

**SKMM FTS PSTN  
Rev. 1.01:2007**

**TECHNICAL SPECIFICATION  
FOR  
TERMINAL EQUIPMENT CONNECTING TO THE  
PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)**



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## **FOREWORD**

This Technical Specification was developed under the authority of the Malaysian Communications and Multimedia Commission (SKMM) under the Communications and Multimedia Act 1998 (CMA 98) and the relevant provisions on technical regulation of Part VII of the CMA 98. It is based on recognised International Standards documents.

This Technical Specification specifies the specification to conform for approval of telecommunications devices.

### **NOTICE**

**This Specification is subject to review and revision**

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**TECHNICAL SPECIFICATION FOR TERMINAL EQUIPMENT  
CONNECTING TO THE PUBLIC SWITCHED TELEPHONE NETWORK  
(PSTN)**

**1. Scope**

This Technical Specification is applicable to all types of terminal equipment (TE) that can be approved for connection to the Public Switched Telephone Network (PSTN).

This Technical Specification specifies:

- a) the protection of users and personnel operating the network from hazards that may arise from the connection of terminal equipment to public telecommunication network;
- b) the protection of public telecommunication network and service from interference and other adverse effects; and
- c) the assessment of compatibility of the terminal equipment with the network.

Additional requirements are included as Annexes B and C to the specification. They are applicable to the optional facilities supported by the TE.

**2. Normative references**

The following normative references are indispensable for the application of this Technical Specification. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

See Annex A.

**3. Abbreviations**

For the purpose of this Technical Specification, the following abbreviation applies.

- CR Conformance requirement defines features and functions, which must be supported at minimum
- M Mandatory requirements
- O Optional requirements
- GID General information and definitions

## **4. Requirements**

### **4.1 General requirements**

#### **4.1.1 Power supply requirements**

The TE may be AC or DC powered. For AC powered equipment, the operating voltage shall be 240 V +5 %, -10 % and frequency 50 Hz  $\pm$  1 % as according to MS 406 or 230 V  $\pm$  10 % and frequency 50 Hz  $\pm$  1 % as according to MS IEC 60038 whichever is current.

Where external power supply is used, e.g. AC adaptor or battery, it shall not affect the capability of the equipment to meet this specification.

Adaptor must be pre-approved by the relevant regulatory body before it can be used with the equipment.

#### **4.1.2 Power supply cord and mains plug requirements**

The equipment shall be fitted with a suitable and appropriate approved power supply cord and mains plug. Both are regulated products and must be pre-approved by the relevant regulatory body before it can be used with the equipment.

The power supply cord shall be certified according to:

- MS 140; or
- BS 6500; or
- IEC 60227-5; or
- IEC 60245-4.

The main plug shall be certified according to:

- 13 A fused plugs: MS 589: Part 1 or BS 1363: Part 1; or
- 2.5 A, 250 V, flat non-rewirable two-pole plugs: MS 1578 or BS EN 50075.

#### **4.1.3 Polarity**

The performance of the terminal equipment shall be independent of the PSTN line polarity i.e. the TE shall conform to the requirements of these requirements for both polarities of the line feeding (ETSI TBR 21, clause 4.3.1).

#### **4.1.4 Interoperability and connectivity requirements**

The TE shall comply with the minimum requirement that is specified by the regulatory body.

##### **4.1.4.1 Interoperability**

The TE shall have the ability to exchange information and to use the information that has been exchanged between two or more systems or components.

##### **4.1.4.2 Connectivity**

The TE shall have the ability to link with other programs and devices to allow interoperability.

#### **4.1.5 Marking requirements**

The equipment shall be marked with the following information:

- a) supplier/manufacture's name or identification mark;
- b) supplier/manufacture's model or type reference; and
- c) other markings as required by the relevant standards.

The markings shall be legible, indelible and readily visible.

#### **4.1.6 Language**

All markings, software and related documents shall be in Bahasa Melayu or English language.

