PAUL SCHERRER INSTITUT

Document No.

ALPHA-520

Document Title

PANDA Transient Tests

M3 & M4 Integral System Test Procedure

PSI internal document

Revision Status						
Rev.	Prepared / Revised by	Approval / Date P-PM	G-PM	G-SQR	Issue Date	Remarks
0	C. Aubert	J. Rey 21-IX-95	J. Torbeck 21. Sep. 95	A. Aubert 22-IX-95	22SEP1995	G-PM approval on file (ERM-024 p.9)

Controlled Copy (CC) Distribution List

Note: Standard distribution (cf. next page) is non-controlled

CC No.	Holder Name, Affiliation	CC List Entry Date	Return / Recall Date
1	Betriebswarte	date of issue	

PAUL SCHERRER INSTITUT	Registrierung TM-42-95-20 ALPHA 520-0
Titel: PANDA Transient Tests M3 & M4 Integrtal System Test Procedure	Ersetzt
Autoren/ Autorinnen: C. Aubert	Erstellt 12.09.1995

Abstract

This report details the procedure for conducting PANDA transient tests M3 and M4 as specified by GE document 25A5764 Rev. 1.

All test phases are described in order to allow PANDA operation during preconditioning processes and test phases.

Verteiler

Abt.	Empfänger / Empfängerinnen	Expl.	Abt.	Empfänger / Empfängerinnen	Expl.
42	G. Yadigaroglu	1		GE at PSI	
	G. Varadi	1		J. Torbeck / G. Wingate	1
	C. Aubert	1		A. Arretz	1
	T. Bandurski	1			
	J. Dreier	1		GE San Jose	
	J. Healzer	1		B. Cecca	1
	M. Huggenberger	1		(for distribution at GE to J.R.	
	S. Lomperski	1		Fitch, T.R. Mc Intyre, B.S.	
	H.J. Strassberger	1		Shiralkar,	
				J.E. Torbeck, DRF No. T10-00005)	
	ALPHA-Dokumentation	2			
	Betriebswarte	1			

	Expl.
Bibliothek	
Reserve	5
Total	20
Seiten	28
Beilagen	
Informationsliste	
D 1 2 3 4 5 8	
Visum Abt./Laborleitung:	

PANDA Transient Tests

M3 & M4 Integral System Test Procedure

90 RPV Initial Conditions Setup for Test

91 RPV Conditions Adjusting

100 Test Conditions Setup

101 PCC1 Pool Conditions Adjusting
102 PCC2 Pool Conditions Adjusting
103 PCC3 Pool Conditions Adjusting
104 SCs Pools Conditions Adjusting
105 SCs Gas Space Conditions Adjusting
106 GDCS Conditions Adjusting
107 DWs Conditions Adjusting

110 Test

111 Data Recording
112 RPV Conditions Adjusting
113 Configuration Setup and Test Initiation

120 End of Test

121 End of Data Recording
122 Facility Shut Down

200 Checklist

00 Introduction

The following procedure describes all test phases for Transient Tests M3 and M4, including preconditioning processes. Assuming that the starting point for the preconditioning is an empty facility at atmospheric conditions, this procedure gives sequences of processes, which do not need to be strickly followed during the preconditioning process, at the discretion of Test Engineer. Required phases are listed in the Checklist and must be recorded when conducted.
The current procedure gives guidance on how to proceed to bring PANDA to the required initial test conditions for a extreme case (from a cold and empty facility). The order of preconditioning sequences may be modified if needed, and single phases may be adapted to the actual conditions. Heating power indicated in preconditioning phases are theoretical and considered as basis for time estimation; the given values correspond to the highest heater performances. Due to PSI electrical power limitation or modification in preconditioning process, the heating power may be reduced. However, the forseen preconditioning process is to start with the Suppression Chambers conditioning after the facility has been set ready for operation. It continues with the GDCS tank, all PCC condenser pools and the Drywell setup. Just before test initiation, the RPV is setup to satisfy the required initial conditions. The test is then conducted during 20 hours under automatic power control and without any operator action. A time estimation for the preconditioning of an empty and cold facility is given for each component in the following table.
Applicable specifically to these two tests M3 and M4, this procedure will be used as basis for the Transient Test M7. A separate procedure will be used for test M7, which is actually an adaptation of the current procedure. Major modifications for M7 concern the Drywell Setup.
Test Plan Specifications are described in the GE document 25A5764 REV.1.

Note: - The temperatures are given in Kelvin and also indicated in °C for the PANDA operation.
- Key parameters or key actions are indicated in dark frames to make reading easier during PANDA operation.

Time Estimation

Phase n°	Preconditioning Phases	time
10	Initial Alignment	not estimated
20	RPV Setup for Vessel Preconditioning	4.0 [hour]
30	Suppression Chambers Setup	12.2 [hour]
40	GDCS Heating	1.7 [hour]
50	PCC1 Pool Setup	2.3 [hour]
60	PCC2 Pool Setup	2.3 [hour]
70	PCC3 Pool Setup	2.3 [hour]
80	Drywells Setup	0.9 [hour]
90	RPV Initial Conditions Setup for Test	not estimated
100	Test Conditions Setup	not estimated
110	Test	20.0 [hour]
10 to 100	Duration for Preconditioning	25.7 [hour]
10 to 110	Duration for the whole Test	45.7 [hour]

Note:
Duration of the phases n° 10, 90 and 100 cannot be estimated; a certain time will be needed to complete these phases, it should not exceed a couple of hours.

01 Test Configuration and Initial Conditions

The configuration for the Transient Tests includes the RPV, Suppression Chambers, Drywells, GDCS, all PCC condensers and their respective pools; the IC condenser and the IC Pool are not part of the test configuration. It is also worth to note that the Equialization Lines connecting both Wetwells to the RPV are closed. A detailed description of the required configuration is given in the above mentioned GE document "Test Plan Specification".
An overview of the test configuration is summarized in the list of Test Initial Conditions given in the following. Defined for all components involved for Transient Tests, these Initial Conditions described in the above mentioned GE document are listed below with the respective tolerances.

Note: The current procedure is based on the values given in that Test Initial Conditions List; evaluation of parameters used during the process are calculated automatically in order to be updated when Initial Conditions are modified.

