absolics inc
General
SECS/HSMS Interface Specification

SVM Smart Factory

SECS/HSMS Standard Specification Sheet

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Version 1. 7

2022-02-06

Recommended for use

By signing this document, you acknowledge that you are responsible for the performance and maintenance of this document within absolics inc.

This document shall be written, reviewed, and approved to keep the approved originals. .

Reviewers:	*absolics inc* Daniel Yoo	**Date:**	2023-02-06

By signing, I authorize this document to be used within the scope of absolics inc's business activities.

Approver:	*absolics inc Sangmin Yoon*	**Date:**	2023-02-06

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My. Revision history

version	Change Date	My. Revisions	Reviewers
1.0	2022-04-25	• Draft	Daniel Yoo
1.1	2022-06-14	■ 2.7 Port & Carrier Management ■ Host Command : PORT_STATE ■ Event : Port State Change • Self inspection RCMD : Chapter 2.11	Daniel Yoo
1.2	2022-07-19	• Sample Format add for Process Program Management Stream / Function	Daniel Yoo
1.3	2022-11-07	• Tool, EFEM Interface seperate	Daniel Yoo
1.4	2022-11-15	• In case, Process Job Management.Multi Process Job added	Daniel Yoo
1.5	2022-12-13	• In case, Process Job Management. ProcessJobDataList, ControlJobDataList added	Daniel Yoo
1.6	2023-01-05	• • EFEM Adds Requirements for Equipment Interface Items : Chapter 2.7 ⑪ • • Add generation of Multiple Process Jobs for upper and lower double-sided processes: Chapter 2.8 ⑨	Daniel Yoo
1.7	2023-02-06	• Communication State Transition Table detail changed : Chapter 2.3.2 • Control Transition Table correct typos (S1F7 → S1F17) : Chapter 2.3.3 • Host Command correct typos (Model → Mode) : Chapter 2.4 ②	Daniel Yoo

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1. Overview

The final authority and determination of the equipment SECS/HSMS interface specification shall be reserved by absolics inc. The specifications may be changed in absolics inc, especially if there is a discrepancy between the standard communication specifications and the equipment communication specifications during the equipment test period. In addition, in the event of equipment anomalies, additional specifications may be provided separately.

1.1. Definition

① This document defines the SECS/HSMS interface standard. This document defines the requirements based on the SEMI Standard. The equipment supplier shall supply the Software based on the contents of this document, and the contents not defined in detail in this document shall be provided based on the SEMI Standard.

② The equipment supplier must complete the test for every message that communicates between the equipment and the host system prior to the equipment supply and must provide the test results and the test log. The equipment supplier shall provide data and information about the changes to the SECS/HSMS interface software each time the software is made and shall provide the test results and logs after the test is conducted.

③ The equipment supplier should provide the equipment SECS/HSMS specification book and a detailed SECS Data Library. The specification should include the communication specification, message format, and communication scenario, and the SECS Data Library should provide Alarm List, V ID (DV, SV) List, CEID List, RCMD List, Process Data Collection Item List, etc. in a separate Excel file format. Scenario should provide Normal Process, Abnormal Process, Carrier Transfer, etc. should be included.

④ Carrier Transfer and Management and Process Management functions should be provided in accordance with the characteristics of the equipment with reference to the SEMI Standard.

Carrier Transfer and Management	▪ SEMI E87 Specification for Carrier Management (CMS)
	▪ SEMI E87.1 Provisional Specification for Carrier Management (CMS)
	▪ SEMI E99 Carrier ID Reader/Writer Functional Standard
Process Management	▪ SEMI E39 Object Services Standard
	▪ SEMI E40 Standard for Processing Management (PJM)
	▪ SEMI E94 Specification for Control Job Managements (CJM)
	▪ SEMI E94.1 Provisional Specification for Control Job Managements (CJM)

This was decided after ongoing discussion at absolics inc and equipment manufacturers are required to adhere to this specification thoroughly.

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1.2. SEMI Referenced Document

1.2.1. Message Transaction and Definition

- SEMI E5 SEMI Equipment Communications Standard 2 Message Content SECS II)
- SEMI E30 Generic Model for communications and Control of Manufacturing Equipment (GEM)
- SEMI E37 High Speed SECS Message Service s HSMS) Generic Services
- SEMI E37.1 High Speed SECS Message Service Single Selected Session Mode (HSMS SS)
- SEMI E37.2 High Speed SECS Message Services General Session (HSMS GS)

1.2.2. Equipment Performance Management

- SEMI E58 Automated Reliability, Availability and Maintainability Standard (ARAMS)
- SEMI E116 Equipment Performance Tracking (EPT)

1.2.3. Carrier Transfer and Management

- SEMI E87 Specification for Carrier Management (CMS)
- SEMI E87.1 Provisional Specification for Carrier Management (CMS)
- SEMI E99 Carrier ID Reader/Writer Functional Standard

1.2.4. Process Management

- SEMI E39 Object Services Standard
- SEMI E40 Standard for Processing Management (PJM)
- SEMI E94 Specification for Control Job Managements (CJM)
- SEMI E94.1 Provisional Specification for Control Job Managements (CJM)

1.2.5. Substrate Level Data collection

- SEMI E90 Specification for Substrate Tracking (STS)

1.3. Reference Information

1.3.1. Carrier Information

Cassette, Tray, etc. Carrier loading glass

1.3.2. Glass ID

Substrate unit to process in equipment

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1.3.3. **PPID (Process Program ID)**

Process Progress Conditions (Recipe Name)

1.3.4. **Data Dictionary (to be submitted separately later)**

Item	Max Length	Type
Carrier ID		
Glass ID		
Lot ID		
Slot ID		
PPID		

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2. Detail SECS/HSMS Requirement Specification

2.1. Communication

2.1.1. HSMS Overview

① High-Speed Message Services (HSMS) defines a communication interface based on TCP/IP suitable for exchanging messages between computers in a manufacturing Factory. HSMS uses TCP/IP stream support, which provides reliable bidirectional simultaneous transmission of adjacent bytes of streams.

② The physical communication between the device and the host is made up of one. Even if multiple units exist on the device, the Host communicates with the device and transfers the events and data from each unit from the device to the host. The HSMS sends and receives all SECS-II/GEM messages by means of communication with the Host. If access to the Carrier and Glass is made by attaching EFEM to the equipment, all events and data occurring in the EFEM communicate with the Host through the equipment. However, in the case of inline equipment, a separate consultation is required.

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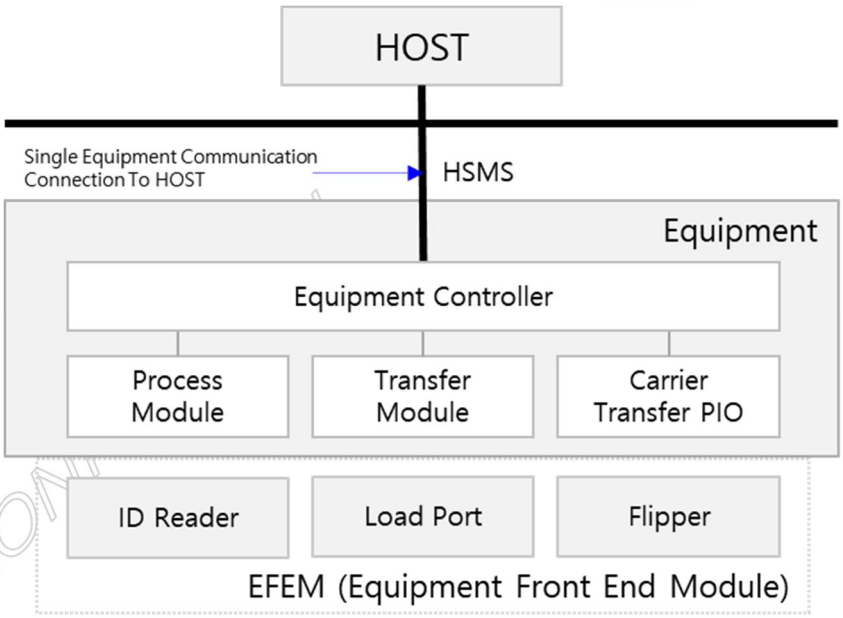
■ Case 1 : When the equipment supplier delivers with EFEM attached



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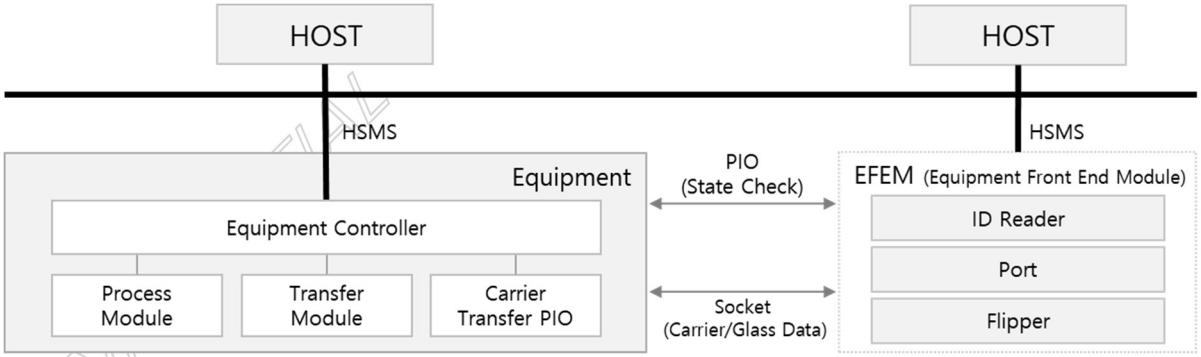
■ Case 2 : For equipment with separate equipment and EFEM configured.



