



Environmental & Technical Requirements of Packaging Materials

CONTENT

1. **SCOPE**
2. **APPLICABLE DOCUMENTS**
3. **ACRONYMS**
4. **APPROVED PACKAGING MATERIALS & TECHNICAL REQUIREMENTS**
5. **ENVIRONMENTAL REQUIREMENTS**
6. **REQUIRED MATERIAL AND TESTING DATA**

1. SCOPE

This specification provides all TE sites and TE suppliers with packaging environmental and technical requirements, which are the minimum to trade and cooperate with EMEA region according to legal regulations.

2. APPLICABLE DOCUMENTS

The following documents constitute a part of this procedure to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. (See DocLink or appropriate document management system for the latest revision).

2.1. TE Specifications

- TEC-138-702 Supplier Requirements for Product Environmental Compliance
- 107-18035 Guideline for the Manufacturing of Thermoformed Standard Trays
- 107-18036 Guideline for the Manufacturing of Extruded Plastic Tubes
- 107-18044 Tape and Reel Packaging
- 107-18048 Assembly of Standard Corrugated Reel PN 973053
- 107-18086 Corrugated Shipping Boxes

2.2. Industry Standards

- AFERA 5001 Self Adhesive Tapes - Measurement of Peel Adhesion from Stainless Steel or from its own Backing
- AFERA 5004 Test Method for Breaking Strength and Elongation of Pressure Sensitive Tape EN 14410 2003
- AFERA 5006 Self Adhesive Tapes - Measurement of Thickness EN 1942 2003
- ASTM D 1000 Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
- DIN 6120 Marking of Packaging Material for Recycling
- EIA 481 Taping of Surface Mount Components for Automatic Handling
- EIA/IS-704 72 mm through 200 mm Carrier Tapes for Packaging Components for Automatic Handling
- EN 13427 Requirements for the use of European standards in the field of packaging and packaging waste
- EN 13698-1 Timber 4 Way Flat Pallets 800x1200 mm ("EURO pallet")
- EN 13698-2 Timber 4 Way Flat Pallets 1000x1200 mm ("Block pallet")
- EN 60068-1 Environmental testing, general and guidance

- EN 61340-2-3 Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation
- EN 61340-5-3 Protection of electronic devices from electrostatic phenomena - Properties and requirements classifications for packaging intended for electrostatic discharge sensitive devices
- FINAT FTM 12 Adhesive Coat Weight
- IEC (EN) 60286-3 Packaging of Surface Mount Components on Continuous Tapes
- IPC/JEDEC J-STD-033 Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices
- ISPM 15 International Standards for Phytosanitary Measures – Regulation of Wood Packaging Material in International Trade
- UIC-435-2 Quality Standard for an European Timber 4 Way Flat Pallet with a Size of 800 x 1200 mm

2.3. Other Documents

- ISO/TR 18568:2021 Packaging and the environment — Marking for material identification
- EU Directive 94/62 EC Packaging and Packaging Waste
- EU Directive 97/129 EC Identification system for packaging materials
- EU Directive 2011/65/EU Restriction on the use of Certain Hazardous Substances in Electrical and Electronic Equipment)
- EC 1907/2006 EU Regulation about REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) - SVHC (Substances of Very High Concern)

3. ACRONYMS



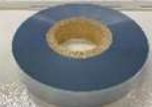



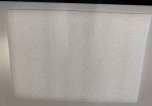









For the purpose of understanding this document, the following abbreviations and acronyms are defined:




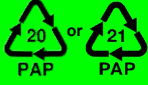



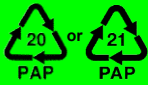

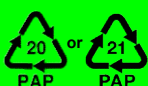


ABS	Acrylonitrile Butadiene Styrene
AFERA	European Association for the Self Adhesive Tape Industry
ASTM	American Society for Testing and Materials
CEN	Comité Européen de Normalisation / European Committee for Standardization
CR	CEN Report
DIN	Deutsches Institut für Normung (German Institute for Standardization)
EIA	Electronic Industries Association
EMEA	Europe, Middle East, Africa
EN	Norme Européenne/ European Standard
EPP	Expanded Polypropylene
ESD	Electro Static Discharge
EU	European Union
FINAT	Fédération Internationale des fabricants et transformateurs d'Adhésifs et Thermocollants sur papiers et autres supports
IATA	International Air Transport Association
ICAO	International Civil Aviation Organizations
IEC	International Electronic Committee
IPC	Institute of Interconnecting and Packaging Electronic Circuits
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
ISPM	International Standard for Phytosanitary Measures
JEDEC	Joint Electronic Device Engineering Council
PC	Polycarbonate
PE	Polyethylene
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinylchloride
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RoHS	Restriction of the use of certain hazardous substances in electrical and electronic equipment














