SOC-MOC vs. EID-B Compliance Matrices

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Applicable documents

Latest EID-B versions on 15 February 2016, Airbus compliance updated to Iss. 10

	Document	Reference	Issue	Revision	Date	Airbus baseline (if different)
AD01	EPD EID-B	SO-EPD-PO-IF-0001	4	0	04/11/15	
AD02	EUI EID-B	IF-CSL-SO-09001	4	4	05/10/15	
AD03	MAG EID-B	SOL-MAG-EID-B	4	2	23/10/15	
AD04	Metis EID-B	METIS-OATO-ICD-001	4	1	02/12/15	
AD05	PHI EID-B	SOL-PHI-MPS-MN1400-IF-2	3	0	18/11/15	
AD06	RPW EID-B	SOLO-RPWSY-IF-55-CNES	5	3	07/10/15	
AD07	SoloHI EID-B	EID-B SoloHI	4	1	12/11/15	
AD08	SPICE EID-B	SPICE-RAL-RS-0001	6	0	07/10/15	
AD09	STIX EID-B	SO-STIX-EID-30001	5	11	16/12/15	
AD10	SWA EID-B	MSSL-SO-SWA-EID-B	7	0	21/10/15	
AD11	Airbus vs EID-B compliance matrices	SOL.S.ASTR.MX.00016	10	0	04/02/16	

Scope of the document

In the following sheets, one for each instrument, we list the instrument-driven requirements applicable to SOC and/or MOC, as specified in the EID-B's listed above.
For each requirement, both SOC and MOC compliance are stated, with additional comments if needed.

Legend compliance tables

C	Compliant
NC	Non-Compliant
PC	Partially Compliant
TBC	To Be Confirmed
N/A	Not Applicable
REQ-xxx	Requirement numbers in red do not appear in the Airbus tables of compliance.

Explanatory text

Req Number	RequirementS on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments SOC	Comments MOC
	No formal EID-B requirements from EPD to Solar Orbiter Ground Segment				

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments	Comments MOC
EUI-GS-001	The heat shield doors must be closed during first two weeks in space, to allow outgassing without UV light on the entrance baffles and internal doors. *Requirement has been updated, following RIDs 51 and 34. EUI clarifies in answer to RID 34 that requirement relates to HS doors which are not hermetically closed and allow outgassing.*	C	C	OK after CDR update.	Ok
EUI-GS-002	The heat shield doors must be closed during non-operational phases to limit instrument ageing. *Remark: During observing periods, EUI has anyway control when its internal door is open or closed and it forms part of the science operations.*	C	C	SOC is compliant to this requirement as door closing during non-observing periods can be commanded as part of LTP/MTP.	Ok MOC: There seems to be a trend of instruments using the heat shield doors for their own use. We always understood that these doors were to be seldom used, but now they are put under increasingly heavy actuation load. ADS should comments on that, but our feeling is that this may be abusing a mechanism that is underqualified.
EUI-GS-005	During a 10 days science window, data summaries will be telemetered down as frequently as ground contacts allow so normally every day the summaries for the previous 24 hr would be available on the ground. After data are made available to the instrument team, these data would be analysed by the science team and within a few hours, lists of priority change request telecommands generated. Reprioritisation TCs can be executed within a day or two only during VSTP cycles. Outside of these cycles, the turn-around for TC execution shall be within the STP cycle (i.e. minimum 1-2 weeks). During Remote Sensing Windows (RSW) where VSTP is in effects, these telecommands should be uplinked at the next VSTP cycle to make maximum use. Outside RSW or during RSW without VSTP, these telecommand should be uplinked at the next STP cycle. Enough time should therefore be foreseen between subsequent flush commands (that evacuate the SOB) to allow this. Images which are degraded because of noise, stability or contrast problems will be lowered in priority and images which have interesting features or are coincident with known events will be raised in priority. Then, autonomously, on-board, the lower priority data will be erased in preference to future higher-priority data. Obviously this has to be done a number of times well before the end of the 10 days science window to have maximum effect. If ground contact is not available, the on-board autonomous priority changing will still take place but will not be as efficient as ground-based checking. *D: The request to send 1000 telecommands during a science window exceeds the TBC commanding budget suggested in EIDA R-728.* *D: The re-prioritisation telecommands would be used only internally to the EUI software and would not affect the mode, power or telemetry budget in any way. The telecommands could even be planned by the ground beforehand (for planning/testing purposes) as dummy re-prioritisation commands which have no effect and replaced late in planning with the exact re-prioritisation numbers.*	C	C	SOC confirms that apart from the nominal STP cycle in which instrument commanding will be uploaded onboard, a so-called iVSTP cycle will be available during RS windows. This iVSTP cycle will allow the daily upload of a limited set of instrument TCs that do NOT impact resource usage and do not conflict with TCs that have been uploaded earlier (see IOR-ICD SOL-SGS-ICD-0003 v0_6 for details on VSTP instrument commanding). Therefore during RS windows, EUI can count on a turn-around time for reprioritisation commands of 2-3 days (= turnaround of VSTP cycle) plus the time the EUI team needs to assess LL data and send commands to SOC. *It is TBD by MOC how many reprioritisation telecommands fit within the daily commanding budget.* *The way these reprioritisaion commands will be handled (following SOC design) is the following: EUI sends IORs at STP that include so-called 'empty windows', i.e. periods during which no commands are scheduled but may be added at VSTP. They will be marked as such in the IOR (see IOR-ICD). At VSTP, any extra commands (not obligatory) are sent to SOC in 'delta-IORs', and forwarded in POR format to MOC.*	The update will be done in the iVSTP cycle or as part of the STP (depending on the mission phase) as long as the EUI commanding, including the reprioritisation, will respect the 150 TC/day.
EUI-GS-030	Online access to the EUI mission products shall be provided through the SSOC in accordance with the open data policy of ESA.	C	C	Access will also be provided through DDS at MOC.	Confirmed.

