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# DELTA Test Report



 **DANAK**  
TEST Reg. no. 100

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*Acoustic Test Report according to IEC 60118-0, 1, 2, 6 on  
DREAM D-XP manufactured by Widex*

**DELTA**

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Name and type	Widex DREAM D-XP
Serial number	# 5036 # 5038 # 5039 # 5044
General description	ITE
Report number	PR168_12
Number of pages	40
Annexes	A, B
Client	Widex Nymøllevej 6 3540 Lyngø Danmark
Contact Person	Ole Gelsbo
Reception date	10-08-2012
Test date	02-10-2012
Climatic conditions	Temperature : 22°C Barometric pressure : 101 kPa Humidity : 53 %
Test methods	IEC 60118 - 0, 1, 2, 6 & DQP-86001
Test Software version	TAL HM 5.0.5
Test program version	TAL010
Co-Reader	PEA
Test personnel	LFN

Responsible



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M.Sc.E.E.

DELTA *Danish Electronic, Light & Acoustics*  
Technical-Audiological Lab.

The present report describes results of measurements on hearing instruments, identified by name, type and serial number.  
The laboratory can not guarantee, that these data applies on the entire production.



## *Test object*

<i>External controls and switches accessible for user</i>	Volume control (on remote) Program switch (on remote)
<i>Preset controls</i>	-
<i>Electrical input</i>	No
<i>Battery, IEC type</i>	312
<i>Hook</i>	-



The manufacturer states that the below listed instruments has the same electro acoustical characteristics as DREAM D-XP.

- DREAM440 D-XP
- DREAM330 D-XP
- DREAM220 D-XP
- DREAM110 D-XP

## *Electro Acoustical Properties*

### *Climatic requirements*

The climate in the testing laboratory is registered. The IEC 60118-0 standard states the following requirements which were fulfilled during test (see page 2):

Temperature:  $23 \pm 5^{\circ}\text{C}$

Air pressure:  $101.3 +5/-20$  kPa

Humidity: 40 - 80 %

### *Test setup*

The measurements are carried out in a free field, in accordance with IEC 60118-0 substitution method.

The test object is connected to the Ear Simulator (IEC 60318-4) using blue tack.

The loudspeaker and the test object are placed in an anechoic chamber 1.2 metres above the grating floor 0.8 metres apart.

### *Hearing aid adjustments and list of accessories*

The hearing aid is programmed by the manufacturer.

For full-on gain the test setting 2 mic omni, max gain is used.

For reference test gain control position the test setting 2 mic omni, reference test gain is used.

### *Measurements*

Reference test frequency is 2500 Hz.

All sound pressures are expressed in dB relative 20  $\mu\text{Pa}$ .

### *Uncertainties*

Frequency:  $\pm 0.5$  %

Current:  $\pm 0.5$  %

Sound Pressure Level, 200 Hz - 4000 Hz:  $\pm 1.5$  dB

Sound Pressure Level, 4000 Hz - 8000 Hz:  $\pm 1.9$  dB

The uncertainty primarily due to tolerances on the control microphone and the IEC 60318-4 coupler.

Attack time:  $\pm 1.1$  ms The uncertainty primarily due to "slew rate" on the loudspeaker.

Recovery time :  $\pm 10$  ms The uncertainty primarily due to Test system.

*DATA (Primary results)*

Maximum output : 129 dB SPL at 2978 Hz  
 Maximum acoustic gain : 69 dB at 2387 Hz  
 Reference test gain : 50 dB at 2500 Hz  
 Current consumption : 1 mA (according to IEC 60118-0.7.11)

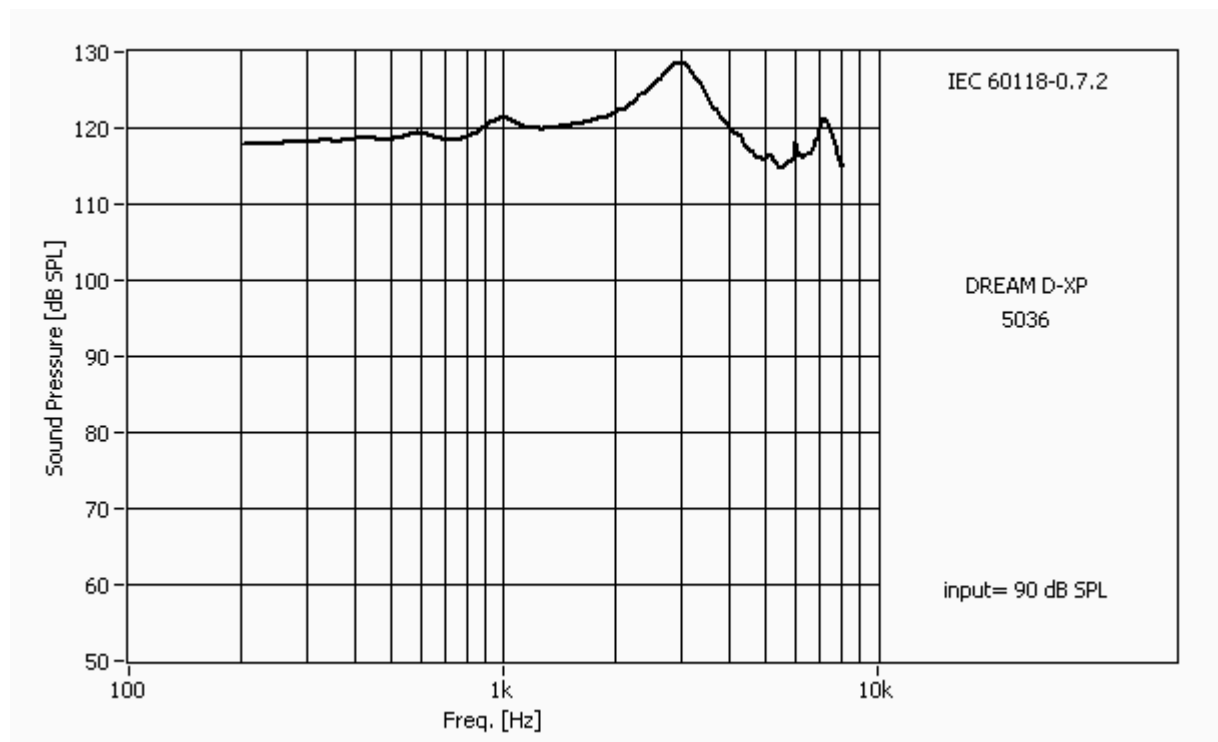
*Reference measurements*

	# 5036	# 5038*	# 5039*	# 5044*
<b>OSPL90 (dB SPL)</b>				
Maximum	129	129	128	129
2500 Hz	126	126	125	126
<b>Full-on gain (dB)</b>				
Maximum	69	69	68	69
2500 Hz	64	65	66	65
<b>Maximum sensitivity of the induction pick-up coil (dB SPL for an input of 1 mA/m)</b>				
Maximum	98	98	98	98
2500 Hz	95	96	95	95

Reference measurement are made on 3 hearing instruments, identified by the serial number stated in the table above (marked by \*).

*IEC 60118-0.7.2 : Output sound pressure level response, OSPL90*

HA adjustment: Full-on gain.

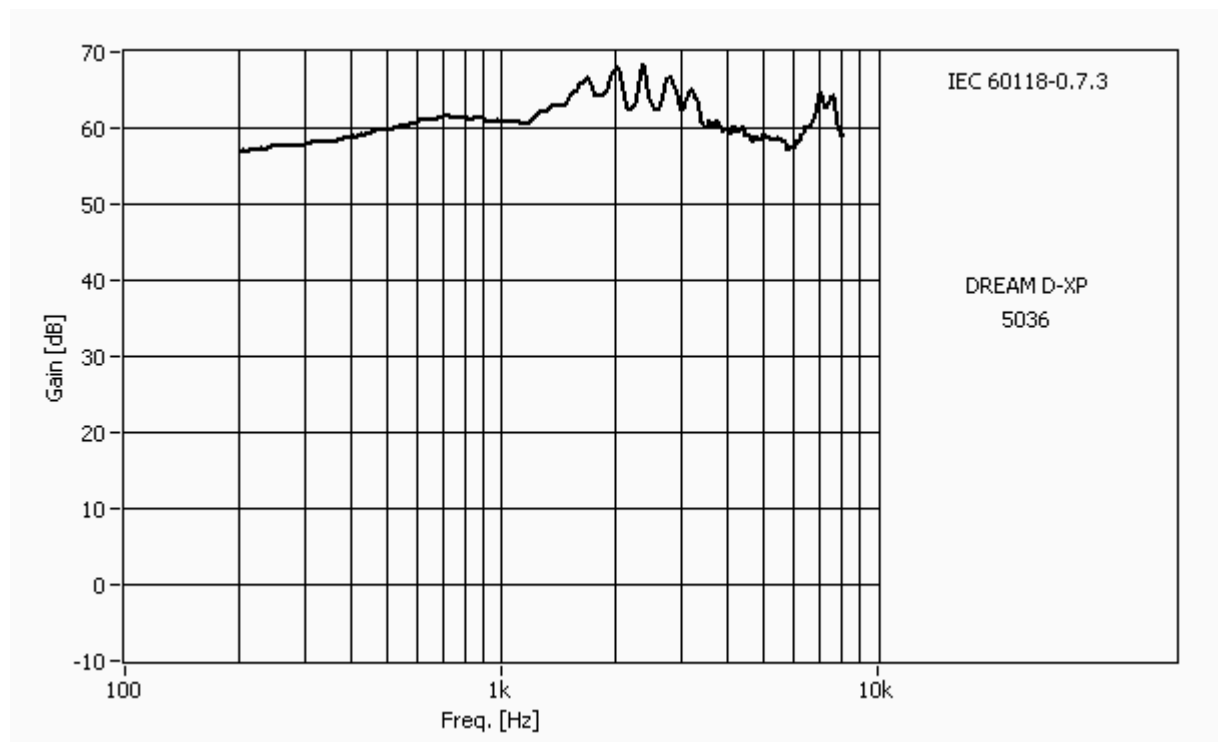


Input = 90 dB SPL.

Frequency response of the sound pressure level obtained in the ear simulator using an input of 90 dB SPL.

*IEC 60118-0.7.3 : Full-on acoustic gain*

HA adjustment: Full-on gain.

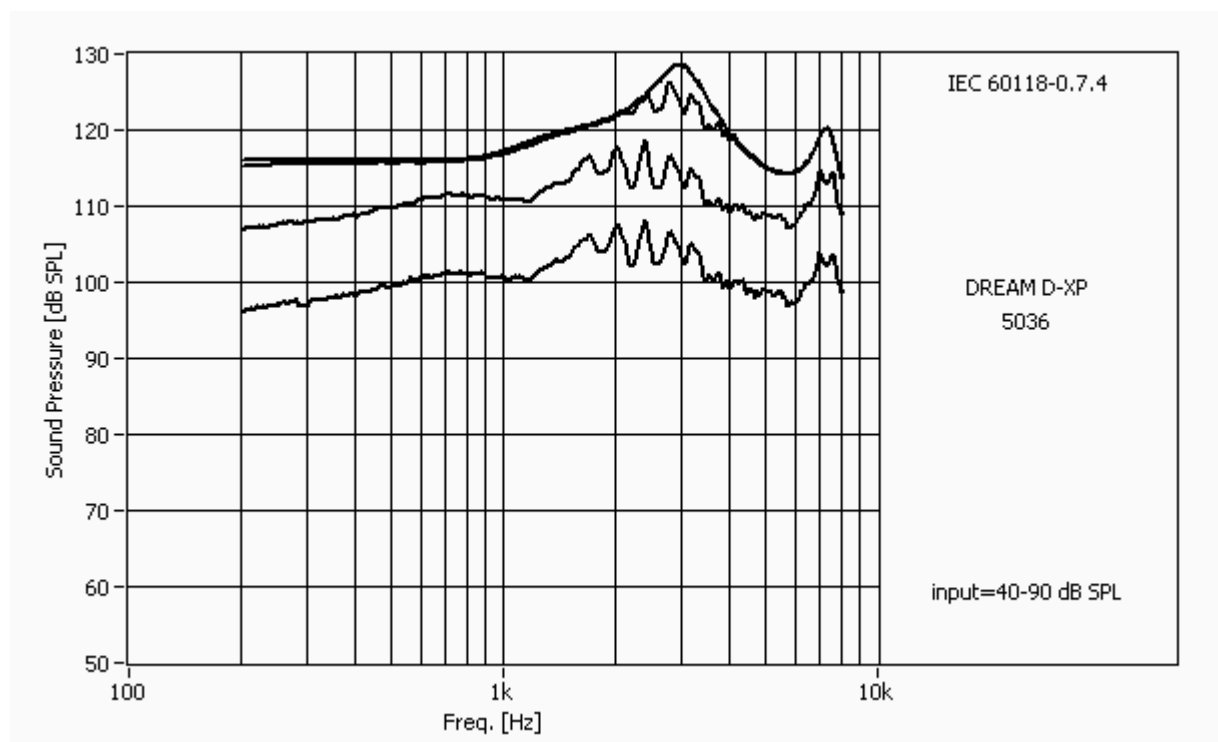


Input = 50 dB SPL.

