50hz frequency means

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The utility frequency, (power) line frequency (American English) or mains frequency (British English) is the nominal frequency of the oscillations of alternating current (AC) in a wide area synchronous grid transmitted from a power station to the end-user. In large parts of the world this is 50 Hz, although in the Americas and parts of Asia it is typically 60 Hz. Current usage by country or region is given in the list of mains electricity by country.

In practice, the exact frequency of the grid varies around the nominal frequency, reducing when the grid is heavily loaded, and speeding up when lightly loaded. However, most utilities will adjust generation onto the grid over the course of the day to ensure a constant number of cycles occur.[2] This is used by some clocks to accurately maintain their time.

Several factors influence the choice of frequency in an AC system.[3] Lighting, motors, transformers, generators, and transmission lines all have characteristics which depend on the power frequency. All of these factors interact and make selection of a power frequency a matter of considerable importance. The best frequency is a compromise among competing requirements.

The first applications of commercial electric power were incandescent lighting and commutator-type electric motors. Both devices operate well on DC, but DC could not be easily changed in voltage, and was generally only produced at the required utilization voltage.

If an incandescent lamp is operated on a low-frequency current, the filament cools on each half-cycle of the alternating current, leading to perceptible change in brightness and flicker of the lamps; the effect is more pronounced with arc lamps, and the later mercury-vapor lamps and fluorescent lamps. Open arc lamps made an audible buzz on alternating current, leading to experiments with high-frequency alternators to raise the sound above the range of human hearing.[citation needed]

Direct-current power was not entirely displaced by alternating current and was useful in railway and electrochemical processes. Prior to the development of mercury arc valve rectifiers, rotary converters were used to produce DC power from AC. Like other commutator-type machines, these worked better with lower frequencies.

With AC, transformers can be used to step down high transmission voltages to lower customer utilization voltage. The transformer is effectively a voltage conversion device with no moving parts and requiring little maintenance. The use of AC eliminated the need for spinning DC voltage conversion motor-generators that require regular maintenance and monitoring.

Since, for a given power level, the dimensions of a transformer are roughly inversely proportional to

frequency, a system with many transformers would be more economical at a higher frequency.

Electric power transmission over long lines favors lower frequencies. The effects of the distributed capacitance and inductance of the line are less at low frequency.

Generators can only be interconnected to operate in parallel if they are of the same frequency and wave-shape. By standardizing the frequency used, generators in a geographic area can be interconnected in a grid, providing reliability and cost savings.

Very early isolated AC generating schemes used arbitrary frequencies based on convenience for steam engine, water turbine, and electrical generator design. Frequencies between 16+2⁄3 Hz and 133+1⁄3 Hz were used on different systems. For example, the city of Coventry, England, in 1895 had a unique 87 Hz single-phase distribution system that was in use until 1906.[5] The proliferation of frequencies grew out of the rapid development of electrical machines in the period 1880 through 1900.

In the early incandescent lighting period, single-phase AC was common and typical generators were 8-pole machines operated at 2,000 RPM, giving a frequency of 133 hertz.

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