**absolicsinc**

**Check Sheet for**

**SECS/HSMS InterfaceSpecification**

**SVM Smart factory 구축**

**Version 0.2**

**2022-05-17**

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**사 용 권 한**

본 문서에 대한 서명은 absolicsinc내부에서 본 문서에 대하여 수행 및 유지관리의 책임이 있음을 인정하는 것임.

*본 문서는 작성, 검토, 승인하여 승인된 원본을 보관한다...*

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본인은 서명으로써 본 문서가 absolicsinc의 업무활동 범위 내에서 사용될 것을 인가함.

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**제.개정 이력**

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# Overview

## Definition

본 문서는 기존 “General SECS/HSMS Interface Specification”사양서의 내용을 포함하고 있으며,이 문서의 요구 사항은 SEMI 표준을 기반으로 한다.

본 문서의 요구사항은 SEMI에서 정의한 기능의 세부적인 방법을 정의하고 장비 공급사가 이에 대응하는 능력을 확인하고자 하는데 목적이 있다. 상세하게 기술되지 않거나 이해되지 않는 기능에 대해서는 SEMI 표준 문서를 기반으로 기능이 제공되어야 한다.

장비와Host간의 모든 통신 Message 및 Data 형식은 입고전에 장비 공급사 엔지니어가 Test하고 확인해야 한다. 장비 S/W 설치 시 담당 엔지니어는 Absolicinc에 상주하여 지원을 해야 하며,Absolicinc가 요청하는 경우 장비 공급사는 SECS/HSMS에 대한 Data 및 기술 지원을 제공해야 한다

장비 공급사는 개정된 문서 또는 장비의 S/W 기능에 대한 정보를 S/W가 개정될 때마다 제공해야 하며 Check List를 작성하여 확인한 결과를 사전에 제공해야 한다. SECS/HSMS Log는 장비 Simulator에 의해 작성되어서는 안 되며, 실제 장비와 호스트(Simulator) 간의 직접 Interface에 의해 작성되어야 한다.

장비 공급자는Absolicinc와 SECS/HSMS 사양 회의가 있을 때 본 문서에 대한 세부내용를 제공해야 한다.

## SEMI Referenced Document

### 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)

### Equipment Performance Management

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

### 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)

### Substrate Level Data collection

* + SEMI E90 Specification for Substrate Tracking (STS)

# Automation Requirements Specification

## Base Functionality Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Item | Reply | Remark |
| EFEM Type | Fixed buffer or Internal buffer? | **Fixed Buffer** |  |
| Unit Cycle Size | Single Glass | **Single Glass** |  |
| N Carrier Batch | **No** |  |
| 1 Carrier M GlassBatch | **No** |  |
| Port 구성 | BP, In/Out Port | **BP, In/Out Port** | **Load Port 존재 안함** |
| BP Port 수 | **N/A** |  |
| In Port 수 | **N/A** |  |
| Out Port 수 | **N/A** |  |
| Carrier Clamping | Clamping 여부 및 Clamping 시점 | **N/A** |  |
| Carrier ID Type | BCR or RF Read/Write | **N/A** |  |
| Carrier Delivery & Pickup | Automatic or Manual | **Automatic** |  |
| Access Mode Change | 변경불가 제약조건 존재 여부 | **변경불가** |  |
| Carrier ID Verify | Host or Equipment | **Host, Equipment** |  |
| Load Port Reservation | Bind or Reserve | **N/A** | **Load Port 존재 안함** |
| Slot Map | Slot Status 종류 | **N/A** |  |
| Slot Map Verify | Host or Equipment? | **N/A** |  |
| Substrate Tracking | SEMI E90 Compliance? | **Yes** |  |
| Glass ID Reader | Glass ID Reading여부 및 Reading 시점 | **N/A** |  |
| Process Job/Control Job Creation | Port에 Carrier 도착 전 또는 도착 후 | **N/A** |  |
| Process Job/Control Job Usage | 1 Process 1 Carrier | **N/A** | **Glass 만 존재** |
| 1 Process M Carrier | **N/A** |  |
| N Process 1 Carrier | **N/A** |  |
| N Process M Carrier | **N/A** |  |
| Slot별 Process Control | Slot별 Recipe Parameter Value 변경 가능 여부 | **변경 가능 ( 단 기존 래시피 적용 Glass가 다 빠져 나간 후 다음 래시피 적용하고 Glass 반입함)** | **모터 속도 변경은 일부분만 적용이 아니라 전부 바껴야 함** |
| Glass Capacity Check | Glass Counts | **Yes** |  |