Test Initial Conditions List

RPV (V.RP)				
-Total Pressure	MP.RP.1 =	295 [kPa]	±	4 [kPa]
- Mean Fluid Temperature	$T_{mean\_F}(RP)$ =	406 [K]	±	2 [K]
- Local Fluid Temperature	MTF.RP.1...5 =	$T_{mean\_F}(RP)$	±	2 [K]
- Water Level	ML.RP.1 =	12.7 [m]	±	0.20 [m]
Drywell 1 and 2 (V.D1 - V.D2)				
- Air Partial Pressure		13 [kPa]	±	2 [kPa]
- Mean Gas Temperature	$T_{mean\_G}(D1)$ =	404 [K]	±	2 [K]
	$T_{mean\_G}(D2)$ =	404 [K]	±	2 [K]
- Local Gas Temperature	MTG.D1.1...6 =	$T_{mean\_G}(D1)$	±	2 [K]
	MTG.D2.1...6 =	$T_{mean\_G}(D2)$	±	2 [K]
- Water Level	ML.D1 =	0 [m]	±	0.10 [m]
	ML.D2 =	0 [m]	±	0.10 [m]
Suppression Chamber 1 and 2 (V.S1 - V.S2)				
-Total Pressure	MP.S1 =	285 [kPa]	±	4 [kPa]
	MP.S2 =	285 [kPa]	±	4 [kPa]
- Mean Gas Temperature	$T_{mean\_G}(S1)$ =	352 [K]	±	2 [K]
	$T_{mean\_G}(S2)$ =	352 [K]	±	2 [K]
- Local Gas Temperature	MTG.S1.1...6 =	$T_{mean\_G}(S1)$	±	2 [K]
	MTG.S2.1...6 =	$T_{mean\_G}(S2)$	±	2 [K]
- Mean Water Temperature	$T_{mean\_w}(S1)$ =	352 [K]	±	2 [K]
	$T_{mean\_w}(S2)$ =	352 [K]	±	2 [K]
- Local Water Temperature	MTL.S1.1...6 =	$T_{mean\_w}(S1)$	±	2 [K]
	MTL.S2.1...6 =	$T_{mean\_w}(S2)$	±	2 [K]
- Water Level	ML.S1 =	3.8 [m]	±	0.10 [m]
	ML.S2 =	3.8 [m]	±	0.10 [m]

Test Initial Conditions List (cont'd)

GDCS (V.GD)

-Total Pressure	MP.GD =	294 [kPa]	±	4 [kPa]
- Mean Fluid Temperature	$T_{mean\_F}(GD)$ =	333 [K]	±	2 [K]
- Local Fluid Temperature	MTF.GD.1...7 =	$T_{mean\_F}(GD)$	±	2 [K]
- Water Level	ML.GD =	0 [m]	±	0.10 [m]

PCC1, 2 and 3 Pools (V.U1 - V.U2 - V.U3)

-Total Pressure	* MP.ENV =	97 [kPa]		
- Mean Water Temperature	* $T_{mean\_w}(U1)$ =	372 [K]	±	2 [K]
	$T_{mean\_w}(U2)$ =	372 [K]	±	2 [K]
	$T_{mean\_w}(U3)$ =	372 [K]	±	2 [K]
- Local Water Temperature	MTL..U1.1...7 =	$T_{mean\_w}(U1)$	±	2 [K]
	MTL.U2.1...7 =	$T_{mean\_w}(U2)$	±	2 [K]
	MTL.U3.1...7 =	$T_{mean\_w}(U3)$	±	2 [K]
- Water Level	ML.U1 =	4.4 [m]	±	0.20 [m]
	ML.U2 =	4.4 [m]	±	0.20 [m]
	ML.U3 =	4.4 [m]	±	0.20 [m]

Note: * The pressure and temperature defined for the PCC Pools correspond to saturated conditions of the environment; values given above correspond to common atmospheric conditions.

10 Initial Alignment

Before starting any preconditioning process, the facility is set into a specific state, which establishes operations from the control room. The configuration is set in order to avoid any unintentional hardware manipulation during testing or preconditioning. Data Acquisition and Control System must be properly initiated and brought into operation. Valves are aligned in accordance to STARTUP Status, automatic heat power regulation files are loaded and as the last preparation phase, the auxiliary water system is filled to allow pumps operation.
Five different preparation phases are needed for the Transient Tests: phase n°11 starting Control and Data Acquisition Systems, phase n°12 for the initial valve setup, phase n°13 for the configuration checking, phase n°14 to prepare the automatic heat power regulation and phase n°15 for auxiliary water system filling.

11 Control System and DAS Setup

- Ethernet connection is isolated from PSI network (Unplug Ethernet connector)
- Run Factory Link software on HP-UNIX workstation (cf. Trending System User's Guide)
- Run DAS software (cf. DAS User's Guide)
- Run Factory Link software on PC (cf. Control Syst. User's Guide)
- Switch all local controllers on "external" and "automatic" state

Record on attached checklist

12 Valve Alignment

- Valve off for pressure difference transmitters
- Set valve positions according to the STARTUP status

Record on attached checklist

13 General Facility Configuraton Check

- Check that the facility configuration corresponds to the required test configuration

Record on attached checklist

14 Prepare Automatic Heat Power Regulation

- Copy PF_TABLE.dec and PF_TABLE.str in C:\FUNK\RECIPE
- Test these two files

Record on attached checklist

15 Auxiliary Water System Filling

- Fill the Auxiliary Water System

16 Instrument / Zero Check

- Check Instruments

Transmitter zero check and DAS reading check according to the actual facility state, recording on DAS-Reading Hard-Copy and Trending Plots.

Record on attached checklist

20 RPV Setup for Vessel Preconditioning

As the heat source for the whole preconditioning process, the RPV must be capable of producing steam for vessel heating or providing hot water to the auxiliary system. In order to establish conditions to generate steam, the RPV is first heated to 373K, while most of the air is purged by venting to the atmosphere. Not all air is purged at this temperature, but that does not affect the vessels preconditioning. Pure steam conditions are only required for the tests. Then the RPV is heated to about 440K to supply the auxiliary water system heat exchanger.
The RPV water level set before preconditioning to anticipate evaporation occuring during heating by steam injection; it should reach the required Tests water level at the end of the preconditioning process. However in any case it must be lower than the main steam lines inlet to avoid water hammer.

