

# PS Booster Hardware Commissioning

LIU-Commissioning Coordination Committee

Friday 13<sup>th</sup> December 2019

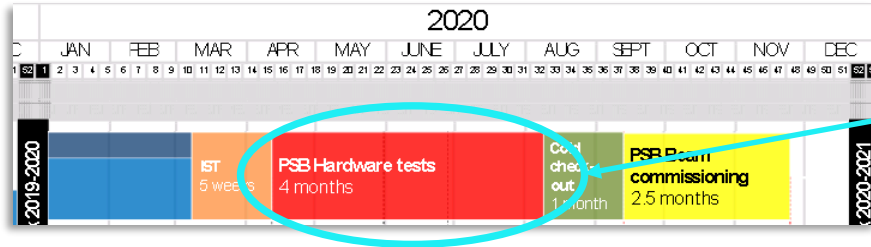
# Outline



1. Definitions
2. Constraints
3. General services readiness
4. Overview of the planning
5. Conclusion

# Hardware Tests: Definitions

## HDW Tests: Dates



**17 weeks**  
from Monday 14/04/2020 to Friday 09/08/2020

## HDW Tests: Goals

- ❖ Allow Equipment Groups to finalize their tests (Access to Zone Restricted, Control Network available,...);
- ❖ Allow BE-OP to Test and Monitor equipment in Remote-Control from CCC;
- ❖ Keep running the equipment to check the reliability.

## HDW Tests: Particularities

- ❖ Machine responsibility handover EN-ACE → BE-OP;
- ❖ Access System in at least in Restricted Mode (key distribution);
- ❖ Impact requests managed by BE-OP (Intervention Period = Operation);
- ❖ Equipment Installation **not allowed**;
- ❖ Equipment Troubleshooting and Corrective Interventions **allowed**.

# Hardware Tests: Constraints



System	April							May							June							July							August													
Machine	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	16	17	18	19	20	21	22
LINAC4	HDW_Test (2w)							LINAC4 Beam Commissioning (L4 main dump) - 3.5 months							PSB - Test (No Beam To LBE)							LINAC4 Beam Commissioning (LBE)																				
BOOSTER	PART 1							PSB HDW_Test (17w)							PART 2							PART 3																				
SWITCH-YARD	IST							POPS_Test							Main Units							SWY - CLOSED (L4 beam to LBE)																				
	PSB Access Restricted							Special Permit (POPSb_Test)							PSB - BEAM Mode (Beam to LBE + POPSb tests) or Access Restricted (PSB HDW_Test)							PSB - BEAM Mode (Beam to LBE + BR.MPS tests) or Access Restricted (PSB HDW_Test)																				

❖ **Part n.1 - from 14/04 to 01/06 (7 weeks):**

- Booster: Tests and Access Allowed;
- Switch-Yard: (BI and BTP) Tests and Access according to Switch-Yard test planning;

❖ **Part n.2 - from 02/06 to 12/07 (6 weeks):**

- Booster Tests with priority to POPSb and BR.MPS;
- Access Limited due to:
  - POPSb and BR.MPS tests;
  - LINAC4 beam to LBE (Booster + Switch-Yard Safety Chain in Beam Mode).

In discussion with TE-EPC

❖ **Part n.3 - from 13/07 to 09/08 (4 weeks):**

- Booster Tests finalization;
- Access Limited due to:
  - LINAC4 beam to LBE (Booster + Switch-Yard Safety Chain in Beam Mode).

# Hardware Tests: General Services



	Period ▾	Task Name ▾	Duration ▾	Start ▾	Finish ▾	Resou Name ▾	Qtr 2, 2020						
							Feb	Mar	Apr	May	Jun	J	
1		▸ BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20								
2	HDW	HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP							
3		▸ Access System Mode	81 days	Tue 14/04/20	Sun 09/08/20								
9		▸ General Services Readiness	106 days	Mon 18/11/19	Thu 30/04/20								
10		Electrical Network - 100% Redundant	0 days	Thu 30/04/20	Thu 30/04/20	EN-EL							
11		Raw Water	0 days	Mon 09/03/20	Mon 09/03/20	EN-Cv							
12		Demineralized-Water	0 days	Mon 24/02/20	Mon 24/02/20	EN-Cv							
13		Ventilation	0 days	Mon 09/03/20	Mon 09/03/20	EN-Cv							
14		Compressed Air	0 days	Mon 18/11/19	Mon 18/11/19	EN-Cv							

❖ Electrical Network:

- Power, to be ready @ 100% for Hardware Commissioning period;
- Full network redundancy available from 30/04/2020.

❖ EN-CV Services ready for the start of HDW (before 14/04/2020).

