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**Information technology — MPEG audio  
technologies —**

Part 1:  
**MPEG Surround**

**AMENDMENT 1** Conformance testing

*Technologies de l'information — Technologies audio MPEG —*

*Partie 1: Ambiance MPEG*

*AMENDEMENT 1: Essai de conformité*

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— *Part 1: MPEG Surround*

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# Information technology — MPEG audio technologies —

## Part 1: MPEG Surround

### AMENDMENT 1: Conformance testing

After Clause 7, add a new clause, Conformance testing, as given below:

## 8 Conformance testing

### 8.1 Introduction

This clause specifies conformance criteria for both bitstreams and decoders compliant with the MPEG Surround standard as defined in Clauses 1 to 7. This is done to assist implementers and to ensure interoperability.

### 8.2 Terms and definitions

The terms and definitions as stated in Clause 3 apply. Furthermore, the following terms and definitions will be used throughout this clause.

**bitstream** – Data encoded according to the MPEG Surround standard.

**conformance test bitstream** – A bitstream used for testing the conformance of an MPEG Surround decoder.

### 8.3 MPEG Surround conformance testing

Subclause 4.7 defines the Baseline MPEG Surround profile comprising 6 levels. Some conformance criteria apply to MPEG Surround in general, while others are specific to the Baseline MPEG Surround profile and its levels. Conformance shall be tested for the level of the profile with which a given bitstream or decoder claims to comply.

### 8.4 Bitstreams

#### 8.4.1 Characteristics

The MPEG Surround AOT can be used in combination with various audio object types.

#### 8.4.2 Test procedure

##### 8.4.2.1 Introduction

An MPEG Surround bitstream shall have the syntax and semantics as specified in Clauses 1 to 7. This subclause defines the conformance criteria that shall be fulfilled by a compliant bitstream. These criteria are specified for the syntactic elements of the bitstream and for some parameters decoded from the MPEG Surround bitstream payload.

8.4.2.2 Configuration header

8.4.2.2.1 SpatialSpecificConfig()

**bsSamplingFrequencyIndex**

Shall be in the range 0x0..0xc or 0xf. For further restrictions, see 8.4.2.5.

**bsSamplingFrequency** For restrictions, see 8.4.2.5.

**bsFrameLength** For restrictions, see 8.4.2.5.

**bsFreqRes** Shall not be encoded with a value of 0.

**bsTreeConfig** Shall be in the range 0..6. For further restrictions, see 8.4.2.5.

**bsQuantMode** Shall not be encoded with a value of 3

**bsOneIcc** No restrictions apply.

**bsArbitraryDownmix** No restrictions apply.

**bsFixedGainsSur** Shall be in the range 0..4.

**bsFixedGainsLFE** Shall be in the range 0..4.

**bsFixedGainsDMX** No restrictions apply.

**bsMatrixMode** No restrictions apply.

**bsTempShapeConfig** Shall not be encoded with a value of 3.

**bsDecorrConfig** Shall not be encoded with a value of 3.

**bs3DaudioMode** No restrictions apply.

**bsEnvQuantMode** Shall be 0.

**bs3DaudioHRTFset** Shall be 0.

8.4.2.2.2 OttConfig()

**bsOttBands** Shall not be encoded with a value larger than the value of numBands as given by Table 39.

8.4.2.2.3 TttConfig()

**bsTttDualMode** No restrictions apply.

**bsTttModeLow** Shall be in the range 0..5.

**bsTttModeHigh** Shall be in the range 0..5.

**bsTttBandsLow** Shall not be encoded with a value larger than the value of numBands as given by Table 39.

8.4.2.2.4 ParamHRTFset()

**bsHRTFfreqRes** Shall not be encoded with a value of 0.

**bsHRTFasymmetric** No restrictions apply.

**bsHRTFlevelLeft** No restrictions apply.

**bsHRTFlevelRight** No restrictions apply.

**bsHRTFphase** No restrictions apply.

**bsHRTFphaseLR** No restrictions apply.

**bsHRTFicc** No restrictions apply.

**bsHRTFiccLR** No restrictions apply.

**8.4.2.2.5 SpatialExtensionConfig()**

|                          |  |
|--------------------------|--|
| <b>bsSacExtType</b>      | No restrictions apply. Note that in case of values indicated as “reserved” in Table 54, the parsing function SpatialExtensionConfigData(bsSacExtType) shall return the value 0, such that possibly present data is read as bsFillBits (i.e., skipped) and correct parsing of the bitstream can continue. |
| <b>bsSacExtLen</b>       | No restrictions apply.   |
| <b>bsSacExtLenAdd</b>    | No restrictions apply.   |
| <b>bsSacExtLenAddAdd</b> | No restrictions apply.   |
| <b>bsFillBits</b>        | No restrictions apply.   |

**8.4.2.2.6 SpatialExtensionConfigData(0)**

The syntactic element SpatialExtensionConfigData(0) shall not be present if the helper variable numSlots has a value that is not listed in Table 55. Furthermore, if this syntactic element is present, the bitstream shall fulfil the requirements outlined in 6.1.13. For further restrictions, see 8.4.2.5.

**bsResidualSamplingFrequencyIndex**

Shall fulfil the requirements outlined in 6.1.13 and Table 88.

**bsResidualFramesPerSpatialFrame**

Shall fulfil the requirements outlined in 6.1.13 and Table 87.

**8.4.2.2.7 ResidualConfig()**

**bsResidualPresent** No restrictions apply.

**bsResidualBands** Shall not be encoded with a value larger than the value of **bsOttbands**.

**8.4.2.2.8 SpatialExtensionConfigData(1)**

The syntactic element SpatialExtensionConfigData(1) shall not be present if bsArbitraryDownmix is encoded with the value of 0 or the helper variable numSlots has a value that is not listed in Table 55. Furthermore, if this syntactic element is present, the bitstream shall fulfil the requirements outlined in 6.1.13.

**bsArbitraryDownmixResidualSamplingFrequencyIndex**

Shall fulfil the requirements outlined in 6.1.13 and Table 88.

**bsArbitraryDownmixResidualFramesPerSpatialFrame**

Shall fulfil the requirements outlined in 6.1.13 and Table 87.

**bsArbitraryDownmixResidualBands**

Shall not be encoded with a value larger than the value of numBands as given by Table 39.

**8.4.2.2.9 TreeConfig()**

**bsOttBoxPresent** No restrictions apply.

**bsOttDefaultCld** No restrictions apply.

**bsOttModeLfe** No restrictions apply.

**bsOttBands** Shall not be encoded with a value larger than the value of numBands as given by Table 39.

**bsOutputChannelPos** Shall be in the range 0..26.

For further restrictions, see 8.4.2.5.

8.4.2.3 Bitstream payload

8.4.2.3.1 SpatialFrame()

**bsIndependencyFlag** No restrictions apply.

8.4.2.3.2 FramingInfo()

**bsFramingType** No restrictions apply.

**bsNumParamSets** For restrictions, see 8.4.2.5.

**bsParamSlot[0]** Shall be in the range 0..bsFrameLength.

**bsDiffParamSlot[ps]** Shall be in the range 0..bsFrameLength-bsParamSlot[ps-1]-1.

8.4.2.3.3 OttData()

No restrictions apply.

8.4.2.3.4 TttData()

ICC values of a certain Ttt box shall not be encoded with a value of 0 if (**bsTttModeLow** < 2 || (**bsTttDualMode** == 1 && **bsTttModeHigh** < 2)).

8.4.2.3.5 SmgData()

**bsSmoothMode** No restrictions apply.

**bsSmoothTime** No restrictions apply.

**bsFreqResStrideSmg** No restrictions apply.

**bsSmgData** No restrictions apply.

8.4.2.3.6 TempShapeData()

**bsTempShapeEnable** No restrictions apply.

**bsTempShapeEnableChannel[ch]**  
No restrictions apply.

8.4.2.3.7 EnvelopeReshapeHuff()

**hcod2D\_EnvRes** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Table A.25, and shall have a length as defined by the corresponding entry in column 'length'.

8.4.2.3.8 ArbitraryDownmixData()

No restrictions apply.

8.4.2.3.9 EcData()

**bsXXXdataMode** shall fulfil the requirements outlined in 6.1.13. Shall not be encoded with the value 2 if residual coding is applied.

**bsDataPairXXX** Shall have the value 0 if setIdx == dataSets-1. No further restrictions apply.

**bsQuantCoarseXXX** No restrictions apply.

**bsFreqResStrideXXX** No restrictions apply.



**8.4.2.3.10 EcDataPair()****bsPcmCodingXXX** No restrictions apply.**bsPilotCodingXXX** No restrictions apply.**8.4.2.3.11 GroupedPcmData()****bsPcmWord** No restrictions apply.**8.4.2.3.12 DiffHuffData()****hcodPilot\_XXX** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Tables A.2, A.3 or A.4, respectively, and shall have a length as defined by the corresponding entry in column 'length'.**bsDiffType** No restrictions apply.**bsCodingScheme** No restrictions apply.**bsPairing** No restrictions apply.**bsDiffTimeDirection** No restrictions apply.**8.4.2.3.13 HuffData1D()****hcodFirstBand\_XXX** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Tables A.2, A.3 or A.4, respectively, and shall have a length as defined by the corresponding entry in column 'length'.**hcod1D\_XXX\_YY** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Tables A.5, A.6 or A.7, respectively, and shall have a length as defined by the corresponding entry in column 'length'.**bsSign** No restrictions apply.**8.4.2.3.14 HuffData2DFreqPair(), HuffData2DTimePair()****hcodLavIdx** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Table A.24, and shall have a length as defined by the corresponding entry in column 'length'.**hcod2D\_XXX\_YY\_ZZ\_LL\_escape** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Tables A.8, A.9 or A.10, respectively, and shall have a length as defined by the corresponding entry in column 'length'.**hcod2D\_XXX\_YY\_ZZ\_LL** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of the applicable table out of Tables A.11 to A.22, and shall have a length as defined by the corresponding entry in column 'length'.**8.4.2.3.15 SymmetryData()****bsSymBit[i]** No restrictions apply.**8.4.2.3.16 LsbData()****bsLsb** For restrictions see 8.4.2.3.24.**8.4.2.3.17 SpatialExtensionFrame()**

No restrictions apply. Note that in case of **bsSacExtType** having values indicated as "reserved" in Table 54, the parsing function **SpatialExtensionFrameData(bsSacExtType)** shall return the value 0, such that possibly present data is read as **bsFillBits** (i.e., skipped) and correct parsing of the bitstream can continue.

**8.4.2.3.18 SpatialExtensionFrameData(0)**

For restrictions see 8.4.2.5.

**8.4.2.3.19 ResidualData()**

**bsIccDiffPresent**[pi][ps] No restrictions apply.

**hcod1D\_ICC\_Diff** **bsCodeW** shall have a value out of a set of values as defined by column 'codeword' of Table A.23, and shall have a length as defined by the corresponding entry in column 'length'.

**IccDiff**[pi][ps][pb] The value of **IccDiff**[pi][ps][pb] shall not result in an invalid value for **idxICC**[pi][ps][pb].

**individual\_channel\_stream()** Shall fulfil the restrictions outlined for this syntactic element in 5.1 and 5.2 and Tables 77 and 78.

**8.4.2.3.20 SpatialExtensionFrameData(1)**

No restrictions apply.

**8.4.2.3.21 ArbitraryDownmixResidualData()**

**bsArbitraryDownmixResidualAbs**[i] No restrictions apply.

**bsArbitraryDownmixResidualAlphaUpdateSet**[i] No restrictions apply.

**individual\_channel\_stream()** Shall fulfil the restrictions outlined for this syntactic element in 5.1 and 5.2 and Tables 77 and 78.