Measurement of full-on acoustic gain obtainable with the hearing aid.

*IEC 60118-0.7.4 : Comprehensive frequency response*

HA adjustment: Full-on gain.

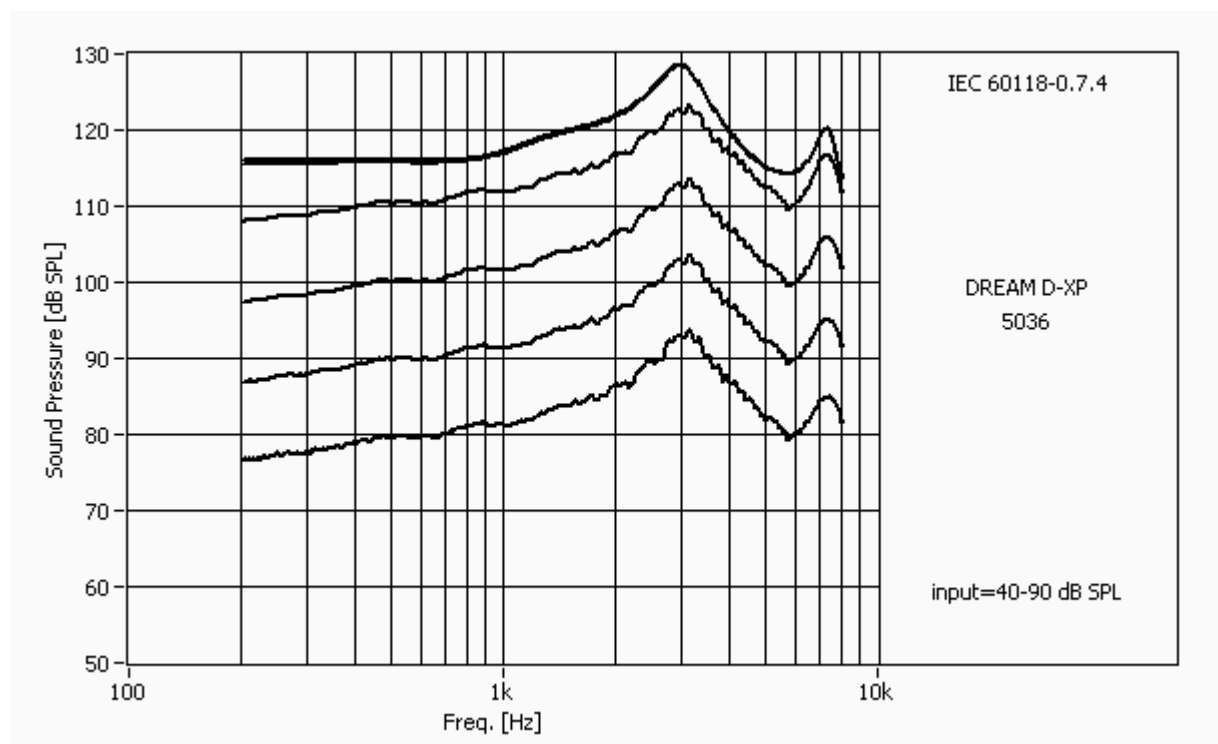


Input = 40, 50, 60, 70, 80 and 90 dB SPL.



*IEC 60118-0.7.4 : Comprehensive frequency response*

HA adjustment: Reference test gain control position.



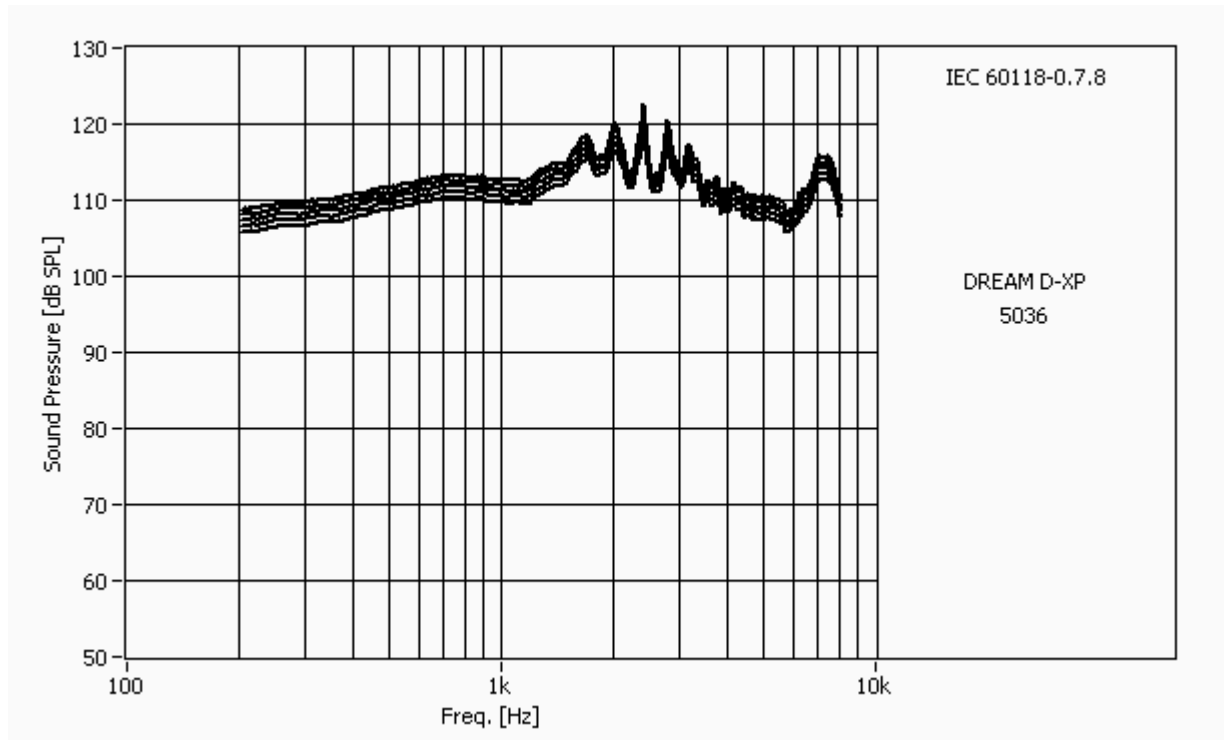
Input = 40, 50, 60, 70, 80 and 90 dB SPL.

The curve for 60 dB SPL input is the 'Basic frequency response'.

Reference test gain = 50 dB.

*IEC 60118-0.7.8 : Effect on full-on acoustic gain of variation of battery supply voltage*

HA adjustment: Full-on gain



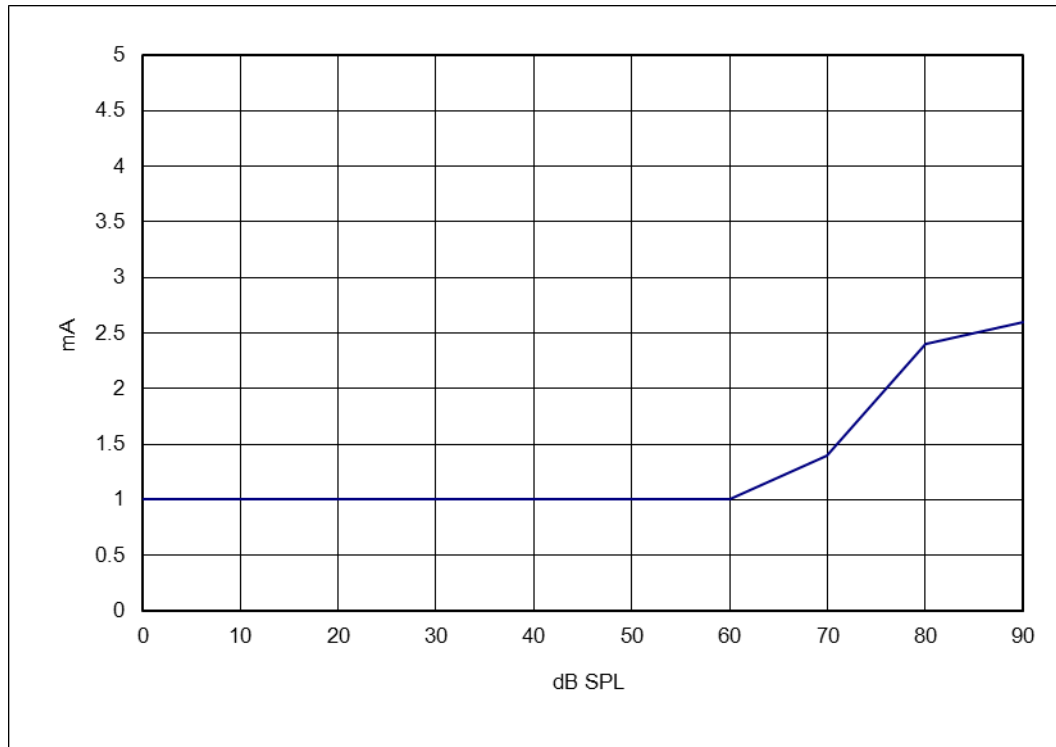
Input = 50 dB SPL.

Supply voltage: 1.1 V, 1.2 V, 1.3 V, 1.4 V, 1.5 V.

Full-on gain dependence of supply voltage.

*IEC 60118-0.7.11 : Battery current*

HA adjustment: Reference test gain control position.



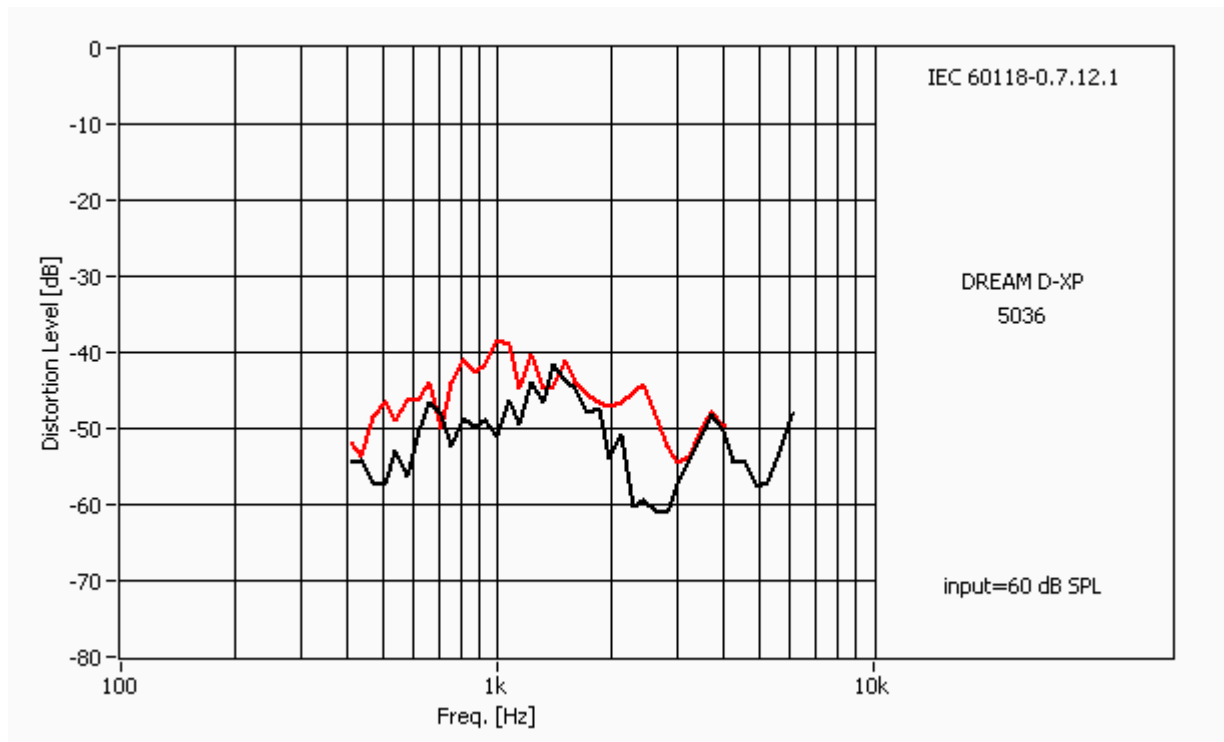
Input = 0, 40, 50, 60, 70, 80 and 90 dB SPL.

Frequency = 2500 Hz

Measurement of the relation between input sound pressure level and battery current.

*IEC 60118-0.7.12.1 : Measurement of nonlinearities (harmonic distortion)*

HA adjustment: Reference test gain control position.



Input = 60 dB SPL.