## HSMS

### HSMS Protocol

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Specification | Reply | Remark |
| Standard | * HSMS Generic Service   + SEMI E37 | **Yes (E37)** |  |
| * HSMS Single-Selected Session   + Mode (HSMS-SS) - SEMI E37.1 | **Yes (E37.1)** |  |
| Connection | * TCP/IP Ethernet (IEEE 802.3).   + RJ-45 Connector | **Yes (RJ-45)** |  |

### HSMS State

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Specification | Reply | Remark |
| State | * TCP/IP Not Connected | **Yes** |  |
| * TCP/IP Connected   + HSMS Not Selected   + HSMS Selected | **Yes** |  |
| State Transition | * TCP/IP Ethernet (IEEE 802.3).   + RJ-45 Connector * SEMI E37.1 (HSMS-SS)참조   + HSMS-SS Connection Diagram   + Communication State Transition (Passive Mode) | **Yes (Passive Mode)** |  |

### Establish TCP/IP Connection & Consideration

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Specification | Reply | Remark |
| State | * TCP/IP Not Connected | **Yes** |  |
| State Transition | * TCP/IP Ethernet (IEEE 802.3).   + RJ-45 Connector * SEMI E37.1 (HSMS-SS)참조   + HSMS-SS Connection Diagram   + Communication State Transition (Passive Mode) | **Yes (Passive Mode)** |  |
| Procedure | * SEMI E37 (HSMS) &E37.1 (HSMS-SS)참조   + Connection Procedure | **Yes** |  |
| Consideration | * SEMI E37 (HSMS)참조   + General Considerations   + TCP/IP Considerations   + SECS-II Considerations   + HSMS-Specific Considerations * SEMI E37.1 (HSMS-SS)참조   + Special Considerations | **Yes** |  |

### HSMS Parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Value Range | Typical Value(s) | Description | Reply | Remark |
| T3 | 1 – 120 | 45 | Reply Timeout | **Yes** |  |
| T5 | 1 – 240 | 10 | Connection Separation Timeout | **Yes** |  |
| T6 | 1 – 240 | 5 | Control Transaction Timeout | **Yes** |  |
| T7 | 1 – 240 | 10 | Not Selected Timeout | **Yes** |  |
| T8 | 1 – 240 | 5 | Network Inter Character Timeout | **Yes** |  |
| Connect Mode | Passive / Active | | Connection Mode | **Passive** |  |
| Local Entity IP Address & Port Number | | | Required for any entity operating in PASSIVE mode. | **192.168.200.100**  **4000** |  |
| Remote Entity IP Address & Port Number | | | Required for any entity operating in ACTIVE mode. | **N/A** |  |

### HSMS Functionality

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Requirements | Reply | Remark |
| Parameter Apply Timing | 변경 시 장비(장비 PC)를 Reboot하지 않더라도 즉시 변경된 내용이 반영 | **Yes** | **EC로 등록** |
| HSMS Connection Port | 장비의 바깥에 위치해야 하며, Host Network에 쉽게 연결이 가능 | **Yes** |  |

## SECS-II & GEM

### GEM Compliance

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Requirements | Reply | Remark |
| Fundamental  GEM | State Model | **Yes** |  |
| Equipment processing States | **Yes** |  |
| Host Initiated S1, F13/F14 Scenario | **Yes** |  |
| Event Notification | **Yes** |  |
| On-Line Identification | **Yes** |  |
| Error Message | **Yes** |  |
| Documentation | **Yes** |  |
| Control (Operator Initiated) | **Yes** |  |
| Additional Capabilities | Establish Communications | **Yes** |  |
| Dynamic Event Report Configuration | **Yes** |  |
| Variable Data Collection | **Yes** |  |
| Trace Data Collection | **Yes** |  |
| Status Data Collection | **Yes** |  |
| Alarm Management | **Yes** |  |
| Remote Control | **Yes** |  |
| Equipment Constants | **Yes** |  |
| Process Program Management | **Yes** |  |
| Material Movement | **No** |  |
| Equipment Terminal Services | **Yes** |  |
| Clock | **Yes** |  |
| Limits Monitoring | **N/A** |  |
| Spooling | **N/A** |  |
| Control (Host Initiated) | **Yes** |  |

