



R4-1.2.2 *IsEdaEnabled Response*

HTTP/1.1 100 Continue
Server: Microsoft-IIS/5.0
Date: Mon, 16 Sep 2002 19:56:41 GMT
HTTP/1.1 200 OK

Server: Microsoft-IIS/5.0
Date: Mon, 16 Sep 2002 19:56:41 GMT

Content-Length: 335
Content-Type: text/html

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <IsEdaEnabledResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <IsEnabled>true</IsEnabled>
    </IsEdaEnabledResponse>
  </soap:Body>
</soap:Envelope>
```

R4-1.2.3 *GetActivePlanIds Request*

...
SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:GetActivePlanIds"
...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:robofurnace:zippo:furnace-00899</To>
      <From>urn:icm:equipment.client:app-1</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <GetActivePlanIds xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-Uj399</ImmutableID>
      </EquipmentID>
    </GetActivePlanIds>
  </soap:Body>
</soap:Envelope>
```



R4-1.2.4 *GetActivePlanIds Response*

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <GetActivePlanIdsResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <ActivePlanIds>DCP-1 DCP-2 DCP-72</ActivePlanIds>
    </GetActivePlanIdsResponse>
  </soap:Body>
</soap:Envelope>
```

R4-1.2.5 *GetDefinedPlanIds Request*

...

SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:GetDefinedPlanIds"

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:robofurnace:zippo:furnace-00899</To>
      <From>urn:icm:equipment.client:app-1</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <GetDefinedPlanIds xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-Uj399</ImmutableID>
      </EquipmentID>
    </GetDefinedPlanIds>
  </soap:Body>
</soap:Envelope>
```



R4-1.2.6 *GetDefinedPlanIds Response*

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <GetDefinedPlanIdsResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <DefinedPlanIds>DCP-1 DCP-2 DCP-3 DCP-4 DCP-10 DCP-11 DCP-15 DCP-72</
        DefinedPlanIds>
    </ GetDefinedPlanIdsResponse>
  </soap:Body>
</soap:Envelope>
```

R4-1.2.7 *ActivatePlan Request*

...

SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:ActivatePlan"

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:robofurnace:zippo:furnace-00899</To>
      <From>urn:icm:equipment.client:app-1</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <ActivatePlan xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-Uj399</ImmutableID>
      </EquipmentID>
      <PlanID>DCP-72</PlanID>
      <UntilDeactivated>false</UntilDeactivated>
    </ActivatePlan>
  </soap:Body>
</soap:Envelope>
```



R4-1.2.8 *ActivatePlan Response*

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <ActivatePlanResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <IsActivated>true</IsActivated>
    </ActivatePlanResponse >
  </soap:Body>
</soap:Envelope>
```

R4-1.2.9 *ActivatePlan Request (invalid)*

...

SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:ActivatePlan"

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:robofurnace:zippo:furnace-00899</To>
      <From>urn:icm:equipment.client:app-1</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <ActivatePlan xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-Uj399</ImmutableID>
      </EquipmentID>
      <PlanID>DCP-95</PlanID>
      <UntilDeactivated>false</UntilDeactivated>
    </ActivatePlan>
  </soap:Body>
</soap:Envelope>
```



R4-1.2.10 *ActivatePlan Response (error)*

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <ActivatePlanResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <IsActivated>false</IsActivated>
      <Error>
        <ErrorTime>2002-09-22T02:22:14.3220000-07:00</ErrorTime>
        <ErrorType>EDA-DCP</ErrorType>
        <ErrorCode>ACTV-13</ErrorCode>
        <ErrorDesc>Unrecognized DCP: DCP-95</ErrorDesc>
      </Error>
    </ActivatePlanResponse >
  </soap:Body>
</soap:Envelope>
```

R4-1.2.11 *DeactivatePlan Request*

...

SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:DeactivatePlan"

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:robofurnace:zippo:furnace-00899</To>
      <From>urn:icm:equipment.client:app-1</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <DeactivatePlan xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-Uj399</ImmutableID>
      </EquipmentID>
      <PlanID>DCP-72</PlanID>
    </DeactivatePlan>
  </soap:Body>
</soap:Envelope>
```



R4-1.2.12 *DeactivatePlan Response*

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <DeactivatePlanResponse xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <DeactivatedPlanIds>DCP-72</DeactivatedPlanIds>
    </DeactivatePlanResponse>
  </soap:Body>
</soap:Envelope>
```

R4-1.3 *EDA Data Messages (supported by the EDA client)*

R4-1.3.1 *EdaEnabled*

...

SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:EdaEnabled"

...

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <EdaEnabled xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-UJ399</ImmutableID>
      </EquipmentID>
    </EdaEnabled>
  </soap:Body>
</soap:Envelope>
```



R4-1.3.2 *EdaDisabled*

```
...
SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:EdaDisabled"
...

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <EdaDisabled xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-UJ399</ImmutableID>
      </EquipmentID>
    </EdaDisabled>
  </soap:Body>
</soap:Envelope>
```



R4-1.3.3 *EdaError*

```
...
SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:EdaError"
...

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <EdaError xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-UJ399</ImmutableID>
      </EquipmentID>
      <Error>
        <ErrorTime>2002-09-22T02:22:14.3220000-07:00</ErrorTime>
        <ErrorType>PerformanceWarning</ErrorType>
        <ErrorCode>Performance.Subsystem</ErrorCode>
        <ErrorDesc>Chamber 4 overheating by 6 degrees Celsius</ErrorDesc>
      </Error>
    </EdaError>
  </soap:Body>
</soap:Envelope>
```




R4-1.3.4 *EdaData*

```
...
SOAPAction: "urn:semi-org:ws:eda_ps_v0.0:EdaData"
...

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Header>
    <MessageHeader soap:mustUnderstand="1" xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <To>urn:icm:equipment.client:app-1</To>
      <From>urn:robofurnace:zippo:furnace-00899</From>
    </MessageHeader>
  </soap:Header>
  <soap:Body>
    <EdaData xmlns="urn:semi-org:schema:eda_ps_v0.0">
      <EquipmentID>
        <Supplier>RoboFurnace, Inc.</Supplier>
        <Model>Zippo 355</Model>
        <ImmutableID>39d-JDII-UJ399</ImmutableID>
      </EquipmentID>
      <Event>
        <EventTime>2002-09-22T04:19:50.0000000-07:00</EventTime>
        <Locator>Furnace</Locator>
        <EventID>TempSetpointReached</EventID>
        <Data>
          <Param>
            <Locator>Furnace.Chamber-1.Heater</Locator>
            <Name>Temperature</Name>
            <Value>
              <DoubleVal>44.203647416413375</DoubleVal>
            </Value>
          </Param>
          <Param>
            <Locator>Furnace.Chamber-2.Heater</Locator>
            <Name>Temperature</Name>
            <Value>
              <DoubleVal>4424.4468085106382</DoubleVal>
            </Value>
          </Param>
        </Data>
      </Event>
      <ExEvent>
        <ExTime>2002-09-22T04:31:43.4140000-07:00</ExTime>
        <Locator>Furnace.Chamber-2.Heater</Locator>
        <ErrorCode>45144</ErrorCode>
        <ExType>Alarm</ExType>
        <ExState>Set</ExState>
        <ExDesc>Chamber 2 is overflowing with Nitrogen. Help.</ExDesc>
        <Data>
          <Param>
            <Name>N2-Flow</Name>
            <Value>
              <DoubleVal>45.126934984520126</DoubleVal>
            </Value>
          </Param>
        </Data>
      </ExEvent>
    </EdaData>
  </soap:Body>
</soap:Envelope>
```



```
</Value>
</Param>
</Data>
</ExEvent>
</EdaData>
</soap:Body>
</soap:Envelope>
```

RELATED INFORMATION 5

CONTENTS OF FILE “eda.xsd”

NOTICE: This related information is not an official part of SEMI PR8. This related information is not intended to modify or supersede the official proposed standard. Determination of the suitability of the material is solely the responsibility of the user.

NOTICE: The code displayed below is available as a file at www.semi.org.

