PAUL SCHERRER INSTITUT

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Document Title

PANDA Transient Tests

M9 Integral System Test Procedure

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Abstract:

This report details the procedure for conducting PANDA Transient Tests M9 specified by GE document 25A5824 Rev.0.

All phases for PANDA operation during the preconditioning processes and the test are described.

Verteiler

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00 Introduction

This procedure for Transient Test M9 describes all test phases 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 is theoretical and considered as basis for time estimation. Due to PSI electrical power limitation or modification in preconditioning process, the heating power may be reduced.
In any case, the foreseen 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 pools and the Drywells. Just before test initiation, the RPV is set up to satisfy the required initial conditions. The test is then conducted under automatic power control and with specific operator actions at the beginning of the test in order to satisfy the test objectives. The test duration is 3 hours.
A time estimation for the preconditioning of an empty and cold facility is given for each component in the following table.
Test Plan Specifications are described in the GE document 25A5824 REV.0.

Note: - Since temperatures are given in Kelvin in the Test Plan Specification and in °C in the PANDA DAS, they are indicated in both units in the current procedure.
- Idem for pressures which appear in kPa in the Test Plan Specification and in bar in the PANDA DAS; they are also indicated in two units in the current procedure.
- 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	1,6 [hour]
30	Suppression Chambers Setup	12,8 [hour]
40	GDCS Heating	2,4 [hour]
50	PCC1 Pool Setup	2,0 [hour]
60	PCC2 Pool Setup	2,0 [hour]
70	PCC3 Pool Setup	2,1 [hour]
80	Drywells Setup	1,3 [hour]
90	RPV Initial Conditions Setup for Test	not estimated
100	Test Conditions Setup	not estimated
110	Test	3,0 [hour]
10 to 100	Duration for Preconditioning	24,2 [hour]
10 to 120	Duration for the whole Test	27,2 [hour]

Note: Duration of phases n°10, 90 & 100 cannot be estimated; it should not exceed a couple of hours.

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01 Test Configuration and Initial Conditions

The configuration for the Transient Test M9 includes the RPV, Suppression Chambers, Drywells, GDCS, all PCC condensers and their respective pools; all pools will be isolated from each other. Since the IC is not lined up for M9, the IC pool will be isolated from the system. The Equalization Lines connecting both Wetwells to the RPV are not part of the system and kept closed.
A detailed description of the required configuration is given in the Test Plan.
The 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 the following List.

Test Initial Conditions List

RPV (V.RP)

- Total Pressure	MP.RP.1 =	319 [kPa]	±	4 [kPa]
- Mean Fluid Temperature	T_{F_mean}(RP) =	Σ(MTF.RP.i)/max(i)		with i=1 to 5
	T_{F_mean}(RP) =	409 [K]	±	2 [K]
- Local Fluid Temperature	MTF.RP.1..5 =	T_{F_mean}(RP)	±	2 [K]
- Water Level	ML.RP.1 =	3,50 [m]	±	0,20 [m]

Drywell 1 and 2 (V.D1 - V.D2)

- Air Partial Pressure	MPG.D1.1 =	0 [kPa]	±	2 [kPa]
	MPG.D2.1 =	0 [kPa]	±	2 [kPa]
- Mean Gas Temperature	T_{G_mean}(D1) =	Σ(MTG.D1.i)/max(i)		with i=1 to 6
	T_{G_mean}(D2) =	Σ(MTG.D2.i)/max(i)		with i=1 to 6
	T_{G_mean}(D1) =	409 [K]	±	2 [K]
	T_{G_mean}(D2) =	409 [K]	±	2 [K]
- Local Gas Temperature	MTG.D1.1...6 =	T_{G_mean}(D1)	±	2 [K]
	MTG.D2.1...6 =	T_{G_mean}(D2)	±	2 [K]
- Water Level	ML.D1 =	0,00 [m]	±	0,10 [m]
	ML.D2 =	0,00 [m]	±	0,10 [m]

Suppression Chamber 1 and 2 (V.S1 - V.S2)

- Total Pressure	MP.S1 =	301 [kPa]	±	4 [kPa]
	MP.S2 =	301 [kPa]	±	4 [kPa]
- Mean Gas Temperature	T_{G_mean}(S1) =	Σ(MTG.S1.i)/max(i)		with i=1 to 6
	T_{G_mean}(S2) =	Σ(MTG.S2.i)/max(i)		with i=1 to 6
	T_{G_mean}(S1) =	352 [K]	±	2 [K]
	T_{G_mean}(S2) =	352 [K]	±	2 [K]
- Local Gas Temperature	MTG.S1.1...6 =	T_{G_mean}(S1)	±	2 [K]
	MTG.S2.1...6 =	T_{G_mean}(S2)	±	2 [K]
- Mean Water Temperature	T_{W_mean}(S1) =	Σ(MTL.S1.i)/max(i)		with i=1 to 6
	T_{W_mean}(S2) =	Σ(MTL.S2.i)/max(i)		with i=1 to 6
	T_{W_mean}(S1) =	352 [K]	±	2 [K]
	T_{W_mean}(S2) =	352 [K]	±	2 [K]
- Local Water Temperature	MTL.S1.1...6 =	T_{W_mean}(S1)	±	2 [K]
	MTL.S2.1...6 =	T_{W_mean}(S2)	±	2 [K]
- Water Level	ML.S1 =	3,80 [m]	±	0,10 [m]
	ML.S2 =	3,80 [m]	±	0,10 [m]

