



# System Acceptance Review - Bifrost

Bifrost – NCRs and NITs  
=ESS.NSS.H01.BIFRO

PRESENTED BY LIAM WHITELEGG

# Agenda



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- 1 NCRs
  - 2 Open NITs
  - 3 EPL
-

# NCRs – Breakdown

## SAR Recommendations



- **Total Number of NCRs @ SAR** = 1
- **Total Number of NCRs @ SSR** = 10
- Six NITs transferred to NCRs as per SAR committee recommendations
  - NIT-21 Change thrust screw to non-magnetic - 10628
  - NIT-224 Bifrost Analyser - Performance Check - 10631
  - NIT-226 Bifrost Cave SAT - Roof Beam Gaps - 10630
  - NIT-29 Stainless steel parts on BE filter - 10629
  - NIT-228 Bifrost Cave SAT - Lead Chimneys - 10625
  - NIT-82 Bifrost BM4 –Magnetism - 10627

10651 - Bifrost raised floor outside the cave not compliant with ESS-5584373		
Status:	In Progress	Equipment: BIFRO.A05.W01
Equipment Descri...	Electrical Power &...	
10648 - Oversized gaps in the BIFROST Guide Shielding		
Status:	In Progress	Equipment: D03.100.1001
Equipment Descri...	Experimental Hall	
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Status:	In Progress	Equipment: E01.100
Equipment Descri...	E01 Level 100	
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Status:	In Progress	Equipment: E01.105.5432
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Status:	In Progress	Equipment: E01.100.5437
Equipment Descri...	BIFROST - E01 A...	
10525 - Absence of CE marking, or related documentation		
Status:	In Progress	Equipment: BIFRO.A01.R03.R01
Equipment Descri...	1.5.1 Thermal shut...	

# NCRs

## Lead Chimney - 10643

- Remaining lead chimney had an original design of 300mm depth
- All installed pipework took up a much smaller volume
- Chimney instead built up with a depth of 200mm
  - Same thickness of lead, but tighter to cave
  - Should be more aggressive shielding
  - Change from agreed design hence NCR