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	SOC Comments	MOC Comments
MAG EIDB M-600	The spacecraft shall perform calibration rolls at least once per orbit.	C	C	SOC is compliant. Rolls will be planned in during Long Term Planning.	OK
MAG EIDB M-601	A calibration roll shall be composed of at least 12 complete revolutions about the rotation axis, at a rate of no less than 0.1 degrees per second (that is, one roll per hour). *D: MAG expects calibration rolls to occur around the Sun-pointing axis for thermal reasons but any axis is acceptable from a calibration viewpoint.*	C	TBC	SOC is compliant in the sense that planning cycles foresee that calibration rolls will be planned in during Long Term Planning. SC is compliant with the roll speed (is maximum rate). *MAG_CDR-120 answer confirmed that there are no further thermal requirements for rolls*	MOC confirms that the calibration rolls will be performed at the maximum safe roll speed, which may be below the required level (TBC). Ultimately this is a requirement on S/C performance, not operations.
MAG EIDB M-605	MAG shall be the first instrument turned on during NECP and shall remain operational in normal mode during the switch-on of other instruments. *D: It is desirable for MAG to be turned on during tests of other spacecraft components, such as antenna pointing, solar array positioning and reaction wheel and thruster activation.*	C	C	SOC compliant in the sense that it will support the commissioning plan for the payload, that will eventually be run by MOC.	MOC confirms that this OK.
MAG EIDB M-606	MAG shall be operational, and commanded into its highest data rate mode, during boom deployment.	N/A	NC	Is not applicable to SOC as this will happen during LEOP.	I-boom deployment likely to place very early in LEOP. MOC cannot commit to operating MAG this early in the mission, as it would imply moving MAG commissioning out of NECP and into LEOP. MAG will be commissioned in NECP, after I-boom has been deployed.
MAG EIDB M-613	MAG shall be operational in normal mode during EGAM. These offer a valuable opportunity for flight calibration of the MAG instrument in a known field. *D: It is important that MAG remains operational during Cruise Phase in order to characterise spacecraft magnetic fields before the start of the nominal mission phase. In particular, by the end of the cruise phase MAG needs to have sufficiently accurate calibration parameters to upload to the spacecraft to provide accurate real-time magnetic field data to RPW and SWA for the operational phase.*	C	C	TBC by MOC. SOC is ready to command MAG operational during EGAMs. **Comment Airbus (compliant):** It is possible to retain MAG in operational state in GAM, noting that this manoeuvre implies thruster fire and a non sun-pointing spacecraft attitude. Note that MAG will be switched off in hibernation in cruise phase due to power constraints. This requirement is also applicable to the Ground Segment.	MOC confirms this is OK.
MAG EIDB M-607	The SMOC shall produce, and keep updated, a Technical Note which describes how to reconstruct from telemetry data the origin and time (to within 1s) of all events which produce magnetic field transients as defined in EIDA R-682. *EIDA R-682: The PIs and Prime Contractor shall ensure that magnetic field transients happening during EMC quiet phases are time-tagged and reported in TM. Their sources shall be identified.* *D: The precision of the timing shall be of 1s or better.*	C	NC	**SOC Compliant with Updated Requirement** SOC Comment on iss 4.2: This is should be a requirement on SOC rather than MOC	Ground-commanded events will be clear from TC History and spacecraft events will be clear from Event History & HKTM, unclear why a dedicated TN is required. MOC unable to correlate magnetic signature, as we do not have the means to observe it in relation to the rest of TM.
MAG EIDB M-610	The Prime and the SMOC shall provide the monitoring data listed in Table 5-1 to MAG in order to assess the operational performance and ageing of the instrument. *Info to be provided by MOC: Spacecraft attitude , Spacecraft location in heliospheric coordinates, timeline of ON/OFF switches of boom mounted sensors&heaters, timeline of any operations that can change magnetic field*	C	C	SOC is compliant in the sense that it will generate auxiliary data products from the S/C location and attitude information MOC provides, and will make accessible through the archive. Coordinates are however TBC.	MOC confirms this is OK.