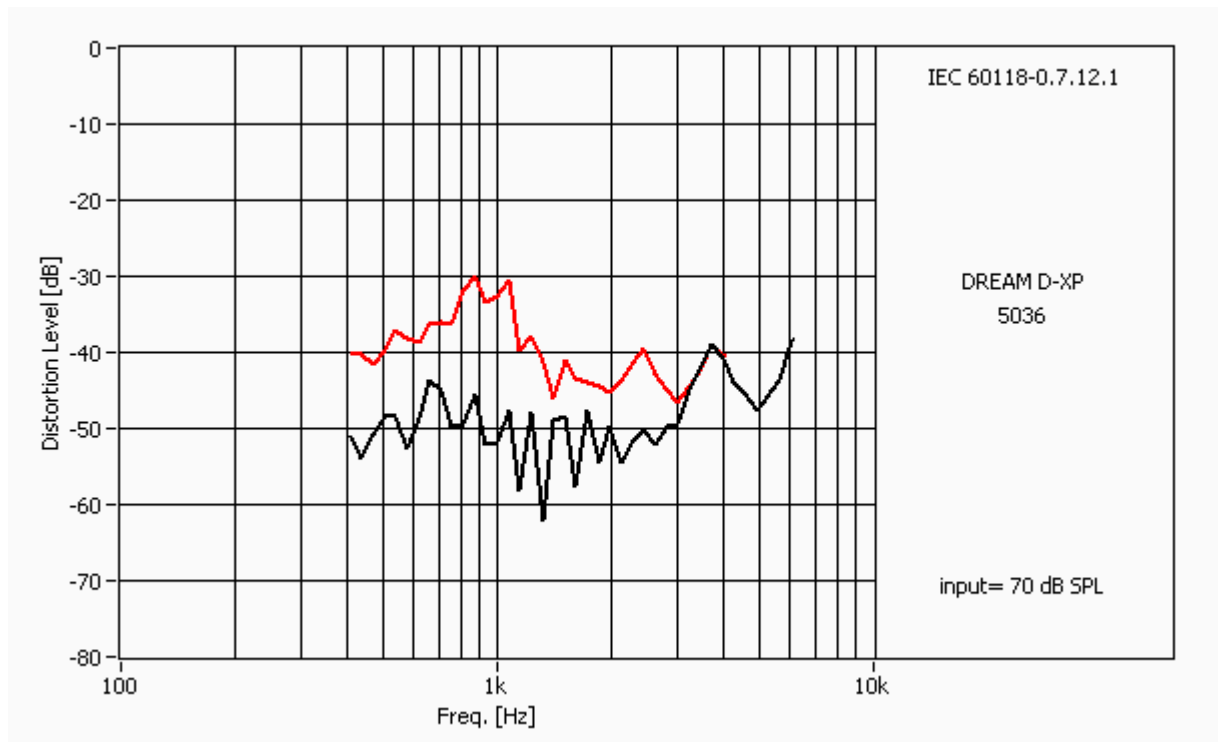
Measurement of amplitude nonlinearities in the hearing instrument 2nd order (Black), 2nd & 3rd order (Red). Harmonic distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118-0.7.12.1 : Measurement of nonlinearities (harmonic distortion)*

HA adjustment: Reference test gain control position.



Input = 70 dB SPL.

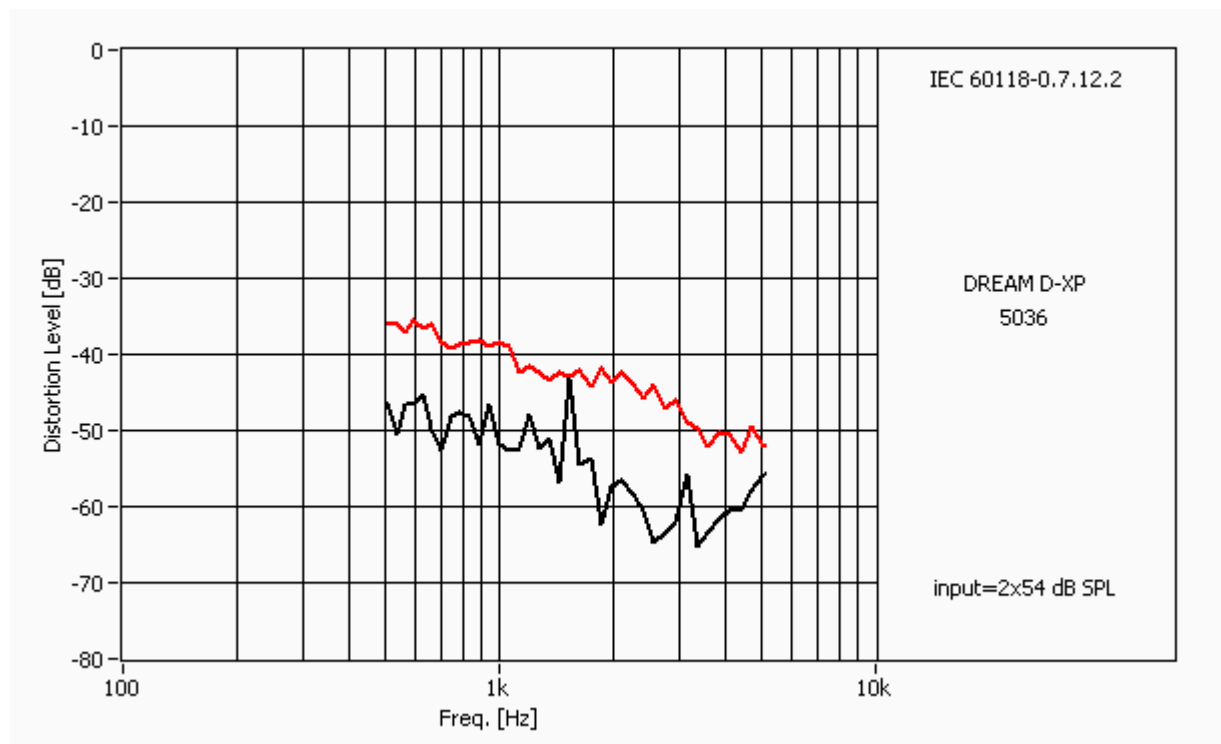
Measurement of amplitude nonlinearities in the hearing instrument 2nd order (Black), 2nd & 3rd order (Red). Harmonic distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118-0.7.12.2 : Measurement of nonlinearities (intermodulation distortion)*

HA adjustment: Reference test gain control position.



Input = 2 x 54 dB SPL.

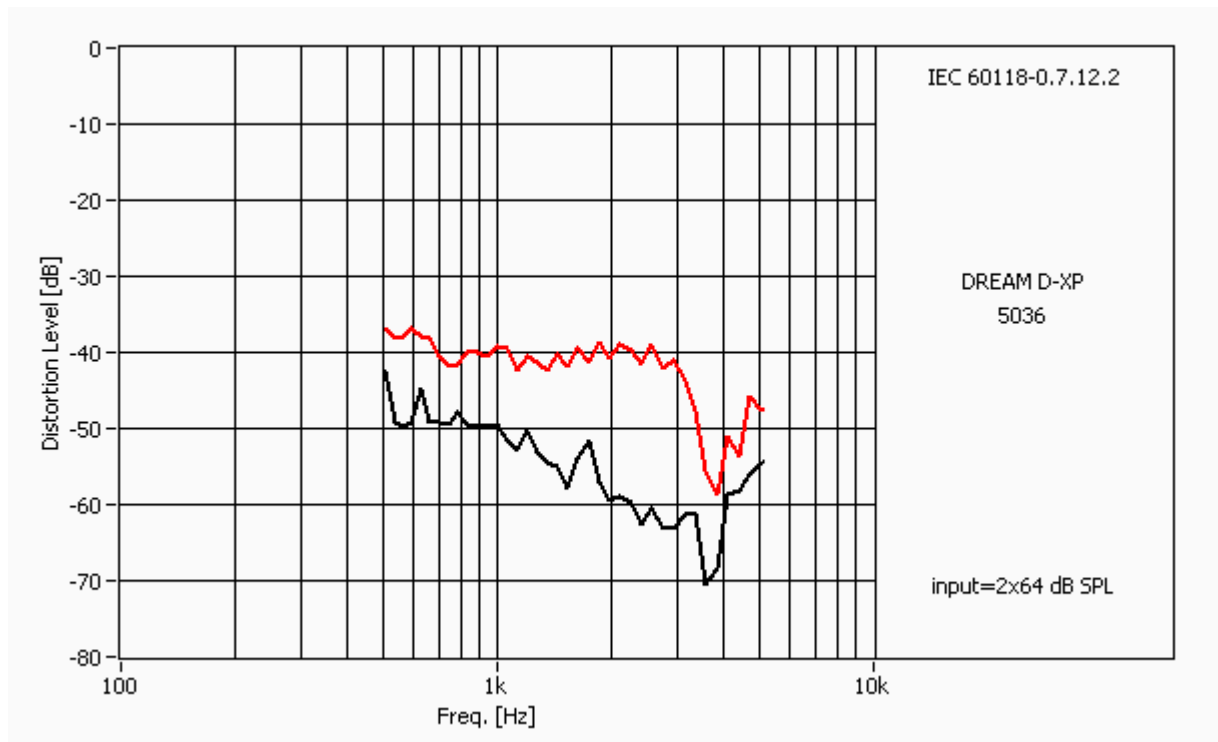
Measurement of amplitude nonlinearities in the hearing aid. Intermodulation products of 2nd order (Black) and 3rd order (Red), relative to the level of the fundamental tone.  $F_2 = F_1 + 125$  Hz. Distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118-0.7.12.2 : Measurement of nonlinearities (intermodulation distortion)*

HA adjustment: Reference test gain control position.



Input = 2 x 64 dB SPL.

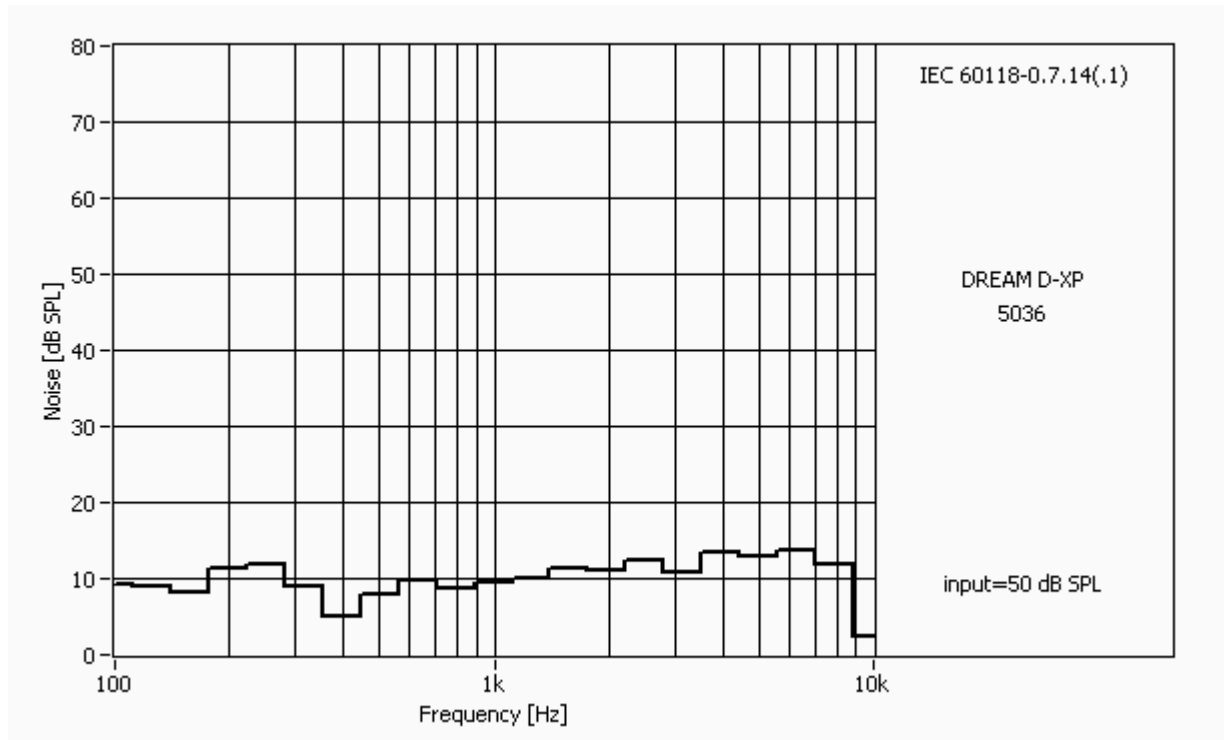
Measurement of amplitude nonlinearities in the hearing aid. Intermodulation products of 2nd order (Black) and 3rd order (Red), relative to the level of the fundamental tone.  $F_2 = F_1 + 125$  Hz. Distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118-0.7.14.1 : Internal noise generated in the hearing instrument (1/3 octave)*

HA adjustment: Reference test gain control position.