③ The device must be able to set the Active/Passive Mode to communicate with the host, and the default is to maintain the Passive Mode.

④ The HSMS communication protocol is defined as shown in the table below.

■ HSMS Protocol

Item	Description
Protocol	SEMI E37 : High speed SECS Message Service(HSMS) Generic Service Including Single Session (HSMS-SS)
Interface	TCP/IP Ethernet
Connection	RJ-45 Adapter
HSMS Parameter	T3,T5,T6,T7,T8,Device ID, TCP/IP Port Number, Connection Mode should be configurable on the equipment screen.

■ HSMS Parameter

No	Name	Value Range	Typical Value(s)	Description
1	T3	1 – 120 seconds	45	Reply Timeout
2	T5	1 – 240 seconds	10	Connection Separation Timeout
3	T6	1 – 240 seconds	5	Control Transaction Timeout
4	T7	1 – 240 seconds	10	Not Selected Timeout
5	T8	1 – 240 seconds	5	Network Inter Character Timeout
6	Connect Mode	Passive / Active	Passive	Connection Mode
7	Local Entity IP Address & Port Number			Required for any entity operating in PASSIVE mode.
8	Remote Entity IP Address & Port Number			Required for any entity operating in ACTIVE mode.

⑤ HSMS must support Multi Open Transaction (Interleaving Message)

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2.2. Equipment HMI Function

① The HSMS Parameter value should be able to be changed on the equipment HMI screen, and the change should be reflected immediately, even if the equipment (equipment PC) is not rebooted when the change is made. The HSMS Connection Port must be located outside the equipment and be easily connected to the Host Network.

② You must be able to change the communication mode and access mode of the device, and the changes can be seen in the HMI of the device, and you must also send an Event to Host about the changes.

③ You can change the respective port type and port status, unit status, and equipment state, and the changes must be sent to the host. Port is EFEM Port for Glass cassette Not Network Port.

④ Alarm List, you must be able to set the availability for the Event List

⑤ Information about Terminal Message, Job sent from Host is displayed by Pop-Up.

⑥ For each maintenance-related parameter, the current value must be verifiable, and the limit value must be set.

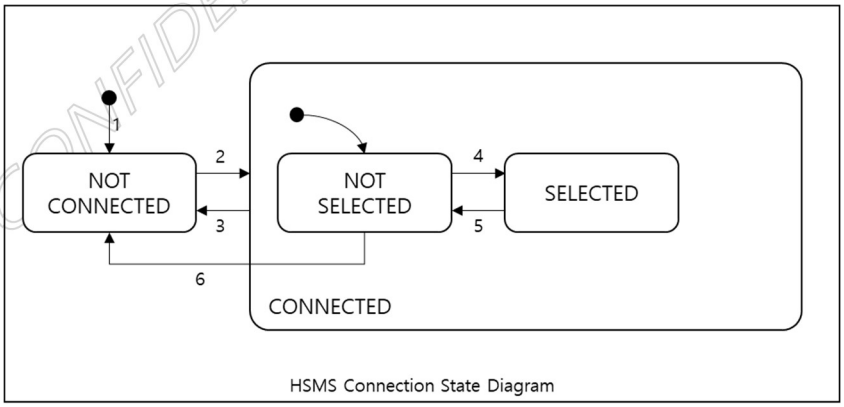
⑦ When Communication mode is offline with HOST, you must provide a screen where the operator can work by entering JOB INFO.

⑧ For equipment that is subjected to Load, Unload operation through EFEM, the ability to start, Abort, etc. must be provided in the EFEM when the Manual process is performed.

2.3. State Diagram

2.3.1. Connection State Diagram

① The HSMS Connection State Machine is illustrated in the diagram below. The operations described in this diagram define the basic requirements of the HSMS. Auxiliary standards can further extend these or other states.



HSMS Connection State Diagram

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② State Description

- NOT CONNECTED - The object is ready to initiate or accept TCP/IP connections, but no connections have been established, or all previously established TCP/IP connections have already been terminated.
- CONNECTED - A TCP/IP connection is established, which has two sub-states: NOT SELECTED and SELECTED.
- NOT SELECTED - A SUBSTATE OF CONNECTED IN WHICH THE HSMS SESSION HAS NOT BEEN ESTABLISHED, OR A PREVIOUSLY ESTABLISHED HSMS SESSION HAS BEEN TERMINATED.
- SELECTED - A substate of the CONNECTED in which at least one HSMS session has been established. This is the normal "operating" state of HSMS. data messages are also exchanged in this state

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③ State Transition Table

No	Current State	Trigger	New State	Comment
1		Local entity-specific preparation for TCP/IP communication.	NOT CONNECTED	Action depends on Connection procedure to be used: active or passive
2	NOTCONNECTED	A TCP/IP connection is established for HSMS communication	CONNECTED - NOT SELECTED	
3	CONNECTED	Breaking of TCP connection.	NOT SELECTED	
4	NOT SELECTED	Successful completion of HSMS Select procedure	SELECTED	HSMS communication is now fully established : data message exchange is permitted
5	SELECTED	Successful completion of HSMS Deselect or Separate.	NOT SELECTED	This transition normally indicates the end of HSMS communication and so an entity would immediately proceed to break the TCP/IP connection (transition 3 above).
6	NOT SELECTED	T7 Connection Timeout	NOT CONNECTED	

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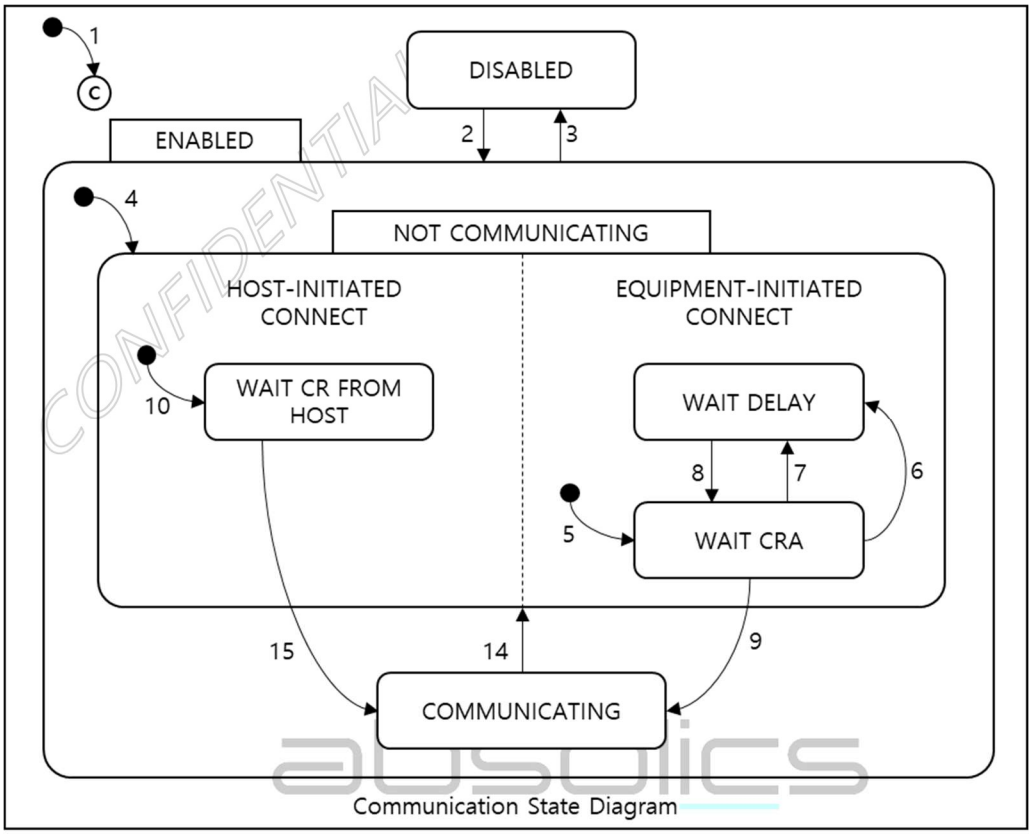
2.3.2. **Communication State Diagram**



Communication State Diagram

① SECS communication has two main states: DISABLED and ENABLED, and the system default state must be user-configurable on the appliance.

② Once the system initialization is complete, the operator should be able to change the communication status on the machine screen.

③ The basic communication status of the equipment should be COMMUNICATING.