# Hardware Tests Planning: Overview

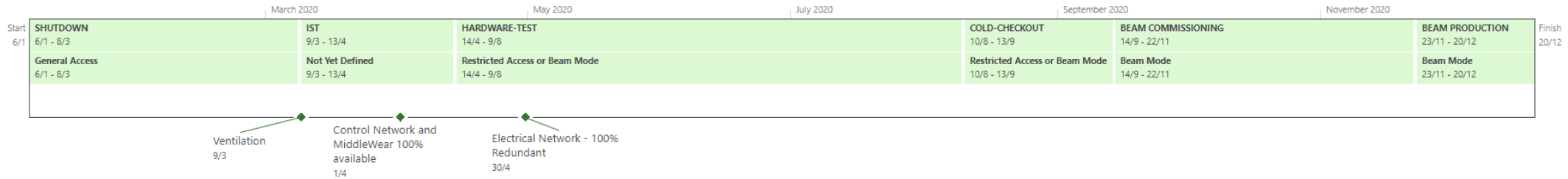


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Status: Checked-in Last Modified: 11/12/2019 10:19 Version: Published



ID	Task Name	Duration	Start	Finish
244	BBQ	86d	25/05/2020	23/09/2020
247	BTP - Wide Band Pick-Up	81d	14/04/2020	09/08/2020
249	BTMS - Ring BPMS	81d	14/04/2020	09/08/2020
255	SI.SMV_Scrapers	81d	14/04/2020	09/08/2020
257	BPMs - Transfer Lines	81d	14/04/2020	09/08/2020
262	Beam_TV	88d	01/04/2020	09/08/2020
266	BCT_DC	63d	11/05/2020	09/08/2020
269	BCT_FAST	62d	12/05/2020	09/08/2020
272	BCT - Transfer Lines	81d	14/04/2020	09/08/2020
275	BLM	85d	08/04/2020	11/08/2020
285	TE-VSC - Vaccum	54d	31/01/2020	17/04/2020
288	EN-STI	14d	27/03/2020	17/04/2020

# Hardware Tests: Conclusion



- ❖ This Planning presentation **is not the final step** of the Booster Hardware-Test Planning, it is only the start;
  - *planning reshuffled due to manpower loading → e.g. TE-EPC, more news beginning of January.*
  
- ❖ The Booster Commissioning Coordinators will take contact with all equipment experts:
  - ✓ To check the test schedule;
  - ✓ To check the OP Check-list;
  - → **Deadline 30/03/2020.**
  
- ❖ This planning is available in MS-Project-OnLine (→ EN-ACE-OSS): [PSB\\_LS2\\_HC](#)
  
- ❖ In case of questions, modifications or whatever impacting the Booster Hardware Test period, please contact the coordinators:
  - Fabrice Chapuis (BE-OP-PSB);
  - Abdel Akroh (BE-OP-PSB).





# Backup slides: Detailed HWC planning

Integration schedule per equipment groups

# Control Network / Middleware readiness (BE-CO)



Period	Task Name	Duration	Start	Finish	Resource Names	Timeline				
						Dec	Qtr 1, 2020 Jan	Feb	Mar	Qtr 2, 2020 Apr
1	<b>BOOSTER LS2 Master Schedule</b>	<b>492 days?</b>	<b>Tue 18/09/18</b>	<b>Fri 18/09/20</b>						
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP					<b>HARDWARE-TEST</b>
3	<b>BE-CO Readiness</b>	<b>375 days</b>	<b>Tue 18/09/18</b>	<b>Wed 01/04/20</b>						
4	SD Control Network and MiddleWare Start-Up	35 days	Mon 13/01/20	Fri 28/02/20	BE-CO					
5	SD Control Network and MiddleWare 100% available	0 days	Wed 01/04/20	Wed 01/04/20	BE-CO					
6	<b>BE-CO (Control Change Requests)</b>	<b>353 days</b>	<b>Tue 18/09/18</b>	<b>Mon 02/03/20</b>						
7	HDW Upgrade PSB and SPS BWS acquisition systems with Linux CPU	0 days	Mon 02/03/20	Mon 02/03/20	BE-BI					
8	HDW Replace dpsbtrfb in b. 361	0 days	Tue 18/09/18	Tue 18/09/18	BE-RF					
9	HDW Consolidate PSB extraction kicker front-end computer	0 days	Mon 02/03/20	Mon 02/03/20	TE-ABT					
10	HDW Consolidate PSB Septa Electronics & Controls. Phase 2.	0 days	Mon 06/01/20	Mon 06/01/20	TE-ABT					
11	HDW Provide Electronics & Controls for PSB BI.TKSTR stripping foils	0 days	Mon 02/03/20	Mon 02/03/20	TE-ABT					
12	HDW Provide Electronics & Controls for PSB BI.BSW	0 days	Mon 02/03/20	Mon 02/03/20	TE-ABT					
13	HDW Provide Electronics & Controls for PSB BI.DIS	0 days	Mon 02/03/20	Mon 02/03/20	TE-ABT					
14	HDW Provide high voltage pulsed generators, Electronics & Controls for PSB BI.KSW	0 days	Mon 02/03/20	Mon 02/03/20	TE-ABT					
15	HDW BI.5MV10 septum magnets upgrade	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
16	HDW Booster injection (correctors, quadrupoles and steerers) upgrade	0 days	Wed 11/12/19	Wed 11/12/19	TE-EPC					
17	HDW Booster Injection BI.BSW Magnets	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
18	HDW Booster Injection Qstrip converters	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
19	HDW Booster main magnets Dipole and Quadrupole (POPS-B) and trims	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
20	HDW New SVC MEQ59	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
21	HDW PowM1553 : Interface changes	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
22	HDW PSB BDL, ONO, XNO, and the BT, BTM, BTY and BTP lines	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					
23	HDW Septum magnets for booster ejection and transfer	0 days	Mon 02/03/20	Mon 02/03/20	TE-EPC					

❖ Control Network and Middleware ready for 01/04/2020;

❖ All CCR (Control Change Request) should be released for the 02/03/2020.

