



**Spark
New Zealand**

PTC 208

Specification of the PTC requirements for Headsets for use in Telephony applications

Draft for public comment

Access Standards

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SCOPE

This Specification covers the requirements for Headsets used in any telephony application. This includes Bluetooth wireless headsets commonly used with mobile phones and Laptop computers. It is not intended to cover headsets without microphones which are intended for listening to music or headsets specifically intended for gaming.

References

PTC 200: Requirements for Connection of Customer Equipment to Analogue lines

PTC 220: Requirements for Private Voice Networks connected to PSTN/ISDN

AS/NZS 4268 Radio equipment and systems - Short range devices

AS/CA S004:2013: Voice Performance Requirements for Customer Equipment

ITU-T Recommendation P.57: Artificial Ears

ITU-T Recommendation P.79: Calculation of Loudness Ratings for Telephone Sets

ITU-T Recommendation P.310: Transmission characteristics for narrow-band digital handset and headset telephones

ITU-T Recommendation P.380: Electro-acoustic measurements on headsets

ETSI EN 301 406: DECT Generic Radio requirements

1 Headset Categories

1.1 Headsets may be monaural or binaural

1.1.1 Digital interface, USB, Ethernet or proprietary, with G.711 codec. USB interface at TRP (0 dBr reference point)

1.1.2 Digital interface, USB, Ethernet or proprietary, with other codec

1.1.3 Analogue interface to existing telephone handset interface.

1.1.4 Analogue or Digital interface connecting directly to a Network (PSTN, ISDN, SIP) ie fully functioning headset telephone.

- *All of the above headsets may be corded or be connected wirelessly to a base station e.g. Bluetooth or DECT*

1.1.5 Wireless headset only, i.e. standards compliant headset intended to work with standards compliant base station, mobile phone or PC. E.g. Bluetooth Special Interest group (SIG)

1.1.6 Wireless base station only. Standards compliant base intended to work with standards compliant headset (e.g. SIG). This category is further subdivided depending whether it has a digital or analogue interface:

2 Requirements

2.1 Other regulatory requirements

2.1.1 Electrical Safety

(a) Headsets with analogue interfaces shall be tested against AS/NZS 60950 or equivalent with the analogue interface assumed to be exposed to TNV3 voltages. Power supplies for associated amplifiers, if applicable shall also be tested against AS/NZS 60950.

(b) Headsets with digital interfaces will generally be only exposed to SELV, in which case electrical safety testing is not necessary.

2.1.2 Electromagnetic Compatibility

(a) Headsets with analogue interfaces will generally not require EMC test reports as they will generally only contain passive components. Power supplies for associated amplifiers, will generally be switched mode, and will require EMC test reports.

(b) Headsets with digital interfaces will require test reports against AS/NZS CISPR22 or equivalent.

2.1.3 Wireless

Where a headset is connected to a base (including a mobile phone or PC), test reports for the wireless technology used are required for a Telepermit grant.

- *Examples are AS/NZS 4268 for Bluetooth and EN 301 406 for DECT.*

2.2 Headset Testing

2.2.1 Digital headsets

2.2.1.1 General

Digital headsets include a codec which for normal telephony will be G.711 A or μ law giving an audio range of 300 to 3400 Hz which is compatible with TDM based switched telephone networks. However different codecs are becoming more common including wideband codecs such as G.722 which encodes/decodes audio up to 7 kHz. There are also Super wideband variants of G.722 which encodes/decodes up to 14 kHz stereo. This allows headsets to be used for reproducing music in addition to being used for telephony.

2.2.1.2 Testing requirements

Wherever possible headsets shall be tested to all relevant clauses of this specification with the headset configured for 3.1 kHz G.711 operation. If it is not possible to configure for G.711 operation the frequency response, loudness rating, STMR and distortion tests may be omitted and replaced with a simple subjective test to confirm that:

- (a) The headset does function properly
- (b) There are no obvious deviations from satisfactory performance compared with a fully compliant narrowband headset.

- *Where test equipment capable of testing specific wideband codec is available it should be used to give complete test results.*
- *As these codecs become more common, it is expected that test equipment will also become more common, and full testing is likely to become mandatory.*

2.2.2 Analogue headsets

2.2.2.1 General

Analogue headsets are usually connected to the handset interface of an existing telephone. The telephone maybe either analogue or digital.

