCC24-R15-11	0	SCHEMATIC FOR DATA AND RADIO COMMUNICATIONS CABLES
TCC24-R15-12	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION USING 474 RTU (1 of 3)
TCC24-R15-13	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION – EXPANSION MODULE 6607 (2 OF 3)
TCC24-R15-14	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION – EXPANSION MODULE 6601 (3 OF 3)
TCC24-R15-15	0	TYPICAL TELEMETRY SCHEMATIC FOR WASTEWATER PUMPSTATION – ETHERNET SWITCH

1.1.4. Appendix C - Typical Sewerage Pumpstation Telemetry I/O

The On/Off states of telemetry digital inputs shall have the following meaning:

Input Description	ON State	OFF State
Bus power healthy	Bus supply healthy	Bus supply failed
Grid supply healthy	Grid supply healthy	Grid supply failed
Wet well level high	Wet well level normal	Wet well level high
Station system mode	System mode selected	Not in system mode
Station local manual mode	Local manual mode selected	Not in local manual mode
Station local auto mode	Local auto mode selected	Not in local auto mode
Pump run	Pump is operating	Pump is off
Pump healthy	Pump protection is healthy	Pump protection has tripped
Pump available	Pump is available	Pump is not available
Pump water in oil	Pump has water in oil fault	Pump is healthy
Odour control healthy	Odour control unit is healthy	Odour control unit has fault
Penstock level high	Penstock level is normal	Penstock level is high
Overflow valve fully shut	Valve fully shut	Valve not fully shut
Overflow valve full open	Valve fully open	Valve not fully open
Overflow valve actuator available in remote	Actuator available	Actuator not available
Overflow valve actuator healthy	Actuator healthy	Actuator failed
Overflow valve actuator torque trip	Actuator healthy	Actuator torque fault
Generator test switch	Generator test switch on	Generator test switch normal
ATS grid supply	ATS in mains position	ATS not in mains position
ATS Generator supply	ATS in generator position	ATS not in generator position
Intruder Switch	Door closed	Door open
Load bank healthy	Load bank OK	Load bank faulted
Generator Circuit Breaker	Generator CB closed	Generator CB open
Generator running	Generator set is operating	Generator set is off
Generator fault	Generator healthy	Generator faulted
Generator failed to start	Generator normal	Generator failed to start
Generator low battery	Battery voltage normal	Battery voltage is low
Generator low fuel	Fuel level normal	Fuel level is low

Note: I/O functionality is not to be changed without written approval from TCC's Nominated Electrical Representative.

Pumps 1 and 2 Monitor and Control I/O Assignment:

I/O No	Description
DI1	Bus power fail
DI2	Grid supply healthy
DI3	Wet well high level (from ELV float switch)
DI4	Station system mode
DI5	Station local manual mode
DI6	Station local auto mode
DI7	Pump 1 run
DI8	Pump 1 healthy
DI9	Pump 1 available
DI10	Pump 1 water in oil (where installed)
DI11	Pump 2 run
DI12	Pump 2 healthy
DI13	Pump 2 available
DI14	Pump 2 water in oil (where installed)
DI15	Odour control healthy (where installed)
DI16	Penstock high level (where installed)
DIAUX1	Power Supply Buffering
DIAUX2	Battery Replacement Alarm
DO1	Pump 1 system start
DO2	Pump 1 remote reset
DO3	Pump 2 system start
DO4	Pump 2 remote reset
DO5	Actuator open
DO6	Actuator close
DO7	spare
DO8	spare
AI1	Wet well level
AI2	Discharge flow (where installed)
AI3	Pump 1 motor current
AI4	Pump 1 motor speed feedback (where installed)
AI5	Pump 2 motor current
AI6	Pump 2 motor speed feedback (where installed)
AO1	Pump 1 VSD speed set point (where installed)
AO2	Pump 2 VSD speed set point (where installed)

Note: I/O assignments are not to be changed without written approval from the TCC Nominated Electrical Representative.

Generator and Actuated Overflow Valve Monitoring I/O Assignment:

I/O No	Description
DIA1	Actuator closed
DIA2	Actuator open
DIA3	Actuator in remote
DIA4	Actuator healthy
DIA5	Actuator torque trip
DIA6	Generator test switch
DIA7	Change-over switch in grid supply position
DIA8	Change-over switch in generator supply position
DIA9	Load bank fault
DIA10	Generator CB closed
DIA11	Generator running
DIA12	Generator fault
DIA13	Generator fail to start
DIA14	Generator low battery
DIA15	Generator low fuel
DIA16	Intruder switch (where specified else spare)
DOA1	spare
DOA2	spare
DOA3	spare
DOA4	spare
DOA5	spare
DOA6	spare
DOA7	spare
DOA8	spare
AIA1	Discharge pressure (where installed)
AIA2	Inlet flow (where installed)
AIA3	spare
AIA4	spare
AIA5	spare
AIA6	spare
AOA1	spare
AOA2	spare

Note: I/O assignments are not to be changed without written approval from the TCC Nominated Electrical Representative.