### SECS-II Message

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S/F | Direction | Description | Reply | Remark |
| SX F0 | H↔ E | Abort Transaction | **Yes** |  |
| S1 F1 | H ↔ E | Are You There Request | **Yes** |  |
| S1 F2 | H ↔ E | Online Data | **Yes** |  |
| S1 F3 | H → E | Selected Equipment Status Request | **Yes** |  |
| S1 F4 | H ← E | Selected Equipment Status Data | **Yes** |  |
| S1 F11 | H → E | Status Variable Name List Request | **Yes** |  |
| S1 F12 | H ← E | Status Variable Name List Data | **Yes** |  |
| S1 F13 | H ↔ E | Establish Communication Request | **Yes** |  |
| S1 F14 | H ↔ E | Establish Communications Request Acknowledge | **Yes** |  |
| S1 F15 | H → E | Request OFF-LINE | **Yes** |  |
| S1 F16 | H ← E | OFF-LINE Acknowledge | **Yes** |  |
| S1 F17 | H → E | Request ON-LINE | **Yes** |  |
| S1 F18 | H ← E | ON-LINE Acknowledge | **Yes** |  |
| S1 F21 | H → E | Data Variable Namelist Request | **Yes** |  |
| S1 F22 | H ← E | Data Variable NamelistData | **Yes** |  |
| S1 F23 | H → E | Collection Event Namelist Request | **Yes** |  |
| S1 F24 | H ← E | Collection Event NamelistData | **Yes** |  |
| S2 F13 | H → E | Equipment Constant Request | **Yes** |  |
| S2 F14 | H ← E | Equipment Constant Data | **Yes** |  |
| S2 F15 | H → E | New Equipment Constant Send | **Yes** |  |
| S2 F16 | H ← E | New Equipment Constant Acknowledge | **Yes** |  |
| S2 F17 | H ↔ E | Date and Time Request | **Yes** |  |
| S2 F18 | H ↔ E | Data and Time Data | **Yes** |  |
| S2 F23 | H → E | Trace Initialize Send | **Yes** |  |
| S2 F24 | H ← E | Trace Initialize Acknowledge | **Yes** |  |
| S2 F25 | H → E | Loopback Diagnostic Request | **Yes** |  |
| S2 F26 | H ← E | Loopback Diagnostic Data | **Yes** |  |
| S2 F29 | H → E | Equipment Constant Namelist Request | **Yes** |  |
| S2 F30 | H ← E | Equipment Constant Namelist | **Yes** |  |
| S2 F31 | H → E | Date and Time Set Request | **Yes** |  |
| S2 F32 | H ← E | Data and Time Set Acknowledge | **Yes** |  |
| S2 F33 | H → E | Define Report | **Yes** |  |
| S2 F34 | H ← E | Define Report Acknowledge | **Yes** |  |
| S2 F35 | H → E | Link Event Report | **Yes** |  |
| S2 F36 | H ← E | Link Event Report Acknowledge | **Yes** |  |
| S2 F37 | H → E | Enable/Disable Event Report | **Yes** |  |
| S2 F38 | H ← E | Enable/Disable Event Report Acknowledge | **Yes** |  |
| S2 F41 | H → E | Host Command Send | **Yes** |  |
| S2 F42 | H ← E | Host Command Acknowledge | **Yes** |  |
| S2 F43 | H → E | Reset Spooling Streams and Functions | **N/A** |  |
| S2 F44 | H ← E | Reset Spooling Acknowledge | **N/A** |  |
| S2 F45 | H → E | Define Variable Limit Attributes | **N/A** |  |
| S2 F46 | H ← E | Variable Limit Attributes Acknowledge | **N/A** |  |
| S2 F49 | H → E | Enhanced Remote Command | **N/A** |  |
| S2 F50 | H ← E | Enhanced Remote Command Acknowledge | **N/A** |  |
| S3 F17 | H → E | Carrier Action Request | **N/A** |  |
| S3 F18 | H ← E | Carrier Action Acknowledge | **N/A** |  |
| S3 F21 | H → E | Port Group Definition | **N/A** |  |
| S3 F22 | H ← E | Port Group Definition Acknowledge | **N/A** |  |
| S3 F23 | H → E | Port Group Action Request | **N/A** |  |
| S3 F24 | H ← E | Port Group Action Acknowledge | **N/A** |  |
| S3 F25 | H → E | Port Action Request | **N/A** |  |
| S3 F26 | H ← E | Port Action Acknowledge | **N/A** |  |
| S3 F27 | H → E | Change Access | **N/A** |  |
| S3 F28 | H ← E | Change Access Acknowledge | **N/A** |  |
| S5 F1 | H ← E | Alarm Report Send | **Yes** |  |
| S5 F2 | H → E | Alarm Report Acknowledge | **Yes** |  |
| S5 F3 | H → E | Enable/Disable Alarm Send | **Yes** |  |
| S5 F4 | H ← E | Enable/Disable Alarm Acknowledge | **Yes** |  |
| S5 F5 | H → E | List Alarm Request | **Yes** |  |
| S5 F6 | H ← E | List Alarm Data | **Yes** |  |
| S6 F1 | H ← E | Trace Data Send | **Yes** |  |
