



Instructions for suppliers in the business of packaging

Packing guidelines for suppliers

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1 PREFACE

1.1 Manual purpose

This manual is intended for suppliers that choose new packaging or replace the existing one so as to be suitable for MAHLE Electric Drives Slovenija plants and for the supplier. The manual offers guidelines to all involved in the packaging process. These standards are necessary to ensure general accountability to maintain quality performance and reduce costs. This manual can be updated by additional requirements of the MAHLE Electric Drives Slovenija receiving facility.

1.2 Supplier's responsibility

- Supplier is responsible for appropriate packaging. Goods must be packed in such a way that they do not break or damage, from the manufacturing source to the point of use in MAHLE Electric Drives Slovenija.
- In choosing packaging, the safety of workers must be considered. Packaging weight must not exceed 12 kg and should enable manual handling by one person.
- Dimensions of a packaging unit must be the lowest possible with regards to the assembly line or line feed and not more than 600x400x480.
- Packaging design must protect the product.
- Supplier is responsible for correct labeling.
- In the process of continuous improvement in MAHLE Electric Drives Slovenija the packaging can be changed. The supplier shall respond to the request and manage new packaging changes.
- The returnable MAHLE Electric Drives Slovenija packagings are preferred, in some cases one-way packaging can be used, which must be recyclable.

Additional supplier responsibilities in the case of MAHLE Electric Drives Slovenija provided returnable packaging.

- Supplier is responsible for keeping records of returnable packaging in and out of the supplier location. In case of deviations of a number of packaging, the supplier must inform MAHLE Electric Drives Slovenija.
 - The supplier must have enough stock of packaging.
 - The supplier is responsible to do an annual report of the packaging condition. The report includes a number of packagings with possible deviations and conditions of packagings. In case of damage or lost packaging at the supplier location, MAHLE Electric Drives Slovenija will charge the supplier. Each supplier must develop a contingency plan for alternative packaging, which has to be approved by MAHLE Electric Drives Slovenija.
-

1.3 The process of defining appropriate packaging

MAHLE Electric Drives Slovenija and the supplier will choose the most appropriate packaging together. The process of defining a new packaging has got development, testing and production phase.

Firstly, both parties choose the packaging, then the tests and confirmation follow.

The supplier must consider the protection of a product inside of the packaging unit to prevent any damage during transportation.

1.4 Supplier's quality day

On the Supplier's quality day of MAHLE Electric Drives Slovenija the respect of the agreement of packaging will be considered. Assessment will be made in respect of the prescribed packaging and labeling. Suppliers will be able to introduce all the problems regarding returnable packaging.

2 THE PROCESS OF DEFINING THE RETURNABLE PACKAGING

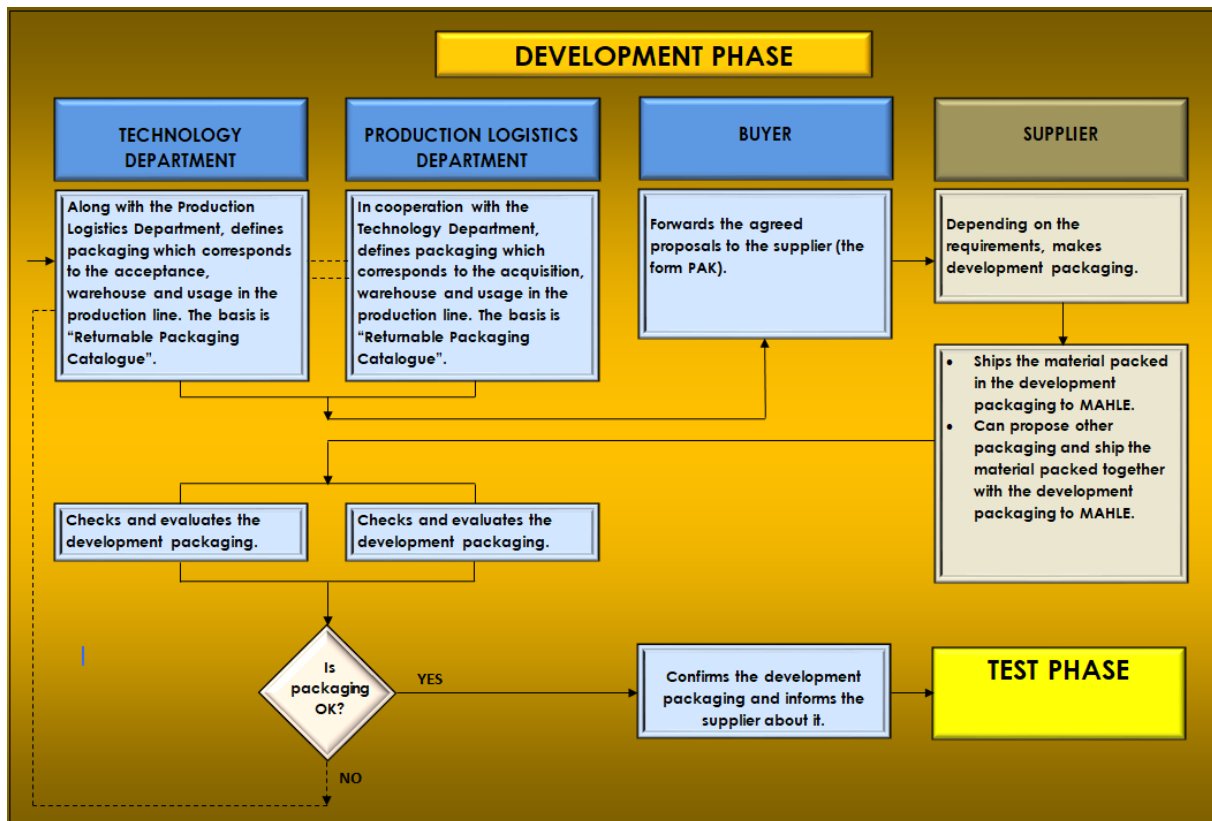
Packaging has to be defined with material when:

- A new product is in the development phase
- Material does not have packaging defined
- Packaging instructions for the material in the system do not exist

2.1 Development phase

In the development stage of raw material, MAHLE Electric Drives Slovenija will choose the appropriate returnable packaging for the supplier or will give the requirements for new packaging. If the new packaging does not suit the supplier, he can choose it from the catalog with the agreement of MAHLE Electric Drives Slovenija. The supplier must comply with the requirements predefined by MAHLE Electric Drives Slovenija. Then the agreement with both parties is made. Exceptionally when the supplier does not meet the packaging in the Catalog, a new packaging can be developed considering the given restrictions.

The supplier can propose a non-returnable packaging, which is fully covered by the supplier. The goods inside the packaging must be protected to avoid damage during transportation.



In defining packaging and packing we have two possibilities:

Basic development for »an unknown part«

- A technologist chooses appropriate packaging, which he wants at a workplace on the shop floor. After compliance with the supplier, he creates instructions for the new part in the Information system packing. Basic packaging must be appropriate for a workplace. Solutions can be found in the Catalogue of returnable packaging in the standardization and unification paragraph.
- Production logistics department in cooperation with the technologist defines handling operations in the warehouse business and production supply. In addition, it defines all packaging levels and palletisation. The aim is that the supplier sends goods in such packaging that there is no further need to repack the basic packaging for storing in warehouses and supply the shop floor.
- Packaging proposals are sent via Purchasing Division to potential suppliers.

Basic or applicative development for »design and purpose known part«

(For example: new rotor, by design same as the existing.)

- Technologist chooses packaging by known principles.
- Technologist creates packing instruction with the link STOC for a new part.
- Packaging and development is driven directly through the PPAP process.
- Coordination with the existing suppliers is minimal.