#### **4.1.7 Electromagnetic Compatibility and electrical safety requirements**

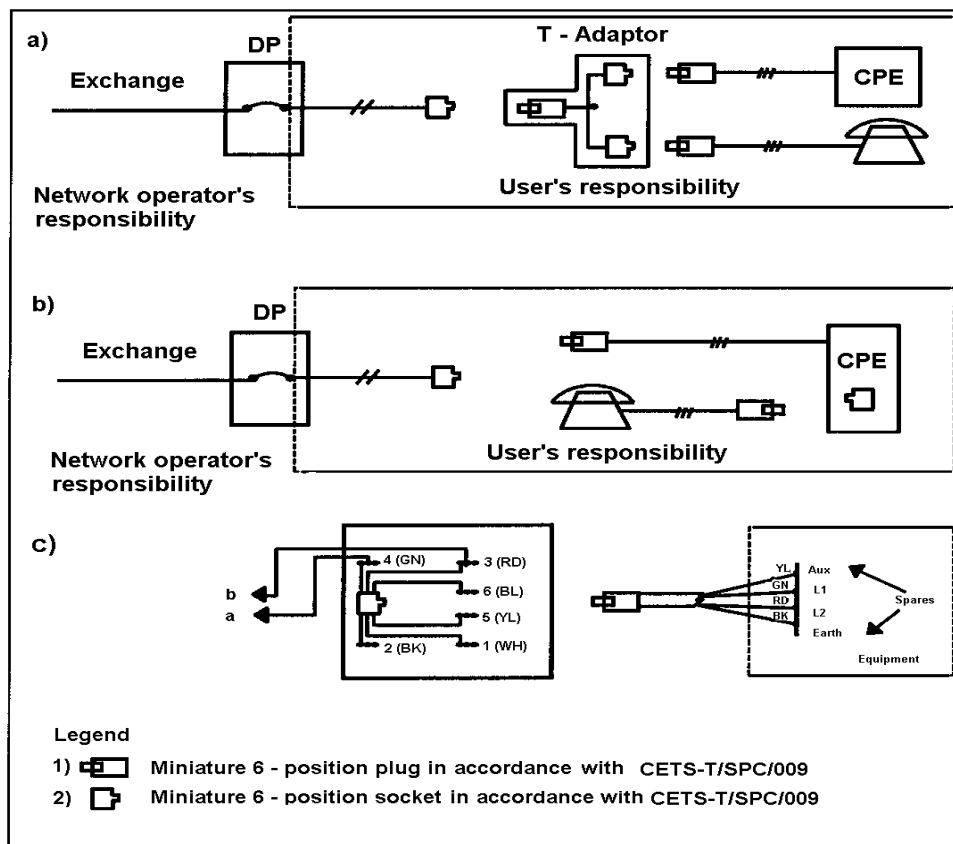
**4.1.7.1** The equipment shall comply with the limits for conducted disturbance at the mains terminals and telecommunication ports, and the limits for radiated disturbance defined in the IEC CISPR 22.

**4.1.7.2** The equipment shall comply with the MS IEC 60950-1 safety standard. The requirements in MS IEC 60950-1 that are applicable to the equipment [e.g. class of equipment, type of telecommunication network voltage (TNV) circuit and types of components] shall be identified and complied with.

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**4.1.8 Connections method**

4.1.8.1	Public Telecommunication Network Termination	CR	Remarks
	Public telecommunication network termination for the connection of the TE is a miniature 6 - position socket shown in Figure 1.	GID	
4.1.8.1.1	Connection of the TE to the public telecommunication network termination is in accordance with Figure 1 a).	O	
4.1.8.1.2	Connection of the TE to the public telecommunication network termination is in accordance with Figure 1 b).	O	
4.1.8.1.3	Line connection of plug and socket is in accordance with Figure 1 c).	O	



**Figure 1. Connections method**



**4.2 Technical requirements**

**4.2.1 General operating requirements**

**4.2.1.1 Ringing signal and service tones** **CR** **Remarks**

TE shall be able to work with the ringing signal and service tones from public exchange. M