R5-1 eda.xsd

```
<?xml version="1.0" encoding="utf-8" ?>
<!--
    SEMI makes no warranties or representations as to the suitability
    of the software set forth herein for any particular application. The
    determination of the suitability of the software is solely the
responsibility
    of the user.

    By publication of this software, SEMI takes no position respecting
    the validity of any patent rights or copyrights asserted in connection
    with any items contained in this software. Users of this software are
    expressly advised that determination of any such patent rights or
    copyrights, and the risk of infringement of such rights are entirely
    their own responsibility.
-->
<xs:schema id="valuetypes" xmlns="urn:semi-org:schema:eda_ps_v0.0"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:semi-
org:schema:eda_ps_v0.0" elementFormDefault="qualified">
  <xs:simpleType name="IntegerValueType">
    <xs:restriction base="xs:integer" />
  </xs:simpleType>
  <xs:simpleType name="IntegerArrayValueType">
    <xs:list itemType="xs:integer" />
  </xs:simpleType>
  <xs:simpleType name="FloatValueType">
    <xs:restriction base="xs:float" />
  </xs:simpleType>
  <xs:simpleType name="FloatArrayValueType">
    <xs:list itemType="xs:float" />
  </xs:simpleType>
  <xs:simpleType name="DoubleValueType">
    <xs:restriction base="xs:double" />
  </xs:simpleType>
  <xs:simpleType name="DoubleArrayValueType">
    <xs:list itemType="xs:double" />
  </xs:simpleType>
  <xs:simpleType name="StringValueType">
    <xs:restriction base="xs:string" />
  </xs:simpleType>
  <xs:simpleType name="StringArrayValueType">
    <xs:list itemType="xs:string" />
  </xs:simpleType>
  <xs:simpleType name="AnyURIValueType">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
  <xs:simpleType name="DateTimeValueType">
```

```

        <xs:restriction base="xs:dateTime" />
    </xs:simpleType>
    <xs:simpleType name="DateTimeArrayValueType">
        <xs:list itemType="xs:dateTime" />
    </xs:simpleType>
    <xs:simpleType name="BooleanValueType">
        <xs:restriction base="xs:boolean" />
    </xs:simpleType>
    <xs:simpleType name="BooleanArrayValueType">
        <xs:list itemType="xs:boolean" />
    </xs:simpleType>
    <xs:simpleType name="Base64BinaryValueType">
        <xs:restriction base="xs:base64Binary" />
    </xs:simpleType>
    <xs:group name="TypeSelectionGroup">
        <xs:choice>
            <xs:element name="StringVal" type="StringValueTypes" />
            <xs:element name="StringArrayVal"
type="StringArrayValueType" />
            <xs:element name="DateTimeVal" type="DateTimeValueType" />
            <xs:element name="DateTimeArrayVal"
type="DateTimeArrayValueType" />
            <xs:element name="AnyURISVal" type="AnyURIValueType" />
            <xs:element name="BoolVal" type="BooleanValueType" />
            <xs:element name="BoolArrayVal" type="BooleanArrayValueType"
/>
            <xs:element name="Base64BinaryVal"
type="Base64BinaryValueType" />
            <xs:element name="IntVal" type="IntegerValueType" />
            <xs:element name="IntArrayVal" type="IntegerArrayValueType"
/>
            <xs:element name="FloatVal" type="FloatValueType" />
            <xs:element name="FloatArrayVal" type="FloatArrayValueType"
/>
            <xs:element name="DoubleVal" type="DoubleValueType" />
            <xs:element name="DoubleArrayVal"
type="DoubleArrayValueType" />
            <xs:element name="StructVal" type="StructureValueType" />
        </xs:choice>
    </xs:group>
    <xs:group name="StructureTypeSelectionGroup">
        <xs:choice>
            <xs:element name="StringVal" type="StringValueTypes" />
            <xs:element name="StringArrayVal"
type="StringArrayValueType" />
            <xs:element name="DateTimeVal" type="DateTimeValueType" />
            <xs:element name="DateTimeArrayVal"
type="DateTimeArrayValueType" />
            <xs:element name="AnyURISVal" type="AnyURIValueType" />
            <xs:element name="BoolVal" type="BooleanValueType" />
            <xs:element name="BoolArrayVal" type="BooleanArrayValueType"
/>
            <xs:element name="Base64BinaryVal"
type="Base64BinaryValueType" />
            <xs:element name="IntVal" type="IntegerValueType" />
            <xs:element name="IntArrayVal" type="IntegerArrayValueType"
/>

```

```

        <xs:element name="FloatVal" type="FloatValueType" />
        <xs:element name="FloatArrayVal" type="FloatArrayValueType"
/>
        <xs:element name="DoubleVal" type="DoubleValueType" />
        <xs:element name="DoubleArrayVal"
type="DoubleArrayValueType" />
    </xs:choice>
</xs:group>
<xs:complexType name="StructureValueType">
    <xs:group ref="StructureTypeSelectionGroup" maxOccurs="unbounded"
minOccurs="1" />
</xs:complexType>
<xs:complexType name="ParamValueType">
    <xs:group ref="TypeSelectionGroup" maxOccurs="unbounded"
minOccurs="1" />
</xs:complexType>
<xs:complexType name="ParamType">
    <xs:sequence>
        <xs:element name="Locator" type="xs:string" minOccurs="0" />
        <xs:element name="Name" type="xs:string" />
        <xs:element name="Value" type="ParamValueType" />
        <xs:element name="MeasTime" type="xs:dateTime" minOccurs="0"
/>
        <xs:element name="Extension" type="ExtensionsType"
minOccurs="0" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ExtensionsType">
    <xs:sequence>
        <xs:any namespace="##other" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="OneOrMoreParamsType">
    <xs:sequence>
        <xs:element name="Param" type="ParamType"
maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EquipmentIdType">
    <xs:sequence>
        <xs:element name="Supplier" type="xs:string" />
        <xs:element name="Model" type="xs:string" />
        <xs:element name="ImmutableID" type="xs:string" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EventType">
    <xs:sequence>
        <xs:element name="EventTime" type="xs:dateTime" />
        <xs:element name="Locator" type="xs:string" />
        <xs:element name="EventID" type="xs:string" />
        <xs:element name="Context" type="OneOrMoreParamsType"
minOccurs="0" />
        <xs:element name="Data" type="OneOrMoreParamsType" />
        <xs:element name="Extension" type="ExtensionsType"
minOccurs="0" />
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="ExceptionType">
  <xs:sequence>
    <xs:element name="ExTime" type="xs:dateTime" />
    <xs:element name="Locator" type="xs:string" />
    <xs:element name="ErrorCode" type="xs:string" />
    <xs:element name="ExType" type="xs:string" />
    <xs:element name="ExState" type="xs:string" />
    <xs:element name="ExDesc" type="xs:string" />
    <xs:element name="Severity" type="xs:string" minOccurs="0"
  />
  <xs:element name="Data" type="OneOrMoreParamsType"
minOccurs="0" />
  <xs:element name="Extension" type="ExtensionsType"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ErrorType">
  <xs:sequence>
    <xs:element name="ErrorTime" type="xs:dateTime" />
    <xs:element name="ErrorType" type="xs:string" />
    <xs:element name="ErrorCode" type="xs:string" />
    <xs:element name="ErrorDesc" type="xs:string" />
    <xs:element name="Extension" type="ExtensionsType"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MessageHeaderType">
  <xs:sequence>
    <xs:element name="To" type="xs:anyURI" />
    <xs:element name="From" type="xs:anyURI" />
    <xs:element name="CorrelationId" type="xs:string"
minOccurs="0" />
  </xs:sequence>
</xs:complexType>
<xs:element name="MessageHeader" type="MessageHeaderType" />
<xs:element name="EquipmentID" type="EquipmentIdType" />
<xs:element name="EdaData">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
      <xs:choice maxOccurs="unbounded" minOccurs="1">
        <xs:element name="Event" type="EventType" />
        <xs:element name="ExEvent" type="ExceptionType"
      />
      </xs:choice>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="EdaError">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="EquipmentID" type="EquipmentIdType"
    />
      <xs:element name="Error" type="ErrorType" />
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

```

<xs:element name="EdaEnabled">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="EdaDisabled">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="IsEdaEnabled">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="IsEdaEnabledResponse">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="IsEnabled" type="xs:boolean" />
      <xs:element name="Error" type="ErrorType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="GetDefinedPlanIds">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="GetDefinedPlanIdsResponse">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="DefinedPlanIds"
type="StringArrayValueType" />
      <xs:element name="Error" type="ErrorType"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="GetActivePlanIds">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="EquipmentID" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="GetActivePlanIdsResponse">
  <xs:complexType>
    <xs:sequence>

```

```

        <xs:element name="ActivePlanIds"
type="StringArrayValueType" />
        <xs:element name="Error" type="ErrorType"
minOccurs="0" />
    </xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="ActivatePlan">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="EquipmentID" />
            <xs:element name="PlanID" type="xs:string" />
            <xs:element name="UntilDeactivated" type="xs:boolean"
/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="ActivatePlanResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="IsActivated" type="xs:boolean" />
            <xs:element name="Error" type="ErrorType"
minOccurs="0" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="DeactivatePlan">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="EquipmentID" />
            <xs:element name="PlanID" type="xs:string" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="DeactivatePlanResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="DeactivatedPlanIds"
type="StringArrayValueType" />
            <xs:element name="Error" type="ErrorType"
minOccurs="0" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:schema>

```


RELATED INFORMATION 6

CONTENTS OF FILE “eda_consumer.wsdl”

NOTICE: This related information is not an official part of SEMI PR8. This related information is not intended to modify or supersede the official proposed standard. Determination of the suitability of the material is solely the responsibility of the user.

NOTICE: The code displayed below is available as a file at www.semi.org.

R6-1 eda_consumer.wsdl

```
<?xml version="1.0" encoding="utf-8"?>
<wsdl:definitions name="EdaConsumer" xmlns="urn:semi-org:ws:eda_ps_v0.0"
xmlns:eda="urn:semi-org:schema:eda_ps_v0.0"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/" targetNamespace="urn:semi-
org:ws:eda_ps_v0.0">
  <!--
    SEMI makes no warranties or representations as to the suitability
    of the software set forth herein for any particular application. The
    determination of the suitability of the software is solely the
responsibility
    of the user.

    By publication of this software, SEMI takes no position respecting
    the validity of any patent rights or copyrights asserted in connection
    with any items contained in this software. Users of this software are
    expressly advised that determination of any such patent rights or
    copyrights, and the risk of infringement of such rights are entirely
    their own responsibility.
  -->

  <wsdl:types>
    <xs:schema id="valuetypes"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:eda="urn:semi-
org:schema:eda_ps_v0.0" targetNamespace="urn:semi-org:schema:eda_ps_v0.0"
elementFormDefault="qualified">
      <xs:simpleType name="IntegerValueType">
        <xs:restriction base="xs:integer"/>
      </xs:simpleType>
      <xs:simpleType name="IntegerArrayValueType">
        <xs:list itemType="xs:integer"/>
      </xs:simpleType>
      <xs:simpleType name="FloatValueType">
        <xs:restriction base="xs:float"/>
      </xs:simpleType>
      <xs:simpleType name="FloatArrayValueType">
        <xs:list itemType="xs:float"/>
      </xs:simpleType>
      <xs:simpleType name="DoubleValueType">
        <xs:restriction base="xs:double"/>
      </xs:simpleType>
      <xs:simpleType name="DoubleArrayValueType">
        <xs:list itemType="xs:double"/>
      </xs:simpleType>
      <xs:simpleType name="StringValueType">
        <xs:restriction base="xs:string"/>
      </xs:simpleType>
    </xs:schema>
  </wsdl:types>
</wsdl:definitions>
```

