
TOPAS

Traffic Open Products and Specifications

TOPAS 2522A

Remote Monitoring and Control of Traffic Control Equipment via a Telecommunications Network

Revision	Date	Scope	Authorised by
A (v5)	11/03/16	Final	Board

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TOPAS 2522A

Corrigendum 9/12/24

REMOTE MONITORING AND CONTROL OF TRAFFIC CONTROL EQUIPMENT VIA A TELECOMMUNICATIONS NETWORK

Updated Appendix Z – adding requirement
for EMC previously omitted

Amendment to out of date legislature

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- 1 Introduction
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1 INTRODUCTION

- 1.1 This specification covers the necessary requirements for remote monitoring and control equipment for use with traffic control equipment via a dial-up connection.
- 1.2 TOPAS specifications are explicitly purchasing specifications and compliance with them is not mandatory. However Local and other Purchasing Authorities may typically require that equipment purchased complies with TOPAS specifications and is TOPAS registered.
- 1.3 Manufacturers may register products as being compliant with this specification, using the process defined in TOPAS 0600
- 1.4 TOPAS registration requires manufacturers submit a Technical File to an appropriate Technical Assessor to aid compliance verification. The content requirement for the Technical File is defined in Appendix Z of this specification.
- 1.5 Guidance to potential users of this Product is given in Appendix A.
- 1.6 Within this specification, "The Product" shall mean all components necessary to provide a complete operational unit meeting the requirements of this specification and the common requirements defined in TOPAS0600.
- 1.7 This specification implements requirements as originally defined in HA specification TR 2522A. Product Approvals to TR2522A may be used to register products to this specification as defined in TOPAS 0600
- 1.8 This specification will be immediately implemented from the date of issue for all new TOPAS Registrations

Glossary of Terms

- 1.9 A comprehensive glossary of terms and abbreviations may be found in the Institute of Highway Engineers guidance note "Traffic Control and Information systems".

Implementation

- 1.7 This specification implements requirements as originally defined in HA specification TR 2522A. Product Approvals to TR2522A may be used to register products to this specification as defined in TOPAS 0600

2 FUNCTIONAL REQUIREMENTS

General

- 2.1 This specification defines the requirements of a Product to provide remote monitoring and control of traffic control equipment via a dial-up telecommunications network.
- 2.2 The Product shall be designed for connection to traffic signal controllers complying with TOPAS 2500.
- 2.3 For the purposes of this Product specification remote monitoring and control systems are divided into two classes as follows:
- i) Monitoring and Control systems, which monitor traffic control equipment for faults, status and timings and, in addition, provide a means of remotely controlling traffic control equipment;
 - ii) Monitoring-Only systems, which provide the monitoring facilities described in i) above, but which do not provide any means of influencing the operation of the traffic control equipment.
- 2.4 The Product shall comprise an Instation, which may be either a shared UTC computer, or a dedicated processor; a data transmission system via a dial-up telecommunications network; and an Outstation Monitoring and Control Unit (OMCU), or Outstation Monitoring Unit (OMU) at each outstation.

Performance

Instation Equipment

- 2.5 The instation equipment shall be capable of performing the following functions:
- a) Transmit information to the outstation to affect those control functions specified in the Works Specification accompanying the procurement contract. (See the NOTE following clause 2.23 (b)).
 - b) Transmit to the outstation the necessary messages to gain access to the monitoring information specified in the Works Specification.
 - c) Receive from the outstation information messages transmitted in response to a) and b) above.
 - d) Provide a means of operator input of the specified control information, which shall take priority over automatically generated control information.
 - e) Provide a means of displaying the monitored information received from the outstations as specified in the Works Specification.
 - f) Provide an alarm and fault report:
 - i) to report the reception of outstation fault reports;
 - ii) to report the system's detection of an instation or data transmission fault.

- g) Provide a non-volatile medium for the automatic recording of detected instation and outstation faults, together with the date and time of reporting of each fault. The capacity of this fault recording facility will be specified in the Works Specification.

Outstation Monitoring and Control unit (OMCU)

- 2.6 Traffic control equipment functions to be monitored by the OMCU shall be as defined in the Works Specification.
- 2.7 The OMCU shall monitor information presented at the controller interface and return all or selected information as specified in the Works Specification on demand from the instation.
- 2.8 Unless specified otherwise in the Works Specification, the OMCU shall be capable of returning selected information to the instation automatically by means of auto-dialling equipment. The information to be returned shall be specified in the Works Specification.
- 2.9 The control functions of the OMCU shall be as defined in the Works Specification.
- 2.10 Monitoring and control information exchanged between OMCU and controller via an interface as defined in TOPAS 2523 or by another approved method.
- 2.11 Where specified in the Works Specification the OMCU shall incorporate a Master Time Clock System (MTCS), which shall provide the facilities necessary to operate a controller to specification TOPAS 2500 in a cableless linking mode, where timetable and plan timings may be transmitted from the instation to the OMCU for storage and subsequent implementation.
- 2.12 Where the facility in 2.11 above is provided, the OMCU shall also include the facility to monitor controller stage greens and check for compliance with stages demanded by the MTCS. Failure to comply shall cause the signal controller to revert to local control.