21 Water Filling

21.0 Check RPV Parameters
- Water Level

Assumption:
ML.RP.1 = 0.0 [m]
M(RPV-water) = 0.00 [ton]

21.1 Supply water until water reachs level equal to 12.7 [m]

Vent Air to the Atmosphere
- Open valve CC.RPV

Auxiliary water system operation
Pump MP.B0D On
ML.RP.1 = 12.7 [m]

MV.B0D = 2.0 [l/s]
M(RPV-water) = 15.00 [ton]
=> time = 7500 [sec]

Pump MP.B0D Off

Fill preheater heating side with water
- Open valve CB.HRH, CB.HFH

21.2 Check RPV Parameters
- Water Level

ML.RP.1 = 12.7 [m]

22 Heating / Purging

22.0 Check RPv Parameters

Assumptions:

-Total Pressure	MP.RP.1 =	101 [kPa]	
- Local Fluid Temperature	MTF.RP.1...5 =	283 [K]	= 10 [°C]
- Structure temperature	MTI.RP.1...3 =	283 [K]	= 10 [°C]
- Water Level	ML.RP.1 =	12.7 [m]	

22.1 Heat until temperature equals 373 [K]
Heaters On
MW.RP.7 = 1500 [kW]
MTF.RP.1...5 = 373 [K]
= 100 [°C]

=> ΔT = 90 [K]

M(RPV-water) = 15.00 [ton] => ΔQ = 5.67 [GJ]
M(RPV-struct) = 8.00 [ton] => ΔQ = 0.19 [GJ]
=> ΔQtot = 5.86 [GJ]
=> time = 3907 [sec]

- Close valve CC.RPV

* MTF.RP.1...5 = 441 [K] => ΔT = 68 [K]
= 168 [°C]

Note: * Temperature corresponding to the heat exchanger operation: SC's water filling

M(RPV-water) = 15.00 [ton] => ΔQ = 4.28 [GJ]
M(RPV-struct) = 8.00 [ton] => ΔQ = 0.27 [GJ]
=> ΔQtot = 4.56 [GJ]
=> time = 3038 [sec]

Heater Off

22.2 Check RPV Parameters

-Total Pressure	MP.RP.1 =	746 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	441 [K]	=	168 [°C]
- Structure temperature	MTI.RP.1...3 =	441 [K]	=	168 [°C]
- Water Level	ML.RP.1 =	14.1 [m]		
	M(RPV-water) =	15.00 [ton]		

30 Suppression Chambers Setup

The Test Initial Conditions require a collapsed water level in both Suppression Chambers of 3,8m above the PANDA heater bundle, that corresponds to a water column of 3,8m from the bottom of the Suppression Chamber. The required temperature is a homogeneous temperature of 352K for the pool water as well as for the gas space. The total pressure, considering saturated conditions, is at 285kPa, which correspond to an air partial pressure of 240kPa.

The Suppression Chambers Setup starts with water filling and pool conditioning (phase n° 31), continues with gas space heating by steam injection keeping 1 bar air partial pressure inside the vessels (phase n° 32). The total pressure is then setup by injecting air with the auxiliary air system (phase n° 33). Phase n° 33 is performed in parallel with phases n° 31 and 32.

31 Water Filling

31.0 Check SCs Parameters

	Assumptions:			
-Total Pressure	MP.S1 =	101 [kPa]		
	MP.S2 =	101 [kPa]		
- Local Water Temperature	MTL.S1.1...6 =	283 [K]	=	10 [°C]
	MTL.S2.1...6 =	283 [K]	=	10 [°C]
- Water Level	ML.S1 =	0 [m]		
	ML.S2 =	0 [m]		

31.1 RPV Setup for Heat Exchanger Operation

Check RPV Parameters

-Total Pressure	MP.RP.1 =	746 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	441 [K]	=	168 [°C]
- Water Level	ML.RP.1 =	14.1 [m]		

Heaters On
MW.RP.7 = 1500 [kW]

31.2 Supply water until water reachs level equal to 3.8 [m]

Auxiliary water system operation
Pump PC.HFH On
Setup control valve CC.BHA
CC.BCA

MTL.BHA =	354.5 [K]	=	81 [°C]	
MTL.BCA =	max [K]			

- Open valve CB.S1L
Pump PC.B0D On

ML.S1 =	3.8 [m]			
ML.S2 =	3.8 [m]			
MV.B0D =	2.1 [l/s]			
M(S1-water) =	42.50 [ton]			
M(S2-water) =	42.50 [ton]			
M(TSL-water) =	7.10 [ton]			
=> time =	43857 [sec]			

- Close valve CB.S1L
Pump PC.B0D Off
Pump PC.HFH Off
Heater Off

MV.B0D =	0.0 [l/s]			

31.3 SCs Parameters
- Mean Water Temperature
- Water Level

$T_{mean\_w(S1)}$ =	352 [K]	=	79 [°C]	
$T_{mean\_w(S2)}$ =	352 [K]	=	79 [°C]	
ML.S1 =	3.8 [m]			
ML.S2 =	3.8 [m]			

32 Gas Space Heating

32.0 Check SCs Parameters
-Total Pressure
- Local Gas Temperature
- Structure temperature

Assumptions:

MP.S1 =	162 [kPa]			
MP.S2 =	162 [kPa]			
MTG.S1.1...6 =	283 [K]	=	10 [°C]	
MTG.S2.1...6 =	283 [K]	=	10 [°C]	
MTI.S1.1...9 =	283 [K]	=	10 [°C]	
MTI.S2 1...9 =	283 [K]	=	10 [°C]	

32.1 RPV Setup for Steam Injection

Check RPV Parameters
-Total Pressure
- Local Fluid Temperature
- Water Level

MP.RP.1 =	746 [kPa]	(Psat)		
MTF.RP.1...5 =	441 [K]	=	168 [°C]	
ML.RP.1 =	14.1 [m]			

Heaters On
MW.RP.7 = 1500 [kW]

32.2 Steam injection
- Open valve CB.S1S, CB.S2S

MTI.S1.1...9 =	352 [K]	=> ΔT =	69 [K]
=	79 [°C]		
MTI.S2.1...9 =	352 [K]		
=	79 [°C]		
M(SCs-struct) =	72.7 [ton]	=> ΔQ =	2.52 [GJ]
M(steam) =	1095 [kg]	=> time =	1678.8 [sec]

- Close valve CB.S1S, CB.S2S
Heater Off
Check RPV Parameters

-Total Pressure	MP.RP.1 =	746 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	441 [K]	=	168 [°C]
- Water Level	ML.RP.1 =	13.1 [m]		

32.3 Check SCs Parameters

-Total Pressure	MP.S1 =	207 [kPa]		
	MP.S2 =	207 [kPa]		
- Mean Gas Temperature	$T_{mean\_G}(S1)$ =	352 [K]	=	79 [°C]
	$T_{mean\_G}(S2)$ =	352 [K]	=	79 [°C]
- Mean Water Temperature	$T_{mean\_w}(S1)$ =	352 [K]	=	79 [°C]
	$T_{mean\_w}(S2)$ =	352 [K]	=	79 [°C]
- Water Level	ML.S1 =	3.8 [m]		
	ML.S2 =	3.8 [m]		

33 Pressurization

33.0 Check SCs Parameters

-Total Pressure	MP.S1 =	207 [kPa]
	MP.S2 =	207 [kPa]

