



## PT. DIMULTI PILAR NARMADI

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# TECHNICAL REQUIREMENTS OF TELECOMMUNICATION EQUIPMENT CONNECTED TO PUBLIC SWITCH TELEPHONE NETWORK (PSTN)

Based on Perdirjen SDPPI No. 04 2020

## GENERAL REQUIREMENTS

### 1. Electromagnetic Compatibility Requirements

The following Emission or Electromagnetic Interference (EMI) measurements must be performed on a CPE device, compilation is valid:

- A. Radiation emissions emitted from CPE equipment must be approved with the Class B requirements specified in clauses 4 and Tables AA and A.5 of SNI CISPR 32;
- B. Conduction emissions at the DC power port of the CPE device must meet the Class B requirements specified in clause 4 and Table A. 10 of CISPR 32; and
- C. The conduction emission in the AC main port must be suitable for CPE according to the AC / DC power converter to the Class B requirements specified in clause 4 and Table A.10 of CISPR 32 (equipment with a DC power port powered by a special AC / DC power converter or adapter which is defined as AC electric powered equipment [clause 3. 1. 1 of SNI CISPR 32]);

### 2. Electrical Safety Requirements

- A. Device electrical safety testing does not apply to devices without an external power supply.
- B. Electrical safety tests or assessments on devices must be performed in accordance with the requirements specified in IEC 60950-1 or IEC 62368-1, based on the following assumptions:
  - I. CPE powered by an external power supply, AC / DC power converter or charger / power adapter;
  - II. CPE which is operated with SELV (Safety Extra Low Voltage) in an environment that allows excess voltage from the telecommunications network. SELV rises to voltages that do not exceed 42.4 V peak or 60 V DC.



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### 3. Power supply

- A. If the device uses an AC power supply, it must be able to use a generally accepted power supply in Indonesia (nominal 220 Vac  $\pm$  10% and frequency 50 Hz  $\pm$  2%).
- B. If the device uses a DC power supply, the device must be able to be used with a supply voltage of -24 Vdc  $\pm$  10%, 5 Vdc  $\pm$  10%, 10 Vdc  $\pm$  10%, 12 Vdc  $\pm$  10% or 48 Vdc  $\pm$  10%, current supply 20 mA and carelessly polarity of the channel.

### 4. Function

The device terminal connected to the PSTN must be able to be used to interconnect via a fixed telephone public network with a circuit connected to an activated circuit.

## CONFORMITY REQUIREMENTS

### 1. Analog Telephone

#### A. Operating Requirements

##### I. Incoming Signal Signaling

- 1) Analog Telephone in its operation detecting a bell signal, the device must respond with audible or visual indication or both if a bell signal is sent with the following characteristics:
  - i. source level: 60 Vac
  - ii. nominal frequency: 25 Hz
  - iii. ring period: 1 second
  - iv. channel replacement prisoners: 1500  $\Omega$
- 2) Analog Telephone that has an automatic call answering facility, calls must be answered after the bell signal is received, at most 10 times or programmable.

##### II. Tone Detection

Analog Telephone which in its operation detects tones (select, busy, call), the device must be able to respond to the tone characteristics as follows:

- 1) frequency: 425 Hz  $\pm$  25 Hz.
- 2) level:  $\leq$  -27 dBm.

#### B. Electrical Requirements

##### I. Resistance

In the on-hook state, resistance is measured by a voltage of 100 Vdc between a-b wire (tip-ring), at least 1 M $\Omega$ .



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### II. Impedance

#### 1) On-hook condition

The device impedance for a frequency of 25 Hz, measured at a voltage of 70 Vac, a minimum of 4,000Ω.

#### 2) Off-hook condition

The DC impedance of the device, measured by a nominal supply voltage of 48 Vdc and a nominal supply current of 20 mA, is a maximum of 400Ω.

