



EUROPEAN COMMISSION
5th EURATOM FRAMEWORK PROGRAMME 1998-2002
KEY ACTION : NUCLEAR FISSION

HTR-E

High-Temperature Reactor Components and Systems

CONTRACT N°
FIKI-CT-2001-00177

WP2 –D17 - Definition of small scale unit and realisation

Colin Grady

HEATRIC

UK

Dissemination level : CO
Document N° : HTR-E-05/12-D-2-3-1
Status : Final
HEATRIC identification number : H0957



High Temperature Reactor Components and Systems

Heatric Order No. H0957

Work Package 2 – Recuperator

Deliverable 17: Manufacturer's Report.

Colin Grady

1	05-12-05	First Issue	Colin Grady	Stephen Dewson	Stephen Dewson
Rev	Date	Description	Author	Reviewed	Approved

D17 Manufacturer's Report

H0957 - HTR-E test recuperator

Test bed – CEA's Claire loop, Grenoble

29/09/2005
P 1

MEGGITT

Contents

- ▀ Why PCHE?
- ▀ Construction method
- ▀ Test core features

29/09/2005
P 2

MEGGITT

Thermal Design

Heatric

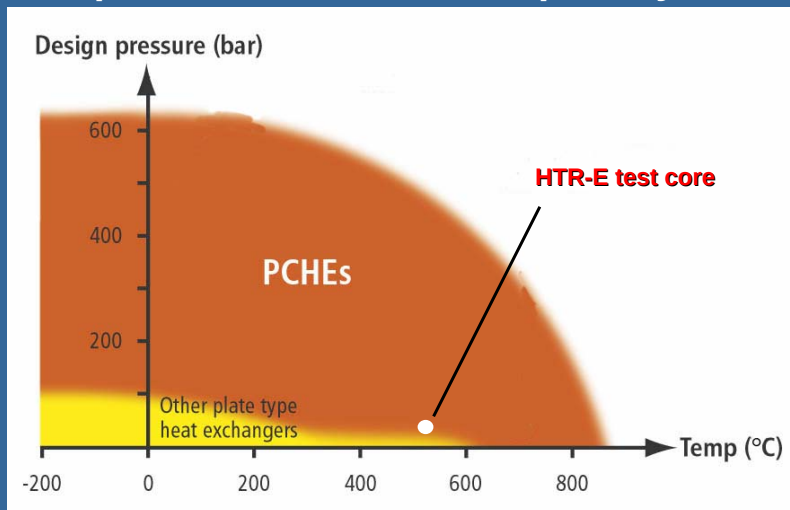
- High thermal effectiveness
- Close temperature approaches
- Deep temperature crosses
- Pressure drop to suit process

29/09/2005
P 3

MEGGITT

Temperature & Pressure Capability

Heatric



29/09/2005
P 4

MEGGITT

Construction of PCHEs

- ▀ Thermal and mechanical design
- ▀ Chemically etch plates
- ▀ Diffusion bond plate stacks
- ▀ Fabricate exchanger

29/09/2005
P 5

MEGGITT

Construction of PCHEs

Plates

- ▀ Typically 1.6mm thick, 600 x 1500 mm
- ▀ Semi-circular flow channels 2mm diameter
- ▀ Produced by chemical etching
- ▀ Custom design for flow channels