Pump 3 Control and Monitoring I/O Assignment:

I/O No	Description
DIB1	Pump 3 run
DIB2	Pump 3 healthy
DIB3	Pump 3 available
DIB4	Pump 3 water in oil (where installed)
DIB5	spare
DIB6	spare
DIB7	spare
DIB8	spare
DIB9	spare
DIB10	spare
DIB11	spare
DIB12	spare
DIB13	spare
DIB14	spare
DIB15	spare
DIB16	spare
DOB1	Pump 3 start
DOB2	Pump 3 reset
DOB3	spare
DOB4	spare
DOB5	spare
DOB6	spare
DOB7	spare
DOB8	spare
AIB1	Pump 3 motor current
AIB2	Pump 3 motor speed feedback (where installed)
AIB3	spare
AIB4	spare
AIB5	spare
AIB6	spare
AOB1	Pump 3 VSD speed set point (where installed)
AOB2	spare

Note: I/O assignments are not to be changed without written approval from the TCC Nominated Electrical Representative.

1.1.5. Appendix D - Summary of Document Submissions and Inspections

The following table is intended to summarise the requirements for submission of documentation through the switchboard project and tie into inspections and progression of milestone dates.

Milestone	Document/Inspection	Comment
Tender submission	Technical Data	Required to allow assessment of what has been offered with tender. May also require drawings, supplier data and other information
Within * weeks of contract award	Detailed design calculations inc:- • Drive/load list • Maximum demand • Load balance • Cable schedule • Circuit breaker selection • Harmonic study (if applic) • Ventilation study (if applic) • Radio survey (if applicable) Workshop drawings for switchboards RPEQ certified drawings (if applicable)	Review of workshop drawings will not occur until full design information is provided. Allow 10 working days for review
Switchboard Construction	Inspections required at:- • Completion of sheet metal • Completion of wiring	Minimum 7 days notice required
Workshop Testing	Witnessed testing at place of swbd manufacture	Minimum 7 days notice required
	As-built drawings for swbd	Required before commencement of site commissioning
Site Construction	Inspections during construction phase	As required
Site Testing	• Electrical safety testing • Functional testing • Commissioning of telemetry/control system • Thermoscan of swbd (if applicable)	Minimum 6 weeks notice req
Practical Completion	• Electrical safety document • As-constructed drawings • Draft O&M manual • Supply of spares (if applic)	Practical completion will not be granted until satisfactory documentation has been received
Completion	• Final O&M manuals • CAD files for drawings	
Final Completion	• Thermoscan (if applicable)	2 weeks prior to end of defects period

* Refer to contract document for submission dates.

1.1.6. Appendix F - Job Specification Checklist

1.	Check operating conditions. Specify location (Indoor/Outdoor)	
2.	Specify Fault Level	
3.	Specify requirement for Supply Authority metering inc tariff	
4.	Specify degree of separation (AS3439-e.g., Form 1, Form 2 etc.)	
5.	Specify how cubicle is to be mounted (i.e., pole, wall or plinth)	
6.	Specify material for cubicle, mounting pans & escutcheon door	
7.	Specify type of door handles and method of locking	
8.	Specify sunhood (if required)	
9.	Specify paint colours (if applicable)	
10.	Specify size and configuration of mains cables 1	
11.	Specify lightning and surge protection requirements	
12.	Specify the control circuit voltage	
13.	Detail all electrical equipment that is to be connected -include current ratings of circuits, kW ratings of motors etc.	
14.	Specify how motors are to be controlled 1	
15.	Specify requirements for motor starters and protection 1	
16.	Detail any special control or instrumentation requirements 1	
17.	Specify if a VegaDis unit and display module is required	
18.	Specify telemetry requirements and detail I/O required signals	
19.	Specify requirements for PLC (if applicable) 1	
20.	Specify any other requirements (e.g., alarms, spare parts, generator etc.)	
21.	Review preferred suppliers list and make alterations if necessary	
22.	Specify requirements for inspection and testing	
23.	Specify delivery address and time	

[1] The design of these items may be the contractor's responsibility.

Refer to main project specification.

1.1.7. Appendix G - Sample Switchboard Datasheets

These sample datasheets are provided to indicate what information is to be included with any purchase request for a switchboard.

The sample datasheets included in this appendix are:

Datasheet No.	Title
DS1	Switchboard Datasheet
DS2	Electrical Load List
DS3	Telemetry I/O Schedule
DS4	Schedule of Technical Data

Datasheets DS1, DS2 and DS3 are to be initially filled in by the purchaser and included with the switchboard purchase request.

Datasheet DS4 is to be completed by the switchboard vendor and included with their quotation for supply of the switchboard.

At the completion of the works the contractor shall revise the datasheets to show the as-constructed data. The revised datasheets shall be included in the handover documentation.

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