

## Major third comparisons

The tables given below compare the qualities of major thirds: the higher the number, the sharper the major third. 0 is pure; average is the size 7 of equal temperament. The unit of measurement is 1/12 Pythagorean comma. Each column – representing the handling of the *diesis* – must total to 21 units in the three major thirds building it, within a pure octave. The mathematical model here is Georg Andreas Sorge’s from 1773, which corrects Johann Georg Neidhardt’s similar model of 1724 and 1732. (Neidhardt’s calculations were off by 1 in all of his major third sizes, in those two publications.)

Most of the temperaments here keep the most out-of-tune major thirds to the top row, i.e. preserving the relationships inherited from regular (“meantone”) temperaments. Those four major thirds were actually diminished fourths in most typical meantone layouts: G#-C, C#-F, F#-Bb, and B-Eb.

Bach’s temperament style for the WTC has the rare peak of E-G# as the brightest major third. Sorge’s own from 1758 appears to be a hybrid with the best practical features from Neidhardt, Bach, and equal temperament. It coincides with eleven notes of Neidhardt’s 1724 Big City (but not presented by Neidhardt anymore in 1732), with a higher G#. Eight of Sorge’s twelve notes are the same as Bach’s; of the other four, F and C# are slightly lower, and E and B are slightly higher. From that comparative perspective, seven major thirds are thus slightly moderated toward equal temperament (size 7): with C-E, F-A, and G-B each becoming wider, and E-G#, Db-F, A-C#, and B-D# each becoming narrower.

**References:** Mark Lindley’s articles *The Fisk Organ at Stanford* p120ff; *Stimmung und Temperatur* p276; Neidhardt’s 1724 and 1732 documents. Corrections 2006-7 to two Neidhardt examples here, which had been given with wrongly placed notes in both *New Grove* (Lindley 2001) and my article (2004-5). The note G was too low in 1724 Big City, and Ab too low in 1724 Village. There are yet more errors than this in J Murray Barbour’s presentations of Neidhardt temperaments, both in his own book (*Tuning and Temperament: A Historical Survey*, 1951/2004) and his various articles. See also: <http://www-personal.umich.edu/~bpl/larips/errata.html>

### Bach 1722 (*Das wohltemperirte Clavier*)

Ab-C	<b>8</b>	Db-F	<b>9</b>	F#-A#	<b>8</b>	B-D#	<b>9</b>
E-G#	<b>10</b>	A-C#	<b>9</b>	D-F#	<b>7</b>	G-B	<b>5</b>
C-E	<b>3</b>	F-A	<b>3</b>	Bb-D	<b>6</b>	Eb-G	<b>7</b>

### 1/4 comma meantone (syntonic comma)

Ab-C	<b>21</b>	Db-F	<b>21</b>	F#-A#	<b>21</b>	B-D#	<b>21</b>
E-G#	<b>0</b>	A-C#	<b>0</b>	D-F#	<b>0</b>	G-B	<b>0</b>
C-E	<b>0</b>	F-A	<b>0</b>	Bb-D	<b>0</b>	Eb-G	<b>0</b>

### 1/6 comma meantone (Pythagorean comma)

Ab-C	<b>15</b>	Db-F	<b>15</b>	F#-A#	<b>15</b>	B-D#	<b>15</b>
E-G#	<b>3</b>	A-C#	<b>3</b>	D-F#	<b>3</b>	G-B	<b>3</b>
C-E	<b>3</b>	F-A	<b>3</b>	Bb-D	<b>3</b>	Eb-G	<b>3</b>

### Sorge 1758 “especially good for *Chorton* organs...”

Ab-C	<b>8</b>	Db-F	<b>8</b>	F#-A#	<b>8</b>	B-D#	<b>8</b>
E-G#	<b>9</b>	A-C#	<b>8</b>	D-F#	<b>7</b>	G-B	<b>6</b>
C-E	<b>4</b>	F-A	<b>5</b>	Bb-D	<b>6</b>	Eb-G	<b>7</b>

**Werckmeister III, 1691 (later discarded by him in favor of equal and other temperaments)**

Ab-C	<b>11</b>	Db-F	<b>11</b>	F#-A#	<b>11</b>	B-D#	<b>8</b>
E-G#	<b>8</b>	A-C#	<b>8</b>	D-F#	<b>5</b>	G-B	<b>5</b>
C-E	<b>2</b>	F-A	<b>2</b>	Bb-D	<b>5</b>	Eb-G	<b>8</b>

**“Vallotti” 1680s forward (common Venetian temperament)**

Ab-C	<b>9</b>	Db-F	<b>11</b>	F#-A#	<b>11</b>	B-D#	<b>11</b>
E-G#	<b>9</b>	A-C#	<b>7</b>	D-F#	<b>5</b>	G-B	<b>3</b>
C-E	<b>3</b>	F-A	<b>3</b>	Bb-D	<b>5</b>	Eb-G	<b>7</b>

**Neidhardt 1724 Village, 1732 Small City**

Ab-C	<b>9</b>	Db-F	<b>9</b>	F#-A#	<b>9</b>	B-D#	<b>9</b>
E-G#	<b>9</b>	A-C#	<b>7</b>	D-F#	<b>5</b>	G-B	<b>4</b>
C-E	<b>3</b>	F-A	<b>5</b>	Bb-D	<b>7</b>	Eb-G	<b>8</b>

**Neidhardt 1724 Small City, 1732 Big City**

Ab-C	<b>9</b>	Db-F	<b>9</b>	F#-A#	<b>9</b>	B-D#	<b>8</b>
E-G#	<b>8</b>	A-C#	<b>8</b>	D-F#	<b>7</b>	G-B	<b>6</b>
C-E	<b>4</b>	F-A	<b>4</b>	Bb-D	<b>5</b>	Eb-G	<b>7</b>

**Neidhardt 1724 Big City**

Ab-C	<b>9</b>	Db-F	<b>8</b>	F#-A#	<b>8</b>	B-D#	<b>8</b>
E-G#	<b>8</b>	A-C#	<b>8</b>	D-F#	<b>7</b>	G-B	<b>6</b>
C-E	<b>4</b>	F-A	<b>5</b>	Bb-D	<b>6</b>	Eb-G	<b>7</b>

**Equal temperament (also Neidhardt’s recommendation for “Court”)**

Ab-C	<b>7</b>	Db-F	<b>7</b>	F#-A#	<b>7</b>	B-D#	<b>7</b>
E-G#	<b>7</b>	A-C#	<b>7</b>	D-F#	<b>7</b>	G-B	<b>7</b>
C-E	<b>7</b>	F-A	<b>7</b>	Bb-D	<b>7</b>	Eb-G	<b>7</b>

**Sorge 1744 “good for *Cammerton* harpsichords...”**

Ab-C	<b>9</b>	Db-F	<b>9</b>	F#-A#	<b>9</b>	B-D#	<b>9</b>
E-G#	<b>7</b>	A-C#	<b>7</b>	D-F#	<b>6</b>	G-B	<b>5</b>
C-E	<b>5</b>	F-A	<b>5</b>	Bb-D	<b>6</b>	Eb-G	<b>7</b>

**Kirnberger 1771 (and others 1740s-50s, and before)**

Ab-C	<b>11</b>	Db-F	<b>11</b>	F#-A#	<b>10</b>	B-D#	<b>10</b>
E-G#	<b>10</b>	A-C#	<b>7.25</b>	D-F#	<b>5.5</b>	G-B	<b>2.75</b>
C-E	<b>0</b>	F-A	<b>2.75</b>	Bb-D	<b>5.5</b>	Eb-G	<b>8.25</b>