**channel\_pair\_element()** Shall fulfil the restrictions outlined for this syntactic element in 5.1 and 5.2 and Tables 77 and 78. The parameter **common\_window** shall be set to the value of 1.

**8.4.2.3.22 SpatialExtensionFrameData(2)**

No further restrictions apply.

**8.4.2.3.23 ArbitraryTreeData()**

No further restrictions apply.

**8.4.2.3.24 Restrictions applying to decoded parameters**

The following restrictions apply to parameters decoded from the MPEG Surround bitstream.

The helper variable **idxXXX**[pi][ps][pb] shall have values in the ranges as specified in 6.1.2.1 after the corresponding decoding process defined in 6.1.2 was carried out for the present **SpatialFrame()**.

If **bs3DaudioMode** has the value 1, then the absolute value of the determinant of  $\mathbf{H}_{\text{Bin}}^{l,k}$  as defined in 6.11.5 shall be larger than or equal to 0.1, i.e.,

$$\left| \det \left( \mathbf{H}_{\text{Bin}}^{l,k} \right) \right| \geq 0.1 .$$

#### 8.4.2.4 Transport of MPEG Surround data

##### 8.4.2.4.1 Transport in an MPEG environment

###### 8.4.2.4.1.1 Introduction

In case of transport of MPEG Surround data in an MPEG-4 environment, the following restrictions apply.

In case of `SpatialSpecificConfig()` is conveyed out-of-band, any in-band `SpatialSpecificConfig()` shall be identical to the out-of-band one.

In case of embedding of MPEG Surround data in MPEG-2/4 AAC payloads, the following restrictions apply. There must be at least one `extension_payload()` element with `extension_type==EXT_SAC_DATA` in each AAC frame in order to enable immediate implicit signalling.

In case of embedding of MPEG Surround data in MPEG-1/2 Layer I/II/III bistreams, the following restrictions apply. The first bit of the `ancSyncword` must be byte-aligned with respect to the first bit of the `0xFFF` syncword of the MPEG-1/2 frame header. The `AncDataElement()` must be completely included in the ancillary data of a single MPEG-1/2 frame. There must be at least one `AncDataElement()` in the ancillary data of each MPEG-1/2 frame in order to enable immediate implicit signalling.

###### 8.4.2.4.1.2 AncDataElement()

|                           |   |
|---------------------------|---|
| <b>ancSyncword</b>        | Shall be <code>0x8E4</code> .   |
| <b>ancType</b>            | No restrictions apply.  |
| <b>ancStart</b>           | No restrictions apply.  |
| <b>ancStop</b>            | No restrictions apply.  |
| <b>ancLenBytes</b>        | No restrictions apply.  |
| <b>ancLenBytesAdd</b>     | No restrictions apply.  |
| <b>ancCrcWord</b>         | Shall have the value as determined by the procedure specified in 7.2.4.   |
| <b>ancDataSegmentByte</b> | A data block formed by concatenation of <code>ancDataSegmentByte</code> as specified in 7.2.4 shall, if <code>ancType==0x0</code> or <code>ancType==0x1</code> , constitute one <code>SacDataFrame()</code> syntax element, padded at the end to obtain an integer number of bytes. |

###### 8.4.2.4.1.3 SacDataFrame(sacHeaderFlag)

|                         |   |
|-------------------------|---|
| <b>sacHeaderFlag</b>    | No restrictions apply.  |
| <b>sacHeaderLen</b>     | No restrictions apply.  |
| <b>sacHeaderLenAdd</b>  | No restrictions apply.  |
| <b>bsFillBits</b>       | No restrictions apply.  |
| <b>sacTimeAlignFlag</b> | No restrictions apply.  |
| <b>sacTimeAlign</b>     | Shall have an absolute value no larger than two times the number of samples in the MPEG Surround PCM frame as defined by <b>bsFrameLength</b> and <b>bsSamplingFrequencyIndex</b> or <b>bsSamplingFrequency</b> . |

##### 8.4.2.4.2 Transport over PCM channels

###### 8.4.2.4.2.1 Introduction

In case of transport of MPEG Surround data over PCM channels, the following restrictions apply.

The BuriedData() data shall be embedded in the LSBs of the PCM channels. Typically, 16 bit PCM samples are used. However, also other sample precisions shall be supported, e.g. 20 and 24 bits.

**8.4.2.4.2.2 BuriedDataHeader()**

- bsBDSyncword** Shall be 0xAA95.
- bsBDChannels** Shall have the value of the number of PCM channels in which the MPEG Surround data is embedded.
- bsBDFramelength** Shall define a PCM buried data frame size which is exactly the same as the MPEG Surround PCM frame size defined by **bsFrameLength** and **bsSamplingFrequencyIndex** or **bsSamplingFrequency**.
- bdBDSubframes** Shall fulfil the restrictions outlined for this syntactic element in 7.3.3.
- bsBDReserved** Shall be 0.
- bsBDAlloc[channel][subframe]** Shall not exceed the value of n for n bit PCM samples.
- bsBDHeaderCrc** shall fulfil the restrictions outlined for this syntactic element in 7.3.3.
- bsBDHeaderPadding** Shall be 0.

**8.4.2.4.2.3 BuriedDataFrame()**

- bsBDFramePadding** Shall be 0.

**8.4.2.4.2.4 BuriedDataElement()**

- bsBDType** Each BuriedDataFrame() shall at least contain one BuriedDataElement() with **bsBDType** set to the value of 0 or 1. In the case of file based applications, the first frame shall contain a BuriedDataElement() with **bsBDType** set to the value of 1.
- bsBDID** Shall be set to a value in the range of 0..7, each value shall be used only once in a BuriedDataFrame().
- bsBDLengthIdx** No restrictions apply.
- bsBDLength** Shall fulfil the restriction outlined for this syntactic element in 7.3.3.
- bsBDBytes** Shall contain exactly one SacDataFrame().
- bsBDDataCrc** Shall fulfil the restrictions outlined for this syntactic element in 7.3.3.

**8.4.2.5 Restrictions depending on profiles and levels**

**8.4.2.5.1 Introduction**

Depending on the profile and level associated with the present MPEG Surround bitstream, further restrictions may apply.

**8.4.2.5.2 Baseline MPEG Surround profile**

For the Baseline MPEG Surround Profile, the following further restrictions apply.

**bsSamplingFrequencyIndex**

Shall be encoded with a value listed in Table AMD1.1.

**bsSamplingFrequency** Shall be encoded with a value listed in Table AMD1.1.

**bsFrameLength** Shall be in the range 3..71.

**bsTreeConfig** Shall be encoded with a value listed in Table AMD1.1.

**Table AMD1.1 — Restrictions for the Baseline MPEG Surround Profile**

|                                 | Level 1          | Level 2          | Level 3          | Level 4          | Level 5          | Level 6          |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>bsSamplingFrequencyIndex</b> | 0x3..0xc,<br>0xf | 0x3..0xc,<br>0xf | 0x3..0xc,<br>0xf | 0x3..0xc,<br>0xf | 0x3..0xc,<br>0xf | 0x0..0xc,<br>0xf |
| <b>bsSamplingFrequency</b>      | <= 48000         | <= 48000         | <= 48000         | <= 48000         | <= 48000         | <= 96000         |
| <b>bsTreeConfig</b>             | 0..4             | 0..4             | 0..4             | 0..4             | 0..6             | 0..6             |

**TreeConfig()** After decoding of the syntactic element **TreeConfig()**, the helper variable **numOutChanAT** shall have a value not larger than 32.

**SpatialExtensionConfigData(0)** This syntactic element shall not be present in case of Level 1 or Level 2.

**SpatialExtensionConfigData(1)** This syntactic element shall not be present.

**bsNumParamSets** Shall have a value not larger than  $\text{bsFrameLength}/4$ , where the division shall be interpreted as an ANSI C integer division.

## 8.5 Decoders

### 8.5.1 Characteristics

#### 8.5.1.1 General

The MPEG Surround decoder can be implemented in two different versions:

- High Quality MPEG Surround
- Low Power MPEG Surround

#### 8.5.1.2 Baseline MPEG Surround profile

- The ability to skip over residual data embedded in the MPEG Surround bitstream payload is mandatory for decoders of level 1 and 2. Decoders of level 3 and higher shall be able to decode and apply a residual bitstream payload.

### 8.5.2 Test procedure

#### 8.5.2.1 Downmix decoders

An MPEG Surround decoder can be used in combination with a downmix decoder. In this case, the downmix decoder shall fulfil the conformance criteria that are applicable to it. If a downmix decoder other than PCM is used, the MPEG Surround conformance test procedure uses a technique that removes the influence of a potentially inaccurate downmix decoder to the maximum extent possible.

8.5.2.2 MPEG Surround decoders

With regard to the definition and further details of the conformance criterion RMS/LSB being used to test MPEG Surround decoders, reference is made to ISO/IEC 14496-4.

The conformance test procedure for MPEG Surround decoders internally creates a reference for comparison, given the conformance test sequence and the output from the decoder under test. For cases where MPEG surround is combined with a downmix codec other than PCM this is accomplished by having every MPEG Surround conformance sequence be divided into two parts as outlined in Figure AMD1.1. The compressed data of the downmix for the two parts is identical but the MPEG Surround payload of the first part signals `bsXXXdataMode = 0`, causing the MPEG Surround decoder to pass the downmix signal through the QMF filterbank without applying any of the MPEG Surround tools, while the second part contains the actual MPEG Surround payload that is intended for use for conformance testing. This split does not exist for the conformance sequences where PCM is used as downmix signal. In these cases the reference for comparison is obtained directly from the PCM conformance sequence.

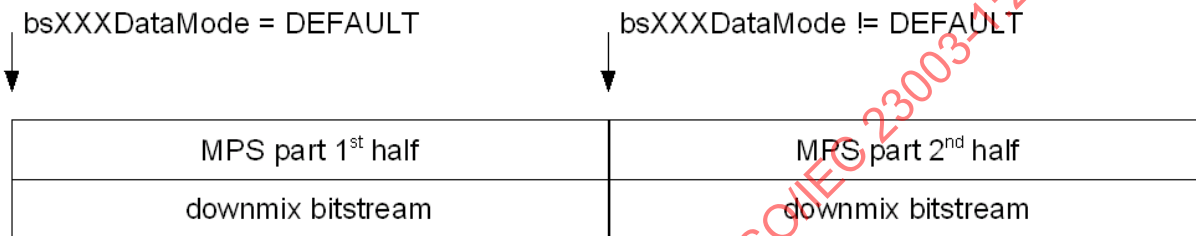


Figure AMD1.1 — The disposition of the MPEG Surround conformance test sequences

The conformance test procedure will

- read the conformance test sequence,
- store the output signal of the decoder under test during decoding of the first half of the bitstream.

Since this output signal is identical to the output-signal from the downmix decoder after QMF analysis and QMF synthesis, it can by means of a polyphase correction filter, be approximated to be the same signal as was used by the MPEG Surround decoder in the decoder under test.

For cases where the downmix decoder is connected directly in the QMF domain like the combination of AAC and SBR (HE AAC), the MPEG Surround conformance test procedure can only approximate the output of the decoder that was used prior to the QMF analysis step. The MPEG Surround conformance test sequences for such decoder combinations are designed to keep the influence of the QMF domain based downmix decoder minimal.

In parallel to storing the signal it shall also be fed to the reference MPEG Surround decoder along with the first half of the compressed MPEG Surround conformance sequence. This way, the reference MPEG Surround decoder will perform the exact same processing steps as the MPEG Surround decoder in the device under test, thereby ensuring that all internal states of both decoders match. The output signal of this decoder shall be compared to the input signal, i.e. the output signal of the decoder under test. This serves as a QMF test of the first half of the conformance file.

