Beam Line: PDF

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Pre-test setup:

Connect PPS interface test box at beam line EPS/PPS interface connector.

The Beam Line Master Spreadsheet contains a comprehensive list of all EPS related signals. As this test plan is executed note the results in the "test results" column of this spreadsheet.

Test Set 1: Vacuum

Vacuum Section:

Starting conditions: pressure at or below acceptable limits, GVs open.

Simulate pressure rise (toward poor vacuum) by disabling the vacuum gauge controller or ion pump controller channel. Ensure EPICS PVs enter proper alarm states, photon shutter closes[1] and vacuum section is isolated. Two local gate valves and one (or more, if it is required to isolate upstream section, e.g. section branching) upstream gate valve close. Record results for the following:

EPICS PV Alarm

EPS fault

Photon Shutter closes

GVx closes

GVy close:

GVz closes

Attempt to open the upstream shutter and gate valves through EPICS.

Photon shutter and gate valves cannot be opened through EPICS (1)

Enable vacuum gauge controller and ensure EPICS alarms clear. Open gate valves and photon shutter through EPICS.

[1] if the intensity of the beam in the section cannot cause damage to its valves, poor vacuum doesn't have to cause shutter close

Photon shutter and gate valves can be opened through EPICS (2)

Gauge name:	EPS fault:			(1)	(2)
	Shutter:	d/s GV:	u/s GV:		
XF:28ID1A-VA{Mono:SBM-IP:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Mono:SBM-CCG:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Mono:SBM-TCG:1}	FE	-	-	Good	Good
XF:28ID1A-VA{Mono:SBM-CCG:2}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Mono:SBM-TCG:2}	FE	-	-	Good	Good
XF:28IDA-VA:1{BS:WB-IP:1}	FE	Good	Good	Good	Good
XF:28IDA-VA:1{BS:WB-CCG:1}	FE	Good	Good	Good	Good
XF:28IDA-VA:1{BS:WB-TCG:1}	FE	-	-	Good	Good
XF:28ID1A-VA{Mir:VFM-IP:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Mir:VFM-CCG:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Mir:VFM-TCG:1}	FE	-	-	Good	Good
XF:28ID1A-VA{Diag:BDM-IP:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Diag:BDM-CCG:1}	FE	Good	Good	Good	Good
XF:28ID1A-VA{Diag:BDM-TCG:1}	FE	-	-	Good	Good
XF:28ID1A-VA{Diag:BDM-IP:2}	FE	Good	Good	Good	Good
XF:28ID1B-VA{Cross-IP:1}	FE	Good	Good	Good	Good
XF:28ID1B-VA{Cross-CCG:1}	FE	Good	Good	Good	Good
XF:28ID1B-VA{Cross-TCG:1}	FE	-	-	Good	Good

Test Set 2: Water flow

Water flow Section:

Record initial flow through section with all valves fully open.

Slowly close supply valve and record the LOW and LOW LOW PV Alarm levels.

If the channel is associated with an EPS action XFD-EPOS, also register the flow at which the EPS fault occurs. Ensure cable disconnection results in EPS action.

Repeat for each water circuit on beam line.

Sensor name:	Nominal flow:	LOW:	LOLO:	EPS:
XF:28ID1A-OP{Mono:SBM}Xtal_F-I	1.5	1.0	0.8	Closes FE Shutter

Test Set 3: Thermal

For each temperature transducer ensure the temperature measurement reports expected value.

Attach an appropriate adaptor and transducer simulator to the temperature input of the EPS system (remote IO chassis or Armor Block). Raise the temperature above each of the HI and HIHI PV alarm limits and ensure the alarm is reported. If the transducer is associated with an EPS interlock, continue to raise the temperature until the EPS trip level is exceeded. Ensure the appropriate EPS mitigation process occurs. Ensure channel cable disconnection results in EPS action.