4. APPROVED PACKAGING MATERIALS & TECHNICAL REQUIREMENTS



The following requirements for packaging suppliers are generally valid unless other requirements are documented on the specific TE packaging drawing.
 A simplified version of this overview and further special national requirements will be documented in the attachment [107-18049_ATT_001](#).





Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging	
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol
4.1 Plastic based packaging that requires recycling marking (alphanumeric code) on the packaging material itself							
Carrier Tape 	PET, PS	yes	107-18044	EIA 481 EIA-IS-704 IEC (EN) 60286-3		yes	yes
Extruded Tubes 	PP, PS, PVC	yes	107-18036		can be made of: 	yes	yes
Pallets, Plastic 	PE, PP	yes				yes	yes
Partitions & Inserts, plastic 	PP	yes				yes	yes
Plastic Bags 	PE natural	yes				yes	yes
Reels, Plastic 	ABS, PS	yes	e.g. 973162			yes	yes
Reels, Plastic, for Carrier Tape 	ABS, PS	yes	107-18044 e.g. 973168	EIA 481 EIA-IS-704 IEC (EN) 60286-3		yes	yes
Totes, Plastic 	PE, PP	yes				yes	yes
Trays, thermoformed 	ABS, PS, PET	yes	107-18035		can be made of: 	yes	yes

Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging		
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol	
4.2 Plastic based packaging that does not require recycling marking (alphanumeric code) on the packaging material itself								
Adhesive Tape		PP natural	yes				no	no
Cover Tape for Carrier Tape		PET/PE	yes	107-18044 e.g. 973169	EIA 481 EIA-IS-704 IEC (EN) 60286-3		no	no
Cushioning, bubble pack		PE natural	yes				no	no
Cushioning, foam		PE	yes				no	no
Cushioning, foam		PUR, antistatic	yes	e.g. PN 740994			no	no
Spacer		PE	yes	e.g. PN 740924			no	no
Strapping		PP	yes				no	no
Stretch Film		PE natural	yes	e.g. 725532			no	no

Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging		
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol	
4.3 Paper based packaging that requires recycling marking (alphanumeric code) on the packaging material itself								
Corrugated Packaging (general)		Corrugated, unbleached	yes	107-18086	DIN 55429-2 DIN 55440-1 DIN EN ISO 3037 DIN EN ISO 2759 DIN EN ISO 535 DIN ISO 3039 DIN EN 20187		yes	yes
Folding Cartons		Chipboard/corrugated, unbleached	yes	e.g. 973171			yes	yes
Corrugated Pads		Corrugated, unbleached	yes	e.g. 973163			yes	yes
Corrugated Grid/Divider/Partition		Chipboard/corrugated, unbleached	yes				yes	yes
Reels, Corrugated		Corrugated, unbleached	yes	107-18048 e.g. 973053	DIN 55429-2 DIN EN ISO 3037 DIN EN ISO 2759 DIN ISO 3039 DIN EN 20187		yes	yes
Reels, Corrugated		Chipboard/corrugated board, unbleached	yes	e.g. 298011			yes	yes

Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging		
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol	
4.4 Paper based packaging that does not require recycling marking (alphanumeric code) on the packaging material itself								
Cushioning, paper-based		Paper based, unbleached	yes	e.g. 740045			no	no
			yes	e.g. 973175			no	no
Spacer / Cushioning Strip		Corrugated, unbleached	yes				no	no
Spacer / Cushioning Strip		Chipboard, grey	yes				no	no
Edge Protection		Corrugated, unbleached	yes	e.g. 740726			no	no
Edge Protection		Chipboard, grey	yes				no	no
Interleaving Paper		Kraft paper, unbleached	yes	107-18123			no	no

Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging		
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol	
4.5 Other packaging that requires recycling marking (alphanumeric code) on the packaging material itself								
Dry Pack, Aluminum bag		Aluminum multilayer film (PET/AL/PE)	yes	e.g. 741145	JEDEC J-STD-033 or DIN 55473		yes	yes