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Test Initial Conditions List (cont'd)

GDCS (V.GD)

- Total Pressure	MP.GD =	318 [kPa]	±	4 [kPa]
- Mean Fluid Temperature	$T_{F\_mean}(GD)$ =	Σ(MTF.GD.i)/max(i)		with i=1 to 7
	$T_{F\_mean}(GD)$ =	329 [K]	±	4 [K]
- Local Fluid Temperature	MTF.GD.1...7 =	$T_{F\_mean}(GD)$	±	4 [K]
- Water Level	ML.GD =	3,50 [m]	±	0,10 [m]

PCC1, PCC2 and PCC3 Pools (V.U1 - V.U2 - V.U3)

- Total Pressure	* MP.ENV =	97 [kPa]		
- Mean Water Temperature	$T_{W\_mean}(U1)$ =	Σ(MTL.U1.i)/max(i)		with i=1 to 7
	$T_{W\_mean}(U2)$ =	Σ(MTL.U2.i)/max(i)		with i=1 to 7
	$T_{W\_mean}(U3)$ =	Σ(MTL.U3.i)/max(i)		with i=1 to 19
	* $T_{W\_mean}(U1)$ =	372 [K]	+0/ -4	[K]
	* $T_{W\_mean}(U2)$ =	372 [K]	+0/ -4	[K]
	* $T_{W\_mean}(U3)$ =	372 [K]	+0/ -4	[K]
- Local Water Temperature	MTL.U1.1...7 =	$T_{W\_mean}(U1)$	±	2 [K]
	MTL.U2.1...7 =	$T_{W\_mean}(U2)$	±	2 [K]
	MTL.U3.1..19 =	$T_{W\_mean}(U3)$	±	2 [K]
- Water Level	ML.U1 =	4,80 [m]	±	0,20 [m]
	ML.U2 =	4,80 [m]	±	0,20 [m]
	ML.U3 =	4,80 [m]	±	0,20 [m]

Note: * The pressure and temperature defined for the PCC Pools correspond to saturation values at usual atmospheric pressure at the test site.

10 Initial Alignment

Before starting any preconditioning process, the facility is set into the 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. The 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 the auxiliary water system is filled to allow pump 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 to "external" and "automatic" state

Record on attached checklist

12 Valve Alignment

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

Record on attached checklist

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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:\FLINK\RECIPE
- Test these two files (RUN program called "TEST" on the PC)

Record on attached checklist

15 Auxiliary Water System Filling

- Fill the Auxiliary Water System

16 Instrument / Zero Check

16.0 - Turn On Oxygen Probes - Refernce Gas and Probe Heaters

16.1 - 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 vessel preconditioning; pure steam conditions are only required for the tests. Then the RPV is heated to about 415K to supply the auxiliary water system heat exchanger.
The RPV water level is set before preconditioning to anticipate evaporation occuring during heating by steam injection; it should reach the required test water level at the end of the preconditioning process. However in any case it must be lower than the main steam line inlets to avoid water hammer.

21 Water Filling

21.0 Monitor RPV Parameters — Assumption:
- Water Level — ML.RP.1 = 0,0 [m]; M(RPV-water) = 0,00 [ton]

21.1 Supply water until level reaches 3,5 [m]
Vent Air to the Atmosphere
- Open valve CC.RPV

Auxiliary water system operation
Pump MP.B0D On — MV.B0D = 2 [l/s]
ML.RP.1 = 3,5 [m] — M(RPV-water) = 4,29 [ton]; => time = 2146 [sec]

Pump MP.B0D Off
Fill preheater heating side with water
- Open valve CB.HRH, CB.HFH

21.2 Monitor RPV Parameters
- Water Level — ML.RP.1 = 3,50 [m]

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22 Heating / Purging

22.0 Monitor RPV Parameters

- Total Pressure	Assumptions:	MP.RP.1 =	97 [kPa]	=	0,97 [bar]
- 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 =	3,50 [m]		

22.1 Heat until temperature equals 373 [K]

Heaters On

MW.RP.7 =	800 [kW]		
MTF.RP.1...5 =	373 [K]	=> ΔT =	90 [K]
=	100 [°C]		
M(RPV-water) =	4,29 [ton]	=> ΔQ =	1,62 [GJ]
M(RPV-struct) =	8,00 [ton]	=> ΔQ =	0,36 [GJ]
		=> ΔQtot =	1,98 [GJ]
		=> time =	2480 [sec]

- Close valve CC.RPV

22.2 Heat until temperature equals 415 [K]

* MTF.RP.1...5 =	415 [K]	=> ΔT =	42 [K]
=	142 [°C]		

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

M(RPV-water) =	4,29 [ton]	=> ΔQ =	0,76 [GJ]
M(RPV-struct) =	8,00 [ton]	=> ΔQ =	0,17 [GJ]
		=> ΔQtot =	0,93 [GJ]
		=> time =	1157 [sec]

Heaters Off

22.3 Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Structure temperature	MTI.RP.1...3 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	3,8 [m]		
	M(RPV-water) =	4,29 [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 301kPa, which includes an air partial pressure of 256kPa.
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 set up by injecting air with the auxiliary air system (phase n°33). Phase n°33 is performed during phases n°31 and 32.