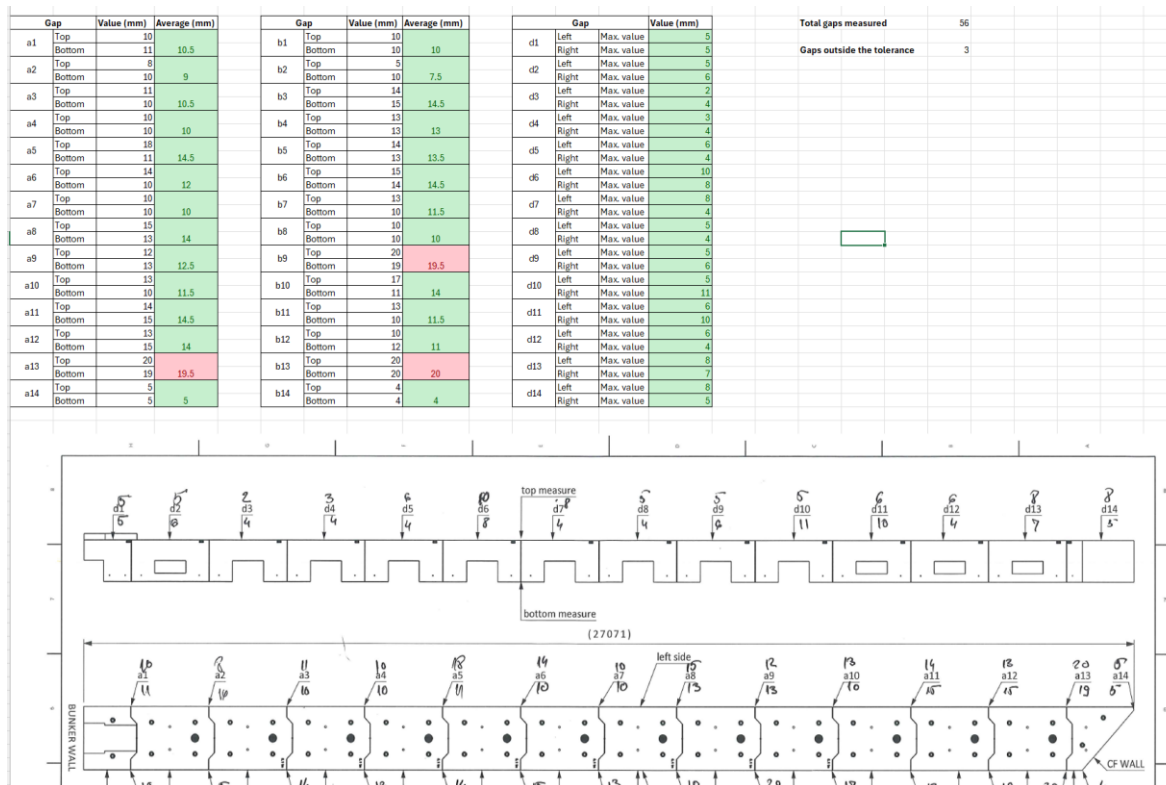


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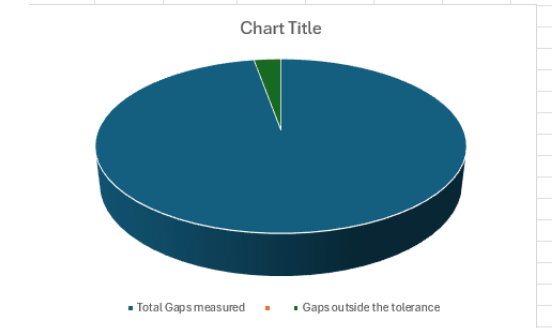
# NCRs

## Oversized Gaps - 10648

- Gaps measured along the beamline shielding
- 24 areas were out of tolerance
- Positions shown in reference files



Total Gaps measured	834
Gaps outside the tolerance	24
Percentage of oversized gaps	2.9%

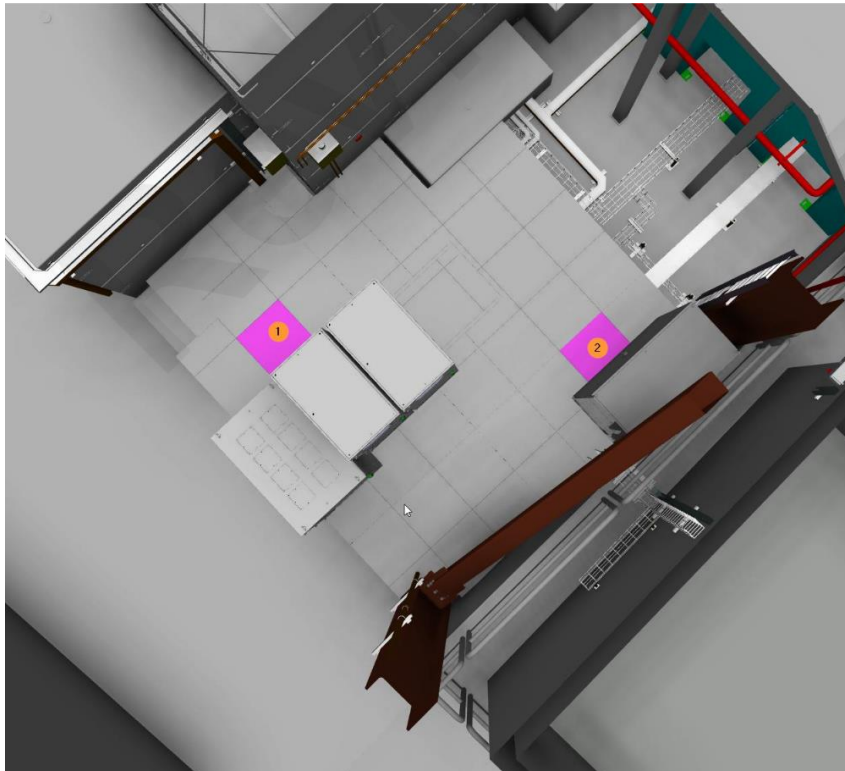


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# NCRs

## Raised Floor - 10651

- One raised floor was non-compliant wrt fire analysis
- Two tiles need to be replaced
- Probably done by the time of me speaking