33.1 Air injection until total pressure reachs 285 [kPa]

Auxiliary air supply system operation
Setup control valve CC.B0G.2 MM.B0G = max
- Open valve CB.S1G, CB.S2G, CB.B0G
MP.S1 = 285 [kPa]
M(air) = 360 [kg] => time = 12800 [sec]
- Close valve CB.S1G, CB.S2G, CB.B0G

33.2 Check SCs Parameters

-Total Pressure	MP.S1 =	285 [kPa]		
	MP.S2 =	285 [kPa]		
- Mean Gas Temperature	$T_{mean\_G}(S1)$ =	352 [K]	=	79 [°C]
	$T_{mean\_G}(S2)$ =	352 [K]	=	79 [°C]
- Mean Water Temperature	$T_{mean\_w}(S1)$ =	352 [K]	=	79 [°C]
	$T_{mean\_w}(S2)$ =	352 [K]	=	79 [°C]
- Water Level	ML.S1 =	3.8 [m]		
	ML.S2 =	3.8 [m]		

40 GDCS Heating

The Tests Initial Conditions require a collapsed water level in the GDCS tank of 10,7m above the PANDA heater bundle, corresponding to a water level of 0,0m from the bottom of the tank taking into account a full GDCS Return Line. The required temperature is a homogeneous temperature of 333K for the whole tank, which is achieved by filling with water up to approximately 5m at the required temperature and then draining the tank. The total pressure, considered in saturated conditions, is in equilibrium with the Drywells at 294kPa, which correspond to an air partial pressure of 274kPa.
The GDCS Setup starts with structure heating by steam injection (phase n° 41), continues with water filling and pool conditioning, while keeping the vessel isolated, the

air is not vented to the atmosphere as long as the total pressure is lower than 10 bars (phase n° 42). The total pressure is then adjusted by injecting air through the auxiliary air system or by venting air to the atmosphere (phase n° 43). That last phase is performed after water has been drained and transferred to the PCC pools.

41 Gas Space Heating

41.0 Check GDCS Parameters — Assumptions:

-Total Pressure	MP.GD =	101 [kPa]		
- Local Fluid Temperature	MTF.GD.1...7 =	283 [K]	=	10 [°C]
- Structure temperature	MTI.GD.1...6 =	283 [K]	=	10 [°C]
- Water Level	ML.GD =	0 [m]		

41.1 RPV Setup for Steam Injection

Check RPV Parameters

-Total Pressure	MP.RP.1 =	746 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	441 [K]	=	168 [°C]
- Water Level	ML.RP.1 =	13.1 [m]		

Heaters On

MW.RP.7 = 1500 [kW]

Note: The RPV temperature must be reduced for the GDCS water filling operation (T=> 436K see 41.2 & 42.1)

41.2 Steam injection

- Open valve CB.GDS

MTI.GD.1...6 = 333 [K] = 60 [°C] => ΔT = 50 [K]

M(GD-struct) = 5.00 [ton] => ΔQ = 0.13 [GJ]

M(steam) = 54.6 [kg] => time = 84 [sec]

- Close valve CB.GDS

Heater Off

Check RPV Parameters

-Total Pressure	MP.RP.1 =	669 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	436 [K]	=	163 [°C]
- Water Level	ML.RP.1 =	12.9 [m]		

41.3 Check GDCS Parameters

-Total Pressure	MP.GD =	121 [kPa]		
- Local Fluid Temperature	MTF.GD.1...7 =	333 [K]	=	60 [°C]
- Structure temperature	MTI.GD.1...6 =	333 [K]	=	60 [°C]
- Water Level	ML.GD =	0 [m]		

Note: In order to get homogeneous temperature in GDCS, it is filled with water.

42 Water Filling

42.0 Check GDCS Parameters

-Total Pressure	MP.GD =	121 [kPa]		
- Local Fluid Temperature	MTF.GD.1...7 =	333 [K]	=	60 [°C]
- Structure temperature	MTI.GD.1...6 =	333 [K]	=	60 [°C]
- Water Level	ML.GD =	0 [m]		

42.1 RPV Setup for Heat Exchanger Operation

Check RPV Parameters

-Total Pressure	MP.RP.1 =	669	[kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	436	[K]	=	163 [°C]
- Water Level	ML.RP.1 =	12.9	[m]		

Heaters On

MW.RP.7 = 1500 [kW]

42.2 Supply water until water reachs level equal to 5.0 [m]

Auxiliary water system operation

Pump PC.HFH On

Setup control valve	CC.BHA	MTL.BHA =	333	[K]	= 60 [°C]
	CC.BCA	MTL.BCA =	max	[K]	
Pump PC.B0D On		MV.B0D =	2.9	[l/s]	
- Open valve CB.GDL					
ML.GD = 5.0 [m]		M(GD-water) =	14.8	[ton]	
		=> time =	5086	[sec]	

- Close valve CB.GDL

Pump PC.B0D Off

Pump PC.HFH Off

Heater Off

42.3 Check GDCS Parameters

-Total Pressure	MP.GD =	626	[kPa]	
- Mean Fluid Temperature	T_{mean_F}(GD) =	333	[K]	= 60 [°C]
- Structure temperature	MTI.GD.1...6 =	333	[K]	= 60 [°C]
- Water Level	ML.GD =	5.00	[m]	

43 Pressurization

43.0 See phase n°72

Since the GDCS is full with water, it cannot be pressurized during the phase n° 43.
The GDCS pressurization is performed during phase n°72.

50 PCC1 Pool Setup

The Tests Initial Conditions for all PCC Pools are the same; water level from the top of the PANDA heater bundle is defined at 23,2m, which corresponds to a water level of 4,4m in the pools. In order to anticipate the effect of evaporation during preconditioning, water is filled up to 4,6 m. The end point temperature is near the saturation temperature for atmospheric pressure.
The pools Setup is performed as follows: water is filled at the highest possible temperature (phase n°51,61 & 71) and the temperature conditions are adjusted then by circulation through the auxiliary heat exchanger (phase n°101,102, & 103).

Note: Similar phases can be performed in parallel; pools can be connected and filled on the same time and water circulation can be also performed with conected pools.

