

AT&S General Storage- and Processing Conditions for products using Embedded Component Packaging, ECP® Technology (“General Storage- and Processing Conditions ECP®”)

Any warranties, guarantees, representations or similar assurances provided by AT&S Austria Technologie & Systemtechnik Aktiengesellschaft, Fabriksgasse 13, 8700 Leoben, Austria, including its affiliated companies (hereinafter referred to as “AT&S”), are based on the prerequisite that AT&S’s products are stored and processed appropriately. These General Storage- and Processing Conditions provide an overview about those prerequisites. In case the General Storage- and Processing Conditions are not adhered to, AT&S disclaims any liability and warranty or implied warranty, including but not limited to liability or warranty claims concerning “solderability” or “resistance of delamination”.

ECP® (Embedded Component Packaging) technology uses the space in an organic, laminate substrate (Printed Circuit Board) for active and/or passive components. Those components will be integrated in the core of the PCB and connected by copper plated micro-vias.

The delivery form of products using ECP® technology can be either packages, which are considered as a surface mount device, or larger printed circuit boards used as carrier or mainboard for surface mount devices.

IPC-Standards J-STD-033 „Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices“ and IPC-1601 “Printed Board Handling and Storage Guidelines” must generally be complied with by the contracting party, unless otherwise specified in the General Storage and Processing Conditions ECP® or otherwise agreed in writing between AT&S and the contracting party.

General Conditions for storage:

ECP® technology uses hygroscopic materials, which means that those materials absorb humidity from the air during storage. The absorbed humidity evaporates in an extremely short time during the „Re flow Solder Process“, which under certain circumstances could lead to delamination. For ECP® products using Rigid-Flex (RFPC) materials, this phenomenon is even more distinct.

To avoid absorption of humidity, following storage conditions are mandatory for packed ECP® products:

Temperature: 20 °C ± 5°C
Relative humidity: max. 60 %

Under the above storage and processing conditions ECP® products can be soldered **3x Reflow** (profile: IPC J-STD 020 / clause 5.6). The time in **unpacked** condition between two reflow cycles shall in no case be more than **24 (twenty-four) hours maximum**. AT&S recommends the time in unpacked condition between two reflow cycles not to exceed 12 (twelve) hours, otherwise AT&S shall be consulted in advance.

AT&S does only warrant for the solderability and resistance to delamination during assembly of ECP® products if the contracting party proves, upon notification of a defect, that the affected ECP® products were stored and treated in accordance with the conditions stipulated in this document.

Drying:

For the above reasons drying of ECP® products before the thermal impact of assembly is recommended as stated below. If appropriate, this drying of the ECP® products might be repeated:

- For ECP® products using Rigid-Flex (RFPC) materials, a drying step is mandatory before assembly.
- In case of storage of packed ECP® products between 6 (six) and 12 (twelve) months between manufacturing date of the ECP® product and soldering by the contracting party, ECP® products must be dried promptly before soldering – see 2) below.
- For ECP® products packed in Tape and Reel, drying is only mandatory if floor life or shelf life is expired. The drying temperature must not exceed 40°C. For drying times, floor life time and shelf life time, refer to J-STD-033.

General Conditions for processing ECP® products:

Surface Finish Technology	Shelf life, packed [month]	Floor life [hrs] in unpacked condition ¹⁾			Comments Drying ²⁾
		Moisture Sensitivity Level			
		Double-Sided	Multilayer	Rigid Flex	
OSP Organic Surface Protection	6	<48h	<24h	<6h	Not possible, only refreshing at AT&S ³⁾
		5	5a	6	
Chemical Tin	9	<48h	<24h	<6h	After thermal stress (e.g. drying) a reduction of the solderability can occur. Observed sampling production is recommended. Refreshing of the tin surface is possible ³⁾ .
		5	5a	6	
ENEPIG E'less Nickel E'less Palladium Immersion Gold	12	<48h	<24h	<6h	Possible
		5	5a	6	
ENIG E'less Nickel Immersion Gold	12	<48h	<24h	<6h	Possible
		5	5a	6	

Table 1: General conditions for processing of ECP® products

1) Floor life means the allowable time period between removal of moisture-sensitive devices from a moisture-barrier bag, dry storage, or dry bake and the solder process.

2) General drying conditions:

ECP® Type	Double-Sided (DS) 1 relamination	Multilayer (ML) ≤ 3 relaminations	Multilayer (ML) ≥ 4 relaminations	Rigid-flex
Center Core ECP®	125 +10/- 0°C 7 hours	125 +10/- 0°C 7 hours	125 +10/- 0°C 10 hours	125 +10/- 0°C 10 hours
Standard ECP® (with Adhesive)	90 +8/- 0°C 24 hours	90 +8/- 0°C 24 hours	90 +8/- 0°C 24 hours	90 +8/- 0°C 24 hours
Time between drying and processing	<48 hours	<24 hours	<24 hours	< 6 hours

Table 2: Drying conditions for ECP® products

3) Refreshing is only possible on array (strip) - level. Array (strip) in this case means that modules are not yet singularized but are shipped back in arrays (strips) as delivered by AT&S.