Packaging Type	Approved Packaging Material	Required Compliance With			Recycling Symbol	Visible on Packaging		
		TE Drawing	TE Standard Specification	Industry Standard		TE Part Number	Recycling Symbol	
4.6 Other packaging that does not require recycling marking (alphanumeric code) on the packaging material itself								
Dry Pack, Humidity Indicator Cards		Chipboard	yes	e.g. 741147			no	no
Packaging, Wood (general)		Wood	yes		ISPM 15		no	no
Pallets, Wood, expendable		Wood	yes	e.g. 741102	ISPM 15		no	no
Pallets, Wood, reusable (EPAL)		Wood	yes	973059	EPAL ISPM 15 UIC 435-2		no	no

5. ENVIRONMENTAL REQUIREMENTS

Packaging material provided to TE has to be compliant with the following documents and regulations. On request of TE Connectivity the packaging supplier has to provide fully required material information to document compliance with the following mentioned requirements.

On request of TE Connectivity the packaging supplier has to provide an actual chemical analysis test report, listing the measuring results for the substances of the product. Other adequate documents must be accepted by TE Connectivity.

5.1 TE Specification TEC-138-702, Rev. S, Section A.2 TE Hazardous Substance List, Table 2, Section 2.6, Compliance Definition: Restrictions in Packaging Materials.

2.6 Compliance Definition: Restrictions in Packaging Materials			
Substance Category	Classification	Threshold Level	Application(s)
Heavy Metals (Lead, Cadmium, Chromium VI and Mercury)	R	100ppm combined by weight	Packaging or packaging components
Expanded polystyrene (EPS) (CAS No 9003-53-6), loose fill only (Note 10)	R	Intentionally added	
Dimethyl Fumarate (DMF) (CAS No 624-49-7)	R	0.1ppm by weight of product	
See REACH SVHC	C	1000ppm by weight of product	
Methyl bromide (CAS No 74-83-9)	R	Intentionally added	
Any biocides used in treatment of wood packaging or transport material not approved In EU Biocides Directive or other local legislation	B	Intentionally added	
Formaldehyde (CAS No 50-00-0)	B	Intentionally added (Note 5)	Composite Wood products or components
		75ppm by weight of textile product	Textiles
Mercury/Mercury compounds	B	Intentionally added	wood and wooden materials
Arsenic/Arsenic Compounds	B	Intentionally added	
Tar oils and creosotes	B	Intentionally added	

Classification:

- B (Banned):** Prohibited in all listed applications
- R (Restricted):** Prohibited unless explicitly permitted by TE
- C (Substance of Concern):** Required to be declared if present and allowed unless explicitly prohibited by TE to address Industry/ Business Unit specific requirements

Notes:

5. Regulatory thresholds for substances in these applications are based on emission or exposure limits rather than on the concentration in the product. Examples of regulatory limits are:
 Formaldehyde: in hardwood plyboard with veneer core – 0.05 ppm (measured as gaseous emission from product) per California Code of Regulations;
 For Nickel in applications of prolonged skin contact - 0.5 micrograms/sq cm/week per DIN EN 1811;
 Radioactive substances -a dose rate exceeding 1 µSv h⁻¹ at a distance of 0,1 m.
 Because emission and exposure levels cannot be derived from actual concentrations, a threshold level of “intentionally added” is indicated for reporting.

10. This restriction ONLY applies to EPS loose fill (also called EPS peanuts) packaging materials as a fill agent for the packing and shipping of product, NOT to all EPS packaging materials (such as cores for reels or EPS cushioning that is used to pack product).
 The restriction also does NOT apply to expanded polystyrene loose fill packaging materials that comply with the following requirements:
 (1) On and after January 1, 2012, until December 31, 2013, inclusive, it is comprised of at least 60 percent recycled material.
 (2) On and after January 1, 2014, until December 31, 2016, inclusive, it is comprised of at least 80 percent recycled material.
 (3) On and after January 1, 2017, it is comprised of 100 percent recycled material.

In case of discrepancies between TEC-138-702 and 107-18049, TE-138-702 shall apply.

5.2 EU Directive 94/62/EC (Packaging and Packaging Waste) Regarding Content of Heavy Metals, Article 11

The sum of concentration levels of lead (Pb), cadmium (Cd), mercury (Hg) and hexavalent chromium (Cr+6) present in packaging or packaging components shall not exceed 100 ppm by weight.