### III. Return Loss

#### 1) Return loss caused by inequality of Analog Telephone aircraft Impedance on network impedance, must meet the conditions as follows:

- i. for frequencies from 300 Hz to 600 Hz:  $\geq 12$  dB
- ii. for frequencies from 601 Hz to 3400 Hz:  $\geq 15$  dB

#### 2) Measurement of Return Loss is done on conditions:

- i. supply voltage: 48 Vdc
- ii. supply current: 20 mA
- iii. reference impedance: 600Ω (resistive)
- iv. sending level: -10 dBm and 0 dBm
- v. gripping with 600Ω if needed

### IV. Signaling

#### 1) outgoing call

At a nominal supply voltage of 48 VDC, the supply current is 20 mA, the DTMF signaling output of the device must meet the following conditions:

##### i. frequency

The digits sent to the PSTN must be a combination of low frequency and high frequency with a tolerance of  $\pm 1.8\%$  of the nominal of each frequency (see Table 1 DTMF Frequency).

Table 1. DTMF frequencies

Nominal Frequency (Hz)		High Frequency Group		
		1209	1336	1447
Low Frequency Group	697	1	2	3
	770	4	5	6
	825	7	8	9
	941	*	0	#

- ii. Power / level  
The power / level of DTMF is in the area of -11 dBm to -4 dBm.
  - iii. Different power / level  
The high frequency group level must be greater than  $2 \text{ dB} \pm 1.5 \text{ dB}$  compared to the low frequency group.
  - iv. Length and range of signals  
The length of the tone-on signal is 40 ms to 500 ms and the tone-off signal interval is 40 ms to 500 ms for transmitting digits in sequence.
- 2) Incoming call  
For a telephone with a bell unit in the form of a bell must be able to generate acoustics of at least 60 dBA (measured perpendicularly 1 meter from the source) if a bell signal is given referring to the technical requirements for conformity in the letters B.1.a.1). A)

### C. Facility Requirements

#### I. Last Number Dialing (Redial)

- 1) The last selected number is automatically stored in memory.
- 2) the number will remain stored until the call to the next number and the next number will automatically replace the previously stored number.
- 3) the use of this facility is carried out manually, namely by pressing certain buttons.
- 4) if redial matters can be carried out automatically, the following conditions apply:
  - i. the interval between calls must be at or can be set in the range of 3 minutes to 15 minutes;

- ii. digit transmission is possible after the device has received a dial tone (the device has a dial tone detector). If the call fails and the PSTN has sent the call, the device must be ready for the next call.
- iii. facilities must be canceled:
  - after a successful automatic call or after detecting ring tone.
  - after repeated calls at most 5 times.
  - equipped with audio and / or visual indicators that indicate that the call set up is in progress.
  - if the device is connected, the redial facility must be delayed or canceled.
  - memory capable of storing at least 15 digits.

## II. Handsfree Call

- 1) The use of this facility is carried out by pressing a certain button.
- 2) Facilities can be deactivated by picking up the handset or certain keys.
- 3) Changes from the condition of the handsfree call to normal conditions or vice versa do not cause an ongoing termination.

## D. Structure Requirements Analogue Telephone

### I. Talk unit

Talk Unit consists of:

- 1) Phone handle
- 2) Thread Phone handle
- 3) Microphone and receiver (ear-phone) and
- 4) Talk Circuit

### II. signalling unit

Signalling unit consist of

- 1) outgoing call signalling is a select button
- 2) incoming call signalling is a ringing, speaker or buzzer that can be included with volume settings

### III. connecting unit

Connecting unit consist of

- 1) "Thread" terminal
- 2) "Thread" phone handle

IV. analogue telephone body

Basic part of Analog telephone must to have friction inhibitors of elastic material which doesn't damage the surface they are located on.

V. phone handle

In phone handle, there should be a place for sending capsule and receivers that are designed in order to provide easy maintenance or easy component replacement.

VI. "Thread" phone handle

"Thread" phone handle should be:

- 1) spiral form and elastic
- 2) both tips are equipped with lock straps
- 3) the cable length is elastic at least 1,5 meters

VII. "Thread" terminal

The length of Thread terminal is minimum 1,5 meters.