# Booster Patrol + DSO Test (BE-ASR + BE-ICS)



Period	Task Name	Duration	Start	Finish	Resou Name
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3	Access System Mode	81 days	Tue 14/04/20	Sun 09/08/20	
4	Restricted Access or Beam Mode	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
5	Access System Patrols and DSO_Tests	56.5 days	Tue 14/04/20	Mon 06/07/20	
6	Beam Patrol	0.5 days	Tue 14/04/20	Tue 14/04/20	BE-OP
7	DSO_Test (POPSb)	0.5 days	Tue 02/06/20	Tue 02/06/20	BE-ASR
8	DSO_Test (BR.MPS)	0.5 days	Mon 06/07/20	Mon 06/07/20	BE-ASR

❖ Beam Patrol closing the Machine → 14/04/2020

❖ 2 DSO Tests required to authorize the Main Power Supplies Tests (→TE-EPC):

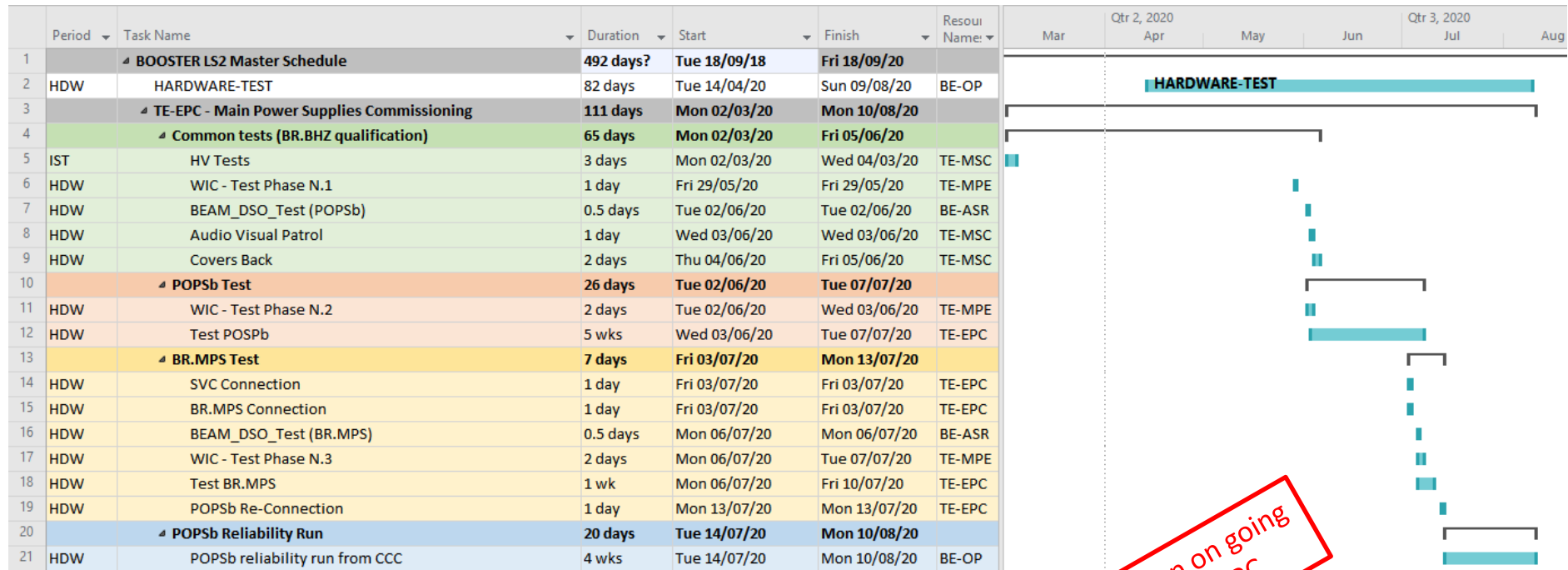
- ✓ 1 DSO Test to qualify: POPSb with BR.BHZ/QFO/QFE → 02/06/2020;
- ✓ 1 DSO Test to qualify: BR.MPS with BR. BR.BHZ/QFO/QFE → 06/07/2020.

Dates to be confirmed with TE-EPC

❖ The DSO tests will qualify the Booster Machine and the Booster Safety Chain for the Beam Production.

❖ The Beam Stoppers will be tested (mandatory).

# Main Power Supplies Tests (TE-EPC + associate groups)



## ❖ Main Power Supplies Tests in 4 phases:

- **Phase1** – 1 week of Common Tests: BR.BHZ/QFO/QDE qualification: WIC, DSO\_Test, Audio/Visual\_Patrol (involving: TE-MS, TE-MPE,...) → 29/05 to 05/06;
- **Phase2** – 5 weeks dedicated to POPSb pulsing the Main Magnets (TE-EPC) → 02/06 to 07/07;
- **Phase3** – 2 weeks to connect and test the back-up: BR.MPS (TE-EPC) → 03/07 to 13/07;
- **Phase4** – 4 weeks: POPSb reconnection and Reliability Run from CCC (BE-OP) → 14/07 to 10/08.