| S6 F2 | H → E | Trace Data Acknowledge | **Yes** |  |
| S6 F11 | H ← E | Event Report Send | **Yes** |  |
| S6 F12 | H → E | Event Report Acknowledge | **Yes** |  |
| S6 F15 | H → E | Event Report Request | **Yes** |  |
| S6 F16 | H ← E | Event Report Data | **Yes** |  |
| S6 F23 | H → E | Request Spooled Data | **N/A** |  |
| S6 F24 | H ← E | Request Spooled Data Acknowledge | **N/A** |  |
| S7 F17 | H → E | Delete Process Program Send | **Yes** |  |
| S7 F18 | H ← E | Delete Process Program Acknowledge | **Yes** |  |
| S7 F19 | H → E | Current EPPD Request | **Yes** |  |
| S7 F20 | H ← E | Current EPPD Data | **Yes** |  |
| S7 F23 | H ↔ E | Formatted Process Program Send | **Yes** |  |
| S7 F24 | H ↔ E | Formatted Process Program Acknowledge | **Yes** |  |
| S7 F25 | H ↔ E | Formatted Process Program Request | **Yes** |  |
| S7F26 | H ↔ E | Formatted Process Program Data | **Yes** |  |
| S7 F27 | H ← E | Process Program Verification Send | **No** |  |
| S7 F28 | H → E | Process Program Verification Acknowledge | **No** |  |
| S9 F1 | H ← E | Unrecognized Device ID | **Yes** |  |
| S9 F3 | H ← E | Unrecognized Stream Type | **Yes** |  |
| S9 F5 | H ← E | Unrecognized Function Type | **Yes** |  |
| S9 F7 | H ← E | Illegal Data | **Yes** |  |
| S9 F9 | H ← E | Transaction Timer Timeout | **Yes** |  |
| S9 F11 | H ← E | Data Too Long | **Yes** |  |
| S9 F13 | H ← E | Conversation Timeout | **N/A** |  |
| S10 F1 | H ← E | Terminal Request | **No** |  |
| S10 F2 | H → E | Terminal Request Acknowledge | **No** |  |
| S10 F3 | H → E | Terminal Display, Single | **Yes** |  |
| S10 F4 | H ← E | Terminal Display, Single Acknowledge | **Yes** |  |
| S10 F5 | H → E | Terminal Display, Multi-Block | **No** |  |
| S10 F6 | H ← E | Terminal Display, Multi-Block Acknowledge | **No** |  |
| S14 F1 | H ↔ E | GetAttr Request | **N/A** |  |
| S14 F2 | H ↔ E | GetAttr Data | **N/A** |  |
| S14 F3 | H ↔ E | SetAttr Request | **N/A** |  |
| S14 F4 | H ↔ E | SetAttr Data | **N/A** |  |
| S14 F5 | H ↔ E | GetType Request | **N/A** |  |
| S14 F6 | H ↔ E | GetType Data | **N/A** |  |
| S14 F7 | H ↔ E | GetAttrName Request | **N/A** |  |
| S14 F8 | H ↔ E | GetAttrName Acknowledge | **N/A** |  |
| S14 F9 | H ↔ E | Create Object Request | **N/A** |  |
| S14 F10 | H ↔ E | Create Object Acknowledge | **N/A** |  |
| S14 F11 | H ↔ E | Delete Object Request | **N/A** |  |
| S14 F12 | H ↔ E | Delete Object Acknowledge | **N/A** |  |
| S16 F5 | H → E | Process Job Command Request | **N/A** |  |
| S16 F6 | H ← E | Process Job Command Acknowledge | **N/A** |  |
| S16 F7 | H ← E | Process Job Alert Notify | **N/A** |  |
| S16 F8 | H ← E | Process Job Alert Confirm | **N/A** |  |
| S16 F9 | H ← E | Process Job Event Notify | **N/A** |  |
| S16 F10 | H ← E | Process Job Event Confirm | **N/A** |  |
| S16 F11 | H → E | PRJobCreateEnh | **N/A** |  |
| S16 F12 | H ← E | PRJobCreateEnh Acknowledge | **N/A** |  |
| S16 F13 | H → E | PRJobDuplicateCreate | **N/A** |  |
| S16 F14 | H ← E | PRJobDuplicateCreateAcknowledge | **N/A** |  |
| S16 F15 | H → E | PRJobMultiCreate | **N/A** |  |
| S16 F16 | H ← E | PRJobMultiCreate Acknowledge | **N/A** |  |
| S16 F17 | H → E | PRJobDequeue | **N/A** |  |
| S16 F18 | H ← E | PRJobDequeue Acknowledge | **N/A** |  |
| S16 F19 | H → E | PRGetAllJobs | **N/A** |  |
| S16 F20 | H ← E | PRGetAllJobs Send | **N/A** |  |
| S16 F21 | H → E | PRGetSpace | **N/A** |  |
| S16 F22 | H ← E | PRGetSpace Send | **N/A** |  |
| S16 F23 | H → E | PRJobSetRecipeVariable | **N/A** |  |
| S16 F24 | H ← E | PRJobSetRecipeVariable Acknowledge | **N/A** |  |
| S16 F25 | H → E | PRJobSetStartMethod | **N/A** |  |
| S16 F26 | H ← E | PRJobSetStartMethod Acknowledge | **N/A** |  |
| S16 F27 | H → E | Control Job Command Request | **N/A** |  |
| S16 F28 | H ← E | Control Job Command Acknowledge | **N/A** |  |