VIII. select unit

If the select unit is select button that consist of 12 buttons 4x3, arrangement and placement of numbers should be in accordance to figure 1.



Figure 1: the arrangement of buttons (4 x 3)

Note:

Select button number 5 have to be equipped with arising sign

## IX. contact hook

contact hook is designed clearly so that it can work well according to its function based on the load of the telephone receiver. In this exact case, contact hook can be in form of pressing button or sliding button.

## 2. Facsimile

### A. Operation requirements

#### I. Signalling out

The device has to provide signalling facility DTMF for conducting call towards PSTN. The characteristic of DTMF refers to electric requirement point 1.b.3) a) (2).

#### II. Compatibility connection

- 1) For such devices that has compatibility ruled in ITU-T recommendation, it should be able to connect with other devices in the same group.
- 2) For such device that needs compatibility with other devices and haven't ruled in the ITU-T recommendation, it should be able to connect with the same devices.

#### III. Classification

Facsimile based on speed is classified as follow:

- 1) Facsimile group II with delivering time more or less 3 minutes (Size A4).
- 2) Facsimile group III with delivering time more or less 1 minute (Size A4).

#### IV. Automatic calling

For calling that is conducted automatically, the device has to be able to awake calling tone (CNG) with characteristic as follow:

- 1) Frequency: 1100 Hz  $\pm$  10%
- 2) Long tone: 0,5 second  $\pm$  10%

#### V. Input and printing unit

Input document unit and printing is minimally having to match with A4 page size.



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### B. Electric requirements

#### I. Impedance

##### 1) On-hook circumstances,

Impedance device for frequency 25Hz is measured on voltage 70 Vac, and the minimal is 4000  $\Omega$

##### 2) Off-hook circumstances

Impedance DC devices is measured by nominal supply voltage 48 Vdc and nominal supply current 20mA, for maximal 400  $\Omega$ .

#### II. Isolation resistant (leakage)

Isolation resistance (leakage) device in on-hook condition is measured with voltage 100 Vdc between wire a (tip) and b (ring):  $\geq 1 \text{ M}\Omega$

#### III. Voltage leakage

For device uses general power supply (AC), voltage leakage from power supply between connecting terminal and outside channel, in on-hook and of-hook condition, maximal 1 Vac/Vdc.

#### IV. Level Voice data

For telecommunication device that can send, receive, and/or reproduce document in form of written or picture through cellular network, the following conditions as follow:

##### 1) send level

It must be manageable from -15 dBm up to 0 dBm with step 1dB or 2 dB

##### 2) receive level

Facsimile group II: -40 dBm up to 0 dBm

Facsimile group III: -43 dBm up to 0 dBm

Impedance: 600  $\Omega \pm 10\%$  in sound frequency 0,4 kHz until 3,4 kHz.

### 3. Private Automatic Branch Exchange

#### A. operating requirement

##### I. signalling incoming signal

For device that in its operation is detecting signal bel, it has to respond with audible indications (sound) or visual indication (sign) or both if it is sent signal bel with characteristic as follow:

##### 1) source level: 60 Vac

##### 2) nominal frequency: 25 Hz

##### 3) ring period: 1 second

##### 4) resistance replacement channel



## II. DTMF detection

For device in operating detect DTMF signal, it needs to have sensitivity to the characteristic of DTMF signal as follow:

- 1) Frequency:  $\pm 1,8\%$  from nominal frequency (see Table 1 frequency DTMF);
- 2) Difference high group level greater than low group  $2\text{dB} \pm 1.5 \text{ dB}$ ;
- 3) DTMF level:  $\leq -11 \text{ dBm}$ .
- 4) signal length:  $\leq 40 \text{ ms}$ ;
- 5) interval between signals:  $\leq 40 \text{ ms}$ .