```

</xs:simpleType>
<xs:simpleType name="StringArrayValueType">
  <xs:list itemType="xs:string"/>
</xs:simpleType>
<xs:simpleType name="AnyURIValueType">
  <xs:restriction base="xs:anyURI"/>
</xs:simpleType>
<xs:simpleType name="DateTimeValueType">
  <xs:restriction base="xs:dateTime"/>
</xs:simpleType>
<xs:simpleType name="DateTimeArrayValueType">
  <xs:list itemType="xs:dateTime"/>
</xs:simpleType>
<xs:simpleType name="BooleanValueType">
  <xs:restriction base="xs:boolean"/>
</xs:simpleType>
<xs:simpleType name="BooleanArrayValueType">
  <xs:list itemType="xs:boolean"/>
</xs:simpleType>
<xs:simpleType name="Base64BinaryValueType">
  <xs:restriction base="xs:base64Binary"/>
</xs:simpleType>
<xs:group name="TypeSelectionGroup">
  <xs:choice>
    <xs:element name="StringVal"
type="eda:StringValueType"/>
    <xs:element name="StringArrayVal"
type="eda:StringArrayValueType"/>
    <xs:element name="DateTimeVal"
type="eda:DateTimeValueType"/>
    <xs:element name="DateTimeArrayVal"
type="eda:DateTimeArrayValueType"/>
    <xs:element name="AnyURIVal"
type="eda:AnyURIValueType"/>
    <xs:element name="BoolVal"
type="eda:BooleanValueType"/>
    <xs:element name="BoolArrayVal"
type="eda:BooleanArrayValueType"/>
    <xs:element name="Base64BinaryVal"
type="eda:Base64BinaryValueType"/>
    <xs:element name="IntVal"
type="eda:IntegerValueType"/>
    <xs:element name="IntArrayVal"
type="eda:IntegerArrayValueType"/>
    <xs:element name="FloatVal"
type="eda:FloatValueType"/>
    <xs:element name="FloatArrayVal"
type="eda:FloatArrayValueType"/>
    <xs:element name="DoubleVal"
type="eda:DoubleValueType"/>
    <xs:element name="DoubleArrayVal"
type="eda:DoubleArrayValueType"/>
    <xs:element name="StructVal"
type="eda:StructureValueType"/>
  </xs:choice>
</xs:group>
<xs:group name="StructureTypeSelectionGroup">

```

```

        <xs:choice>
            <xs:element name="StringVal"
type="eda:StringValueType"/>
            <xs:element name="StringArrayVal"
type="eda:StringArrayValueType"/>
            <xs:element name="DateTimeVal"
type="eda:DateTimeValueType"/>
            <xs:element name="DateTimeArrayVal"
type="eda:DateTimeArrayValueType"/>
            <xs:element name="AnyURIVal"
type="eda:AnyURIValueType"/>
            <xs:element name="BoolVal"
type="eda:BooleanValueType"/>
            <xs:element name="BoolArrayVal"
type="eda:BooleanArrayValueType"/>
            <xs:element name="Base64BinaryVal"
type="eda:Base64BinaryValueType"/>
            <xs:element name="IntVal"
type="eda:IntegerValueType"/>
            <xs:element name="IntArrayVal"
type="eda:IntegerArrayValueType"/>
            <xs:element name="FloatVal"
type="eda:FloatValueType"/>
            <xs:element name="FloatArrayVal"
type="eda:FloatArrayValueType"/>
            <xs:element name="DoubleVal"
type="eda:DoubleValueType"/>
            <xs:element name="DoubleArrayVal"
type="eda:DoubleArrayValueType"/>
        </xs:choice>
    </xs:group>
    <xs:complexType name="StructureValueType">
        <xs:choice>
            <xs:group ref="eda:StructureTypeSelectionGroup"
maxOccurs="unbounded" minOccurs="1"/>
        </xs:choice>
    </xs:complexType>
    <xs:complexType name="ParamValueType">
        <xs:group ref="eda:TypeSelectionGroup"
maxOccurs="unbounded" minOccurs="1"/>
    </xs:complexType>
    <xs:complexType name="ParamType">
        <xs:sequence>
            <xs:element name="Locator" type="xs:string"
minOccurs="0"/>
            <xs:element name="Name" type="xs:string"/>
            <xs:element name="Value"
type="eda:ParamValueType"/>
            <xs:element name="MeasTime" type="xs:dateTime"
minOccurs="0"/>
            <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ExtensionsType">
        <xs:sequence>
            <xs:any namespace="##other"/>

```

```

        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="OneOrMoreParamsType">
        <xs:sequence>
            <xs:element name="Param" type="eda:ParamType"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EquipmentIdType">
        <xs:sequence>
            <xs:element name="Supplier" type="xs:string"/>
            <xs:element name="Model" type="xs:string"/>
            <xs:element name="ImmutableID"
type="xs:string"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EventType">
        <xs:sequence>
            <xs:element name="EventTime"
type="xs:dateTime"/>
            <xs:element name="Locator" type="xs:string"/>
            <xs:element name="EventID" type="xs:string"/>
            <xs:element name="Context"
type="eda:OneOrMoreParamsType" minOccurs="0"/>
            <xs:element name="Data"
type="eda:OneOrMoreParamsType"/>
            <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ExceptionType">
        <xs:sequence>
            <xs:element name="ExTime" type="xs:dateTime"/>
            <xs:element name="Locator" type="xs:string"/>
            <xs:element name="ErrorCode" type="xs:string"/>
            <xs:element name="ExType" type="xs:string"/>
            <xs:element name="ExState" type="xs:string"/>
            <xs:element name="ExDesc" type="xs:string"/>
            <xs:element name="Severity" type="xs:string"
minOccurs="0"/>
            <xs:element name="Data"
type="eda:OneOrMoreParamsType" minOccurs="0"/>
            <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ErrorType">
        <xs:sequence>
            <xs:element name="ErrorTime"
type="xs:dateTime"/>
            <xs:element name="ErrorType" type="xs:string"/>
            <xs:element name="ErrorCode" type="xs:string"/>
            <xs:element name="ErrorDesc" type="xs:string"/>
            <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>

```

```

<xs:complexType name="MessageHeaderType">
  <xs:sequence>
    <xs:element name="To" type="xs:anyURI"/>
    <xs:element name="From" type="xs:anyURI"/>
    <xs:element name="CorrelationId"
type="xs:string" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:element name="MessageHeader"
type="eda:MessageHeaderType" />
  <xs:element name="EquipmentID" type="eda:EquipmentIdType"/>
  <xs:element name="EdaData">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="eda:EquipmentID"/>
        <xs:choice maxOccurs="unbounded"
minOccurs="1">
          <xs:element name="Event"
type="eda:EventType"/>
          <xs:element name="ExEvent"
type="eda:ExceptionType"/>
        </xs:choice>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="EdaError">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="EquipmentID"
type="eda:EquipmentIdType"/>
        <xs:element name="Error"
type="eda:ErrorType"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="EdaEnabled">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="eda:EquipmentID"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="EdaDisabled">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="eda:EquipmentID"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="IsEdaEnabled">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="eda:EquipmentID"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="IsEdaEnabledResponse">

```

```

        <xs:complexType>
            <xs:sequence>
                <xs:element name="IsEnabled"
type="xs:boolean"/>
                <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="GetDefinedPlanIds">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="GetDefinedPlanIdsResponse">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="DefinedPlanIds"
type="eda:StringArrayValueType"/>
                <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="GetActivePlanIds">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="GetActivePlanIdsResponse">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="ActivePlanIds"
type="eda:StringArrayValueType"/>
                <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="ActivatePlan">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
                <xs:element name="PlanID"
type="xs:string"/>
                <xs:element name="UntilDeactivated"
type="xs:boolean"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="ActivatePlanResponse">
        <xs:complexType>
            <xs:sequence>

```

```

                                <xs:element name="IsActivated"
type="xs:boolean"/>
                                <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
                                </xs:sequence>
                                </xs:complexType>
                                </xs:element>
                                <xs:element name="DeactivatePlan">
                                <xs:complexType>
                                <xs:sequence>
                                <xs:element ref="eda:EquipmentID"/>
                                <xs:element name="PlanID"
type="xs:string"/>
                                </xs:sequence>
                                </xs:complexType>
                                </xs:element>
                                <xs:element name="DeactivatePlanResponse">
                                <xs:complexType>
                                <xs:sequence>
                                <xs:element name="DeactivatedPlanIds"
type="eda:StringArrayValueType"/>
                                <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
                                </xs:sequence>
                                </xs:complexType>
                                </xs:element>
                                </xs:schema>
</wsdl:types>
<wsdl:message name="MessageMetadata">
    <wsdl:part name="MessageHeader" element="eda:MessageHeader"/>
</wsdl:message>
<wsdl:message name="EdaErrorIn">
    <wsdl:part name="EdaErrorNotification" element="eda:EdaError"/>
</wsdl:message>
<wsdl:message name="EdaEnabledIn">
    <wsdl:part name="EdaEnabledNotification"
element="eda:EdaEnabled"/>
</wsdl:message>
<wsdl:message name="EdaDisabledIn">
    <wsdl:part name="EdaDisabledNotification"
element="eda:EdaDisabled"/>
</wsdl:message>
<wsdl:message name="EdaDataIn">
    <wsdl:part name="EdaDataNotification" element="eda:EdaData"/>
</wsdl:message>
<wsdl:portType name="EdaConsumerPortType">
    <wsdl:operation name="EdaError">
        <wsdl:input name="EdaErrorInput" message="EdaErrorIn"/>
    </wsdl:operation>
    <wsdl:operation name="EdaEnabled">
        <wsdl:input name="EdaEnabledInput" message="EdaEnabledIn"/>
    </wsdl:operation>
    <wsdl:operation name="EdaDisabled">
        <wsdl:input name="EdaDisabledInput"
message="EdaDisabledIn"/>
    </wsdl:operation>
    <wsdl:operation name="EdaData">

```

```

        <wsdl:input name="EdaDataInput" message="EdaDataIn"/>
    </wsdl:operation>
</wsdl:portType>
<wsdl:binding name="EdaConsumerSOAPBinding" type="EdaConsumerPortType">
    <soap:binding style="document"
transport="http://schemas.xmlsoap.org/soap/http"/>
    <wsdl:operation name="EdaError">
        <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:EdaError"/>
        <wsdl:input name="EdaErrorInput">
            <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
            <soap:body use="literal"/>
        </wsdl:input>
    </wsdl:operation>
    <wsdl:operation name="EdaEnabled">
        <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:EdaEnabled"/>
        <wsdl:input name="EdaEnabledInput">
            <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
            <soap:body use="literal"/>
        </wsdl:input>
    </wsdl:operation>
    <wsdl:operation name="EdaDisabled">
        <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:EdaDisabled"/>
        <wsdl:input name="EdaDisabledInput">
            <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
            <soap:body use="literal"/>
        </wsdl:input>
    </wsdl:operation>
    <wsdl:operation name="EdaData">
        <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:EdaData"/>
        <wsdl:input name="EdaDataInput">
            <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
            <soap:body use="literal"/>
        </wsdl:input>
    </wsdl:operation>
</wsdl:binding>
</wsdl:definitions>

```


RELATED INFORMATION 7

CONTENTS OF FILE “eda_equipment.wsdl”

NOTICE: This related information is not an official part of SEMI PR8. This related information is not intended to modify or supersede the official proposed standard. Determination of the suitability of the material is solely the responsibility of the user.

NOTICE: The code displayed below is available as a file at www.semi.org.

R7-1 eda_equipment.wsdl

```
<?xml version="1.0" encoding="utf-8"?>
<wsdl:definitions name="EdaEquipment" xmlns="urn:semi-org:ws:eda_ps_v0.0"
xmlns:eda="urn:semi-org:schema:eda_ps_v0.0"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/" targetNamespace="urn:semi-
org:ws:eda_ps_v0.0">
  <!--
    SEMI makes no warranties or representations as to the suitability
    of the software set forth herein for any particular application. The
    determination of the suitability of the software is solely the
responsibility
    of the user.