### Equipment Communication Model

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Communication | | Sub-State | Reply | Remark |
| Disabled |  |  | **Yes** |  |
| Enabled | Communicating |  | **Yes** |  |
| Not Communicating | Wait CR From Host | **Yes** |  |
| Wait Delay | **Yes** |  |
| Wait CRA | **Yes** |  |

\* CR :Communication Request

\* CRA :Communication Request Acknowledge

### Equipment Control Mode & Data Collection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Control State Mode | | Access Mode | AMHS | Data Collection | Reply | Remark |
| Online | Local | Manual | Not Use | Yes | **Yes** |  |
| Remote | Auto | Use | Yes | **Yes** |  |
| Manual | Not Use | Yes | **Yes** |  |
| Offline | Host Off-Line | Manual | Not Use | No | **Yes** |  |
| Attempt On-Line | Manual | Not Use | No | **Yes** |  |
| Equipment Off-Line | Manual | Not Use | No | **Yes** |  |

### Control State of Equipment(System)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mode | Description | S/F | Reply | Remark |
| Offline | Host에서 장비 Control State를 Offline 으로전환 | **S1F15** | **S1F16** | **0: OFF-LINE Acknowledge**  **1-63: Reserved** |
| Online | Host에서 장비 Control State를 Online으로 전환 | **S1F17** | **S1F18** | **0: ON-LINE Accepted**  **1: ON-LINE Not Allowed**  **2: Equipment Already ON-LINE**  **3-63: Reserved** |
| Online-Local | Host에서 장비 Control State를 Online-Local로 전환 |  | **N/A** | **설비에서 변경** |
| Online-Remote | Host에서 장비 Control State를 Online-Remote로 전환 |  | **N/A** | **설비에서 변경** |

### Port Access Mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mode | Description | S/F | Reply | Remark |
| Auto | Port Access Mode를 Auto로 전환 |  | **N/A** | **Load Port 존재 안함** |
| Manual | Port Access Mode를 Manual로 전환 |  | **N/A** |  |

### Remote Command

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Command | Description | S/F | Reply | Remark |
| Start | Job Start |  | **N/A** |  |
| Stop | Equipment / Process Module / Unit |  | **N/A** |  |
| Pause | Equipment / Process Module / Unit | **S2F41** | **S2F42** | **PAUSE** |
| Abort | Equipment / Process Module / Unit |  | **N/A** |  |
| Cancel | Equipment / Process Module / Unit |  | **N/A** |  |
| Hold | Equipment / Process Module / Unit |  | **N/A** |  |
| Resume | Equipment / Process Module / Unit | **S2F41** | **S2F42** | **RESUME** |
| Buzzer | On/Off | **S2F41** | **S2F42** | **BUZZER** |
| Signal Tower | On, Off, Blink / Color | **S2F41** | **S2F42** | **SIGNAL\_TOWER** |
| 추가 제공하는 Command | **PPSELECT** | **S2F41** | **S2F42** | **PPSELECT** |