④ Communication State Transition

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No	Current State	Trigger	New State	Action	Comment
1	(Entry to Communications)	System Initialization	System Default	None	The system default may be set to DISABLED or ENABLED
2	DISABLED	Operator switches from DISABLED to ENABLED	ENABLED	None	SECS-II communications are enabled
3	ENABLED	Operator switches from ENABLED to DISABLED	DISABLED	None	SECS-II communication are prohibited
4	(Entry to ENABLED)	Any entry to ENABLED state	NOT COMMUNICATING	None	May enter from system initialization to ENABLED or through operator switch to ENABLED
5	(Enter to EQUIPMENT-INITIATED CONNECT))	(Any entry to NOT COMMUNICATING)	WAIT CRA	Initialize communications. Set CommDelay timer “expired” Send S1F13	Begin the attempt to establish communications
6	WAIT CRA	Connection transaction failure	WAIT DELAY	Initialize CommDelay timer. Dequeue all messages queued to send	If appropriate, dequeued messages shall be placed in spool buffer in the order generated. Wait for timer to expire
7	WAIT DELAY	CommDelay timer expired	WAIT CRA	Send S1,F13	Wait for S1,F14. May receive S1F,13 from Host
8	WAIT DELAY	Received a message other than S1,F13	WAIT CRA	Discard message. No reply. Set CommDelay timer “expired”. Send S1,F13	Indicates opportunity to establish communications
9	WAIT CRA	Received expected S1, F14 with COMMACK=0	COMMUNICATING	None	Communications are established
10	(Entrt to HOST-INITIATED CONNECT)	(Any enter to NOT COMMUNICATING)	WAIT CR FROM HOST	None	Wait for S1, F13 from Host
14	COMMUNICATING	Communication	NOT	Dequeue all	Dequeued messages

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		failure. (See SEMI E4 or SEMI E37 for a protocol-specific definition of communication failure)	COMMUNICATING	messages queued to send	may be placed in spool buffer as appropriate
15	WAIT CR FROM HOST	Received S1,F13	COMMUNICATING	Send S1,F14 with COMMACK=0	Communication are estabhished

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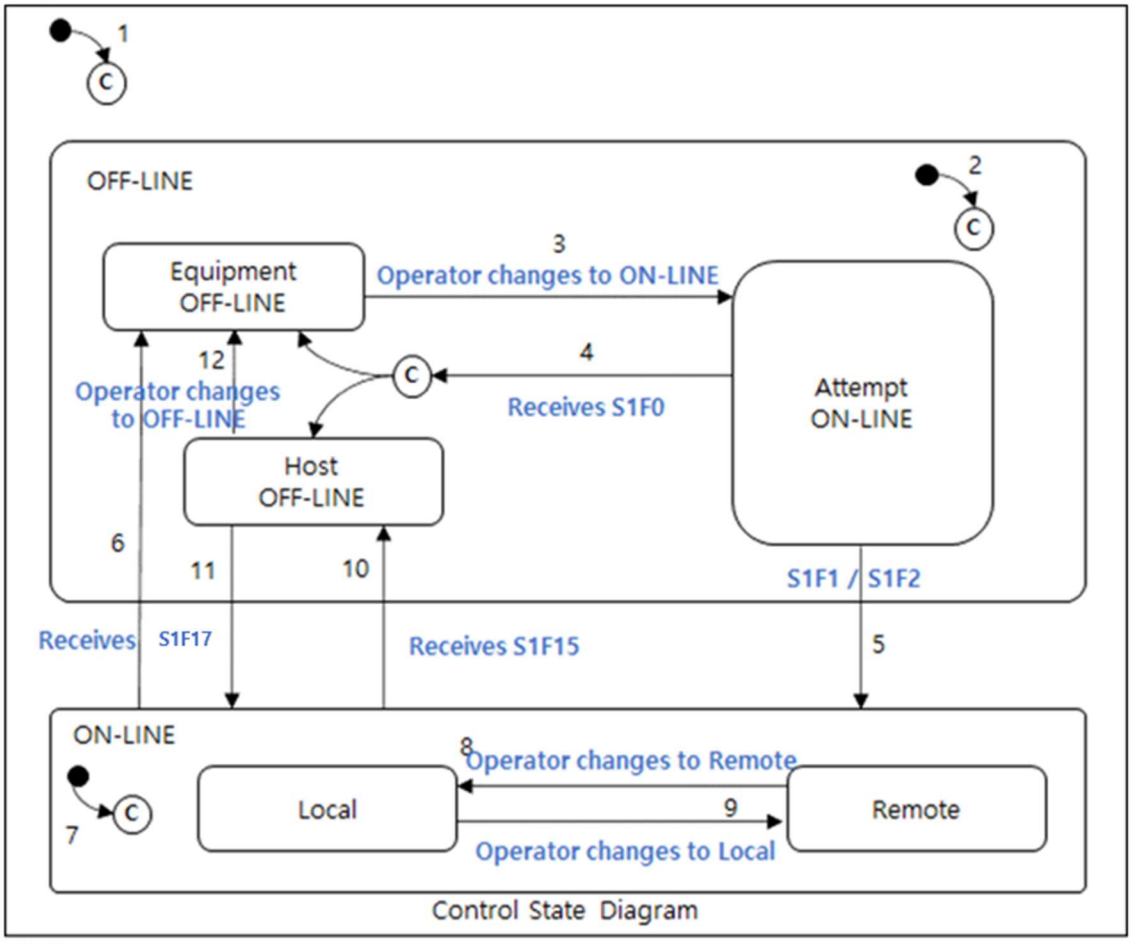
2.3.3. **Control State Diagram**



① The Control State Model defines the level of cooperation between the Host and the equipment.

② The equipment must provide the Host with three Control State Models.

■ REMOTE Mode: The Host can control the equipment in all available ranges

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- LOCAL Mode: Host can control the equipment to the extent that it does not affect the operation of the equipment
- OFF-LINE: The device is not controlled by the Host and provides only very limited information.

③ The Control State Mode is displayed independently of the Port status and can be changed on the equipment screen even if the equipment is in progress (Processing)

④ When the equipment control mode is changed from ON-LINE to OFF-LINE, LOT information sent by the Host must be retained until the ongoing Lot is unloaded. If the machine control mode is changed to ON-LINE before the lot is unloaded, the relevant Lot information must be continuously reported.

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⑤ Control State Transition

No	Current State	Trigger	New State	Action	Comment
1	(Undefined)	Entry into Control State	Control	None	Default set to On-Line or Off-Line. (I'm setting it to On-Line)
2	(Undefined)	Entry into Off-Line	Off-Line	None	Facility Default is set to Off-Line
3	Equipment Off-Line	If set to Off-Line as Default, the operator presses the On-Line button.	Attempt On-Line	None	The fixture always sends S1F1 when requested by On-Line.
4	Attempt On-Line	S1F0.	State by Configuration	None	Off-Line or Host Off-Line Set with Default
5	Attempt On-Line	Equipment receives S1F2	On-Line	None	Switched to On-Line
6	On-Line	Operator switches to Off-Line	Equipment Off-Line	None	Facility reports as e-vent to Host that it is off-line
7	(Undefined)	Entry into On-Line	On-Line, Remote or Local	None	Facility reports Remote or Local as an event
8	Local	Operator presses the ‘Remote’ button	Remote	None	Facility reports transition to Remote state as an event
9	Remote	Operator presses the ‘Local’ button.	Local	None	Facility reports transition to Local state as an event
10	On-Line	Host sends S1F15 to the	Host Off-Line	None	Switched to On-Line and switched

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		equipment.			to Default Control State
11	Host Off-Line	Host sends S1F17 to the equipment	On-Line	None	Switched to On-Line and switched to Default Control State
12	Host Off-Line	Operator presses the Off-Line switch	Equipment Off-Line	None	The facility reports that it is off-line to Host as an event

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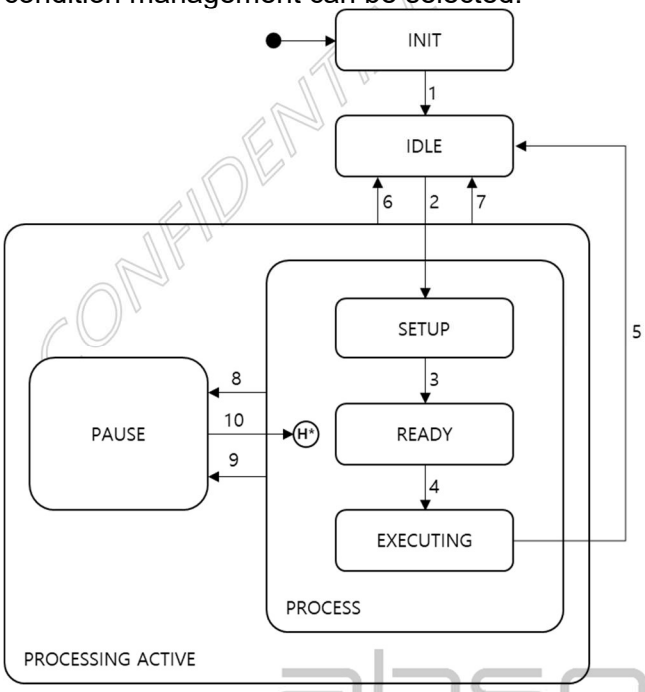
2.3.4. **Process State**

By defining the State for the Processing of Equipment, an operational method for equipment condition management can be selected.



① IDLE: This is the state after initialization or after completing Process. From then on, the equipment is in a state of waiting for orders to proceed with the work. To be able to transition from IDLE to READY, the process selection to be carried out on the equipment and the loading of the product into the equipment must be carried out.

② SETUP: A state in which all external conditions for the process are satisfied. It determines whether the port of the equipment is in a suitable state, whether the necessary parameters, such as temperature/pressure, are in the Limit, and if satisfied, a transition of state occurs to READY for the work to proceed. To go from SETUP to READY, the Parameter Setting of the process must be completed after the process has been selected.