# Finemet Cavities (BE-RF)



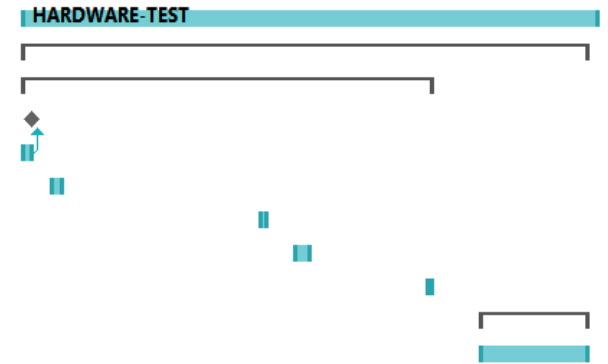
	Period	Task Name	Duration	Start	Finish	Resou Name
1		BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HDW	HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3		RF - Finemet	125 days	Fri 13/03/20	Fri 11/09/20	
4		Low-Level Tests	125 days	Fri 13/03/20	Fri 11/09/20	
5		LL_RF Train Distribution	0 days	Wed 15/04/20	Wed 15/04/20	
6	HDW	LL Expert Tests	4.2 wks	Fri 13/03/20	Tue 14/04/20	BE-RF
7	HDW	LL Commissioning	21 wks	Tue 14/04/20	Fri 11/09/20	BE-RF
8		BE-OP Test and Training	24 days	Mon 10/08/20	Fri 11/09/20	
9	HDW	BE-OP Test and Training	4.8 wks	Mon 10/08/20	Fri 11/09/20	

- ❖ The whole HDW period will be managed by the LL-RF team to characterize the Finemet (HL-RF) with the Low-Level → 14/04 to 11/09;
- ❖ BE-OP tests and training during the Cold-Checkout and Beam Commissioning period → 10/08 to 11/09.

# B-Train /White Rabbit (TE-MSc)



Period	Task Name	Duration	Start	Finish	Resource Name	Qtr 2, 2020 Apr	May	Jun	Qtr 3, 2020 Jul
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20					
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP				
3	B-Train	81 days	Tue 14/04/20	Fri 07/08/20					
4	B-Train (without Beam)	57 days	Tue 14/04/20	Mon 06/07/20					
5	B-Train (White Rabbit) Distribution	0 days	Wed 15/04/20	Wed 15/04/20					
6	HDW WR transmission to the users#1 (POPSb, RF, BCT) only Controls	2 days	Tue 14/04/20	Wed 15/04/20	TE-MSc				
7	HDW Check the B-Train electronics (sensors) (POPSb pulsing)	2 days	Mon 20/04/20	Tue 21/04/20	TE-MSc				
8	HDW WR transmission to the users#2 (POPSb (controls+ pulsing in current mode), RF, BCT)	1 day	Tue 02/06/20	Tue 02/06/20	TE-MSc				
9	HDW Test full system (POPS (in field reg. mode), RF (controls+ hardware))	3 days	Tue 09/06/20	Thu 11/06/20	TE-MSc				
10	HDW Test PCO degraded mode (MPS (I reg. mode only), RF)	1 day	Mon 06/07/20	Mon 06/07/20	TE-MSc				
11	B-Train HDW-Test (without Beam)	16 days	Fri 17/07/20	Fri 07/08/20					
12	HDW B-Train HDW Test from CCC	16 days	Fri 17/07/20	Fri 07/08/20	BE-OP				



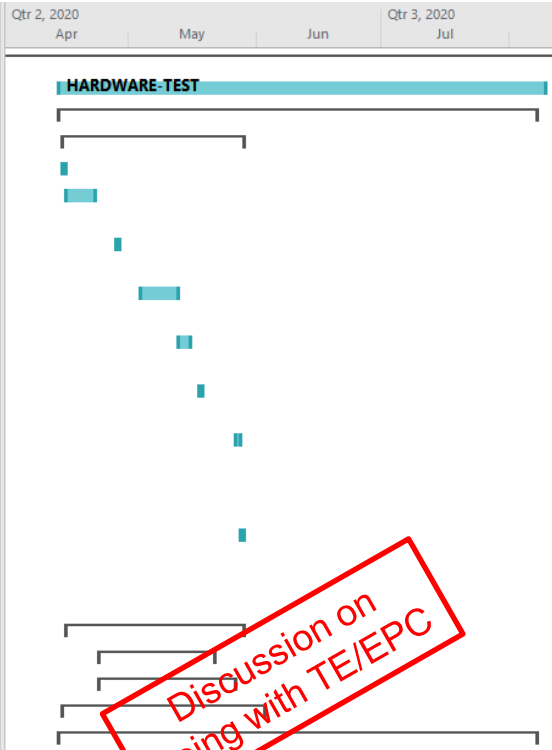
## ❖ B-Train:

- **Phase1** – Several tests to check the B-Train Generation and Transmission (POSPb ↔ RF) managed by TE-MSc with BE-OP support → 14/04 to 06/07;
- **Phase2** – Test and Monitoring from CCC → 17/07 to 07/08.