    By publication of this software, SEMI takes no position respecting
    the validity of any patent rights or copyrights asserted in connection
    with any items contained in this software. Users of this software are
    expressly advised that determination of any such patent rights or
    copyrights, and the risk of infringement of such rights are entirely
    their own responsibility.
  -->

  <wsdl:types>
    <xs:schema id="valuetypes"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:eda="urn:semi-
org:schema:eda_ps_v0.0" xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/" targetNamespace="urn:semi-
org:schema:eda_ps_v0.0" elementFormDefault="qualified">
      <xs:simpleType name="IntegerValueType">
        <xs:restriction base="xs:integer"/>
      </xs:simpleType>
      <xs:simpleType name="IntegerArrayValueType">
        <xs:list itemType="xs:integer"/>
      </xs:simpleType>
      <xs:simpleType name="FloatValueType">
        <xs:restriction base="xs:float"/>
      </xs:simpleType>
      <xs:simpleType name="FloatArrayValueType">
        <xs:list itemType="xs:float"/>
      </xs:simpleType>
      <xs:simpleType name="DoubleValueType">
        <xs:restriction base="xs:double"/>
      </xs:simpleType>
      <xs:simpleType name="DoubleArrayValueType">
        <xs:list itemType="xs:double"/>
      </xs:simpleType>
    </xs:schema>
  </wsdl:types>
</wsdl:definitions>
```

```

</xs:simpleType>
<xs:simpleType name="StringValue" >
  <xs:restriction base="xs:string"/>
</xs:simpleType>
<xs:simpleType name="StringArrayValue" >
  <xs:list itemType="xs:string"/>
</xs:simpleType>
<xs:simpleType name="AnyURIValue" >
  <xs:restriction base="xs:anyURI"/>
</xs:simpleType>
<xs:simpleType name="DateTimeValue" >
  <xs:restriction base="xs:dateTime"/>
</xs:simpleType>
<xs:simpleType name="DateTimeArrayValue" >
  <xs:list itemType="xs:dateTime"/>
</xs:simpleType>
<xs:simpleType name="BooleanValue" >
  <xs:restriction base="xs:boolean"/>
</xs:simpleType>
<xs:simpleType name="BooleanArrayValue" >
  <xs:list itemType="xs:boolean"/>
</xs:simpleType>
<xs:simpleType name="Base64BinaryValue" >
  <xs:restriction base="xs:base64Binary"/>
</xs:simpleType>
<xs:group name="TypeSelectionGroup">
  <xs:choice>
    <xs:element name="StringVal"
type="eda:StringValueType"/>
    <xs:element name="StringArrayVal"
type="eda:StringArrayValueType"/>
    <xs:element name="DateTimeVal"
type="eda:DateTimeValueType"/>
    <xs:element name="DateTimeArrayVal"
type="eda:DateTimeArrayValueType"/>
    <xs:element name="AnyURIVal"
type="eda:AnyURIValueType"/>
    <xs:element name="BoolVal"
type="eda:BooleanValueType"/>
    <xs:element name="BoolArrayVal"
type="eda:BooleanArrayValueType"/>
    <xs:element name="Base64BinaryVal"
type="eda:Base64BinaryValueType"/>
    <xs:element name="IntVal"
type="eda:IntegerValueType"/>
    <xs:element name="IntArrayVal"
type="eda:IntegerArrayValueType"/>
    <xs:element name="FloatVal"
type="eda:FloatValueType"/>
    <xs:element name="FloatArrayVal"
type="eda:FloatArrayValueType"/>
    <xs:element name="DoubleVal"
type="eda:DoubleValueType"/>
    <xs:element name="DoubleArrayVal"
type="eda:DoubleArrayValueType"/>
    <xs:element name="StructVal"
type="eda:StructureValueType"/>
  
```

```

        </xs:choice>
    </xs:group>
    <xs:group name="StructureTypeSelectionGroup">
        <xs:choice>
            <xs:element name="StringVal"
type="eda:StringValueType"/>
            <xs:element name="StringArrayVal"
type="eda:StringArrayValueType"/>
            <xs:element name="DateTimeVal"
type="eda:DateTimeValueType"/>
            <xs:element name="DateTimeArrayVal"
type="eda:DateTimeArrayValueType"/>
            <xs:element name="AnyURIVal"
type="eda:AnyURIValueType"/>
            <xs:element name="BoolVal"
type="eda:BooleanValueType"/>
            <xs:element name="BoolArrayVal"
type="eda:BooleanArrayValueType"/>
            <xs:element name="Base64BinaryVal"
type="eda:Base64BinaryValueType"/>
            <xs:element name="IntVal"
type="eda:IntegerValueType"/>
            <xs:element name="IntArrayVal"
type="eda:IntegerArrayValueType"/>
            <xs:element name="FloatVal"
type="eda:FloatValueType"/>
            <xs:element name="FloatArrayVal"
type="eda:FloatArrayValueType"/>
            <xs:element name="DoubleVal"
type="eda:DoubleValueType"/>
            <xs:element name="DoubleArrayVal"
type="eda:DoubleArrayValueType"/>
        </xs:choice>
    </xs:group>
    <xs:complexType name="StructureValueType">
        <xs:choice>
            <xs:group ref="eda:StructureTypeSelectionGroup"
maxOccurs="unbounded" minOccurs="1"/>
        </xs:choice>
    </xs:complexType>
    <xs:complexType name="ParamValueType">
        <xs:group ref="eda:TypeSelectionGroup"
maxOccurs="unbounded" minOccurs="1"/>
    </xs:complexType>
    <xs:complexType name="ParamType">
        <xs:sequence>
            <xs:element name="Locator" type="xs:string"
minOccurs="0"/>
            <xs:element name="Name" type="xs:string"/>
            <xs:element name="Value"
type="eda:ParamValueType"/>
            <xs:element name="MeasTime" type="xs:dateTime"
minOccurs="0"/>
            <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>

```

```

<xs:complexType name="ExtensionsType">
  <xs:sequence>
    <xs:any namespace="##other"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="OneOrMoreParamsType">
  <xs:sequence>
    <xs:element name="Param" type="eda:ParamType"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EquipmentIdType">
  <xs:sequence>
    <xs:element name="Supplier" type="xs:string"/>
    <xs:element name="Model" type="xs:string"/>
    <xs:element name="ImmutableID"
type="xs:string"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EventType">
  <xs:sequence>
    <xs:element name="EventTime"
type="xs:dateTime"/>
    <xs:element name="Locator" type="xs:string"/>
    <xs:element name="EventID" type="xs:string"/>
    <xs:element name="Context"
type="eda:OneOrMoreParamsType" minOccurs="0"/>
    <xs:element name="Data"
type="eda:OneOrMoreParamsType"/>
    <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ExceptionType">
  <xs:sequence>
    <xs:element name="ExTime" type="xs:dateTime"/>
    <xs:element name="Locator" type="xs:string"/>
    <xs:element name="ErrorCode" type="xs:string"/>
    <xs:element name="ExType" type="xs:string"/>
    <xs:element name="ExState" type="xs:string"/>
    <xs:element name="ExDesc" type="xs:string"/>
    <xs:element name="Severity" type="xs:string"
minOccurs="0"/>
    <xs:element name="Data"
type="eda:OneOrMoreParamsType" minOccurs="0"/>
    <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ErrorType">
  <xs:sequence>
    <xs:element name="ErrorTime"
type="xs:dateTime"/>
    <xs:element name="ErrorType" type="xs:string"/>
    <xs:element name="ErrorCode" type="xs:string"/>
    <xs:element name="ErrorDesc" type="xs:string"/>

```

```

        <xs:element name="Extension"
type="eda:ExtensionsType" minOccurs="0"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MessageHeaderType">
    <xs:sequence>
        <xs:element name="To" type="xs:anyURI"/>
        <xs:element name="From" type="xs:anyURI"/>
        <xs:element name="CorrelationId"
type="xs:string" minOccurs="0"/>
    </xs:sequence>
</xs:complexType>
<xs:element name="MessageHeader"
type="eda:MessageHeaderType" />
    <xs:element name="EquipmentID" type="eda:EquipmentIdType"/>
    <xs:element name="EdaData">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
                <xs:choice maxOccurs="unbounded"
minOccurs="1">
                    <xs:element name="Event"
type="eda:EventType"/>
                    <xs:element name="ExEvent"
type="eda:ExceptionType"/>
                </xs:choice>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="EdaError">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="EquipmentID"
type="eda:EquipmentIdType"/>
                <xs:element name="Error"
type="eda:ErrorType"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="EdaEnabled">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="EdaDisabled">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element name="IsEdaEnabled">
        <xs:complexType>
            <xs:sequence>
                <xs:element ref="eda:EquipmentID"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>

```