31 Water Filling

31.0 Monitor SCs Parameters

	Assumptions:			
- Total Pressure	MP.S1 =	97 [kPa]	=	0,97 [bar]
	MP.S2 =	97 [kPa]	=	0,97 [bar]
- Local Water Temperature	MTL.S1.1...6 =	283 [K]	=	10 [°C]
	MTL.S2.1...6 =	283 [K]	=	10 [°C]
- Water Level	ML.S1 =	0,00 [m]		
	ML.S2 =	0,00 [m]		

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31.1 RPV Setup for Heat Exchanger Operation
Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	3,78 [m]		

Heaters On
MW.RP.7 = 800 [kW]

31.2 Supply water until level reaches 3,8 [m]
Auxiliary water system operation
Pump PC.HFH On
Setup control valve CC.BHA — MTL.BHA = 354,5 [K] = 81 [°C]
CC.BCA — MTL.BCA = max [K]
- Open valve CB.S1L, CB.S2L
Pump PC.B0D On — MV.B0D = 2 [l/s]
ML.S1 = 3,8 [m] — M(S1-water) = 42,50 [ton]
ML.S2 = 3,8 [m] — M(S2-water) = 42,50 [ton]
M(TSL-water) = 7,10 [ton]
=> time = 46050 [sec]
- Close valve CB.S1L, CB.S2L
Pump PC.B0D Off — MV.B0D = 0 [l/s]
Pump PC.HFH Off
Heaters Off

31.3 SCs Parameters

- Mean Water Temperature	T_{w_mean}(S1) =	352 [K]	=	79 [°C]
	T_{w_mean}(S2) =	352 [K]	=	79 [°C]
- Water Level	ML.S1 =	3,80 [m]		
	ML.S2 =	3,80 [m]		

32 Gas Space Heating

32.0 Monitor SCs Parameters — Assumptions:

- Total Pressure	MP.S1 =	156 [kPa]	=	1,56 [bar]
	MP.S2 =	156 [kPa]	=	1,56 [bar]
- Local Gas Temperature	MTG.S1.1...6 =	283 [K]	=	10 [°C]
	MTG.S2.1...6 =	283 [K]	=	10 [°C]
- Structure temperature	MTI.S1.1...9 =	283 [K]	=	10 [°C]
	MTI.S2.1...9 =	283 [K]	=	10 [°C]

32.1 RPV Setup for Steam Injection
Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	3,78 [m]		

Heaters On
MW.RP.7 = 800 [kW]

32.2 Steam injection
- Open valve CB.B1S, CB.S1S, CB.S2S

MTI.S1.1...9 = 352 [K] = 79 [°C] — => ΔT = 69 [K]
MTI.S2.1...9 = 352 [K] = 79 [°C]
M(SCs-struct) = 72,7 [ton] — => ΔQ = 2,52 [GJ]
ΔM(steam) = 1095 [kg] — => time = 3148 [sec]

- Close valve CB.B1S, CB.S1S, CB.S2S
Heaters Off

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Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	2,82 [m]		

32.3 Monitor SCs Parameters

- Total Pressure	MP.S1 =	201 [kPa]	=	2,01 [bar]
	MP.S2 =	201 [kPa]	=	2,01 [bar]
- Mean Gas Temperature	T_{G_mean}(S1) =	352 [K]	=	79 [°C]
	T_{G_mean}(S2) =	352 [K]	=	79 [°C]
- Mean Water Temperature	T_{W_mean}(S1) =	352 [K]	=	79 [°C]
	T_{W_mean}(S2) =	352 [K]	=	79 [°C]
- Water Level	ML.S1 =	3,80 [m]		
	ML.S2 =	3,80 [m]		

33 Pressurization

33.0 Monitor SCs Parameters

- Total Pressure	MP.S1 =	201 [kPa]	=	2,01 [bar]
	MP.S2 =	201 [kPa]	=	2,01 [bar]

33.1 Air injection until total pressure reaches 301 [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 = 301 [kPa] = 3,01 [bar]
ΔM(air) = 62 [kg] => time = 2073 [sec]

- Close valve CB.S1G, CB.S2G, CB.B0G

33.2 Monitor SCs Parameters

- Total Pressure	MP.S1 =	301 [kPa]	=	3,01 [bar]
	MP.S2 =	301 [kPa]	=	3,01 [bar]
- Mean Gas Temperature	T_{G_mean}(S1) =	352 [K]	=	79 [°C]
	T_{G_mean}(S2) =	352 [K]	=	79 [°C]
- Mean Water Temperature	T_{W_mean}(S1) =	352 [K]	=	79 [°C]
	T_{W_mean}(S2) =	352 [K]	=	79 [°C]
- Water Level	ML.S1 =	3,80 [m]		
	ML.S2 =	3,80 [m]		

40 GDCS Heating

The Test Initial Conditions require a water level in the GDCS tank of 14,8m above the PANDA heater bundle, corresponding to a water level of 4,10m from the bottom of the tank, taking into account a full GDCS Return Line. The required temperature is a homogeneous temperature of 329K for the whole tank, which is achieved by filling with water up to approximately 5,5m at the required temperature and then draining the tank until the required level is reached. The total pressure in GDCS, under saturated conditions and in equilibrium with the Drywell pressure is at 318kPa, which include an air partial pressure of 16kPa.
The GDCS Setup consits of heating by water filling (phase n° 41) and pressurization by air injection (phase n° 42). Filling and draining processes are performed with the GDCS vent valve open. The total pressure is then adjusted by injecting air by mean of the auxiliary air system or by venting air to the atmosphere (phase n° 42). That last phase is performed after water has been drained and transferred to the PCC pools.