# Auxiliary Power Supplies (TE-EPC + associate groups)



Period	Task Name	Duration	Start	Finish	Resou Name
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3	TE-EPC Auxiliary Power Converters / Magnets Test	81 days	Tue 14/04/20	Fri 07/08/20	
4	BHP Aux. Power-Converters pulsing in BOOSTER	30 days	Wed 15/04/20	Thu 28/05/20	
5	HDW 9 - Connection to Magnet.	1 day	Wed 15/04/20	Wed 15/04/20	TE-EPC
6	HDW 10 - Current loop tuning at I.max = 10 % x I.nominal.	5 days	Thu 16/04/20	Wed 22/04/20	TE-EPC
7	HDW 11 - Circuit and Magnet Polarity check.	1 day	Tue 28/04/20	Tue 28/04/20	TE-MSC, (BE-OP)
8	HDW 12 - Current loop tuning at I.max = 100 % x I.nominal.	7 days	Mon 04/05/20	Tue 12/05/20	TE-EPC
9	HDW 13 - Testing & Validation of CCLIBS - IRMS minimiser	3 days	Wed 13/05/20	Fri 15/05/20	TE-EPC
10	HDW 14 - Heat run at I.mag = I.max Duration of [8; 24] hours.	1 day	Mon 18/05/20	Mon 18/05/20	TE-MSC, (EN-EL)
11	HDW 15.1 - [BIS Interlock / External conditions] <=> [power converter] interface comissioning.	1 day	Wed 27/05/20	Wed 27/05/20	TE-MPE, BE-OP
12	HDW 15.2 - [BIS Interlock / External conditions] <=> [power converter] interface comissioning.	1 day	Thu 28/05/20	Thu 28/05/20	TE-MPE, BE-OP
13	BCER Aux. Power-Converters pulsing in BOOSTER	29 days	Thu 16/04/20	Thu 28/05/20	
21	BHP Aux. Power-Converters pulsing in SWITCH-YARD	18 days	Fri 24/04/20	Thu 21/05/20	
29	BCER Aux. Power-Converters pulsing in SWITCH-YARD	21 days	Fri 24/04/20	Tue 26/05/20	
36	TE-EPC / TE-ABT Synchronized Test in: BCER and BHP	32 days	Wed 15/04/20	Tue 02/06/20	
47	Other Aux. Power-Converters not part of the LIU Project	81 days	Tue 14/04/20	Fri 07/08/20	



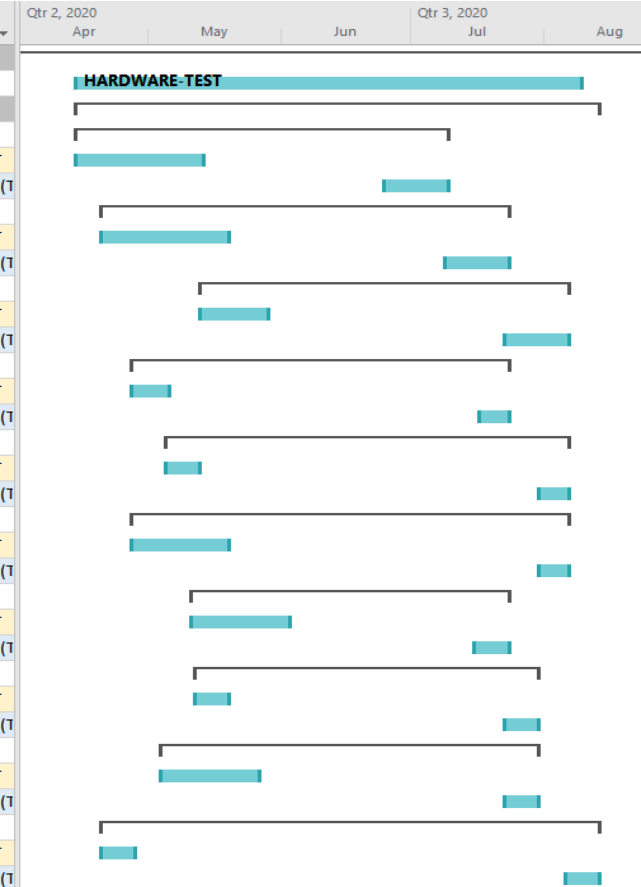
❖ Auxiliary Power Supplies split in 6 groups and applying the TE-EPC Checklist procedure :

- **Groups 1 and 2** gather the Aux. P.C. located in BHP or BCER and pulsing magnets in Booster Zone;
- **Groups 3 and 4** gather the Aux. P.C. located in BHP or BCER and pulsing magnets in Switch-Yard Zone;
- **Group 5** gather the Aux. P.C. located in BHP or BCER and pulsing magnets managed by TE-ABT (Phase3);
- **Group 6** gather the Aux. P.C. located in BHP, BCER or BAT which the full commissioning test are not necessary (Orbit Correctors, Multipoles, ...) .