```

        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="IsEdaEnabledResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="IsEnabled"
type="xs:boolean"/>
            <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="GetDefinedPlanIds">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="eda:EquipmentID"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="GetDefinedPlanIdsResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="DefinedPlanIds"
type="eda:StringArrayValueType"/>
            <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="GetActivePlanIds">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="eda:EquipmentID"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="GetActivePlanIdsResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="ActivePlanIds"
type="eda:StringArrayValueType"/>
            <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
<xs:element name="ActivatePlan">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="eda:EquipmentID"/>
            <xs:element name="PlanID"
type="xs:string"/>
            <xs:element name="UntilDeactivated"
type="xs:boolean"/>
        </xs:sequence>
    </xs:complexType>

```

```

        </xs:element>
        <xs:element name="ActivatePlanResponse">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="IsActivated"
type="xs:boolean"/>
                    <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="DeactivatePlan">
            <xs:complexType>
                <xs:sequence>
                    <xs:element ref="eda:EquipmentID"/>
                    <xs:element name="PlanID"
type="xs:string"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="DeactivatePlanResponse">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="DeactivatedPlanIds"
type="eda:StringArrayValueType"/>
                    <xs:element name="Error"
type="eda:ErrorType" minOccurs="0"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
    </xs:schema>
</wsdl:types>
<wsdl:message name="MessageMetadata">
    <wsdl:part name="MessageHeader" element="eda:MessageHeader"/>
</wsdl:message>
<wsdl:message name="IsEdaEnabledIn">
    <wsdl:part name="IsEdaEnabledRequest" element="eda:IsEdaEnabled"/>
</wsdl:message>
<wsdl:message name="IsEdaEnabledOut">
    <wsdl:part name="IsEdaEnabledResponse"
element="eda:IsEdaEnabledResponse"/>
</wsdl:message>
<wsdl:message name="GetDefinedPlanIdsIn">
    <wsdl:part name="GetDefinedPlanIdsRequest"
element="eda:GetDefinedPlanIds"/>
</wsdl:message>
<wsdl:message name="GetDefinedPlanIdsOut">
    <wsdl:part name="GetDefinedPlanIdsResponse"
element="eda:GetDefinedPlanIdsResponse"/>
</wsdl:message>
<wsdl:message name="GetActivePlanIdsIn">
    <wsdl:part name="GetActivePlanIdsRequest"
element="eda:GetActivePlanIds"/>
</wsdl:message>
<wsdl:message name="GetActivePlanIdsOut">
    <wsdl:part name="GetActivePlanIdsResponse"
element="eda:GetActivePlanIdsResponse"/>

```

```

</wsdl:message>
<wsdl:message name="ActivatePlanIn">
  <wsdl:part name="ActivatePlanRequest" element="eda:ActivatePlan"/>
</wsdl:message>
<wsdl:message name="ActivatePlanOut">
  <wsdl:part name="ActivatePlanResponse"
element="eda:ActivatePlanResponse"/>
</wsdl:message>
<wsdl:message name="DeactivatePlanIn">
  <wsdl:part name="DeactivatePlanRequest"
element="eda:DeactivatePlan"/>
</wsdl:message>
<wsdl:message name="DeactivatePlanOut">
  <wsdl:part name="DeactivatePlanResponse"
element="eda:DeactivatePlanResponse"/>
</wsdl:message>
<wsdl:portType name="EdaEquipmentPortType">
  <wsdl:operation name="IsEdaEnabled">
    <wsdl:input name="IsEdaEnabledInput "
message="IsEdaEnabledIn"/>
    <wsdl:output name="IsEdaEnabledOutput "
message="IsEdaEnabledOut"/>
  </wsdl:operation>
  <wsdl:operation name="GetDefinedPlanIds">
    <wsdl:input name="GetDefinedPlanIdsInput "
message="GetDefinedPlanIdsIn"/>
    <wsdl:output name="GetDefinedPlanIdsOutput "
message="GetDefinedPlanIdsOut"/>
  </wsdl:operation>
  <wsdl:operation name="GetActivePlanIds">
    <wsdl:input name="GetActivePlanIdsInput "
message="GetActivePlanIdsIn"/>
    <wsdl:output name="GetActivePlanIdsOutput "
message="GetActivePlanIdsOut"/>
  </wsdl:operation>
  <wsdl:operation name="ActivatePlan">
    <wsdl:input name="ActivatePlanInput "
message="ActivatePlanIn"/>
    <wsdl:output name="ActivatePlanOutput "
message="ActivatePlanOut"/>
  </wsdl:operation>
  <wsdl:operation name="DeactivatePlan">
    <wsdl:input name="DeactivatePlanInput "
message="DeactivatePlanIn"/>
    <wsdl:output name="DeactivatePlanOutput "
message="DeactivatePlanOut"/>
  </wsdl:operation>
</wsdl:portType>
<wsdl:binding name="EdaEquipmentSOAPBinding"
type="EdaEquipmentPortType">
  <soap:binding style="document"
transport="http://schemas.xmlsoap.org/soap/http"/>
  <wsdl:operation name="IsEdaEnabled">
    <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:IsEdaEnabled"/>
    <wsdl:input name="IsEdaEnabledInput">

```



```

        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="IsEdaEnabledOutput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="GetDefinedPlanIds">
    <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:GetDefinedPlanIds"/>
    <wsdl:input name="GetDefinedPlanIdsInput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="GetDefinedPlanIdsOutput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="GetActivePlanIds">
    <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:GetActivePlanIds"/>
    <wsdl:input name="GetActivePlanIdsInput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="GetActivePlanIdsOutput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="ActivatePlan">
    <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:ActivatePlan"/>
    <wsdl:input name="ActivatePlanInput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="ActivatePlanOutput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:output>
</wsdl:operation>
<wsdl:operation name="DeactivatePlan">
    <soap:operation style="document" soapAction="urn:semi-
org:ws:eda_ps_v0.0:DeactivatePlan"/>
    <wsdl:input name="DeactivatePlanInput">

```



```

        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="DeactivatePlanOutput">
        <soap:header use="literal" part="MessageHeader"
message="MessageMetadata" wsdl:required="true"/>
        <soap:body use="literal"/>
    </wsdl:output>
</wsdl:operation>
</wsdl:binding>
</wsdl:definitions>
```

RELATED INFORMATION 8

CONTENTS OF FILE “OpSeg.xsd”

NOTICE: This related information is not an official part of SEMI PR8. This related information is not intended to modify or supersede the official proposed standard. Determination of the suitability of the material is solely the responsibility of the user.

NOTICE: The code displayed below is available as a file at www.semi.org.

R8-1 OpSeg.xsd

```
<?xml version="1.0" encoding="utf-8" ?>
<!--
    SEMI makes no warranties or representations as to the suitability
    of this software for any particular application. The determination
    of the suitability of the software is solely the responsibility
    of the user.