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41 Water Filling

41.0 Monitor GDCS Parameters

Assumptions:				
- Total Pressure	MP.GD =	97 [kPa]	=	0,97 [bar]
- 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 =	0,00 [m]		

41.1 RPV Setup for Heat Exchanger Operation

Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	2,82 [m]		

Heaters On

MW.RP.7 = 800 [kW]

Heaters On

MW.RP.7 = 800 [kW]

41.2 Supply water until level reaches 5,5 [m]

Setup control valve CC.BUV

- Open valve CB.GDV

Auxiliary water system operation

Pump PC.HFH On

Setup control valve CC.BHA	MTL.BHA =	331 [K]	=	58 [°C]
CC.BCA	MTL.BCA =	max [K]		
Pump PC.B0D On	MV.B0D =	2 [l/s]		
- Open valve CB.GDL				
ML.GD = 5,5 [m]	M(GD-water) =	16,4 [ton]		
	=> time =	8195 [sec]		

- Close valve CB.GDL

Pump PC.B0D Off

Pump PC.HFH Off

Heaters Off

41.3 Monitor GDCS Parameters

- Total Pressure	MP.GD =	97 [kPa]	=	0,97 [bar]
- Mean Fluid Temperature	T_{F_mean}(GD) =	329 [K]	=	56 [°C]
- Structure temperature	MTI.GD.1...6 =	329 [K]	=	56 [°C]
- Water Level	ML.GD =	5,50 [m]		

42 Pressurization

42.0 See phase n°73

Since the GDCS is full with water, it cannot be pressurized during the phase n°42.

The GDCS pressurization is performed at phase n°73.

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50 PCC1 Pool Setup

The Test Initial Conditions for all PCC Pools are the same; water level from the top of the PANDA heater bundle is defined at the maximum possible level (23,6m), which corresponds to a water level of 4,8m in the pools. The end point temperature is near the saturation temperature for actual atmospheric pressure.
The Pools Setup is performed as follows: water is filled at the highest possible temperature (phase n°51, 61, 71 & 72) and the temperature conditions are adjusted then by water circulation through the auxiliary heat exchanger (phase n°105, 106 & 107).

Note: Pools can be connected together and filled simultaneously; water circulation might also be performed simultaneously with interconnected pools.

51 Water Filling

65.0 Monitor PCC1 Pool Parameters

- Local Water Temperature	MTL.U1.1...7 =	283 [K]	=	10 [°C]
- Water Level	ML.U1 =	0,00 [m]		

65.1 RPV Setup for Heat Exchanger Operation
Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	2,82 [m]		

Heaters On
MW.RP.7 = 800 [kW]

Note: The RPV temperature indicated here is a basis for the water filling operation; it might be lower than indicated.

51.2 Supply water until level reaches 4,9 [m]
Auxiliary water system operation
Pump PC.HFH On
Setup control valve CC.BHA MTL.BHA = 375 [K] = 102 [°C]
CC.BCA MTL.BCA = max [K]
Pump PC.B0D On MV.B0D = 2 [l/s]
- Open valve CB.U1L

ML.U1 = 4,9 [m] M(U1-water) = 14,22 [ton]
=> time = 7111 [sec]

- Close valve CB.U1L
Pump PC.B0D Off
Pump PC.HFH Off
Heaters Off

51.3 Monitor PCC1 Pool Parameters

- Mean Water Temperature	T_{w_mean}(U1) =	372 [K]	=	99 [°C]
- Water Level	ML.U1 =	4,90 [m]		

60 PCC2 Pool Setup

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

61 Water Filling

61.0 Monitor PCC2 Pool Parameters

- Local Water Temperature	MTL.U2.1...7 =	283 [K]	=	10 [°C]
- Water Level	ML.U2 =	0,00 [m]		

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61.1 RPV Setup for Heat Exchanger Operation
Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	2,82 [m]		

Heaters On
MW.RP.7 = 800 [kW]

Note: The RPV temperature indicated here is a basis for the water filling operation; it might be lower than indicated.

61.2 Supply water until level reaches 4,9 [m]
Auxiliary water system operation
Pump PC.HFH On

Setup control valve CC.BHA	MTL.BHA =	375 [K]	=	102 [°C]
CC.BCA	MTL.BCA =	max [K]		
Pump PC.B0D On	MV.B0D =	2 [l/s]		
- Open valve CB.U2L				
ML.U2 = 4,9 [m]	M(U2-water) =	14,22 [ton]		
	=> time =	7111 [sec]		

- Close valve CB.U2L

Pump PC.B0D Off
Pump PC.HFH Off
Heaters Off

61.3 Monitor PCC2 Pool Parameters

- Mean Water Temperature	T_{W_mean}(U2) =	372 [K]	=	99 [°C]
- Water Level	ML.U2 =	4,90 [m]		

70 PCC3 Pool Setup

For PCC3 Pool Setup refer to description of pools conditioning in phase n°50. In that case, the water comes from the GDCS; this phase defines the transfer (of the water used to heat the GDCS tank) from GDCS to PCC3 pool.
After water has been drained, the GDCS is pressurized by air injection (phase n°73).