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	SOC Comments	MOC Comments
METIS-4.6.4-1	During the decontamination phase (from 6 hours to 3 months after launch) the temperature of the cold element interface shall be maintained in the range of 0ºC to +60ºC.	C	N/A	As this requirement affects NECP, SOC is not directly involved. On the other hand, SOC will support the NECP operations planning to make sure decontamination heaters will be switched on during all times in NECP, except when agreed by all instrument teams sharing the decontamination heater line.	Requirement not applicable to MOC, as per minutes SOL-ESC-MN-05011. ESA Project to address via CR.
METIS-5.2.1-2	For all planned operations for which an off-pointing angle may exceed 30 arcmin or beta_max when beta_max>30 arcmin (see Fig 5.1), for more than 30 minutes is expected, then the HS door shall be closed.	C (within the assumptions clarified in the comments)	C	The HS doors are operated by MOC but will be commanded through SOC and planned by the SOWG during the Long Term Planning. SOC is compliant in the sense that it will track the periods during which science observations are scheduled that require METIS door closing, through a specific parameter in E-FECS off-pointing events (see SOL-SGS-ICD-0006_EFECS-ICD v0.3 Sect. 2.2.2). There are two types of science operations that fall in this category: (a) science campaign with SC-offpointing on-disk but above beta_max for >30mins, (b) science campaign relying on target tracking in which it cannot be excluded that the finally chosen SC off-pointing will go beyond beta_max for at least 30 mins (to be assessed on case-by-case basis). From the AOCS requirements*, we infer that (c) HGA and SA movements will not need door closure as they last for <30mins with APE disturbance <5arcmin. (d) The case of wheel off-loading activities is more involved as the AOCS may not return to fine-pointing mode within 30mins. SOC's position is that IF somebody can formally state that there is no credible AOCS failure where the off-pointing error can sit stably between 30 arcmin and ~2.5degrees (whatever value at which the SC Safe mode is triggered), then Metis door can stay open during WOLs. However, if not, then we believe the door should be closed, at least close to perihelion where WOL excursions may go beyond beta max. (e) One additional disturbance event we need to be careful with are rolls during METIS operations (e.g. comms rolls and rolls during Metis straylight calibration). To recall, one operational approach to the comms rolls (assumed in the Airbus availability analysis) is to roll "there-and-back" for every pass, achieving comms-compatible roll during the pass, but nominal roll outside of the pass. These rolls can be done in two ways one fast but with reduced APE, and one slow. If utilising the "there-and-back" approach for comms rolls, we might have expected to do them fast, to minimise the time taken, but perhaps for the sake of METIS we would need to close the door; or alternatively do the roll slow instead?	MOC confirms compliance from the point of view of operations. Planning cycle will include a check on planned off-pointing angle as required. For now, MOC recommends to baseline the 'fast roll' approach, which can be later adapted to the S/C behaviour once it is better characterised.
METIS-5.2.1-35	Opening and closure of Metis HS door are proposed by Metis PI and executed by MOC whenever safety conditions are respected.	C	C	This is understood by SOC as a request to consult the Metis PI during the planning process on whether the door should be open or closed during certain planned science operations (within Metis safety constraints), and not to have a last-minute (VSTP) door operation. Please remember that once the Metis observation schedule is onboard (= at time of STP, 1-2 weeks before the observation), the timeline cannot be changed. Confirmed by answer to METIS_CDR-111	MOC confirms METIS door operation shall be part of overall science planning cycle. As such, it will be executed based ultimately on PI inputs.