③ READY: All the conditions are satisfied and only the Start command of the Operator (Host) is left. At this time, when the Start command is received, the state is transferred.

④ EXECUTING: The equipment is performing its own tasks. when the job is terminated gracefully it switches to the idle state

⑤ PAUSE: The machine switches to the PAUSE state if it receives a Pause command from the operator or host. If the cause of the PAUSE occurrence is received by the operator or the Host after the action, it can be converted into the Pause occurrence process or the required process, depending on the characteristics of the equipment.

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⑥ STOP/ABORT: The equipment is transferred to the IDLE state when the STOP/ABORT command is received from the operator or host. However, in the case of ABORT, the status may be determined according to the equipment characteristics.

#	Current State	Trigger	New State	Action	Comment
1	INIT	Finish initializing your device	IDLE	None	None
2	IDLE	Finish all the settings on your device	SETUP	None	None
3	SETUP	All actions related to Setup are completed and wait for the Start command	Ready	May vary by device	None
4	READY	The device received the Start command	Executing	May vary by device	None
5	EXECUTING	Operation Completed	IDLE	None	None
6	PROCESSING ACTIVE	The device received a Stop command	IDLE	None	None
7	PROCESSING ACTIVE	The device received an Abort command	IDLE	May vary by device	None
8	PROCESS	The equipment is determined to be Pause for reasons such as Alarm	PAUSE	May vary by device	Contractor intervention required
9	PROCESS	The device receives a Pause command	PAUSE	May vary by device	None
10	PAUSE	The appliance received the Resume command	The equipment is replaced with the previous Process Sub State	May vary by device	None

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2.4. Host Command

In the Host, equipment can be controlled using the Host Command or a specific Stream/Function.

① The HSMS Parameter can be checked and changed using Equipment Constant (S2F13/14, S2F15/16).

② You can change the equipment Control model. (S1F15/16, S1F17/18)

③ Host Command: The Host Command entry is as follows, and further changes can be made during the specification consultation process.

Command	Description	Item
ACCESS_MODE	Port Access Mode	Auto, Manual (set based on Port Type)
BUZZER	Buzzer Control	On, Off
SIGNAL_TOWER	Signal Tower Control	Color: Green, Yellow, Red Status: On, Off, Blink
START	Process Start	
PPSELECT	Process Program Select	
CARRIER_RECREATE	When 'Ready to Unload' Reprocessing. Without actual unload action. equipment will process Re-Create a Job. For example, become a change to 'Ready to work' state.	
PAUSE	Pause after proceeding with the currently ongoing Glass	Might be need detail scenario for 'Self Inspection'. If 'Self Inspection' will necessary, discuss separately later.
RESUME	Restart for PAUSE	Same with 'PAUSE'
STOP		
ABORT	Cancel Job after proceeding with the Glass that is currently in progress	Discuss separately later.
CANCEL	Cancel a Job for a Pre-Progress Job	
PORT_STATE	Port state change	Enable, Disable, Port No

④ If the Process Module receives a deactivation (Disable, stop, etc.) command for the Process Module while it is in the process, the machine must complete the process with respect to the glass currently in process and eject the Glass from the Process Module. The Process Module must then be deactivated, and subsequent Glass must be deactivated, and the subsequent Glass must be deactivated with another Process Module. Even if the equipment is in the process, you should be able to activate the Process Module using the Host Command.

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2.5. Data Collection

Equipment status can be monitored through Event Report, Trace Data Report, and various monitoring by Host, or various data collection for equipment data collection.

2.5.1. Event Data Collection (Dynamic Event Report Configuration)

Event Data Collection provides a flexible method for data collection to systems that require that data. Users can write reports and Links for the Event. Event report configuration may include Status Variable(SV), Equipment Constant(EC), Data Variable (DV), etc., and when reporting Event on equipment, the Data Value (DV) is valid for a particular Event and under a particular state and should not be allowed at any other point in time.

① The equipment supplier must provide predefined report and link information for every reportable event, which should include the variable name, the variable type, the variable category (SV, DV, EC), and the meaning of the variable.

② Every Event that occurs on the machine must have a unique ID. IDs must be distinguished for each process module and unit.

③ The VID must have a unique ID for each Process Module, Unit

④ Host can be operated with the following dynamic event configuration:

- HOST can define/delete a Report for Variable
- HOST can link/unlink a predefined report for a specific event
- Host can Enable/disable for a specific event

⑤ The equipment must always maintain the Define Report (S2, F33), Link Report (S2, F35), and Event Enable/Disable (S2, F37) defined by the host. Even if the equipment is restarted, the configuration last defined by the host must be maintained.

⑥ The equipment must provide all information related to the process progress information for all Events related to the process progress.

- The Host provides Lot/Carrier, Glass/Slot, Product, and process progress information to the equipment.
- The equipment must maintain this information and report the information to host when a process progress event occurs.
- In the event of a glass-related Event. the equipment must report information such as Slot/Glass/Lot/Product/Process.
- In the event of a process-related Event. the equipment must report the Lot/Product/Process and the Glass Count in which the progress is completed.

⑦ Spooling should be kept inactive mode as default.

⑧ The following Event Report should be basically provided by equipment, and the detailed Collection Event (CEID) is decided in consultation with the absolics inc engineer. Check the collection Event items from the absolics inc engineer. CEID,Event Name, and VID associated with the event must be provided in Excel format.

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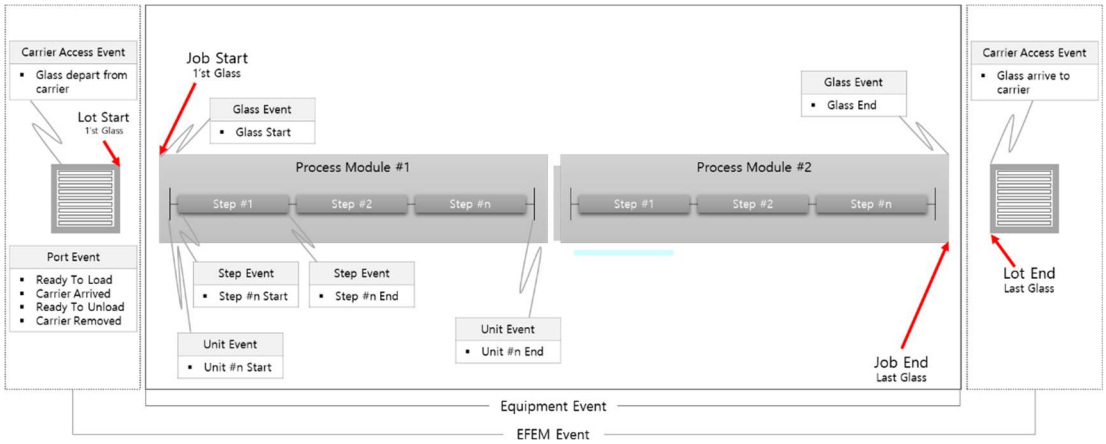
A. All operations manually entered or performed manually by the operator on the HMI.
   - Change the Recipe (Current Recipe)
   - Glass, Carrier Forced Discharge
   - Raw materials, Subsidiary and mounting/Unmounting event for Jig/Tool
   - Operator Information (Operator ID number)

B. Report all events that correspond to device state changes within the device, such as equipment, units, etc.
   - The beginning and end of every movement.
   - Start and end where glass transfer and related mechanical operations take place
   - Carrier load/unload related start and end
   - The start and end that proceed by the command of the Host
   - Each port Status/Type change

C. Carrier/Glass ongoing events are as follows: Events that occur during Carrier/Glass are as follows and the equipment and events reported by EFEM are distinguished from each other.



   - It must be possible to report the Glass Count for the item when the glass departs or arrives in the carrier.

D. Required Events

구분	Event	Description
Control Mode		
Equipment/EFEM	Equipment OFF-LINE	ON-LINE → OFF-LINE
Equipment/EFEM	Control State LOCAL	REMOTE → LOCAL OFF-LINE → LOCAL
Equipment/EFEM	Control State REMOTE	LOCAL → REMOTE OFF-LINE → REMOTE
Processing		
EFEM	Lot Start	Port 의 Carrier 에서 첫번째 Glass 가 출발

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EFEM	Lot Complete	Port 의 Carrier 에 마지막 Glass 가 도착
Equipment	Process Start	Job Start
Equipment	Process Complete	Job End
Equipment	Process Cancel	Job 진행전 작업 취소
Equipment	Process Abort	Job 진행중 작업 취소
Equipment	Process Module Start	Process Module 에서 공정 진행 시작
Equipment	Process Module Complete	Process Module 에서 공정 진행 완료
Equipment	Glass Start	Glass 가 Process Module 에서 공정 진행 시작
Equipment	Glass Complete	Glass 가 Process Module 에서 공정 진행 완료
Equipment	Recipe Step Start	Recipe Step 진행 시작
Equipment	Recipe Step Complete	Recipe Step 진행 완료
Equipment	Processing State Change	장비의 Process 상태 변경
Port & Carrier		
EFEM	Ready To Load	Port 가 비었을 때
EFEM	Carrier Arrived	Port 에 Carrier 가 놓였을 때
EFEM	Carrier Clamped	Port 의 Carrier 에 대한 Clamp 가 완료
EFEM	Carrier ID Read	Carrier ID Read 완료
EFEM	Carrier ID Verification	Carrier ID Verification 완료
EFEM	Slot Map Read	Slot Map Read 완료
EFEM	Slot Map Verification	Slot Map Verification 완료
EFEM	Ready To Start	Lot Start 준비 완료
EFEM	Ready To Unload	Unload Port 에서 공정진행 완료 후 Unload 대기
EFEM	Carrier Unclamped	Port 의 Carrier 에 대한 Clamp 가 완료
EFEM	Carrier Removed	Port 에서 Carrier Unload 완료
EFEM	Carrier Access Start	Carrier 에서 Glass 가 공정 진행을 위하여 출발
EFEM	Carrier Access End	Carrier 에 Glass 가 공정 진행 완료후 도착
EFEM	Port Type Change	Load Port Type 을 BP, In Port, Out Port 로 변경