In the development phase, MAHLE Electric Drives Slovenia will provide the PDS to the supplier

- If there is no specific requirement for packaging, the supplier receives an empty form, which he fills in according to his own packaging options.
- In case of a special request for packaging by MEDS, the supplier receives a form to be filled out by a technologist MEDS (STOC packaging instruction)
- After receipt, the completed form is checked and confirmed by the MEDS services.

PACKAGING DATA SHEET - SERIES

Choose (Finished goods / Component)	Component					
MAHLE production plant:						
1. CONTACT DATA / RELEASE BY						
	SAP No.	Name of MAHLE plant / supplier	Released from	Date	Contact No.	
MAHLE:						
Supplier						
2. PRODUCT DATA					Product photo	
	Identification	Article Code	Unit	Weight (kg)	Dimensions (mm)	
MAHLE:				Piece	L x W x H / Diameters (Ø)	
Supplier						
	YES	NO	COMMENTS			
2.1. Corrosion protection	<input type="checkbox"/>	<input type="checkbox"/>				
2.2. Hazardous goods	<input type="checkbox"/>	<input type="checkbox"/>				
2.3. Cleanliness requirements	<input type="checkbox"/>	<input type="checkbox"/>				
2.4. ESD protection	<input type="checkbox"/>	<input type="checkbox"/>				
2.5. Packaging restriction	<input type="checkbox"/>	<input type="checkbox"/>				
2.6. Packaging stackability	<input type="checkbox"/>	<input type="checkbox"/>				
2.7. Others?	<input type="checkbox"/>	<input type="checkbox"/>				
	YES	NO	Description	Responsible	Department	
2.8. Robotized load / unload process	<input type="checkbox"/>	<input type="checkbox"/>	The part will be handled by a robot? Load / Unload.			
2.9. Load/Unload Packaging instructions?	<input type="checkbox"/>	<input type="checkbox"/>	Does the part need instruction to be handled in the packaging?			
2.10. Parts repacking	<input type="checkbox"/>	<input type="checkbox"/>	Will the part need to be repacked upon arrival at Mahle?			
3. PACKING BILL OF MATERIAL						
* If Finished good/Component does or doesn't have Handling Unit please choose it :						
Package type	QTY.	MAHLE Material-No. Packaging code	Identification / Description	Returnable/ Disposable (oneway)	Ext. Dimensions (mm) L W H	
Handling Unit						
Plastic Box/ Cardboard Box/ Correx Box/ etc.						
Lid						
Other						
Other						
Other						
Internal (layer/ separator/ inlay /blister /plastic bag /bubble bag/ VCI, etc.)						
Number of Layers						
blister						
Weight (kg)			Numbers of parts By Handling Unit	Numbers of		Numbers of parts By Loading Unit
Handling unit	Loading Unit			Layers	Hu per Layers	
Gross	NET	Gross				
-	-	-				
Max. Height per pallet (1,000 mm)				OK	**IF PACKING IS BACKUP P.	
Max. Weight per handling Unit (12 Kg)			-	OK		
Max. Weight per Loading Unit (1.000 Kg)			-	OK		
MAHLE :				SUPPLIER :		
LOGISTICS		QUALITY	PRODUCTION	LOGISTICS		

2.2 Test phase

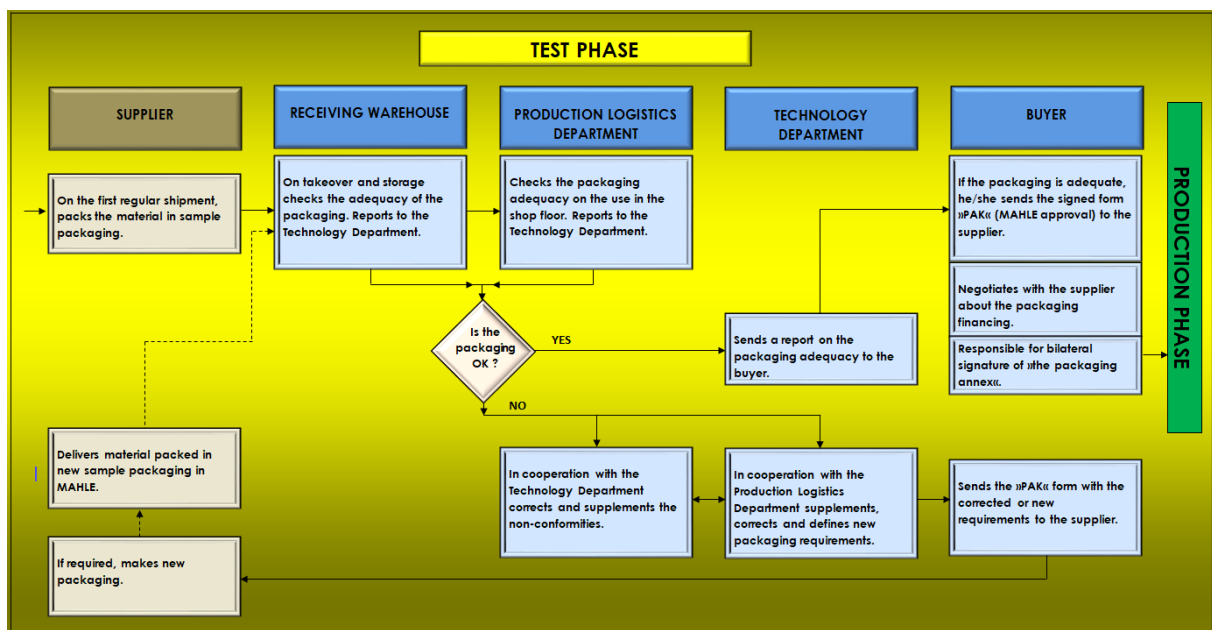
Basic development – new packaging for a completely new design and purpose of new parts.

In coordination with a supplier a new packaging is tested. After the final reconciliation the documents of the packaging are made in the information system. In this phase the technology department forwards a demand for development (PPAP process) to the purchasing department (forward to the supplier). On the first regular shipment (can be done with the PPAP examples), re-examination of appropriateness of the pack is being made to solve possible problems.

Basic development or application development - packaging design and the purpose of the part is already known.

On the first regular shipment from the supplier to MAHLE Electric Drives Slovenija, adequacy of the packaging is checked on acquisition, storage and on the assembly line in MAHLE Electric Drives Slovenija.

If the packaging meets all the criteria, MAHLE Electric Drives Slovenija and the Supplier confirm it with a »packaging annex«. Upon signature, the production phase can start.



Annex of packaging

MAHLE		EMBALAŽA IN PAKIRANJE															
TMD MBO OSLANA 12 76100 BRČKO, DC BOSNA-HERZ.		Sprejemnik: 180000498 Dobavitelj: 252437 Datum signat: 28.04.2013 Obdobje veljavnosti: 01.01.2013 do 31.12.2013															
NP ID	Materiala	Naziv	Materiala	Količina	EM	VH	Lot	K	ID	Embalaze	Naziv	Embalaze	Dimenzije	Brzota	Tara	EAN	Velja od
				pakiranja	TE				TF								
01	19401237	jemstva		100	K 0 1	V	146	1	79900001	100	P19401237	100	100x100x100	100	100	100	18.02.2013
				8004144	8004144				8004144	8004144							18.02.2013
01					V	0 19	4		79900010	100	100x100x100	100	100x100x100	100	100	100	18.02.2013
				10000000	10000000				10000000	10000000							18.02.2013
01					N	4			79900010	100	100x100x100	100	100x100x100	100	100	100	18.02.2013
				10000001	10000001				10000001	10000001							18.02.2013
02					N	K 0 1	V	146	1	79900010	100	100x100x100	100	100	100	100	18.02.2013
				8004144	8004144				8004144	8004144							18.02.2013

Podpis/Datum: _____ (Dajmo ime)

Podpis/Datum: _____ (Dajmo ime)

Legenda: NP - Nova pakiranja VH - Valjčica, horizontalna embalaža TE - Datum embalaže V - Valjčica embalaže = kocka
 BM - Baza nove LIT - Lestvica embalaže TF - Datum pakiranja Tuh in + kg Embaza in + mm

2.3 Production phase

In this phase all the documents of packing and packagings must be made and entered into the information system.