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments SOC	Comments MOC
PHI-EIDB RGS-0970	Upon PHI request, the Ground Segment shall adjust the Cold Element temperature range to support the PHI annealing heater during annealing operation. *Comment: The request for temperature adjustment at the CE might be required in case that the PHI internal annealing heater is not capable to heat the PHI detector to the required temperature.*	N/A	C	SOC assumes the CE temperature range shall be adjusted by MOC rather than SOC. TBC by MOC.	MOC confirms compliance on the basis of the discussion minutes SOL-ESC-MN-05011. Compliance agreed, within the performance limits of the S/C.
PHI-EIDB RGS-0972	The Annealing Mode F shall be run as often as possible, whenever PHI is not in observational mode. The operating time of the annealing mode shall be at least 40d/orbit. The length of an individual annealing mode operation interval shall be maximized to 15d (goal). The minimum length of an individual annealing mode operation shall be 1 day. *Clarification:* *Annealing shall be run whenever power is available and the operation is compliant with mission operation requirements (e.g., EMC quiet phases for in-situ operations). Annealing becomes ineffective for operation periods shorter than 1 day. The CE temperature shall be as high as possible during annealing operation (without exceeding the maximum non-operation temperature).* *Comment: The request for temperature adjustment at the CE might be required in case that the PHI internal annealing heater is not capable to heat the PHI detector to the required temperature.* *PHI acknowledges the fact that the SORA will only be qualified to 60deg. In case this limit would be exceeded in flight the impact will be to anneal at a lower temperature at a longer duration.* *The above requirements on the annealing capabilities might require the PHI Cold Element to be connected to a spacecraft radiator which is not shared with other instruments.*	C	C	SOC is compliant in the sense that it will accept PHI annealing requests and schedule them on a best effort basis, i.e. within the restrictions imposed by the S/C and other payload (power restrictions, EMC cleanliness, etc.) (*see PHI_CDR-144).*	OK as standard planning requests.

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments SOC	Comments MOC
Calibration Rolls during Earth GAMs (observations of Auroral Kilometric Radiation)					
RPW-OPS-900	The SMOC / SSOC shall ensure that in carrying out the ANT calibration during the **cruise phase**, the following geometrical constraints are fulfilled: . The Earth distance shall be greater than 115 Earth radii (in order to merge the North and South pole AKR in the same 1 degree angle of resolution). . The Earth distance shall be less than 1000 Earth radii (in order to allow high measurement resolution). . Solar Orbiter shall be on the night side of the Earth, more exactly between -80 deg and +120 deg from the -X GSE axis.	TBC	PC	These windows are all located very close to Earth GAMs and require a non-nominal spacecraft attitude. Not all trajectories are compliant to these requirements.The reformulated requirements (no off-pointing) pose fewer problems, however the best opportunity for calbration (in both the Original Oct 2018 and Option E trajectories) occurs just after launch so TBC whether comissioning will be at an advanced enough point to do this while still within 1000RE of Earth. It would be good if RPW could assess the suitability of the EGAM in the Option E trajectory for calibration (at first sight the geometry isn't ideal).	MOC concurs with SOC assessment. Compliance to this requirement in Option E trajectory is only possible during EGAM, and not during NECP. RPW to assess if geometry is OK.
RPW-OPS-910	The SMOC / SSOC shall ensure that while being in the AKR visibility zone, the spacecraft will perform rolls around +XS/C axis (in red) with the +XS/C axis directed toward the Sun. In principal, Solar Orbiter shall adopt several attitudes in order to characterize in space, using the AKR, the antenna gain, effective length and vector direction. After discussion with ESA and first simulations of the rolls efficiency by the RPW team it has been basically agreed that rolls along the spacecraft +X axis directed toward the Sun will be sufficient.	TBC	C	These windows are all located very close to Earth GAMs and require a non-nominal spacecraft attitude. In the Oct 2018 (CReMa) launch window there does not seem to be such opportunity. **UNDER DISCUSSION WITH RPW TEAM** SOC provided RPW with details of Earth flyby geometries for CReMA 3.1 Oct 2018 trajectory, so RPW can assess how well they can calibrate without offpointing the spacecraft See above.	MOC confirms that it will command S/C rolls around +X sc axis. Any other attitude cannot be confirmed at this point.
RPW-OPS-920	The SMOC / SSOC shall ensure that each calibration rotation has a duration of at least 3 hrs. with a rotation rate such that at least 3 full rotations occur during a roll *Typically if the rotation rate is 0.1 degrees per second then each roll event shall last for 3 hours minimum. If it is 0.05 degrees per second then the duration shall be 6 hours minimum. Rolls for 8 hours per day, with roll rates between 0.1 degrees per second and 0.05 degrees per second are optimum.* *D: The SMOC / SSOC shall ensure that RPW is in burst mode during the calibration rotations.*	N/A C	C	Requirement on MOC SOC will process burst mode commands sent by RPW team through the IOR.	Rotation duration may be longer, depending on the maximum rate allowed by ADS. Otherwise OK with MOC.
RPW-OPS-940:	The SMOC / SSOC shall ensure that the spacecraft will be mechanically identical throughout the RPW ANT calibration rolls. *D: It is expected that the spacecraft keeps the same mechanical configuration (solar array orientation, high gain antenna orientation ...) during the calibration rotations. Justification: High size elements of the spacecraft like solar arrays have an influence on antenna diagram. This influence can be simulated, but during calibration the position of these elements shall remain identical in order to keep the same antenna diagram during all the rotations..*	N/A	C	Requirement on MOC	MOC confirms compliance on the basis of a single attitude: rotation around +X sc axis, pointing to the Sun.
Antenna Deployments					
RPW-OPS-850	The prime contractor shall ensure that the RPW ANT can be deployed one monopole at a time.	N/A	N/A	Confusing requirement: on Airbus or on GS? In combination with req RPW-OPS-1030, we assume this one should be renamed RPW-SC-850 There is now an RPW-SC-850 that airbus state compliance with	Not applicable to Ground. ADS to assess if S/C allows it.

