



EUROPEAN
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Community Research

RAPHAEL

Contract Number: **516508 (FI6O)**



DELIVERABLE (D-CT1.3)

RAPHAEL / SP-CT (Component Development)

WP1: HEAT EXCHANGERS

PCIV Design Study

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Dissemination Level (place an X in the appropriate cell)

PU	Public	
RE	Restricted to the partners of the RAPHAEL project	X
CO	Confidential, only for specific distribution list defined on this document	

RAPHAEL (ReActor for Process heat, Hydrogen And ELectricity generation)



ReActor for Process heat, Hydrogen And ELelectricity generation (RAPHAEL)		
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Document title						
RAPHAEL IP – DELIVRABLE D-CT1.3– PCIV Design study						
Abstract						
A completely new type of cooling system is used. Heat pipes are placed directly in the cast iron segments. For the HTR module the cooling system was located in the cavern wall. The new concept keeps the temperatures in the cast iron segments and in the pre-stressing tendons at a considerably lower level than cavern cooling could achieve for the HTR 600. Using plane FEA a basic design and several parameter variations were analyzed. Stresses due to stationary and transient temperature fields (that would have to be calculated in a future study) can be expected to be much smaller. The system of heat pipes can be optimized to further lower the temperatures, particularly for the pre-stressing tendons. It can safely be assumed that for the optimized system conventional low cost pre-stressing steels can be used. When higher temperatures act over long terms much more expensive steels would have to be used. The materials used for the PCIV are readily available. No special procurement times need to be taken into account for the assembly schedule. Nine months after release of the drawings the first segments can be delivered to the construction site for assembly. Further manufacturing and assembly will take about 12 months. The cost estimate is straightforward for all work concerning cast iron fabrication and assembly. As for the pre-stressing steels the material cost of conventional quality is used. The most expensive component of the PCIV could liner and penetrations. For this component only estimates are possible. The cost estimate does not include first-of-its-kind work.						
Revisions						
Rev.	Date	Short description	Author	WP Leader	SP Leader	Coordinator
00	7/11/2006	Final issue	D. Bounin 	P. TOCHON CEA GRENOBLE 	D. BESSON, ANP-F 	E. BOGUSCH, ANP-D 