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# NCRs

## Absence of CE Marking - 10525



- Thermal shutter needs to a CE/DoI
- All paperwork is approved in Chess
- Chess is not enough though, so now we have to get everyone to sign before it is formalised

EU DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY IN ACCORDANCE WITH ANNEX II, PART 1, SECTION B OF THE MACHINERY DIRECTIVE 2006/42/EC	
Manufacturer/authorised representative: European Spallation Source ESS ERIC P.O Box 176, SE-221 00 Lund, Sweden Visiting address: Odarslövsvägen 113, 224 84 Lund	
Description of the machinery:	
Denomination/make:	ESS.NSS.H01.BIFRO.A01.R03.R01
Type:	Thermal shutter
Serial number:	1
Year of manufacture:	2025
Function:	Pneumatic controlled Shutter to shut of neutron beam in BIFROST instrument.
We hereby declare that the following essential requirements of Machinery Directive 2006/42/EC are applied and fulfilled: 1.1, 1.3, 1.5, 1.6, 1.7	
We also declare that this partially completed machinery complies with the following applicable directives:	
Comment: The following harmonized standards have been considered: EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction	
Important notice: The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provision of this directive, where appropriate.	

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# Progress on NITs – Breakdown

## Breakdown of NITs registered at SAR

Presented NITs at SAR		@SSR
• Core team	33	3
• SE	9	9
• Choppers	2	1
• Shielding	2	1
• Detectors	6	6
• Beam Monitors	24	19
• Motion Control	8	3
• <b>Total</b>	<b>84</b>	<b>42</b>

• *The above is all NITs (regardless of deadline) and ignores those added after*





# Progress on NITs – Breakdown

## Current Breakdown of Open NITs

• Core team	6
• Choppers	1
• Shielding	1
• Detectors	6
• Beam Monitors	19
• Motion Control	3
• Sample Environment	9
• <b>Total</b>	<b>45</b>

- *Of these 45 NITs, 30 were labelled as required to clear SAR and SRR*

# Progress on NITs – Beam Monitors



## Beam Monitor NITs

- Beam Monitor project is responsible for 19 NITs labelled at SAR as required to pass the SAR
- Suggestion is to relabel these at required for SAR or SRR 5

Issue Type	Issue key	Issue id	Summary	Custom field (To be resolved before)
Task	NIT-45	470380	BIFROST: BM (Fission) Purpose Made Electrical	Energization
Task	NIT-283	493526	BIFROST - successfully deploy and test the slow control of the fission monitor	TG5/iSAR
Task	NIT-280	493523	BIFROST - Complete monitor gas system	TG5/iSAR
Task	NIT-285	493528	BIFROST - Modify and test R5560 firmware for Bragg peak monitor	TG5/iSAR
Task	NIT-277	493520	BIFROST - mark all monitor components with the correct FBS tags	TG5/iSAR
Task	NIT-278	493521	BIFROST - resolve 1 Ohm connection error on beam monitors	TG5/iSAR
Task	NIT-287	493530	BIFROST - Confirm data format for fission and CASCADE using on site DAQs	TG5/iSAR
Task	NIT-282	493525	BIFROST - successfully deploy and test the slow control of CASCADE monitor	TG5/iSAR
Task	NIT-288	493531	BIFROST - Verify time stamping for fission and CASCADE monitors	TG5/iSAR
Task	NIT-286	493529	BIFROST - Test EFU functionality for fission and CADCADE monitors	TG5/iSAR
Task	NIT-290	493533	BIFROST - Verify data aggregation for fission and CASCADE monitors	TG5/iSAR
Task	NIT-295	493538	BIFROST - Debug bit/cropping problem in IBM2 DAQ	TG5/iSAR
Task	NIT-292	493535	BIFROST - Test that a 14 Hz integrated count number for fission and CASCADE can be broadcast over Kafka	TG5/iSAR
Task	NIT-293	493536	BIFROST - Verify that NICOS can count against fission and CASCADE 14 Hz integrated count numbers	TG5/iSAR
Task	NIT-291	493534	BIFROST - Test that aggregated data can be saved in the nexus file	TG5/iSAR
Task	NIT-289	493532	BIFROST - EFU for Bragg peak monitor	TG5/iSAR
Task	NIT-294	493537	BIFROST - Release ICD and firmware documentation for the monitor system	TG5/iSAR
Task	NIT-281	493524	BIFROST - successfully deploy all 4 monitors on the same ring	TG5/iSAR
Task	NIT-46	470381	BIFROST: BM (Fission) Email Manufacturer Electrical	TG5/iSAR