This means that each individual packaging element (i.e. box, bag, label, strapping, pallet, etc.) must not contain more than 100 ppm by weight of the above four metals combined

$$\text{Pb} + \text{Cd} + \text{Hg} + \text{Cr}^{\text{VI}} < 100 \text{ ppm}$$

This requirement is in accordance with TE specification TEC-138-702, see section 5.1.

5.3 EU Regulation (EC) No. 1907/2006 REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) - SVHC (Substances of Very High Concern)

As an extract of the SVHC list the concentration of the following substances shall not exceed 0,1 % by weight:

- Polybrominated biphenyls (PBB) CAS-No. 59536-65-1
- Polybrominated diphenyl ethers (PBDE) several CAS no.
- Di (2-ethylhexyl) phthalate (DEHP) CAS-No. 117-81-7
- Butyl benzyl phthalate (BBP) CAS-No. 85-68-7
- Dibutyl phthalate (DBP) CAS-No. 84-74-2
- Diisobutyl phthalate (DIBP) CAS-No. 84-69-5

5.4 EU Directive 2011/65/EU RoHS (Restriction on the use of Certain Hazardous Substances in Electrical and Electronic Equipment)

Although packaging materials are not within the scope of the RoHS directive itself, they shall comply with substance restrictions of RoHS.

Regulated substance group heavy metals see section 5.2

Regulated substance group phthalates see section 5.3

Note:

Heavy metal concentration as required by EU directive 94/62/EC (packaging and packaging waste) is more restrictive than EU directive 2011/65/EU (RoHS).

6. REQUIRED MATERIAL AND TESTING DATA

On request of TE Connectivity the packaging supplier has to provide fully required material information such as detailed paper layer composition for corrugated material as well as material data sheets for packaging material.

In addition on request of TE Connectivity the packaging supplier has to provide material test results as follows:

Packaging Type	Testing Method or Standard	Description of Testing Method	Unit of Measure
Adhesive Tape	AFERA 5001	Peel adhesion, adhesive force	N/25 mm
	AFERA 5004	Tensile strength	N/25 mm
		Tensile elongation	%
	AFERA 5006	Material thickness	mm
	ASTM D 1000 (1)	Minimum adhesive force at 70 ° C	N/25 mm
	ASTM D 1000 section 22-29	Tensile strength	N/25 mm
		Tensile elongation	%
	FINAT FTM 1	Peel adhesion (180°) at 300mm per minute	N/25 mm
	FINAT FTM 9	Loop tack measurement	N/25 mm
FINAT FTM 12	Glue thickness	g/m ²	
ISO 4593/DIN 53370	Determination of thickness by mechanical scanning	µm	
Carrier Tape (EIA)	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, (volume resistivity), point-to-point resistance, focussing on inner cavities	Ohm
Corrugated Packaging M	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner and outer surface	Ohm
	EN ISO 12048 or DIN 55440-1	Box Compression Test	N
	DIN EN ISO 2759	Bursting strength (Mullen)	kPa
	DIN EN ISO 535	Cobb-1800	g/m ²
	DIN EN ISO 3037	Edge crush resistance	kN/m
	DIN EN ISO 3039	Paper grammage testing	g/m ²
	DIN EN 20187	Standard atmosphere test conditions	g/m ²
	Cover Tape (EIA)	IEC 60286-3	Peel off force
JIS-K-6734		Tensile Strength	N/mm ²
JIS-K-6911		Surface resistivity of base and sealant layer	Ohm
JIS-K-7105		Luminous transmittance	%
Extruded Tubes	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner and outer surface	Ohm
Foam Cushion	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner and outer surface	Ohm
Interleaving Paper	DIN 53124	ph-value	
	DIN 53125	Chloride content	weight %
	DIN 53127	Sulphur content	weight %
Paper Cushion	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner and outer surface	Ohm
Plastic Bags	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner and outer surface	Ohm
Plastic Trays	IEC 61340-2-3 EN 61340-2-3	Surface resistivity, volume resistivity, point-to-point resistance, focussing on inner cavities	Ohm

(1) Test tapes versus corrugated box instead of steel plate. Test made 20 hours after tape application with a temperature of 70 ° C. All other test criteria according to ASTM D 1000, sections 38-42.