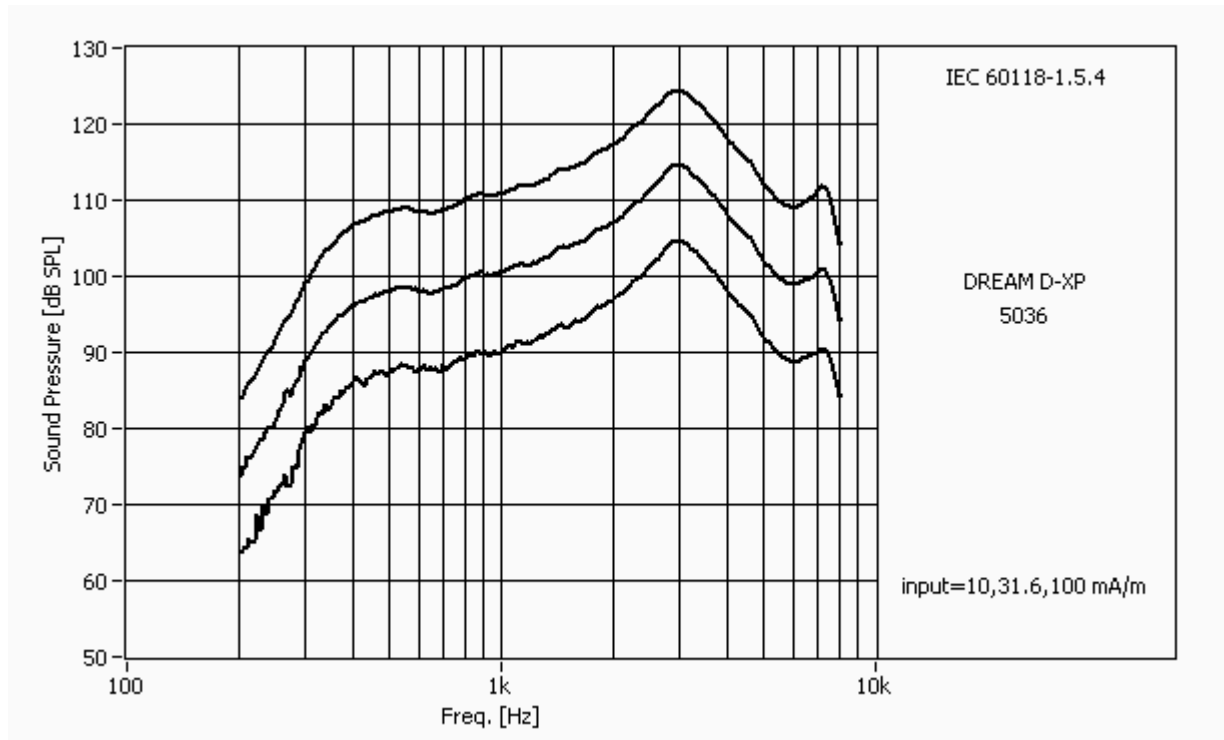
Input = 50 dB SPL.

The purpose of the measurement is to determine the internally generated noise in the hearing aid (input related).



*IEC 60118-1.5.4 : Basic frequency response*

HA adjustment: Reference test gain control position.



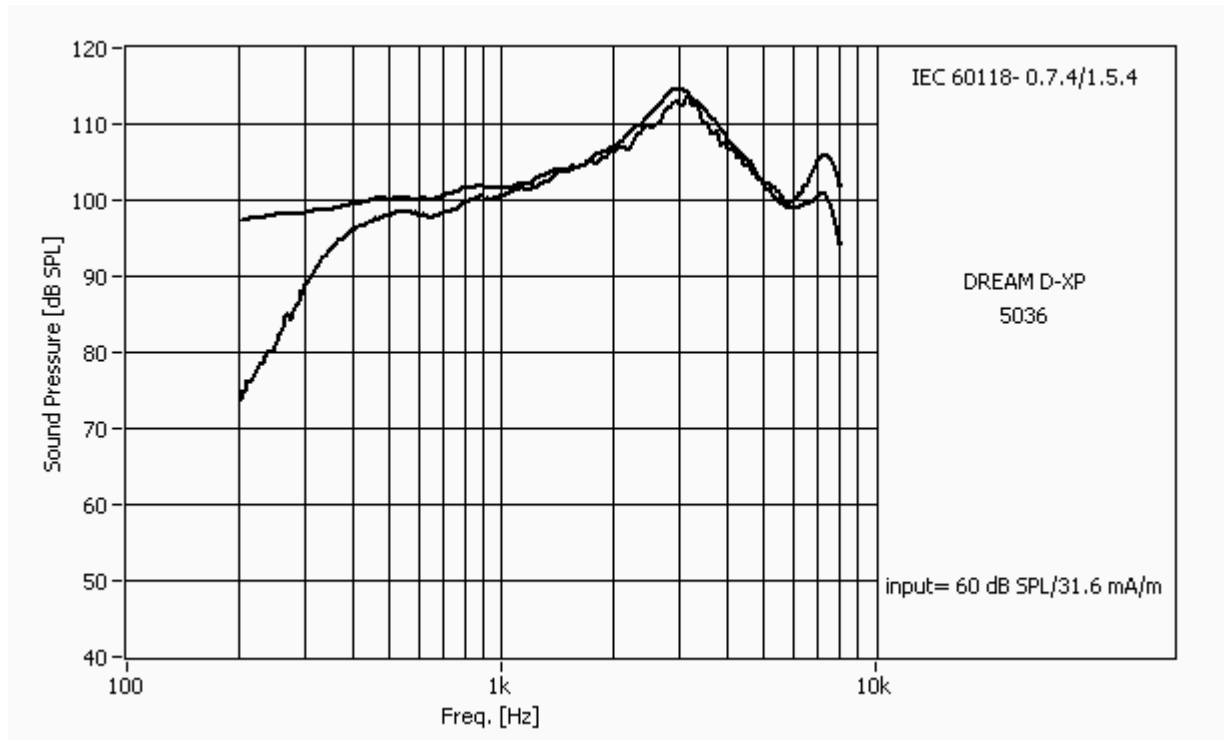
Input = 10.0 mA/m, 31.6 mA/m and 100 mA/m.

HA frequency response of the induction pick-up coil.

T position.

*IEC 60118-1.5.4 : Basic frequency response (continued)*

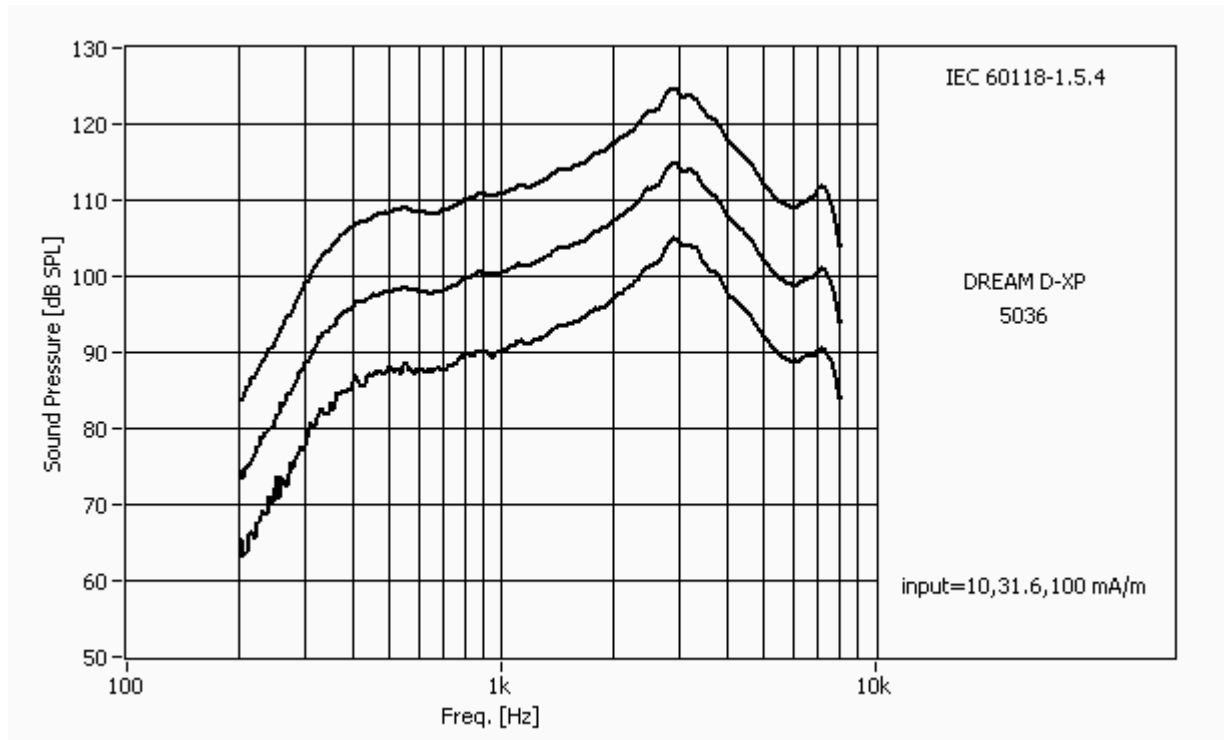
HA adjustment: Reference test gain control position.



HA frequency responses for inductive and acoustical input, respectively 31.6 mA/m and 60 dB SPL.

*IEC 60118-1.5.4 : Basic frequency response*

HA adjustment: Reference test gain control position.



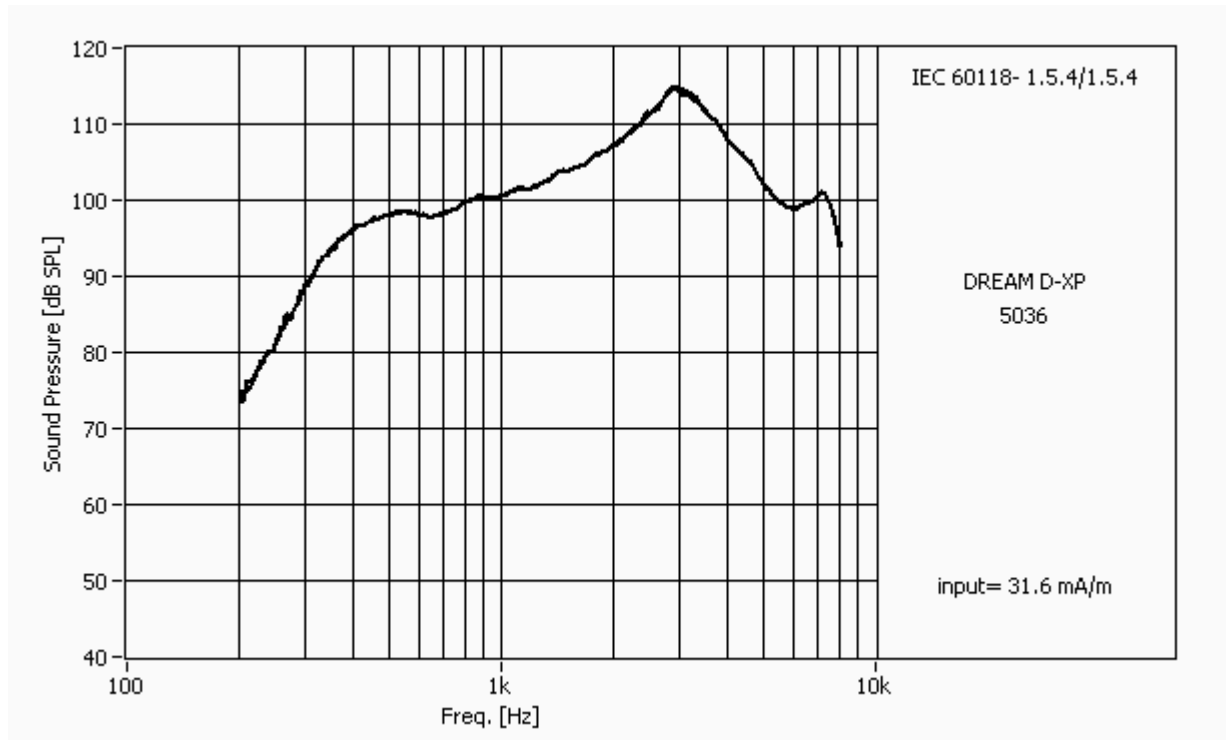
Input = 10.0 mA/m, 31.6 mA/m and 100 mA/m.

HA frequency response of the induction pick-up coil.

MT position.

