

# AES Standard - Method for Measurement of Weighted Peak Flutter of Analogue Sound Recording and Reproducing Equipment

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## Abstract

Weighted peak flutter is measured using a 3150-Hz tone transmitted through the equipment. The tone is frequency demodulated, frequency-response weighted, peak-to-peak detected, time-response weighted, and read out on a two-sigma statistical voltmeter over a period of at least 5 s. Results are reported as “weighted peak flutter of the recorder (or reproducer, or recording/reproducing system):  $\pm$  \_\_\_ percent.”

A toleranced graph and table give the frequency-response weighting (approximately at 6-dB-per-octave drop above and below 4 Hz, with an additional drop below 0,5 Hz). The statistical voltmeter is described; it is preferred, and replaces the quasi-peak meter (now deprecated) of the original standard.

Good engineering practices are given for the meter design. The rationale for this standard is given in an annex. This standard has technical requirements identical to IEC 60386 Ed.1 1972 as amended by IEC 60386-am1, 1988. Measurement results according to this standard are identical to those made according to the older standards originally published as IEEE Std-193, IEC 60386 Ed.1 1972, CCIR 409-2, and DIN 45 507.

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## Foreword

This foreword is not part of AES6-2008 *AES Standard - Method for Measurement of Weighted Peak Flutter of Sound Recording and Reproducing Equipment*.

This standard is an editorial revision of American National Standard S4.3-1972, originally published as IEEE Standard 193-1971 by the Institute of Electrical and Electronics Engineers.

In its attempt to find a reproducible test method for obtaining flutter measurements, the Recording and Reproducing Standards Subcommittee of the IEEE Group on Audio and Electroacoustics Standards Committee took into consideration the desirability of finding a method that did not require the services of one carefully trained operator for performing all the flutter measurements in a single laboratory. Consideration was given to weighted peak meters of the type called for in the German Standards, and a series of user tests was performed to (1) determine whether weighted meter readings agreed with the subjective judgements of a listening panel, (2) find out if weighted peak readings are more easily determined than those made with an instrument having the dynamics of the Standard Volume Indicator, and (3) check the willingness of recording equipment manufacturers and recording studios in the USA to change to a weighted peak measurement.

Because all of these test were favorable, the Committee developed the present document to supersede IEEE Std 193-1953 (ANSI Z57.1-1954). The new standard is an adaptation of the IEC Publication 386 (1972), and the technical requirements for the weighted peak flutter meter and the essence of the measuring procedures conform with those of the German Standard, DIN 45 507, 1996, the current CCIR Standard, 409-2, 1970, and the IEC publication. The technical requirements given for weighted peak meters are identical to those in DIN 45 507, and several different models are commercially available that meet the specifications of this standard.

The working group which undertook the investigation resulting in this standard and which prepared the final document consisted of: John G. McKnight (Chairman), Laurence Moore, Stephen F. Temmer, Arnold L. Seligson, and Donald Truax.

Appreciation is expressed to Dr. Hans Schiesser of the Institut für Rundfunktechnik (Hamburg, Germany) for his assistance in verifying the interpretations of the original German standard.

### Foreword to 2008 revision

This revision incorporates the text of clause 4, "Measuring equipment and Methods", of Amendment 1 to IEC 60386, published in 1988-03. This replaces the original clause 4, "Measuring Equipment" of IEC 386: 1972.

The new clause 4 specifies the same weighting frequency response curve as the original clause 4, but adds the new "Method 1: Two-sigma method (preferred)", while retaining the original quasi-peak meter as "Method 2 (deprecated)". The reason for this change is given in Annex A of the present standard.

We have made several revisions of the wording of the present text in order to clarify the original meanings.

JG McKnight  
Chair, working group SC-03-01

### Addendum 2012-10-11

At the request of the principal author the title of the document has been amended to indicate its application to "Analogue Sound Recording and Reproducing Equipment".

### Note on normative language

In AES standards documents, sentences containing the word "shall" are requirements for compliance with the document. Sentences containing the verb "should" are strong suggestions (recommendations). Sentences giving permission use the verb "may". Sentences expressing a possibility use the verb "can".

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## 0 Introduction

Flutter, wow, drift, and “scrape flutter” are all forms of distortion in analog recording and reproducing systems that use a moving medium. These are caused by undesired frequency modulation introduced into the signal by an irregular motion of the recording medium during the recording, duplicating, and reproducing processes.

## 1 Scope

This standard specifies the "weighted peak" method of measuring flutter of sound recorders and reproducers for normal audio usage. For special purposes - high speed duplicators, different speeds in recording and reproducing, etc. - special procedures not described here should, if required, be used. Flutter components at frequencies above the measurement bandwidth of this standard (e.g. "scrape flutter") are acknowledged to exist and can affect the subjective quality of an analog sound recorder, but are not included within the scope of this standard.

## 2 Normative references

No external reference documents are required for the application of this document.

## 3 Definitions

For the purposes of this standard, the following definitions shall apply:

### 3.1 Drift

Frequency modulation of the signal in the range below approximately 0,5 Hz resulting in distortion which may be perceived as a slow changing of the average pitch.

NOTE Measurement of drift is not covered by this standard

### 3.2 Wow

Frequency modulation of the signal in the range of approximately 0,5 Hz to 6 Hz resulting in distortion which may be perceived as a fluctuation of pitch of a tone or program.

NOTE Measurement of unweighted wow only is not covered by this standard.

### 3.3 Flutter

Frequency modulation of the signal in the range of approximately 6 Hz to 100 Hz resulting in distortion which may be perceived as a roughening of the sound quality of a tone or program.

NOTE Measurement of unweighted flutter only is not covered by this standard