**4.2.1.2 Power fail condition** **CR** **Remarks**

**4.2.1.2.1** The equipment is designed such that no interruption of normal telephone service is possible during 240 V AC power failure. M

**4.2.1.2.2** In the event of an exchange power failure, the equipment shall immediately release the exchange lines and shall revert to the normal free condition on the restoration of power. M

**4.2.1.2.3** The equipment shall place the exchange lines in readiness to incoming calls after releasing the exchange lines. M

**4.2.1.2.4** Incorrect manual operation of the equipment will not interfere with the proper operation of any PSTN plant. M

**4.2.2 Electrical characteristics**

**4.2.2.1 Insulation resistance** **CR** **Remarks**

The insulation resistance between any one of the line terminals and the earth terminal shall be more than 5 MΩ measured at 100 V DC. M

**4.2.2.2 Impedance limits** **CR** **Remarks**

**4.2.2.2.1 Unlooped condition**

**4.2.2.2.1.1** TE shall present to the exchange line a DC resistance more than 1 MΩ measured at 100 V DC with current less than or equal to 100 μA. M Acceptable test method: ETSI TBR 21, A.4.4.1

**4.2.2.2.1.2** TE shall present to the exchange line an impedance more than 2 000 Ω at 25 Hz. M Acceptable test method: ETSI TBR 21, A.4.4.2.1

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<b>4.2.2.2.1.3</b>	TE shall be able to withstand sustained ringing voltages from the telephone line of 75 V to 85 V r.m.s at nominal frequency of 25 Hz $\pm$ 2 Hz.	M	
<b>4.2.2.2.2</b>	<b>Looped condition</b>		
<b>4.2.2.2.2.1</b>	A DC resistance of 80 $\Omega$ to 450 $\Omega$ for line currents between 20 mA to 110 mA.	M	Acceptable test method: ETSI TBR 21, A.4.7.1
<b>4.2.2.2.2.2</b>	For analogue TE supporting non-voice services only, the return loss calculated shall be more than 8 dB with respect to 600 $\Omega$ in the frequency range of 300 Hz to 3 400 Hz for line current up to 110 mA.  NOTE. Requirements are applicable only to non-voice TE (without handset function) such as modems and some facsimile machines.	M	Acceptable test method: ETSI TBR 21, A.4.7.2
<b>4.2.2.2.2.3</b>	For analogue TE supporting handset telephony, the return loss calculated shall be more than 14 dB with respect to 600 $\Omega$ in the frequency range of 300 Hz to 3 400 Hz for line current up to 110 mA.  NOTE. Requirement is mandatory if TE incorporate analogue handset function.	O	Acceptable test method: ETSI TBR 38, A.2.8
<b>4.2.2.2.2.4</b>	The equipment shall be capable of performing satisfactorily with continuous DC current between 20 mA and 110 mA from the public exchange.	M	Acceptable test method: ETSI TBR 21, A.4.7.1
<b>4.2.2.3</b>	<b>Impedance unbalance about earth</b>  Impedance unbalance about earth expressed in Longitudinal Conversion Loss (LCL) shall be more than or equivalent to 40 dB in the frequency range of 300 Hz to 600 Hz and more than or equivalent to 46 dB in the frequency range of 600 Hz to 3 400 Hz.	<b>CR</b>  M	<b>Remarks</b>  Acceptable test method: ETSI TBR 21, A.4.7.4

<b>4.2.2.4</b>	<b>Signal frequencies and sending levels</b>	<b>CR</b>	<b>Remarks</b>
<b>4.2.2.4.1</b>	All signals transmitted to public telecommunication network line shall be nominally confined to the frequency range of 300 Hz to 3 400 Hz and the power level during any 10 second period shall not exceed -6 dBm when measured with 600 Ω termination.  NOTE. These requirements do not apply to DTMF signals.	M	Acceptable test method: ETSI TBR 21, A.4.7.3.1
<b>4.2.2.4.2</b>	Any power transmitted above 3 400 Hz shall be reduced progressively by at least 12 dB/octave.	M	Acceptable test method: ETSI TBR 21, A.4.7.3.4
<b>4.2.2.4.3</b>	Any individual spectral component of the transmitted signals into the public telecommunication network line shall not exceed -33 dBm at frequencies above 3 400 Hz and -70 dBm at 50 kHz and above.	M	Acceptable test method: ETSI TBR 21, A.4.7.3.4

**4.2.3 Calling function**

TE that initiates calls to the public telephone exchange shall conform to the requirements of this clause.