    By publication of this software, SEMI takes no position respecting
    the validity of any patent rights or copyrights asserted in connection
    with any items contained in this software. Users of this software are
    expressly advised that determination of any such patent rights or
    copyrights, and the risk of infringement of such rights are entirely
    their own responsibility.
-->
<xs:schema id="OpSeg" targetNamespace="urn:semi-org:schema:opseg_v0.0"
  elementFormDefault="qualified" xmlns="urn:semi-org:schema:opseg_v0.0"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:simpleType name="EventTypeEnumerator">
    <xs:restriction base="xs:nonNegativeInteger">
      <xs:enumeration value="0" />
      <xs:enumeration value="1" />
      <xs:enumeration value="2" />
      <xs:enumeration value="3" />
      <xs:enumeration value="4" />
      <xs:enumeration value="5" />
      <xs:enumeration value="6" />
      <xs:enumeration value="7" />
      <xs:enumeration value="8" />
      <xs:enumeration value="9" />
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="OpSegEventType">
    <xs:sequence>
      <xs:element name="SegmentType" type="xs:string" />
      <xs:element name="EventType" type="EventTypeEnumerator" />
      <xs:element name="TaskName" type="xs:string" minOccurs="0" />
      <xs:element name="Purpose" type="xs:string" minOccurs="0" />
      <xs:element name="SegInstID" type="xs:string" minOccurs="0" />
      <xs:element name="ParSegInstID" type="xs:string"
minOccurs="0" />
    </xs:sequence>
  </xs:complexType>
  <xs:element name="OpSegEvent" type="OpSegEventType" />
</xs:schema>
```



NOTICE: SEMI makes no warranties or representations as to the suitability of the standards set forth herein for any particular application. The determination of the suitability of the standard is solely the responsibility of the user. Users are cautioned to refer to manufacturer' s instructions, product labels, product data sheets, and other relevant literature, respecting any materials or equipment mentioned herein. These standards are subject to change without notice.

By publication of this standard, Semiconductor Equipment and Materials International (SEMI) takes no position respecting the validity of any patent rights or copyrights asserted in connection with any items mentioned in this standard. Users of this standard are expressly advised that determination of any such patent rights or copyrights, and the risk of infringement of such rights are entirely their own responsibility.

SEMI INTERNATIONAL STANDARDS



FACILITIES

Semiconductor Equipment and Materials International

SEMI F1-96

SPECIFICATION FOR LEAK INTEGRITY OF HIGH-PURITY GAS PIPING SYSTEMS AND COMPONENTS

NOTE: This entire document was revised in 1995.

1 Purpose

This specification defines the leak testing requirements and leakage rates for high-purity gas piping systems and components used in semiconductor manufacturing. It is also intended as an aid in the procurement and installation of equipment, materials, and services.

2 Scope

2.1 This specification applies to high-purity gas piping systems and components used in semiconductor manufacturing facilities and comparable research and development areas.

2.2 It includes testing methods for complete systems, subsystems, and individual components.

2.3 It states requirements for both the user and manufacturer and establishes leak rate limits for acceptance testing and qualification testing.

3 Limitations

3.1 This specification is not a replacement for safety regulations. It is the responsibility of the user to ensure that piping systems and components comply with all applicable safety regulations.

3.2 Interferences

3.2.1 Mass spectrometer leak testing with helium can result in misleading indications due to high permeability of polymeric materials by helium. Permeation is often indicated by a delayed leakage indication and a continually rising apparent leakage rate. Helium tracer gas under pressure is absorbed by permeable materials, and subsequent desorption can inhibit later testing at sensitive levels. Therefore, perform the tests in this order: inboard, internal, and outboard.

3.2.2 For low pressure tests, 1 MPa (147 psig) or less, the space to be filled with tracer gas must be purged or evacuated to avoid dilution. This applies both to enclosures and to the interiors of test objects.

3.2.3 Long tubing lines or small diameter tubing at an inlet may require purging to ensure that the tracer gas reaches the test object.

3.2.4 Conductance between the test object and the leak detector must be adequate to ensure test sensitivity. Restrictions such as regulators or check valves between

the test object and the leak detector may require testing the test object before installing the downstream components.

3.2.5 Air flow can severely hinder capture of leaking gas by a detector probe. If possible, such air flow should be reduced to a minimum during testing. If testing must be performed in an area with substantial air flow, a protective film, such as is described in ASTM E 499, Method B, should be placed around the probe tip when examining each joint.

3.2.6 Temperature variations may affect leak performance. However, this specification does not address this effect.

4 Referenced Documents

All documents cited shall be the latest published revisions.

4.1 SEMI Document

SEMI S2 — Safety Guidelines for Semiconductor Manufacturing Equipment

4.2 ASTM Standards¹

E 493 — Standard Test Methods for Leaks Using the Mass Spectrometer Leak Detector in the Inside-Out Testing Mode

E 498 — Standard Methods of Testing for Leaks Using the Mass Spectrometer Leak Detector or Residual Gas Analyzer in the Tracer Probe Mode

E 499 — Standard Methods of Testing Leaks Using the Mass Spectrometer Leak Detector in the Detector Probe Mode

5 Terminology

5.1 *acceptance test* — A test conducted on each component, subsystem, or system produced. It is the basis for acceptance or rejection by the purchaser. The purpose of acceptance testing is to provide a check to ensure that the component, subsystem, or system has been properly assembled or manufactured.

5.2 *component* — An individual piece or a complete assembly of individual pieces capable of being joined

¹ American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

with other pieces or components. The typical components referred to by this specification are valves, fittings, regulators, pressure gauges, pressure and flow sensors, and tubing welded to fittings.

5.3 design pressure — Of a system or subsystem, the pressure at the most severe condition of internal and external pressure expected during normal service. The maximum pressure expected in any portion of a system or subsystem is typically determined by the maximum adjustable setting of the last pressure regulator that supplies it, the supply pressure to the regulator, or the actuation pressure of any relief device incorporated.

5.4 high-purity — Of a system, subsystem, or component used for the control of chemicals (gases or liquids), designed and constructed in such a manner that it does not introduce significant impurities, particulate or molecular, into the flow stream it controls or regulates.

NOTE: Such systems, subsystems, or components are designed and constructed such that, if an impurity is introduced into the flow path, it can be readily purged to an insignificant level.

5.5 leak — A path (or paths) in a sealed system that will pass tracer gas when a pressure differential or diffusion path exists. There are two leak mechanisms: a mechanical passage and a material through which gas can diffuse or permeate. A leak may have both mechanisms operating in parallel.

5.6 leakage, inboard — Leakage from outside to inside occurring when the internal pressure is less than the external pressure acting on a component. Inboard leakage is typically determined by introducing a tracer gas around the exterior of the piping system or component under test.

NOTE: Inboard leak tests are easier tests to conduct to high sensitivity levels, but are typically not indicative of pressurized operating conditions. It is difficult to correlate an inboard leak test to the performance of a component, subsystem, or system when under internal pressure. Also, the internal collapsing forces created by external pressure may mask leaks which may exist under pressurized operating conditions.

5.7 leakage, internal — Leakage occurring within a component across a flow barrier, such as the seat of a closed valve.

5.8 leakage, outboard — Leakage from inside to outside occurring when the internal pressure is greater than the external pressure acting on a component. Outboard leakage is typically determined by introducing a tracer gas into the interior of the piping system or component under test.

5.9 may — A term indicating that a provision is neither required nor prohibited by this specification.

5.10 measured leak rate — The rate of leakage of a given component, subsystem, or system measured under specific conditions and employing a tracer gas.

NOTE: When testing with high-pressure 100% helium on a mass spectrometer leak detector, measured leak rates must be converted to equivalent standard leak rates.

5.11 qualification test — A test conducted on samples of production articles manufactured to a single design to establish the performance rating of a product. The tests are extensive and closely controlled and completely analyze the characteristics of a component for use in a high-purity installation.

5.12 rated pressure — The manufacturer's recommended maximum allowable operating pressure at the manufacturer's rated temperature.

5.13 shall — A term indicating that a provision is a requirement of this specification.

5.14 should — A term indicating that a provision is recommended as good practice but is not a requirement of this specification.

5.15 shutoff valve — A valve designed for, and capable of, positive closure to prevent flow within a system. Typical shutoff valves include manually actuated, power-actuated, or spring-actuated, fail-safe shutoff valves. Generally excluded are self-actuated valves such as check valves, pressure regulators, flow controllers, and other devices not intended to provide positive shutoff.

5.16 standard leak rate — The flow of helium at 21.1°C (70°F) and 101.3 kPa (1 atm) through a leak when the partial pressure of helium on the high side is 101.3 kPa and the partial pressure on the low side is below 133 Pa (1 torr).

NOTE: Express leak rates in kiloPascal-liters per second (kPa-L/sec). Calculate the standard leak rate of helium from the measured leak rate by multiplying by the ratio of 101.3 kPa to the partial pressure of helium, as follows:

$$\text{Standard} = \frac{101.3 \text{ kPa}(1 \text{ atm}) \times \text{measured leak rate}}{\text{actual He partial pressure}}$$

5.17 subsystem — An assembly of two or more components manufactured as a single entity. A subsystem must be combined with one or more additional components or subsystems to form a complete system. The typical subsystems referred to by this specification are gas source manifolds, gas distribution manifolds, and gas control manifolds within the process equipment.

5.18 *system* — An integrated structure of components and subsystems capable of performing, in aggregate, one or more specific functions. For the purpose of this specification, a system includes the gas source manifold, its connection to the gas source, the distribution piping, and the gas control manifold within the process equipment.

7.3.2 Isolate portions of a system that are not being tested during the test.

7.3.3 Tracer gas pressure shall not exceed the manufacturer's pressure rating.

7.3.4 Conduct leakage tests at a temperature between 18°C (64°F) and 26°C (78°F).

6 Ordering Information

Orders for equipment or services requiring leak testing in accordance with this specification shall include:

- a. This specification number and date of issue.
- b. Acceptance test requirements and applicable test paragraphs of this specification for the specific product being purchased.
- c. Qualification test requirements, if any, and applicable test paragraphs of this specification for the specific product being purchased.
- d. The design pressure to be used for internal and outboard leakage testing of systems, subsystems, or components.
- e. Whether certification of the qualification or acceptance tests and a report of test results is required.

7 Requirements

7.1 *Personnel Qualifications* — Personnel performing tests in accordance with this specification shall have suitable training and experience. Such personnel should, as a minimum:

- a. be trained and experienced in the use of mass spectrometer leak detectors,
- b. be familiar with the use of the ASTM test methods referenced by this specification, and
- c. be familiar with the operation and calibration of the specific equipment used in performing the tests.

7.2 Tests

7.2.1 Prior to initial operation, test each component, subsystem, and system in accordance with this specification.