*IEC 60118-1.5.4 : Basic frequency response (continued)*

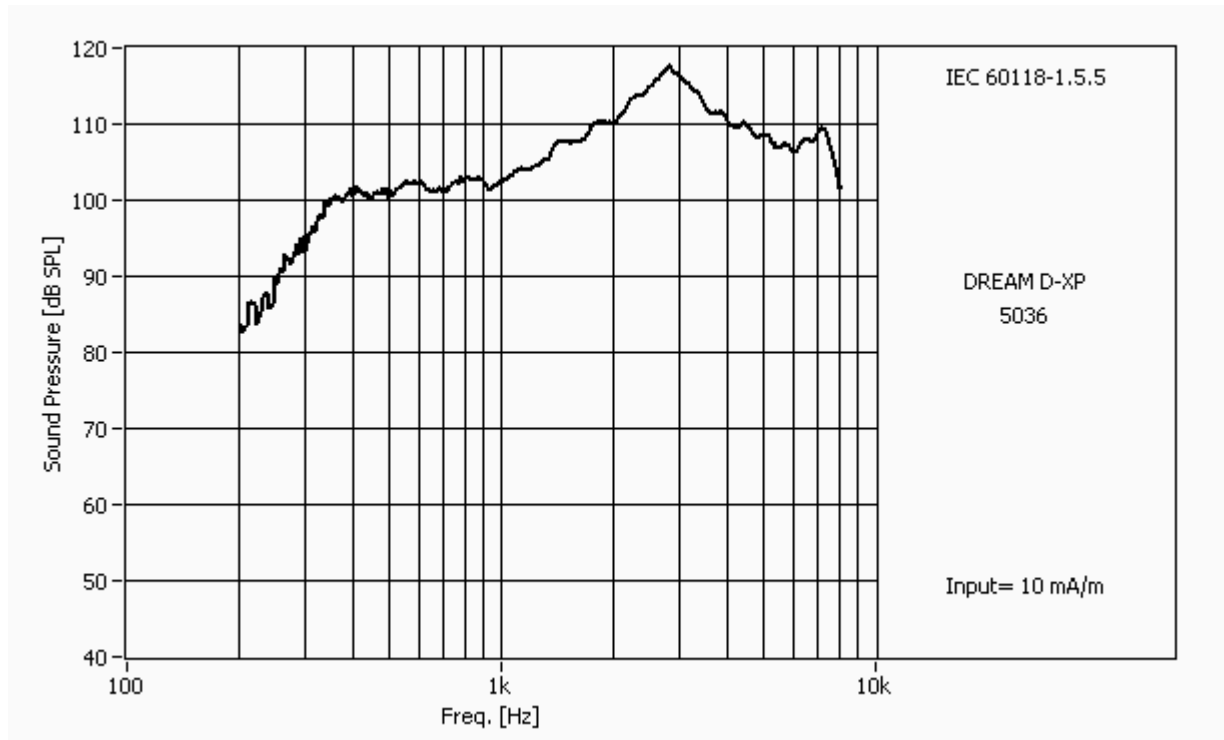
HA adjustment: Reference test gain control position.



HA frequency responses for an inductive input of 31.6 mA/m for T and MT position.

*IEC 60118-1.5.5 : Frequency response with full-on gain control setting*

HA adjustment: Full-on gain.



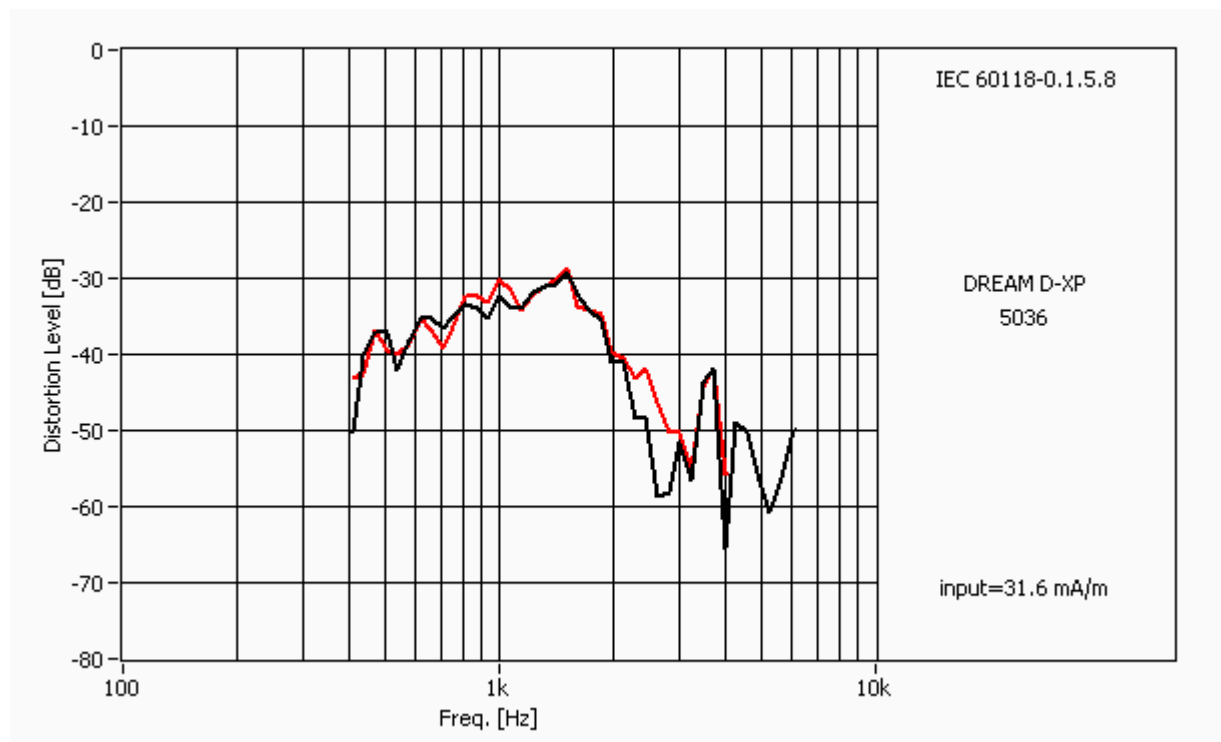
Input = 10.0 mA/m.

Maximum sensitivity for an input of 1 mA/m: 98 dB SPL.

Sensitivity at 2500 Hz for an input of 1 mA/m: 95 dB SPL.

*IEC 60118-1.5.8 : Measurement of nonlinearities (harmonic distortion, magnetic input)*

HA adjustment: Reference test gain control position.



Input = 31.6 mA/m.

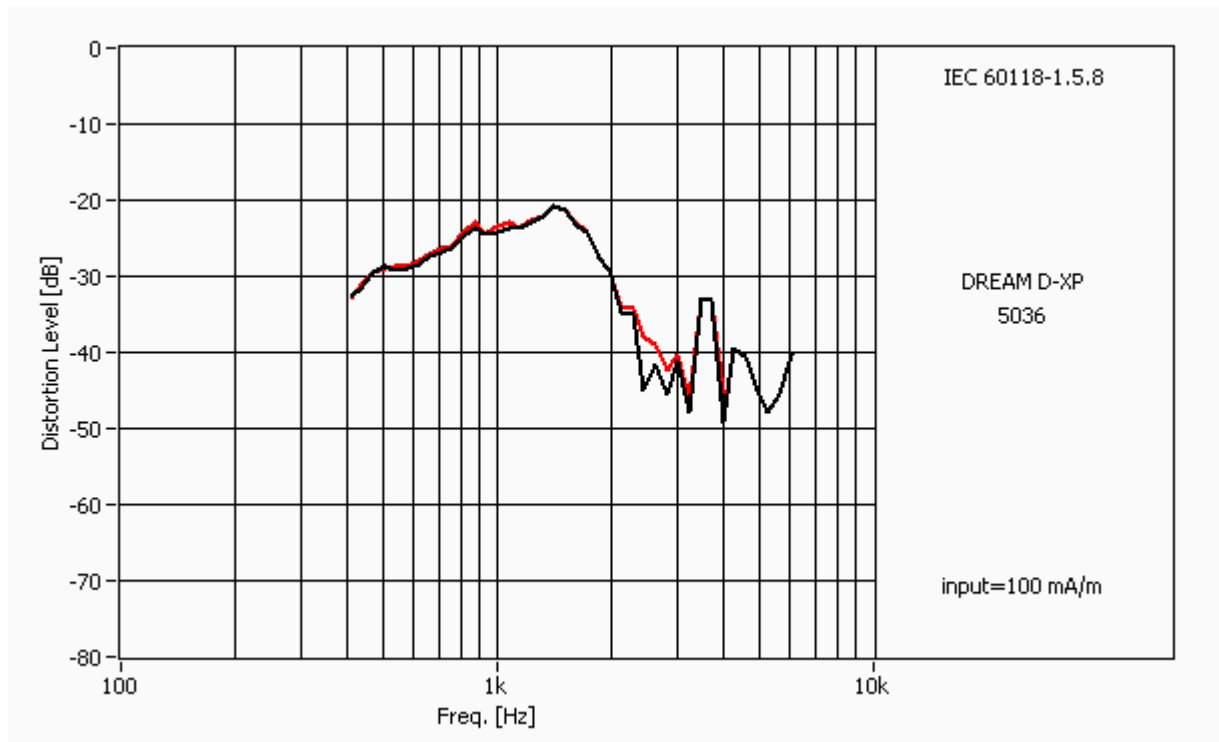
Measurement of amplitude nonlinearities in the hearing instrument 2nd order (Black), 2nd & 3rd order (Red). Harmonic distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118-1.5.8 : Measurement of nonlinearities (harmonic distortion, magnetic input)*

HA adjustment: Reference test gain control position.



Input = 100 mA/m.

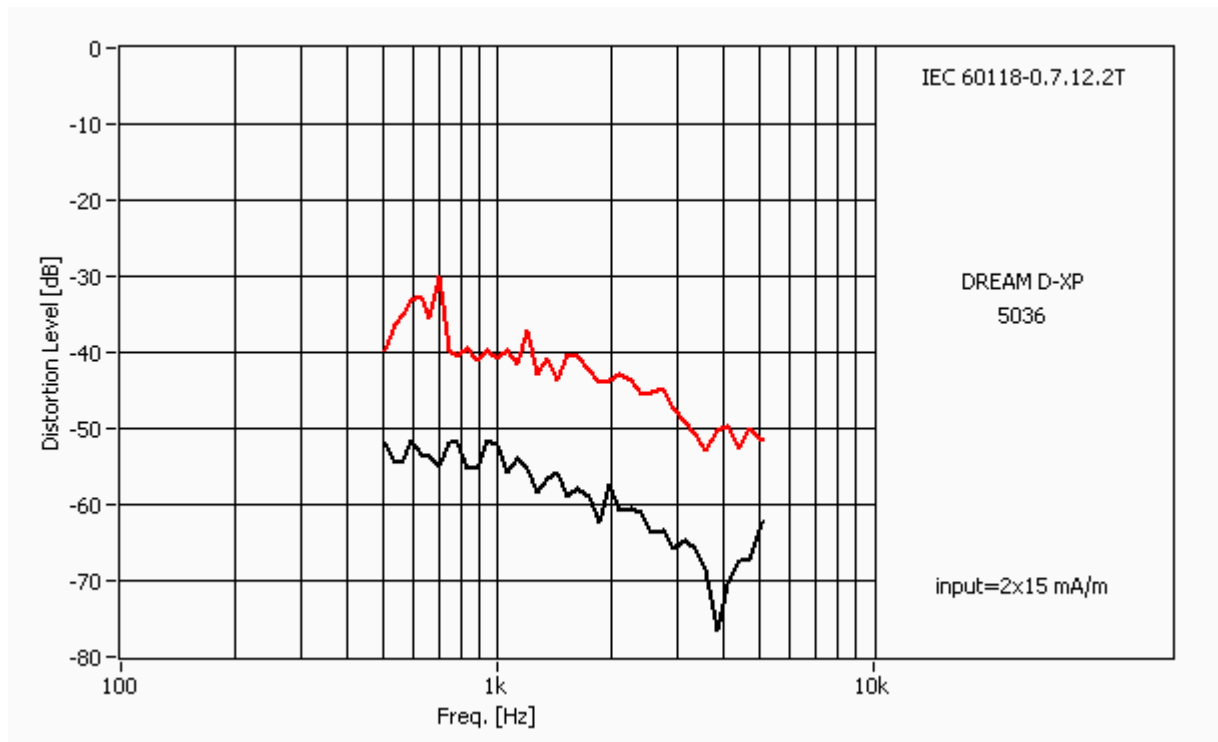
Measurement of amplitude nonlinearities in the hearing instrument 2nd order (Black), 2nd & 3rd order (Red). Harmonic distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

*IEC 60118\* : Measurement of nonlinearities (intermodulation distortion, magnetic input)*

HA adjustment: Reference test gain control position.



Input = 2 x 15.8 mA/m.