## III. Tone Detection

For devices that detect operations in tone (select, busy, call), the device must be able to respond tone characteristics as follows:

- 1) Frequency:  $425 \text{ Hz} \pm 25 \text{ Hz}$ .
- 2) Level:  $\leq -27 \text{ dBm}$ .

## IV. Generating tones (applies to devices that are use tone mode)

- 1) Dial tone
  - i. Minimum level of  $-25 \text{ dBm}$ , maximum of  $-5 \text{ dBm}$  ( $600 \Omega$  ending)
  - ii. Frequency of  $300\text{-}500 \text{ Hz}$
  - iii. Free rhythm
- 2) Ring back tone
  - i. Minimum level of  $-25 \text{ dBm}$ , maximum of  $-5 \text{ dBm}$  ( $600 \Omega$  ending).
  - ii. Frequency of  $300\text{-}500 \text{ Hz}$ .
  - iii. Rhythm  $0.5\text{-}1.5$  seconds ON,  $3\text{-}6$  seconds OFF.
- 3) Busy-tone
  - i. Minimum level of  $-25 \text{ dBm}$ , maximum of  $-5 \text{ dBm}$  ( $600 \Omega$  ending).
  - ii. Frequency:  $300\text{-}500 \text{ Hz}$ .
  - iii. Rhythm: Different from the select tone and tone call on.
- 4) Noise

With a  $600 \Omega$  cover, noise is channeled by branches maximum,  $-60 \text{ dBm}$ .

5) Sensitivity of Channel Isolation Resistance

For devices that in operation provides supply to end devices for connection development, then the device must be able to operate well in conditions of insulation resistance wire a-b  $\pm 20$  kg.

**B. Electrical Requirements**

**I. Characteristics of a 2W j Voice Frequency Port**

1) High Frequency Group (HGF) with a tolerance of  $\pm 1.8\%$ :

- i. F1: 1209 Hz (1187 - 1231 Hz)
- ii. F2: 1336 Hz (1312 - 1360 Hz)
- iii. F3: 1477 Hz (1450 - 1504 Hz)

2) Low Frequency Group (LGF) with tolerance of  $\pm 1.8\%$ :

- i. F1: 697 Hz (684 - 710 Hz)
- ii. F2: 1336 Hz (1312 - 1360 Hz)
- iii. F3: 1477 Hz (1450 - 1504 Hz)

3) Different levels of high groups are greater than low groups of 2 dB  $\pm 1.5$  dB

4) Frequency power level: -11 to -4 dBm.

5) Signal length: 40 - 500 ms.

6) Interval of signals: 40 - 500 ms.

7) Nominal impedance:  $600\Omega \pm 20\%$

8) Return Loss:  $\geq 12$  dB (300 Hz - 600 Hz);  $\geq 15$  dB (600 Hz - 3400 Hz)

9) Voice Channel Frequency: 300 Hz - 3400 Hz

**II. Insulation Resistance (Leakage)**

Insulation resistance (leak) device is on hook, measured with a voltage of 100 Vdc between a wire (tip) and b (ring):  $\geq 1$  M $\Omega$ . For devices equipped with grounding facilities:

- 1) between wire a and grounding device:  $\geq 1$  M $\Omega$ .
- 2) between wire b and grounding device:  $\geq 1$  M $\Omega$ .

**III. Impedance**

1) On-hook condition

The device impedance for a frequency of 25 Hz, is measured at a voltage of 70 Vac, a minimum of 4000 $\Omega$ .

2) Off-hook condition

DC impedance of the device, measured by voltage the nominal supply is 48 V dc and the nominal supply current is 20 mA, a maximum of 400  $\Omega$ .

IV. Supply to Channels

For devices which in its operation provides a supply to the end device for building connection, the supply current to the channel is at the annual short circuit condition of the channel 0  $\Omega$ , a maximum current of 60 mA.