51 Water Filling

51.0 Check PCC1 Pool Parameters

- Local Water Temperature	MTL.U1.1...7 =	283	[K]	=	10 [°C]
- Water Level	ML.U1 =	0	[m]		

51.1 RPV Setup for Heat Exchanger Operation

Check RPV Parameters

-Total Pressure	MP.RP.1 =	669	[kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	436	[K]	=	163 [°C]
- Water Level	ML.RP.1 =	12.9	[m]		

Heaters On

MW.RP.7 = 1500 [kW]

* MTF.RP.1...5 =	447	[K]	=> ΔT =	11.0	[K]
* =	174	[°C]			

Note: * Temperature corresponding to the heat exchanger operation: PCC1 Pool water filling

MP.RP.1 =	870	[kPa]		
ML.RP.1 =	13.2	[m]		
M(RPV-water) =	15.00	[ton]	=> ΔQ =	0.08 [GJ]
M(RPV-struct) =	8.00	[ton]	=> ΔQ =	0.04 [GJ]
			=> ΔQtot =	0.09 [GJ]
			=> time =	59 [sec]

51.2 Supply water until water reachs level equal to 4.6 [m]

Auxiliary water system operation

Pump PC.HFH On

Setup control valve	CC.BHA	MTL.BHA =	375.5	[K]	= 102 [°C]
	CC.BCA	MTL.BCA =	max	[K]	
Pump PC.B0D On		MV.B0D =	1.6	[l/s]	

- Open valve CB.U1L

* ML.U1 =	4.6	[m] *	M(U1-water) =	13.35	[ton]
			=> time =	8345	[sec]

- Close valve CB.U1L

Pump PC.B0D Off

Pump PC.HFH Off

Heater Off

51.3 Check PCC1 Pool Parameters

- Mean Water Temperature	T_{mean_w}(U1) =	372	[K]	=	99 [°C]
- Water Level	ML.U1 =	4.60	[m]		

60 PCC2 Pool Setup

For PCC2 Pool Setup refer to description of pools conditioning in phase n°50.

61 Water Filling

61.0 Check PCC2 Pool Parameters

- Local Water Temperature	MTL.U2.1...7 =	283 [K]	=	10 [°C]
- Water Level	ML.U2 =	0 [m]		

61.1 RPV Setup for Heat Exchanger Operation

Check RPV Parameters

-Total Pressure	MP.RP.1 =	870 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	447 [K]	=	174 [°C]
- Water Level	ML.RP.1 =	13.2 [m]		

Heaters On

MW.RP.7 = 1500 [kW]

61.2 Supply water until water reacns level equal to 4.6 [m]

Auxiliary water system operation

Pump PC.HFH On

Setup control valve	CC.BHA	MTL.BHA =	375.5 [K]	=	102 [°C]
	CC.BCA	MTL.BCA =	max [K]		
Pump PC.B0D	On	MV.B0D =	1.6 [l/s]		
- Open valve	CB.U2L				
ML.U2 = 4.6 [m]		M(U2-water) =	13.35 [ton]		
		=> time =	8345 [sec]		

- Close valve CB.U2L

Pump PC.B0D Off

Pump PC.HFH Off

Heater Off

61.3 Check PCC2 Pool Parameters

- Mean Water Temperature	$T_{mean\_w}(U2)$ =	372 [K]	=	99 [°C]
- Water Level	ML.U2 =	4.6 [m]		

70 PCC3 Pool Setup

For PCC3 Pool Setup refer to description of pools conditioning in phase n°50. This phase is actually for the water transfer from GDCS to PCC3 pool; the water used to heat the GDCS tank.

After water has been drained, the GDCS is pressurized by air injection (phase n°72).

71 Water Transfer from GDCS Tank

71.0 Check PCC3 Pool Parameters

- Local Water Temperature	MTL.U3.1...7 =	283 [K]	=	10 [°C]
- Water Level	ML.U3 =	0 [m]		

Check GDCS Parameters

-Total Pressure	MP.GD =	626 [kPa]		
- Mean Fluid Temperature	T_{mean_F}(GD) =	333 [K]	=	60 [°C]
- Structure temperature	MTI.GD.1...6 =	333 [K]	=	60 [°C]
- Water Level	ML.GD =	5.00 [m]		

71.1 RPV Setup for Heat Exchanger Operation

Check RPV Parameters

-Total Pressure	MP.RP.1 =	870 [kPa]	(Psat)	
- Local Fluid Temperature	MTF.RP.1...5 =	447 [K]	=	174 [°C]
- Water Level	ML.RP.1 =	13.2 [m]		

Heaters On
MW.RP.7 = 1500 [kW]

* MTF.RP.1...5 = 444 [K] => ΔT = -3.0 [K]
= 171 [°C]

Note: * Temperature corresponding to the heat exchanger operation: water heating from GDCS up to 373K

71.2 Supply water until water reachs level equal to 4.6 [m]

Auxiliary water system operation
Pump PC.HFH On
Setup control valve MTL.BHA = 375.5 [K] = 102 [°C]
MTL.BCA = max [K]
Pump PC.B0D On MV.B0D = 1.60 [l/s]
- Open valve CB.U3U, CB.GDL
ML.U3 = 4.60 [m] M(U3-water) = 13.35 [ton]
=> time = 8345 [sec]
- Close valve CB.U3U, CB.GDL
Pump PC.B0D Off
Pump PC.HFH Off
Heater Off

71.3 Check PCC3 Pool Parameters

- Mean Water Temperature	T_{mean_W}(U3) =	372 [K]	=	99 [°C]
- Water Level	ML.U3 =	4.60 [m]		

Check GDCS Parameters

-Total Pressure	MP.GD =	122 [kPa]		
- Mean Fluid Temperature	T_{mean_F}(GD) =	333 [K]	=	60 [°C]
- Structure temperature	MTI.GD.1...6 =	333 [K]	=	60 [°C]
- Water Level	ML.GD =	0.10 [m]		

Check RPV Parameters

-Total Pressure	MP.RP.1 =	814 [kPa]		
- Local Fluid Temperature	MTF.RP.1...5 =	444 [K]	=	171 [°C]
- Water Level	ML.RP.1 =	13.1 [m]		

72 GDCS Pressurization

72.0 Check GDCS Parameters
-Total Pressure MP.GD = 122 [kPa]

72.1 Air injection until total pressure reachs 294 [kPa]

Auxiliary air supply system operation
Setup control valve CC.B0G.2 MM.B0G = max
- Open valve CB.GDG, CB.B0G
MP.GD = 294 [kPa]
M(air) = 28 [kg] => time = 945 [sec]
- Close valve CB.GDG, CB.B0G

72.2 Check GDCS Parameters
-Total Pressure MP.GD = 294 [kPa]
- Mean Fluid Temperature T_{mean_F}(GD) = 333 [K]
- Water Level ML.GD = 0.1 [m]

80 Drywells Setup

The nominal Drywell condition is no water; the atmosphere is a mixture of steam with a small amount of air. The total pressure considered at saturated condition is defined at 294kPa, which corresponds to an air partial pressure of 13kPa. The required temperature being homogeneous in the whole gas space, is defined at 404K.
The Drywells Setup consists of steam injection to heat the gas space (phase n° 81) and of a depressurization by venting to atmosphere (phase n° 82). In order to get homogeneous temperature in the whole vessel, air is purged during phase n°81 and an amount of about 20kg of air is injected to the Drywells in order to satisfy the required air partial pressure of 13kPa.
During the heating process, the RPV, used as steam source, is cooled down in order to draw near to the required test initial conditions - heater power is controlled in order to decrease the RPV temperature.