For the second half of the compressed data, an MPEG Surround processed reference signal shall be created based on the previously derived signal. This makes it possible to test the accuracy of the MPEG Surround decoder alone without influence from the underlying downmix decoder. Furthermore, the accuracy of the QMF implementation of the decoder under test is tested separately for every conformance sequence.

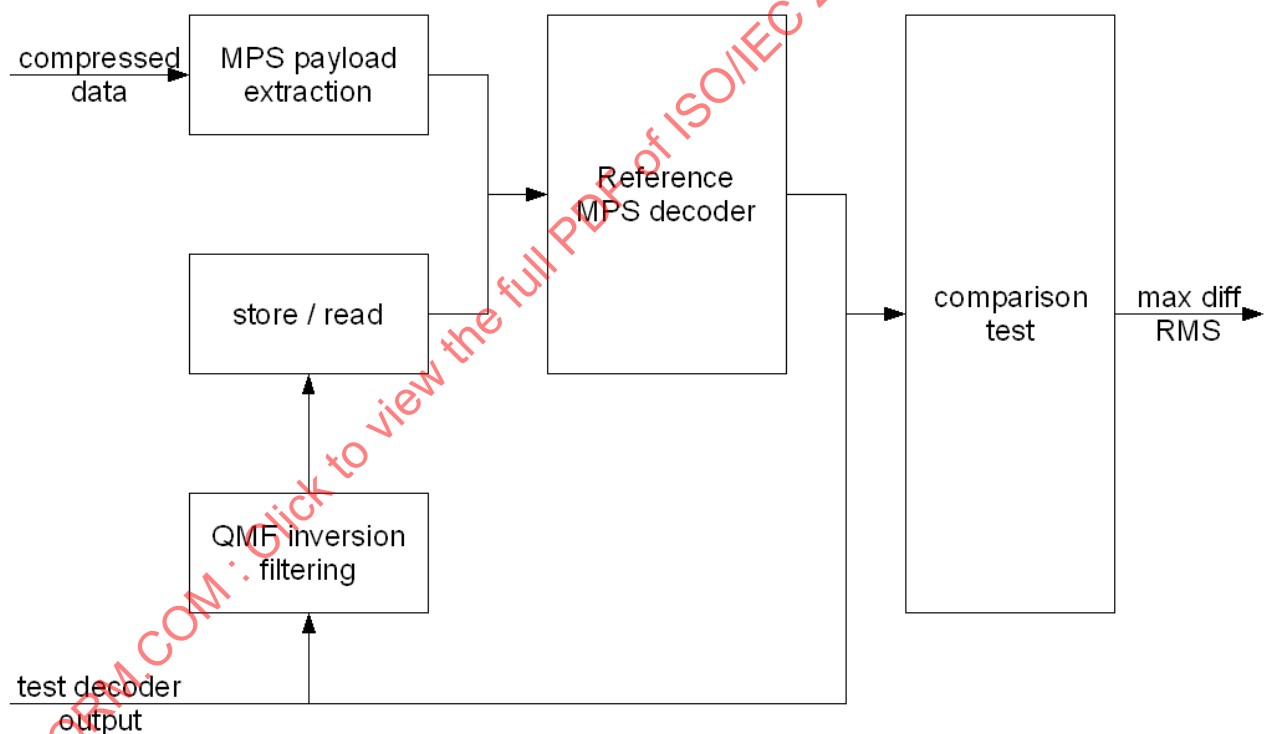
If HE AAC is used as downmix coder, and a complex QMF filter bank with a modified internal phase angle (hereinafter referred to as twiddles) is used in the decoder under test, the `al_sbr_twi_*` sequences shall be

tested first. For further information regarding these sequences, please refer to ISO/IEC 14496-4:2004, 6.6.17.2.2 (SBR conformance test procedure).

In order to ensure that the QMF is implemented correctly, the output from the QMF test specific sequences \*\_qmf\_\* are compared to the internal reference applying the polyphase correction filter and storing the first half of the test sequence. This is done to detect errors in the QMF implementation, which would otherwise appear to be errors in the downmix decoder. By omitting the parts of the tool that are designed to neglect differences in the downmix decoder implementation for the QMF specific sequences, it is ensured that the QMF is implemented correctly.

If the decoder under test passes the conformance criterion for the dedicated QMF test sequences being specified in Table AMD1.5, this is a good indication that the QMF implementation is accurate. However, it is no definite guarantee, and hence it could happen that a QMF implementation that barely passes the conformance for the QMF test, does not pass conformance for other parts of the system due to the QMF implementation. Therefore, it is useful to observe the result from the QMF test for the first half for any of the conformance sequences. This can give a good indication of the origin of a potential error.

Figure AMD1.2 outlines a flowchart of the MPEG Surround conformance test procedure.



**Figure AMD1.2 — Block diagram of the MPEG Surround conformance test procedure**

The relevant modules are:

- QMF inversion filtering: This module applies a polyphase correction filter that approximates the inverse of the equivalent QMF filterbank in the decoder under test. The delay imposed by this module is given by:  $delay = 64 \cdot \left( \frac{K-1}{2} \right)$ , where  $K = 25$  is the length of the polyphase filter. The polyphase filter matrix  $\mathbf{H}(k,l)$  of size  $64 \times K$  is tabulated in Table AMD1.2. The polyphase filtering step



consists of the operation which maps a time signal  $x(n)$  to  $y(n)$ , where

$$y(k + 64i) = \sum_{l=0}^{K-1} \mathbf{H}(k, l) x(k + 64(i - l)), \quad k = 0, 1, \dots, 63.$$

This module is not active for conformance bitstreams that use PCM as downmix signal.

- store / read: for the first half of the conformance test sequences this module stores the output of the QMF and in parallel routes it to the reference MPEG Surround decoder. For the second half of the conformance test sequences the signal that was stored from the first half is fed to the reference MPEG Surround decoder again.
- MPEG Surround payload extraction: This module extracts the MPEG Surround bitstream from the conformance test sequence and feeds it to the reference MPEG Surround decoder.
- Reference MPEG Surround decoder: This module is the reference MPEG Surround decoder according to Clauses 1 to 7 and Annexes A and B.

**Table AMD1.2 — Polyphase filter matrix  $\mathbf{H}(k, l)$  of size  $64 \times 25$**

```
H[64][25] = {
{ 1.3994244e-07, 0.0000000e+00, -2.9058151e-07, 0.0000000e+00, -1.3757007e-05,
0.0000000e+00, -3.8711165e-04, 0.0000000e+00, 3.6186281e-04, 0.0000000e+00,
3.7702263e-04, 0.0000000e+00, 1.0000049e+00, 0.0000000e+00, 3.7702263e-04,
0.0000000e+00, 3.6186281e-04, 0.0000000e+00, -3.8711165e-04,
0.0000000e+00, -1.3757007e-05, 0.0000000e+00, -2.9058151e-07, 0.0000000e+00,
1.3994244e-07 },
{ 1.3964719e-07, 0.0000000e+00, -2.9742459e-07, 0.0000000e+00, -1.3181384e-05,
0.0000000e+00, -3.8654437e-04, 0.0000000e+00, 3.7214108e-04, 0.0000000e+00,
3.6667915e-04, 0.0000000e+00, 9.9999586e-01, 0.0000000e+00, 3.6667915e-04,
0.0000000e+00, 3.7214108e-04, 0.0000000e+00, -3.8654437e-04,
0.0000000e+00, -1.3181384e-05, 0.0000000e+00, -2.9742459e-07, 0.0000000e+00,
1.3964719e-07 },
{ 1.2357771e-07, 0.0000000e+00, -2.6251894e-07, 0.0000000e+00, -1.1825179e-05,
0.0000000e+00, -3.6305811e-04, 0.0000000e+00, 3.4969594e-04, 0.0000000e+00,
3.6185021e-04, 0.0000000e+00, 1.0000091e+00, 0.0000000e+00, 3.6185021e-04,
0.0000000e+00, 3.4969594e-04, 0.0000000e+00, -3.6305811e-04,
0.0000000e+00, -1.1825179e-05, 0.0000000e+00, -2.6251894e-07, 0.0000000e+00,
1.2357771e-07 },
{ 1.2249635e-07, 0.0000000e+00, -2.6464047e-07, 0.0000000e+00, -1.1081786e-05,
0.0000000e+00, -3.6102224e-04, 0.0000000e+00, 3.5541117e-04, 0.0000000e+00,
3.5963495e-04, 0.0000000e+00, 1.0000056e+00, 0.0000000e+00, 3.5963495e-04,
0.0000000e+00, 3.5541117e-04, 0.0000000e+00, -3.6102224e-04,
0.0000000e+00, -1.1081786e-05, 0.0000000e+00, -2.6464047e-07, 0.0000000e+00,
1.2249635e-07 },
{ 1.2588236e-07, 0.0000000e+00, -2.6200461e-07, 0.0000000e+00, -1.0461199e-05,
0.0000000e+00, -3.6487563e-04, 0.0000000e+00, 3.4857949e-04, 0.0000000e+00,
3.6248811e-04, 0.0000000e+00, 9.9999030e-01, 0.0000000e+00, 3.6248811e-04,
0.0000000e+00, 3.4857949e-04, 0.0000000e+00, -3.6487563e-04,
0.0000000e+00, -1.0461199e-05, 0.0000000e+00, -2.6200461e-07, 0.0000000e+00,
1.2588236e-07 },
{ 1.3263993e-07, 0.0000000e+00, -2.7003524e-07, 0.0000000e+00, -9.8822524e-06,
0.0000000e+00, -3.7356560e-04, 0.0000000e+00, 3.5176466e-04, 0.0000000e+00,
3.6332857e-04, 0.0000000e+00, 1.0000102e+00, 0.0000000e+00, 3.6332857e-04,
0.0000000e+00, 3.5176466e-04, 0.0000000e+00, -3.7356560e-04,
0.0000000e+00, -9.8822524e-06, 0.0000000e+00, -2.7003524e-07, 0.0000000e+00,
1.3263993e-07 },
{ 1.4163726e-07, 0.0000000e+00, -2.7824870e-07, 0.0000000e+00, -9.2977181e-06,
0.0000000e+00, -3.8490239e-04, 0.0000000e+00, 3.5260588e-04, 0.0000000e+00,
3.6420460e-04, 0.0000000e+00, 1.0000110e+00, 0.0000000e+00, 3.6420460e-04,
0.0000000e+00, 3.5260588e-04, 0.0000000e+00, -3.8490239e-04,
0.0000000e+00, -9.2977181e-06, 0.0000000e+00, -2.7824870e-07, 0.0000000e+00,
1.4163726e-07 },