V. Return Loss

Return loss caused by inequality of device impedance to network impedance, must meet the following conditions:

- 1) for frequencies of 300 Hz to 600 Hz:  $\geq 12$  dB.
- 2) for frequencies from 601 Hz to 3400 Hz:  $\geq 15$  dB.

Note: Return Loss measurements are performed on conditions:

- 1) supply voltage: 48 Vdc
- 2) supply current: 20 mA
- 3) reference impedance: 600 Q (resistive)
- 4) sending level: -10 dBm and 0 dBm.
- 5) gripping with 600 Q if needed.

VI. Voltage Leaks

For devices that use a common (AC) power supply, leakage of the voltage from the power supply between the connection terminal with the outside channel, in the on-hook and off-hook conditions, a maximum of 1 Vac / Vdc.

VII. Bell Generator

For devices that generate bell signals, the bell generator output requirements are as follows:

- 1) voltage: 40 Vac until 90 Vac (RMS) no load condition.
- 2) frequency: 25 Hz  $\pm$  3 Hz or 50 Hz  $\pm$  5 Hz.

C. Facility requirements

I. Last Number Dialing (Redial)

- 1) The last selected number is automatically stored in memory.

- 2) that number will remain stored until call to the next number and the next number will automatically replace the previously stored number.
- 3) the use of this facility is carried out manually, namely by pressing certain buttons.
- 4) in the event that redial can be done automatically, the following conditions apply:
  - i. the interval between calls for programs that are fixed, is in the range of 3 minutes to 15 minutes, while for the programmable must be set in the area of 3 minutes to 15 minutes.
  - ii. digit transmission is possible after the device has received a dial tone (the device has a dial tone detector). If the call fails and the PSTN has sent a busy tone, the device must release and be ready for the next call.
  - iii. facilities must be canceled:
    - after a successful automatic call or after detecting ring tone.
    - after repeating the maximum call is fulfilled (for the fixed program, at most 5 times and for the programmable must be set 5 times.
    - equipped with visual or audible indicators or both which show that the development of the connection is in direct.
    - if the device is connected and the facility will be active according to the activity program, it must be delayed or canceled.
  - iv. memory can store at least 15 digits.

## II. Abbreviated Dialing

- 1) the use of this facility is carried out manually.
- 2) in the event that this facility is equipped with automatic redial, the facility requirements in item 3. c. 1) d) are applied.
- 3) memory can store at least 15 digits.

## III. Reminder Dialing

- 1) The facility must work on time according to the program and accompanied by the appearance of visual indications or audible or both, and also digit transmission is carried out after dial tone detection.
- 2) If the device is in contact and the facility will be active, the activity must be postponed or canceled.
- 3) in terms of facilities can recalling automatically, the provision applies as in clause 3.a.2

- 4) memory can store at least 15 digits

#### IV. Automatic Answering and Recording

- 1) The device must answer, when receive call signal from PSTN (it can be configured for up to 10 rings).
- 2) There is a memory location to record information/message that will be given to caller when the calling is answered. And it must be given a sign to caller, that is recorder ready to record the caller message.
- 3) When an incoming call or recording take place, customers must be possible if they want to answer directly.
- 4) After the caller breaks the connection, the device must return to the on-hook condition and ready to receive the next call.
- 5) If the caller's message storage capacity is up, the device must be inactive as an answering machine.

#### V. Hands-free Call

- 1) The use of this facility is carried out by pressing a certain button.
- 2) The facility can be deactivated by picking up phone handles or certain button.
- 3) The change from hands-free call to normal condition or vice versa, it's not cause ongoing termination of relation.

#### VI. Music on Hold

- 1) In connected condition, music or tone will be active after user press the certain button without ongoing termination of relation.
- 2) The facilities equipped with indicators (audio, video or both), which indicates that the facility is active.
- 3) The changes from music on hold condition to normal condition cannot disconnect an ongoing relation.