81 Gas Space Heating

81.0 Check Drywells Parameters	Assumptions:			
-Total Pressure	MP.D1	101 [kPa]		
	MP.D2	101 [kPa]		
- Local Gas Temperature	MTG.D1.1...6 =	283 [K]	=	10 [°C]
	MTG.D2.1...6 =	283 [K]	=	10 [°C]
- Structure temperature	MTI.D1.1...9 =	283 [K]	=	10 [°C]
	MTI.D2.1...9 =	283 [K]	=	10 [°C]
- Water Level	ML.D1 =	0.0 [m]		
	ML.D2 =	0.0 [m]		

81.1 Connect Drywells to all PCC Condensers
- Open valve CB.P1F, CB.P2F, CB.P3F

81.2 RPV Setup for Steam Injection
Check RPV Parameters

-Total Pressure	MP.RP.1 =	814 [kPa]		
- Local Fluid Temperature	MTF.RP.1...5 =	444 [K]	=	171 [°C]
- Water Level	ML.RP.1 =	13.1 [m]		

Heaters On
MW.RP.7 = 1500 [kW]

81.3 Steam injection

Vent Valve Opening for Air Purging

- Open valve CC.BUV, CB.D1V, CB.D2V
- Open valve CB.D1S, CB.D2S

MTI.D1.1...9 =	[K]	=> ΔT =	90 [K]
=	[°C]		
MTI.D2.1...9 =	373 [K]	=> ΔT =	90 [K]
=	100 [°C]		
M(DWs-struct) =	48.9 [ton]	=> ΔQ =	2.21 [GJ]
M(DWs-steam) =	98 [kg]	=> ΔQ =	0.26 [GJ]
		=> ΔQtot =	2.47 [GJ]
M(steam) =	961 [kg]	=> time =	1645 [sec]

Vent valves are closed when temperature has reached 373K and seems steady

- Close valve CC.BUV, CB.D1V, CB.D2V

81.4 Continue steam injection

MTI.D1.1...9 =	404 [K]	=> ΔT =	31 [K]
=	131 [°C]		
MTI.D2.1...9 =	404 [K]	=> ΔT =	31 [K]
=	131 [°C]		
M(DWs-struct) =	48.9 [ton]	=> ΔQ =	0.76 [GJ]
M(DWs-steam) =	182 [kg]	=> ΔQ =	0.43 [GJ]
		=> ΔQtot =	1.20 [GJ]
M(steam) =	331 [kg]	=> time =	797 [sec]

- Close valve CB.D1S, CB.D2S

Heater Off

Note: The RPV cooling down energy corresponds to 2,55 GJ, the duration of that steam injection process might be overestimated.

81.5 Check RPV Parameters

-Total Pressure	MP.RP.1 =	295 [kPa]		
- Mean Fluid Temperature	T_{mean_F}(RP) =	406 [K]	=	133 [°C]
- Water Level	ML.RP.1 =	12.6 [m]		

Check Drywells Parameters

-Total Pressure	MP.D1	281 [kPa]		
	MP.D2	281 [kPa]		
- Local Gas Temperature	MTG.D1.1...6 =	404 [K]	=	131 [°C]
	MTG.D2.1...6 =	404 [K]	=	131 [°C]
- Structure temperature	MTI.D1.1...9 =	404 [K]	=	131 [°C]
	MTI.D2.1...9 =	404 [K]	=	131 [°C]

Check PCCs Parameters

-Total Pressure	MP.P1F =	281 [kPa]		
	MP.P2F =	281 [kPa]		
	MP.P3F =	281 [kPa]		
- Local Gas Temperature	MTG.P1.1...9 =	372 [K]	=	99 [°C]
	MTG.P2.1...9 =	372 [K]	=	99 [°C]
	MTG.P3.1...9 =	372 [K]	=	99 [°C]

82 Pressurization

Both Drywells have been now purged to the atmosphere or to the PCC condensers; a certain amount of air have been vented to the PCCs, in order to satisfy the temperature equilibrium in the pools and the pressure equilibrium between Drywells and PCCs.
The Drywell atmosphere is considered as pure steam and saturated, while the PCCs contain some air. Drywells and PCCs are pressurized by air injection (phase n°82).

82.0 Check Drywells Parameters

-Total Pressure	MP.D1	281 [kPa]		
	MP.D2	281 [kPa]		
- Local Gas Temperature	MTG.D1.1...6 =	404 [K]	=	131 [°C]
	MTG.D2.1...6 =	404 [K]	=	131 [°C]
- Structure temperature	MTI.D1.1...9 =	404 [K]	=	131 [°C]
	MTI.D2.1...9 =	404 [K]	=	131 [°C]

82.1 Air injection until air partial pressure reaches 13 [kPa] ± 2 [kPa]

Auxiliary air supply system operation
Setup control valve CC.B0G.2 MM.B0G = max
- Open valve CB.D1G, CB.D2G, CB.B0G
  Δ MP.D1 =13 [kPa]
  Δ MP.D2 =13 [kPa]
  M(air) = 20 [kg] => time = 741 [sec]
- Close valve CB.D1G, CB.D2G, CB.B0G

82.3 Check Drywells Parameters

- Air Partial Pressure		13 [kPa]	± 2	[kPa]
- Local Gas Temperature	MTG.D1.1...6 =	404 [K]	=	131 [°C]
	MTG.D2.1...6 =	404 [K]	=	131 [°C]
- Structure temperature	MTI.D1.1...9 =	404 [K]	=	131 [°C]
	MTI.D2.1...9 =	404 [K]	=	131 [°C]

Check PCCs Parameters

-Total Pressure	MP.P1F =	294 [kPa]		
	MP.P2F =	294 [kPa]		
	MP.P3F =	294 [kPa]		
- Local Gas Temperature	MTG.P1.1...9 =	372 [K]	=	99 [°C]
	MTG.P2.1...9 =	372 [K]	=	99 [°C]
	MTG.P3.1...9 =	372 [K]	=	99 [°C]

90 RPV Initial Conditions Setup for Test

After having used the RPV as heat source for the vessel preconditioning, it might be at conditions, which might differ from these required for test initiation; water level, pressure and temperature may need to be adjusted in order to satisfy the test initial conditions. However the whole preconditioning anticipates the final state; start conditions are defined in order to get RPV conditions after other vessel preconditioning close to the required test initial conditions for the RPV.
Phase n° 91 is a parameter check, which will give basis for the adjusting of RPV conditions.