```



```

{ 1.5225622e-07, 0.0000000e+00, -2.9847658e-07, 0.0000000e+00, -8.6322461e-06,
0.0000000e+00, -3.9817229e-04, 0.0000000e+00, 3.6682773e-04, 0.0000000e+00,
3.6520318e-04, 0.0000000e+00, 1.0000023e+00, 0.0000000e+00, 3.6520318e-04,
0.0000000e+00, 3.6682773e-04, 0.0000000e+00, -3.9817229e-04,
0.0000000e+00, -8.6322461e-06, 0.0000000e+00, -2.9847658e-07, 0.0000000e+00,
1.5225622e-07 },
{ 1.6478236e-07, 0.0000000e+00, -3.0432202e-07, 0.0000000e+00, -7.9865548e-06,
0.0000000e+00, -4.1291769e-04, 0.0000000e+00, 3.6138244e-04, 0.0000000e+00,
3.6524549e-04, 0.0000000e+00, 9.9999787e-01, 0.0000000e+00, 3.6524549e-04,
0.0000000e+00, 3.6138244e-04, 0.0000000e+00, -4.1291769e-04,
0.0000000e+00, -7.9865548e-06, 0.0000000e+00, -3.0432202e-07, 0.0000000e+00,
1.6478236e-07 },
{ 1.7700776e-07, 0.0000000e+00, -3.1917655e-07, 0.0000000e+00, -7.2525066e-06,
0.0000000e+00, -4.2693986e-04, 0.0000000e+00, 3.6739108e-04, 0.0000000e+00,
3.7398884e-04, 0.0000000e+00, 1.0000029e+00, 0.0000000e+00, 3.7398884e-04,
0.0000000e+00, 3.6739108e-04, 0.0000000e+00, -4.2693986e-04,
0.0000000e+00, -7.2525066e-06, 0.0000000e+00, -3.1917655e-07, 0.0000000e+00,
1.7700776e-07 },
{ 1.9190022e-07, 0.0000000e+00, -3.3997140e-07, 0.0000000e+00, -6.4636648e-06,
0.0000000e+00, -4.4353455e-04, 0.0000000e+00, 3.7785451e-04, 0.0000000e+00,
3.6609041e-04, 0.0000000e+00, 9.9999733e-01, 0.0000000e+00, 3.6609041e-04,
0.0000000e+00, 3.7785451e-04, 0.0000000e+00, -4.4353455e-04,
0.0000000e+00, -6.4636648e-06, 0.0000000e+00, -3.3997140e-07, 0.0000000e+00,
1.9190022e-07 },
{ 2.0687658e-07, 0.0000000e+00, -3.5116608e-07, 0.0000000e+00, -5.6529042e-06,
0.0000000e+00, -4.5943578e-04, 0.0000000e+00, 3.7761421e-04, 0.0000000e+00,
3.6593984e-04, 0.0000000e+00, 1.0000094e+00, 0.0000000e+00, 3.6593984e-04,
0.0000000e+00, 3.7761421e-04, 0.0000000e+00, -4.5943578e-04,
0.0000000e+00, -5.6529042e-06, 0.0000000e+00, -3.5116608e-07, 0.0000000e+00,
2.0687658e-07 },
{ 2.2409953e-07, 0.0000000e+00, -3.6155050e-07, 0.0000000e+00, -4.8704421e-06,
0.0000000e+00, -4.7715346e-04, 0.0000000e+00, 3.7500804e-04, 0.0000000e+00,
3.7232514e-04, 0.0000000e+00, 9.9998879e-01, 0.0000000e+00, 3.7232514e-04,
0.0000000e+00, 3.7500804e-04, 0.0000000e+00, -4.7715346e-04,
0.0000000e+00, -4.8704421e-06, 0.0000000e+00, -3.6155050e-07, 0.0000000e+00,
2.2409953e-07 },
{ 2.4214140e-07, 0.0000000e+00, -3.7828056e-07, 0.0000000e+00, -3.9947736e-06,
0.0000000e+00, -4.9507069e-04, 0.0000000e+00, 3.7903876e-04, 0.0000000e+00,
3.6711132e-04, 0.0000000e+00, 1.0000145e+00, 0.0000000e+00, 3.6711132e-04,
0.0000000e+00, 3.7903876e-04, 0.0000000e+00, -4.9507069e-04,
0.0000000e+00, -3.9947736e-06, 0.0000000e+00, -3.7828056e-07, 0.0000000e+00,
2.4214140e-07 },
{ 2.5911752e-07, 0.0000000e+00, -3.9510017e-07, 0.0000000e+00, -3.1209281e-06,
0.0000000e+00, -5.1130084e-04, 0.0000000e+00, 3.8404997e-04, 0.0000000e+00,
3.7099966e-04, 0.0000000e+00, 9.9999511e-01, 0.0000000e+00, 3.7099966e-04,
0.0000000e+00, 3.8404997e-04, 0.0000000e+00, -5.1130084e-04,
0.0000000e+00, -3.1209281e-06, 0.0000000e+00, -3.9510017e-07, 0.0000000e+00,
2.5911752e-07 },
{ 2.7884610e-07, 0.0000000e+00, -4.0799614e-07, 0.0000000e+00, -2.2609589e-06,
0.0000000e+00, -5.2960881e-04, 0.0000000e+00, 3.8353187e-04, 0.0000000e+00,
3.7634198e-04, 0.0000000e+00, 9.9999409e-01, 0.0000000e+00, 3.7634198e-04,
0.0000000e+00, 3.8353187e-04, 0.0000000e+00, -5.2960881e-04,
0.0000000e+00, -2.2609589e-06, 0.0000000e+00, -4.0799614e-07, 0.0000000e+00,
2.7884610e-07 },
{ 2.9602788e-07, 0.0000000e+00, -4.2291064e-07, 0.0000000e+00, -1.3532960e-06,
0.0000000e+00, -5.4495744e-04, 0.0000000e+00, 3.8704406e-04, 0.0000000e+00,
3.7601779e-04, 0.0000000e+00, 1.0000058e+00, 0.0000000e+00, 3.7601779e-04,
0.0000000e+00, 3.8704406e-04, 0.0000000e+00, -5.4495744e-04,
0.0000000e+00, -1.3532960e-06, 0.0000000e+00, -4.2291064e-07, 0.0000000e+00,
2.9602788e-07 },
{ 3.1619118e-07, 0.0000000e+00, -4.3132034e-07, 0.0000000e+00, -5.2733039e-07,
0.0000000e+00, -5.6257657e-04, 0.0000000e+00, 3.8295297e-04, 0.0000000e+00,
3.6733911e-04, 0.0000000e+00, 9.9999517e-01, 0.0000000e+00, 3.6733911e-04,
0.0000000e+00, 3.8295297e-04, 0.0000000e+00, -5.6257657e-04,
0.0000000e+00, -5.2733039e-07, 0.0000000e+00, -4.3132034e-07, 0.0000000e+00,
3.1619118e-07 },

```

{ 3.3473225e-07, 0.0000000e+00, -4.2760192e-07, 0.0000000e+00, 2.9030487e-07, 0.0000000e+00, -5.7827802e-04, 0.0000000e+00, 3.6988876e-04, 0.0000000e+00, 3.8353349e-04, 0.0000000e+00, 1.0000049e+00, 0.0000000e+00, 3.8353349e-04, 0.0000000e+00, 3.6988876e-04, 0.0000000e+00, -5.7827802e-04, 0.0000000e+00, 2.9030487e-07, 0.0000000e+00, -4.2760192e-07, 0.0000000e+00, 3.3473225e-07 },

{ 3.5431225e-07, 0.0000000e+00, -4.6086255e-07, 0.0000000e+00, 1.1840786e-06, 0.0000000e+00, -5.9436815e-04, 0.0000000e+00, 3.8840594e-04, 0.0000000e+00, 3.7925529e-04, 0.0000000e+00, 9.9999727e-01, 0.0000000e+00, 3.7925529e-04, 0.0000000e+00, 3.8840594e-04, 0.0000000e+00, -5.9436815e-04, 0.0000000e+00, 1.1840786e-06, 0.0000000e+00, -4.6086255e-07, 0.0000000e+00, 3.5431225e-07 },

{ 3.7197036e-07, 0.0000000e+00, -4.5896401e-07, 0.0000000e+00, 1.9141738e-06, 0.0000000e+00, -6.0860488e-04, 0.0000000e+00, 3.7822182e-04, 0.0000000e+00, 3.7854051e-04, 0.0000000e+00, 1.0000007e+00, 0.0000000e+00, 3.7854051e-04, 0.0000000e+00, 3.7822182e-04, 0.0000000e+00, -6.0860488e-04, 0.0000000e+00, 1.9141738e-06, 0.0000000e+00, -4.5896401e-07, 0.0000000e+00, 3.7197036e-07 },

{ 3.9094028e-07, 0.0000000e+00, -4.7393409e-07, 0.0000000e+00, 2.7060785e-06, 0.0000000e+00, -6.2349656e-04, 0.0000000e+00, 3.8166686e-04, 0.0000000e+00, 3.7728579e-04, 0.0000000e+00, 1.0000029e+00, 0.0000000e+00, 3.7728579e-04, 0.0000000e+00, 3.8166686e-04, 0.0000000e+00, -6.2349656e-04, 0.0000000e+00, 2.7060785e-06, 0.0000000e+00, -4.7393409e-07, 0.0000000e+00, 3.9094028e-07 },

{ 4.0641634e-07, 0.0000000e+00, -4.6408426e-07, 0.0000000e+00, 3.3154721e-06, 0.0000000e+00, -6.3548893e-04, 0.0000000e+00, 3.6713020e-04, 0.0000000e+00, 3.8524393e-04, 0.0000000e+00, 9.9999889e-01, 0.0000000e+00, 3.8524393e-04, 0.0000000e+00, 3.6713020e-04, 0.0000000e+00, -6.3548893e-04, 0.0000000e+00, 3.3154721e-06, 0.0000000e+00, -4.6408426e-07, 0.0000000e+00, 4.0641634e-07 },

{ 4.2228094e-07, 0.0000000e+00, -4.8785101e-07, 0.0000000e+00, 4.0367952e-06, 0.0000000e+00, -6.4736219e-04, 0.0000000e+00, 3.7917058e-04, 0.0000000e+00, 3.8470839e-04, 0.0000000e+00, 9.9999693e-01, 0.0000000e+00, 3.8470839e-04, 0.0000000e+00, 3.7917058e-04, 0.0000000e+00, -6.4736219e-04, 0.0000000e+00, 4.0367952e-06, 0.0000000e+00, -4.8785101e-07, 0.0000000e+00, 4.2228094e-07 },

{ 4.3772348e-07, 0.0000000e+00, -4.8667868e-07, 0.0000000e+00, 4.6238900e-06, 0.0000000e+00, -6.5889757e-04, 0.0000000e+00, 3.7190069e-04, 0.0000000e+00, 3.7260942e-04, 0.0000000e+00, 9.9999990e-01, 0.0000000e+00, 3.7260942e-04, 0.0000000e+00, 3.7190069e-04, 0.0000000e+00, -6.5889757e-04, 0.0000000e+00, 4.6238900e-06, 0.0000000e+00, -4.8667868e-07, 0.0000000e+00, 4.3772348e-07 },

{ 4.5021388e-07, 0.0000000e+00, -4.9993260e-07, 0.0000000e+00, 5.1350584e-06, 0.0000000e+00, -6.6797436e-04, 0.0000000e+00, 3.7716353e-04, 0.0000000e+00, 3.8661818e-04, 0.0000000e+00, 9.9999730e-01, 0.0000000e+00, 3.8661818e-04, 0.0000000e+00, 3.7716353e-04, 0.0000000e+00, -6.6797436e-04, 0.0000000e+00, 5.1350584e-06, 0.0000000e+00, -4.9993260e-07, 0.0000000e+00, 4.5021388e-07 },

{ 4.6123548e-07, 0.0000000e+00, -4.9227744e-07, 0.0000000e+00, 5.5482076e-06, 0.0000000e+00, -6.7602498e-04, 0.0000000e+00, 3.6724077e-04, 0.0000000e+00, 3.8514159e-04, 0.0000000e+00, 1.0000002e+00, 0.0000000e+00, 3.8514159e-04, 0.0000000e+00, 3.6724077e-04, 0.0000000e+00, -6.7602498e-04, 0.0000000e+00, 5.5482076e-06, 0.0000000e+00, -4.9227744e-07, 0.0000000e+00, 4.6123548e-07 },