3 CHANGING A PREDEFINED RETURNABLE PACKAGING

Material, the packaging of which has to be defined is:

- Material is already developed
- Packaging is determined
- There is a packaging instruction in the system

Process changes are implemented in the same way as in defining new returnable packaging.

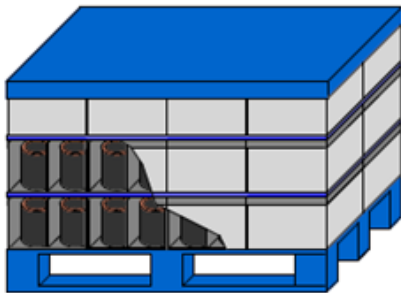
4 PACKAGING INSTRUCTIONS

4.1 Process description

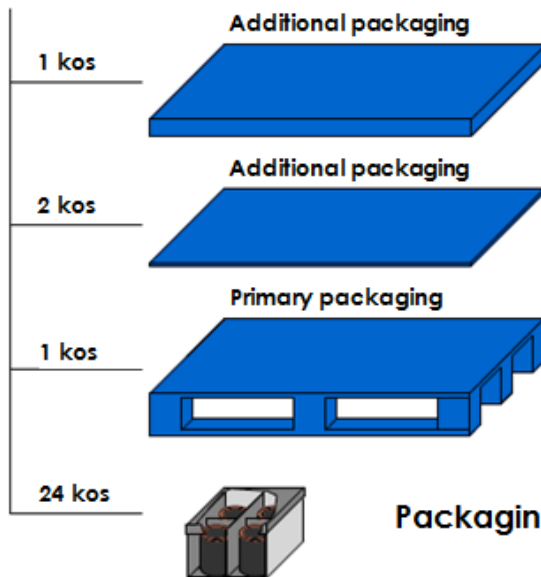
When the accordance of packaging between the supplier and MAHLE Electric Drives Slovenija is achieved, the packaging instructions in MAHLE Electric Drives Slovenija are made. Packaging instructions are linked to the annex of the contract of packaging. The supplier can see the packaging or packaging instructions in the annex made in MAHLE Electric Drives Slovenija.

4.2 Content of packaging instruction

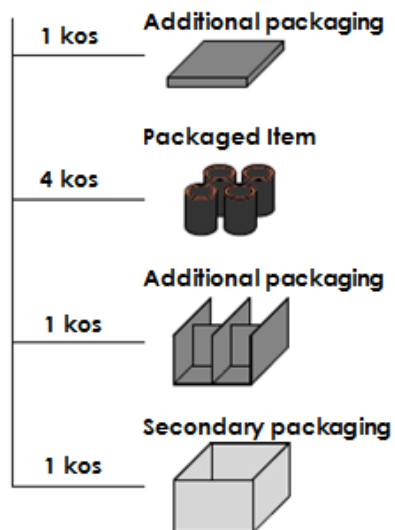
1. Supplier code and name
2. Standard packaging instruction
3. Sub-packaging instruction
4. Part number and quantity
5. TE(empty basic packaging) and TF (filled basic packaging)document



Handling unit – Packaging instruction



Packaging unit – Sub-packaging instruction



5 STANDARDS

5.1 General requirements and definition

5.1.1 Returnable packaging

Wherever possible and reasonable from an economic point of view, returnable packaging is preferred. Returnable packaging must be capable of being used for multiple return trips. Its design requires:

- Stackability
- Preferably collapsibility into smaller volumes to save space
- Durability and washability, lightweight and firmness
- Ability to be easily filled and emptied
- Ability to be attached to pallets for easy lifting and handling manually

5.1.2 One-way packaging

When application of returnable packaging is not reasonable or possible, one-way packaging shall be selected.

Therefore the one-way packaging is required to be:

- Stackable
- Environmentally friendly
- Able to be emptied quickly
- Able to provide protection against corrosion and all types of damages
- The material should be separated by cardboard cell divider. Wrapping each piece separately is not allowed! (represents additional unrolling work and more waste material)

5.1.3 Packaging unit

A packaging unit represents the smallest unit in which the ordered quantity is packed. The packaging unit can be MAHLE Electric Drives Slovenija 's returnable, supplier's or one-way packaging unit.



5.1.4 Handling unit

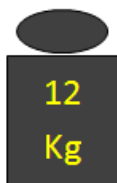


A handling unit consists of a packaging unit and can contain other additional packaging. It must ensure mechanical manipulation. The handling unit must be labeled.

5.2 Weight and dimensions

MAHLE Electric Drives Slovenia requires the use of a base with dimensions of 800 x 600 mm, which constitutes a handling unit suitable for transport and machine handling within the company. The recommended height of the pallet is 700 mm, for optimal utilization of the load in the container (stack 3 pallets). The use of a base with dimensions of 1200 x 800 (mm) is an exception for larger-heavier components, a packaging request and approval is required.

The maximum permissible weight of the entire packaging unit is 1000 kg. The maximum permitted height of the entire packaging unit is 1050mm. This ensures undisputed storage.

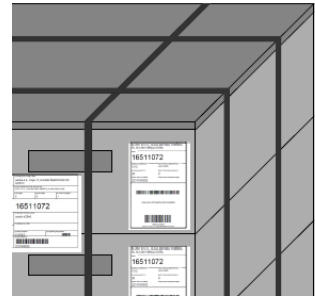


The total weight of one packaging unit must not exceed 12 kg to ensure manipulation by one person. Some receiving facilities in MAHLE Electric Drives Slovenija are designed in a way that 12 kg can be exceeded. On the other hand, some materials used in MAHLE Electric Drives Slovenija exceed 12 kg so the rule cannot be followed in the packaging unit.

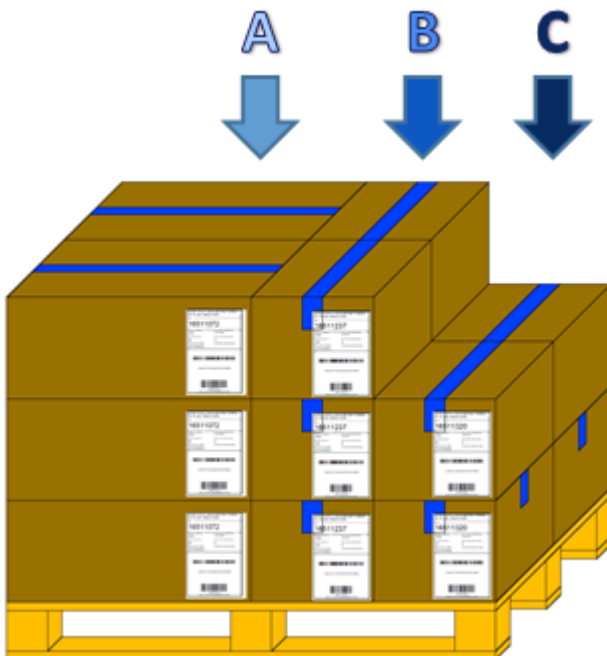
The packaging unit must be designed in the way that maximum space is used in it and there is no empty space. By doing so, other requirements must be followed as mentioned early.

5.3 Stacking and protecting the packaging and handling unit.

Packaging must be fixed and prevented from moving. Incomplete layers must be avoided. PP or metal straps shall be used to fix packaging units due to safety reasons. Packagings shall be covered and wrapped with stretch foil.



The figure shows an example of stacking the various items on a pallet for mixed codes A, B and C.



It should be ensured that on the pallet there are not different batches for the same products.

In the event that occurs the same product with two batches is on one pallet, we need each batch folded together and provide access to each batch without reloading the other.

In the case of two or more batches each manipulation unit or each box must be specially marked with ODETTE or logistic label.

