ORC and sCO2 Performance Charts: R134a, R245fa, CO2 – 2026 Edition

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https://www.infinityturbine.com/infinity-turbine-performance-charts-2026.html

Updated 2026 edition of Infinity Turbine's ORC and supercritical CO2 performance curves: R134a, R245fa and CO2 charts, CO2 heat-rate tables from 100 to 700 °C, sCO2 turbine types, and data-center applications. 62-page PDF.

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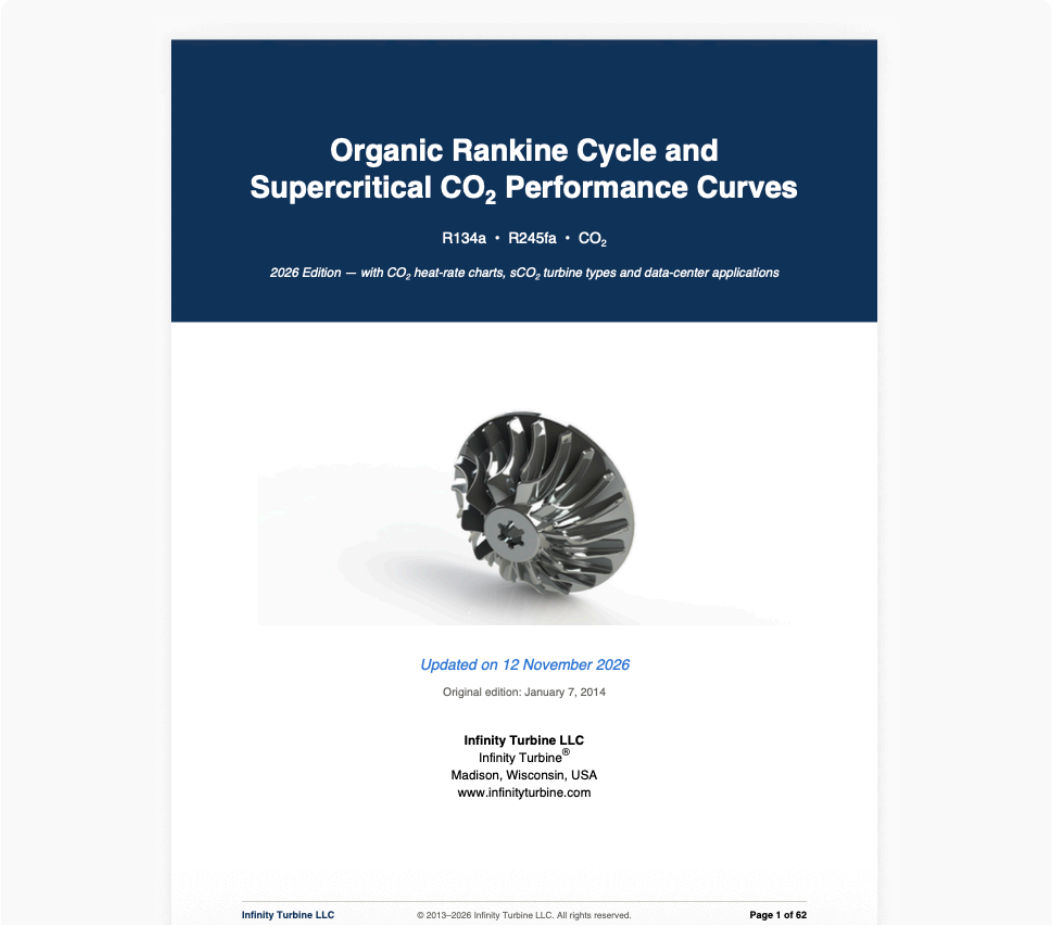
ORC and sCO2 Performance Charts: R134a, R245fa, CO2 – 2026 Edition

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Price: $499 USD

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Updated on 12 November 2026

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Introduction

Updated on 12 November 2026

This publication gives performance curves for the Organic Rankine Cycle (ORC) and for carbon dioxide power cycles — the transcritical CO_2 Rankine cycle and the supercritical CO_2 (sCO_2) Brayton cycle.

ORC: Primarily designed for utilization of waste heat with low-grade temperature sources, the ORC charts cover temperatures below 212 °F (100 °C) and up to about 180 °C for refrigerants such as R134a and R245fa. The performance curves are standardized to 1 gallon per minute (3.785 litres per minute) of heat-source water, so the user can multiply the figures by their own flow rate. Efficiencies from low-grade heat are typically 3 to 15 percent. *2026 update:* R134a and R245fa are now high-GWP HFCs being phased down in the US and EU; new ORC systems increasingly use R1233zd(E), R1234ze(E) or CO_2. The charts remain valid as thermodynamic references.

Brayton Cycle: The sCO_2 Brayton cycle can use heat from just above the critical temperature of CO_2 (31 °C / 88 °F) to over 700 °C. Calculated cycle efficiencies in the new heat-rate section range from about 33–38% at 500 °C to about 47% at 700 °C for a recompression cycle with realistic component efficiencies.