2.2.2.2 Testing

The telephones to which the headset is connected to for testing shall be Telepermitted to the appropriate PTC specification

2.3 Volume controls

2.3.1 Receive volume

- (a) RLR measurements shall be made at both minimum and maximum volume control settings, as well as a setting which gives an RLR compliant with the appropriate clause of this specification.
 - *It is desirable although not essential that all the volume control settings are within the relevant RLR range.*
- (b) Acoustic shock shall be measured with receive volume set to full level
- (c) Headsets with analogue interfaces shall incorporate volume controls with a range of not less than 15 dB. For headsets with digital interfaces a receive volume control is optional provided the headset meets the Receive Loudness Rating requirement.
- (d) Headsets with digital interfaces may include a receive volume control provided:
 - There is at least one setting which results in meeting the RLR requirements of clause 2.5.1.2 of this specification, and
 - No setting results in the acoustic shock requirements of clause 2.7.2 of this specification being exceeded.

2.3.2 Send volume

Due to the non-standard nature of an analogue interface, analogue headsets must have a method of setting the send level. This shall consist of two parts:

- (a) A method of adjusting the level (preferably by a switched attenuator which is not easily accessible to the user, so that once the send level is set, it stays set, and is not subject to drift)
- (b) A procedure for checking that the send level results in the Send Loudness Rating (SLR) being within +/- 3 dB of the objective SLR for the network interface of the device to which the headset is attached (+5 to +14 dB for a digital interface and +2 to +11 dB for a PSTN analogue interface). This procedure shall be documented by the supplier/manufacturer, and verified by the test laboratory as producing a compliant SLR.

- This is particularly important, as the user of the headset cannot directly know how loud or quiet the call might sound to the person on the other end of a call.

2.4 Frequency Response

2.4.1 Send Frequency response

2.4.1.1 Headsets with digital interface

The send frequency response of a headset with a digital interface shall comply with the send frequency response limits shown in Figure 1.

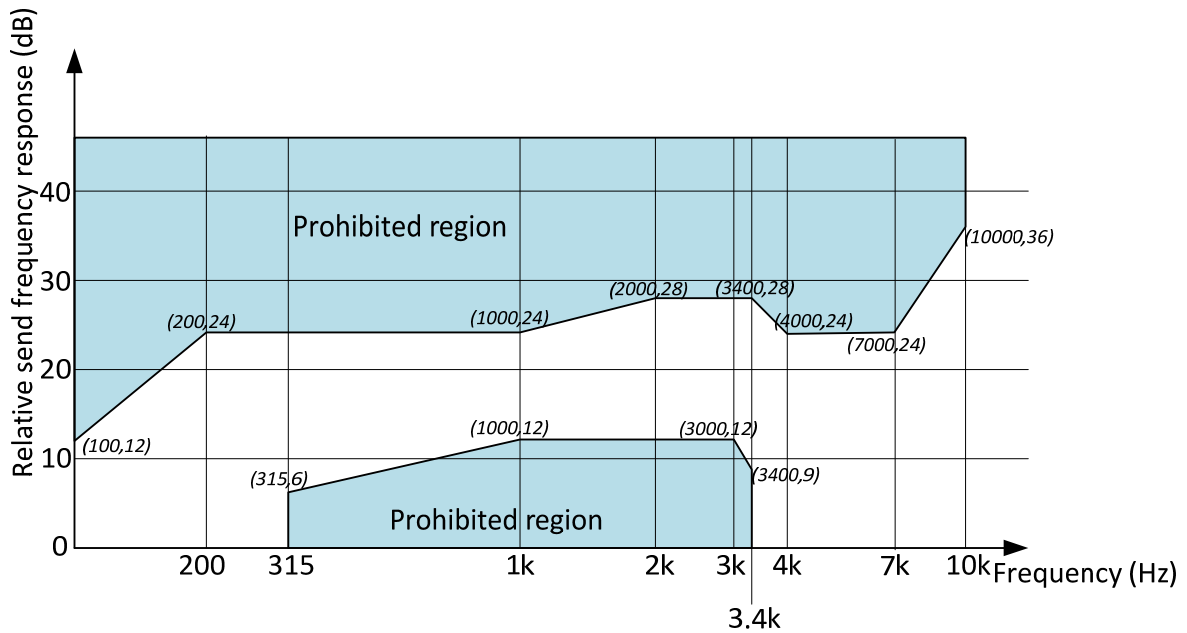


Figure 1 Relative Send Frequency response for Headsets with a digital interface

- Ref: Figure 5 of AS/CA S004:2013.

