**Spark New Zealand**

**PTC 208**

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

Access Standards

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April 2016

**Contents**

**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

USB Device Class Definition for Audio Data Formats: Release 1.0, 1998

# 1    Headset Categories

1.1    Headsets may be monaural or binaural

1.1.1   Digital interface, e.g. USB

1.1.2   Analogue interface to existing telephone handset interface.

1.1.3   Analogue interface to input/output ports of a sound card on a PC or laptop etc

1.1.4   Analogue or Digital interface connecting directly to a Network (PSTN, ISDN, SIP) i.e. 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 usually not require EMC test reports as they will generally only contain passive components. Power supplies for associated amplifiers, are likely to 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 to convert between the digital interface and the inherently analogue earpiece and microphone.  The codec may decode/encode the narrowband G.711 signals directly or it may be a wideband codec, and rely on a further transcoding function between the headset interface and the telephone network interface to compress/expand the signals to/from a narrowband G.711 bit stream. A typical scenario would be a wideband headset with a USB interface, connected to a PC running a SIP client which is then connected via an Ethernet port to a private network which is in turn connected back to one of the various interfaces on the public telephone network.

### 2.2.1.2  Testing requirements

Digital Headsets shall be tested to all relevant clauses of this specification with the headset connected to a compatible telephony application. Using the scenario described in clause 2.2.1.1, the headset would be connected to a PC running a SIP Client, and the test interface would be the Ethernet port on the PC. The test setup would be the same as for a SIP telephone, with the Ethernet port being the 0 dBr reference point.

### 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. An Analogue headset could also be connected to a soundcard on a PC running a SIP client.

### 2.2.2.2  Testing requirements

The telephones to which the headset is connected to for testing shall be Telepermitted to the appropriate PTC specification. In the case of an analogue headset being connected to a PC sound card, the combined headset and SIP client would be tested to the requirements for a SIP telephone as in 2.2.1.2 above.

## 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:

  o There is at least one setting which results in meeting the RLR requirements of clause 2.5.1.2 of this specification, and
  o 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 variability in microphones between one headset and another, both digital and analogue headsets are likely to require am method of setting the send level. This may be via an attenuator for analogue headsets or a software setting for digital headsets.

Each headset shall include 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. The procedure shall be included in the results of the PTC 208 test report.

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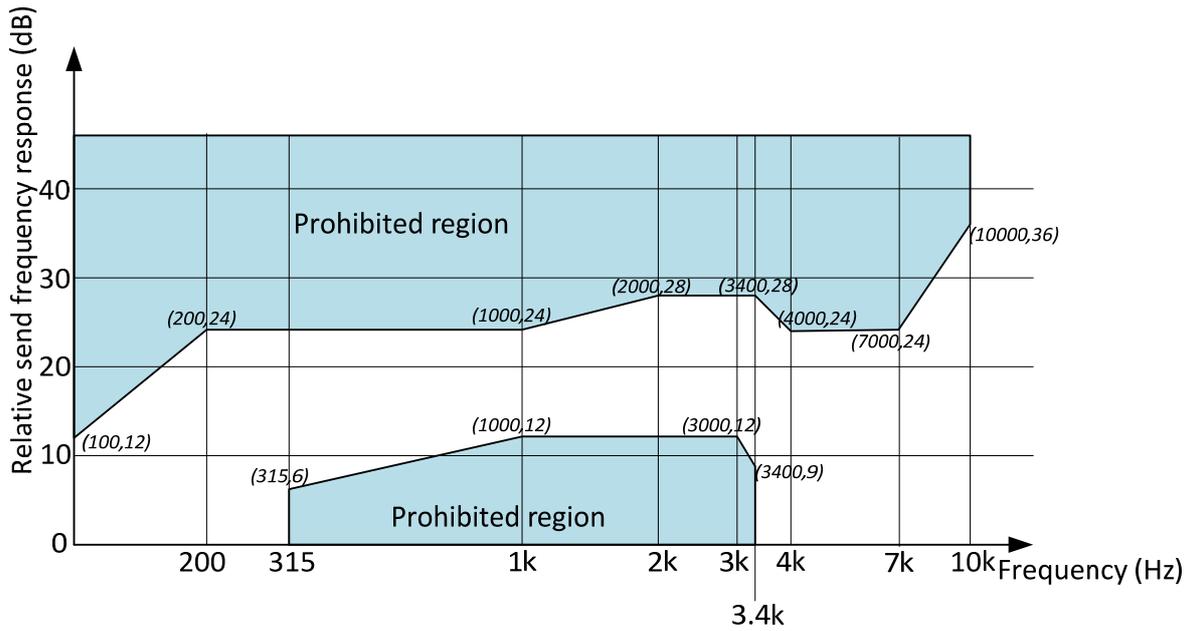
**Figure 1   Relative Send Frequency response for Headsets with a digital interface**

