

RIGHT AC TEMPERATURE: SCIENCE & TECHNOLOGY

NEWS: New temperature rule for AC

WHAT'S IN THE NEWS?

The Union Ministry of Power has proposed regulating new air conditioners to operate between 20°C–28°C to improve energy efficiency, public health, and climate goals. This aligns with global trends and supports India's efforts in reducing emissions and electricity load from rising AC usage.

1. Context of the Proposal

- The Union Ministry of Power has proposed setting a standardized temperature range (20°C to 28°C) for all new air conditioners.
- The aim is to promote energy efficiency, protect public health, and reduce environmental damage associated with excessive AC usage.

2. Why Regulate AC Temperature?

a. Energy Efficiency and Conservation

- Air conditioners are one of the most energy-intensive appliances in modern homes and offices.
- For every 1°C increase in the thermostat setting of an AC, energy usage can drop by approximately 6%.
- The Bureau of Energy Efficiency (BEE) states that setting ACs at a default temperature of 24°C could save up to 20 billion units of electricity per year.
- With India's AC demand expected to create an additional 200 GW power load by 2030, regulating temperature settings is essential for avoiding stress on the electricity grid and ensuring energy security.

b. Public Health and Thermal Safety

- Overcooling indoor environments (e.g., below 18°C) can be harmful to health.
- Low temperatures can raise blood pressure, aggravate asthma, worsen respiratory infections, and create discomfort.
- Vulnerable populations — including infants, the elderly, and those with chronic conditions — are at greater risk in cold environments.
- Studies link prolonged exposure to low indoor temperatures with poor mental health outcomes like anxiety and depression due to physical discomfort and altered circadian rhythms.

c. Climate and Environmental Responsibility

- ACs significantly contribute to India's rising electricity demand, much of which is still generated from fossil fuels.

- Unregulated AC usage leads to higher greenhouse gas emissions.
- Promoting energy-efficient temperature settings supports India's commitments under the Paris Agreement on climate change.
- Cooling loads are expected to triple in India by 2050, and managing them wisely is essential for sustainable development.

3. International Comparisons

- Several countries have already implemented or recommended similar temperature regulations:
 - **Italy:** Public buildings must maintain AC temperatures at or above 27°C; violators may be fined.
 - **Spain:** Similar rules apply to public spaces; households are encouraged but not legally bound.
 - **Greece:** Enforces a 27°C minimum in public buildings as part of a national energy-saving initiative.
 - **Japan:** Promotes a 28°C office AC setting under the voluntary 'Cool Biz' campaign.
 - **USA (California):** Guidelines exist but there is no legal temperature mandate for homes or workplaces.

4. How Does an Air Conditioner Work? (Vapour-Compression Cycle)

a. Heat Transfer Principle

- Heat always moves from a warmer area to a cooler one.
- ACs use electricity to reverse this flow, pulling heat out of a cooler space (indoor room) and expelling it outdoors.

b. Steps of the Cooling Process

- **Evaporation (Indoor Cooling)**
 - Refrigerant in the evaporator coils absorbs heat from the warm room air.
 - It evaporates (boils at a low temperature), cooling the air.
 - Simultaneously, it dehumidifies the room as moisture condenses on the coil and drains out.
- **Compression**
 - The gaseous refrigerant is compressed by the compressor (uses most of the electricity).
 - Its pressure and temperature rise significantly (up to 90°C).

- **Condensation (Outdoor Unit)**

- The hot gas moves into condenser coils where it releases heat into the outside air.
- The refrigerant condenses back into a high-pressure liquid.

- **Expansion**

- The liquid passes through an expansion valve, dropping its pressure and temperature.
- It turns into a cold liquid-vapour mix and returns to the evaporator to restart the cycle.

5. Why This Efficiency Drops at Lower Settings

- The greater the difference between indoor and outdoor temperatures, the harder the AC has to work.
- Setting the AC below 20°C forces it to run continuously, consuming more energy and stressing components.
- Optimal refrigerant behavior and heat exchange happen within a moderate temperature range (around 24–27°C).
- Hence, outside condenser coils are placed outdoors where they can effectively release heat into the atmosphere.

Source: <https://timesofindia.indiatimes.com/technology/tech-news/new-ac-temperature-rule-in-india-what-is-it-and-why-government-wants-to-limit-ac-cooling-between-20c-and-28c/articleshow/121770699.cms>