

Formula 1

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Formula 2

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Formula 3

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Detailed Explanation

IEC 62282-3-100:2022 fills a critical gap in international standardization for low-temperature geothermal energy conversion by establishing uniform criteria for Organic Rankine Cycle (ORC) systems deployed in stationary, grid-connected or off-grid geothermal power plants. It defines functional safety requirements—including pressure containment, thermal management, organic working fluid handling, and control system reliability—tailored to the unique challenges of geothermal brine heat sources (typically 80–180°C), where corrosion, scaling, and non-condensable gas presence demand robust system integration. The standard mandates performance testing protocols (e.g., net electric output, thermal efficiency, part-load behavior) under representative geothermal inlet conditions and includes validation procedures for control logic, emergency shutdown sequences, and emissions compliance related to volatile organic compounds (VOCs). Furthermore, it harmonizes interfaces between ORC modules and balance-of-plant components (e.g., heat exchangers, pumps, grid inverters), enabling modular deployment, third-party certification, and lifecycle assessment across manufacturers and jurisdictions. While historically grouped under IEC TC 105 (Fuel Cell Systems), this part was intentionally scoped to ORC technology due to overlapping system-level safety and energy conversion concerns with electrochemical systems—though no fuel cell hardware or electrochemistry is involved.

Key Components

#	Component
1	ORC Power Block (evaporator, expander, condenser, pump)
2	Geothermal Heat Exchanger (primary side brine interface)
3	Organic Working Fluid Circuit (e.g., R245fa, isobutane, toluene)

Applications

#	Application
1	Low-temperature geothermal binary power plants
2	Hybrid geothermal-solar thermal ORC cogeneration systems
3	Remote/off-grid geothermal microgrids for rural electrification

Related Concepts

#	Concept
1	Binary Cycle Geothermal Power
2	Organic Rankine Cycle Thermodynamics
3	IEC 62282 Series (Fuel Cell Standards Framework)

Tags

geothermal, ORC, IEC standard, binary cycle, renewable energy