# Progress on NITs – Sample Environment



## Sample Environment NITs

- Sample Environment group is responsible for 8 NITs labelled at SAR as required to pass the SRR
- Suggestion is to relabel these as required for ORR

Issue Type	Issue key	Issue id	Summary	Custom field (To be resolved before)
Task	NIT-273	493516	BIFROST - implement alarm for cryomagnet coil temperature being off target in NICOS	iSRR
Task	NIT-274	493517	BIFROST - test Kafka streaming for all sample environment variables in the sample environment test plan	iSRR
Task	NIT-270	493513	BIFROST - Implement needle valve and cryogen display in NICOS	iSRR
Task	NIT-271	493514	BIFROST - Implement alarm for low cryogen levels on sample environment in NICOS	iSRR
Task	NIT-272	493515	BIFROST - Implement an alarm for sample environment temperature being off target in NICOS	iSRR
Task	NIT-267	493510	BIFROST - Implement all orange cryostat PV's in NICOS	iSRR
Task	NIT-268	493511	BIFROST - Implement Oxford cryomagnet PVs in NICOS	iSRR
Task	NIT-269	493512	BIFROST - ramp rate, temperature curve and setpoint in NICOS (via Lakeshore)	iSRR

# Progress on NITs – Remaining

## Remaining NITs to be cleared before SRR acceptance

Issue Type	Issue key	Issue id	Summary	Custom field (To be resolved before)
Task	NIT-529	512065	Bifrost- Link to NCR 10651 Fire suppression under the false floor.	iSRR
Task	NIT-245	492689	Install BIFROST Side Plates	iSRR
Task	NIT-31	465436	BIFROST Instrument Earthing System	TG5/iSAR

- NIT-529 is the copy of an NCR and should be solved by the time I am speaking
- NIT-245 has been mostly solved, but two plates remain to be installed
  - OH&S delayed installation to keep open access routes
  - Shall be resolved before BoT
- NIT-31 is still open and discussions on the solution are on-going
  - Discussions between having a functional detector system or complying to standards
  - Option 1 - To try and use a high frequency filter
  - Option 2 – Truly floating the UPS as was originally intended



# Progress on NITs – ORR



## Remaining NITs

- None of the below is required to enable beam on Bifrost
- NITs 259 to 262 could slow down progress if not solved before hot commissioning

Issue key	Issue id	Summary	Custom field (To be resolved before)
NIT-142	484035	Amendment of Attenuator 1 Valve and Attenuator Tags	TG6/ ORR
NIT-143	484036	Shutter Switch Junction Box	TG6/ ORR
NIT-275	493518	BIFROST - implement sample environment and sensor IDs to be written in the nexus file	TG6/ ORR
NIT-258	493433	BIFROST - replace bad resistor on 2.7 meV, 2, detector module	TG6/ ORR
NIT-259	493435	BIFROST - Implement setting firmware registries on individual DAQs	TG6/ ORR
NIT-284	493527	BIFROST - deploy and test backend rack PDU control for RMM power cycling	TG6/ ORR
NIT-260	493436	BIFROST - Test RMM timing using general NSS method	TG6/ ORR
NIT-261	493437	BIFROST - Detector group to document He-3 PSD tube firmware	TG6/ ORR
NIT-262	493438	BIFROST - Detector: Finetune firmware registries to maximize gamma suppression and efficiency	TG6/ ORR
NIT-231	491420	Bifrost - Beryllium Filter Adjustment System Amendments	TG6/ ORR
NIT-530	512512	Document obsolescence (ESS-5914777)	TG6/ ORR
NIT-242	492615	BIFROST Cooling SAT document missing	TG6/ ORR
NIT-246	492806	Precision time stamping for motor positions	TG6/ ORR
NIT-35	466802	Change BIFROST BBGOA drawing title	TG6/ ORR
NIT-331	496924	Cable tray hindering the extraction of supporting pillar for patch panels in Bifrost	