If possible, keep to the rules of one batch on one pallet.

5.4 Delivery documentation

Packaging units must contain documentation that comprises information about the supplier's name, and identify the packing quantity of receiving material. Also, the packaging shall have a date of delivery and date of production. In the packaging documentation shall also include the identify of the returnable MAHLE Electric Drives Slovenia packaging.

5.5 Recycling and environmental requirements

Packaging shall be planned to take into account basic economic and ecological requirements.

Some basic rules are:

- The best way to reduce packaging waste is to reduce the total amount of packaging.
- Reduction of numerous one-way packaging materials used by the supplier.
- Recycling – Returnable or one-way packaging must be made of recyclable materials.

The European Union is seeking to harmonize measures regarding environmental requirements.

Environmental requirements regarding packaging materials must comply with the »European Communities Directive 94/62/EC.«

MAHLE Electric Drives Slovenia will be considering the European directive when planning new returnable packaging. To avoid environmental pollution, we use eco-friendly materials, which can be recycled and for this reason, they are marked with such international symbol. Every arrow has a meaning that is: **Collect! Process! Reuse!**



For returnable packaging mainly plastic materials are used. Label of the type or to say the chemical composition of the material is a triangle with three arrows and a number in the middle. Below the triangle, there can also be initials of the material.



6 PROCESS OF MANAGEMENT OF RETURNABLE PACKAGING

Returnable packaging can be in the ownership of MAHLE Electric Drives Slovenija or a supplier. There are some rules for managing returnable packaging written below.

6.1 MAHLE Electric Drives Slovenija provided packaging

6.1.1 Loop size calculation

Calculation of the number of packaging units is the basis for the management of returnable packaging. MAHLE Electric Drives Slovenija will calculate the number of packaging needed for all the suppliers.

The formula below is MAHLE Electric Drives Slovenija's standard formula for calculating the number of packaging in accordance with management in the business.

6.1.2 Formula and parameters for calculation

- Existing supply plan:

$$N = \frac{\sigma_d + Qd_{povp} * t_{dob} * t_{osk} + Qz_{alpv}}{Q_{emb}}$$

- Calculation for developing supply plan:

$$N = \frac{Qd * t_{dob} * t_{osk} + Qz_{alv}}{Q_{emb}}$$

Legend:

N – Packaging quantity

Qs_{povp} – Average lot size

Qs – lot size

Qd_{povp} – Average consumption per day

Qd - consumption per day

σ_d – Standard deviation per day in U/M

Qemb – quantity of materials in one packaging unit

t_{dob} – delivery time in days (transportation + takeover + lead time in days, when packagings are at a supplier (example: in case the packaging is in use at the supplier just for packing on the last operation, we have to use 1 day+ shipping wait time)).

t_{osk} – time of supply of packaging units in days (transportation + order or recall; this time is 1 day for the Slovenian suppliers)

Qzalpovp – average stock

Qzalv – safety stock, we estimate it (explanation below).

6.1.3 The procurement and financing of returnable packaging

After making an agreement in terms of technology for returnable packaging, the production Logistics of a PE will give the necessary quantity for purchasing it (optional purchase salesman for central warehouse purchases or production program manager if a BU does not have a production logistics department).

The purchase salesman makes an agreement with the supplier on the percentage of financing the purchase of returnable packaging.

The first demand for purchase by supplier is carried out by the department TEH-PRTLPL. For the next purchase of the same packaging, an acquisition offer is made by the business organizer for packaging.

6.1.4 Delivery packaging to supplier

MAHLE Electric Drives Slovenija keeps the status of sent packaging to the supplier. All movements of packaging are guided by quantity and by ident number. MAHLE Electric Drives Slovenija also makes visual inspection of eventual damages on the packaging before delivery and excludes it from delivery and replaces it with a good one.

6.1.5 Supplier's packagings takeover

The supplier must check all returnable packaging upon delivery. The quantity and possible damages must be checked. If there are some issues, the supplier must provide the information to the responsible person in MAHLE Electric Drives Slovenija. MAHLE Electric Drives Slovenija will solve the problems as soon as the information is provided.

6.1.6 Packagings status supplier

The supplier is responsible to manage his own status of the packaging inventory. Any discrepancies shall be reported to MAHLE Electric Drives Slovenija. MAHLE Electric Drives Slovenija will see its own inventory of packaging and will reply to the supplier.

The supplier is financially responsible for unjustly missing packaging. If a supplier damaged the packaging, he must pay for it or replace it with a new one.

Certain packagings are worn out and damage can occur for this reason. MAHLE Electric Drives Slovenija will take note of this and will write-off such packaging (no cost for the supplier).

6.1.7 Inventory

The supplier is responsible for making an inventory of MAHLE Electric Drives Slovenija returnable packaging once a year.

MAHLE Electric Drives Slovenija will send the inventory list for returnable packaging. Based on the list, the supplier makes inventory and sends the list back to MAHLE Electric Drives Slovenija.

In case some packaging units are missing, MAHLE Electric Drives Slovenija will consider the reason and possible financing of the missing or damaged packaging.

6.1.8 Hygiene of returnable packaging

The supplier shall keep the hygiene of the returnable packaging unless MAHLE Electric Drives Slovenija and the supplier has reached a different agreement.

The supplier must pay attention to the cleanliness of the packaging. Some materials that are used on production lines in MAHLE Electric Drives Slovenija become useless if in touch with filth.

6.1.9 Supplier's packaging

MAHLE Electric Drives Slovenija will calculate the necessary quantity of packagings as described above.

In order to prevent incorrect inventory and consequent lack of packagings, the supplier shall manage the status list correctly and make inventory once a year.

Regardless of the ownership, it is the supplier's responsibility to maintain order and hygiene of packagings.

7 AIR FREIGHT

7.1 Introduction

To ensure damage-free transportation shipments must be properly packed. There are some pointers written below, just to understand the meaning and importance of proper packaging for damage-free air freight movements.

7.2 Hazards of distribution

Punctures and abrasion: Occur when the package comes in contact with other packages during the shipping process.

Compression: happens when external forces damage the faces, sides or corners of a package.

Environmental exposures: packagings are exposed to high and low pressure and temperatures that may have effects on packages and products. There are also others, such as dirt, dust and precipitation. A shipper must consider these hazards to avoid damage to product and packages.

Shipment handling: Usually the packaging is handled with a forklift, and it is common that impacts associated with handling operations occur. Proper cushioning can reduce the damage that may occur.

Vibration: Proper cushioning can absorb the negative vibrations when handling, transporting and fork lifting.

7.3 Marking and labeling shipments

All air freights must be properly labeled. A label must be durable and must consist of a name, address, shipper and consignee. It also has to be clearly visible. Below there are a few examples of markings commonly used.

DO NOT FORK



KEEP DRY



FRAGILE



DO NOT TOP LOAD



TOP HEAVY



CENTER OF GRAVITY



7.4 Cardboard cartons

Cardboard cartons are the most common type of shipping container. We must know the strength and weaknesses of these containers to have damage-free shipments. This type of material loses strength in about six months. In addition, humidity and moisture weaken cartons and we cannot reuse them anymore.

A tape is most common for closure of carton boxes and improper application can cause closure failure. Use quality packaging tape designed specifically for sealing carton boxes.

7.5 Pyramid-shaped loads

Pyramid-shaped loads are one of the biggest packaging problems in the industry. They do not provide a level surface on top and therefore can cause damage to other shipments. Shipments packed in such a way can cost more. We must avoid such shipment packaging.

7.6 Wood packages

Wood packages allow safe, damage-free transit if it is done properly using quality lumber. Use plywood and not oriented strand board (OSB), medium density fiberboard (MDF) or particleboard.

Fasteners should not be located in knots or other defective areas of the wood. Use diagonal braces on each panel to increase the strength of a wooden box.