# Beam Transfer Magnets (TE-ABT)



Period	Task Name	Duration	Start	Finish	Resource Name	Qtr 2, 2020		Qtr 3, 2020	
						Apr	May	Jun	Jul
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20					
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP				
3	TE-ABT Tests	85 days	Tue 14/04/20	Thu 13/08/20					
4	BI.DIS	60 days	Tue 14/04/20	Thu 09/07/20					
5	HDW BI.DIS - Phase 3: HDW (System Pulsng in Local @ HV)	4.2 wks	Tue 14/04/20	Wed 13/05/20	TE-ABT				
6	HDW BI.DIS - Phase 4: HDW (System Pulsin in Remote from CCC)	2.2 wks	Thu 25/06/20	Thu 09/07/20	BE-OP,(T				
7	BI.KSW16L1, 16L4, 1L4	66 days	Mon 20/04/20	Thu 23/07/20					
8	HDW BI.KSW - Phase 3: HDW (System Pulsng in Local @ HV)	4.2 wks	Mon 20/04/20	Tue 19/05/20	TE-ABT				
9	HDW BI.KSW - Phase 4: HDW (System Pulsin in Remote from CCC)	2.2 wks	Thu 09/07/20	Thu 23/07/20	BE-OP,(T				
10	BI.TSTR1L1	60 days	Wed 13/05/20	Thu 06/08/20					
11	HDW Stripping Foil - Phase 3: HDW (System Pulsng in Local @ HV)	2.2 wks	Wed 13/05/20	Thu 28/05/20	TE-ABT				
12	HDW Stripping Foil - Phase 4: HDW (System Pulsin in Remote from CC	2.2 wks	Thu 23/07/20	Thu 06/08/20	BE-OP,(T				
13	BI.BSW1L1.1/2/3/4	61 days	Mon 27/04/20	Thu 23/07/20					
14	HDW BI.BSW - Phase 3: HDW (System Pulsng in Local @ HV)	1.2 wks	Mon 27/04/20	Tue 05/05/20	TE-ABT				
15	HDW BI.BSW - Phase 4: HDW (System Pulsin in Remote from CCC)	1 wk	Fri 17/07/20	Thu 23/07/20	BE-OP,(T				
16	BI.SMV10	66 days	Tue 05/05/20	Thu 06/08/20					
17	HDW BI.SMV - Phase 3: HDW (System Pulsng in Local @ HV)	1.2 wks	Tue 05/05/20	Tue 12/05/20	TE-ABT				
18	HDW BI.SMV - Phase 4: HDW (System Pulsin in Remote from CCC)	1 wk	Fri 31/07/20	Thu 06/08/20	BE-OP,(T				
19	BE.KFA14L1	71 days	Mon 27/04/20	Thu 06/08/20					
20	HDW BE.KFA - Phase 3: HDW (System Pulsng in Local @ HV)	3.2 wks	Mon 27/04/20	Tue 19/05/20	TE-ABT				
21	HDW BE.KFA - Phase 4: HDW (System Pulsin in Remote from CCC)	5 days	Fri 31/07/20	Thu 06/08/20	BE-OP,(T				
22	BE.BSW14L4/15L1/15L4	52 days	Mon 11/05/20	Thu 23/07/20					
23	HDW BE.BSW - Phase 3: HDW (System Pulsng in Local @ HV)	3 wks	Mon 11/05/20	Tue 02/06/20	TE-ABT				
24	HDW BE.BSW - Phase 4: HDW (System Pulsin in Remote from CCC)	1.2 wks	Thu 16/07/20	Thu 23/07/20	BE-OP,(T				
25	BE.SMH15L1	56 days	Tue 12/05/20	Thu 30/07/20					
26	HDW BE.SMH - Phase 3: HDW (System Pulsng in Local @ HV)	1.2 wks	Tue 12/05/20	Tue 19/05/20	TE-ABT				
27	HDW BE.SMH - Phase 4: HDW (System Pulsin in Remote from CCC)	1.2 wks	Thu 23/07/20	Thu 30/07/20	BE-OP,(T				
28	BT.KFA10/20	62 days	Mon 04/05/20	Thu 30/07/20					
29	HDW BT.KFA - Phase 3: HDW (System Pulsng in Local @ HV)	3.2 wks	Mon 04/05/20	Tue 26/05/20	TE-ABT				
30	HDW BT.KFA - Phase 4: HDW (System Pulsin in Remote from CCC)	1.2 wks	Thu 23/07/20	Thu 30/07/20	BE-OP,(T				
31	BT.SMV10/20	81 days	Mon 20/04/20	Thu 13/08/20					
32	HDW BT.SMV - Phase 3: HDW (System Pulsng in Local @ HV)	1.2 wks	Mon 20/04/20	Mon 27/04/20	TE-ABT				
33	HDW BT.SMV - Phase 4: HDW (System Pulsin in Remote from CCC)	1.2 wks	Thu 06/08/20	Thu 13/08/20	BE-OP,(T				



❖ The HDW period gathers the TE-ABT tests: Phase 3 and 4

- **Phase3:** System pulsing in LOCAL with power/voltage increase to max. (tests synchronized with TE-EPC – Group 5);
- **Phase4:** Test in Remote from CCC and reliability run.