- *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.
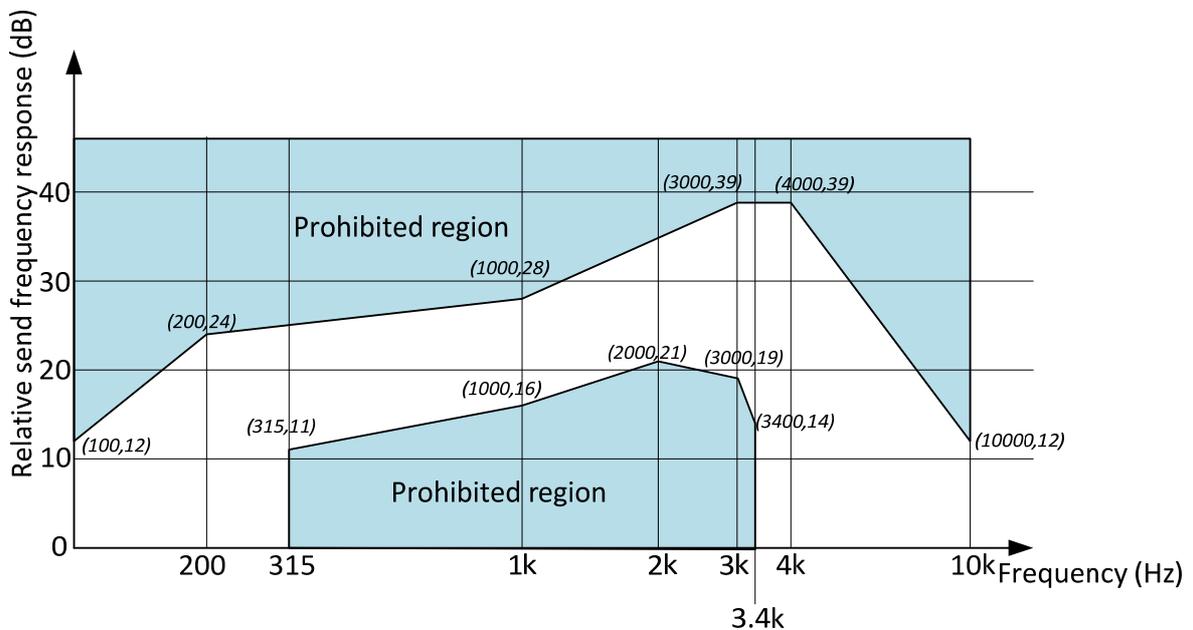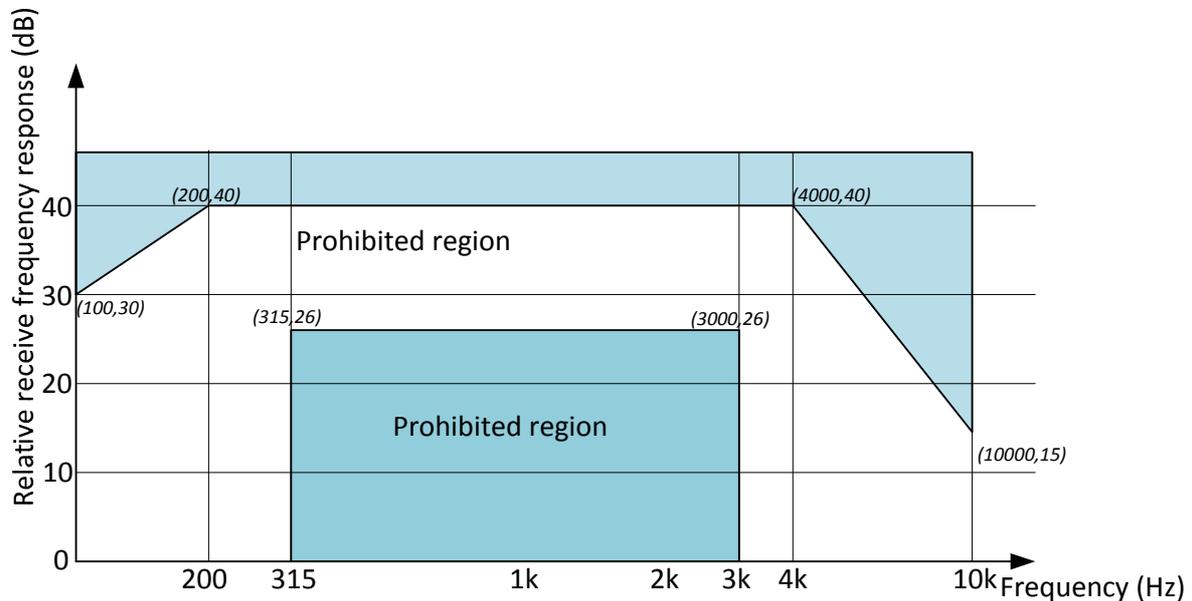


**Figure 2   Relative Send Frequency response for Headsets with an analogue interface**

- *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 Vrms 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<br><br>Interface: | Monaural/Binaural<br><br>Telephone handset/USB /other(description)<br><br>Wireless/corded<br><br>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<br><br>Telepermit Number | Analogue/Digital<br><br>…PTC 2…………. | |
| 2.3.1(c) | Volume Control range (Analogue headsets)<br>*Limit: ≥ 15 dB* | ……………dB | Yes/No |
| 2.3.2(a)<br><br>2.3.2(b) | Method of send level adjustment<br><br>Method of setting correct level | ………description | Yes/No |
| 2.4.1.1 | *Must result in compliant SLR*<br><br>Send Frequency Response (digital interface) | ………User supplied documentation | Yes/No |
| 2.4.1.2 | *Limit: PTC 208 Figure 1*<br><br>Send Frequency Response (analogue interface) | …...plot | Yes/No |
| 2.4.2 | *Limit: PTC 208 Figure 2*<br><br>Receive Frequency Response | ……plot | Yes/No |
| 2.5.1.1 | *Limit: PTC 208 Figure 3* | …....plot | Yes/No |
| 2.5.1.2 | SLR Digital Interface<br>*Limit: +5 to +14 dB* | ……..dB | Yes/No |
| 2.5.2.1 | RLR Digital Interface<br>*Limit: Monaural: -1 to +5 dB*<br>*Limit: Monaural: +2 to +8 dB* | ………..dB/  N/A<br>………..dB/  N/A | Yes/No |

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

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