

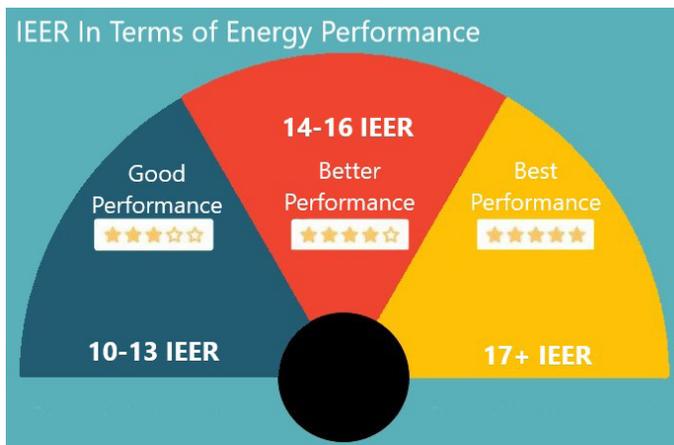


# from experience

## Cool Facts About Air-Conditioning Equipment Performance Ratings

The U.S. Department of Energy (DOE) requires new packaged air conditioning units and Variable Refrigerant Flow (VRF) systems to come with a Seasonal Energy Efficiency Ratio (SEER) or an Integrated Energy Efficiency Ratio (IEER), depending on unit tonnage. Equipment must also be rated with an Energy Efficiency Ratio (EER) – a basis from which calculations for the first two ratios are made.

SEER values are present on units with a cooling capacity of five tons or less, while IEER values are found on units with cooling capacity greater than five tons. These values provide the specifying engineer with an industry standard for evaluating energy performance and lifecycle cost between different manufacturers and equipment models.



SEERs and IEERs are useful tools because EERs do not incorporate seasonal variations or part loading of a unit, both of which can greatly affect performance. The SEER looks at the cooling output of the unit and the energy it consumes in watt-hours, while considering seasonal changes. This measurement can evaluate the energy use of small units serving a single zone, e.g., a small office space; however, it is more commonly in use for residential size and style equipment. Alternatively, the IEER includes part loading of a unit in its calculation to find the typical energy efficiency regardless of seasonal changes. This measurement is used on larger-sized equipment, e.g., a 50-ton rooftop unit, since most will not run at full capacity all the time. Therefore, the IEER attempts to consider that effect on the unit's performance over time. (See how the IEER is calculated in Experience in Brief, at right.)

So what do these ratings truly represent? In short, higher SEER or IEER values indicate more efficient equipment and potential energy savings over the life of the equipment. As of 2019, the DOE requires new packaged air-cooled equipment to have a minimum SEER of 13-14 which varies based on location, or a minimum IEER of 10-13 which varies based on location and tonnage. Higher efficiencies are on track to be required by policy makers in the coming years to decrease energy consumption. Thinking ahead to future projects, note that some municipalities and utility providers do offer rebates for exceeding a set efficiency ratio on new equipment. Before your next project, consider these potential up-front savings, as well as the potential cost savings on energy throughout the life of your equipment.

### experience in brief

The calculation of EER, SEER, and IEER ratings is established by the Air Conditioning, Heating & Refrigeration Institute (AHRI) in standards [210/240](#) and [1230](#) respectively. For example, IEER is calculated as indicated below:

$$\text{IEER} = (0.02 \cdot A) + (0.617 \cdot B) + (0.238 \cdot C) + (0.125 \cdot D)$$

Where:

- A = EER at 100% net capacity at AHRI standard condition (95°F)
- B = EER at 75% net capacity and reduced ambient
- C = EER at 50% net capacity and reduced ambient
- D = EER at 25% net capacity and reduced ambient

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