Type K Thermocouples

Sensor name:	Temperature:	HI:	HIHI:	EPS Action:
XF:28ID1A-OP{Mono:SBM-Ax:Pitch}MtrT-I	27.3	-	-	Monitoring only
XF:28ID1A-OP{Mono:SBM-Ax:Roll}MtrT-I	27.4	-	-	Monitoring only
XF:28ID1A-OP{Mono:SBM-Ax:Yaw}MtrT-I	26.7	-	-	Monitoring only
XF:28ID1A-OP{Mono:SBM}TXtal-I	26.7	40	50	Closes FE Shutter

Test Set 4: Bridge Safety

Standard operation:

Standard operation is when the administrative control key is not activated. In this mode of operation, having any safety input that is not in the safe state will engage the 3 bridge Z-axis brakes, and disable the STO input for delta taus MC7 and MC8. In addition the D1 Actuator is not be able to move if the bridge safety is not armed. The reset button must be pressed to arm the bridge safety system. Reset is not required for the Hutch doors.

With the bridge safety system armed, for each safety input, check that putting it into the unsafe state will engage the 3 Z-axis brakes and disable STO input for MC7 and MC8, and prevent the D1 actuator from moving.

Safety input	Unsafe state	3 z-axis brakes engaged	MC7 and MC8 STO disabled	Reset does not arm bridge safety when input not satisfied	D1 Actuator can not move
B Hutch door switches	doors open	Good	Good	Good	Good
EPS overtravel signal	overtravel hit	Good	Good	Good	Good
Upstream bridge e-stop	e-stop pressed	Good	Good	Good	Good
Downstream bridge e-stop	e-stop pressed	Good	Good	Good	Good

Administrative control mode:

Administrative control mode is when the administrative control key is activated. This mode follows all rules of standard operation except that the B hutch door switches and the EPS overtravel no longer disarm the bridge safety. This means that B hutch doors and EPS overtravel no longer engage the brakes and disable the STO input.

With the administrative control key activated, and the bridge safety armed, put the safety input into the unsafe state, and confirm the items defeined in the tables below:

Safety input	Unsafe state	3 z-axis brakes engage	MC7 and MC8 STO disabled	Reset does not arm bridge safety when input not satisfied	D1 Actuator can not move
Upstream bridge e-stop	e-stop pressed	Good	Good	Good	Good
Downstream bridge e-stop	e-stop pressed	Good	Good	Good	Good

Safety input	Unsafe state	3 z-axis brakes don't engage	MC7 and MC8 STO still enabled	D1 Actuator moves
B Hutch door switches	doors open	Good	Good	Good
EPS overtravel signal	overtravel hit	Good	Good	Good

Test Set 6: EPS/PPS interface

For the primary Photon Shutter:

Front End: If *FRONT END ENABLE STATUS* and *FOE SECURE* and not *USER INTERLOCK* command the front end shutter to open.

Front end opens and ***FRONT END OPEN STATUS*** = OPEN: **Good**

Command the front end shutter to close.

Front end closes and ***FRONT END OPEN STATUS*** = CLOSED: **Good**

With the front end open force a user interlock.

Front end closes and ***FRONT END OPEN STATUS*** = CLOSED: **Good**

Attempt to open the front end shutter through EPICS while not all gate valves in white-beam region down to next secondary shutter are open.

Front end cannot be opened through EPICS: **Good**

For each secondary photon shutter:

If PHOTON SHUTTER x ENABLE STATUS = 1 (ABILITY TO OPEN) and ESEE x SECURE command the shutter to open.

Shutter opens and **PHOTON SHUTTER x *OPEN STATUS*** = OPEN **Good**

Command the shutter to close.

Shutter closes and **PHOTON SHUTTER x *OPEN STATUS*** = CLOSED **Good**

Attempt to open the shutter through EPICS while not all gate valves in white-beam region downstream the shutter are open.

Shutter cannot be opened through EPICS: **Good**

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