Measurement of amplitude nonlinearities in the hearing aid. Intermodulation products of 2nd order (Black) and 3rd order (Red), relative to the level of the fundamental tone.  $F_2 = F_1 + 125$  Hz. Distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

Conversion between dB and % THD

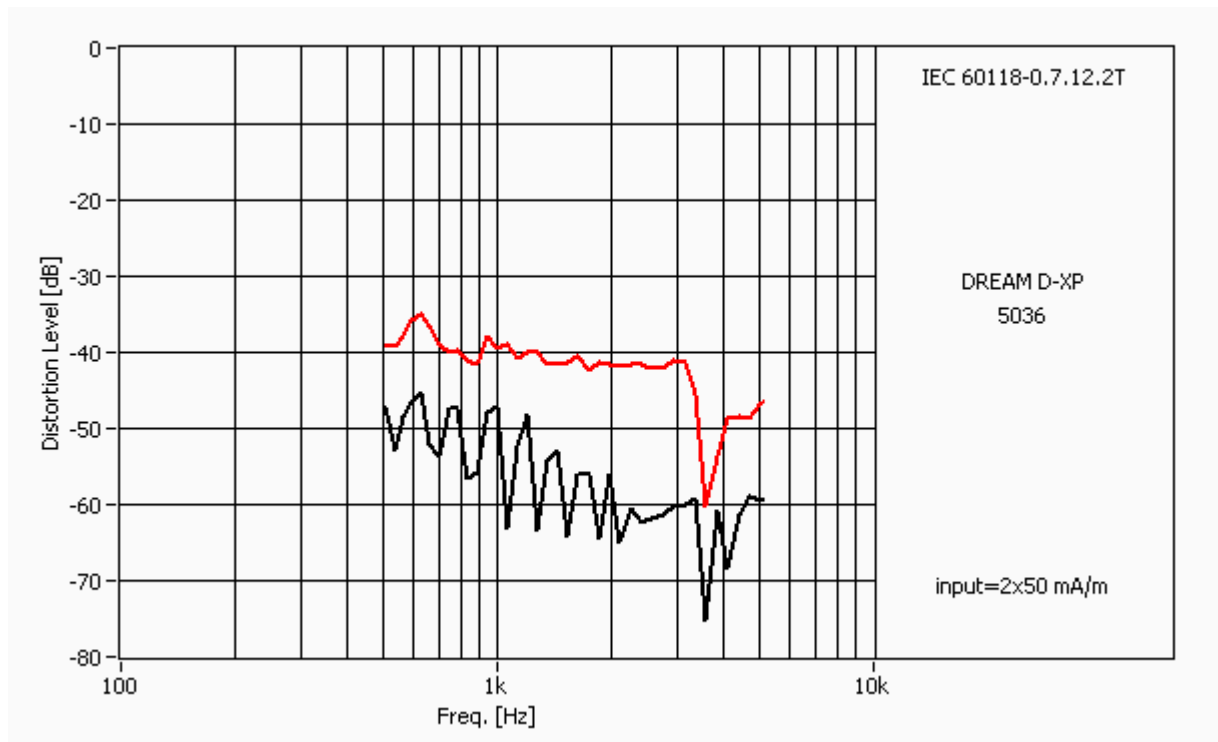
dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

\* Intermodulation distortion with magnetic input is not a part of IEC 60118 at the moment.



*IEC 60118\* : Measurement of nonlinearities (intermodulation distortion, magnetic input)*

HA adjustment: Reference test gain control position.



Input = 2 x 50 mA/m.

Measurement of amplitude nonlinearities in the hearing aid. Intermodulation products of 2nd order (Black) and 3rd order (Red), relative to the level of the fundamental tone.  $F2 = F1 + 125$  Hz. Distortion is measured by means of Test system with a frequency resolution of 10 points per octave.

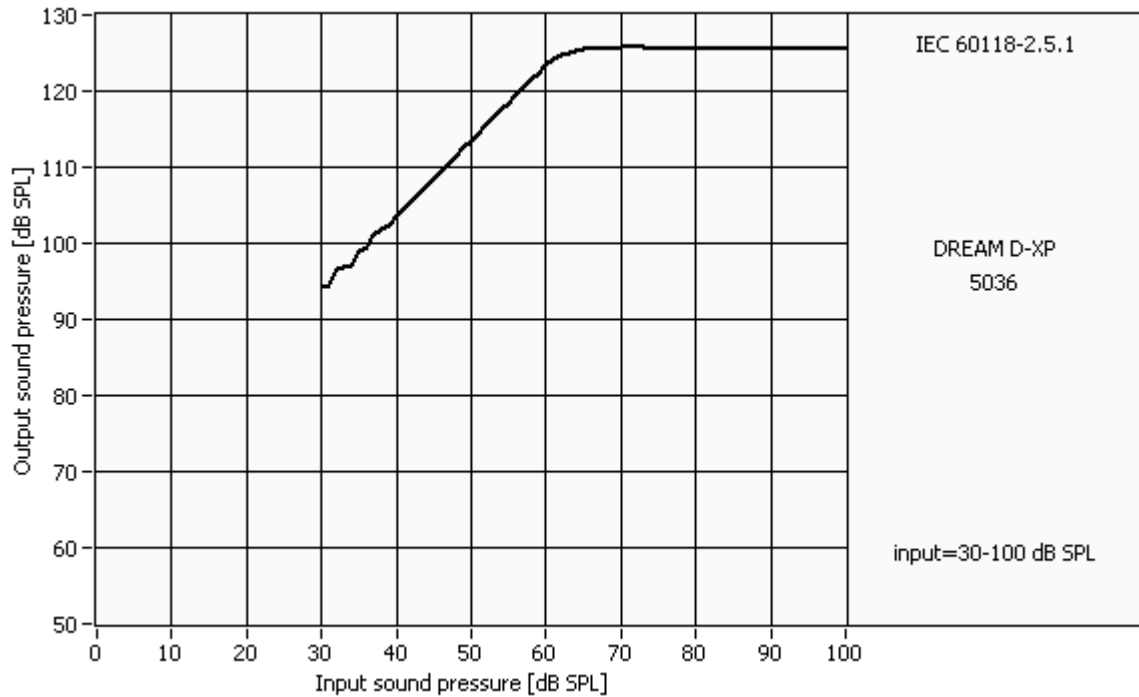
Conversion between dB and % THD

dB	%
-10	32
-20	10
-26	5
-30	3
-40	1

\* Magnetic input is not a part of IEC 60118 at the moment.

*IEC 60118-2.5.1 : Steady-state input/output graph (AGC systems)*

HA adjustment: Full-on gain.



Test frequency = 2500 Hz.

Measurement of the relation between input sound pressure level and output sound pressure level.

## *Annex A*

### *Reference measurements*

Beside the complete documentation in the main test report, measurements on additional samples are obtained for documentation of the Nordic Requirement Specifications clause 5 regarding consistency between samples. Primary data are stated by numbers in the main test report. The enclosed curves on each hearing aid are

*IEC 60118-0.7.2 - Output sound pressure level, OSPL90.*

*IEC 60118-0.7.3 - Full-on acoustic gain.*

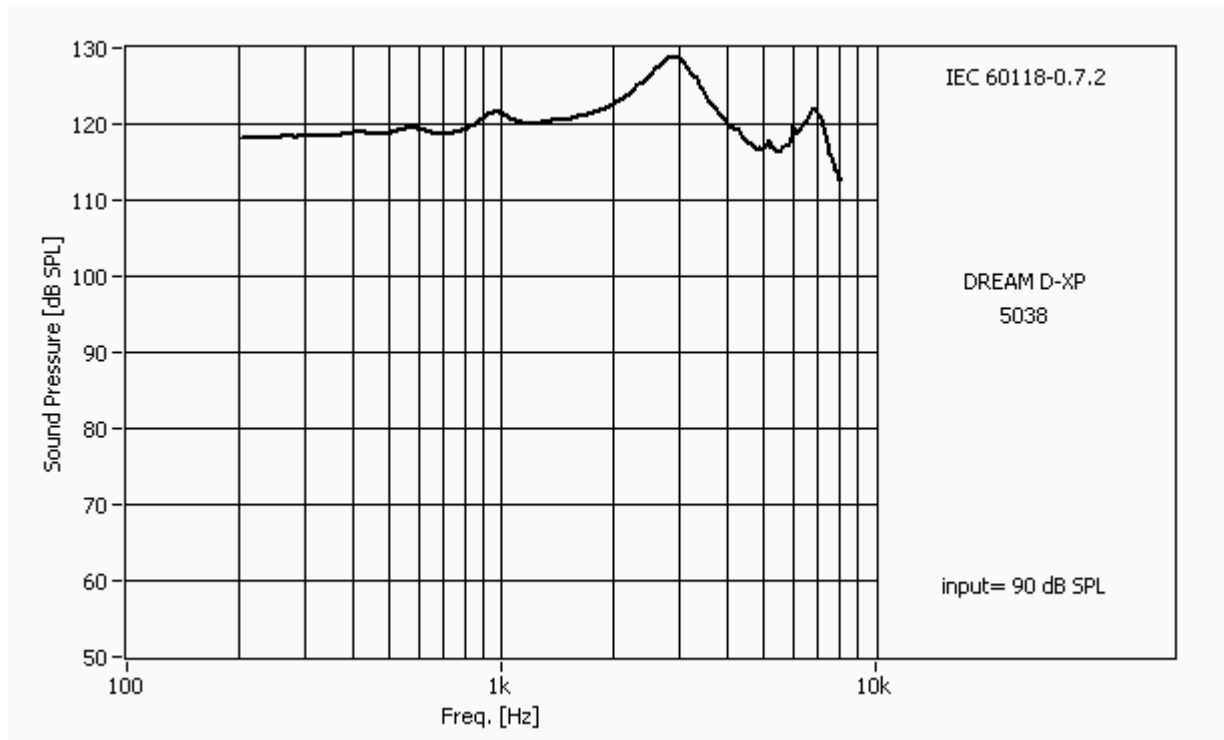
and if the hearing aid is equipped with an induction pick-up coil:

*IEC 60118-1.5.5 - Frequency response with full-on gain control setting.*

The hearing aids used for reference measurements are identified by name and serial number in the window beside the curve.

*IEC 60118-0.7.2 : Output sound pressure level response, OSPL90*

HA adjustment: Full-on gain.

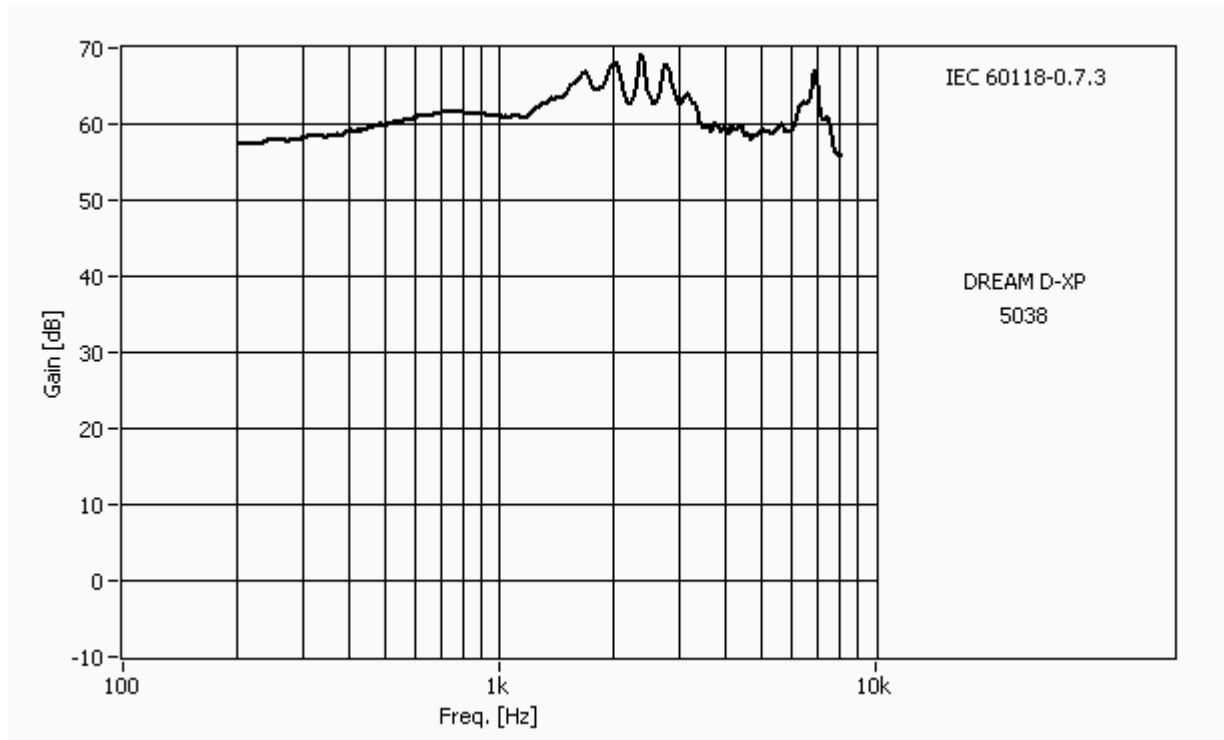


Input = 90 dB SPL.

Frequency response of the sound pressure level obtained in the ear simulator using an input of 90 dB SPL.

*IEC 60118-0.7.3 : Full-on acoustic gain*

HA adjustment: Full-on gain.