7.2.2 If repairs or additions are made after the leakage tests, retest the affected portions of the component, subsystem, or system.

7.3 Test Conditions

7.3.1 All joints, including welds, shall be uninsulated, unpainted, and exposed for examination during the test.

7.4 Leak Rate Limits

Table 1

<i>Direction</i>	<i>Component</i>	<i>Component</i>	<i>Subsystem</i>		<i>System</i>	
	<i>kPa - L/sec</i>	<i>atm - cc/sec</i>	<i>kPa - L/sec</i>	<i>atm - cc/sec</i>	<i>kPa - L/sec</i>	<i>atm - cc/sec</i>
Inboard	10^{-10}	10^{-9}	10^{-9}	10^{-8}	10^{-10} (per point)	10^{-9}
Internal	10^{-10}	10^{-9}	10^{-10}	10^{-9}	10^{-10}	10^{-9}
Outboard	10^{-10}	10^{-9}	10^{-9}	10^{-8}		1 ppm
			(or 1 ppm increase in atmospheric concentration if by probe method)		1 ppm increase in atmospheric concentration	

NOTES:

- The internal leakage specifications apply only if the test object is rated for positive closure.
- The internal leakage specification applies to each positive closure. If positive shutoff devices are in parallel, the specification applies to the parallel devices as a group.
- When piping systems or components employ polymeric seals, the internal and outboard leak rates specified above shall be modified by multiplying the stated values by 100.
- When new construction projects preclude measurement of outboard leakage at the leak rates specified above, the outboard leakage limits shall be modified by multiplying the stated values by 100.

8 Test Methods

8.1 Dangers

8.1.1 Testing of systems, subsystems, or components with high pressure gas could cause explosive rupture of these items, with the resulting fragmentation causing death or serious injury. In addition, if a component of the system under test were to fail, an unrestricted supply of tracer gas could cause pressurization and rupture of the test enclosure. Such testing shall not be performed without shielding that will protect the operator and other personnel in the event of equipment failure. The source of tracer gas should be provided with a suitable device that will limit or shut off the flow in the event of component rupture.

8.1.2 Some elements of a piping system may not be designed for pressurization. Pressurization of such system elements could cause explosive rupture, with the resulting fragmentation causing death or serious injury. Such elements shall not be tested in a manner inconsistent with the manufacturer's specifications. Valves used to isolate these elements of systems must be rated for higher pressure than the proposed test pressure.

8.1.3 Some components may be designed for closure only in one direction or only under pressure or vacuum. Testing of such components in a manner other than that for which they are designed could cause explosive rupture, with the resulting fragmentation causing death or serious injury. Such components shall not be tested in a manner inconsistent with the manufacturer's specifications.

8.2 Tracer Gas — (Unless otherwise specified in Sections 8.4 through 8.6.)

8.2.1 For those tests in which the test object is enclosed in or sprayed with tracer gas, 100% helium.

8.2.2 For those tests in which the test object is pressurized with tracer gas, 101.3 kPa (1 atm) of helium plus nitrogen to pressurize to the design pressure.

8.2.3 The use of helium with a purity level of less than 100 ppb total contaminants and filtered at point of use to less than 0.1 μ m is required.

8.2.4 Inboard tests are performed at one atmosphere.

8.2.5 Internal and outboard tests are performed at the design pressure.

8.3 The use of a dry, oil-free helium mass spectrometer leak detector is recommended to prevent hydrocarbon contamination of the piping system or component during inboard and internal leak testing.

8.4 Components

8.4.1 Inboard

8.4.1.1 *Reference Method* — ASTM E 498, Method A. Component acceptance shall be based upon total component integrity in accordance with ASTM E 498, Article 6.8. Components that are too large to enclose in a single helium envelope may be enclosed in segments to determine total integrity.

8.4.1.2 Test each component for total inboard leakage by introducing helium into a bag or other enclosure around the component. Ensure that the enclosure is sufficiently well-purged of air to minimize dilution of the helium. In instances where the bagging technique is not practical, the inboard leakage method of Section 8.6.1.2 may be substituted.

8.4.1.3 *Test Time* — Monitor the leak rate for 15 seconds.

8.4.2 Internal—Qualification Test

8.4.2.1 *Reference Method* — ASTM E 498, Method A. Connect the outlet side of the closed component to the leak detector. Apply tracer gas at the component's design pressure to the inlet side. Inlet and outlet sides shall be as designated by the manufacturer.

8.4.2.2 *Tracer Gas* — 100% helium.

8.4.2.3 *Test Time* — Monitor the leak rate for 15 seconds.

8.4.3 Internal—Acceptance Test

8.4.3.1 *Reference Method* — ASTM E 498, Method A. Connect the outlet side of the closed component to leak detector. Apply tracer gas at atmospheric pressure to the inlet side. Inlet and outlet sides shall be as designated by the manufacturer.

8.4.3.2 *Tracer Gas* — 100% helium.

8.4.3.3 *Tracer Gas Pressure* — Atmospheric.

8.4.3.4 *Test Time* — Monitor the leak rate for 15 seconds.

8.4.4 Outboard—Method 1

8.4.4.1 *Reference Method* — ASTM E 498, Method B, modified as follows:

- a. Cap the outlet of the component with a high integrity fitting.
- b. For valves and regulators, open the flow path through the component. Install the component in a vacuum chamber. A leak tight gas flow passage must extend from the test component to the exterior of the vacuum chamber.

- c. Connect the leak detector to the vacuum chamber and evacuate the chamber.

- d. Pressurize the test component.

NOTE: Special fixtures may be required to test components with tube stub ends to insure personnel safety and to prevent component damage.

8.4.4.2 *Test Time* — Maintain the test condition for one minute.

8.4.5 *Outboard—Method 2* — Same as for Method 1, except use 100% helium as the tracer gas.

8.4.6 Unassembled Components

8.4.6.1 Components that are assembled by the purchaser, rather than the manufacturer, or that are altered or repaired by the purchaser, shall be tested by the purchaser in accordance with this specification.

8.4.6.2 Test of such components by the purchaser shall not be performed under conditions that exceed the manufacturer's ratings.

8.5 Subsystems

8.5.1 Inboard

8.5.1.1 *Reference Method* — ASTM E 498, Method A. Subsystem acceptance shall be based upon total subsystem integrity in accordance with ASTM E 498, Article 6.8.

8.5.1.2 Test for total inboard leakage by introducing helium into a bag or other enclosure around the subsystem. Ensure that the enclosure is sufficiently well-purged of air to minimize dilution of the helium. In instances where the bagging technique is not practical, the inboard leakage method of Section 8.6.1.2 may be substituted.

8.5.1.3 Test time should be based on actual times to record a standard capillary leak placed at the furthest point in the subsystem from the leak detector.

8.5.1.4 Subsystems that are too large to enclose in a single helium envelope may be tested in segments to determine total integrity.

8.5.2 Internal—Method 1

8.5.2.1 *Reference Method* — ASTM E 498, Method A, modified as follows:

- a. Close the shutoff valve and pressurize the inlet with tracer gas.
- b. Connect the leak detector to the closest point available to the valve outlet. Keep the evacuated portion of the subsystem as small as practicable.

8.5.2.2 Test each subsystem for internal leakage of each shutoff valve.

8.5.2.3 Test time should be based on actual times to record a standard capillary leak placed at the furthest point in the subsystem from the leak detector.

8.5.3 *Internal—Method 2* — As in Method 1, except use 100% helium as the tracer gas.

8.5.4 *Outboard—Method 1*

8.5.4.1 *Reference Method* — ASTM E 493, Method B, modified such that the subsystem shall be prefilled and maintained at constant pressure during the test.

NOTE: The pressure may be different for different portions of the subsystem.

8.5.4.2 *Test Time* — Monitor the leak rate for 15 seconds.

8.5.5 *Outboard—Method 2*

8.5.5.1 *Reference Method* — ASTM E 499, Method A, direct probing. Examine each joint with a detector probe.

8.6 *Systems*

8.6.1 *Inboard*

8.6.1.1 *Reference Method* — ASTM E 498, Method A.

8.6.1.2 Test each system for total inboard leakage by spraying a small stream of tracer gas around each point of possible leakage.

8.6.1.3 Test time should be based on actual times to record a standard capillary leak placed at the furthest point in the system from the leak detector.

8.6.2 *Internal*

8.6.2.1 *Reference Method* — ASTM E 498, Method A, modified as follows:

- a. Close the shutoff valve and pressurize the inlet with tracer gas.
- b. Connect the leak detector to the closest point available to the valve outlet. Keep the evacuated portion of the subsystem as small as practicable.

8.6.2.2 Test each subsystem for internal leakage of each shutoff valve.

8.6.2.3 Test time should be based on actual time to record a standard capillary leak placed at the furthest point in the subsystem from the leak detector.

8.6.3 *Internal—Method 2* — Same as in Method 1, except use 100% helium as the tracer gas.

8.6.4 *Outboard*

8.6.4.1 *Reference Method* — ASTM E 499, Method A, Direct Probing. Each joint shall be examined with a detector probe.

9 Certification

When specified in the purchase order or contract, the manufacturer's or supplier's certification shall be furnished to the purchaser stating that the articles furnished have been tested in accordance with applicable paragraphs of this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

10 Related Documents

10.1 *ANSI Standard*²

ANSI/ASME B31.3 — Chemical Plant and Petroleum Refinery Piping

10.2 *ASTM Standards*³

ASTM E 425 — Standard Definitions of Terms Relating to Leak Testing

ASTM E 479 — Standard Guide for Preparation of a Leak Testing Specification

10.3 *Other Document*⁴

McMaster, Robert C., ed., *Nondestructive Testing Handbook*, 2nd ed., Volume One: Leak Testing.

2 American National Standards Institute, 1430 Broadway, New York, NY 10018

3 American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

4 American Society for Nondestructive Testing, 4153 Arlingate Plaza, Caller Number 28518, Columbus, OH 43228



NOTICE: These standards do not purport to address safety issues, if any, associated with their use. It is the responsibility of the user of these standards to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. SEMI makes no warranties or representations as to the suitability of the standards set forth herein for any particular application. The determination of the suitability of the standard is solely the responsibility of the user. Users are cautioned to refer to manufacturer's instructions, product labels, product data sheets, and other relevant literature respecting any materials mentioned herein. These standards are subject to change without notice.

The user's attention is called to the possibility that compliance with this standard may require use of copyrighted material or of an invention covered by patent rights. By publication of this standard, SEMI takes no position respecting the validity of any patent rights or copyrights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of any such patent rights or copyrights, and the risk of infringement of such rights, are entirely their own responsibility.



SEMI F2-94 (Withdrawn 0703) SPECIFICATION FOR 316L STAINLESS STEEL TUBING FOR GENERAL PURPOSE SEMICONDUCTOR MANUFACTURING APPLICATIONS

NOTICE: This document was balloted and approved for withdrawal in 2003.

1 Purpose

The purpose of this specification is to identify the applicable ASTM tubing specification requirements and to define the special material chemical composition requirements for 316L stainless steel tubing which is to be used for general purpose applications in semiconductor manufacturing facilities.

SEMI F3-94 (Withdrawn 1103)

GUIDE FOR WELDING STAINLESS STEEL TUBING FOR SEMICONDUCTOR MANUFACTURING APPLICATIONS

NOTICE: This document was balloted and approved for withdrawal in 2003.

1 Purpose

1.1 The purpose of this guide is to provide instructions to increase the awareness of the user to the available procedures for welding stainless steel gas distribution systems, and to provide information from which subsequent evaluations and standardization can be derived.

2 Scope

2.1 This guide covers the general requirements for the welding of stainless steel gas distribution systems.

3 Referenced Documents

NOTE: The following documents become part of the guide to the extent that they are included herein.

3.1 The referenced documents are to be their current edition as published by their sponsors.

3.2 SEMI Specification

