



ADVANCED PROJECTS AND DECOMMISSIONING

NUMERO D'OTP OU EOTP	NOMBRE DE PAGES : 8	RAISON SOCIALE FOURNISSEUR :	
	NOMBRE D'ANNEXES : 0		
40T.3060603-NPFV	CONFIDENTIALITE :	NUMERO DE COMMANDE	IMMATRICULATION FOURNISSEUR

CODE

DESIGNATION

AFFAIRE

HT

HTR

NATURE

DT

Note Technique

THEME

MATERIEL

4000

Généralités chaudières

TITRE :

FP6 RAPHAEL-IP
Technical specification related to PCIV design

TITRE ABREGE :

FP6 RAPHAEL PCIV TECHNICAL
SPECIFICATION

A	09/09/2005	DES	D. BESSON	A. CROS	J.D. POUZADOUX	first issue
IND	DATE	ETAT	REDACTEUR NOM-VISA	VERIFICATEUR NOM-VISA	APPROBATEUR NOM-VISA	MODIFICATIONS - OBSERVATIONS - ACCORDS REFERENCES ET DATES
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IMMATRICULATION CLIENT :						
			IMMATRICULATION INTERNE :	PVEI	DC	05
				0450	ESN / ESN	
			UNITE	TYPE	ANNEE	CHRONO
			TRIGRAMMES			

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Contents

1.	INTRODUCTION	5
2.	Reports AND INPUT DATA.....	5
3.	DEFINITION OF THE WORK TO BE DONE	5
3.1	General definition.....	5
3.2	Definition of the tasks.....	5
3.3	Meeting.....	5
4.	delivable	6
4.1	Quality assurance	6
4.2	Corresponding members.....	6
4.3	Time schedule	6
4.4	TAKING OVER	6



List of tables

Table 1 operating conditions



List of figures

Figure 1 main vessel dimensions of 600 MWth

1. INTRODUCTION

As part of the sixth Frame work Programme – RAPHAEL's IP (**Re**Actor for **P**rocess, heat, **H**ydrogen **A**nd **E**lectricity generation-Integrated Project), this technical specification defines the work to be done by SIEMPELKAMP (Name of the subcontractor).

The work to be performed is focused on the study of 'Pre-stressed Cast-Iron vessels (PCIV) to elaborate the feasibility of a PCIV under the boundary conditions of actual HTR modular designs. Framatme ANP, as RAPHAEL's IP Partner 01 will be responsible for placing the sub contract.

2. REPORTS AND INPUT DATA

The applicable reports are as follows:

1. FP6 RAPHAEL Integrated Project – Annex I – Description of work, November 30th 2004,
2. Book from FZJ: VGD als berstsichere Druckbehälter für innovative Anwendungen in der Kerntechnik,
3. Main vessel geometric dimensions : see figure 1 of this specification,
4. Operating conditions: see table 1 of this specification.

3. DEFINITION OF THE WORK TO BE DONE

3.1 General definition

The work to be done is to elaborate the feasibility of a PCIV under the boundary conditions of actual HTR modular designs. Such pressure vessels have been investigated for former HTR projects to replace prestressed concrete vessels for large HTR (>1200 MWth) or steel vessels for modular HTR (~ 200MWth) including the heat transfer in accident conditions.

3.2 Definition of the tasks

The following tasks have to be done by the subcontractor:

- to elaborate a drawing of the main vessel based on PCIV concept, on the geometric dimensions mentioned in the figure 1 of this specification and on the operating conditions as defined in the table 1 of this specification,
- to assess the manufacturing cost and the general time schedule for manufacturing including mounting on site of such PCIV,
- to recover the past experiences related to the heat transfer from the main vessel to the coolers.

3.3 Meeting

The sub contractor will be involved in a meeting in Germany to present its results.

4. DELIVRABLE

One Deliverable including one drawing will be elaborated by the sub contractor and submitted for acceptance to Framatome ANP. The subcontractor shall take into account the Framatome comments and shall up-date this Deliverable. The title of this synthesis will be: PCIV design study. The Deliverable identification will be: D-CT1.3.

4.1 Quality assurance

The subcontractor is responsible for the quality assurance of the work performed for the tasks as listed in the paragraph 3.2 of this specification, following the internal quality assurance programme of his organisation.

4.2 Corresponding members

Les corresponding members of the subcontractor will be:

- Contractual and financial aspects : Mr. François Luquet (francois.luquet@framatome-anp.com),
- Technical aspects: M. D. Besson from Framatome (daniel.besson@framatome-anp.com)

The subcontractor will nominate associated corresponding members from its company.

4.3 Time schedule

- Meeting participation : during the year 2006,
- Delivery of the first issue of the synthesis: January 2006,
- Delivery of the final issue of the synthesis: March 2006.

4.4 TAKING OVER

After the approval of the synthesis from Framatome, the corresponding invoice can be sent.

**Table 1 operating conditions**

Core inlet temperature	450 °C
Core outlet temperature	850 ° C
Reactor power	600 MWth
Primary helium pressure	6.5 MPa
Volumetric flow rate through the circulator	70 M ³ /H

Options to consider:

The range of parameters to continue for optimization is:

- Core temperature outlet 850 to 900 °C
- Core temperature inlet 350 to 450 °C
- Primary helium pressure and volumetric helium flow rate through the circulator +/- 10 % around the reference values.

Figure 1 main vessel dimensions of 600 MWth