RPW-OPS-950:	The SMOC shall ensure that the spacecraft will point the +X S/C axis in the Sun direction during the deployment of each ANT monopole. *D: This requirement prevents unsymmetrical deployment of the antennas, by providing even illumination of each shape memory alloy hinges – which are heat activated.*	N/A	C	req on MOC	Confirmed
RPW-OPS-960:	The SMOC shall ensure that spacecraft inertial TM from the AOCS will be available on ground to monitor the RPW ANT deployments.	N/A	C	Requirement on MOC as deployment will happen as part of commissioning.	Confirmed
RPW-OPS-970:	The SMOC shall ensure that the RPW ANT monopoles will be deployed during the Near Earth Commissioning Phase (NECP).	C (Gen-12)	**NC**	SOC is compliant in the sense that it shall support the SolO Project Team in developing the commissioning plans to be performed during the Near Earth Commissioning Phase (NECP). It will coordinate the implementation of the payload's commissioning needs in the overall NECP plan, and support the instrument commissioning on a best-effort basis.	RPW has stated in the past that (ref. SOL-ESC-MN-05011) that no Trajectory Correction Maneouvres (TCM) can take place until the RPW Antennae have been deployed. Given that a TCM may be required at the end of LEOP (Launcher Injection Correction), the deployment of RPW antennae will take place during LEOP, not NECP.
RPW-OPS-980:	The SMOC shall ensure that the RPW ANT deployment will occur when the distance from Sun of the spacecraft is above 0.9 AU.	N/A	C	Depending on launch window, TBC. Req on MOC as deployment is scheduled for NECP.	MOC will aim for deployment above 0.9 AU. When the deployment can be done during LEOP (see OPS-970) MOC is compliant.
RPW-OPS-990:	The SMOC shall ensure that the RPW ANT deployment will occur when the spacecraft attitude is three axes stabilised.	N/A	C	Req on MOC	Confirmed
RPW-OPS-1030:	The SMOC shall ensure that the spacecraft will deploy the RPW ANT one monopole at a time.	N/A	C	Req on MOC	Confirmed
RPW-OPS-1040	Taking into account preliminary design of antennas, deployment sequence shall be : *[see EIDB p143 for a description of the deployment steps]* *The deployment procedure for the antennas is not yet completely defined, but the preliminary scheme for the deployment is described in EID-B*	N/A	C	N/A	MOC confirms compliance. However, detailed deployment procedure will be necessary from instrument team.
RPW-OPS-2030	The SMOC shall switch ON the MEB and the ANT preamplifiers at least 10 minutes before the antennas deployment.	N/A	**NC**		RPW antenna deployment likely to place very early in LEOP. MOC cannot commit to operating RPW this early in the mission, as it would imply moving RPW commissioning out of NECP and into LEOP. RPW will be commissioned in NECP, after its antennae have been deployed.
RPW-OPS-2040	*The SMOC shall switch OFF the MEB and the PA preamplifiers at least 10 minutes after the antennas deployment.*	N/A	**NC**	I'm not sure why they need to be switched off at all. Requirement probably motivated by need for MEB and PA to be on for at least 10 minutes after deployment, rather than that they need to be switched off after this long?	RPW antenna deployment likely to place very early in LEOP. MOC cannot commit to operating RPW this early in the mission, as it would imply moving RPW commissioning out of NECP and into LEOP. RPW will be commissioned in NECP, after its antennae have been deployed.
RPW-OPS-2060	The SMOC shall ensure that the RPW ANT microswitches status TM will be available on ground to confirm RPW ANT deployments.	N/A	C		Confirmed
I-Boom Deployment					
RPW-OPS-1100	*The SMOC shall switch ON the MEB and SCM preamplifier at least 10 minutes before the I-Boom deployment.*	N/A	**NC**	Equivalent to MAG Requirement EIDB M-606 so likely a requirment on Airbus. RPW should clarify if they need to be commanded into a certain science mode during boom deployment.	I-boom deployment to take place very early in LEOP. Very likely not possible to commission RPW beforehand.
RPW-OPS-1110	*The SMOC shall switch OFF the MEB and SCM preamplifier at least 10 minutes after the I-Boom deployment.*	N/A	**NC**	Also likely a requirement on Airbus	I-boom deployment to take place very early in LEOP. Very likely not possible to commission RPW beforehand.
Interference campaign					
RPW-OPS-580:	An interference campaign shall be done after antenna deployment, the RPW is set to ON, and all the Solar Orbiter Instruments are OFF. The other instruments shall be set to ON successively and RPW will analyse the influence of each instrument on its measurements and especially on the background noise that it measures.	C	C	SOC is compliant in the sense that it shall support the SolO Project Team in developing the commissioning plans to be performed during the Near Earth Commissioning Phase (NECP). It will coordinate the implementation of the payload's commissioning needs in the overall NECP plan, and support the instrument commissioning on a best-effort basis.	Confirmed
SSMM data storage					
RPW-OPS-1000	At the S/C SSMM level, the following packet stores shall be at least allocated to RPW: . One packet store for storing all the HK TM packets which are not conveyed to the OBC	PC (PC)	C	SOC foresees to split HK and LL data over different packet stores, which will probably be shared amongst all payload. These PS will be sized to make sure all data can be kept at all times, up to longest conjunction.	