# Transverse Feedback (BE-RF)

Period	Task Name	Duration	Start	Finish	Resou Name
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3	Transverse Feedback	106 days	Mon 20/04/20	Fri 18/09/20	
4	HDW Phase 3: Dry Run from CCC	5 days	Mon 20/04/20	Fri 24/04/20	
5	HDW Phase 4: System Commissioning with Beam	5 days	Mon 14/09/20	Fri 18/09/20	

# Vacuum (TE-VSC)

Period	Task Name	Duration	Start	Finish	Resou Name
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3	TE-VSC - Vaccum	4 days?	Tue 14/04/20	Fri 17/04/20	
4	HDW HDW_Test: Regular from CCC (See Minute from 06/05/2020)	4 days?	Tue 14/04/20	Fri 17/04/20	BE-OP

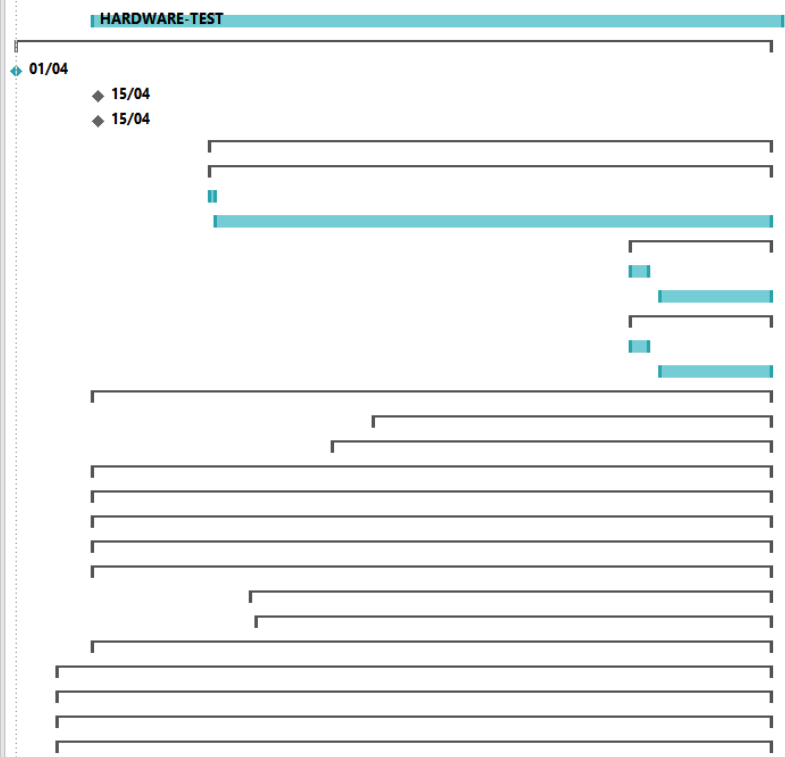
# Beam-Stopppers (EN-STI)

Period	Task Name	Duration	Start	Finish	Resou Name
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20	
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP
3	EN-STI	13 days	Mon 30/03/20	Fri 17/04/20	
4	HDW L4T.TDI.0740Beam Stopper test in Remote from CCC	13 days	Mon 30/03/20	Fri 17/04/20	BE-OP
5	HDW BTP.SPT05 / BTP.SPT10Beam Stopper test in Remote from CCC	13 days	Mon 30/03/20	Fri 17/04/20	BE-OP

# Beam Instrumentation (BE-BI)



Period	Task Name	Duration	Start	Finish	Resou Name	Docur
1	BOOSTER LS2 Master Schedule	492 days?	Tue 18/09/18	Fri 18/09/20		EDMS
2	HDW HARDWARE-TEST	82 days	Tue 14/04/20	Sun 09/08/20	BE-OP	
3	BE-BI System Tests	88 days	Wed 01/04/20	Fri 07/08/20		
4	Control Network and MiddleWare 100% available	0 days	Wed 01/04/20	Wed 01/04/20	BE-CO	
5	B-Train (White Rabbit) Distribution	0 days	Wed 15/04/20	Wed 15/04/20	TE-MS	
6	LL_RF Train Distribution	0 days	Wed 15/04/20	Wed 15/04/20	BE-RF	
7	Beam Wire-Scanners	68 days	Mon 04/05/20	Fri 07/08/20		
8	BRr.BSW2L1 (Old)	68 days	Mon 04/05/20	Fri 07/08/20		
9	HDW BRr.BSW2L1 (Old) - Dry Run from CCC	1 day	Mon 04/05/20	Mon 04/05/20	BE-OP, BI	
10	HDW BRr.BSW2L1 (Old) - OP Tests	67 days	Tue 05/05/20	Fri 07/08/20	BE-OP	
11	BRr.BWSH4L1 (New)	18 days	Wed 15/07/20	Fri 07/08/20		
12	HDW BRr.BWSH4L1 (New) - Dry Run from CCC	3 days	Wed 15/07/20	Fri 17/07/20	BE-OP, BI	
13	HDW BRr.BWSH4L1 (New) - OP Tests	15 days	Mon 20/07/20	Fri 07/08/20	BE-OP	
14	BRr.BWSV11L11 (New)	18 days	Wed 15/07/20	Fri 07/08/20		
15	HDW BRr.BWSH11L1 (New) - Dry Run from CCC	3 days	Wed 15/07/20	Fri 17/07/20	BE-OP, BI	
16	HDW BRr.BWSH11L1 (New) - OP Tests	15 days	Mon 20/07/20	Fri 07/08/20	BE-OP	
17	SEM_Grids	81 days	Tue 14/04/20	Fri 07/08/20		
27	MONITOR H0/H-	49 days	Mon 01/06/20	Fri 07/08/20		
32	BBQ	54 days	Mon 25/05/20	Fri 07/08/20		
35	BTP - Wide Band Pick-Up	81 days	Tue 14/04/20	Fri 07/08/20		
37	BTMS - Ring BPMS	81 days	Tue 14/04/20	Fri 07/08/20		
43	SI.SMV_Scrapers	81 days	Tue 14/04/20	Fri 07/08/20		
45	BPMs - Transfer Lines	81 days	Tue 14/04/20	Fri 07/08/20		
50	Beam_TV	81 days	Tue 14/04/20	Fri 07/08/20		
53	BCT_DC	63 days	Mon 11/05/20	Fri 07/08/20		
56	BCT_FAST	62 days	Tue 12/05/20	Fri 07/08/20		
59	BCT - Tansfer Lines	81 days	Tue 14/04/20	Fri 07/08/20		
62	BLM	83 days	Wed 08/04/20	Fri 07/08/20		
63	BLM FIC	83 days	Wed 08/04/20	Fri 07/08/20		
66	BLM IC	83 days	Wed 08/04/20	Fri 07/08/20		
69	BLM DIAMOND	83 days	Wed 08/04/20	Fri 07/08/20		