2.4.1.2 Headsets with analogue interface

The send frequency response of a headset with an analogue interface shall comply with the send frequency response limits shown in Figure 2.

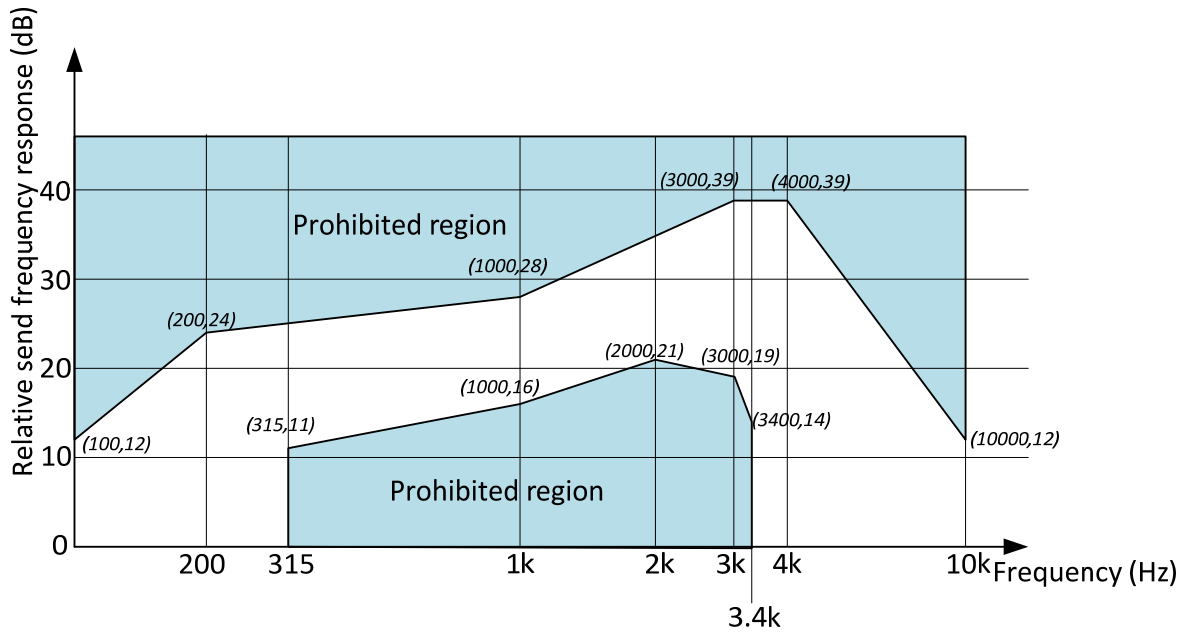


Figure 2 Relative Send Frequency response for Headsets with an analogue interface

- Ref: Figure 3 of AS/CA S004:2013.

2.4.2 Receive Frequency Response

2.4.2.1 Headsets with digital or analogue interface

The receive frequency response of all headsets shall comply with the receive frequency response limits shown in Figure 3.