	D: HK packets DPU, PDU, BIAS, LFR, TNR- HFR, TDS *+ Low-latency Science packets in all modes / at least 2.6 Gbits = 500 bps x 60 days* . One packet store for storing the Science TM packets produced in the SURVEY mode (SURVEY_NORMAL mode or SURVEY_BURST mode) and the Science TM packets corresponding to the normal data stream produced in DETECTION mode *D: at least 26 Gbits = 5000bps x 60 days* . One packet store for storing the Science TM packets produced in the SBM modes (packet store dedicated to the selective downlink). *D: at least 16 Gbits* *= 50 SBM1 events (50x15 minutes)* *+ 4 SBM2 events (4x120 minutes)*	(C) (PC)		This PS is what SOC calls the 'RPW bulk science store' and it will be sized according to the needs along the mission to prevent data loss. Current models use a PS size bigger than 26Gbits. A selective downlink scheme is being implemented for the SBM packet store but details are TBC. At the moment it is not guaranteed that the selective downlink capability will be available throughout whole mission.
RPW-OPS-1020	The routing by the SSMM of the RPW packets toward the different RPW packet stores shall follow the rules given in Table 19 (see EID-B)	C	C	SOC is compliant in the sense that it can control the routing of TM to packet stores, and can thus configure according to the mentioned rules, as long as they are not in conflict with overall onboard data management. Currently, the LL data APID is missing in EIDB 5.0
RPW-OPS-1050	The S/C buffer size for service 20 and the HK packet for inter-instrument exchange shall be extended to 33 bytes instead of 8 bytes.	C		Note that latest S20 summary document lists 34 bytes for RPW (heartbeat + 33bytes of parameters for S20 distribution).

