



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

HTR-M

**European Project for the development of HTR Technology
- Materials for the HTR**

CONTRACT N°
FIKI-CT-2000-00032
&
FIKI-CT-2001-00135

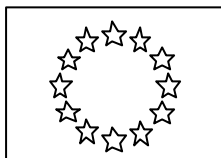
**Notes of a HTR-M & M1 Specialist Meeting on Corrosion &
Carburisation**

H. Rantala

JRC

Netherlands

Dissemination level: [CO](#),
Document Number: HTR-M-03/07-M-2-0-72



EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Energy
HFR Unit



HTR-M & M1
High-Temperature Reactor - Materials
(EC-funded Project: FIKI-CT-2000-00032)
(EC-funded Project: FIKI-CT-2001-00135)

EUROPEAN COMMISSION

Fifth Framework project for the development of HTR technology Materials for the HTR (HTR-M & HTR-M1)

**Project Ref. FIKI-CT-2000-00032
& FIKI-CT-2001-00135**

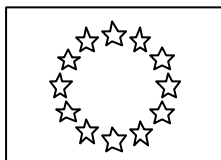
**Notes of HTR-M / M1 Specialist Meeting
at**

FZJ, Julich, Germany, 15th April 2002

Participants:

H. Rantala
P Ennis

JRC, Netherlands
FZJ, Germany



EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Energy
HFR Unit



HTR-M & M1
High-Temperature Reactor - Materials
(EC-funded Project: FIKI-CT-2000-00032)
(EC-funded Project: FIKI-CT-2001-00135)

Petten, 6 June, 2003

Technical notes from the meeting at Jülich on 15 April 2002

The meeting was held between Phil Ennis from FZJ and Henrik Rantala from JRC. Based on his past experience P. Ennis gave advice to JRC how to arrange the carburisation and decarburisation of the HTR-M turbine blade and disc alloys.

P. Ennis recommended that after the carburisation treatment the emphasis should be put on tensile and Charpy tests. The creep and fatigue properties will not be affected in a negative way by the carburisation.

After the decarburisation treatment the creep properties will be affected to some extent and therefore creep tests are recommended.

After the thermal cycle the original microstructure should be recovered by performing the original manufacturing heat treatment with solution and hardening heat treatments. P. Ennis also recommended to make a reference heat treatment in an inert atmosphere at the same temperature as the carburisation/decarburisation tests in order to verify the effect of the thermal cycle.

For the carburisation treatment FZJ recommends the following composition of the gas:

Ar + 1-2% CH₄

For the decarburisation treatment FZJ recommends the following composition of the gas:

Ar + 500μbar H₂ + 50μbar H₂O

The temperature & time combination needs to be tested and depends on the surface/volume ratio of the samples, but as an indication ø6mm 617 samples had been completely decarburised at 950°C in less than 1000 hours.

The pressure during the treatment is not believed to be important. Therefore the pressure should be just slightly above the ambient pressure in order to prevent the ingress of oxygen into the heat treatment vessel.

The carburisation/decarburisation treatment can be more difficult with Al-oxide forming alloys (like CM247).

The carbon content of the heat treated specimens can be analysed in Jülich if this service is not available in Petten.