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EFEM	Port State Change	Port 의 상태를 Enable/Disable 로 변경
Port Access		
EFEM	Access Mode Auto	Port 의 Access Mode 를 Auto (AMHS 사용 가능)로 변경
EFEM	Access Mode Manual	Port 의 Access Mode 를 Manual 로 변경
Process Program		
Equipment	Process Program Create	신규 Process Program 생성
Equipment	Process Program Modify	Process Program 수정
Equipment	Process Program Delete	Process Program 삭제
Equipment	Process Program Change	Process Program 생성, 수정, 삭제
Equipment State		
Equipment	Equipment State IDLE	장비 상태가 Idle 로 변경
Equipment	Equipment State RUN	장비 상태가 Run 으로 변경
Equipment	Equipment State MAINTENANCE	장비 상태를 Maintenance 로 변경
Equipment	Equipment State DOWN	장비 상태를 Down 으로 변경

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- When the event expressed above occurs, the VID (SV, DV) that can be linked must be presented by the equipment supplier.

⑨ When the value related to the maintenance of the equipment reaches the Limit Value, the corresponding event must be provided.

2.5.2. **Status Variable Data**

The Host can request equipment status by allocating SVID as wanted. The equipment must send the selected Status Variable Data according to the host's request. The Host may request a specific or description of all available Status Variables (names and units). Status Variable Data can be defined in S1F3 and is defined in the Trace Data (S2F23/24, S6F1) and Event Report (S2F33/34/35/36/37/38, S6F11) that the equipment periodically reports. The minimum Status Variable Data required for equipment automation is as follows, and the equipment supplier must provide all SVIDs of the equipment in the form of an Excel file.

① Control State, Process State, Equipment State, Access Mode

② Carrier ID and Port Type for each Port.

③ Glass ID, Carrier ID, Lot ID, Carrier Slot No, Recipe ID, Recipe Step of Glass in Progress by Unit.

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④ Process Data for each Unit and Recipe Step

⑤ Number of Glasses remaining in the Load Port Carrier

⑥ Carrier ID, Lot ID, Carrier Slot No, Glass ID when exporting glass from Load Port Carrier or importing glass into Unload Port Carrier

2.5.3. **Data Variable**

Host may define an RPTID including the data variable of the equipment. If there is a report defined at the time of the event report, the Status Variable Value and the Equipment Constant Value must be the current value of the equipment and the Data Variable Value must be processable according to the validity of the particular event collected. If the data item (SVID, DVID, ECID) is a Event Reporting according to the equipment environment and process conditions. If this is not possible, the problem should be recorded in the documentation. if not, Report links are considered possible for all Events. The minimum data to be collected by Process Data is provided in a separate document, and basically all data generated by the machine must be collectible. Details of which must be determined in consultation with the absolics inc engineer and a
Final confirmation from the absolics inc engineer. The equipment supplier must provide the relevant DVID in Excel file format.

2.5.4. **Equipment Constant**

The Host can set a new Equipment Constant using the S2F15 Message and retrieve the value and contents of the Equipment Constant registered as S2F13 and S2F29. In addition, if the Equipment Constant is changed by the operator, the Equipment Constant change Event must be communicated to the Host via the S6F11 message.

① The equipment shall provide all the ECIDs that the equipment has to the Host.

② The equipment supplier must provide all ECIDs of the equipment in the format of an Excel file.

2.5.5. **Trace Data Collection**

① How to collect Trace data

The Trace Data Collection provides a way to periodically sampling the data. The equipment must set up the Trace Report according to Host's command S2F23. The host can specify the name of the trace report (TRID), the data sampling period (DSPER), the Total Sample Count (TOTSMP), the Report Group Size (REPGSZ), and the list of data to be sent for the trace report (V ID). The equipment can sample for the data SV assigned at a interval defined by the Host (DSPER). It must be performed, and a predefined Trace Report must be sent to the Host according to the allocated Report Group Size. The Trace Report defined on the equipment must be automatically deleted after the final Trace Report is sent. Host can modify or restart the trace being processed using the same TRID if the old Trace has terminated or a new Trace needs to be started. If you need to delete a Trace Report, you can specify TOTSMP=0 for that TRID so that Host can terminate the Trace Report.

- The equipment must support at least 4 simultaneous Traces and can be simultaneously collected with multiple Traces for the same SVID.

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- Exclude Reply Message (S6, F2) for Host performance and transaction reduction
- You must provide all the equipment and process data that is being monitored on the equipment screen, and can be added after the equipment setup.
- The equipment is 0 in one trace. Trace data collection for 500 Parameters should be possible in a 5-second cycle.

② Trace Data Collection Items

- All Data Collection Items (VIVs) that can be monitored on the Equipment Screen (HMI) must be reported to Host. Detailed Collection Items (VIVs) are discussed and determined with the absolics inc engineer. In addition, the equipment supplier must verify the Data Collection Item and obtain a signature from the absolics inc engineer.
- The equipment must use a Data Collection Item (SVID) to provide Preventive Maintenance (PM) data to the Host. PM data may include processing time, cumulative usage time after PM, cumulative usage, etc., and detailed collection items are discussed and determined with the absolics inc engineer.
- If there are multiple Process Units in the equipment, each unit must have an SVID that represents the Key Parameter related to the process progress. Key parameters include Carrier ID, Glass ID, Carrier Slot No, Recipe ID, Recipe Step No, Equipment State, Unit State, etc.

2.6. Alarm Management

An alarm is defined by the equipment supplier to provide physical safeguards against such abnormal situations, such as situations in which the normal production of people, equipment or products being processed is difficult. When an alarm occurs, the operation of the equipment may be stopped depending on the type of alarm.

① Alarm Code is divided into two parts: Alarm Type Code of Alarm On/Off Bit and 7 Bit. The on/off bit means that Bit 8 = 1 is the Alarm setting, and Bit 8 = 0 means to turn off the Alarm. This means that the alarm has been turned off. Alarm type code uses Bits 1 through 7 of 7 Bits, see SEMI E5 for details.

② The device must be able to enable/disable from the Host or equipment HMI for all alarms that the equipment has. The facility must only report to the Host for Alarms enabled in the Host or HMI.

③ Every Alarm ID defined on the device must have a unique value. (1 ALID = 1 ALTX)

④ When an Alarm is detected on the device, the Alarm is set. If the Alarm is no longer detected by the device or if the Alarm has been dismissed by a person, it should report that the Alarm has been dismissed. After the occurrence of Alarm, the same Alarm should not be continuously reported until the Alarm is released.

⑤ You should be able to verify the currently issued Alarm from Host

⑥ When the Alarm occurs, the Unit from which the Alarm occurred, and information indicating the device should be included in the ALID.

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⑦ Alarm information should be available for reporting to Event Report (S6F11)

2.7. Port & Carrier Management

The Port is used to load/unload the carrier on the equipment and consists of a Load Port and a Unload Port. The Port is divided into Load Port, Unload Port by equipment type and customization. Each Port must have a unique Port ID, and the Port Type per Port ID must be able to be defined by the equipment HMI.

① Port Number should be specified while increasing the number from left to right relative to the front of the equipment.

② If Port loads a Carrier on an empty or empty Port, it reports the Event to the Host

③ When you change the Port type, you must report the event to the host. There must be a VID representing the old Port Type and the current Port Type related to the Port Type.

④ There are 2 ways to Load a Carrier into the machine. If Access Mode is Manual, the operator loads the Carrier to the Port and then presses the switch (or confirmed by the HMI) to announce the completion of the load, and if Auto, the load-related PIO signal between the AMHS and the equipment is completed, the load is determined to be complete.

⑤ Carrier Load/Unload reports the corresponding Carrier ID to the Host on Port

⑥ If a Carrier is Loaded in the Unload Port and a Carrier with Glass rather than an empty Carrier is Loaded, an Alarm is sounded to notify the operator.

⑦ When transferring a glass that has completed the process to the carrier of the Unload port, only the glass with the same Carrier ID must be transferred to the same carrier. If the glass that should not be transferred to the same Carrier sends the Unload Request Event to the host when waiting for the unload, and the Access Model If Manual, it will ring an alarm so that the operator can recognize it.

⑧ If all the Glass has been transferred to the Carrier of the Unload Port and becomes the Full Carrier, the Unload Request Event is sent to the Host, and if the Access Model is Manual, the Alarm is sounded so that the operator can be aware of it. If there is no subsequent Glass, the Carrier of the Unload Port will perform the forced export during a long wait. In the event of forced ejection, the corresponding You should provide the ability to send an Event to Host and set the longest latency for the device to determine the long wait time.