{ 4.7093342e-07, 0.0000000e+00, -5.0788307e-07, 0.0000000e+00, 5.9620807e-06, 0.0000000e+00, -6.8286929e-04, 0.0000000e+00, 3.7519562e-04, 0.0000000e+00, 3.8270037e-04, 0.0000000e+00, 1.0000083e+00, 0.0000000e+00, 3.8270037e-04, 0.0000000e+00, 3.7519562e-04, 0.0000000e+00, -6.8286929e-04, 0.0000000e+00, 5.9620807e-06, 0.0000000e+00, -5.0788307e-07, 0.0000000e+00, 4.7093342e-07 },

{ 4.7796038e-07, 0.0000000e+00, -4.9866528e-07, 0.0000000e+00, 6.2078279e-06, 0.0000000e+00, -6.8793904e-04, 0.0000000e+00, 3.6589354e-04, 0.0000000e+00, 3.8531463e-04, 0.0000000e+00, 9.9999545e-01, 0.0000000e+00, 3.8531463e-04, 0.0000000e+00, 3.6589354e-04, 0.0000000e+00, -6.8793904e-04, 0.0000000e+00, 6.2078279e-06, 0.0000000e+00, -4.9866528e-07, 0.0000000e+00, 4.7796038e-07 },

{ 4.8431598e-07, 0.0000000e+00, -5.0620252e-07, 0.0000000e+00, 6.4581137e-06, 0.0000000e+00, -6.9238442e-04, 0.0000000e+00, 3.6910310e-04, 0.0000000e+00, 3.8267438e-04, 0.0000000e+00, 1.0000074e+00, 0.0000000e+00, 3.8267438e-04, 0.0000000e+00, 3.6910310e-04, 0.0000000e+00, -6.9238442e-04, 0.0000000e+00, 6.4581137e-06, 0.0000000e+00, -5.0620252e-07, 0.0000000e+00, 4.8431598e-07 },

{ 4.8704099e-07, 0.0000000e+00, -5.0692875e-07, 0.0000000e+00, 6.5691230e-06, 0.0000000e+00, -6.9429199e-04, 0.0000000e+00, 3.6870298e-04, 0.0000000e+00, 3.8569997e-04, 0.0000000e+00, 1.0000058e+00, 0.0000000e+00, 3.8569997e-04, 0.0000000e+00, 3.6870298e-04, 0.0000000e+00, -6.9429199e-04, 0.0000000e+00, 6.5691230e-06, 0.0000000e+00, -5.0692875e-07, 0.0000000e+00, 4.8704099e-07 },

{ 4.8817909e-07, 0.0000000e+00, -5.0914948e-07, 0.0000000e+00, 6.6161365e-06, 0.0000000e+00, -6.9506895e-04, 0.0000000e+00, 3.6987590e-04, 0.0000000e+00, 3.8264932e-04, 0.0000000e+00, 9.9998602e-01, 0.0000000e+00, 3.8264932e-04, 0.0000000e+00, 3.6987590e-04, 0.0000000e+00, -6.9506895e-04, 0.0000000e+00, 6.6161365e-06, 0.0000000e+00, -5.0914948e-07, 0.0000000e+00, 4.8817909e-07 },

{ 4.8704099e-07, 0.0000000e+00, -5.0692875e-07, 0.0000000e+00, 6.5691230e-06, 0.0000000e+00, -6.9429199e-04, 0.0000000e+00, 3.6870298e-04, 0.0000000e+00, 3.8569997e-04, 0.0000000e+00, 1.0000058e+00, 0.0000000e+00, 3.8569997e-04, 0.0000000e+00, 3.6870298e-04, 0.0000000e+00, -6.9429199e-04, 0.0000000e+00, 6.5691230e-06, 0.0000000e+00, -5.0692875e-07, 0.0000000e+00, 4.8704099e-07 },

{ 4.8431598e-07, 0.0000000e+00, -5.0620252e-07, 0.0000000e+00, 6.4581137e-06, 0.0000000e+00, -6.9238442e-04, 0.0000000e+00, 3.6910310e-04, 0.0000000e+00, 3.8267438e-04, 0.0000000e+00, 1.0000074e+00, 0.0000000e+00, 3.8267438e-04, 0.0000000e+00, 3.6910310e-04, 0.0000000e+00, -6.9238442e-04, 0.0000000e+00, 6.4581137e-06, 0.0000000e+00, -5.0620252e-07, 0.0000000e+00, 4.8431598e-07 },

{ 4.7796038e-07, 0.0000000e+00, -4.9866528e-07, 0.0000000e+00, 6.2078279e-06, 0.0000000e+00, -6.8793904e-04, 0.0000000e+00, 3.6589354e-04, 0.0000000e+00, 3.8531463e-04, 0.0000000e+00, 9.9999545e-01, 0.0000000e+00, 3.8531463e-04, 0.0000000e+00, 3.6589354e-04, 0.0000000e+00, -6.8793904e-04, 0.0000000e+00, 6.2078279e-06, 0.0000000e+00, -4.9866528e-07, 0.0000000e+00, 4.7796038e-07 },

{ 4.7093342e-07, 0.0000000e+00, -5.0788307e-07, 0.0000000e+00, 5.9620807e-06, 0.0000000e+00, -6.8286929e-04, 0.0000000e+00, 3.7519562e-04, 0.0000000e+00, 3.8270037e-04, 0.0000000e+00, 1.0000083e+00, 0.0000000e+00, 3.8270037e-04, 0.0000000e+00, 3.7519562e-04, 0.0000000e+00, -6.8286929e-04, 0.0000000e+00, 5.9620807e-06, 0.0000000e+00, -5.0788307e-07, 0.0000000e+00, 4.7093342e-07 },

{ 4.6123548e-07, 0.0000000e+00, -4.9227744e-07, 0.0000000e+00, 5.5482076e-06, 0.0000000e+00, -6.7602498e-04, 0.0000000e+00, 3.6724077e-04, 0.0000000e+00, 3.8514159e-04, 0.0000000e+00, 1.0000002e+00, 0.0000000e+00, 3.8514159e-04, 0.0000000e+00, 3.6724077e-04, 0.0000000e+00, -6.7602498e-04, 0.0000000e+00, 5.5482076e-06, 0.0000000e+00, -4.9227744e-07, 0.0000000e+00, 4.6123548e-07 },

{ 4.5021388e-07, 0.0000000e+00, -4.9993260e-07, 0.0000000e+00, 5.1350584e-06, 0.0000000e+00, -6.6797436e-04, 0.0000000e+00, 3.7716353e-04, 0.0000000e+00, 3.8661818e-04, 0.0000000e+00, 9.9999730e-01, 0.0000000e+00, 3.8661818e-04, 0.0000000e+00, 3.7716353e-04, 0.0000000e+00, -6.6797436e-04, 0.0000000e+00, 5.1350584e-06, 0.0000000e+00, -4.9993260e-07, 0.0000000e+00, 4.5021388e-07 },

{ 4.3772348e-07, 0.0000000e+00, -4.8667868e-07, 0.0000000e+00, 4.6238900e-06, 0.0000000e+00, -6.5889757e-04, 0.0000000e+00, 3.7190069e-04, 0.0000000e+00, 3.7260942e-04, 0.0000000e+00, 9.9999990e-01, 0.0000000e+00, 3.7260942e-04, 0.0000000e+00, 3.7190069e-04, 0.0000000e+00, -6.5889757e-04, 0.0000000e+00, 4.6238900e-06, 0.0000000e+00, -4.8667868e-07, 0.0000000e+00, 4.3772348e-07 },

{ 4.2228094e-07, 0.0000000e+00, -4.8785101e-07, 0.0000000e+00, 4.0367952e-06, 0.0000000e+00, -6.4736219e-04, 0.0000000e+00, 3.7917058e-04, 0.0000000e+00, 3.8470839e-04, 0.0000000e+00, 9.9999693e-01, 0.0000000e+00, 3.8470839e-04, 0.0000000e+00, 3.7917058e-04, 0.0000000e+00, -6.4736219e-04, 0.0000000e+00, 4.0367952e-06, 0.0000000e+00, -4.8785101e-07, 0.0000000e+00, 4.2228094e-07 },

{ 4.0641634e-07, 0.0000000e+00, -4.6408426e-07, 0.0000000e+00, 3.3154721e-06, 0.0000000e+00, -6.3548893e-04, 0.0000000e+00, 3.6713020e-04, 0.0000000e+00, 3.8524393e-04, 0.0000000e+00, 9.9999889e-01, 0.0000000e+00, 3.8524393e-04, 0.0000000e+00, 3.6713020e-04, 0.0000000e+00, -6.3548893e-04, 0.0000000e+00, 3.3154721e-06, 0.0000000e+00, -4.6408426e-07, 0.0000000e+00, 4.0641634e-07 },

{ 3.9094028e-07, 0.0000000e+00, -4.7393409e-07, 0.0000000e+00, 2.7060785e-06, 0.0000000e+00, -6.2349656e-04, 0.0000000e+00, 3.8166686e-04, 0.0000000e+00, 3.7728579e-04, 0.0000000e+00, 1.0000029e+00, 0.0000000e+00, 3.7728579e-04, 0.0000000e+00, 3.8166686e-04, 0.0000000e+00, -6.2349656e-04, 0.0000000e+00, 2.7060785e-06, 0.0000000e+00, -4.7393409e-07, 0.0000000e+00, 3.9094028e-07 },

{ 3.7197036e-07, 0.0000000e+00, -4.5896401e-07, 0.0000000e+00, 1.9141738e-06, 0.0000000e+00, -6.0860488e-04, 0.0000000e+00, 3.7822182e-04, 0.0000000e+00, 3.7854051e-04, 0.0000000e+00, 1.0000007e+00, 0.0000000e+00, 3.7854051e-04, 0.0000000e+00, 3.7822182e-04, 0.0000000e+00, -6.0860488e-04, 0.0000000e+00, 1.9141738e-06, 0.0000000e+00, -4.5896401e-07, 0.0000000e+00, 3.7197036e-07 },