Data Transmission System

- 2.13 The Data Transmission system shall incorporate an error checking facility, which shall be described in detail in the manufacturer's or supplier's product specification. The detection, at the instation or outstation, of any data transmission error, which the system is incapable of correcting automatically, shall activate the alarm described in clause 2.5 (f) (ii) and record the event in accordance with clause 2.5 (g).
- 2.14 No implementation of control data shall take place until the data has been verified by the error detection system.
- 2.15 Adequate safeguards shall be provided to minimise the possibility of unauthorised control of equipment, e.g. the use of access codes.
- 2.16 The Data Transmission System between the Instation and the OMCU shall be one of the following:

PSTN or GPRS Network

- 2.17 The Instation data transmission equipment shall include at least one auto-dialling unit and each outstation shall be provided with an auto-answering unit.
- 2.18 Where specified in the Works Specification the instation shall also include an auto-answering facility and each outstation shall be provided with an auto-dialling facility.
- 2.19 All equipment shall be approved by BABT for connection to a PSTN or GPRS network.
- 2.20 All transmission equipment shall operate in accordance with the current issue of British Standards specifications BS6305, 6317, 6320, 6789, BS EN 41003 for the use of equipment connected to a PSTN or GPRS network.

Digital IP Network

- 2.21 The digital IP network between the Instation and the OMCU shall be point-to-point configured connection using Wide Area Networking (WAN) technologies.
- 2.22 A permanently established virtual circuit (PVC) shall be provided between the Instation and the OMCU.

Controller/OMCU Interface

- 2.23 The system connection to signal controllers to specification TOPAS 2500 shall be by any of the means described below, or a combination of these means:
- a) By means of the interface described in TOPAS 2523, or other approved serial interface.
 - b) By means of direct connections to the controller.

NOTE: Certain control facilities available at this interface are not suitable for remote operation because their safe use requires the presence of an Engineer on site. For signal controllers to TOPAS 2500 it is not possible to remotely use commands requiring access Level 3 or higher as defined in TOPAS 2523.

Construction

- 2.24 The OMCU and outstation data transmission equipment shall be designed for mounting as follows:
- a) As ancillary equipment within an existing traffic signal controller case.
 - b) Within a freestanding equipment case manufactured from suitable material to provide mechanical protection for the equipment in the intended environment. The housing shall be designed to maintain the mechanical, environmental and the EMC protection for a minimum of 15 years, with suitable maintenance.

Equipment Interconnection

- 2.25 The outputs of the Product are isolated from earth and the power supplies.
- 2.26 The output is protected from accidental reversal of the current flow.
- 2.27 The wiring form or cable between the outstation equipment and traffic control equipment shall be terminated at some convenient point within the equipment case. The terminal provided for the wiring from the traffic control equipment shall be capable of easy disconnection and of approved design.

NOTE: Screw terminals that entail a direct contact between the retaining screw and the terminated wire will not be acceptable.

Electrical Requirements

- 2.28 All equipment shall be suitable for operation in accordance with this specification when connected to the UK mains supply.
- 2.29 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.

Environmental Testing

- 2.30 The equipment shall be tested by an approved body to ensure that the following environmental performance requirements as specified in TR 2130C in the following areas have been satisfied:
- Dry Heat} Change of
Cold} Temperature
 - Damp Heat Cyclic
 - Solar Radiation
 - Water Penetration (to IP ratings in clause 2.31)
 - Drop and Topple
 - Bump
 - Vibration transportation
 - Vibration, random, Operational
- 2.31 The equipment case housing the outstation equipment is to BS EN 60529 IP 55 or better.

Failure Modes

- 2.32 Any detected failure of the instation or data transmission equipment shall result in termination of transmission of control data.

- 2.33 Where possible, failure of the OMCU shall cause all control signals to be inhibited in such a manner as to cause the controller to assume its fallback mode automatically.

Reliability

- 2.34 The reliability of the OMCU shall be such that it has an average failure rate of no more than 1 failure in 4 years with a life expectancy of 15 years.