71 Water Transfer from GDCS Tank

71.0 Monitor PCC3 Pool Parameters

- Local Water Temperature	MTL.U3.1..19 =	283 [K]	=	10 [°C]
- Water Level	ML.U3 =	0,00 [m]		

Monitor GDCS Parameters

- Total Pressure	MP.GD =	97 [kPa]	=	0,97 [bar]
- Mean Fluid Temperature	T_{F_mean}(GD) =	329 [K]	=	56 [°C]
- Structure temperature	MTI.GD.1...6 =	329 [K]	=	56 [°C]
- Water Level	ML.GD =	5,50 [m]		

71.1 RPV Setup for Heat Exchanger Operation
Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	388 [kPa]	=	3,88 [bar]
- Local Fluid Temperature	MTF.RP.1...5 =	415 [K]	=	142 [°C]
- Water Level	ML.RP.1 =	2,82 [m]		

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Heaters On
MW.RP.7 = 800 [kW]

Note: The RPV temperature indicated here is a basis for the water filling operation; it might be lower than indicated.

71.2 Supply water until level reaches 3,5 [m] in the GDCS tank
Auxiliary water system operation
Pump PC.HFH On
Setup control valve MTL.BHA = 383,0 [K] = 110 [°C]
MTL.BCA = max [K]
Pump PC.B0A On MV.B0A = 2 [l/s]
- Open valve CB.B0L, CB.LXA, CB.AXU
CB.U3U, CB.GDL
ML.GD = 3,50 [m]
ML.U3 = 1,45 [m]
M(U3-water) = 4,21 [ton]
=> time = 2104 [sec]
- Close valve CB.U3U, CB.GDL
CB.B0L, CB.LXA, CB.AXU
Heaters Off
Pump PC.B0A Off
Pump PC.HFH Off

Isolate GDCS from atmosphere
- Close valve CC.BUV, CB.GDV

71.3 Monitor PCC3 Pool Parameters
- Mean Water Temperature $T_{w\_mean}(U3)$ = 372 [K] = 99 [°C]
- Water Level ML.U3 = 1,45 [m]

Monitor GDCS Parameters
- Total Pressure MP.GD = 97 [kPa] = 0,97 [bar]
- Mean Fluid Temperature $T_{F\_mean}(GD)$ = 329 [K] = 56 [°C]
- Structure temperature MTI.GD.1...6 = 329 [K] = 56 [°C]
- Water Level ML.GD = 3,50 [m]

Monitor RPV Parameters
- Total Pressure MP.RP.1 = 388 [kPa] = 3,88 [bar]
- Local Fluid Temperature MTF.RP.1...5 = 415 [K] = 142 [°C]
- Water Level ML.RP.1 = 2,82 [m]

72 Water Filling

Since the available water in GDCS does not fill entirely the PCC3 pool, cold water is supplied from the demineralized water tank.

72.0 Monitor PCC3 Pool Parameters
- Mean Water Temperature $T_{w\_mean}(U3)$ = 372 [K] = 99 [°C]
- Water Level ML.U3 = 1,45 [m]

72.1 RPV Setup for Heat Exchanger Operation
Monitor RPV Parameters
- Total Pressure MP.RP.1 = 388 [kPa] = 3,88 [bar]
- Local Fluid Temperature MTF.RP.1...5 = 415 [K] = 142 [°C]
- Water Level ML.RP.1 = 2,82 [m]

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Heaters On
MW.RP.7 = 800 [kW]

Note: The RPV temperature indicated here is a basis for the water filling operation; it might be lower than indicated.

72.2 Supply water until level reaches 4,90 [m]
Auxiliary water system operation
Pump PC.HFH On
Setup control valve CC.BHA MTL.BHA = 375 [K] = 102 [°C]
CB.B0L CC.BCA MTL.BCA = max [K]
Pump PC.B0D On MV.B0D = 2 [l/s]
- Open valve CB.U3L
ML.U3 = 4,90 [m] M(U3-water) = 10,01 [ton]
=> time = 5007 [sec]
- Close valve CB.U3L
Pump PC.B0D Off
Pump PC.HFH Off
Heaters Off

72.3 Monitor PCC3 Pool Parameters
- Mean Water Temperature T_{w_mean}(U3) = 372 [K] = 99 [°C]
- Water Level ML.U3 = 4,90 [m]

73 GDCS Pressurization

73.0 Monitor GDCS Parameters
- Total Pressure MP.GD = 97 [kPa] = 0,97 [bar]

73.1 Air injection until total pressure reaches 318 [kPa]
Auxiliary air supply system operation
Setup control valve CC.B0G.2 MM.B0G = max
- Open valve CB.GDG, CB.B0G
MP.GD = 318 [kPa] = 3,18 [bar]
ΔM(air) = 14,0 [kg] => time = 465 [sec]
- Close valve CB.GDG, CB.B0G

73.2 Monitor GDCS Parameters
- Total Pressure MP.GD = 318 [kPa] = 3,18 [bar]
- Mean Fluid Temperature T_{F_mean}(GD) = 329 [K]
- Water Level ML.GD = 3,50 [m]

80 Drywells Setup

The nominal Drywell condition is no water, pure steam condition and homogeneous temperature of 409K.
The Drywells Setup consists of steam injection to heat up the gas space and the structure; the air is purged during the first part of the heating process in order to get pure steam conditions (phase n°81).
During the heating process, the RPV, used as steam source, is cooled down in order to approach the required test initial conditions - heater power is controlled in order to decrease the RPV temperature.