## Data Collection

### Compliance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Events | CEID | Reply | Remark |
| Mode | Control State Remote | **1003** |  |  |
| Control State Local | **1002** |  |  |
| Equipment Offline | **1001** |  |  |
| Operator Command Issued | **N/A** |  |  |
| Processing-Lot | Processing Start | **N/A** |  | **Lot의 Processing 관리 안함** |
| Processing Completed | **N/A** |  |  |
| Processing Stopped | **N/A** |  |  |
| Processing State Changed | **N/A** |  |  |
| Processing-Glass | Glass Processing Start | **No** |  |  |
| Glass Processing Completed | **No** |  |  |
| Glass Processing Stopped | **No** |  |  |
| Glass Processing State Changed | **No** |  |  |
| Transfer | Glass In to Carrier | **N/A** |  | **EFEM에서 발생** |
| Glass Out from Carrier | **N/A** |  | **상동** |
| Glass In to Process Module | **1201** |  | **SubstrateLocationOccupied** |
| Glass Out from Process Module | **1202** |  | **SubstrateLocationUnoccupied** |
| Glass Transfer Start | **1101** |  | **ModuleStart** |
| Glass Transfer End | **1102** |  | **ModuleEnd** |
| Alarm | Alarm Detected | **1031** |  |  |
| Alarm Cleared | **1032** |  |  |
| Process Program | Process Program Changed | **1071** |  |  |
| Process Program Selected | **1072** |  |  |
| New Execution Recipe Name | **Yes** |  |  |
| New Execution Recipe Status | **Yes** |  |  |
| Executing Recipe Name | **Yes** |  |  |
| Executing Recipe Status | **Yes** |  |  |
| Execution Recipe Change Event | **Yes** |  |  |
| Successful Upload | **Yes** |  |  |
| Fail Upload | **Yes** |  |  |
| Successful Download | **Yes** |  |  |
| FailDownload | **Yes** |  |  |
| Material | Material Arrived | **N/A** |  |  |
| Material Removed | **N/A** |  |  |
| Material Transferred | **N/A** |  |  |
| Spool | Spooling Activated | **N/A** |  |  |
| Spooling Deactivated | **N/A** |  |  |
| Spool Transmit Failure | **N/A** |  |  |
| All SVID Req. | S1F11/F12. Host sends L:0 to request all SVIDs. | **Yes** |  | **L0로 모든 SV보고 가능** |
| All DVID Req. | S1F21/F22. Host sends L:0 to request all DVIDs. | **Yes** |  | **L0로 모든 DV보고 가능** |
| All CEID Req. | S1F23/24. Host sends L:0 to imply all CEIDs. | **Yes** |  | **L0로 모든 CEID보고 가능** |

### Event Reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event | Description | CEID | Related VID | Remark |
| Process Job Start | ProcessJob 시작 | **N/A** |  | **PJ/CJ 없음** |
| Process Job End | ProcessJob 종료 | **N/A** |  | **PJ/CJ 없음** |
| Control Job Start | ControlJob시작 | **N/A** |  | **PJ/CJ 없음** |
| Control Job End | ControlJob종료 | **N/A** |  | **PJ/CJ 없음** |
| Process Start | Lot의 첫번째 Glass가 시작 | **1301** | **310, 311, 312, 313, 314, 315, 316** | **GlassStart** |
| Process Completed | Lot의 마지막 Glass가 종료 | **1302** | **310, 311, 312, 313, 314, 315, 316** | **GlassEnd** |
| Glass Start | Glass가 Process Module에서 시작 | **1311** | **310, 311, 312, 313, 314, 315, 316** | **GlassStartEach** |
| Glass End | Glass가 Process Module에서 종료 | **1312** | **310, 311, 312, 313, 314, 315, 316** | **GlassEndEach** |
| Process Module Start | Process Module에서 시작 | **N/A** |  |  |
| Process Module End | Process Module에서 종료 | **N/A** |  |  |
| Recipe Step Start | Glass가 특정 Recipe Step 시작 | **N/A** |  | **시간적 Step이 아닌 공간적 Step 임** |
| Recipe Step End | Glass가 특정 Recipe Step 종료 | **N/A** |  | **공간적 Recipe Step** |
| Carrier Access Start | Carrier에서 Glass 반출 | **N/A** |  | **EFEM에 해당함** |
| Carrier Access End | Carrier에 Glass 반입 | **N/A** |  | **EFEM에 해당함** |
| Recipe Created | 신규 Recipe 생성 | **1071** | **307, 308** |  |
| Recipe Modified | Recipe 수정 | **1071** | **307, 308** |  |
| Recipe Deleted | Recipe 삭제 | **1071** | **307, 308** |  |
| Data Collection | Glass/Lot 종료시 각 Recipe Step에 대한 공정 진행 Data | **1401** | **310, 311, 312, 313, 314, 315, 316, 321** | **엑셀에 작성** |