⑨ If a Carrier is forced to be discharged due to a problem in the process or the inability to proceed further, the Carrier ID and the corresponding Glass List must be reportable to the Host.

⑩ Host can change the status of a specific port to Enable/Disable on the Host. When the Port status is Enable, all events and data related to the movement and operation of Port, Carrier, and Glass must be reportable and if the status is Disable, the event is not reported from the

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equipment to the host. The time when Enable/Disable can be changed on the host must be performed before the Cassette is loaded on the port. If you cannot change the state of the port, you must reply to the host.

⑪ Information related to Carrier and Glass that is transmitted to the equipment through EFEM, the equipment must also know the same information as EFEM knows. Equipment shall be provided by VID for all information received from EFEM.

2.8. Process Job Management

① When the equipment is in production, the Host transmits the job information to set the conditions for the process. Since the job information required for the process may vary from equipment to equipment, the necessary job information for the equipment supplier should be consulted with the absolics inc engineer.

② The job information received from the Host shall be displayed on the equipment HMI, and the screen configuration shall be determined in consultation with the absolics inc engineer.

③ If the job information received from the Host differs from the information required to be produced by the equipment, the Host is replied to NG. (ex: When the recipe sent from the host does not exist in the device, the Carrier ID send from the device and the Carrier ID sent from the host are different, etc.)

④ In order to proceed with the process, if the Glass ID is read from the equipment and the value is a Glass ID that does not exist in the HOST, the glass input is stopped and an Alarm is generated to notify the operator.

⑤ Using Equipment Constant, it is possible to determine whether to proceed in case the slot mapping order by Glass ID is different.

⑥ If there are multiple Load ports, when the carrier is loaded, the Host creates a Job for the Carrier of the Load Port. The equipment uses the Job information received from the Host to generate Job for the Carrier and proceeds with the process. After the Job for a carrier is created, if the carrier is unloaded before the completion of the process, the job for that carrier is automatically canceled and a Job Cancel Event must be sent to the host.

⑦ During the process, it is sometimes necessary to proceed with a specific glass among the glasses in the carrier first and then proceed with the subsequent glass depending on the result of the process. In this case, the Host can create a Job only for that Glass, and a ReadyToUnload Event occurs when the process progress of the preceding glass(LOT) is completed, and the Carrier can be unloaded. The Carrier of the Load Port should be able to proceed after creating a new Job (CarrierReCreate) without Unloading the Carrier in the ReadyToUnload state.

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⑧ Processes that require both upper and lower sides should be able to proceed on both sides without unloading the carrier. CEID and VID must be provided by separating the upper and lower surfaces. For detailed items, consult with absolics inc engineer.

⑨ Even if Port No, Carrier ID, Lot ID, and Slot No are all the same during the upper and lower sides, multiple process jobs can be created. At this time, the PJID is assigned a unique ID for each job..

⑩ Host provides a variety of additional information that is unknown to the equipment such as Product/Flow/Operation at the time of Job creation. The equipment shall be able to manage the additional information received from the Host as attributes for the carrier and report effectively at all events.

⑪ Multi process jobs can be created on the equipment in the Host, and queuing of the equipment must be possible for the generated process jobs.

⑫ The equipment supplier shall have a VID that can report the information to the Host by referring to the contents of the Process Job and Control Job transmitted from the

■ Required fields : ControlJobID, ProcessJobID, Carrier ID, PPID, Slot No, Substrate ID

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2.9. Equipment State Management

The equipment supplier must manage and report the State for the equipment and each unit to the Host. The equipment status is divided into 4 main as follows:

① IDLE

This state states that there is no product in progress in the equipment and that the process is waiting to proceed.

② RUN

This state is the state in which the equipment has entered the product to proceed with the process in the IDLE state and the process has begun to proceed. This state is maintained when the process is continuously in progress, and if the process progress is completed in the equipment and there are no products in progress, the equipment status is changed to IDLE.

③ DOWN

This state is a state in which the equipment cannot be driven due to equipment problems in the IDLE or RUN state.

④ MAINTENANCE

This state is the Preventive Maintenance (PM) condition. When maintenance is complete, the equipment changes to the IDLE state.

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2.10. Process Program Management

Transmit the Process Programs between the HOST and the equipment to each other and define the methods by which these Process Programs can be managed.

① The equipment supplier must provide the ability to create, modify, and delete Process Programs.

② The equipment supplier shall provide an Event for the creation, modification and deletion of the Process Program. This Event should be able to report PPChangeName, PPChangeStatus

- PPChangeName : Process Program ID (PPID) created, changed, or deleted.
- PPChangeStatus : The actions taken in the Process Program. Has Create, Modify, Delete

③ The equipment supplier must provide the ability to upload/download the Process Program from the Host. This specification recommends a Formatted Process Program, and the Process Program Body consists of a PPARMNAME and a PPARMVALUE. If the equipment supplier is forced to use the Unformatted Process Program, the PPBODY should be explained.

- Equipment Process Program Directory Request: S7F19
- Process Program Send: S7F23
- Process Program Request: S7F25
- Sample Format

```
S7,F23 / S7F26
  L, 4
    <PPID>
    <MDLN>
    <SOFTREV>
    <L, c
      <L, 2
        <CCODE>
      <L, p
        <L, 2
          <PPARMNAME>
          <PPARMVALUE>
```

2.11. Flip Mounting Equipment

Equipmentwith Flip attached to the EFEM must provide the following features:

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① Process Module 에서 제공하는 Event, VID 와 동일한 수준의 정보를 제공해야 한다

- Glass In/Out Event
- Glass top side, bottom side flip start, end Event
- Glass flip information (top/bottom)
- Carrier ID, Glass ID, Slot No.etc.,

② If Self inspection scenario need for Glass must be supplied below functions.

A. For glass that needs self inspection, the host sends information about the glass when creating a job.

B. After moving to the Flip Station, the engineer must be notified of the relevant matter through a buzzer.

C. The next glass should not proceed before the work of the glass corresponding to the visual inspection and the engineer's judgment are completed, but after the visual inspection is completed. Visual inspection completion standards will be discussed separately

③ The detailed items are decided in consultation with the engineer of absolics inc..

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2.12. Miscellaneous Function

④ Management of raw materials and jig/tool use and recovery

- When the equipment is mounted/removed from the raw materials and the Jig/tools, the corresponding information is reported to the Host at the event.
- Increase (decrease) usage each time production is carried out based on the usage received from Host
- Using the corresponding value/tooling information received from the host, an alarm is generated and notified to the user if the usage is a Warning Value. If the usage reaches the Limit Value, the alarm is generated and then Cycle Stop to induce the replacement of the raw material and the jig/tool.

⑤ Operator Management

- When Operator information (Operator ID) updated, the user information is sent to Host

2.13. Documentation

Equipment suppliers must submit documents that include:

① Equipment Supplier SECS/HSMS Specification

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② CEID List

CEID	Description

③ VID (SV, DV, EC) List

ID Type	VID	V Name	Unit	Format	Length	Description

④ Define Report List (Equipment Initial State Data)

RPTID	Report Description	VID	V Name

⑤ Link Event Report List (Equipment Initial State Data)

CEID	CEID Description	RPTID	Report Description

⑥ Data Dictionary

Data Item	Where	Code	Code Description

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2.14. Equipment Log

Equipment suppliers are required to submit the following SECS/HSMS Log files after the equipment inspection and admission. Log must be an actual Log file containing the Normal Scenario, the Abnormal Scenario.

① Dynamic Event Report Setting Log (Scenario with RPTID, VID, CEID)

- Linked Process Data for Unit End/Recipe Step End
- Linked State for When Port State Changing
- Linked Data for each unit on the glass movement

② Normal Scenario Log

- Carrier Loading to Unload (Carrier Loading →Read Carrier ID →Job Start →Glass Start/End Job End →Carrier Unloading)
- Port State Change & Carrier Information
- Process Information by Unit
- Process Data for each Glass

③ Trace Data Log

- Trace Initiate (Trace Start/End)

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- Interval 0.5 seconds Trace Data Report
- Use 2 TRIDs and 5 00 VIDs per TRID
- Includes Key Parameters (Carrier ID, Glass ID, Carrier Slot No, Recipe ID, Recipe Step No, Equipment State, Unit State)

④ Abnormal Case

- Process Job creation failed
- Forced Glass Ejection
- Carrier forced ejection

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3. SECS Message

3.1. Message Summary (Stream / Function)

The equipment shall be able to send/receive the following SECS/HSMS Message. If any other items are required or need to be added, a final consultation shall be made with the ABSOLICS inc engineer.