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81 Gas Space Heating

81.0 Monitor Drywell Parameters

Assumptions:

- Total Pressure
  - MP.D1 = 97 [kPa] = 0,97 [bar]
  - MP.D2 = 97 [kPa] = 0,97 [bar]
- 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 = 0,00 [m]
  - ML.D2 = 0,00 [m]

81.1 Connect Drywells to all PCC Condensers

- Open valve CB.P1F, CB.P2F, CB.P3F

81.2 RPV Setup for Heat Exchanger Operation

Monitor RPV Parameters

- Total Pressure: MP.RP.1 = 388 [kPa] = 3,88 [bar]
- Local Fluid Temperature: MTF.RP.1...5 = 415 [K] = 142 [°C]
- Water Level: ML.RP.1 = 2,82 [m]

Heaters On

MW.RP.7 = 800 [kW]

81.3 Steam injection (with air purging)

Vent valve opening for air purging

- Open valve CC.BUV, CB.D1V, CB.D2V
- Open valve CB.B1S, CB.D1S, CB.D2S

MTI.D1.1...9 = 373 [K] = 100 [°C] => ΔT = 90 [K]

MTI.D2.1...9 = 373 [K] = 100 [°C] => ΔT = 90 [K]

M(DWs-struct) = 48,9 [ton] => ΔQ = 2,21 [GJ]

M(DWs-steam) = 98 [kg] => ΔQ = 0,26 [GJ]

=> ΔQtot = 2,47 [GJ]

ΔM(steam) = 1073 [kg] => time = 3084 [sec]

Vent PCC Feed lines are closed when temperature has reached 373K and is steady

- Close valve CC.BUV, CB.D1V, CB.D2V
  CB.P1F, CB.P2F, CB.P3F

81.4 Continue Steam Injection (without air purging)

MTI.D1.1...9 = 409 [K] = 136 [°C] => ΔT = 36 [K]

MTI.D2.1...9 = 409 [K] = 136 [°C] => ΔT = 36 [K]

M(DWs-struct) = 48,9 [ton] => ΔQ = 0,88 [GJ]

M(DWs-steam) = 182 [kg] => ΔQ = 0,44 [GJ]

=> ΔQtot = 1,32 [GJ]

ΔM(steam) = 575 [kg] => time = 1652 [sec]

- Close valve CB.B1S, CB.D1S, CB.D2S

Heaters Off

Note: * During that phase, the RPV, used as heat source for steam injection to the Drywell, is cooled down in order to approach the required test initial conditions - heat power is controlled (eventually not used) in order to decrease the RPV temperature.

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81.5 Monitor RPV Parameters

- Total Pressure	MP.RP.1 =	319 [kPa]	=	3,19 [bar]
- Mean Fluid Temperature	T_{F_mean}(RP) =	409 [K]	=	136 [°C]
- Water Level	ML.RP.1 =	1,50 [m]		

Monitor Drywell Parameters

- Total Pressure	MP.D1 =	319 [kPa]	=	3,19 [bar]
	MP.D2 =	319 [kPa]	=	3,19 [bar]
- Local Gas Temperature	MTG.D1.1...6 =	409 [K]	=	136 [°C]
	MTG.D2.1...6 =	409 [K]	=	136 [°C]
- Structure temperature	MTI.D1.1...9 =	409 [K]	=	136 [°C]
	MTI.D2.1...9 =	409 [K]	=	136 [°C]

90 RPV Initial Conditions Setup for Test

After having used the RPV as heat source for vessel preconditioning, it might be under conditions differing from these required for test initiation; water level, pressure and temperature may need to be adjusted in order to satisfy the test initial conditions.
Phase n° 91 starts with a parameter monitoring, which will give the basis for RPV condition adjustement.

91 Adjusting RPV Conditions

91.0 Monitor RPV Parameters — Assumtions:

- Total Pressure	MP.RP.1 =	319 [kPa]	=	3,19 [bar]
- Mean Fluid Temperature	T_{F_mean}(RP) =	409 [K]	=	136 [°C]
- Water Level	ML.RP.1 =	3,50 [m]		

91.1 Adjust Test Initial Conditions in RPV

Assuming saturated conditions and a negligible air partial pressure, the pressure is set by adjusting the temperature. Cooling is achieved by venting steam to the atmosphere. Heating is performed by using RPV heaters. Any required action is allowed to set up the RPV test initial conditions with the required tolerances (see phase 01).

100 Test Conditions Setup

PANDA preconditioning has now been performed and the state of the facility is close to that required for test initiation; conditions out of tolerance must be adjusted to the defined values.
The test condition setup starts with the adjustment of both Suppression Chamber (SC) Pools (phase n° 101) and continues with the SCs gas space setup (phase n°102). The GDCS tank is then adjusted to its defined test initial conditions (phase n°103), before adjusting conditions of both Drywells (phase n° 104). The test condition setup continues with the PCC Pools condition adjustment (phase n° 105, 106 & 107), which can be performed simultaneously. All these phases are not defined in detail, allowing any required action to get the test initial conditions established.

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101 Adjusting SC Pools Conditions

101.0 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 (see phase 01).