91 RPV Conditions Adjusting

91.0 Check RPV Parameters

	Assumtions:			
-Total Pressure	MP.RP.1 =	295 [kPa]		
- Mean Fluid Temperature	T_{mean_F}(RP) =	406 [K]	=	133 [°C]
- Water Level	ML.RP.1 =	12.6 [m]		

91.1 Adjust Test Initial Conditions in RPV

Assuming saturated conditions and a negligeable air partial pressure, the pressure is set by adjusting the temperature. Cooling is achieved by supplying cold water and/or by venting steam to the atmosphere. Heating is performed by using RPV heaters. Any required action is allowed to setup the RPV test initial conditions to match the required tolerances (ref. GE document "Test Plan Specification").

100 Test Conditions Setup

PANDA preconditioning has been now performed and its state is close to those required for the initiation; conditions out of tolerance must be adjusted to the defined values. Temperatures, pressures or water levels are set in order to anticipate the natural evolution; values do not exceed the corresponding tolerances.
The test condition setup starts with PCC Pools condition adjustments (phase n° 101, 102 & 103), which can be performed in parallel, continues with both Suppression Chambers (SCs) pools (phase n° 104), whose conditions are also adjusted in parallel, and with conditions adjusting for the SCs gas space (phase n°105). The GDCS tank is then adjusted to its defined test initial conditions (phase n°106), before adjusting conditions in both Drywells (phase n° 107). All these phases are not defined in detail, allowing any required action to get the test initial conditions established.

101 PCC1 Pool Conditions Adjusting

101.0 Adjust Test Initial Conditions in PCC1 Pool

Assuming saturated conditions at atmospheric pressure, the water temperature might be adjusted by water circulation through auxiliary heat exchanger; and due to evaporation, the water level might adjusted by supplying water. Any required action is allowed to setup the PCC pools test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").
All PCC pools conditions must be adjusted, that may be performed simultaneously by connecting the 3 pools together.

101.1 Check PCC1 Pool Parameters

- Mean Water Temperature	T_{mean_w}(U1) =	372 [K]	±	2 [K]
	=	99 [°C]		
- Local Water Temperature	MTL_U1.1...7 =	T_{mean_w}(U1)	±	2 [K]
- Water Level	ML.U1 =	4.4 [m]	±	0.20 [m]

Record on attached checklist

102 PCC2 Pool Conditions Adjusting

102.0 Adjust Test Initial Conditions in PCC2 Pool

For PCC2 pool conditions adjusting refer to description of pool conditions adjusting in phase n°101.

102.1 Check PCC2 Pool Parameters

- Mean Water Temperature
- Local Water Temperature
- Water Level

$T_{mean\_w}(U2)$ =	372 [K]	±	2 [K]
=	99 [°C]		
MTL.U2.1..7 =	$T_{mean\_w}(U2)$	±	2 [K]
ML.U2 =	4.4 [m]	±	0.20 [m]

Record on attached checklist

103 PCC3 Pool Conditions Adjusting

103.0 Adjust Test Initial Conditions in PCC3 Pool

For PCC3 pool conditions adjusting refer to description of pool conditions adjusting in phase n°101.

103.1 Check PCC3 Pool Parameters

- Mean Water Temperature
- Local Water Temperature
- Water Level

$T_{mean\_w}(U3)$ =	372 [K]	±	2 [K]
=	99 [°C]		
MTL.U3.1..7 =	$T_{mean\_w}(U3)$	±	2 [K]
ML.U3 =	4.4 [m]	±	0.20 [m]

Record on attached checklist

104 SCs Pools Conditions Adjusting

104.0 Adjust Test Initial Conditions in Suppression Chamber Pools

After the check of the water temperature and water level, required action to adjust the corresponding parameters are supplying or draining water to satisfy the defined water level, and water circulation through one or the other of the two auxiliary heat exchangers as required to adjust the desired temperature. Any action is allowed to setup the SCs pools test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").

104.1 Check SCs Parameters

- Mean Water Temperature
- Local Water Temperature
- Water Level

$T_{mean\_w}(S1)$ =	352 [K]	±	2 [K]
=	79 [°C]		
$T_{mean\_w}(S2)$ =	352 [K]	±	2 [K]
=	79 [°C]		
MTL.S1.1..6 =	$T_{mean\_w}(S1)$	±	2 [K]
MTL.S2.1..6 =	$T_{mean\_w}(S2)$	±	2 [K]
ML.S1 =	3.8 [m]	±	0.100 [m]
ML.S2 =	3.8 [m]	±	0.100 [m]

Record on attached checklist

105 SCs Gas Space Conditions Adjusting

105.0 Adjust Test Initial Conditions in Suppression Chamber Gas Space

Assuming saturated steam/air mixture, the temperature and the pressure are separately adjusted by steam and air injection. Any required action is allowed to setup the SCs gas space test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").

105.1 Check SCs Parameters

-Total Pressure

- Mean Gas Temperature

- Local Gas Temperature

Record on attached checklist

MP.S1 =	285 [kPa]	±	4 [kPa]
MP.S2 =	285 [kPa]	±	4 [kPa]
$T_{mean\_G}(S1)$ =	352 [K]	±	2 [K]
=	79 [°C]		
$T_{mean\_G}(S2)$ =	352 [K]	±	2 [K]
=	79 [°C]		
MTG.S1.1..6 =	$T_{mean\_G}(S1)$	±	2 [K]
MTG.S2.1..6 =	$T_{mean\_G}(S2)$	±	2 [K]

106 GDCS Conditions Adjusting

106.0 Adjust Test Initial Conditions in GDCS

Assuming saturated steam/air mixture, the temperature and the pressure are separately adjusted by steam and air injection. Any required action is allowed to setup the GDCS test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").

106.1 Check GDCS Parameters

-Total Pressure

- Mean Fluid Temperature

- Local Fluid Temperature

- Water Level

Record on attached checklist

MP.GD =	294 [kPa]	±	4 [kPa]
$T_{mean\_G}(GD)$ =	333 [K]	±	2 [K]
=	60 [°C]		
MTF.GD.1..7 =	$T_{mean\_G}(GD)$	±	2 [K]
ML.GD =	0.1 [m]	±	0.10 [m]

107 DWs Conditions Adjusting

107.0 Adjust Test Initial Conditions in Drywells

Assuming saturated steam/air mixture, the temperature and the pressure are separately adjusted by steam and air injection. Any required action is allowed to setup the Drywells test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").