3 REFERENCES

3.1 Where undated references are listed, the latest issue of the publication applies.

British Standards

3.2 British Standards are published by the British Standards Institution, London

BS 7671	Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition
BS EN 50556	Road Traffic Signal Systems
BS EN 50293	Electromagnetic Compatibility - Road Traffic Signal Systems
BS EN 60529	Degrees of protection by enclosures (IP Code)

Specifications

3.3 TOPAS Limited Specifications are available from www.topasgroup.org.uk

TOPAS 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TOPAS 2500	Traffic Signal Controller
TOPAS 2523	Traffic Control Equipment Interfacing Specification
TOPAS 0600	TOPAS Registration process

Other Publications

3.4 Other publications can be obtained from the Stationary Office.

Directive 89/336/EEC EMC Regulations 2016 (Statutory Instrument 2016 No 1091)

APPENDIX A INFORMATIVE GUIDE

General

- A1 This Appendix is an informative guide to Highways Authorities who wish to purchase / hire and use remote monitoring and control equipment that has been declared conformant to this specification. Prospective purchasers/hirers should ensure that the procurement contract addresses the following issues.

Works Specification

- A2 The purchaser should define the following requirements that relate to a specific scheme in the form of a Works specification:
- A list of the control functions to be provided for the interchange;
 - A list of the monitoring functions to be provided for the interchange;
 - The capacity of the Fault recording facility to be provided;
 - The requirements for the Master Time Clock System if required;
 - The scheme specific telecommunication provisions and requirements.

Marking and Labelling

- A3 The purchase contract should call for the outstation equipment to be fitted with a label displaying an emblem as defined by the purchaser together with the following information:
- The TOPAS specification to which it is approved;
 - The electrical supply requirements of the equipment.

APPENDIX Z - TECHNICAL FILE CONTENT

This appendix defines the necessary content for a Technical File (a collection of relevant documents) which must be reviewed by an appropriate Technical Assessor as part of the TOPAS Registration process (See TOPAS 0600).

The 'ticked' items are required to be present in a Technical File used to support TOPAS Registration against TOPAS 2522A. **Please read the description criteria carefully.**

<i>Ref</i>	<i>Item</i>	<i>Description</i>	<i>Required</i>
1	Overview document	A summary document outlining the product, specifying which TOPAS and other relevant specification(s) the product has been designed to comply with, together with a detailed table of contents for the Technical File. Where external certificates or documents are referred to these shall be included either: (a) within this overview document; or (b) supplied separately as part of this Technical File.	√
2	QA accreditation certificate(s)	A copy of the Quality Management Registration Certificates for the organisation applying for TOPAS Product Registration.	√
3	Details of all required standards and regulations including CE/CA requirements that apply to the Product	A list of all standards to be complied with. Including explicit CE/CA declarations of performance/conformity for those standards, including all certificates, shall be included in this Technical File.	√
4	A functional design description of the product	Title, document number, version and date of the overall System Design Document for the Product.	√
5	Product part numbers	A list of top-level assembly part numbers and their issue states including all firmware / software part numbers and issues.	√
6	Statement of Compliance	A clause-by-clause statement of compliance against TOPAS 2522A confirming compliance or non-compliance and referencing supporting evidence. (An example template can be found on the TOPAS website)	√
7	Functional test procedures and results	A list of all functional test schedules and test result documents (by document number and issue) that substantiate the Statement of Compliance.	√

8	BS EN 50293 EMC test procedures and results	(a) Title, document number, version and date of the EMC test performance requirement document. Copies of the results of EMC testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	√
9	Optical test procedures and results required by this specification	For all products which have any defined optical performance requirements (a) Title, document number, version and date of the optical test performance requirement document. Copies of the results of optical testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	N/A
10	Environmental test results	(a) A list of relevant Environmental tests performance requirements defined in TOPAS 2130. Copies of the results of the Environmental testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	√
11	Radio Equipment Regulations test results	For all products which include any transmitting and/or receiving radio equipment (a) A copy of the RER Declaration Of Conformity (b) Reference to the RER Technical Documentation for the product (by title, document number and version). (c) Copies of the results of radio testing, undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File. The test results should be those identified in the RER Technical Documentation and should cover any specific IR2030 requirements for the type of radio used. A copy of the Type Examination Certificate for radio equipment not covered by a Designated EN standard.	√
12	Primary Safety Test procedure and results	For Traffic signal Control equipment only: (a) The title, document number, version and date of the Primary Safety Test schedule. (b) A copy of the test results must be included as part of the Technical File.	N/A
13	Failure Mode Analysis	For Traffic signal Control equipment only Title, document number, version and date of the product failure mode analysis requirements and results.	N/A