101.1 Monitor SCs Parameters

- Mean Water Temperature
- Local Water Temperature
- Water Level

$T_{W\_mean}(S1)$ =	352 [K]	±	2 [K]
=	79 [°C]		
$T_{W\_mean}(S2)$ =	352 [K]	±	2 [K]
=	79 [°C]		
MTL.S1.1...6 =	$T_{W\_mean}(S1)$	±	2 [K]
MTL.S2.1...6 =	$T_{W\_mean}(S2)$	±	2 [K]
ML.S1 =	3,80 [m]	±	0,10 [m]
ML.S2 =	3,80 [m]	±	0,10 [m]

Record on attached checklist

102 Adjusting SC Gas Space Conditions

102.0 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 (see phase 01).

102.1 Monitor SCs Parameters

- Total Pressure
- Mean Gas Temperature
- Local Gas Temperature

MP.S1 =	3,01 [bar]	±	0,04 [bar]
MP.S2 =	3,01 [bar]	±	0,04 [bar]
$T_{G\_mean}(S1)$ =	352 [K]	±	2 [K]
=	79 [°C]		
$T_{G\_mean}(S2)$ =	352 [K]	±	2 [K]
=	79 [°C]		
MTG.S1.1...6 =	$T_{G\_mean}(S1)$	±	2 [K]
MTG.S2.1...6 =	$T_{G\_mean}(S2)$	±	2 [K]

Record on attached checklist

103 Adjusting GDCS Conditions

103.0 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 (see phase 01).

103.1 Monitor GDCS Parameters

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

MP.GD =	3,18 [bar]	±	0,04 [bar]
$T_{F\_mean}(GD)$ =	329 [K]	±	4 [K]
=	56 [°C]		
MTF.GD.1...7 =	$T_{F\_mean}(GD)$	±	4 [K]
ML.GD =	3,50 [m]	±	0,10 [m]

Record on attached checklist

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104 Adjusting DWs Conditions

104.0 Adjust Test Initial Conditions in Drywells

Assuming saturated conditions and an air partial pressure satisfying the required value, the temperature is adjusted by steam injection. Any required action is allowed to setup the Drywells test initial conditions according to the defined tolerances (see phase 01).

104.1 Monitor Drywell Parameters

- Air Partial Pressure	MPG.D1.1 =	0 [kPa]	±	2 [kPa]
	MPG.D2.1 =	0 [kPa]	±	2 [kPa]
- Mean Gas Temperature	T_{G_mean}(D1) =	409 [K]	±	2 [K]
	=	136 [°C]		
	T_{G_mean}(D2) =	409 [K]	±	2 [K]
	=	136 [°C]		
- Local Gas Temperature	MTG.D1.1...6 =	T_{G_mean}(D1)	±	2 [K]
	MTG.D2.1...6 =	T_{G_mean}(D2)	±	2 [K]
- Structure temperature	MTI.D1.1...9 =	T_{G_mean}(D1)	±	2 [K]
	MTI.D2.1...9 =	T_{G_mean}(D2)	±	2 [K]
- Water Level	ML.D1 =	0,00 [m]	±	0,10 [m]
	ML.D2 =	0,00 [m]	±	0,10 [m]

Record on attached checklist

105 Adjusting PCC1 Pool Conditions

105.0 Adjust Test Initial Conditions in PCC1 Pool

For all pools, water temperature adjustment is performed by water circulation through the auxiliary heat exchanger and level adjustment by supplying water from the demineralized water tank. Any required action is allowed to setup the PCC pools test initial conditions according to the defined tolerances (see phase 01).
Since all PCC pool initial conditions are the same, they may be adjusted simultaneously by connecting the four pools together.

105.1 Set PCC1 Pool Parameters

- Mean Water Temperature	T_{W_mean}(U1) =	372 [K]	+0/-4	[K]
	=	99 [°C]	+0/-4	[°C]
- Local Water Temperature	MTL.U1.1...7 =	T_{W_mean}(U1)	±	2 [K]
- Water Level	ML.U1 =	4,80 [m]	±	0,20 [m]

Record on attached checklist

106 Adjusting PCC2 Pool Conditions

106.0 Adjust Test Initial Conditions in PCC2 Pool

For PCC2 Pool conditions adjustment refer to description of phase n°105.

106.1 Monitor PCC2 Pool Parameters

- Mean Water Temperature	T_{W_mean}(U2) =	372 [K]	+0/-4	[K]
	=	99 [°C]	+0/-4	[°C]
- Local Water Temperature	MTL.U2.1...7 =	T_{W_mean}(U2)	± 2	[K]
- Water Level	ML.U2 =	4,80 [m]	±	0,20 [m]

Record on attached checklist

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107 Adjusting PCC3 Pool Conditions

107.0 Adjust Test Initial Conditions in PCC3 Pool
For PCC3 Pool conditions adjustment refer to description of phase n°105.

107.1 Monitor PCC3 Pool Parameters

- Mean Water Temperature
- Local Water Temperature
- Water Level

$T_{W\_mean}(U3)$ =	372 [K]	+0/ -4	[K]
=	99 [°C]	+0/ -4	[°C]
MTL.U3.1..19 =	$T_{W\_mean}(U3)$	±	2 [K]
ML.U3 =	4,80 [m]	±	0,20 [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 Test Plan. 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 113.9) and the test initiation (phases n°113.10 to 113.12) should not exceed a few minutes (~5min). Before test initiation, just before phase n° 113.10, the test initial conditions must be within the tolerances given in all n°100 and n°112 phases, in order to satisfy the acceptance criteria defined in phase 01. If test initial conditions do not satisfy the above mentioned acceptance criteria, the test is interrupted, the heat power is shut down (phase n° 122.0), the vessels are isolated (phase n° 122.4) 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 valve-in must be performed after the test initial conditions have been established; it is performed during test configuration setup (phase n°113.8).