107.1 Check Drywells Parameters

- Air Partial Pressure
- Mean Gas Temperature
- Local Gas Temperature
- Structure temperature
- Water Level

	13 [kPa]	±	2 [kPa]	
$T_{mean\_a}(D1)$ =	404 [K]	±	2 [K]	
=	131 [°C]			
$T_{mean\_a}(D2)$ =	404 [K]	±	2 [K]	
=	131 [°C]			
MTG.D1.1...6 =	$T_{mean\_a}(D1)$	±	2 [K]	
MTG.D2.1...6 =	$T_{mean\_a}(D2)$	±	2 [K]	
MTI.D1.1...9 =	$T_{mean\_a}(D1)$	±	2 [K]	
MTI.D2.1...9 =	$T_{mean\_a}(D2)$	±	2 [K]	
ML_D1 =	0.0 [m]	±	0.10 [m]	
ML_D2 =	0.0 [m]	±	0.10 [m]	

Record on attached checklist

110 Test

The facility satisfies now the required test initial conditions and must be configured according to the test configuration described in GE document "Test Plan Specification". Due to the relatively quick test initiation, data recording is started (phase n°111) before setting the desired RPV conditions (phase n°112) and before setting the test configuration (phase n°113). That last phase should not affect the PANDA conditions, but in order to assure test initial conditions satisfying the defined tolerances, the duration of all these phases between the test configuration setup (phase n°113.1 to n° 133.9) and the test initiation (phase n°113.10) should not exceed a few minutes (~5min). After test initiation, the test initial conditions must be within the tolerances given in phases n°110 and 112, in order to satisfy the acceptance criteria defined in the above mentioned GE document. If test initial conditions do not satisfy the above mentioned acceptance criteria, test is interrupted, the heat power is shut down (phase n° 122.0), vessel are isolated (phase n° 122.1) and the procedure starts again with the Test Conditions Setup (phase n° 100).
Due to the excessive pressure differences between vessels during the preconditioning, the pressure difference transmitters lineup (valve in) must be performed after the facility has test initial conditions established; it is performed during test configuration setup (phase n°113.7).

111 Data Recording

111.0 Start Data Recording (At least 20 hours after test initiation)

- Set "Daten-Speich." on HP-1000
- Set "Data recording rate" on HP-1000 (cf. requirement in Test Plan)

Record on attached checklist

111.1 Record the PANDA-Building temperature at elevation 0m and 22m

Record on attached checklist

112 RPV Conditions Adjusting

112.0 Adjust Test Initial Conditions in RPV

Assuming saturated conditions and a negligeable air partial pressure, the required pressure is set by adjusting the temperature. Any required action is allowed to setup the RPV test initial conditions according to the defined tolerances (ref. GE document "Test Plan Specification").

112.1 Check RPV Parameters

-Total Pressure
- Mean Fluid Temperature
- Local Fluid Temperature
- Water Level

MP_RP.1 =	295 [kPa]	±	4 [kPa]
T_{mean_F}(RP) =	406 [K]	±	2 [K]
=	133 [°C]		
MTF_RP.1...5 =	T_{mean_F}(RP)	±	2 [K]
ML_RP.1 =	12.7 [m]	±	0.20 [m]

Record on attached checklist

113 Configuration Setup and Test Initiation

113.0 Setup Automatic Heat Power Regulation
- Set "SCALED OPERATING POWER"
- Set "TRANSIENT START TIME AFT. SCRAM"

Record on attached checklist

113.1 Connect all Pools Together
- Close valve CB.B1L
- Open valve CB.U1L, CB.U2L, CB.U3L

Record on attached checklist

113.2 Open GDCS Pressure Equialization lines
- Open valve CB.GP1, CB.GP2

Record on attached checklist

113.3 Open Main Vent Lines
- Open valve CB.MV1, CB.MV2

Record on attached checklist

113.4 Open GDCS Return Line
- Open valve CB.GRT.2, CB.GRT.1

Record on attached checklist

113.5 Open PCC Vent Lines
- Open valve CB.P1V, CB.P2V, CB.P3V

Record on attached checklist

113.6 Open PCC Condensate Lines
- Open valve CB.P1C, CB.P2C, CB.P3C

Record on attached checklist

113.7 Instrument / Zero Check and Pressure Difference Transmitters Valve in
- Check Instruments as described in phase n°16
- Open valve Pressure Difference Transmitters Valve in

Record on attached checklist

113.8 Open Main Steam Lines
- Open valve CB.MS1, CB.MS2
- Open valve CC.MS1, CC.MS2

Record on attached checklist

113.9 Print Valve Status Report every two hours during the Test duration
- Compare to Valve Status for Test Start M3 &M4
- Attach Valve Status Reports to the Checklist

Record on attached checklist

113.10 Test Initiation
- Select "ACTUAL TRANSIENT TIME" - "TRANS. START"

Record on attached checklist

113.11 Check Test Initial Conditions - Acceptance Criteria
- Check parameters as indicated in phases 100 & 112.

Record on attached checklist

113.12 Test Interruption
If the Acceptance Criteria are not satisfied follow goto phase n° : 122.0 & 122.1
=> phase n° 122.0
=> phase n° 122.1
- Restart procedure with phase n° 100 (Test Conditions Setup)

120 End of Test

At the end of 20 hours data recording will be terminated and the test performances completed. Phases n° 121 and 122 describe the end of test and the facility shut down.

121 End of Data Recording

121.0 Stop Data Recording (cf DAS User's Guide)
After 20 hours test data recording is terminated.

121.1 Save Data (cf Control System User's Guide) Record on attached checklist

121.2 Record the PANDA-Building temperature at elevation 0m and 22m

Record on attached checklist

122 Facility Shut Down

122.0 Stop Heat Power
Heater Off

122.1 Isolating Vessels

- Close valve CB.MS1, CB.M2S
  CB.P1C, CB.P2C, CB.P3C
  CB.P1V, CB.P2V, CB.P3V
  CB.GRT.2, CB.GRT.1
  CB.MV1, CB.MV2
  CB.U1L, CB.U2L, CB.U3L

122.2 Valve Alignment

- Set valve positions according to the valve SHUT DOWN status
- Printout valve status report
- Compare to valve status for facility shut down

200 Checklist

Checklist Transient Test Number		
Completion of Procedure Phase n°	Date / Time	Signatures Performer / Reviewer
11		
12		
13		
14		
16		
101		
102		
103		
104		
105		
106		
107		
111.0		
111.1		
112		
113.0		
113.1		
113.2		
113.3		
113.4		
113.5		
113.6		
113.7		
113.8		
113.9		
113.10		
113.11		
121		