ACR-1000 General Design Requirements (1)

Plant Type	Pressure Tube Reactor
Unit Size	~1200 MWe (gross) and >1100 Mwe net
No. of Units per Plant	2 with potential single unit adaptation
Safety Design Concept	Improved Active and Passive Safety Systems
Plant Life	60 years
Design Philosophy	Simple, robust, enhanced design margins based on proven technology, with passive resistance to severe accidents.
Seismic	
• Peak Ground Acceleration (PGA), DBE	0.3 g (improvement over CANDU 6)
Minimum Exclusion Zone (EZ) radius	500 m
Fuel	SEU in 43 element CANFLEX fuel bundle
Power Coefficient of Reactivity	Negative during all modes of operation
Full-core Coolant Void Reactivity (CVR)	Small negative coolant-void reactivity under nominal design conditions
Average Discharge Fuel Burn-up[1]	~10 MWd/kgU
Cooling Water Supply	Once through cooling or cooling towers
DESIGN TARGETS	
Project schedule from Contract Effective Date (CED) to In-Service Date (ISD)	66/54 months for first and n^{th} unit of integrated two-unit plant
Construction period, from first concrete to Fuel loading date	46 months for the first unit and 42 months for the n^{th} unit
PROTECTION	
Accident Resistance	Design features which minimize the occurrence and severity of initiating events, such as: • Robust margin to Regional Over Power (ROP) trip • Adequate time to respond to plant upset conditions through improved design features • Use of best available material and technology
Enhanced Passive Safety	Includes traditional CANDU features; moderator and shield tank as emergency heat sinks, plus the additional benefit of reserve water tank to provide passive sink make-up.

[1] The value of the fuel burn-up will be finalized after fuel design optimisation.

ACR-1000 General Design Requirements [1]

Core Damage Prevention	Design features which prevent initiating events from progressing to the point of fuel damage
• Total Severe Core Damage Frequency	Less than 10^{-5} / reactor year
• Total Large Release Frequency	Less than 10^{-6} / reactor year
• Station Blackout Capability (loss of Class III & IV)	24 hours or more (poison-prevent mode)
Mitigation	
• Containment	Steel lined pre-stressed concrete dry structure with a design pressure greater than the peak pressure generated by a loss-of-coolant accident or a main steam line break.
• Licensing	CNSC licensing requirements with consideration of specific additional licensing requirements of other target countries.
PERFORMANCE	
Capacity Factor	93% Capacity Factor on a year-to-year basis and >90% averaged over lifetime of the plant, based on a mid-life refurbishment outage to replace the fuel channels and upgrade / replace equipment defined by the life management extension program
Refuelling	On power
Unplanned Automatic Shutdown Events	Less than 1 per year
Power Manoeuvring	Rapid power reduction from 100% to 75% Periodic load reduction from 100% to 60% (e.g., weekend)
Load Rejection/Loss of Grid	Loss of load without turbine or reactor trip
Site Spent Fuel Storage Capacity	Ten years of operation plus one full core in pool storage, potentially supplemented by dry storage, as required, for an additional fifty years of operation.
Occupational Radiation Exposure	Specified to be <1.5 person-Sievert/year averaged over the lifetime of the plant
OPERABILITY AND MAINTAINABILITY	
• Design for Operation	Operability features designed into the plant such as ease of use, forgiving plant response and adequate design margin.
• Design for Maintenance (one shutdown every three years)	Maintainability features designed into the plant including, standardization of systems and components, minimal maintenance needs, provision of adequate access and improved working conditions.

ACR-1000 General Design Requirements [1]

• Equipment Access	Ready access to equipment with sufficient lay-down space for maintenance.
• Equipment Replacement	Facilitate replacement of all components including fuel channels and steam generators.
• Four quadrant design	Allows one safety train to be maintained on-line
DESIGN PROCESS AND CONSTRUCTABILITY	
Design and Plan for Construction	Design and Integrated Plan with plant owner acceptance
Design Process	
• Design Integration	Manage and execute design as an integrated two-unit plant with common shared systems to be available when needed for first unit commissioning and start of operations. Design is adaptable for single unit application if required.
• Information Management	Computerized system and 3-D CADD models to generate and utilize plant technical database during design, construction and operation.