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments	Comments MOC
SHI.EIDB.69	The Solar Orbiter project office shall schedule the SIM door deployment under the following constraints: • Door deployment shall occur when the spacecraft distance from the sun is < 1.0 AU. • After the SIM door is deployed, the spacecraft distance from the sun shall remain <1.14 AU. • Door deployment shall occur at least 2 weeks before the first orbital encounter for the Solar Orbiter baseline mission. • Door deployment shall occur greater than 90 days and less than 3.5 years after launch. *The SIM door is deployed after 90 days to protect the instrument optics and baffles from the spacecraft outgassing and thruster molecular accumulation, less than 3.5 years to satisfy the door deployment mechanism torque margin requirement after being stowed for a long duration. The SoloHI operational and survival heater power is minimized to fit within the SoloHI power allocations by designing for the SIM door open thermal case for a maximum spacecraft distance from the sun of ≤ 1.14 AU.*	C	C	SOC is compliant in the sense that it will plan, together with SoloHI and MOC, the SoloHI door opening at the most suitable time, taking into account the conditions specified in the requirement, the time needed for SoloHI open-door commissioning and the mission constraints. Door opening shall normally be planned during one of the RS checkout windows. Please also note that the door opening will need to be planned off-line and without industrial support which is no longer available after NECP.	Concur with SOC assessment
SHI.EIDB.70	The Solar Orbiter project office shall schedule the SoloHI instrument commissioning before door deployment during the Near Earth Commissioning Phase (NECP). The SoloHI instrument commissioning activities before the SIM door deployment are described in Section 4.6 of the SoloHI Instrument User Manual.	C	C	As this requirement affects NECP, SOC is not directly involved. On the other hand, SOC will support the NECP operations planning to fulfill SoloHI's requirements, within the TM and power constraints.	MOC confirms SOLOHI commissioning plan to be drafted according to their inputs.
SHI.EIDB.71	The Solar Orbiter project office shall schedule the SIM instrument commissioning after door deployment for 5 days in the first two weeks after the SIM door deployment. The SoloHI instrument commissioning activities after the SIM door deployment are described in Section 4.6 of the SoloHI Instrument User Manual.	C	C	SOC shall schedule the door-open instrument commissioning following upon the instrument door opening (see also reply to EIDB.14). Details on the power consumption, data generation and duration of the required tests, as given in the IUM, will be used to find the optimal schedule, in collaboration with SoloHI team.	Concur with SOC assessment
SHI.EIDB.72	The Solar Orbiter project office shall schedule the SIM detector annealing for a continuous period of 24 hours for each Solar Orbiter mission orbit after the SIM door has been deployed and before the 30 days of science operations for each orbit. *Radiation tests of the SoloHI APS detectors have shown that room temperature annealing can attenuate the detector radiation damage that increases the detector dark current and reduce the dark current closer to its original performance.*	C	C	Will be scheduled through operations planning.	Concur with SOC assessment
SHI.EIDB.73	The Solar Orbiter project office shall provide the quaternions from the Solar Orbiter attitude estimate and the attitude estimate time tag to the SoloHI team for SoloHI instrument observing periods, including the nominal science observing periods, instrument commissioning and instrument calibrations, after the SIM door has been deployed.	C	C	All information present in HK downlinked to ground will be made available for instrument retrieval from the MOC EDDS. SOC will assist SOLO-HI in identifying the location and interpretation of their parameters of interest. The HK will include a quaternion (one at least), but the presence of the raw STR quaternion (rather than e.g. the processed quaternion of the onboard filter) and the details of acquisition time-stamping information is in the hands of the Spacecraft development and would have to be checked.	MOC confirms availability of requested information is through EDDS.
SHI.EIDB.43	SoloHI Autonomy Rule with Flight Software Mode Transition: A SoloHI instrument ground command shall be sent to transition from the SoloHI flight software Housekeeping mode to Observing mode at the next ground contact, after a SoloHI internal autonomy rule has triggered so that SoloHI instrument diagnostic tests can be performed. If the SoloHI flight software mode transition occurred during the orbital science encounter, the SoloHI flight software mode shall be promoted from Housekeeping to Observing within ≤ 2 days of the original autonomy rule action. *The SoloHI autonomy rule action for SoloHI electronics hot operational temperature violations, primary and secondary power over-current violations, and operational power under-voltage violations will transition the SoloHI flight software mode from Observing to Housekeeping.*	N/A	C	This recovery action is related to the FDIR rules in EIDB.40/41 below. To be assessed by MOC.	MOC confirms compliance ref. SOL.ESC.MN.05011.
SHI.EIDB.82	After the SoloHI instrument is powered off by the Solar Orbiter spacecraft after a failure to receive the Instrument Heartbeat within the maximum time period, the Solar Orbiter MOC shall set the Spacewire link reconfiguration to the alternate Spacewire link from the active Spacewire link before the Instrument Heartbeat autonomy rule action was triggered. .	N/A	C	To be assessed by MOC	MOC will carry out instrument recovery ops as defined in the detailed instrument procedure inputs.