<b>4.2.3.1</b>	<b>Dual Tone Multifrequency (DTMF) signalling</b>	<b>CR</b>	<b>Remarks</b>
<b>4.2.3.1.1</b>	The equipment shall send the call address information to the public exchange by means of DTMF signalling codes as specified in Table 1.	M	Acceptable test method: ETSI TBR 21, A.4.8.2.1

**Table 1. DTMF signalling frequency combination**

<b>Low group (Hz)</b>	<b>High group (Hz)</b>		
	<b>1 209</b>	<b>1 336</b>	<b>1 477</b>
<b>697</b>	1	2	3
<b>770</b>	4	5	6
<b>852</b>	7	8	9
<b>941</b>	*	0	#

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4.2.3.1.2	Transmit signalling frequencies shall not deviate more than $\pm 1.5\%$ from the nominal values.	M	Acceptable test method: ETSI TBR 21, A.4.8.2.2
4.2.3.1.3	The sending level for low group frequencies into public telecommunication network line shall be $-10 \text{ dBm} \pm 2 \text{ dB}$ .	M	Acceptable test method: ETSI TBR 21, A.4.8.2.2
4.2.3.1.4	The sending level for high group frequencies into public telecommunication network line shall be $-8 \text{ dBm} \pm 2 \text{ dB}$ .	M	Acceptable test method: ETSI TBR 21, A.4.8.2.2
4.2.3.1.5	During sending of any DTMF frequency combination, the level of the tone in the high frequency group shall be 1 dB to 6 dB higher than the level of the tone in the low frequency group.	M	Acceptable test method: ETSI TBR 21, A.4.8.2.2
4.2.3.1.6	The total power of unwanted frequency components during signalling shall be at least 20 dB below the power level of signal frequency.	M	Acceptable test method: ETSI TBR 21, A.4.8.2.3
4.2.3.2	<b>Decadic pulse</b>	<b>CR</b>	<b>Remarks</b>
	a) The nominal dial speed is 10 pulses per second (pps) $\pm 1$ pps.	M	
	b) The nominal pulse width is as follows:  Break pulse : $66.7 \text{ ms} \pm 2.5 \text{ ms}$  Make pulse : $33.3 \text{ ms} \pm 2.5 \text{ ms}$		
	c) The inter-digital pause is between 600 ms to 1 000 ms.		
	NOTE. Requirements are applicable only to TE equipped with pulse dialling.		