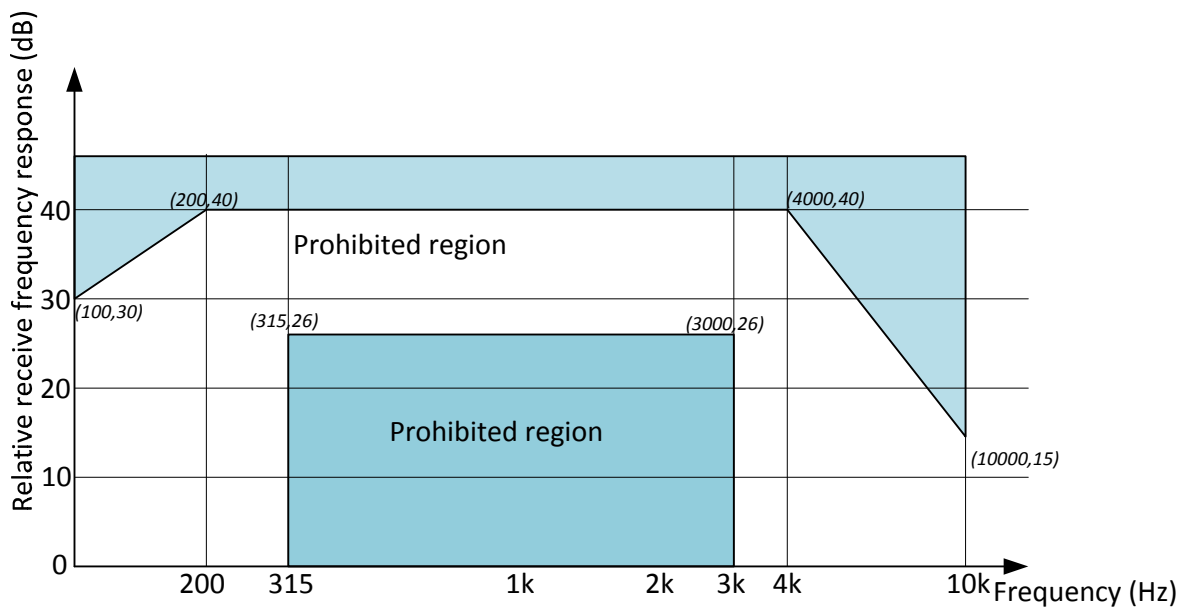


Figure 3 Relative Receive Frequency response for Headsets with an analogue or digital interface

- Ref: Figure 7 of AS/CA S004:2013.
- For analogue interfaces, measurements made at the interface of the connected telephone without artificial line.

2.5 Loudness Ratings

2.5.1 Headsets with a digital interface

2.5.1.1 Send Loudness rating

The Send Loudness Rating measured at the digital interface shall be from 5 to 14 dB (objective SLR = + 8 dB).

- *The acceptable range for compliance is not centred about the objective SLR, as many headsets have microphones which are away from the Mouth Reference Point. The higher value of SLR requires the user to speak louder to maintain an acceptable signal to noise ratio. This approach is also common with small mobile handsets.*

2.5.1.2 Receive Loudness rating

The Receive Loudness Rating measured at the acoustic interface shall be from -1 to +5 dB for a monaural headset and +5 to +11 dB for each earphone of a binaural headset (objective $RLR_{(monaural)} = +2$ dB, $RLR_{(binaural)} = +8$ dB).

- Ref: ITU-T Recommendation P.310: 2009 clause 6.2.1

2.5.2 Headsets with an analogue interface

For the purpose of measuring the loudness ratings, the analogue headset shall be connected to the handset connection of either an analogue or digital phone, and set up as per the manufacturer's instructions. The loudness ratings are then measured between the headset acoustic interface and the phone interface.

2.5.2.1 Send Loudness Rating

(a) For an analogue headset connected to the handset interface of a digital phone, the send loudness rating measured at the digital interface of the phone shall be from +5 to +14 dB (Objective SLR = +8 dB).

(b) For an analogue headset connected to the handset interface of an analogue phone, the send loudness rating measured at the analogue interface (zero length line, 600 Ohm) of the phone shall be from +2 to +11 dB (Objective SLR = + 5 dB).

- *The acceptable range for compliance is not centred about the objective SLR, as many headsets have microphones which are away from the Mouth Reference Point. The higher value of SLR requires the user to speak louder to maintain an acceptable signal to noise ratio. This approach is also common with small mobile handsets.*
- See clause 2.3.2 for additional requirements.

2.5.2.2 Receive Loudness Rating

(a) The receive loudness rating measured at the acoustic interface of an analogue headset connected to the handset interface of a digital phone shall be from -1 to +5 dB for a monaural headset and +5 to +11 dB for a binaural headset (objective $RLR_{(monaural)} = +2$ dB, $RLR_{(binaural)} = +8$ dB).