Req Number	Requirements on Ground Segment (MOC and SOC)	Compliance SOC	Compliance MOC	Comments	MOC Comments
SPICE-EIDB-R-5	Spacecraft operations shall ensure cycling of the SFM focus mechanism across its full range once per orbit in order to maintain full lubrication performance.	C	C	These will be scheduled through the normal science planning products, i.e. through SOC. *(agreed with MOC on 4 Sep '13)*	This should be OK to plan in advance for every orbit.
SPICE-EIDB-R-6	Spacecraft operations (ESOC) shall ensure cycling of the SDM door mechanism across its full range of motion once per orbit in order to maintain full lubrication performance. This is to include the case where SPICE is not otherwise operating.	C	C	These will be scheduled through the normal science planning products, i.e. through SOC. *(agreed with MOC on 4 Sep '13)*	This should be OK to plan in advance for every orbit.
SPICE-EIDB-R-7	Spacecraft operations (ESOC) shall ensure cycling of the SCM mechanism across its full range once per orbit or six month period in order to maintain full lubrication performance.	C	C	These will be scheduled through the normal science planning products, i.e. through SOC. *(agreed with MOC on 4 Sep '13)*	This should be OK to plan in advance for every orbit.
SPICE-EIDB-R-8	ESOC shall track and log the number of write cycles to the NVM in the SEB during flight as a limited life item.	N/A	TBC	Requirement on MOC only.	Unclear what this would involve. In principle this should not be a problem (TBC). Tracked via Action on SPICE
SPICE-EIDB-R-26	ESA and the Spacecraft Operations team shall ensure that the decontamination heater line will be permanently (except in the case of spacecraft emergencies and specific commissioning activities from METIS and EUI) enabled from 6 hours after launch until 3 months after launch.	N/A	C	Requirement on MOC. Seems fine with current baseline (decontamination heater line will be switched off from time to time during check-out of the other heated instruments)	Confirmed OK.
SPICE-EIDB-R-27	For the period of cruise phase, outside of RS check out windows, ESA and spacecraft operation team shall provide power to the SPICE decontamination heater line for the purpose of warming the SPICE Mirror (the power required by SPICE is 2 W), if spacecraft resources and other activities allow.	C	C	To be assessed by MOC. Note that this requirement has both SC as operational part. Airbus is compliant now that the power has been decreased to 2W.	MOC confirms OK.
SPICE-EIDB-R-34	The spacecraft and ground segment shall together be capable of reporting the following SPICE instrument parameters and SC parameters relevant for the SPICE instrument every minute. It shall provide the following data items to the ground: - Voltages to instrument primary power supply. Bus voltage (uncalibrated "raw counts" value provided by the PCDU and conversion to engineering units performed by the ground based control system using calibration data in the SRDB). - Currents to instrument primary power supply (to the achievable accuracy limited to 4% of full scale LCL level) - Power status – i.e. LCL (power supply) and RSA (relay) status for SPICE (as is done in event message generated in power-on and power-off sequences). - The SRP (SOU) and URP (SEB) and CE temperature sensor readings– see section 4.5.4.	C to distribution		SOC is compliant in the sense that all SPICE HK information that is dowlinked to the ground will be distributed to the instrument team. (*See also below for Airbus compliance)*	
SPICE-EIDB-R-36:	In the case of a planned removal of power from the SEB (a “soft-power off”), at least 60 seconds shall be given by the ground segment for the SDM door to close prior to removal of SEB power. The ground segment shall confirm in telemetry at the next contact that the last SDM position status was closed.	N/A	C	Req on MOC	Ok, as long as clearly proceduralized in the IUM.
SPICE-EIDB-R-37:	The spacecraft shall support updates of the SPICE FSW as detailed in section 4.7.5 of the EID-B when SPICE is in Boot maintenance or Standby modes.	N/A	C	Requirement on MOC.	Ok, as long as clearly proceduralized in the IUM.
SPICE-EIDB-R-95:	The feedthrough door shall not be opened until a confirmation message is received by the S/C from the SPICE instrument using service 3 that the SDM is in the open position. The possible SDM states in the SPICE telemetry shall be ‘open’, 'neither' and ‘closed’. *Understood this requires confirmation via ground (and so delay)*	TBC	N/A	**This requirement should be assessed by Airbus for compliance. In the new door concept it should be Airbus applicable.** If not taken care of by the SC, it is not clear how this will be handled in practice. SOC is expected to plan the heatshield door operations (at LTP typically). However this requirement, and in particular the descriptive text below, seem to require a loop via ground. Does this mean that we will never be able to open SPICE's HS door outside ground contact? To be clarified. COMPLIANCE MISSING IN AIRBUS MATRIX ISSUE 10	MOC will operate Heatshield doors via CSW function. This requirement is on S/C functionality, not on operations. ADS shall state compliance to this requirement.

SPICE-EIDB-R-104	For the period of cruise phase, the ESA and the spacecraft operation team shall maintain the SPICE Cold-element interface at a delta-T of at least 15deg.C above the SOU interface temperature, outside of RS check-out windows if spacecraft resources and other activities allow.	N/A	PC	Compliance and Feasibility to be assessed by MOC **and by Airbus D&S.** CE is designed to run cold, and CE heater is not sized for any other purpose than to prevent the temperature going below the minimum acceptable. "If resources and activities allow" phrasing is irrelevant if the requirement is physically unachievable.	OK from an operations point of view (keeping the CE heater ON). However, MOC cannot ensure that the temperature remains within the required range. Ultimate S/C functional requirement, therefore ADS must state compliance. Note that the required delta-T of 15 deg can hardly be called 'operational'. Ground can operate the heater ON, nothing else.

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	No formal requirements have been found on SOC or MOC.				

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