111 Data Recording

111.0 Start Data Recording

- Set "Daten-Speich." on HP-1000
- Set "Data recording rate" on HP-1000 / High Scan Rate: 1/2 Hz

Record on attached checklist

111.1 Record the PANDA-Building temperatures at elevation 0m and 22m
Record on attached checklist

112 Adjusting RPV Conditions

112.0 Adjust Test Initial Conditions in RPV

Assuming saturated conditions and a negligible 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 (see phase 01).

112.1 Monitor RPV Parameters

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

MP.RP.1 =	3,19 [bar]	±	0,04 [bar]
$T_{F\_mean}(RP)$ =	409 [K]	+	2 [K]
=	136 [°C]		
MTF.RP.1...5 =	$T_{F\_mean}(RP)$	±	2 [K]
ML.RP.1 =	3,50 [m]	±	0,20 [m]

Record on attached checklist

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113 Configuration Setup and Test Initiation

Before test initiation the PANDA facility is partly configured; all valves which must be lined up are open, except both main steam line valves and the GDCS drain line valve. These last lineup processes are included in the test initiation phase; they are performed at phases n°113.11

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

Record on attached checklist

113.1 Isolate Pools
Pools might be already isolated, in that case verify that the following valves are closed
- Close valve CB.U1L, CB.U2L, CB.U3L
  CB.U1U, CB.U2U, CB.U3U

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

Record on attached checklist

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

Record on attached checklist

113.6 Open all PCC Feed Lines
- Open valve CB.P1F, CB.P2F, CB.P3F

Record on attached checklist

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

Record on attached checklist

113.8 VB-Opening Setup
- Set up automatic VB-Opening Control (Process Control System)
- Set up automatic Burst-measurement for VB-Opening (DAS-System)

Record on attached checklist

113.9 Heat Power Setup
- Connect Electrical Lines on Schema (click on the lower arrow)
- Select "ACTUAL CALCULATED POWER" - " POWER ON"
- Select "ACTUAL TRANSIENT TIME" - "TRANS. START"

Record on attached checklist

113.10 Open Main Steam Lines
- Open valve CB.MS1, CB.MS2

Record on attached checklist

113.11 Open GDCS Drain Line
- Open valve CB.GRT.2, CB.GRT.1

Record on attached checklist

113.12 Print Valve Status Report every hour during the Test duration
- Compare to Valve Status for Test M9
- Attach Valve Status Reports to the Checklist

Record on attached checklist

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113.13 Check O_2 Probes
- Check every two hours, the oxygen flow which must be at ~10-20%
- Check every two hours, the probe temperature which must be at ~695 °C

Record on attached checklist

113.14 Check Test Initial Conditions - See if Acceptance Criteria were reached before Test Initiation
- Check parameters as indicated in phases n°100 & n°112.

Record on attached checklist

113.15 Test Interruption
If the Acceptance Criteria were not satisfied before test start, conduct phases n°122.1 & 122.4
=> phase n° 122.1
=> phase n° 122.4
- Restart procedure with phase n° 100 (Test Conditions Setup)

120 End of Test

At the end of 6 hours data recording may be terminated (phase n°121), and the test performance declared complete.
The facility shutdown is described at phase n°122.

121 End of Data Recording

121.0 Stop Data Recording (cf DAS User's Guide) Record on attached checklist
At 6 hours after test start, the test is terminated and data recording stopped.

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

121.2 Record the PANDA-Building temperatures at elevation 0m and 22m
Record on attached checklist

122 Facility Shut Down

122.0 VB-Opening Setup
- Disable automatic VB-OPening Control (Process Control System)

122.1 Stop Heat Power
Heaters Off

122.2 Oxygen Probes Shut Off

122.3 Pressure Transmitters Piping Valve Off

122.4 Isolating Vessels

Check that the following valves are closed :

CB.MS1, CB.MS2
CB.P1F, CB.P2F, CB.P3F
CB.P1C, CB.P2C, CB.P3C
CB.P1V, CB.P2V, CB.P3V
CB.GRT.2,CB.GRT.1
CB.MV1, CB.MV2
CB.GP1, CB.GP2

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122.5 Valve Alignment

- Set valve positions according to the valve STARTUP status
- Print out valve status report
- Compare the printed out valve status report to valve STARTUP status

122.6 - Set "Data recording rate" on HP-1000 / Low Scan Rate: $2*10^{-3}$ Hz

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200 Checklist

Checklist Transient Test Number: ..... Date:		
Completion of Procedure Phase n°	Date / Time	Signatures Performer / Reviewer
11		
12		
13		
14		
16		
101.1		
102.1		
103.1		
104.1		
105.1		
106.1		
107.1		
111.0		
111.1	Building Temperatures at 0m: and 22m:	
112.1		
113.0		
113.1		
113.2		
113.3		
113.4		
113.5		
113.6		
113.7		
113.8		
113.9		
113.10	Time of Test Start	

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Checklist (cont'd)

Transient Test Number: ..... Date: .....

Completion of Procedure Phase n°	Date / Time	Signatures Performer / Reviewer
113.11		
113.12		
113.13		
113.14		
121.0		
121.1		
121.2	Building Temperatures at 0m: and 22m:	