(b) The receive loudness rating measured at the acoustic interface of an analogue headset connected to the handset interface of an analogue phone (zero length line, 600 Ohm) shall be from -3.5 to -9.5 dB for a monaural headset and +2.5 to -3.5 dB for a binaural headset (objective $RLR_{(monaural)} = -6.5$ dB, $RLR_{(binaural)} = -0.5$ dB).

2.6 Sidetone Masking Rating (STMR)

2.6.1 The STMR for digital headsets shall be not less than 10 dB. The preferred STMR is about 15 dB and not more than 20 dB.

2.6.2 The STMR for analogue headsets connected to the handset interface of an analogue telephone shall be not less than 7 dB, and when connected to the handset interface of a digital phone shall be not less than 10 dB.

2.7 Maximum levels and Acoustic Shock

2.7.1 Headsets with an analogue interface

With up to 30 V_{rms} applied to the analogue interface, the sound pressure level shall be less than 118 dB SPL for monaural and binaural headsets from 100 to 4000 Hz.

2.7.2 Headsets with a digital interface

With 3.14 dBm₀ applied to the digital interface the sound pressure level shall be less than 118 dB SPL for a monaural and binaural headsets from 100 to 4000 Hz.

2.8 Distortion

2.8.1 Send Distortion

The send distortion for both digital and analogue headsets shall be less than 7% THD with a 1000Hz sinewave of -4.7 dBPa applied at the mouth reference point.

2.8.2 Receive Distortion

The receive distortion for both analogue and digital headsets shall be less than 7% THD with a 1000Hz sinewave of -10 dBm₀₍₆₀₀₎ (-10 dBm applied at the 0 dBr point).

2.9 Delay

2.9.1 Headsets with an analogue interface

The delay between the electrical and acoustic interfaces of an analogue headset shall be less than 5 ms for a wired headset and 60 ms for a wireless headset.

2.9.2 Headsets with a digital interface

The delay between the TRP and acoustic interfaces of a digital headset shall be less than 50 ms for a wired headset and 100 ms for a wireless headset.

2.10 Weighted Terminal Coupling Loss TCLw

The TCLw for both analogue and digital headsets shall be not less than 55 dB.

2.11 Headset Telephones

2.11.1 General

Headset telephones are complete telephony devices which have the ability to initiate outgoing calls and terminate incoming calls, so will include provision for dialling, ringing and on-hook/off hook control. Headset telephones may connect to the PSTN, a digital network using SIP or Q931 signalling or a proprietary PBX extension port.

2.11.2 Requirements

2.11.2.1 Analogue Headset Telephones

Analogue headset telephones shall meet the requirements of PTC 200 with the exception of Loudness Ratings as follows:

(a) The send loudness rating measured at the analogue network interface (zero length line) of an analogue headset telephone shall be +2 to +11 dB (Objective SLR = + 5 dB).

- See note for clause 2.5.2.1 (b) above

(b) The receive loudness rating measured at the acoustic interface (zero length line) of an analogue headset telephone shall be from -3.5 to -9.5 dB for a monaural headset and +2.5 to -3.5 dB for a binaural headset (objective $RLR_{(monaural)} = -6.5$ dB, $RLR_{(binaural)} = -0.5$ dB).

2.11.2.2 Digital Headset Telephones

Digital Headset Telephones shall meet the requirements of PTC 220 Section 8 with the exception of Loudness Ratings as follows:

(a) The Send Loudness Rating measured at the digital interface shall be from 5 to 14 dB (objective SLR = + 8 dB).

(b) The Receive Loudness Rating measured at the acoustic interface shall be from -1 to +5 dB for a monaural headset and +5 to +11 dB for each earphone of a binaural headset (objective $RLR_{(monaural)} = +2$ dB, $RLR_{(binaural)} = +8$ dB).

- See note for clause 2.5.2.1 (b) above

2.12 Wireless Headset only

For the purposes of Telepermitting a wireless headset only, the headset shall be tested to all clauses of this specification in conjunction with a suitable base station.

2.13 Wireless Base station only

For the purposes of Telepermitting a wireless base station only, the base station shall be tested to all clauses of this specification in conjunction with a suitable wireless headset.