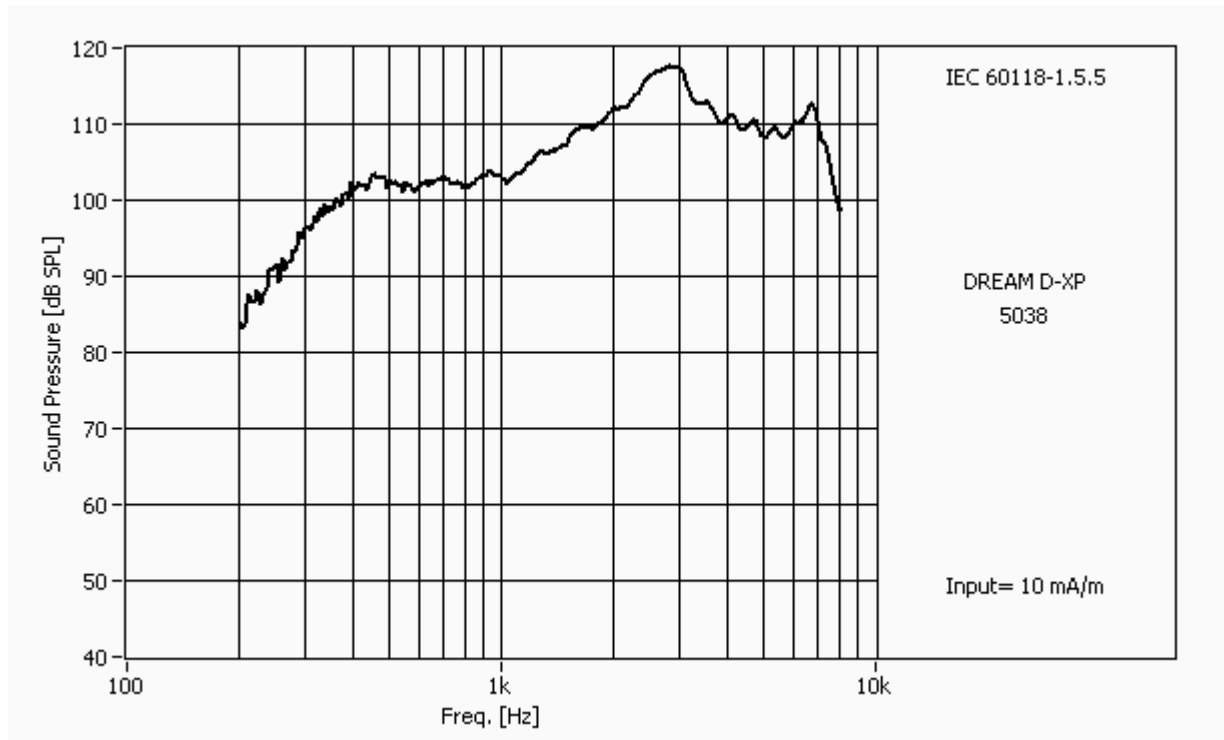


Input = 50 dB SPL.

Measurement of full-on acoustic gain obtainable with the hearing aid.

*IEC 60118-1.5.5 : Frequency response with full-on gain control setting*

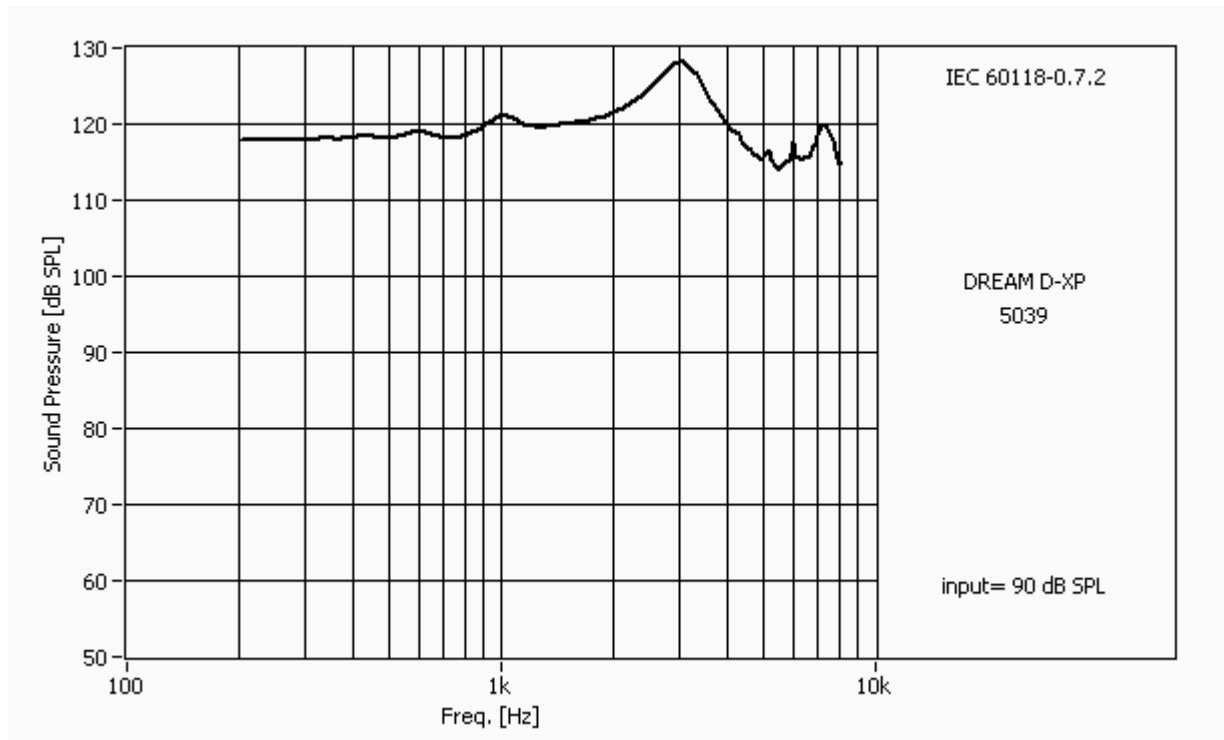
HA adjustment: Full-on gain.



Input = 10.0 mA/m.

*IEC 60118-0.7.2 : Output sound pressure level response, OSPL90*

HA adjustment: Full-on gain.

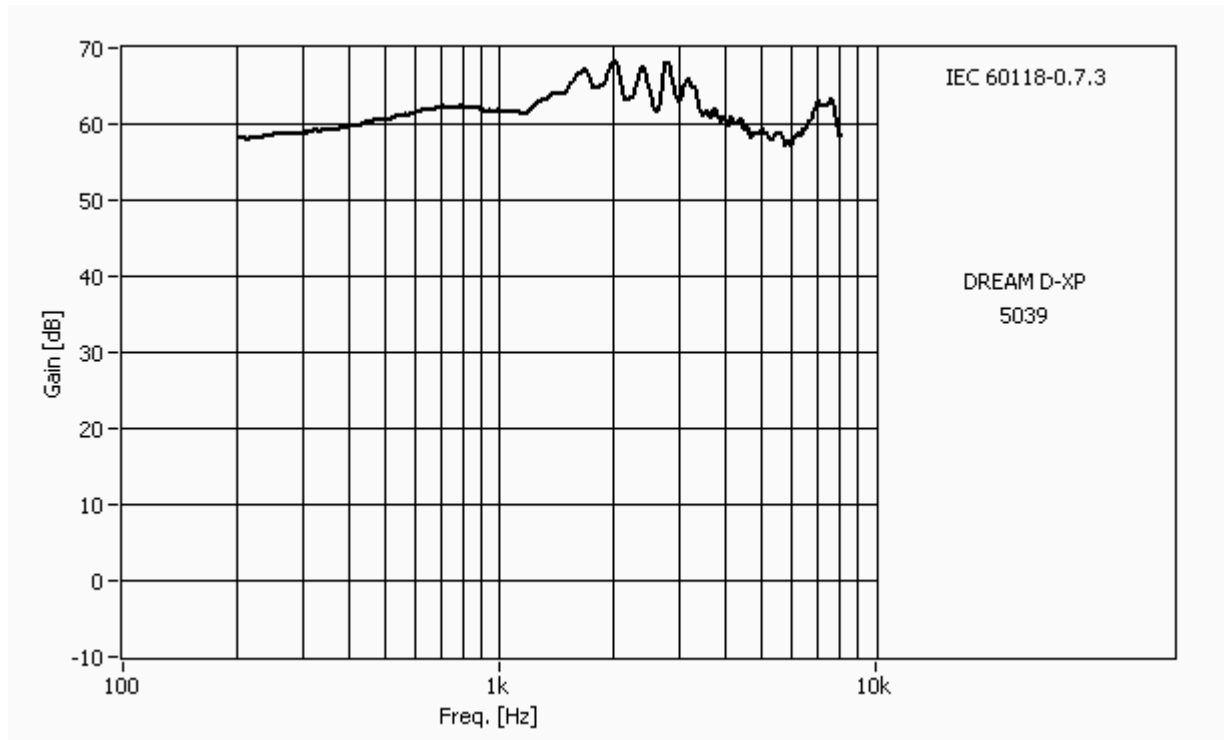


Input = 90 dB SPL.

Frequency response of the sound pressure level obtained in the ear simulator using an input of 90 dB SPL.

*IEC 60118-0.7.3 : Full-on acoustic gain*

HA adjustment: Full-on gain.



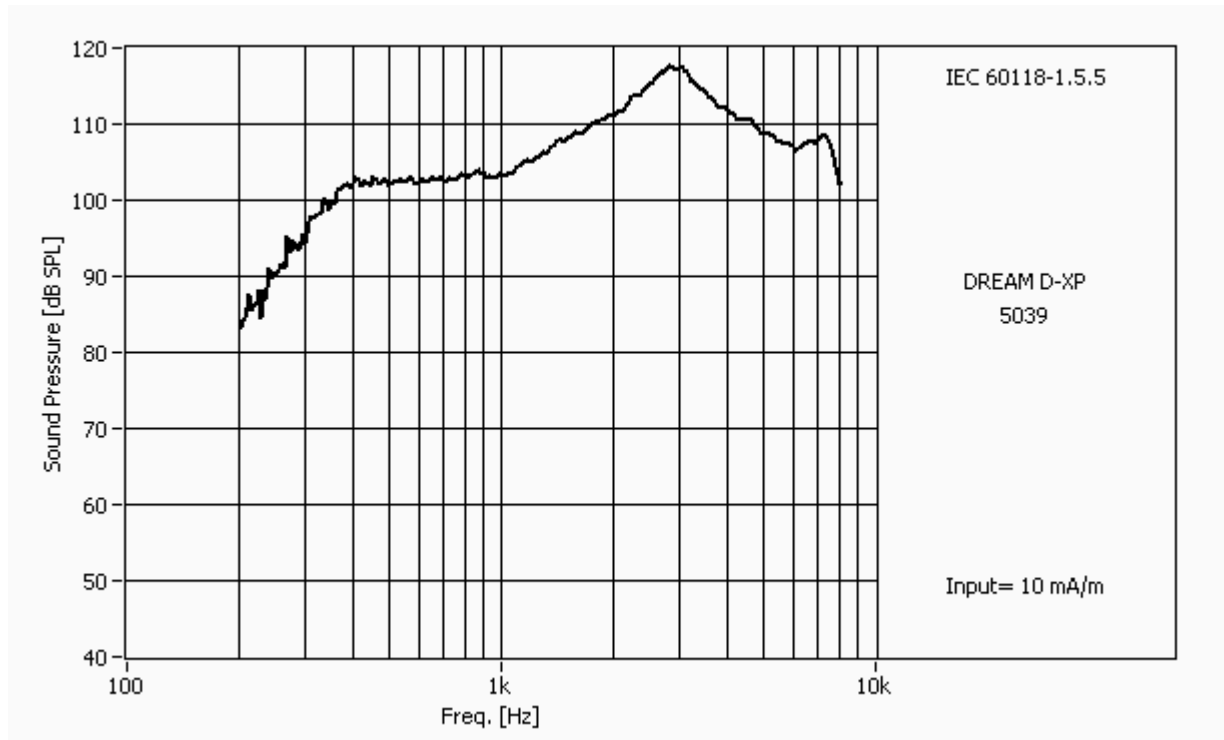
Input = 50 dB SPL.

Measurement of full-on acoustic gain obtainable with the hearing aid.