{ 3.5431225e-07, 0.0000000e+00, -4.6086255e-07, 0.0000000e+00, 1.1840786e-06, 0.0000000e+00, -5.9436815e-04, 0.0000000e+00, 3.8840594e-04, 0.0000000e+00, 3.7925529e-04, 0.0000000e+00, 9.9999727e-01, 0.0000000e+00, 3.7925529e-04, 0.0000000e+00, 3.8840594e-04, 0.0000000e+00, -5.9436815e-04, 0.0000000e+00, 1.1840786e-06, 0.0000000e+00, -4.6086255e-07, 0.0000000e+00, 3.5431225e-07 },

```

{ 3.3473225e-07, 0.0000000e+00, -4.2760192e-07, 0.0000000e+00, 2.9030487e-07,
0.0000000e+00, -5.7827802e-04, 0.0000000e+00, 3.6988876e-04, 0.0000000e+00,
3.8353349e-04, 0.0000000e+00, 1.0000049e+00, 0.0000000e+00, 3.8353349e-04,
0.0000000e+00, 3.6988876e-04, 0.0000000e+00, -5.7827802e-04, 0.0000000e+00,
2.9030487e-07, 0.0000000e+00, -4.2760192e-07, 0.0000000e+00, 3.3473225e-07 },
{ 3.1619118e-07, 0.0000000e+00, -4.3132034e-07, 0.0000000e+00, -5.2733039e-07,
0.0000000e+00, -5.6257657e-04, 0.0000000e+00, 3.8295297e-04, 0.0000000e+00,
3.6733911e-04, 0.0000000e+00, 9.9999517e-01, 0.0000000e+00, 3.6733911e-04,
0.0000000e+00, 3.8295297e-04, 0.0000000e+00, -5.6257657e-04,
0.0000000e+00, -5.2733039e-07, 0.0000000e+00, -4.3132034e-07, 0.0000000e+00,
3.1619118e-07 },
{ 2.9602788e-07, 0.0000000e+00, -4.2291064e-07, 0.0000000e+00, -1.3532960e-06,
0.0000000e+00, -5.4495744e-04, 0.0000000e+00, 3.8704406e-04, 0.0000000e+00,
3.7601779e-04, 0.0000000e+00, 1.0000058e+00, 0.0000000e+00, 3.7601779e-04,
0.0000000e+00, 3.8704406e-04, 0.0000000e+00, -5.4495744e-04,
0.0000000e+00, -1.3532960e-06, 0.0000000e+00, -4.2291064e-07, 0.0000000e+00,
2.9602788e-07 },
{ 2.7884610e-07, 0.0000000e+00, -4.0799614e-07, 0.0000000e+00, -2.2609589e-06,
0.0000000e+00, -5.2960881e-04, 0.0000000e+00, 3.8353187e-04, 0.0000000e+00,
3.7634198e-04, 0.0000000e+00, 9.9999409e-01, 0.0000000e+00, 3.7634198e-04,
0.0000000e+00, 3.8353187e-04, 0.0000000e+00, -5.2960881e-04,
0.0000000e+00, -2.2609589e-06, 0.0000000e+00, -4.0799614e-07, 0.0000000e+00,
2.7884610e-07 },
{ 2.5911752e-07, 0.0000000e+00, -3.9510017e-07, 0.0000000e+00, -3.1209281e-06,
0.0000000e+00, -5.1130084e-04, 0.0000000e+00, 3.8404997e-04, 0.0000000e+00,
3.7099966e-04, 0.0000000e+00, 9.9999511e-01, 0.0000000e+00, 3.7099966e-04,
0.0000000e+00, 3.8404997e-04, 0.0000000e+00, -5.1130084e-04,
0.0000000e+00, -3.1209281e-06, 0.0000000e+00, -3.9510017e-07, 0.0000000e+00,
2.5911752e-07 },
{ 2.4214140e-07, 0.0000000e+00, -3.7828056e-07, 0.0000000e+00, -3.9947736e-06,
0.0000000e+00, -4.9507069e-04, 0.0000000e+00, 3.7903876e-04, 0.0000000e+00,
3.6711132e-04, 0.0000000e+00, 1.0000145e+00, 0.0000000e+00, 3.6711132e-04,
0.0000000e+00, 3.7903876e-04, 0.0000000e+00, -4.9507069e-04,
0.0000000e+00, -3.9947736e-06, 0.0000000e+00, -3.7828056e-07, 0.0000000e+00,
2.4214140e-07 },
{ 2.2409953e-07, 0.0000000e+00, -3.6155050e-07, 0.0000000e+00, -4.8704421e-06,
0.0000000e+00, -4.7715346e-04, 0.0000000e+00, 3.7500804e-04, 0.0000000e+00,
3.7232514e-04, 0.0000000e+00, 9.9998879e-01, 0.0000000e+00, 3.7232514e-04,
0.0000000e+00, 3.7500804e-04, 0.0000000e+00, -4.7715346e-04,
0.0000000e+00, -4.8704421e-06, 0.0000000e+00, -3.6155050e-07, 0.0000000e+00,
2.2409953e-07 },
{ 2.0687658e-07, 0.0000000e+00, -3.5116608e-07, 0.0000000e+00, -5.6529042e-06,
0.0000000e+00, -4.5943578e-04, 0.0000000e+00, 3.7761421e-04, 0.0000000e+00,
3.6593984e-04, 0.0000000e+00, 1.0000094e+00, 0.0000000e+00, 3.6593984e-04,
0.0000000e+00, 3.7761421e-04, 0.0000000e+00, -4.5943578e-04,
0.0000000e+00, -5.6529042e-06, 0.0000000e+00, -3.5116608e-07, 0.0000000e+00,
2.0687658e-07 },
{ 1.9190022e-07, 0.0000000e+00, -3.3997140e-07, 0.0000000e+00, -6.4636648e-06,
0.0000000e+00, -4.4353455e-04, 0.0000000e+00, 3.7785451e-04, 0.0000000e+00,
3.6609041e-04, 0.0000000e+00, 9.9999733e-01, 0.0000000e+00, 3.6609041e-04,
0.0000000e+00, 3.7785451e-04, 0.0000000e+00, -4.4353455e-04,
0.0000000e+00, -6.4636648e-06, 0.0000000e+00, -3.3997140e-07, 0.0000000e+00,
1.9190022e-07 },
{ 1.7700776e-07, 0.0000000e+00, -3.1917655e-07, 0.0000000e+00, -7.2525066e-06,
0.0000000e+00, -4.2693986e-04, 0.0000000e+00, 3.6739108e-04, 0.0000000e+00,
3.7398884e-04, 0.0000000e+00, 1.0000029e+00, 0.0000000e+00, 3.7398884e-04,
0.0000000e+00, 3.6739108e-04, 0.0000000e+00, -4.2693986e-04,
0.0000000e+00, -7.2525066e-06, 0.0000000e+00, -3.1917655e-07, 0.0000000e+00,
1.7700776e-07 },
{ 1.6478236e-07, 0.0000000e+00, -3.0432202e-07, 0.0000000e+00, -7.9865548e-06,
0.0000000e+00, -4.1291769e-04, 0.0000000e+00, 3.6138244e-04, 0.0000000e+00,
3.6524549e-04, 0.0000000e+00, 9.9999787e-01, 0.0000000e+00, 3.6524549e-04,
0.0000000e+00, 3.6138244e-04, 0.0000000e+00, -4.1291769e-04,
0.0000000e+00, -7.9865548e-06, 0.0000000e+00, -3.0432202e-07, 0.0000000e+00,
1.6478236e-07 },

```

```

{ 1.5225622e-07, 0.0000000e+00, -2.9847658e-07, 0.0000000e+00, -8.6322461e-06,
0.0000000e+00, -3.9817229e-04, 0.0000000e+00, 3.6682773e-04, 0.0000000e+00,
3.6520318e-04, 0.0000000e+00, 1.0000023e+00, 0.0000000e+00, 3.6520318e-04,
0.0000000e+00, 3.6682773e-04, 0.0000000e+00, -3.9817229e-04,
0.0000000e+00, -8.6322461e-06, 0.0000000e+00, -2.9847658e-07, 0.0000000e+00,
1.5225622e-07 },
{ 1.4163726e-07, 0.0000000e+00, -2.7824870e-07, 0.0000000e+00, -9.2977181e-06,
0.0000000e+00, -3.8490239e-04, 0.0000000e+00, 3.5260588e-04, 0.0000000e+00,
3.6420460e-04, 0.0000000e+00, 1.0000110e+00, 0.0000000e+00, 3.6420460e-04,
0.0000000e+00, 3.5260588e-04, 0.0000000e+00, -3.8490239e-04,
0.0000000e+00, -9.2977181e-06, 0.0000000e+00, -2.7824870e-07, 0.0000000e+00,
1.4163726e-07 },
{ 1.3263993e-07, 0.0000000e+00, -2.7003524e-07, 0.0000000e+00, -9.8822524e-06,
0.0000000e+00, -3.7356560e-04, 0.0000000e+00, 3.5176466e-04, 0.0000000e+00,
3.6332857e-04, 0.0000000e+00, 1.0000102e+00, 0.0000000e+00, 3.6332857e-04,
0.0000000e+00, 3.5176466e-04, 0.0000000e+00, -3.7356560e-04,
0.0000000e+00, -9.8822524e-06, 0.0000000e+00, -2.7003524e-07, 0.0000000e+00,
1.3263993e-07 },
{ 1.2588236e-07, 0.0000000e+00, -2.6200461e-07, 0.0000000e+00, -1.0461199e-05,
0.0000000e+00, -3.6487563e-04, 0.0000000e+00, 3.4857949e-04, 0.0000000e+00,
3.6248811e-04, 0.0000000e+00, 9.9999030e-01, 0.0000000e+00, 3.6248811e-04,
0.0000000e+00, 3.4857949e-04, 0.0000000e+00, -3.6487563e-04,
0.0000000e+00, -1.0461199e-05, 0.0000000e+00, -2.6200461e-07, 0.0000000e+00,
1.2588236e-07 },
{ 1.2249635e-07, 0.0000000e+00, -2.6464047e-07, 0.0000000e+00, -1.1081786e-05,
0.0000000e+00, -3.6102224e-04, 0.0000000e+00, 3.5541117e-04, 0.0000000e+00,
3.5963495e-04, 0.0000000e+00, 1.0000056e+00, 0.0000000e+00, 3.5963495e-04,
0.0000000e+00, 3.5541117e-04, 0.0000000e+00, -3.6102224e-04,
0.0000000e+00, -1.1081786e-05, 0.0000000e+00, -2.6464047e-07, 0.0000000e+00,
1.2249635e-07 },
{ 1.2357771e-07, 0.0000000e+00, -2.6251894e-07, 0.0000000e+00, -1.1825179e-05,
0.0000000e+00, -3.6305811e-04, 0.0000000e+00, 3.4969594e-04, 0.0000000e+00,
3.6185021e-04, 0.0000000e+00, 1.0000091e+00, 0.0000000e+00, 3.6185021e-04,
0.0000000e+00, 3.4969594e-04, 0.0000000e+00, -3.6305811e-04,
0.0000000e+00, -1.1825179e-05, 0.0000000e+00, -2.6251894e-07, 0.0000000e+00,
1.2357771e-07 },
{ 1.3964719e-07, 0.0000000e+00, -2.9742459e-07, 0.0000000e+00, -1.3181384e-05,
0.0000000e+00, -3.8654437e-04, 0.0000000e+00, 3.7214108e-04, 0.0000000e+00,
3.6667915e-04, 0.0000000e+00, 9.9999586e-01, 0.0000000e+00, 3.6667915e-04,
0.0000000e+00, 3.7214108e-04, 0.0000000e+00, -3.8654437e-04,
0.0000000e+00, -1.3181384e-05, 0.0000000e+00, -2.9742459e-07, 0.0000000e+00,
1.3964719e-07 },
{ 1.3994244e-07, 0.0000000e+00, -2.9058151e-07, 0.0000000e+00, -1.3757007e-05,
0.0000000e+00, -3.8711165e-04, 0.0000000e+00, 3.6186281e-04, 0.0000000e+00,
3.7702263e-04, 0.0000000e+00, 1.0000049e+00, 0.0000000e+00, 3.7702263e-04,
0.0000000e+00, 3.6186281e-04, 0.0000000e+00, -3.8711165e-04,
0.0000000e+00, -1.3757007e-05, 0.0000000e+00, -2.9058151e-07, 0.0000000e+00,
1.3994244e-07 },
{ 3.4766980e-08, 0.0000000e+00, -6.7631578e-08, 0.0000000e+00, -6.9749736e-06,
0.0000000e+00, -1.9242196e-04, 0.0000000e+00, 1.6298227e-04, 0.0000000e+00,
3.5405288e-04, 0.0000000e+00, 9.9999403e-01, 0.0000000e+00, 3.5405288e-04,
0.0000000e+00, 1.6298227e-04, 0.0000000e+00, -1.9242196e-04,
0.0000000e+00, -6.9749736e-06, 0.0000000e+00, -6.7631578e-08, 0.0000000e+00,
3.4766980e-08 }
}

```

The test sequences specified in Table AMD1.5 ff have to be applied. The testing shall be done using the test procedure defined above. The conformance of the underlying downmix decoder shall be tested before conformance testing is done for the MPEG Surround decoder. The MPEG Surround decoder is based on a pseudo QMF filterbank. This is the most critical part of the MPEG Surround Tool in terms of precision. Hence, in order to simplify conformance testing, it is recommended to first check the accuracy of the QMF implementation.