7.7 Air freight pallets

We use mainly wooden and plastic pallets for air freights. Pallets should be high quality to reduce damages according to forklifting and manual handling. Pallets also have to be: large enough to accommodate shipments without overhang, damage free without any nails out of the pallet. We also must not exceed the maximum capacity of the pallet.

Plastic pallets are an alternative to wooden pallets. They are very durable and they can be reused many times. On the other hand, they are very expensive.

7.8 Dunnage

One big problem with shipments is empty spaces in carton boxes and other containers. Empty spaces can cause material movements and therefore possible damage and brakes. So we must use dunnage that can be simple rolled-up paper, wood inserts or blocks or custom wraps and foam.

7.9 Cushioning

During shipments many transportation operations take place. Because of this, products require cushioning for protection against vibrations and shocks from the time of the pickup to the final delivery. Cushioning must absorb multiple shocks.

7.10 Stretch wrapping and allowed type of pallet

Stretch wrapping is a common and effective method of keeping boxes and containers together. The stretch wrap must be applied correctly: around the pallet and then continued around the load and upward.



8 ANTI-CORROSION PROTECTION

8.1 General anti-corrosion requirements

The corrosion protection (unless specifically prescribed otherwise in the drawings or specifications/quality standards) must be defined by the supplier in accordance with the sensitivity of its product, which it is aware of.

In order to meet the requirements of the packaging legislation and not to burden the environment unnecessarily, only environmentally compatible materials are to be used.

The chosen protection method may not impair the functionality and use of the products. Protection agents that are used must be free from residues and be capable of being removed and disposed of in an economically viable manner.

VCI resources as a rust inhibitor or aluminium composite foil bags can be used, if it is ensured that the protection exists beyond the prescribed service life and parts thereof or individual materials are not inadmissibly influenced.

The suppliers shall inform MEDS about the planned use of anticorrosion protection in the packaging instruction form.

8.2 Sustainability, health, safety and environmental reporting requirements for all packaging (including VCI protection and drying agents)

Regulations that shall apply to all packaging placed on the market in the European Union and to all packaging waste are:

- Directive 2008/98/EC
- Regulation (EC) No 1907/2006 (REACH Regulation)

MEDS requires compliance with the stated requirements to be reported by suppliers written declarations, including additional documentation (e.g. SDS – Safety Data Sheets or Technical Data Sheets) of packaging when requested.

8.3 Requirements for VCI (Volatile Corrosion Inhibitor) protection packaging

For parts that require special protection from corrosion, the following packaging must additionally be used:

- VCI must be compatible with the process liquids that are used.
- Use the correct quantity of VCI depending on the size of the packing material in accordance with the VCI supplier's recommendations.
- Combine different VCI emitters like paper, bags and other drying agents (e.g. silica gel sachets or calcium chloride sachets), where necessary.
- Vacuum packaging in aluminum composite foil, with the addition of drying agents and/or VCI emitters (e.g. VCI paper), where necessary.
- When packing, the parts and the ambient air should have the same temperature.
- Use clean gloves and avoid fingerprints.
- After packing, the VCI bag must be sealed airtight.

Anti-corrosion packaging should generally be used for all sea transport!

Examples of anti-corrosion packaging

			
Packing materials	Europe	Overseas	Not permitted
Bags / films	PC bags, VCI bags, PE and VCI side-fold covers and box covers, aluminum composite foil bags, PE film, VCI film, aluminum composite foil, stretch film	PC bags, VCI bags, PE and VCI side-fold covers and box covers, aluminum composite foil bags, PE film, VCI film, aluminum composite foil, stretch foil	Intercept films

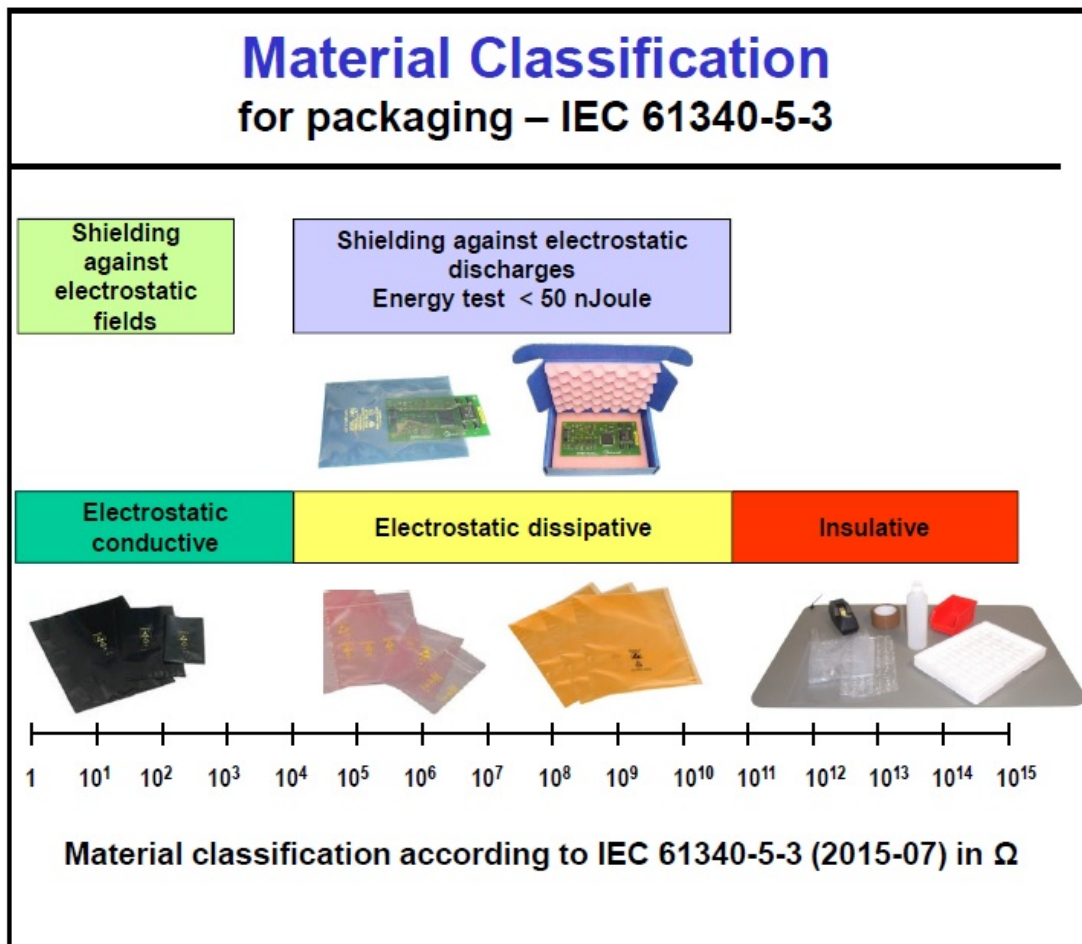
9 ANTISTATIC PROTECTION

Antistatic protection (unless otherwise specified in the drawings or specifications/quality standards) must be determined by the supplier based on the sensitivity of its product.