Working Fluid: When this document was first published, closed-cycle CO_2 gas turbines were still a research topic. Since then, the 10 MWe STEP Demo pilot plant in San Antonio, Texas, has run at full speed (27,000 rpm) at 500 °C and 250 bar turbine inlet and delivered about 4 MWe net to the grid in simple recuperated cycle, with conversion to a recompression cycle at up to 715 °C planned next. Commercial sCO_2 waste-heat engines of about 8 MW have been offered for gas turbine exhaust since 2019.

Both the ORC and sCO_2 cycles can use waste heat and so reduce fuel use. Supercritical CO_2 can also raise the efficiency of fossil, nuclear, solar-thermal and other topping-cycle plants, and as a bottoming cycle on simple-cycle gas turbines can add roughly 30–50% more electricity from the same fuel.

Advantages of the Brayton Cycle: A closed-loop sCO_2 cycle can use any high-grade thermal energy source: natural gas, diesel and coal; geothermal, biomass, waste heat and solar thermal. Brayton and Organic

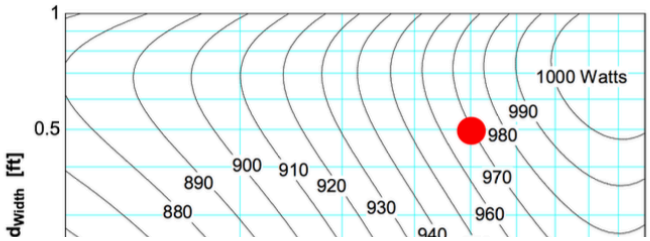
Rankine cycles can be cascaded for maximum heat recovery. The newest application is on-site power for data centers, where sCO_2 bottoming cycles recover gas turbine exhaust heat and CO_2 refrigeration and heat pumps cool the IT load and export heat.

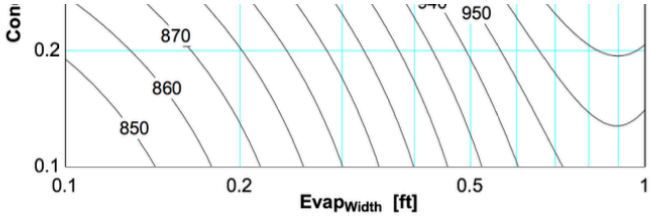
Chart Data: The original performance charts and data in this document were originated and commissioned by Infinity Turbine LLC and calculated in EES (Engineering Equation Solver) by a refrigeration engineer holding a Master's in Mechanical Engineering (thermo-fluid mechanics) from Johns Hopkins University and a BS in Mechanical Engineering, with over nine years' experience in refrigeration engineering and product development. The 2026 heat-rate data were calculated with the open-source CoolProp property library; assumptions are listed in that section.

How this document is organised: pages that follow reproduce the original R134a, R245fa and CO_2 charts, the high-temperature comparison and the CO_2 Brayton charts as published in 2014. Updated and new sections follow the original summary.

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1 GPM Evaporator Water 194F
4 GPM Condenser Water 50F



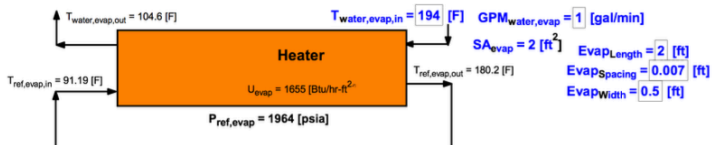


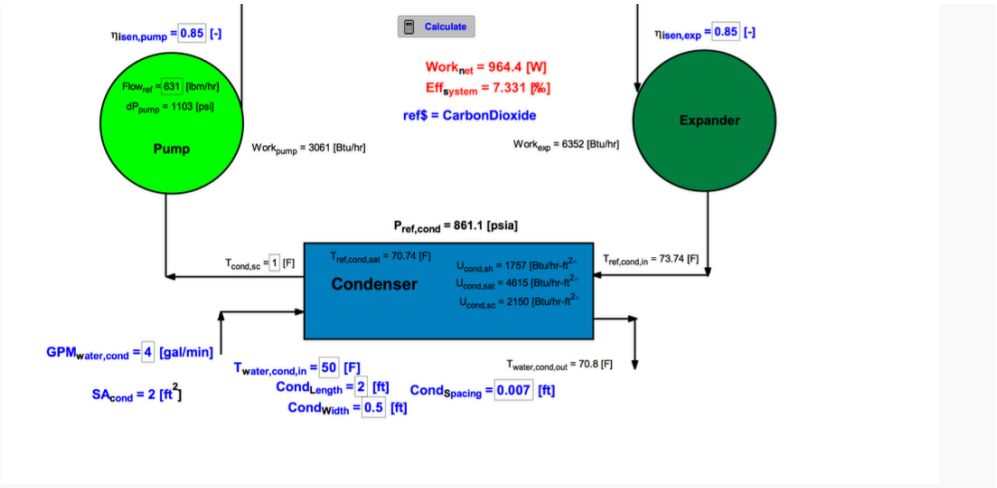
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CO2 Performance Chart