8.5.3 Test sequences

To test MPEG Surround decoders, ISO/IEC JTC 1/SC 29/WG 11 supplies a number of test sequences. The naming convention of these bitstreams is as follows: The first part of the name (the part preceding the first underscore) specifies the downmix coder that was used for the respective test sequences according to Table AMD1.3. The second part of the name (between the first and the last underscore) specifies the properties of the test sequence in question according to Table AMD1.4. The test sequences are defined in Table AMD1.5 ff.

**Table AMD1.3 — Mapping between file prefix and downmix codec**

| File prefix | Downmix coder              |
|-------------|----------------------------|
| aac         | MPEG-4 AAC                 |
| heaac       | MPEG-4 High Efficiency AAC |
| l2          | MPEG-1 Layer II            |
| l3          | MPEG-1 Layer III           |
| pcm         | PCM                        |

**Table AMD1.4 — Mapping between second part of file name and bitstream properties**

| File basename | Bitstream properties                     |
|---------------|--|
| _qmf_         | Tests the QMF implementation             |
| _tree_        | Tests various tree configurations        |
| _arbtrees_    | Tests arbitrary tree configuration       |
| _quant_       | Tests various quantization modes         |
| _smooth_      | Tests parameter smoothing                |
| _shape_       | Tests temporal shaping tools             |
| _param_       | Tests various numbers of parameter bands |
| _ts_          | Tests various numbers of time slots      |
| _oneicc_      | Tests single ICC                         |
| _mtx_         | Tests integrated matrixing               |
| _res_         | Tests residual coding                    |
| _arbdmx_      | Tests arbitrary downmix                  |
| _arbdmxres_   | Tests arbitrary downmix residual         |

Table AMD1.5 — List of MPEG Surround conformance test sequences with MPEG-4 AAC profile downmix

| Sequence           |                      | aac_mps_oneicc | aac_mps_param_4 | aac_mps_param_5 | aac_mps_param_7 | aac_mps_param_10 | aac_mps_param_14 | aac_mps_param_20 | aac_mps_param_28 | aac_mps_qmf | aac_mps_quant_0 |
|--------------------|----------------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|-------------|-----------------|
|                    |                      |                |                 |                 |                 |                  |                  |                  |                  |             |                 |
| downmix coder      | AOT                  | 2              | 2               | 2               | 2               | 2                | 2                | 2                | 2                | 2           | 2               |
|                    | extAOT               | --             | --              | --              | --              | --               | --               | --               | --               | --          | --              |
|                    | backwards compatible | --             | --              | --              | --              | --               | --               | --               | --               | --          | --              |
|                    | SBR present          | --             | --              | --              | --              | --               | --               | --               | --               | --          | --              |
|                    | SSC Embedding        | --             | --              | --              | --              | --               | --               | --               | --               | --          | --              |
|                    | number of channels   | 2              | 2               | 2               | 2               | 2                | 2                | 2                | 2                | 1           | 2               |
|                    | sampling frequency   | 48000          | 48000           | 48000           | 48000           | 48000            | 48000            | 48000            | 48000            | 48000       | 48000           |
|                    | frame length         | 1024           | 1024            | 1024            | 1024            | 1024             | 1024             | 1024             | 1024             | 1024        | 1024            |
| time slots / frame |                      | 16             | 16              | 16              | 16              | 16               | 16               | 16               | 16               | 16          | 16              |
| parameter bands    |                      | 28             | 4               | 5               | 7               | 10               | 14               | 20               | 28               | 28          | 28              |
| tree configuration |                      | 2              | 2               | 2               | 2               | 2                | 2                | 2                | 2                | 2           | 2               |
| quantization mode  |                      | 0              | 0               | 0               | 0               | 0                | 0                | 0                | 0                | 0           | 0               |
| one ICC            |                      | 1              | 0               | 0               | 0               | 0                | 0                | 0                | 0                | 0           | 0               |
| arbitrary downmix  |                      | 0              | 0               | 0               | 0               | 0                | 0                | 0                | 0                | 0           | 0               |
| arbitrary tree     |                      | 0              | 0               | 0               | 0               | 0                | 0                | 0                | 0                | 0           | 0               |
| surround gain      |                      | 2              | 2               | 2               | 2               | 2                | 2                | 2                | 2                | 2           | 2               |
| LFE gain           |                      | 1              | 1               | 1               | 1               | 1                | 1                | 1                | 1                | 1           | 1               |
| downmix gain       |                      | 4              | 4               | 4               | 4               | 4                | 4                | 4                | 4                | 4           | 4               |
| matrix comp. mode  |                      | 0              | 0               | 0               | 0               | 0                | 0                | 0                | 0                | 0           | 0               |

|                            |    |    |    |    |    |    |    |    |    |    |
|----------------------------|----|----|----|----|----|----|----|----|----|----|
| temp shape config          | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| decorr config              | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| energy based qu.           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 3D stereo                  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| number of LFE bands        | 2  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 2  |
| residual coding            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary downmix residual | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| residual sampling rate     | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual frames  | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual bands   | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TttModeLow                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| TttLow start band          | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TttLow stop band           | 28 | 4  | 5  | 7  | 10 | 14 | 20 | 28 | 28 | 28 |
| TttModeHigh                | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TttHigh start band         | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TttHigh stop band          | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table AMD1.6 — List of MPEG Surround conformance test sequences with MPEG-4 AAC profile downmix (ctd.)

| Sequence      | aac_mps_quant_1      | aac_mps_quant_2 | aac_mps_quant_3 | aac_mps_res | aac_mps_shape_ges | aac_mps_shape_stp | aac_mps_smooth | aac_mps_tree_5151 | aac_mps_tree_5152 | aac_mps_tree_525 |
|---------------|----------------------|-----------------|-----------------|-------------|-------------------|-------------------|----------------|-------------------|-------------------|------------------|
| downmix coder | AOT                  | 2               | 2               | 2           | 2                 | 2                 | 2              | 2                 | 2                 | 2                |
|               | extAOT               | --              | --              | --          | --                | --                | --             | --                | --                | --               |
|               | backwards compatible | --              | --              | --          | --                | --                | --             | --                | --                | --               |
|               | SBR present          | --              | --              | --          | --                | --                | --             | --                | --                | --               |



|                                   |                           |       |       |       |       |       |       |       |       |       |       |
|-----------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                   | <b>SSC Embedding</b>      | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    |
|                                   | <b>number of channels</b> | 2     | 2     | 2     | 2     | 2     | 2     | 1     | 1     | 2     | 2     |
|                                   | <b>sampling frequency</b> | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 |
|                                   | <b>frame length</b>       | 1024  | 1024  | 1024  | 1024  | 1024  | 1024  | 1024  | 1024  | 1024  | 1024  |
| <b>time slots / frame</b>         | 16                        | 16    | 16    | 16    | 16    | 16    | 16    | 16    | 16    | 16    | 16    |
| <b>parameter bands</b>            | 28                        | 28    | 28    | 28    | 28    | 28    | 28    | 28    | 28    | 28    | 28    |
| <b>tree configuration</b>         | 2                         | 0     | 0     | 2     | 2     | 2     | 2     | 0     | 0     | 1     | 2     |
| <b>quantization mode</b>          | 1                         | 2     | 3     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>one ICC</b>                    | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>arbitrary downmix</b>          | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>arbitrary tree</b>             | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>surround gain</b>              | 2                         | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |
| <b>LFE gain</b>                   | 1                         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     |
| <b>downmix gain</b>               | 4                         | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     |
| <b>matrix comp. mode</b>          | 0                         | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     |
| <b>temp shape config</b>          | 0                         | 0     | 0     | 0     | 2     | 2     | 1     | 0     | 0     | 0     | 0     |
| <b>decorr config</b>              | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 2     | 0     |
| <b>energy based qu.</b>           | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>3D stereo</b>                  | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>number of LFE bands</b>        | 2                         | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |
| <b>residual coding</b>            | 0                         | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>arbitrary downmix residual</b> | 0                         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| <b>residual sampling rate</b>     | --                        | --    | --    | 48000 | --    | --    | --    | --    | --    | --    | --    |
| <b>number of residual frames</b>  | --                        | --    | --    | 1     | --    | --    | --    | --    | --    | --    | --    |

|                          |    |    |    |         |    |    |    |    |    |    |
|--------------------------|----|----|----|---------|----|----|----|----|----|----|
| number of residual bands | -- | -- | -- | 7,7,7,7 | -- | -- | -- | -- | -- | -- |
| TttModeLow               | 1  | -- | -- | 1       | 1  | 1  | 1  | -- | -- | 1  |
| TttLow start band        | 0  | -- | -- | 0       | 0  | 0  | 0  | -- | -- | 0  |
| TttLow stop band         | 28 | -- | -- | 28      | 28 | 28 | 28 | -- | -- | 28 |
| TttModeHigh              | 0  | -- | -- | 0       | 0  | 0  | 0  | -- | -- | 0  |
| TttHigh start band       | -- | -- | -- | --      | -- | -- | -- | -- | -- | -- |
| TttHigh stop band        | -- | -- | -- | --      | -- | -- | -- | -- | -- | -- |

Table AMD1.7 — List of MPEG Surround conformance test sequences with MPEG-4 High Efficiency AAC profile downmix

| Sequence           |                      | heaac_mps_oneicc | heaac_mps_param_4 | heaac_mps_param_5 | heaac_mps_param_7 | heaac_mps_param_10 | heaac_mps_param_14 | heaac_mps_param_20 | heaac_mps_param_28 | heaac_mps_qmf | heaac_mps_quant_0 |
|--------------------|----------------------|------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|---------------|-------------------|
| downmix coder      | AOT                  | 2                | 2                 | 2                 | 2                 | 2                  | 2                  | 2                  | 2                  | 2             | 2                 |
|                    | extAOT               | 5                | 5                 | 5                 | 5                 | 5                  | 5                  | 5                  | 5                  | 5             | 5                 |
|                    | backwards compatible | --               | --                | --                | --                | --                 | --                 | --                 | --                 | --            | --                |
|                    | SBR present          | 1                | 1                 | 1                 | 1                 | 1                  | 1                  | 1                  | 1                  | 1             | 1                 |
|                    | SSC Embedding        | --               | --                | --                | --                | --                 | --                 | --                 | --                 | --            | --                |
|                    | number of channels   | 2                | 2                 | 2                 | 2                 | 2                  | 2                  | 2                  | 2                  | 1             | 2                 |
|                    | sampling frequency   | 48000            | 48000             | 48000             | 48000             | 48000              | 48000              | 48000              | 48000              | 48000         | 48000             |
|                    | frame length         | 2048             | 2048              | 2048              | 2048              | 2048               | 2048               | 2048               | 2048               | 2048          | 2048              |
| time slots / frame | 32                   | 32               | 32                | 32                | 32                | 32                 | 32                 | 32                 | 32                 | 32            |                   |
| parameter bands    | 28                   | 4                | 5                 | 7                 | 10                | 14                 | 20                 | 28                 | 28                 | 20            |                   |
| tree configuration | 2                    | 2                | 2                 | 2                 | 2                 | 2                  | 2                  | 2                  | 2                  | 2             |                   |

|                            |  |    |    |    |    |    |    |    |    |    |    |    |
|----------------------------|--|----|----|----|----|----|----|----|----|----|----|----|
| quantization mode          |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| one ICC                    |  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary downmix          |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary tree             |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| surround gain              |  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| LFE gain                   |  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| downmix gain               |  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  |
| matrix comp. mode          |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| temp shape config          |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| decorr config              |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| energy based qu.           |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 3D stereo                  |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| number of LFE bands        |  | 2  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 2  |
| residual coding            |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary downmix residual |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| residual sampling rate     |  | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual frames  |  | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual bands   |  | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TttModeLow                 |  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| TttLow start band          |  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TttLow stop band           |  | 28 | 4  | 5  | 7  | 10 | 13 | 19 | 22 | 28 | 19 | 19 |
| TttModeHigh                |  | 0  | 0  | 0  | 0  | 0  | 5  | 5  | 5  | 0  | 5  | 5  |
| TttHigh start band         |  | -- | -- | -- | -- | -- | 13 | 19 | 22 | -- | 19 | 19 |
| TttHigh stop band          |  | -- | -- | -- | -- | -- | 14 | 20 | 28 | -- | 20 | 20 |