The type of packaging should be determined according to the ESD requirements of the standard IEC61340-5-3 / ANSI/ESD S20.20

9.1 ESD packaging

Electrostatic conductive	$R_p / R_v / R_{pp} < 10 \text{ k}\Omega$
Electrostatic dissipative	$10 \text{ k}\Omega \leq R_p / R_v / R_{pp} < 100 \text{ G}\Omega$
Electrostatic insulator	$R_p / R_v / R_{pp} > 100 \text{ G}\Omega$
Electrostatic coated packaging (against electrostatic discharges)	$10 \text{ k}\Omega < R_p / R_v / R_{pp} < 100 \text{ G}\Omega$ energy test $E < 50 \text{ nJ}$



9.2 Electrostatically conductive packaging

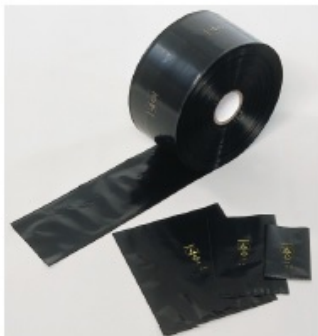
Protects against electrostatic fields

Does not protect against electrostatic discharges!

$$R_p / R_v / R_{pp} < 10 \text{ k}\Omega$$

Conductive materials

Electrostatic conductive $R_s < 1 \times 10^4 \Omega$



9.3 Electrostatic dissipative packaging

Protects against electrostatic discharges

Does not protect against electrostatic fields!

$$10 \text{ k}\Omega \leq R_p / R_v / R_{pp} < 100 \text{ G}\Omega$$

Dissipative materials

Electrostatic dissipative $1 \times 10^4 \leq R_s \leq 1 \times 10^{11} \Omega$



9.4 Electrostatic coated packaging

Protects against electrostatic discharges

Protects against electrostatic fields

$$R_p / R_v < 1 \text{ k}\Omega / E < 50 \text{ nJ}$$





- homogeneous surface conductive coating $R_p < 1 \text{ k}\Omega$
- volume conductive input $R_v < 1 \text{ k}\Omega$

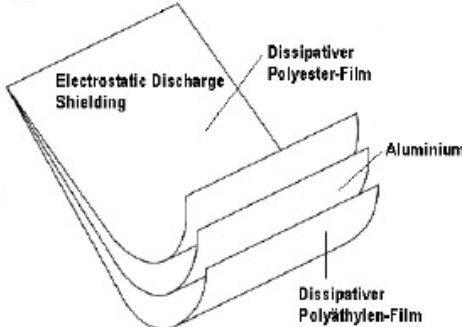
Permissible transmitted test energy: 0.1% EHBM 1 kV

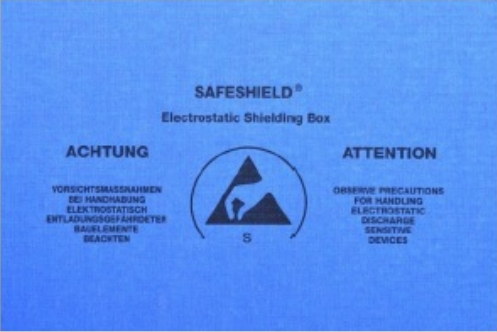
ESD Shielding materials

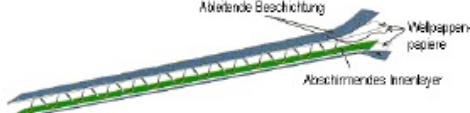
Protection against electrostatic discharge

Energy - test: $E < 50 \text{ nJoule}$





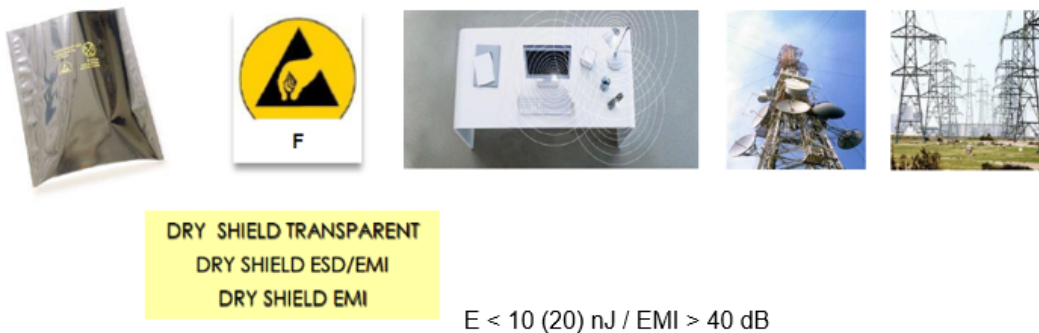


9.5 Electrostatic coated packaging against electromagnetic fields

Protects against electrostatic discharges

Protects against electrostatic fields

Protects against electromagnetic fields



MARKING AND LABELLING OF PACKAGING UNITS

Unless otherwise agreed between MAHLE Electric Drives Slovenija and the supplier the ODETTE labelling standard is used.

Every transport unit must have transportation label and also every packaging unit must have a label which shall contain:

- Manufacturer's name
- Material name
- Order number
- MAHLE Electric Drives Slovenija's ident
- Quantity number

Labelling of the goods ordered is an integral part of the contracts and annexes to the contracts between MAHLE Electric Drives Slovenija and the supplier.

All chemicals must be given on each packaging unit as prescribed by the Law on chemicals and safety data sheet.

9.6 Marking the first samples and special deliveries

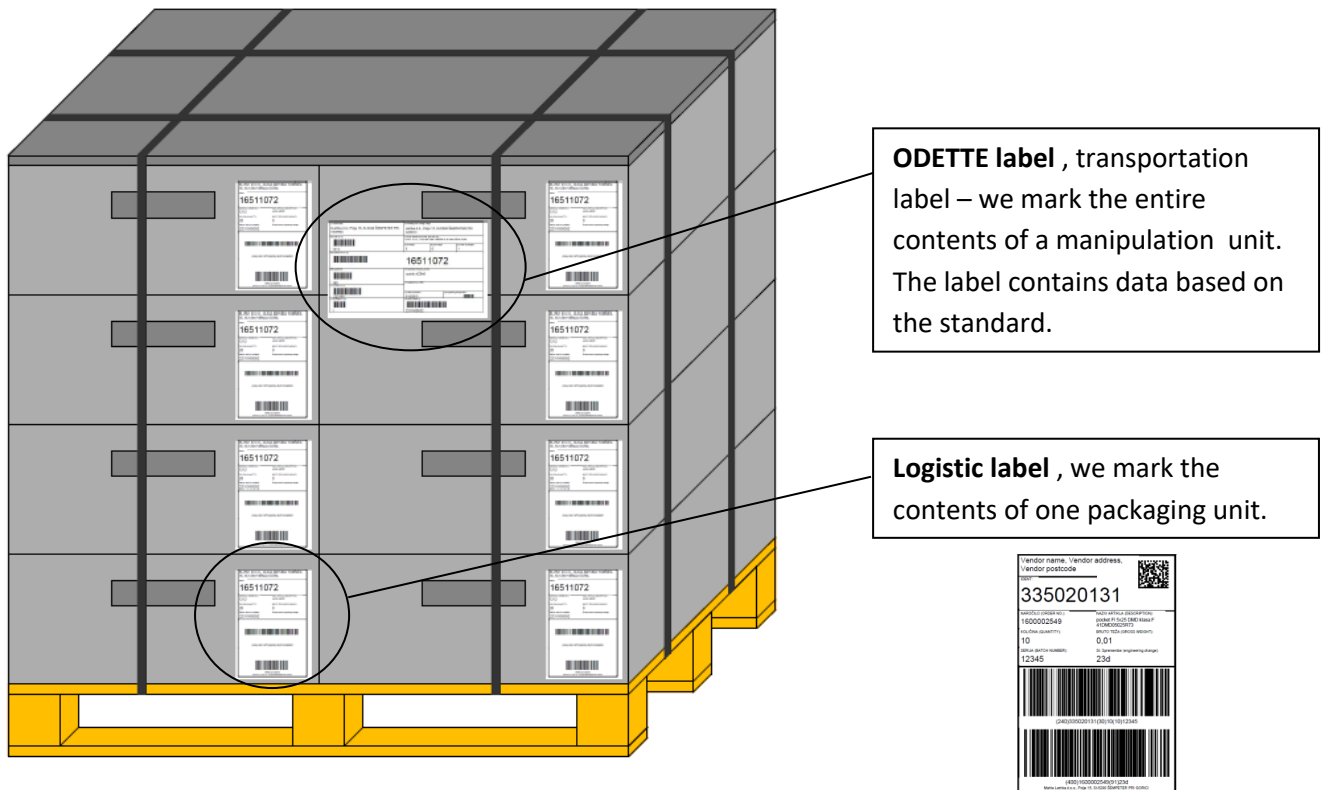
The supplier must label the first samples with yellow label and complete it with the required data hereinafter:

DOBAVITELJ / SUPPLIER	PREJEMNIK / RECIPIENT MAHLE Electric Drives Slovenija d.o.o. Polje 15 5290 Šempeter pri Gorici		
PROTOTIPNI VZOREC / PROTOTYPE <input type="checkbox"/> PPAP VZOREC / PPAP SAMPLES <input type="checkbox"/> NOVA SPREMEMBA (1. serija) / NEW ENGIN.CHANGE (1st batch) <input type="checkbox"/>			
Kontaktna oseba <i>/ Name of contact</i>	<input type="text"/>	Tel. št. <i>/ Phone</i>	<input type="text"/>
Koda materiala / <i>Part number</i> :			
Naročilo / <i>Order</i> :			
Št. spremembe / <i>Engineering change</i> :			
Količina <i>/ Quantity</i>	<input type="text"/>	Vzrok / <i>Motive</i>
Obr.: P. 224/1			

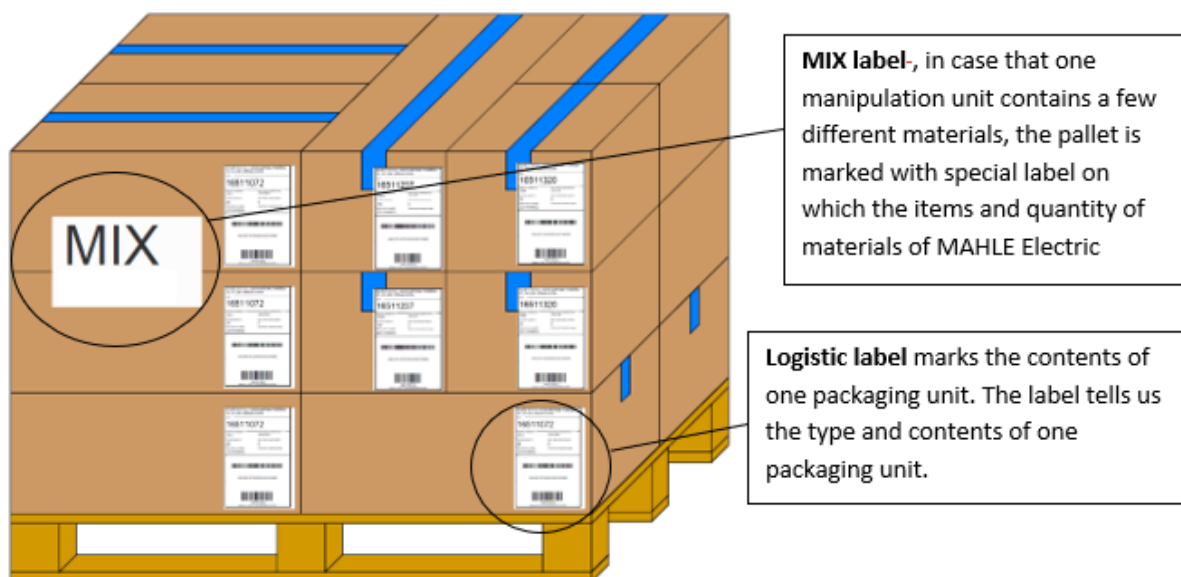
Furthermore, the supplier must mark special deliveries that are subjected to quality control with the yellow label. The next yellow label must be applied by the supplier in such cases:

DOBAVITELJ / SUPPLIER	PREJEMNIK / RECIPIENT MAHLE Electric Drives Slovenija d.o.o. Polje 15 5290 Šempeter pri Gorici		
POSEBNA DOBAVA / SPECIAL LOT			
Kontaktna oseba <i>/ Name of contact</i>	<input type="text"/>	Tel. št. <i>/ Phone</i>	<input type="text"/>
Koda materiala / <i>Part number</i> :			
Št. spremembe / <i>Reference</i> :			
Količina <i>/ Quantity</i>	<input type="text"/>	Vzrok / <i>Motive</i>
<input type="checkbox"/> 100% OK potrjeni kosi / <i>100 % OK certified parts</i> Specifikacija po risbi / <i>Print requirement</i> Metoda preverjanja kakovosti / <i>Checking method</i>			
<input type="checkbox"/> Kosi NOK in odobritev / <i>Parts NOK and approved</i> Specifikacija po risbi / <i>Print requirement</i> Dejanska dimenzija / <i>Actual dimension</i>			
<input type="checkbox"/> 100% OK kosi po zaključenih korektivnih ukrepih (2 pošiljki) reklamacije: <i>100% OK parts after final corrective action implementation (2 shipments)</i> Obr.: P. 225/1			

9.7 Marking - labelling manipulation and packaging units



9.8 Marking mixed manipulation and packaging unit



9.9 Programme for labelling manipulation and packaging units

Instructions for printing proper labels for packaging units materials for delivery to MAHLE Electric Drives Slovenija are hereinafter. We have two types of labels: Odette label and logistic label. Both are in accordance with the standards.

Computer program helps a supplier to make correct labeling of goods/packaging units in accordance with the applicable standards.

The odette label is made by the Odette standard, which is used most in the automotive industry, while the logistic label is made by the recommendations of EAN Slovenia (based on recommendations of EAN International) and is suitable for a common use.

Labels are designed to allow you to gather data from processes that take place throughout the supply chain (takeover, storage, control, various manipulations) with the use of a barcode reader. The read data are unambiguous, so that the contents are automatically detected, which greatly reduces the possibility of data entry errors.

Conditions for use of the program are running Microsoft Windows and Microsoft Office Excel.

9.9.1 Font's installation

First, we install fonts that allow us barcode printing.

The font is located in a file (file extension ttf). Fonts are in the mail.

Fonts are installed according to the procedure described in the file received from the purchasing department.




9.9.2 Programme installation

The program does not require special installation, we just have to copy and paste it to the hard disk. In the folder we find the file »labels.xls« and copy it to the hard disk.

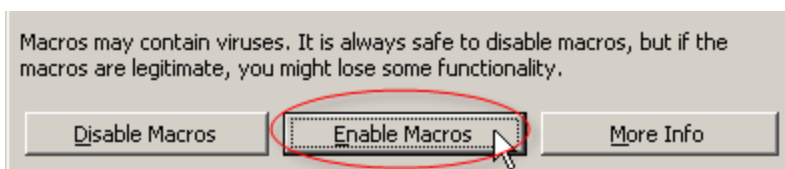
We then create a shortcut on the desktop.

9.9.3 Programme description

We start the programmer by double-clicking on the icon of the program or the shortcut.

Name	Date modified	Type	Size
 Labels.xls	14.10.2015 15:06	Microsoft Excel 97...	1.130 KB

On startup we enable macros.



A screenshot of a 'MENU' dialog box. The dialog has a title bar with 'MENU' and a close button. It contains eight buttons stacked vertically: PRINT, REPRINT, ADD ITEM, CHANGE ITEM, VIEW HISTORY, ADDRESSES, PRINT SETUP, and EXIT. The 'ADDRESSES' button is highlighted with a dashed border.

Then a menu opens where we can do further actions.

9.9.4 Address check

A screenshot of an 'ADDRESSES' dialog box. It has a title bar with 'ADDRESSES' and a close button. The dialog is divided into three sections: SHIP-TO PARTY, UNLOADING POINT, and VENDOR. Each section has three input fields: NAME, ADDRESS 1, and ADDRESS 2. The SHIP-TO PARTY and UNLOADING POINT sections have the same data: NAME 'MAHLE Electric Drives Slovenija d.o.o.', ADDRESS 1 'Polje 15', and ADDRESS 2 'SI-5290 ŠEMPETER PRI GORICI'. The VENDOR section has placeholder text: NAME 'Vendor name', ADDRESS 1 'Vendor address', and ADDRESS 2 'Vendor postcode'. At the bottom, there are two buttons: 'SAVE' and 'BACK'.