# Further Issues

## Issues that potentially should become NITs

- Fire Suppression SAT is incomplete and should be marked to be resolved before SRR completion
- PRA covering gas lines is incomplete and should be marked to be resolved before SRR completion
- 4 systems currently going through CE/DOI process should be NITs/NCRs
  - Sample Jaws
  - Attenuators
  - Sample Exposure System
  - Get lost tube
- Area risk assessments received comments and these should be implemented. NIT to cover this
- EPL releases – almost all marked as-built. Just one major node remains
- As built CIDL – meeting next week



- Vast majority released as as-built. All parts delivered by core team and in-kind partners released
- Motion safety needs to be added
- Supply system and PSS handed over for release

ESS.NSS.H01.BIFRO - BIFROST - ESS-1109057 - A - 10.0 - Preliminary - talalosman									
+	ESS-1109057.1	-	Rev 2.0	-	Preliminary	-	talalosman (ESS-1109057.1)		
+	ESS-1109057.2	-	1.0	-	Preliminary	-	daniellundgren		
+	ESS.NSS.H01.BIFRO.A01	-	Beam Transport and Conditioning (BIFROST)	-	ESS-3820224	-	ASB - As Built - 2.0 - Release - talalosman (ESS.NSS.H01.BIFRO.A01)	✓	✓
+	ESS.NSS.H01.BIFRO.A02	-	Sample Exposure System (BIFROST)	-	ESS-3820316	-	ASB - As Built - 4.0 - Release - liamwhiteleg (ESS.NSS.H01.BIFRO.A02)	✓	✓
+	ESS.NSS.H01.BIFRO.A04	-	Support Systems (BIFROST)	-	ESS-3820234	-	ASB - As Built - 1.0 - Release - liamwhiteleg (ESS.NSS.H01.BIFRO.A04)	✓	✓
+	ESS.NSS.H01.BIFRO.A05	-	Supply System (BIFROST)	-	ESS-3532900	-	A - 1.0 - Preliminary - liamwhiteleg (ESS.NSS.H01.BIFRO.A05.1)	—	
+	ESS.NSS.H01.BIFRO.B01	-	Scattering Characterization System	-	ESS-4979989	-	ASB - As Built - 2.0 - Review - liamwhiteleg (ESS.NSS.H01.BIFRO.B01)	✓	✓
+	ESS.NSS.H01.BIFRO.F01	-	Personnel Safety System (BIFROST PSS)	-	ESS-4000178	-	ASD - As Designed (P) - 1.0 - Preliminary - daniellundgren (ESS.NSS.H01.BIFRO.F01)	—	
+	ESS.NSS.H01.BIFRO.G01	-	BIFRO.st Vacuum System	-	ESS-3820233	-	ASB - As Built - 1.0 - Release - talalosman (ESS.NSS.H01.BIFRO.G01)	✓	✓
+	ESS.NSS.H01.BIFRO.K01	-	Instrument Automation Control System	-	ESS-3999368	-	ASD - As Designed (P) - 1.0 - Preliminary - daniellundgren (ESS.NSS.H01.BIFRO.K01)	✗	
+	ESS.NSS.H01.BIFRO.U01	-	Experimental Cave	-	ESS-3820231	-	ASB - As Built - 7.0 - Release - liamwhiteleg (ESS.NSS.H01.BIFRO.U01.1)	✓	✓