### Trace Data Collection

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Requirements | Reply | Remark |
| 기본 정보 | TRID별 500Parameter/0.5초 | **Yes** | **성능 문제없음** |
| 최소 4개 이상의 TRID 제공 | **Yes** |  |
| 0.1초 단위 Trace Data 제공 | **Yes** | **Trace Data 필요할 경우** |
| TRID별 제공 가능한 SVID Count | **Yes** | **Trace Data 필요할 경우** |
| H/W변경 없이 SVID추가시 무상으로 추가 | **Yes** |  |
| DSPER Format | **hhmmss** |  |
| 안정성 | Trace Data 수집시Operation 및 Processing에 대한 안정성 | **Yes** |  |
| Functionality | S6F1 제공 | **Yes** |  |
| S6F2 사용 여부 설정 (ECID 이용) | **Yes** | **ECID에 따라서 noreply로 전환** |
| TOTSMP를 무한대로 설정 | **Yes** | **무한대 설정시 설비 Off될때까지 발생함** |
| DV 수집 가능 여부 | **No** | **SVID 로 수집 가능** |
| Key Parameter 관련 SVID  장비, Process Module별 Lot ID, Carrier ID, Glass ID, Slot No, Recipe, Recipe Step, | **Yes** | **협의 후 결정** |

## Recipe Management

### General Recipe Control

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Specifications | Reply | Remark |
| Recipe Format | Formatted Process Program 지원 | **Yes** |  |
| Upload | Full PPBody Upload | **Yes** |  |
| Partial PPBody Upload | **No** |  |
| Download | Full PPBody Download | **Yes** |  |
| Partial PPBodyDownload | **No** |  |
| Current PPID List Request | PPID List Request/Reply | **Yes** |  |
| Process Program Time Req. | Recipe Created date-time Request/Reply | **No** |  |
| Recipe Updated date-time Request/Reply | **No** |  |
| Recipe History & Version Control | **No** |  |
| Process Program 존재 확인 | Upload/Download시 Recipe 존재 확인 | **No** |  |
| Event | CREATE | **Yes** |  |
| UPDATE | **Yes** |  |
| DELETE | **Yes** |  |

### Recipe ControlReliability

|  |  |  |  |
| --- | --- | --- | --- |
| Items | Specifications | Reply | Remark |
| Recipe Download | PPBodyDownload 가능 시점  (Processing중일 때 Download) | **Yes** |  |
| 신규 Recipe Download  Download불가/신규 Recipe 생성 | **Yes** |  |
| 기존 Recipe Download  Download불가/기존 Recipe Delete & Create/기존 Recipe Update & Version 관리 | **Yes** |  |
| Recipe Delete | Recipe Delete 가능 시점  (Processing중일 때 Delete) | **TDB** |  |

## Carrier Management

### CMS Support (Refer to E87, E109)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | Section | Reply | Remark |
| Statement | Load Port Numbering | 9.2 | **N/A** | **Load Port 존재 안함** |
| Carrier Slot Numbering | 9.3 | **N/A** |  |
| Load Port Transfer State Model | 9.5~9.5.4 | **N/A** |  |
| Carrier Object Implementation | 10 | **N/A** |  |
| Load Port Reservation State Model (Internal Buffer Equipment) | 12 | **N/A** |  |
| Load Port / Carrier Association State Model | 13 | **N/A** |  |
| Carrier ID Verification Support | 13 | **N/A** |  |
| Slot Map Verification Support | 14.2 | **N/A** |  |
| Services Implementation | 14.3 | **N/A** |  |
| Additional Events Implementation | 16 | **N/A** |  |
| Variable data Definitions | 18 | **N/A** |  |
| Alarms Implementation | 19 | **N/A** |  |
| LoadPort Reservation State Mode | 12, 20 | **N/A** |  |
| Reservation Visible Signal | 12.2 | **N/A** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | S/F | Reply | Remark |
| ServicesMessage | Bind |  | **N/A** | **Load Port 존재 안함** |
| CancelBind |  | **N/A** |  |
| CancelAllCarrierOut |  | **N/A** |  |
| CancelCarrier |  | **N/A** |  |
| CancelCarrierAtPort |  | **N/A** |  |
| CancelCarrierNotification |  | **N/A** |  |
| CancelCarrierOut |  | **N/A** |  |
| CancelReservationAtPort |  | **N/A** |  |
| CarrierIn |  | **N/A** |  |
| CarrierNotification |  | **N/A** |  |
| CarrierOut |  | **N/A** |  |
| CarrierReCreate |  | **N/A** |  |
| CarrierRelease |  | **N/A** |  |
| CarrierTagReadData |  | **N/A** |  |
| CarrierTagWriteData |  | **N/A** |  |
| ChangeAcess |  | **N/A** |  |
| ChangeServiceStatus |  | **N/A** |  |
| ProcessWithCarrier |  | **Yes** |  |
| ReserveAtPort |  | **N/A** |  |

### Load Port Actuating State

|  |  |  |  |
| --- | --- | --- | --- |
| State Name | CEID | Reply | Remark |
| Occupied | **N/A** |  | **Load Port 존재 안함** |
| UnOccupied | **N/A** |  |  |
| Clamped | **N/A** |  |  |
| Unclamped | **N/A** |  |  |
| Docked | **N/A** |  |  |
| Undocked | **N/A** |  |  |
| PortSensorOn(Placement) | **N/A** |  |  |
| PortSensorOff(Presence) | **N/A** |  |  |