Table AMD1.8 — List of MPEG Surround conformance test sequences with MPEG-4 High Efficiency AAC profile downmix (ctd.)

| Sequence            | downmix coder |        |                      |             |               |                    |                    |              | time slots / frame | parameter bands | tree configuration | quantization mode | one ICC | arbitrary downmix | arbitrary tree | surround gain | LFE gain | downmix gain | matrix comp. mode |
|---------------------|---------------|--------|----------------------|-------------|---------------|--------------------|--------------------|--------------|--------------------|-----------------|--------------------|-------------------|---------|-------------------|----------------|---------------|----------|--------------|-------------------|
|                     | AOT           | extAOT | backwards compatible | SBR present | SSC Embedding | number of channels | sampling frequency | frame length |                    |                 |                    |                   |         |                   |                |               |          |              |                   |
| heaac_mps_quant_1   | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 2                  | 1                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_quant_2   | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 0                  | 2                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_quant_3   | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 0                  | 3                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_res       | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_shape_ges | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_shape_stp | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 1                 |
| heaac_mps_smooth    | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_tree_5151 | 2             | 5      | --                   | 1           | --            | 1                  | 48000              | 2048         | 32                 | 20              | 0                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_tree_5152 | 2             | 5      | --                   | 1           | --            | 2                  | 48000              | 2048         | 32                 | 20              | 1                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |
| heaac_mps_tree_525  | 2             | 5      | --                   | 1           | --            | 1                  | 48000              | 2048         | 32                 | 20              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        | 4            | 0                 |

|                            |    |    |    |         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----------------------------|----|----|----|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| temp shape config          | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |
| decorr config              | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| energy based qu.           | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 3D stereo                  | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| number of LFE bands        | 2  | 2  | 2  | 2       | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| residual coding            | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary downmix residual | 0  | 0  | 0  | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| residual sampling rate     | -- | -- | -- | 24000   | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual frames  | -- | -- | -- | 1       | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual bands   | -- | -- | -- | 7,7,7,7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TttModeLow                 | 1  | -- | -- | 1       | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| TttLow start band          | 0  | -- | -- | 0       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| TttLow stop band           | 19 | -- | -- | 22      | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| TttModeHigh                | 5  | -- | -- | 5       | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  |
| TttHigh start band         | 19 | -- | -- | 22      | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| TttHigh stop band          | 20 | -- | -- | 28      | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

Table AMD1.9 List of MPEG Surround conformance test sequences with MPEG-1 Layer II downmix

| Sequence   |                    | I2_mps_arbdmx | I2_mps_arbdmxres | I2_mps_mtx | I2_mps_oneicc | I2_mps_param_4 | I2_mps_param_5 | I2_mps_param_7 | I2_mps_param_10 | I2_mps_param_14 | I2_mps_param_20 | I2_mps_param_28 | I2_mps_qmf | I2_mps_quant_0 | I2_mps_quant_1 |
|------------|--------------------|---------------|------------------|------------|---------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|------------|----------------|----------------|
| core coder | ancCrcLen          | 0             | 0                | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
|            | number of channels | 2             | 2                | 2          | 2             | 2              | 2              | 2              | 2               | 2               | 2               | 2               | 2          | 2              | 1              |

|                            | sampling frequency | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 | 48000 |
|----------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                            | frame length       | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  | 1152  |
| time slots / frame         |                    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    |
| parameter bands            |                    | 28    | 28    | 28    | 28    | 4     | 5     | 7     | 10    | 14    | 20    | 28    | 28    | 28    | 28    |
| tree configuration         |                    | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 0     |
| quantization mode          |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     |
| one ICC                    |                    | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| arbitrary downmix          |                    | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| arbitrary tree             |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| surround gain              |                    | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |
| LFE gain                   |                    | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     |
| downmix gain               |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| matrix comp. mode          |                    | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| temp shape config          |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| decorr config              |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| energy based qu.           |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| 3D stereo                  |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| number of LFE bands        |                    | 2     | 2     | 2     | 2     | 1     | 1     | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     |
| residual coding            |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| arbitrary downmix residual |                    | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| residual sampling rate     |                    | --    | 32000 | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    |
| number of residual frames  |                    | --    | 1     | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    |
| number of residual bands   |                    | --    | 12    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    | --    |
| TttModeLow                 |                    | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | --    |
| TttLow start band          |                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | --    |

|                    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |
|--------------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| TttLow stop band   | 28 | 28 | 28 | 28 | 4  | 5  | 7  | 10 | 14 | 20 | 28 | 28 | 28  | -- |
| TttModeHigh        | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | -- |
| TttHigh start band | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | --  | -- |
| TttHigh stop band  | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | --  | -- |
| bsSmoothMode       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0  |
| bsQuantCoarseXXX   | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0,1 | 0  |

Table AMD1.10 — List of MPEG Surround conformance test sequences with MPEG-1 Layer II downmix (ctd.)

| Sequence         | core coder |                    |                    |              | time slots / frame | parameter bands | tree configuration | quantization mode | one ICC | arbitrary downmix | arbitrary tree | surround gain | LFE gain |
|------------------|------------|--------------------|--------------------|--------------|--------------------|-----------------|--------------------|-------------------|---------|-------------------|----------------|---------------|----------|
|                  | ancCrcLen  | number of channels | sampling frequency | frame length |                    |                 |                    |                   |         |                   |                |               |          |
| I2_mps_quant_2   | 0          | 1                  | 48000              | 1152         | 18                 | 28              | 0                  | 2                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_res       | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_shape_ges | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_shape_stp | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_smooth    | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_tree_5151 | 0          | 1                  | 48000              | 1152         | 18                 | 28              | 0                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_tree_5152 | 0          | 1                  | 48000              | 1152         | 18                 | 28              | 1                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_tree_7271 | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 3                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_tree_7272 | 0          | 2                  | 48000              | 1152         | 18                 | 28              | 4                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_ts_36     | 1          | 2                  | 48000              | 1152         | 36                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_32khz     | 0          | 2                  | 32000              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |
| I2_mps_44khz     | 0          | 2                  | 44100              | 1152         | 18                 | 28              | 2                  | 0                 | 0       | 0                 | 0              | 2             | 1        |

|                            |    |            |    |    |       |    |    |    |    |    |    |    |    |
|----------------------------|----|------------|----|----|-------|----|----|----|----|----|----|----|----|
| downmix gain               | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| matrix comp. mode          | 0  | 0          | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| temp shape config          | 0  | 0          | 2  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| decorr config              | 0  | 0          | 0  | 0  | 0     | 0  | 2  | 0  | 0  | 0  | 0  | 0  | 0  |
| energy based qu.           | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 3D stereo                  | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| number of LFE bands        | 2  | 2          | 2  | 2  | 2     | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| residual coding            | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| arbitrary downmix residual | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| residual sampling rate     | -- | 32000      | -- | -- | --    | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual frames  | -- | 1          | -- | -- | --    | -- | -- | -- | -- | -- | -- | -- | -- |
| number of residual bands   | -- | 0,18,18,19 | -- | -- | --    | -- | -- | -- | -- | -- | -- | -- | -- |
| TttModeLow                 | -- | 1          | 1  | 1  | 1     | -- | -- | 1  | 1  | 1  | 1  | 1  | 1  |
| TttLow start band          | -- | 0          | 0  | 0  | 0     | -- | -- | 0  | 0  | 0  | 0  | 0  | 0  |
| TttLow stop band           | -- | 28         | 28 | 28 | 28    | -- | -- | 28 | 28 | 28 | 28 | 28 | 28 |
| TttModeHigh                | -- | 0          | 0  | 0  | 0     | -- | -- | 0  | 0  | 0  | 0  | 0  | 0  |
| TttHigh start band         | -- | --         | -- | -- | --    | -- | -- | -- | -- | -- | -- | -- | -- |
| TttHigh stop band          | -- | --         | -- | -- | --    | -- | -- | -- | -- | -- | -- | -- | -- |
| bsSmoothMode               | 0  | 0          | 0  | 0  | 0...3 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| bsQuantCoarseXXX           | 0  | 0          | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |



Table AMD1.11 — List of MPEG Surround conformance test sequences with MPEG-1 Layer III downmix

| Sequence            | Sequence           |                   |            |               |                |                |                |                 |                 |                 |                 |            |                |                |
|---------------------|--------------------|-------------------|------------|---------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|------------|----------------|----------------|
|                     | I3_mps_arbdlmx     | I3_mps_arbdlmxres | I3_mps_mtx | I3_mps_oneicc | I3_mps_param_4 | I3_mps_param_5 | I3_mps_param_7 | I3_mps_param_10 | I3_mps_param_14 | I3_mps_param_20 | I3_mps_param_28 | I3_mps_qmf | I3_mps_quant_0 | I3_mps_quant_1 |
| core coder          | ancCrcLen          | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
|                     | number of channels | 2                 | 2          | 2             | 2              | 2              | 2              | 2               | 2               | 2               | 2               | 2          | 2              | 1              |
|                     | sampling frequency | 48000             | 48000      | 48000         | 48000          | 48000          | 48000          | 48000           | 48000           | 48000           | 48000           | 48000      | 48000          | 48000          |
|                     | frame length       | 1152              | 1152       | 1152          | 1152           | 1152           | 1152           | 1152            | 1152            | 1152            | 1152            | 1152       | 1152           | 1152           |
| time slots / frame  | 18                 | 18                | 18         | 18            | 18             | 18             | 18             | 18              | 18              | 18              | 18              | 18         | 18             | 18             |
| parameter bands     | 28                 | 28                | 28         | 28            | 4              | 5              | 7              | 10              | 14              | 20              | 28              | 28         | 28             | 28             |
| tree configuration  | 2                  | 2                 | 2          | 2             | 2              | 2              | 2              | 2               | 2               | 2               | 2               | 2          | 2              | 0              |
| quantization mode   | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 1              |
| one ICC             | 0                  | 0                 | 0          | 1             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| arbitrary downmix   | 1                  | 1                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| arbitrary tree      | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| surround gain       | 2                  | 2                 | 2          | 2             | 2              | 2              | 2              | 2               | 2               | 2               | 2               | 2          | 2              | 2              |
| LFE gain            | 1                  | 1                 | 1          | 1             | 1              | 1              | 1              | 1               | 1               | 1               | 1               | 1          | 1              | 1              |
| downmix gain        | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| matrix comp. mode   | 0                  | 0                 | 1          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| temp shape config   | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| decorr config       | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| energy based qu.    | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| 3D stereo           | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |
| number of LFE bands | 2                  | 2                 | 2          | 2             | 1              | 1              | 1              | 1               | 1               | 2               | 2               | 2          | 2              | 2              |
| residual coding     | 0                  | 0                 | 0          | 0             | 0              | 0              | 0              | 0               | 0               | 0               | 0               | 0          | 0              | 0              |