### 4. Key Telephone System (KTS)

#### A. Operational requirements

##### I. Signaling incoming signal

For devices that in operation detect the bell signal, the device must respond with an audio indication, video, or both when sent a bell signal with the following characteristics:

- 1) Source level: 60 Vac
- 2) Nominal frequency: 25 Hz
- 3) Ring period:  $\leq 1$  detik



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### 4) Prisoner channel replacement: 1500

## B. Electric requirements

### I. Characteristic of Voice Frequency Port/2W

- 1) High Group Frequency (HGF) with tolerance  $\pm 1.8\%$ :
  - i. F1 : 1209 Hz (1187 - 1231 Hz)
  - ii. F2 : 1336 Hz (1312 - 1360 Hz)
  - iii. F3 : 1477 Hz (1450 - 1504 Hz)
- 2) Low Group Frequency (LGF) with tolerance  $\pm 1.8\%$ :
  - i. F1 : 697 Hz (684 - 710 Hz)
  - ii. F2 : 1336 Hz (1312 - 1360 Hz)
  - iii. F3 : 1477 Hz (1450 - 1504 Hz)
- 3) The high level group difference is greater than low group 2 dB  $\pm 1.5$  dB
- 4) Frequency power level : -11 dBm until -4 dBm
- 5) Signal length: 40 ms - 500 ms.
- 6) Interval between signals: 40 ms - 500 ms.
- 7) Nominal impedance: 600 ohm  $\pm 20\%$
- 8) Return Loss :  $\geq 12$  dB (300 Hz - 600 Hz);  $\geq 15$  dB (600 Hz - 3400 Hz)
- 9) Frequency of voice channel: 300 Hz - 3400 Hz.

### II. Insulation resistance (leakage)

Insulation resistance (leakage) of the device is on the hook, measured with a voltage of 100 Vdc between wires a (tip) and b (ring):  $\geq 1$  M ohm. for devices equipped with grounding facilities:

- 1) Between wire a and grounding device:  $\geq 1$  M ohm.
- 2) Between wire b and grounding device:  $\geq 1$  M ohm.

### III. Impedance

#### 1) On-hook condition

Device impedance for a frequency of 25 Hz, measured at voltage 70 Vac, minimum 4000 ohm.

#### 2) Off-hook condition

Impedance of DC device, measured with nominal voltage 48 Vdc and a nominal supply current of 20 mA, maximum 400 ohm.



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### 5. Other Telecommunication Tools or Devices Connected to PSTN

#### A. Operating and signaling requirements

Outgoing call signaling is measured at the Power Supply voltage 48 Vdc with current 20 mA, DTMF signaling characteristics must meet the following requirements:

##### I. Frequency

The digits sent to the PSTN are a combination of low frequencies and high frequency with tolerance value  $\pm 1,8\%$  from nominal value for each frequency (please refer to Tabel 1 DT MF Frequency).

##### II. Power level

DTMF power is in the area from -11 dBm to -4 dBm

##### III. Difference level

High frequency group level must be wider 0,5 dB until 3,5 dB compared to the low frequency group.

#### B. Electric requirement

##### I. Resistance

In the open-in state, the resistance is measured by a power 100 Vdc between wire a-b (tip-ring), at least 1 mega ohm.

##### II. Impedance

###### 1) On-hook condition

Impedance of the device for frequency 25 Hz, measured by power 70 Vac, minimum 4000 ohm.

###### 2) Off-hook condition

Impedance of DC device, measure by nominal power 48 Vdc and nominal current 20 mA, maximum 400 ohm.

###### 3) Return Loss

Return loss that caused by difference impedance of the device to network impedance, it must to fulfill following requirement:

- i. For frequency 300 Hz - 600 Hz:  $\geq 12$  dB.
- ii. For frequency 601 Hz s/d 3400 Hz:  $\geq 15$  dB.

Note:

Return loss requirement is conducted at following condition:

- i. Voltage: 48 Vdc
- ii. Current: 20 mA
- iii. Reference impedance: 600 ohm (resistive)
- iv. Sending level: -10 dBm and 0 dBm.
- v. Gripping with 600 ohm if needed.