SEMI F2 — Specification for 316L Stainless Steel Tubing for General Purpose Semiconductor Manufacturing Applications

3.3 ANSI/ASME Specifications¹

B16.25 — Butt Welding Ends

B31.3 — Chemical Plant and Petroleum Refining Piping

Boiler and Pressure Vessel Code — Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators

3.4 AWS Specification²

AWS D10.9 — Specification and Qualification of Welding Procedures and Welders for Piping and Tubing

3.5 ASTM Specification³

¹ American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017

² American Welding Society, 550 NW LeJeune Road, P.O. Box 351040, Miami, Florida 33135

A450 (Section 25) — General Requirements for Carbon, Ferritic Alloy, and Austenitic Steel Tubes

4 General Requirements

4.1 All welding performed under this guide should conform to the applicable requirements of the ASME Boiler and Pressure Vessel Code, Section IX, ANSI B16.25, B31.3 Chapter V, and AWS D10.9, to the extent that they are included herein.

5 Materials

5.1 All materials to be welded should be manufactured to ASTM specifications and so certified by the manufacturer. Certification should conform to ASTM A-450, Section 25.

5.2 All seamless austenitic stainless steel tubing should be in conformance with SEMI F2.

6 Testing of Welders

6.1 All welds should be based upon Welding Procedure Specifications and be documented with associated Procedure Qualification Records in accordance with ASME Boiler and Pressure Vessel Code, Section IX, or with AWS D10.9.

6.2 Qualification of the welding procedures to be used, and of the performance of welders and welding operators, should conform to the requirements of the ASME Boiler and Pressure Vessel Code, Section IX, Articles II and III, or AWS D10.9.

7 Welding Procedure

7.1 Component Preparation

7.1.1 All weld end preparation should be done in such a manner as to minimize the introduction of contaminants into the system.

7.1.2 All cutting of component or tubing weld ends should be done with a sharp-edged tool. No lubricants of any kind should be allowed.

7.1.3 All component and tubing weld ends that are to be cut should be de-burred without chamfering.

7.1.4 All welding ends requiring preparation for procedures requiring the use of filler material should be prepared in accordance with ANSI/ASME B16.25.

³ American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

7.1.5 Surfaces for welding should be clean and should be free from oxidation, discoloration, oil, scale, chips, or other material that is detrimental to welding.

7.1.6 All components should be maintained in a clean condition until welded into the system.

7.2 Welding Requirements

7.2.1 Welding equipment used to make welds should be operated in accordance with the manufacturer's operating and safety instructions.

7.3 Welding Procedures

7.3.1 Prior to the welding of a particular size, wall thickness, alloy, and heat of material, sample welds should be made, dissected, and analyzed.

7.3.2 These welds should be checked for poor penetration, joint contamination, joint soundness, surface oxidation, discoloration, pitting, cracking, defects of fit-up, or defects of workmanship.

7.3.3 Once a sample weld is found to be acceptable, the sample weld should be the on-site work sample against which other welds of the same size, wall thickness, alloy, and heat of material are judged. All essential and supplementary essential variables should be documented in the procedure qualification record.

7.3.4 Any significant deviation(s) from the on-site work sample (7.3.3) will cause the weld(s) to be rejected. Rejected welds should be removed and replaced.

7.3.5 Sample test welds should be made periodically. These tests should be compared to the on-site work sample (7.3.3). Deviation from the on-site work sample should be cause for rejection. The sample test welds should be made at/when:

1. The beginning of each shift.
2. The end of each shift.
3. Any change in welding procedure, materials, tubing size, equipment, or equipment adjustments are made.
4. Any time that a concern or deviation to the weld quality has occurred.

7.3.6 Sample test welds should be kept on file and may be reviewed at any time during the construction.

7.3.7 Where a weld is found defective, the preceding two welds should be tested as indicated in Paragraph 7.3.2. If either of these welds shows signs of poor penetration, joint contamination, lack of joint soundness, surface oxidation, discoloration, pitting, cracking, defects of fit-up, or defects of workmanship,

then all welds made since the last welding procedure was established should be removed and replaced.

7.4 Weld Set-up

7.4.1 Check parameters and verify that they are in accordance with the qualified welding procedure.

7.5 Purging

7.5.1 During welding, all tubes, fittings, valves, sub-assemblies, and all other components should be continuously purged.

7.5.2 Automatic orbital head welding equipment should supply a constant gas-backing shield to the weld head during welding.

7.5.3 During all welding, a sufficient amount of purge/shield gas should be maintained until the weld head is removed from the newly welded parts.

7.5.4 Both purge/shield gas supply lines should contain flow indicators to ensure proper purging.

7.6 Weld Identification

7.6.1 A daily log should be maintained on all welds, and as-built drawings recording all data should be maintained in the welding area.

7.6.2 All welds should be identified with a code number and cross-referenced with the drawings for future evaluation.

7.7 Additional Requirements

7.7.1 Maintain sufficient distance between weld joints and valve seats to avoid damage to valve seats or valve stem tips.



NOTICE: These standards do not purport to address safety issues, if any, associated with their use. It is the responsibility of the user of these standards to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. SEMI makes no warranties or representations as to the suitability of the standards set forth herein for any particular application. The determination of the suitability of the standard is solely the responsibility of the user. Users are cautioned to refer to manufacturer's instructions, product labels, product data sheets, and other relevant literature respecting any materials mentioned herein. These standards are subject to change without notice.

The user's attention is called to the possibility that compliance with this standard may require use of copyrighted material or of an invention covered by patent rights. By publication of this standard, SEMI takes no position respecting the validity of any patent rights or copyrights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of any such patent rights or copyrights, and the risk of infringement of such rights, are entirely their own responsibility.

APPENDIX 1

SAMPLE WELDING SPECIFICATION

NOTE: This related information is not an official part of this SEMI guide and is not intended to modify or supercede the official guide. It has been derived from industry specifications. Publication was authorized by full letter ballot procedures. Determination of the suitability of the material is solely the responsibility of the user.

A1-1 General

A1-1.1 The entire piping system will be kept under a continuous purge until all welding is complete.

A1-1.2 All tools and fixtures used for the assembly and welding shall be maintained clean and shall not be removed for use outside of the Class 100 preparation area.

A1-2 Tubing Preparation Requirements

A1-2.1 Use only tools and handling techniques that will not mar, disturb the shape of, or in any way reduce the quality of the materials used in this system.

A1-2.2 Tubing must be under inert gas purge during the cutting and end-facing/truing operation.

A1-2.3 Tube ends shall be covered while the purge is removed using a technique that will minimize the amount of infiltration or contamination. Covers shall be of non-particulating material.

A1-2.4 Cut ends shall be de-burred and faced to be square to an appropriate tolerance, per orbital welding equipment manufacturer's recommendation. The tubing shall not be scratched during de-burring. Abrasive wheels shall not be used. A lathe, milling, or portable end prep tool that clamps to the exterior of the tube is permitted.

A1-2.5 Make all necessary preparations for installing tubing and tube sub-assemblies so that exposure of the interior surface to atmosphere is minimized.

A1-2.6 Tubing and tube sub-assemblies shall be mechanically fitted into place, dimensionally verified, clearances verified, welding parameters set, and all pre-weld procedures completed in readiness to begin the welding process prior to removing protective covers.

A1-3 Welding Process Requirements

A1-3.1 Welding shall be by the gas tungsten arc welding (GTAW) process with backing shielding and inside tubing purge. All stainless steel tubes shall be joined using an automatic orbital butt-welding machine.

A1-3.2 During welding, all gas lines must be continuously purged.

A1-3.2.1 Stainless steel tubing purge lines shall be used. Flow measurement and control shall be with a clean rotameter.

A1-3.2.2 Weld shield purge gas shall be filtered with a 0.01 μ m filter connected to the inlet bulkhead fitting of the welder.

A1-3.3 Every weld shall be tagged, logged, and inspected.

A1-3.3.1 A daily log shall be maintained on all welds and an as-built isometric drawing recording all data shall be maintained in the welding area.

A1-3.3.2 All welds shall be identified with a code number and cross-referenced with the isometric drawings for future evaluation.

A1-3.4 As much welding as is feasible will be performed in the preparation area in the form of sub-assemblies.

A1-3.5 Alignment of tubing of nominal size 2" in diameter and larger for orbital welding shall be by an external clamping jig where space permits.

A1-3.6 Valves shall be located so as to allow space to operate the valve after installation at the job site.

A1-4 Welding Procedure Requirements

A1-4.1 All materials, testing of welders, and welding procedures shall comply with the requirements of SEMI F3.

A1-4.2 Set up the fabrication in a suitable preparation area or at the job site.

A1-4.3 Make all necessary preparations for installing tube and tube sub-assemblies such that exposure of the interior surface to atmosphere is minimized. Insure that there is purge flow prior to welding.

A1-4.4 On tubes larger than a nominal size of 1/2" , place a reducing cap on the discharge end of the tube with a 12-mm (0.5") or smaller outlet.

A1-4.5 Insert the tube ends into the orbital tube weld holder for butt-welding.

A1-4.6 Perform only one weld joint at a time.

A1-4.7 The completed sections of the piping system should never be without positive purge pressure and flow to all system extremities. System extremities should *not* be capped in such a way as to permit purge flow to stop. This purge must be maintained at all times, including overnight and during weekends and breaks.

A1-4.8 Sub-assemblies, after completion, shall be purged and covered for subsequent installation in the field.

A1-4.9 A backing shield (purge through the weld head) is required during welding.

A1-4.10 Where a weld is found defective, the preceding two welds should be tested as described in Paragraph 7.3.2 of SEMI F3. If either of these welds shows signs of poor penetration, joint contamination, lack of joint soundness, surface oxidation, discoloration, pitting, cracking, defects of fit-up, or defects of workmanship, then all welds made since the last welding procedure was established should be removed and replaced.

A1-4.11 On-site work sample welds shall be made before each series of welding operations. On-site sample welds shall also be made at the start of each workday and any time any welding parameter is changed.

A1-4.12 Sample test welds shall be made periodically. These tests shall be compared to the on-site work sample. Deviation from the on-site work sample shall be cause for rejection. The sample test welds shall be made at/when:

1. The beginning of each shift.
2. The end of each shift.
3. Any change in welding procedure, materials, tubing size, equipment, or equipment adjustments are made.
4. Any time a concern or deviation to the weld quality has occurred.

A1-4.13 If the system becomes contaminated due to a fabrication technique, the contaminated sections shall be re-cleaned.

A1-4.14 Welding at the job site shall be enclosed in a clean work area.

A1-4.15 When the welding is performed in a clean envelope, the envelope shall have openings for the tube to extend in two directions, a clean polyester film window, and openings for the hands. HEPA-filtered air shall be supplied to the envelope under pressure to ensure a clean working environment.

A1-4.16 The envelope shall be installed prior to removal of the tube caps. Full purge through the tube to be welded shall be completed before removing the clean envelope to attach the weld head.

A1-4.17 Final positioning of the weld head and weld process shall be performed within the clean envelope.