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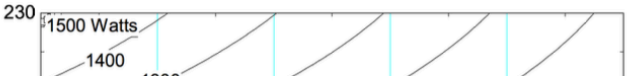
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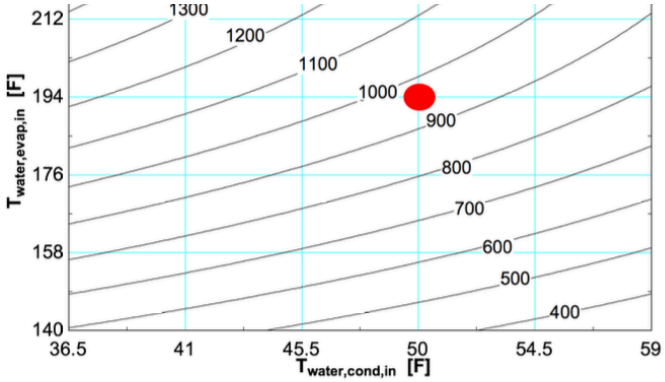




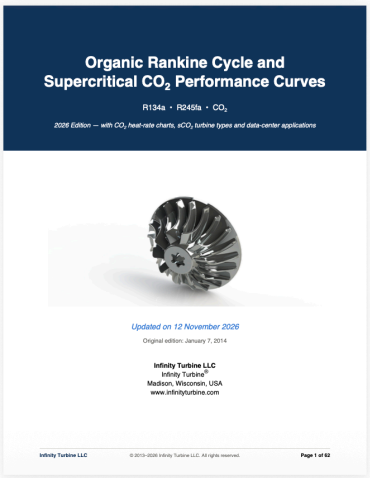
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4 GPM Condenser Water
0.5ft Condenser Width
0.5ft Evaporator Width





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Organic Rankine Cycle and Supercritical CO_2 Performance Curves

R134a • R245fa • CO_2

2026 Edition — with CO_2 heat-rate charts, sCO_2 turbine types and data-center applications

Updated on 12 November 2026

Original edition: January 7, 2014

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Available Languages (charts are in English)

• English: Organic Rankine Cycle and Supercritical CO_2 Performance Curves
• Español (Spanish): Curvas de rendimiento del ciclo Rankine orgánico y del CO_2 supercrítico
• Français (French): Courbes de performance du cycle Rankine organique et du CO_2 supercritique
• Deutsch (German): Leistungskurven für Organic•Rankine•Cycle und überkritisches CO_2
• Italiano (Italian): Curve di prestazione del ciclo Rankine organico e della CO_2 supercritica
• Nederlands (Dutch): Prestatiecurven voor de Organische Rankinecyclus en superkritisch CO_2
• Svenska (Swedish): Prestandakurvor för organisk Rankinecykel och superkritisk CO_2
• Suomi (Finnish): Orgaanisen Rankine•prosessin ja ylikriittisen CO_2:n suorituskykykäyrät
• Türkçe (Turkish): Organik Rankine Çevrimi ve Süperkritik CO_2 Performans Eğrileri
• العربية (Arabic): منحنيات أداء دورة رانكن العضوية وثاني أكسيد الكربون فوق الحرج CO_2
• हिन्दी (Hindi): ऑर्गेनिक रैंकिन चक्र और सुपरक्रिटिकल CO_2 प्रदर्शन वक्र
• 简体中文 (Simplified Chinese): 有机朗肯循环与超临界 CO_2 性能曲线
• 繁體中文（台灣） (Traditional Chinese, Taiwan): 有機朗肯循環與超臨界 CO_2 性能曲線
• 한국어 (Korean): 유기 랭킨 사이클 및 초임계 CO_2 성능 곡선
• 日本語 (Japanese): 有機ランキンサイクルおよび超臨界 CO_2 性能曲線

The PDF files for each language:

Spanish	Infinity_Turbine_Curvas_de_Rendimiento_2026_ES.pdf
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Italian	Infinity_Turbine_Curve_di_Prestazione_2026_IT.pdf

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Leistungskurven für Organic-Rankine-Cycle

und überkritisches CO_2

R134a • R245fa • CO_2

Ausgabe 2026 — mit Diagrammen zum spezifischen Wärmeverbrauch von CO_2, sCO_2-Turbinentypen und Anwendungen in Rechenzentren



Aktualisiert am 12. November 2026

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Curve di prestazione del ciclo Rankine organico e della CO_2 supercritica

R134a • R245fa • CO_2

Edizione 2026 — con grafici del consumo specifico di calore della CO_2, tipi di turbine a sCO_2 e applicazioni nei data center



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