<b>4.2.3.3</b>	<b>Keypad dialling</b>	<b>CR</b>	<b>Remarks</b>																				
<b>4.2.3.3.1</b>	Keypads used in equipment for dialling shall be alphanumeric keypads and the relationships between the letters and the digits shall comply with ITU-T Recommendation E.161 option A as shown in Figure 2.	M																					
	<table border="0"> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">ABC</td> <td style="text-align: center;">DEF</td> </tr> <tr> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">6</td> </tr> <tr> <td style="text-align: center;">GHI</td> <td style="text-align: center;">JKL</td> <td style="text-align: center;">MNO</td> </tr> <tr> <td style="padding: 5px;">7</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">9</td> </tr> <tr> <td style="text-align: center;">PQRS</td> <td style="text-align: center;">TUV</td> <td style="text-align: center;">WXYZ</td> </tr> <tr> <td style="padding: 5px;">*</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">#</td> </tr> </table>	1	2	3		ABC	DEF	4	5	6	GHI	JKL	MNO	7	8	9	PQRS	TUV	WXYZ	*	0	#	
1	2	3																					
	ABC	DEF																					
4	5	6																					
GHI	JKL	MNO																					
7	8	9																					
PQRS	TUV	WXYZ																					
*	0	#																					
	<b>Figure 2. Alphanumeric keypad layout</b>																						
<b>4.2.3.3.2</b>	The associated letters must not impair the legibility of the digit (§ 3.1.1, ITU-T Recommendation E.161).	M																					
<b>4.2.3.3.3</b>	The tactile identifier on the "5" button shall be provided (§ 3.6, ITU-T Recommendation E.161).	M																					
<b>4.2.3.4</b>	<b>Automatic dialling</b>	<b>CR</b>	<b>Remarks</b>																				
	For equipment which carries out dialling automatically:	M	Acceptable test method: ETSI TBR 21, A.4.8.2.4 and A.4.8.2.5																				
	a) the sending length of the DTMF signal shall be at least 65 ms; and																						
	b) the inter-digit pause between 2 DTMF signals shall not be less than 65 ms.																						
<b>4.2.4</b>	<b>Automatic answering</b>	<b>CR</b>	<b>Remarks</b>																				
<b>4.2.4.1</b>	TE shall have a ringing signal detector and answer an incoming call by looping the line within 9 seconds from the start of the ringing signal.	See note																					

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- 4.2.4.2** TE shall restore the exchange line to unlooped condition: See note
- a) after the detection of busy tone sent by the exchange to indicate that the calling party has cleared first;
  - b) alternatively, for equipment with a timer, after the time pre-set for the automatic transmission or recording of message; and.
  - c) If failure occurs when the equipment is answering an incoming call, the exchange line shall be immediately released and the equipment reset on resumption of mains supply.

NOTE. Requirement is "M" if TE incorporates features with telephone answering capability e.g. Direct Inward System Access (DISA), voice message system etc.

**Annex A**  
(normative)

**Normative references**

BS 1363: Part 1	13 A plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
BS 6500	Electric cables Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments
BS EN 50075	Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes
ETSI TBR 21	Terminal Equipment (TE); Attachment Requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) to TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signalling
ETSI TBR 38	Public Switched Telephone Network (PSTN); Attachment Requirements for a terminal equipment incorporating and analogue handset function capable of supporting the justified case service when connected to the analogue interface of the PSTN in Europe
IEC 60227-5	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)
IEC 60245-4	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables
IEC CISPR 22	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
ITU-T Recommendation E.161	Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network
MS 140	Specification for insulated flexible cords and cables
MS 406	Specification for voltages and frequency for alternating current transmission and distribution systems

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MS 589: Part 1	Specification for 13 A plugs, socket outlets, adaptors and connection units Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
MS 1578	Specification for flat non-rewirable two-pole plugs, 2.5 A, 250 V, with cord, for the connection of class II-Equipment for household and similar purposes
MS IEC 60038	IEC standard voltages
MS IEC 60950-1	Information technology equipment - Safety - Part 1: General requirements
CETS-T/SPC/002	Data/Facsimile Modem
CETS-T/SPC/003	Facsimile Machine
CETS-T/SPC/006	Alarm System (PSTN)
CETS-T/SPC/009	Miniature Plug and Socket
CETS-T/SPC/011	Cordless Telephone 46/49 MHz
CETS-T/SPC/012	PABX/KTS Equipment
CETS-T/SPC/015	Analogue Calling Line Identification



**Annex B**  
(normative)

**Analogue handset function**

If TE supports handset telephony, then the following additional requirements are applicable. (Circuit for measurement of transmission characteristic refer to Figure B1).