29/09/2005
P 6

MEGGITT

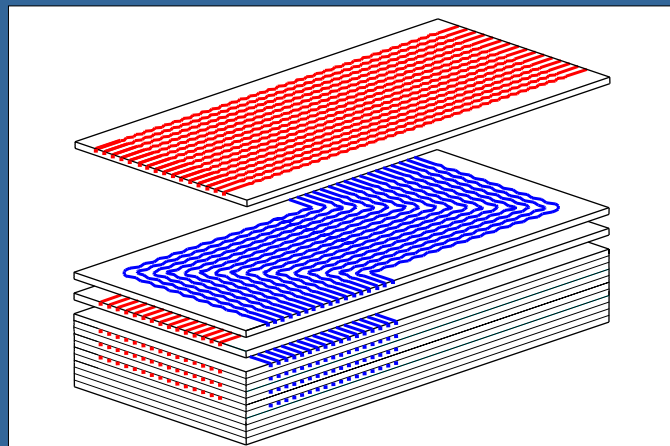
Test core counter flow arrangement



29/09/2005
P. 7

MEGGITT

Plate stacking prior to diffusion bonding



29/09/2005
P. 8

MEGGITT

Plate stack prior to diffusion bonding



29/09/2005
P 9

MEGGITT

Diffusion Bonding

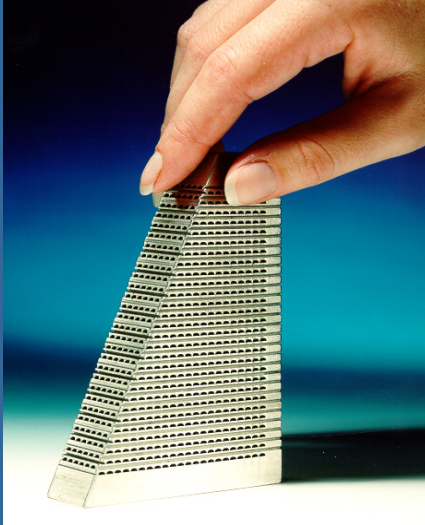
- Solid state joining process giving rise to parent metal strength
- Clean high temperature and pressure process
- No melting or deformation
- No braze, flux or filler
- Grain growth across plate interface

29/09/2005
P 10

MEGGITT

Sample from diffusion bonded core

Heatric

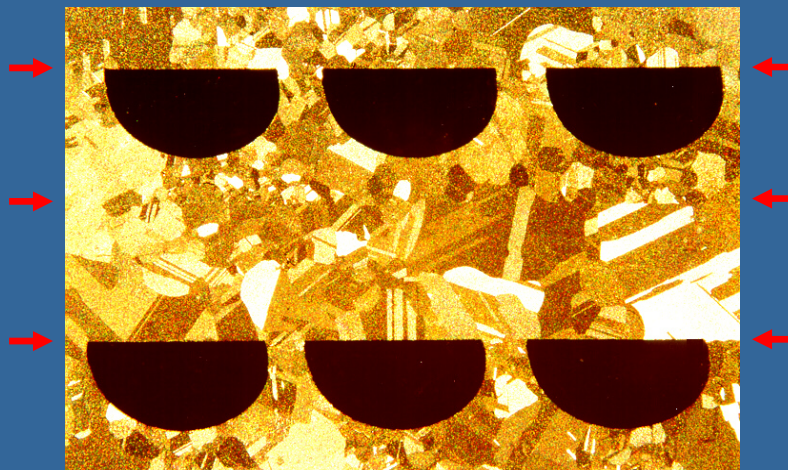


29/09/2005
P 11

MEGGITT

Section through diffusion bonded core

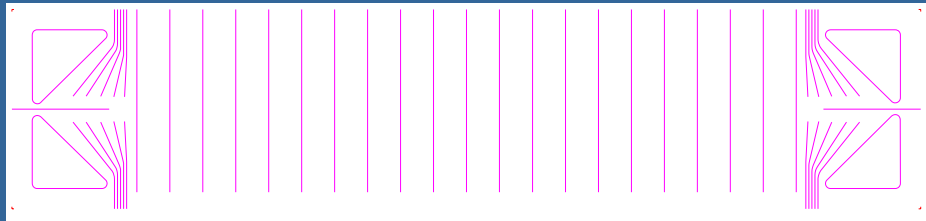
Heatric



29/09/2005
P 12

MEGGITT

Test Core Additional Feature

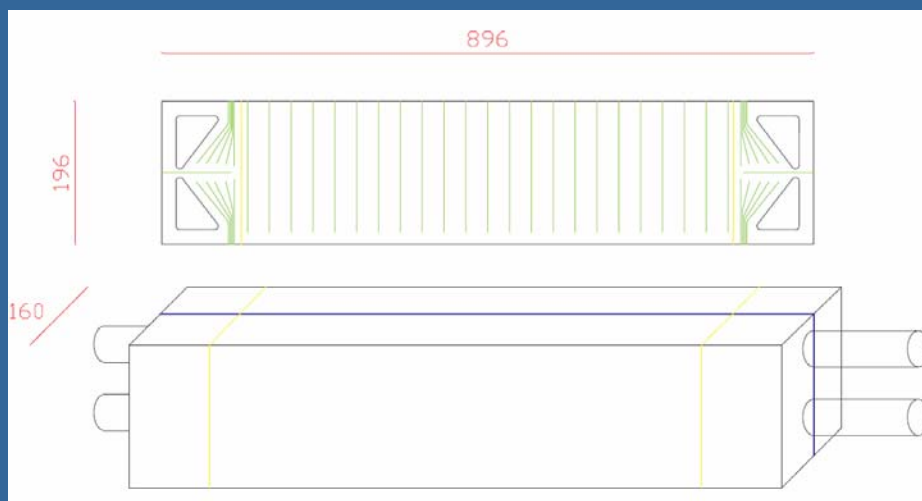


- Instrumentation plate: Included mid stack to allow metal temperatures to be recorded.

29/09/2005
P 13

MEGGITT

HTR-E Test Core Schematic



29/09/2005
P 14

MEGGITT

www.heatric.com