### Load Port Alarm Event

|  |  |  |  |
| --- | --- | --- | --- |
| Alarm Name | ALID | Reply | Remark |
| PIO Failure | **N/A** |  | **Load Port 존재 안함** |
| Access Mode Violation | **N/A** |  |  |
| Carrier Presence Sensor Error | **N/A** |  |  |
| Carrier Placement Sensor Error | **N/A** |  |  |
| Carrier ID Read Failure | **N/A** |  |  |
| Carrier ID Verification Failure | **N/A** |  |  |
| Carrier Dock Failure | **N/A** |  |  |
| Carrier Undock Failure | **N/A** |  |  |
| Carrier Clamped Failure | **N/A** |  |  |
| Carrier Unclamped Failure | **N/A** |  |  |
| Carrier Removal Error | **N/A** |  |  |
| Slot Map Read Failure | **N/A** |  |  |
| Slot Map Verification Failure | **N/A** |  |  |
| Duplicated Carrier ID | **N/A** |  |  |
| Internal Buffer Move Failure | **N/A** |  |  |
| Attempt To use out of Service Load Port | **N/A** |  |  |

## Process Job & Control Job

### Process Job(E40)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | Section | Reply | Remark |
| Fundamental | Single Process Job Execution | 8.2 | **N/A** | **PJ 사용안함** |
| Process Job Failure Indication | 8.2.1.7 | **N/A** |  |
| Abort Command | 8.2.3.2 | **N/A** |  |
| Process Job Object Implementation | 8.3,9 | **N/A** |  |
| Reject Invalid/Incomplete Parameters | 8.2.1.2.1 | **N/A** |  |
| Reject Unsupported Capabilities | 11.2 | **N/A** |  |
| Services Implementation (not per Additional) | 10 | **N/A** |  |
| Partial, Order Process Option in PRJOB | 8.2.1.2 | **N/A** |  |
| Additional Function | Process Job Control Message | 8.2.1 | **N/A** |  |
| Stop, Pause and Resume Commands | 8.2.2.3,4,5 | **N/A** |  |
| Manual Process Start | 8.2.3.9 | **N/A** |  |
| Process Job Queuing | 8.3 | **N/A** |  |
| Process Tuning | 7.5, 10.4.9 | **N/A** |  |
| Process of Material Groups | 7.6 | **N/A** |  |
| Multiple Concurrent Process Jobs | 7.7 | **N/A** |  |
| Multiple Consecutive Process Jobs | 7.8 | **N/A** |  |
| Process Job With No Material | 7.9 | **N/A** |  |
| Event Notification | 8.2.2 | **N/A** |  |
| Enhanced Job Creation | 10.4.2 | **N/A** |  |
| Multiple Job Creation | 10.4.3 | **N/A** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | S/F | Reply | Remark |
| ServicesMessage | PRJobCreate |  | **N/A** | **PJ 사용안함** |
| PRJobCommand |  | **N/A** |  |
| PRJobAlert |  | **N/A** |  |
| PRJobEvent |  | **N/A** |  |
| PRJobCreateEnh |  | **N/A** |  |
| PRJobDuplicateCreate |  | **N/A** |  |
| PRJobMultiCreate |  | **N/A** |  |
| PRJobDequeue |  | **N/A** |  |
| PRGetAllJobs |  | **N/A** |  |
| PRGetAllSpace |  | **N/A** |  |
| PRJobSetRecipeVariable |  | **N/A** |  |
| PRJobSetStartMethod |  | **N/A** |  |
| Control Job Command Req |  | **N/A** |  |

### Control Job(E94)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | Section | Reply | Remark |
| Fundamental | Control Job Object | 8 | **N/A** | **CJ 사용안함** |
| Control Job State Model | 9 | **N/A** |  |
| Control Job Queue Model | 10 | **N/A** |  |
| Carrier Properties | 11 | **N/A** |  |
| Service Message Implementation | 12 | **N/A** |  |
| Variable Data | 7.3.2 | **N/A** |  |
| Events | 14 | **N/A** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Items | S/F | Reply | Remark |
| ServicesMessage | Create Object |  | **N/A** | **CJ 사용안함** |
| CJAbort |  | **N/A** |  |
| CJCancel |  | **N/A** |  |
| CJDeselect |  | **N/A** |  |
| CJHOQ ( Head Of Queue ) |  | **N/A** |  |
| CJPause |  | **N/A** |  |
| CJResume |  | **N/A** |  |