Phon loudness functions, ELC(f, L), known as equal loudness-level contours (Fletcher & Munson, 1933) represent the sound pressure level in dB SPL of tones at frequency f that are perceived by normal-hearing listeners as equally loud as a 1 kHz tone at L dB SPL; the loudness of tones on a contour is defined as L phons. Because the auditory system operates as a real-time frequency analyzer (Helmholtz, 1884), the ELC has become the standard for defining the useful frequency and intensity ranges for normal hearing. The international ELC standard was recently revised with a classic loudness model representing updated measurements of phon data (Suzuki & Takeshima, JASA 116, 918-933, 2004 ELC). Data included in the ISO revision, show systematic departures from the classic model, which can be understood in terms of progress during the past 50 years in studies of the nonlinear auditory periphery and brainstem feedback. The updated model validates an earlier psychophysical study of the acoustic reflex (Rabinowitz & Goldstein, 1973; Rabinowitz, 1977), thereby providing a framework for mutually constructive interaction between psychophysical and physical study of the ear-brainstem system and its role in protecting hearing (Fletcher & Reopelle, JASA 32, 401-404, 1960). [NIH funded 1972-2004]