## Thermoelastic Heat Pump

### Author

* Andrew Parker, NREL (design)
* Brian Ball, NREL (measure coding)

### Description

When a shape-memory alloy is mechanically stressed it undergoes a solid-to-solid phase transformation and rejects heat to the surroundings. When exposed to the surroundings, it absorbs heat and returns to the original shape. Researchers have prototyped air conditioning equipment based on this concept. It is estimated that cooling equipment based on this technology can realistically achieve a COP of around 6, which is roughly twice as good as existing vapor compression technologies.

### Modeler Description

For each model, find every DX cooling and heating coil and increase the COP to 6. Since very little information about this technology is available, do not change performance curves or upper/lower operating temperature limits.

### Use Case Types

Retrofit, New Construction

### Arguments

No arguments

### Initial Condition Message

The initial model contained X DX cooling coils and Y DX heating coils.

### Final Condition Message

The COP of the following coils was increased to 6: #{Coil1}, #{ Coil2}...

### Not Applicable Messages

Not applicable if no DX cooling or heating coils were found.

### Warning Messages

### Information Messages

Initial and final COPs for each coil

### Error Messages

### Code Outline

* Find all Coil:Cooling:DX:SingleSpeed, Coil:Cooling:DX:TwoSpeed, and Coil:Heating:DX:SingleSpeed objects
  + Change their rated COP (hi and low for 2spd) to 6.

### Tests

**This measure applies to:**

1. Large Office
2. Medium Office
3. Primary School
4. Secondary School
5. Large Hotel
6. Hospital
7. Small Office
8. Stand-Alone Retail
9. Strip Mall
10. Supermarket
11. Quick Service Restaurant
12. Full Service Restaurant
13. Small Hotel
14. Outpatient Healthcare
15. Warehouse
16. Midrise Apartment

**Test results:**

### References

1. <http://energy.gov/sites/prod/files/2014/03/f12/Non-Vapor%20Compression%20HVAC%20Report.pdf>