<b>B1.</b>	<b>Sending and Receiving Loudness Ratings (SLR and RLR)</b>	<b>CR</b>	<b>Remarks</b>
<b>B.1.1</b>	<p>The SLR shall be <math>+3 \text{ dB} \pm 4 \text{ dB}</math> when measured with the feed resistance <math>R_f</math> set to <math>2\ 800 \ \Omega</math> and <math>1\ 000 \ \Omega</math> and <math>+3 \text{ dB} +7/-4 \text{ dB}</math> when measured with the feed resistance <math>R_f</math> set to <math>500 \ \Omega</math>.</p> <p>For TE supporting handsfree or loudspeaking functions which is not powered from a separate power supply, the requirement to measure with <math>R_f</math> set to <math>2\ 800 \ \Omega</math> shall be replaced by a requirement to measure with <math>R_f</math> set to <math>2\ 300 \ \Omega</math>.</p>	M	Acceptable test method: ETSI TBR 38, A.2.2.1
<b>B.1.2</b>	<p>The RLR shall be <math>-8 \text{ dB} \pm 4 \text{ dB}</math> when measured with the feed resistance <math>R_f</math> set to <math>2\ 800 \ \Omega</math> and <math>1\ 000 \ \Omega</math> and <math>-8 \text{ dB} +7/-4 \text{ dB}</math> when measured with the feed resistance <math>R_f</math> set to <math>500 \ \Omega</math>.</p> <p>For TE supporting handsfree or loudspeaking functions which is not powered from a separate power supply, the requirement to measure with <math>R_f</math> set to <math>2\ 800 \ \Omega</math> shall be replaced by a requirement to measure with <math>R_f</math> set to <math>2\ 300 \ \Omega</math>.</p>	M	Acceptable test method: ETSI TBR 38, A.2.2.2
<b>B2.</b>	<b>Sidetone</b>	<b>CR</b>	<b>Remarks</b>
	Sidetone Masking Rating (STMR) shall not be less than $+10 \text{ dB}$ .		Acceptable test method: ETSI TBR 38, A.2.3

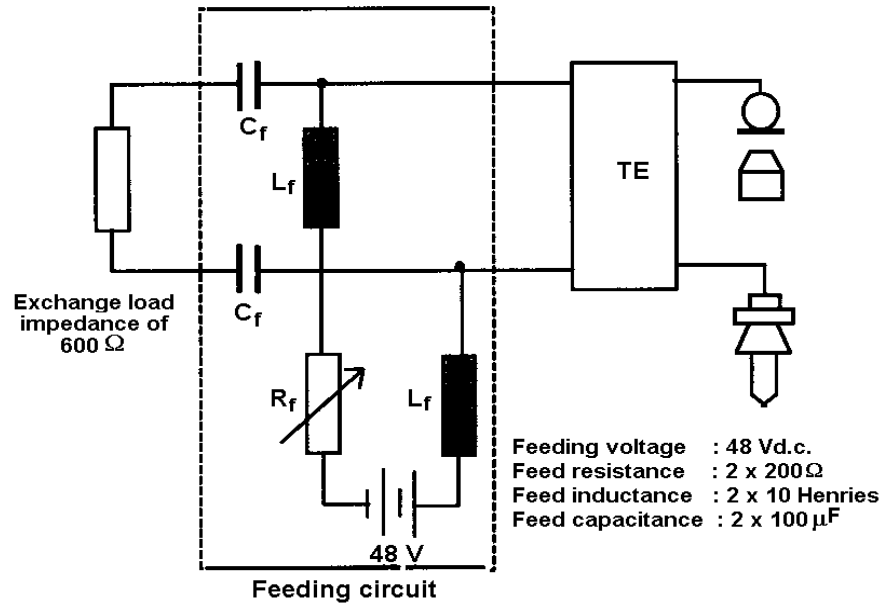


Figure B1. Circuit for measurement of transmission characteristics

**Annex C**  
(normative)

**Additional requirements**

If the TE falls under any of the categories below, then the requirements specified in the related documents listed in Table C1 are also applicable.

**Table C1. Additional requirements**

<b>Category</b>	<b>Related documents</b>
Data/Facsimile Modem	CETS-T/SPC/002
Facsimile Machine	CETS-T/SPC/003
Alarm System (PSTN)	CETS-T/SPC/006
Cordless Telephone 46/49 MHz	CETS-T/SPC/011
PABX/KTS Equipment	CETS-T/SPC/012
Analogue Calling Line Identification	CETS-T/SPC/015