Stream	Function	S/F	Direction	Description
X	0	SX F0	H ↔ E	Abort Transaction
1	1	S1 F1	H ↔ E	Are You There Request
1	2	S1 F2	H ↔ E	Online Data
1	3	S1 F3	H → E	Selected Equipment Status Request
1	4	S1 F4	H ← E	Selected Equipment Status Data
1	11	S1 F11	H → E	Status Variable Name List Request
1	12	S1 F12	H ← E	Status Variable Name List Data
1	13	S1 F13	H ↔ E	Establish Communication Request
1	14	S1 F14	H ↔ E	Establish Communications Request Acknowledge
1	15	S1 F15	H → E	Request OFF-LINE
1	16	S1 F16	H ← E	OFF-LINE Acknowledge
1	17	S1 F17	H → E	Request ON-LINE
1	18	S1 F18	H ← E	ON-LINE Acknowledge
1	21	S1 F21	H → E	Data Variable Namelist Request
1	22	S1 F22	H ← E	Data Variable Namelist Data
1	23	S1 F23	H → E	Collection Event Namelist Request
1	24	S1 F24	H ← E	Collection Event Namelist Data
2	13	S2 F13	H → E	Equipment Constant Request
2	14	S2 F14	H ← E	Equipment Constant Data
2	15	S2 F15	H → E	New Equipment Constant Send
2	16	S2 F16	H ← E	New Equipment Constant Acknowledge
2	17	S2 F17	H ↔ E	Date and Time Request
2	18	S2 F18	H ↔ E	Data and Time Data
2	23	S2 F23	H → E	Trace Initialize Send
2	24	S2 F24	H ← E	Trace Initialize Acknowledge
2	25	S2 F25	H → E	Loopback Diagnostic Request
2	26	S2 F26	H ← E	Loopback Diagnostic Data
2	29	S2 F29	H → E	Equipment Constant Namelist Request
2	30	S2 F30	H ← E	Equipment Constant Namelist
2	31	S2 F31	H → E	Date and Time Set Request
2	32	S2 F32	H ← E	Data and Time Set Acknowledge
2	33	S2 F33	H → E	Define Report
2	34	S2 F34	H ← E	Define Report Acknowledge
2	35	S2 F35	H → E	Link Event Report

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2	36	S2 F36	H ← E	Link Event Report Acknowledge
2	37	S2 F37	H → E	Enable/Disable Event Report
2	38	S2 F38	H ← E	Enable/Disable Event Report Acknowledge
2	41	S2 F41	H → E	Host Command Send
2	42	S2 F42	H ← E	Host Command Acknowledge
2	43	S2 F43	H → E	Reset Spooling Streams and Functions
2	44	S2 F44	H ← E	Reset Spooling Acknowledge
2	45	S2 F45	H → E	Define Variable Limit Attributes
2	46	S2 F46	H ← E	Variable Limit Attributes Acknowledge
2	49	S2 F49	H → E	Enhanced Remote Command
2	50	S2 F50	H ← E	Enhanced Remote Command Acknowledge
3	17	S3 F17	H → E	Carrier Action Request
3	18	S3 F18	H ← E	Carrier Action Acknowledge
3	21	S3 F21	H → E	Port Group Definition
3	22	S3 F22	H ← E	Port Group Definition Acknowledge
3	23	S3 F23	H → E	Port Group Action Request
3	24	S3 F24	H ← E	Port Group Action Acknowledge
3	25	S3 F25	H → E	Port Action Request
3	26	S3 F26	H ← E	Port Action Acknowledge
3	27	S3 F27	H → E	Change Access
3	28	S3 F28	H ← E	Change Access Acknowledge
5	1	S5 F1	H ← E	Alarm Report Send
5	2	S5 F2	H → E	Alarm Report Acknowledge
5	3	S5 F3	H → E	Enable/Disable Alarm Send
5	4	S5 F4	H ← E	Enable/Disable Alarm Acknowledge
5	5	S5 F5	H → E	List Alarm Request
5	6	S5 F6	H ← E	List Alarm Data
6	1	S6 F1	H ← E	Trace Data Send
6	2	S6 F2	H → E	Trace Data Acknowledge
6	11	S6 F11	H ← E	Event Report Send
6	12	S6 F12	H → E	Event Report Acknowledge
6	15	S6 F15	H → E	Event Report Request
6	16	S6 F16	H ← E	Event Report Data
6	23	S6 F23	H → E	Request Spooled Data
6	24	S6 F24	H ← E	Request Spooled Data Acknowledge
7	17	S7 F17	H → E	Delete Process Program Send
7	18	S7 F18	H ← E	Delete Process Program Acknowledge
7	19	S7 F19	H → E	Current EPPD Request
7	20	S7 F20	H ← E	Current EPPD Data
7	23	S7 F23	H ↔ E	Formatted Process Program Send
7	24	S7 F24	H ↔ E	Formatted Process Program Acknowledge
7	25	S7 F25	H ↔ E	Formatted Process Program Request
7	26	S7 F26	H ↔ E	Formatted Process Program Data

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7	27	S7 F27	H ← E	Process Program Verification Send
7	28	S7 F28	H → E	Process Program Verification Acknowledge
9	1	S9 F1	H ← E	Unrecognized Device ID
9	3	S9 F3	H ← E	Unrecognized Stream Type
9	5	S9 F5	H ← E	Unrecognized Function Type
9	7	S9 F7	H ← E	Illegal Data
9	9	S9 F9	H ← E	Transaction Timer Timeout
9	11	S9 F11	H ← E	Data Too Long
9	13	S9 F13	H ← E	Conversation Timeout
10	1	S10 F1	H ← E	Terminal Request
10	2	S10 F2	H → E	Terminal Request Acknowledge
10	3	S10 F3	H → E	Terminal Display, Single
10	4	S10 F4	H ← E	Terminal Display, Single Acknowledge
10	5	S10 F5	H → E	Terminal Display, Multi-Block
10	6	S10 F6	H ← E	Terminal Display, Multi-Block Acknowledge
14	1	S14 F1	H ↔ E	GetAttr Request
14	2	S14 F2	H ↔ E	GetAttr Data
14	3	S14 F3	H ↔ E	SetAttr Request
14	4	S14 F4	H ↔ E	SetAttr Data
14	5	S14 F5	H ↔ E	GetType Request
14	6	S14 F6	H ↔ E	GetType Data
14	7	S14 F7	H ↔ E	GetAttrName Request
14	8	S14 F8	H ↔ E	GetAttrName Acknowledge
14	9	S14 F9	H ↔ E	Create Object Request
14	10	S14 F10	H ↔ E	Create Object Acknowledge
14	11	S14 F11	H ↔ E	Delete Object Request
14	12	S14 F12	H ↔ E	Delete Object Acknowledge
16	5	S16 F5	H → E	Process Job Command Request
16	6	S16 F6	H ← E	Process Job Command Acknowledge
16	7	S16 F7	H ← E	Process Job Alert Notify
16	8	S16 F8	H ← E	Process Job Alert Confirm
16	9	S16 F9	H ← E	Process Job Event Notify
16	10	S16 F10	H ← E	Process Job Event Confirm
16	11	S16 F11	H → E	PRJobCreateEnh
16	12	S16 F12	H ← E	PRJobCreateEnh Acknowledge
16	13	S16 F13	H → E	PRJobDuplicateCreate
16	14	S16 F14	H ← E	PRJobDuplicateCreate Acknowledge
16	15	S16 F15	H → E	PRJobMultiCreate
16	16	S16 F16	H ← E	PRJobMultiCreate Acknowledge
16	17	S16 F17	H → E	PRJobDequeue
16	18	S16 F18	H ← E	PRJobDequeue Acknowledge
16	19	S16 F19	H → E	PRGetAllJobs
16	20	S16 F20	H ← E	PRGetAllJobs Send

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16	21	S16 F21	H → E	PRGetSpace
16	22	S16 F22	H ← E	PRGetSpace Send
16	23	S16 F23	H → E	PRJobSetRecipeVariable
16	24	S16 F24	H ← E	PRJobSetRecipeVariable Acknowledge
16	25	S16 F25	H → E	PRJobSetStartMethod
16	26	S16 F26	H ← E	PRJobSetStartMethod Acknowledge
16	27	S16 F27	H → E	Control Job Command Request
16	28	S16 F28	H ← E	Control Job Command Acknowledge

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4. Operation Scenario

4.1. Unit Scenario

4.1.1. Communication Enable

① Host Establish Communications

Host		Direction	Equipment	
Establish Communication Request	S1F13	→		
		←	S1F14	Establish Communications Request Acknowledge Reply COMMACK = Accept and Communication state = Communicating

② Equipment Establish Communications

Host		Direction	Equipment	
		←	S1F13	Establish Communication Request
Establish Communications Request Acknowledge	S1F143	→		Reply COMMACK = Accept and Communication state = Communicating

4.1.2. Control State

① Change from EQP/EFEM to Online state

Host		Direction	Equipment	
Operator actuates ON-LINE switch when equipment OFF-LINE state is active.				
		←	S1F1	Are You There Request
Online Data	S1F2	→		
		←	S6F11	Event Report Send (Control State Changed To Online Local or Online Remote)
Event Report Acknowledge	S6F12	→		

① Change from EQP/EFEM to offline state

Host		Direction	Equipment	
		←	S6F11	Event Report Send

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				(Control State Changed To Offline)
Event Report Acknowledge	S6F12	→		

② Change from your EQP/EFEM to Online/Local or Online/Remote

Host		Direction	Equipment	
		←	S6F11	Event Report Send (Control State Changed To Online Local or Online Remote)
Event Report Acknowledge	S6F12	→		

③ Change a EQP/EFEM from Host to Offline

Host		Direction	Equipment	
Request Offline	S1F15	→		
		←	S1F16	Offline Acknowledge
		←	S6F11	Event Report Send (Control State Changed To Offline)
Event Report Acknowledge	S6F12	→		