*IEC 60118-1.5.5 : Frequency response with full-on gain control setting*

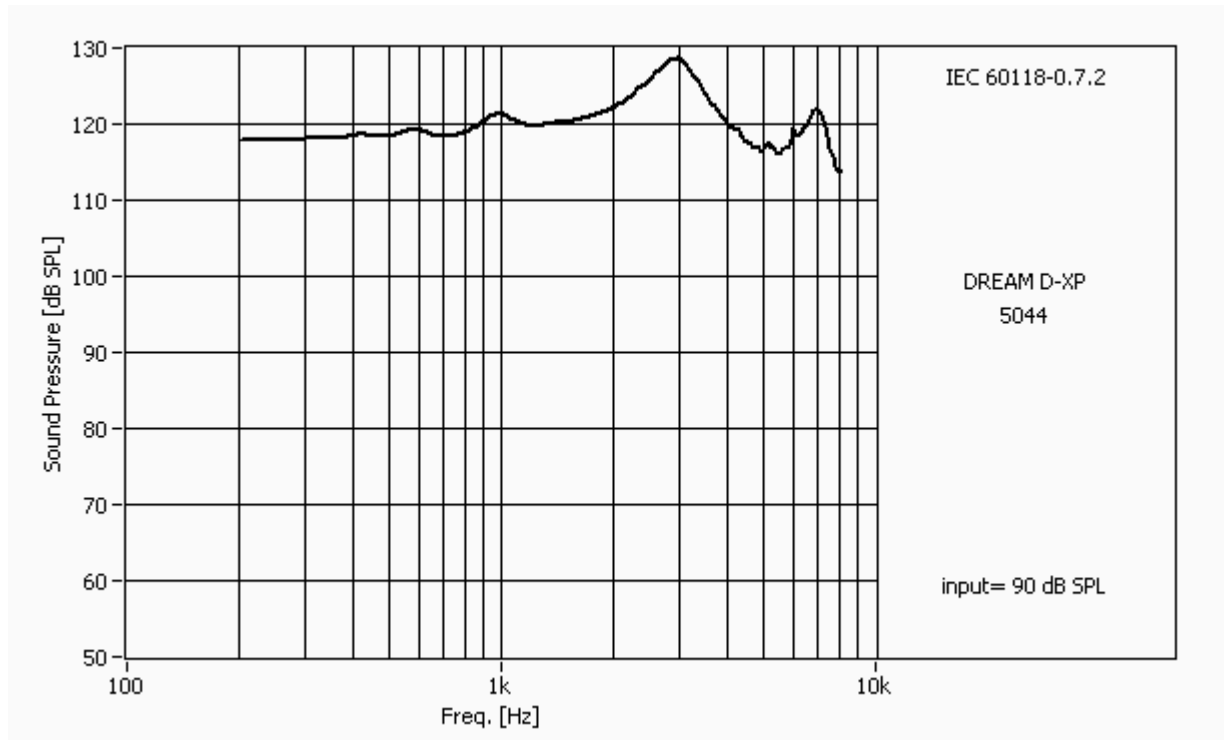
HA adjustment: Full-on gain.



Input = 10.0 mA/m.

*IEC 60118-0.7.2 : Output sound pressure level response, OSPL90*

HA adjustment: Full-on gain.

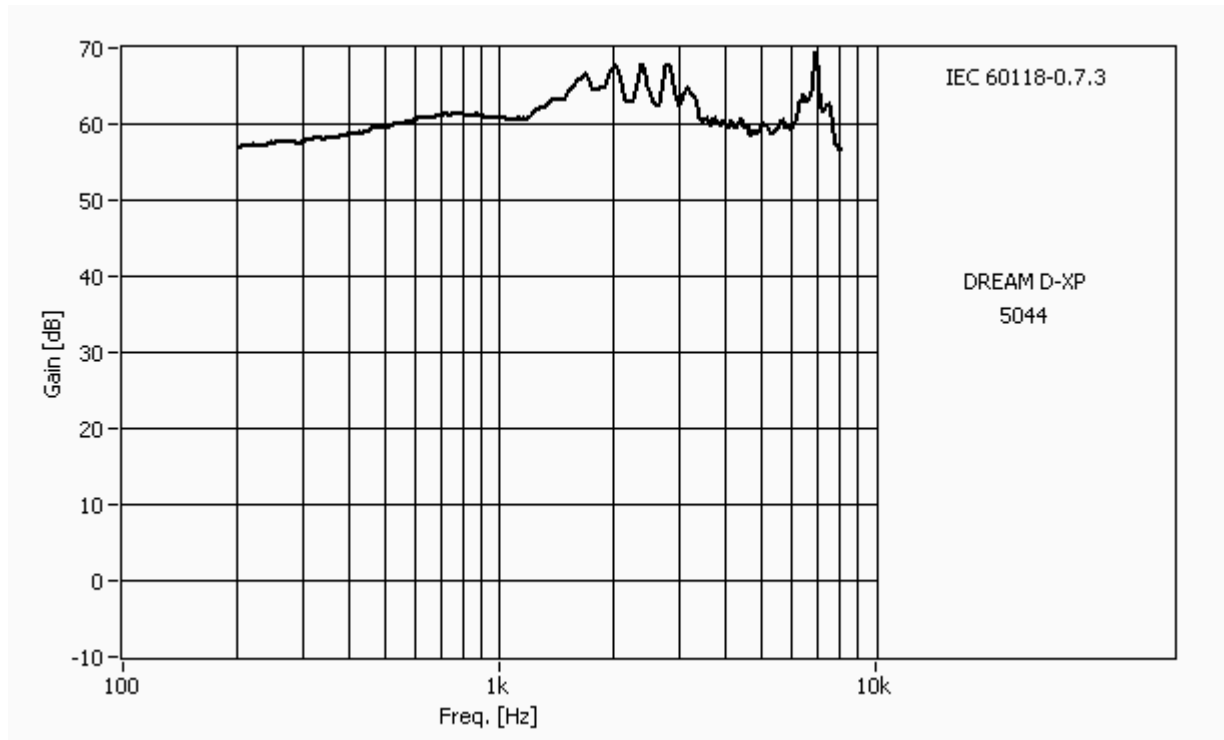


Input = 90 dB SPL.

Frequency response of the sound pressure level obtained in the ear simulator using an input of 90 dB SPL.

*IEC 60118-0.7.3 : Full-on acoustic gain*

HA adjustment: Full-on gain.

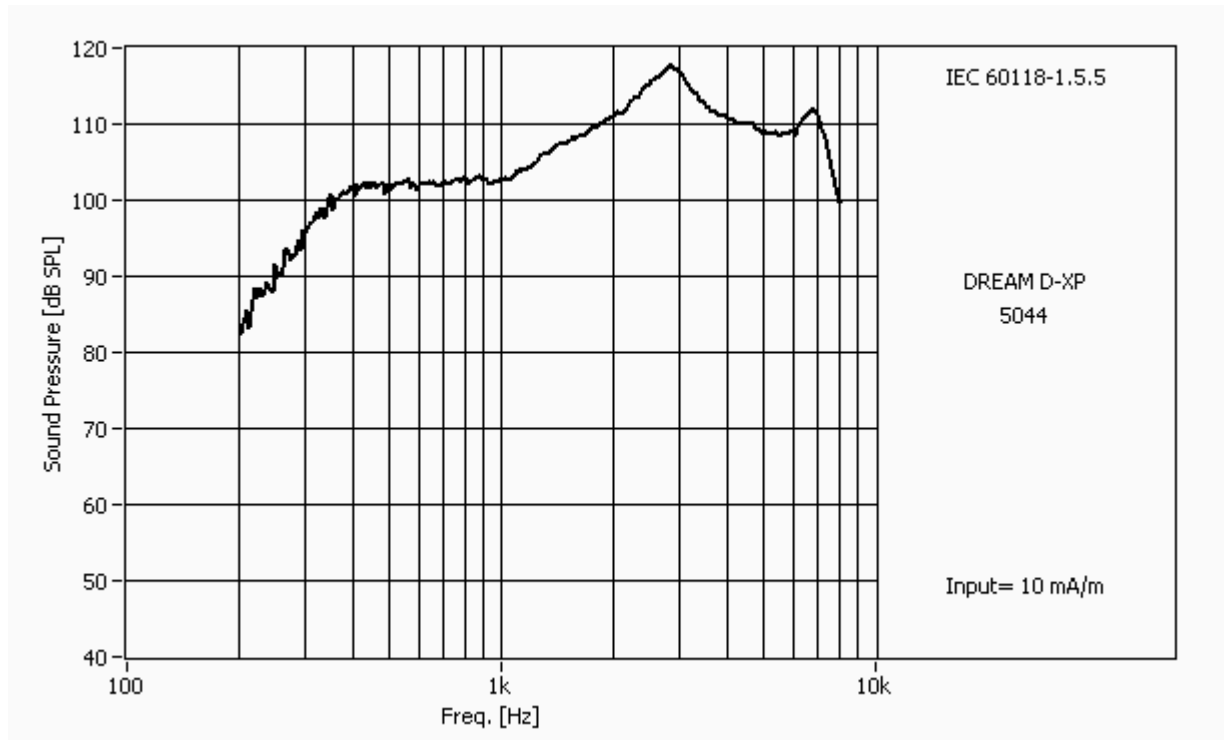


Input = 50 dB SPL.

Measurement of full-on acoustic gain obtainable with the hearing aid.

*IEC 60118-1.5.5 : Frequency response with full-on gain control setting*

HA adjustment: Full-on gain.



Input = 10.0 mA/m.

***Annex B***  
*(Outside scope of accreditation)*

*Nordic Requirement Specifications 7th Edition, March 2007*

Test object: Widex DREAM D-XP

## *Nordic Requirement Specification, General*

The measurements are performed according to the IEC Publication 60118-0, 60118-1, 60118-2, 60118-6.

*Nordic requirement specification (shall)* Obtained

### *4.1 – Marking*

The hearing aid shall be marked with the name of the manufacturer, a type designation and the serial number. Custom made hearing aid shall be provided with identification for left or right side.

Yes

### *4.3.3 – Battery and battery cassette*

The battery compartment shall be distinctly marked with a + symbol for battery polarity. The hearing aid shall not be damaged by incorrect insertion of the battery. The battery cassette and the battery compartment shall be attached to the hearing aid casing.

Yes

### *4.3.4 – Induction pick-up coil*

In a vertical magnetic field as described in IEC 60118-1 the sensitivity of the pick-up coil shall not increase by more than 2 dB when the hearing aid is tilted in any direction from the position as worn on a head-and-torso simulator.

Yes

### *4.3.5 – Electrical input and output connection*

The socket and the plug for connecting an earphone shall conform to the IEC 60118-12 *Dimensions of electrical connector systems*.

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### *4.3.6 – Control and switches*

All controls on the hearing aid which influences the output level shall be mounted such that output level increases when the control knob is moved upwards or clockwise or fro left to right of forwards. For hearing aid intended for the left ear only, however the user gain control shall be mounted in such a way that an upward, forward or an anti-clockwise operation of the control knob increases the output level. This requirement shall also apply turn-off switches operating in vertical directions.

Yes

## *Nordic Requirement Specification, Electroacoustical Requirements*

The measurements are performed according to the IEC Publication 60118-0, 60118-1, 60118-2, 60118-6.

<i>Nordic requirement specification (shall)</i>	Obtained	IEC 60118
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### *5.1 - Maximum Sound Pressure Level*

If the maximum output sound pressure level exceeds 132 dB, the hearing aid shall be supplied with a label warning against auditory hazard.	-	0.7.1 0.7.2
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### *5.2 - Resonances*

For the frequency range below 3500 Hz the difference between peaks and valleys closer than 2/3 octave in the frequency response curve shall not exceed 8 dB. This requirement shall apply to the basic frequency response curve and to the OSPL90 curve.	Yes	0.7.2 0.7.4
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### *5.4 - Function of controls*

There shall be an agreement between the marking of a control and the adjusted quantity. All controls shall show reasonable proportionality between the change of the continuous or stepped position and the adjusted quantity.	-	0.7.6
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#### *5.4.2 - User gain control*

If the frequency response is changed by the operation of the gain control this shall be documented and justified by the supplier.	-	0.7.6
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## *Nordic Requirement Specification, Electroacoustical Requirements*

The measurements are performed according to the IEC Publication 60118-0, 60118-1, 60118-2, 60118-6.

*Nordic requirement specification (shall)* Obtained IEC 60118

### *5.5 - Non-linear distortion*

For input signals in the range 400 - 3000 Hz the harmonic distortion of the hearing aid shall not exceed 10% at a signal level of 70 dB SPL or 100 mA/m. Yes 0.7.12  
1.5.8

At an input level of 60 dB SPL or 31.6 mA/m neither component shall exceed 5%. Yes

The requirement apply for the highest of the 2nd and 3rd components.

For intermodulation the requirement is valid in the frequency range  $500 \text{ Hz} < f_2 < 5000 \text{ Hz}$

### *5.6 - Internal noise*

The equivalent input noise level measured in third octave bands in accordance to IEC 118-0 clause 7.14.2 shall not exceed the values in row 1 from the table below. Yes 0.7.14

Third –octave bands	500	630	800	1000-3150	Hz
SPL	19	18	17	16	dB

The requirement does not apply to frequencies and settings for which the gain is < 5 dB.

### *5.7 - Induction pickup*

An inductive input signal of 31.6 mA/m shall give the same output signal level as an acoustical input signal (using the m-position) of 55-67 dB SPL in the frequency range 500-4000. Yes 1.5.4

For hearing aids without volume control the requirement is 57-65 dB SPL in the frequency range 500-4000.

The output of T and MT position shall not deviate more than 2 dB in the frequency range 500 to 4000 Hz.

### *5.9 - Electrical input*

The input sensitivity shall be in the range 0.5 mV to 10 mV. - 6.3.2

### *5.13 - Immunity against other technical equipment*

The input related interference level (IRIL) shall be stated and be < 55 dB SPL. Yes 13.6.1