Appendix 1. Test Schedule

PTC 208 clause	Test	Result	Compliance
1	Headset description	Monaural/Binaural	
	Interface:	Telephone handset/USB /other(description)	
		Wireless/corded	
		Codec:G.711/other/N/A	
2.1.1	AS/NZS 60950 Report	Compliant report..	Yes/No
2.1.2	AS/NZS CISPR 22 Report	Compliant report..	Yes/No
2.1.3	Applicable RF test report	Compliant report..	Yes/No
2.2.2.2	Type of phone used for testing analogue headset	Analogue/Digital	
	Telepermit Number	...PTC 2.....	
2.3.1(c)	Volume Control range (Analogue headsets) <i>Limit: ≥ 15 dB</i>	.....dB	Yes/No
2.3.2(a)	Method of send level adjustment	.....description	Yes/No
2.3.2(b)	Method of setting correct level		
2.4.1.1	<i>Must result in compliant SLR</i>	.....User supplied documentation	Yes/No
2.4.1.2	Send Frequency Response (digital interface) <i>Limit: PTC 208 Figure 1</i>	.....plot	Yes/No
2.4.2	Send Frequency Response (analogue interface) <i>Limit: PTC 208 Figure 2</i>	.....plot	Yes/No
2.5.1.1	Receive Frequency Response <i>Limit: PTC 208 Figure 3</i>	.....plot	Yes/No
2.5.1.2	SLR Digital Interface <i>Limit: +5 to +14 dB</i>	.....dB	Yes/No
2.5.2.1	RLR Digital Interface <i>Limit: Monaural: -1 to +5 dB</i> <i>Limit: Monaural: +2 to +8 dB</i>	.....dB/ N/A.....dB/ N/A	Yes/No

PTC 208 clause	Test	Result	Compliance
2.5.2.2	SLR Analogue Headset connected to Digital Phone <i>Limit: +5 to +14 dB</i>	.....dB/ N/A	Yes/No
	connected to Analogue Phone <i>Limit: +2 to +11dB</i>	.....dB/ N/A	Yes/No
	RLR Analogue Headset connected to Digital Phone <i>Limit: Monaural: -1 to +5 dB</i>	.....dB/ N/A	Yes/No
	<i>Limit Binaural: +5 to +11 dB</i>	.....dB/ N/A	
	Connected to Analogue Phone <i>Limit: Monaural: -3.5 to -9.5 dB</i>	.....dB/ N/A	Yes/No
	<i>Limit: Binaural: +2.5 to -3.5 dB</i>	.....dB/ N/A	
2.6.1	STMR Digital Headset <i>Limit: > 10 dB</i>	.....dB/ N/A	Yes/No
2.6.2	STMR Analogue Headset connected to Digital Phone <i>Limit: > 10 dB</i>	.....dB/ N/A	Yes/No
	Connected to Analogue Phone <i>Limit: > 7 dB</i>	.....dB/ N/A	Yes/No
2.7	Max Sound Pressure level Analogue and Digital Headsets <i>Limit: <118 dB SPL</i>	.....dB SPL	Yes/No
2.8.1	Send Distortion, Analogue and Digital Headsets <i>Limit: <7% THD @ 1000Hz</i>	.....% THD _(1000 Hz)	Yes/No
2.8.2	Receive Distortion, Analogue and Digital Headsets <i>Limit: <7% THD @ 1000Hz</i>	.....% THD _(1000 Hz)	Yes/No
2.9.1	Delay Analogue Headsets Wired <i>Limit: <5 ms</i>	..... ms /NA	Yes/No
	Wireless <i>Limit: <60 ms</i>	..... ms /NA	

PTC 208 clause	Test	Result	Compliance
2.9.2	Delay Digital Headsets Wired <i>Limit: <50 ms</i> Wireless <i>Limit: <100 ms</i>	..... ms /NA ms /NA	Yes/No Yes/No
2.10	<i>TCLw</i> <i>Limit: > 55 dB</i>	..... dB	Yes/No
2.11.2.1	Analogue Headset Telephone <i>Required: PTC 200 with appropriate loudness ratings (see Clause 2.11.2.1)</i>	.....PTC 200 Report	Yes/No
2.11.2	Digital Headset Telephone <i>Required: PTC 220 Section 8 with appropriate loudness ratings (see Clause 2.11.2.1)</i>	.....PTC 220 Report	Yes/No