④ Change EQP/EFEM from HOST to Online

Host		Direction	Equipment	
Request Online	S1F17	→		
		←	S1F18	Online Acknowledge
		←	S6F11	Event Report Send (Control State Changed To Online Local or Online Remote)
Event Report Acknowledge	S6F12	→		

③ Change a EQP/EFEM from Host to Online/Local or Online/Remote

Host		Direction	Equipment	
Host Command	S2F41	→		
		←	S2F42	Host Command Acknowledge
		←	S6F11	Event Report Send (Control State Changed To Online Local or Online Remote)
Event Report Acknowledge	S6F12	→		

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4.1.3. **Equipment Constant**

① Request the current Constant Value of equipment from HOST

Host		Direction	Equipment	
Equipment Constant Request	S2F13	→		
		←	S2F14	Equipment Constant Data

② Transmission of the Constant Value of Equipment from HOST

Host		Direction	Equipment	
New Equipment Constant Send	S2F15	→		
		←	S2F16	New Equipment Constant Acknowledge

③ Host Equipment Constantans Name list Request

Host		Direction	Equipment	
Host Constant Namelist Request	S2F29	→		
		←	S2F30	Equipment Constant Namelist

④ Operator changes the Equipment Constant value on the machine screen

Host		Direction	Equipment	
		←	S6F11	Event Report Send (Equipment Constant Change)
Event Report Acknowledge	S6F12	→		

① Operator creates, changes, and deletes machine screen Recipe

Host		Direction	Equipment	
		←	S6F11	Event Report Send (Process Program Change)
Event Report Acknowledge	S6F12	→		

4.1.4. **Data Collection**

① Host Request Collection Event Namelist

Host		Direction	Equipment	
Collection Event Namelist Request	S1F23	→		
		←	S1F24	Collection Event Namelist Reply

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② Host Request Data Variable Namelist

Host		Direction	Equipment	
Data Variable Namelist Request	S1F21	→		
		←	S1F22	Data Variable Namelist Reply

③ Host Request Equipment Status Data

Host		Direction	Equipment	
Selected Equipment Status Request	S1F3	→		
		←	S1F4	Selected Equipment Status Data

④ Host Request Equipment Status Variable Namelist.

Host		Direction	Equipment	
Status Variable Namelist Request	S1F11	→		
		←	S1F12	Status Variable Namelist Reply

⑤ Collection Event Report

Host		Direction	Equipment	
		←	S6F11	Event Report Send
Event Report Acknowledge	S6F12	→		

⑥ Dynamic Collection Event Setup

Host		Direction	Equipment	
Disable Event Report	S2F37	→		
		←	S2F38	Disable Event Report Acknowledge
Define Report (Delete)	S2F33	→		
		←	S2F34	Define Report Acknowledge
Define Report (Define)	S2F33	→		
		←	S2F34	Define Report Acknowledge
Link Event Report (Link)	S2F35	→		
		←	S2F36	Link Event Acknowledge
Enable Event Report	S2F37	→		
		←	S2F38	Enable Event Report Acknowledge

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⑦ Trace Data Collection

Host		Direction	Equipment	
Trace Initialize Send	S2F23	→		
		←	S2F24	Trace Initialize Acknowledge
		←	S6F1	Trace Data Send
		.	.	
		.	.	
		←	S6F1	Trace Data Send
Trace Initialize Send (TOTSMP=0)	S2F23	→		
		←	S2F24	Trace Initialize Acknowledge

4.1.5. **Alarm Scenario**

① Alarm Report

Host		Direction	Equipment	
		←	S5F1	Alarm Report Send
Alarm Report Acknowledge	S5F2	→		

② Alarm Enable/Disable

Host		Direction	Equipment	
Enable/Disable Alarm Send	S5F3	→		
		←	S5F4	Enable/Disable Alarm Acknowledge

4.1.6. **Process Program**

① Delete Process Program from Host

Host		Direction	Equipment	
Delete Process Program Send	S7F17	→		
		←	S7F18	Delete Process Program Acknowledge.

② Process Program Directory Request

Host		Direction	Equipment	
Current EPPD Request	S7F19	→		

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		←	S7F20	Current EPPD Data

③ Process Program Upload (Formatted)

Host		Direction	Equipment	
Formatted Process Program Request	S7F25	→		
		←	S7F26	Formatted Process Program Data

④ Process Program Download (Formatted)

Host		Direction	Equipment	
Formatted Process Program Send	S7F23	→		
		←	S7F24	Formatted Process Program Acknowledge
		←	S7F27	Process Program Verification Send
Process Program Verification Acknowledge	S7F28	→		

4.1.7. **Terminal Service**

① Displaying messages from Host on the appliance HMI

Host		Direction	Equipment	
Terminal Display	S10F3	→		
		←	S10F4	Terminal Display Acknowledge

② Enter Message from the appliance HMI and send it to Host

Host		Direction	Equipment	
		←	S10F1	Terminal Request
Terminal Request Acknowledge	S10F4	→		

4.2. Process Flow

4.2.1. **Overall Normal Process Flow**

4.2.2.

EFEM	Direction	Host	Direction	Equipment
Load port is empty				

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EFEM		Direction	Host			Direction	Equipment	
Ready To Load	S6F11	→						
		←	S6F12	Acknowledge				
Carrier Load by Operator or AGV								
Carrier Arrived	S6F11	→						
		←	S6F12	Acknowledge				
Carrier Clamped	S6F11	→						
		←	S6F12	Acknowledge				
Carrier ID Read & Slot Map	S6F11	→						
		←	S6F12	Acknowledge				
		←	S3F17	Carrier Action Request (ProceedWithCarrier)				
Acknowledge	S3F18	→						
Carrier ID & Slot Map Verification OK	S6F11	→						
		←	S6F12	Acknowledge				
				Process Job Create Request	S16F11/ S16F15	→		
						←	S16F12/ S16F16	Acknowledge
						←	S6F11	Process Job Queued
				Acknowledge	S16F12	→		
		←	S14F9	Create Control Job	S14F9	→		
Acknowledge	S14F10	→				←	S14F10	Acknowledge
Control Job Created	S6F11	→				←	S6F11	Control Job Created
		←	S6F12	Acknowledge	S6F12	→		
Control Job Created	S6F11	→						
		←	S6F12	Acknowledge				
		←	S16F27	Control Job Command(CJStart)				
Acknowledge	S16F28	→						

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EFEM		Direction	Host			Direction	Equipment	
						←	S6F11	Process Job Select
				Acknowledge	S6F12	→		
Carrier Access In	S6F11	→						
		←	S6F12	Acknowledge				
						←	S6F11	Process Job Execute
				Acknowledge	S6F12	→		
			Glass 가 공정을 시작한 경우					
						←	S6F11	Glass Start
				Acknowledge	S6F12	→		
			Process Module 수만큼 Event 발생					
						←	S6F11	Process Module Start
				Acknowledge	S6F12	→		
			Recipe Step 수만큼 Event 발생					
						←	S6F11	Recipe Step Start
				Acknowledge	S6F12	→		
						←	S6F11	Recipe Step End (With Process Data)
				Acknowledge	S6F12	→		
						←	S6F11	Process Module End (With Process Data)
				Acknowledge	S6F12	→		
						←	S6F11	Glass End (With Process Data)
				Acknowledge	S6F12	→		
						←	S6F11	Process Job Completed
				Acknowledge	S6F12	→		
Control Job Completed	S6F11	→						
		←	S6F12	Acknowledge				
Carrier 에 마지막 Glass 가 도착한 경우								
Carrier Access End	S6F11	→						

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EFEM		Direction	Host			Direction	Equipment	
		←	S6F12	Acknowledge				
Ready To Unload	S6F11	→						
		←	S6F12	Acknowledge				
Carrier Unload by Operator or AGV								
Carrier Removed	S6F11	→						
		←	S6F12	Acknowledge				
Ready To Load	S6F11	→						
		←	S6F12	Acknowledge				

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4.2.3. **Abnormal Process Flow**

Abnormal Case is defined by the equipment supplier to create and submit a Process Flow

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5. General Vendor Requirements

5.1. Equipment-specific communication specifications

① After the publication of the absolics inc equipment interface standard specification, a briefing session will be held for the equipment supplier.

② The detailed communication specifications for each equipment will be finalized after the equipment operation scenario consultation meeting that takes place after the order.

③ Equipment suppliers should attend an Interface specification meeting led by absolics inc engineers.

5.2. Device-specific Interface communication specifications

① After the communication specifications are finalized, the absolics inc engineer will be consulted on a schedule to conduct pre- and post-import testing.

② Pre-import testing can be carried out via Simulator, but post-import testing must be carried out in the actual state of operation of the equipment.

③ Post-import testing of the equipment must be attended by both the S/W and H/W engineers of the equipment supplier and is conducted by the absolics inc business and the host fence engineer.

④ After the equipment is brought in, the I/O, driven, communication test inside the equipment before the test must be completed in advance.

⑤ In principle, mass production transfer is not possible after the equipment is brought in and before the completion of the test unless otherwise requested by absolics inc.

⑥ The final inspection of the equipment will reflect the test results between the equipment and the Host.

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Appendix

① Data Collection Items

Item	Units/Figures	Notation example

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