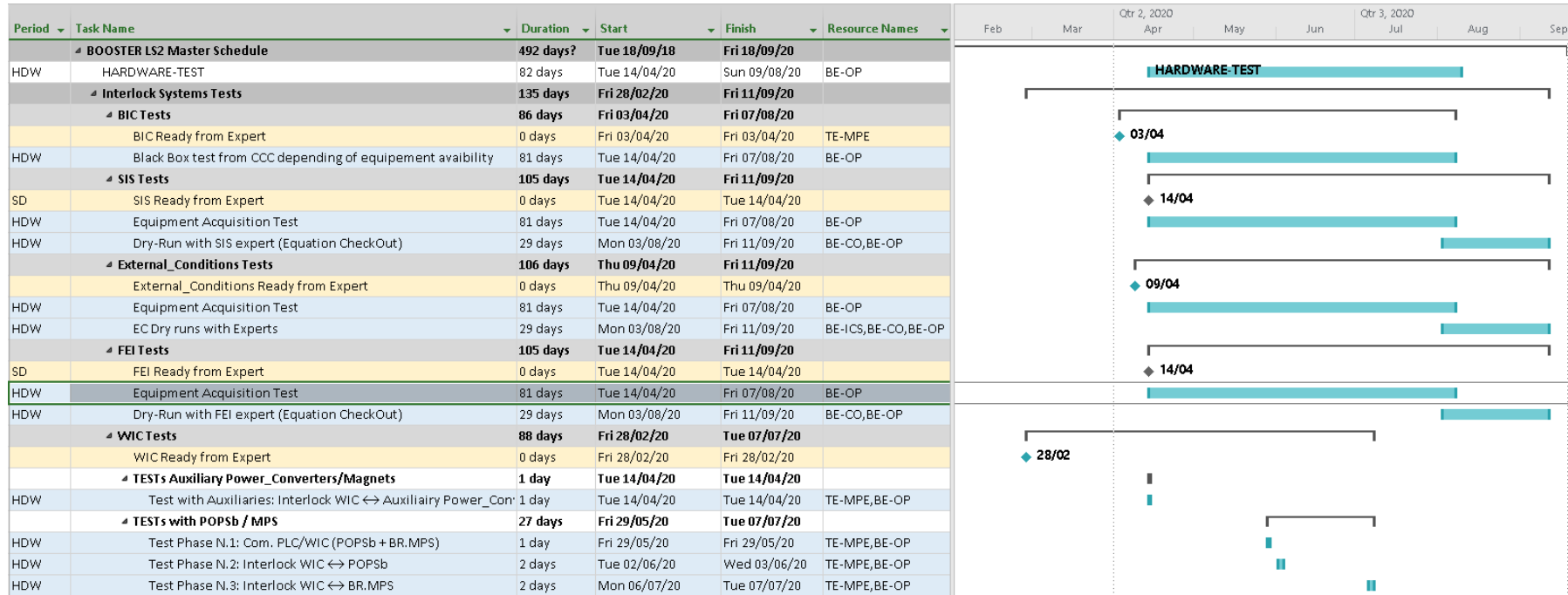


## ❖ Prerequisite Systems

- Control Network and Middleware ready from 01/04/2020;
- B-Train Distribution ready from 15/04/2020;
- LL\_RF Train Distribution ready from 15/04/2020;

❖ Dry Run milestones must be checked and confirmed by BE-OP.

# Interlocks (TE-MPE, BE-ICS, BE-CO)



❖ Interlock Systems Ready from Expert Side → Prerequisite for Test from CCC

- BIC from 03/04/2020;
- SIS from 14/04/2020;
- External-Conditions from 09/04/2020;
- FEI from 14/04/2020;

❖ WIC test integrated to TE-EPC checklist. The WIC readiness is prerequisite before starting test with the magnets (Mains or Auxiliary);

❖ All the Interlock Systems Tests will be done with respect to the equipment readiness (feedback source ready).