MAHLE Electric Drives Slovenija's and the supplier's addresses are already written in the Excel file, which is used in printout of the labels. In case you change the address or MAHLE Electric Drives Slovenija's address is changed, all the addresses in the table in the system are changed. In this case you open the tab »Addresses« which opens a new window where we can change the current address.

9.9.5 Printing

For printing labels we choose »print«, which is located in the main menu in the program. A new window opens with a few fields which have to be filled in. The fields colored in red are obligatory, whereas the green fields can be filled in optionally. The first field requires ident number, then we have quantity on one label. The program calculates net and gross weight by itself from the quantity on the label filled in the second box.

We can also fill in this information ourselves. In the field »date of production« the date displays automatically, which can also be changed. Batch number is not required, because the program generates it automatically, based on the previous batch number (numbering is according to the last four numbers and is encoded in the programme according to the rules in MAHLE Electric Drives Slovenija).

The 'SELECT LABEL' dialog shows a list with 'ODETTE' selected. Below it are buttons for 'LOG', 'LOG x4', 'BACK', and 'EXIT'.

The 'LABEL' configuration window contains the following fields:

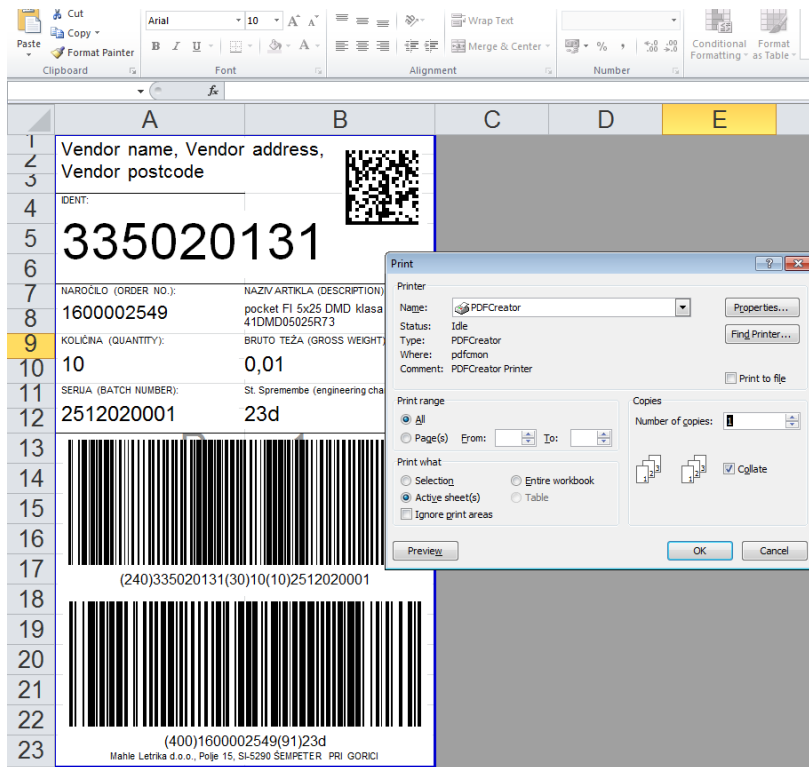
IDENT. NUM.	335020131		
QUANTITY PER LABEL	10		
NUM. OF LABELS	1		
WHOLE QUANTITY	10		
NET WEIGHT	0.01	GROSS WEIGHT	0.01
DATE OF PRODUCTION	10/15/2015		
BATCH	123456		
ENGINEERING CHANGE N.	23d		
ORDER NUM.	1600002549		

At the bottom of the 'LABEL' window are buttons for 'PRINT' and 'BACK'.

When we have filled in all the fields correctly, we click on the tab »print«. Then a new window displays in which we choose the label type we want to print (Odette or logistic label).

We click on the selected label.

Afterward the fulfilled label and window for printing is displayed. The window is shown below.



All we have to do is choose the printer to print the label and then click OK. We can also check the number of labels to be printed, but this is by default transferred from the printing window, where we have determined the quantity (we can also change this - the field is colored in red). Please, pay special attention to some program bug in Excel where you must not choose »preview« before printing, because the program will freeze.

9.9.6 Reprinting

In case we want to repeat the pre-printed label, we choose »reprinting« in the main menu. In the new window we select (field ITEM), in which we can select labels from the last printed backward.

After selecting the number of the item, we click on »PRINTING« and a new window opens with the box filled in with parameters we had printed with the label before. The procedure is always the same as described above.

9.9.7 Entry of a new material code

Entry of a new material ident that does not exist yet is possible with a click on » add new ident« in the main menu of the program. After clicking on this button, a new window appears which requires filling in new data for this material.

Field Name	Value
IDENT. NUM.	335020131
ORDER NUM.	1600002549
SHORT TEXT	pocket FI 5x25 DMD klasa F 4IDMD05C
NET WEIGHT / PIECE (kg)	0.001
GROSS WEIGHT / PIECE (kg)	0.001
VENDOR MAT. NUM.	
ENGINEERING CHANGE N.	23d
EAN	

Standard values for MAHLE Electric Drives Slovenija are:

- Order number (field ORDER NUMBER: ten-digit number starts with 15 or 16).
- Ident number (field IDENT No.: for raw materials, many digits numerical value).
- Net weight / piece (kg).
- Drawing number (field DRAWING No.- we add a number of actual valid drawing numbers in the field, by which goods are purchased).
- EAN (field EAN - in case the supplier has EAN number, he shall enter it - according to this number the goods are taken over).

After we have entered all the fields we click »ENTER« and data is entered into the Excel file. Material is on the list for printing a label.

9.9.8 Correcting the current ident data

If we want to correct the current material ident, which has been added to the list of materials, we have to click »correct« in the main menu. Similarly, when we enter a new ident, a new window appears in which we must first complete the field with IDENT No. or select it from the previous entry. Then we change the fields we want to be different and click on »CORRECT«.

Field Name	Value / Highlight
ORDER NUM.	15..., 16... (Red)
IDENT. NUM.	(Red)
SHORT TEXT	(Red)
NET WEIGHT / PIECE (kg)	(Red)
GROSS WEIGHT / PIECE (kg)	(Red)
VENDOR MAT. NUM.	(Green)
ENGINEERING CHANGE N.	(Green)
EAN	(Green)

Buttons: ADD, BACK

9.9.9 History overview

If we want to overview the history of printed labels, we have to click on »history« in the main menu. That puts us into the Excel sheet »H«, where we can see the history of all printed labels for the past three months. Labels that were printed more than 3 months ago are deleted automatically due to too many data on the list.

If we want to go back from the Excel sheet to the main menu, we must click on »MENU«, which is located to the top of the history overview sheet.

	A	B	C	D	E	F	G	
		MENU		IZHOD				
1	STPOS	1SHIPTOPARTY			2UNLOADINGPOINT			3D
2		NAZIV	ADD1	ADD2	NAZIV	ADD1	ADD2	
3		4 MAHLE EI Polje 15		SI-5290 ŠE	MAHLE EI Polje 15		SI-5290 ŠE	15
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

9.9.10 Correcting output settings

Both types of labels (Odette and logistic) have some settings that can be done before printing. In case the printed label is not good and you want to change the paper size or make larger fonts or even make a bigger label, you can do it by clicking on the »output settings« in the main menu.

The screenshot shows a 'PRINT SETUP' dialog box with the following settings:

- ODETTE LABEL:**
 - PAPER SIZE: A5
 - ZOOM: 120 %
- LOG. LABEL:**
 - PAPER SIZE: A5
 - ZOOM: 150 %

Buttons: SAVE, BACK

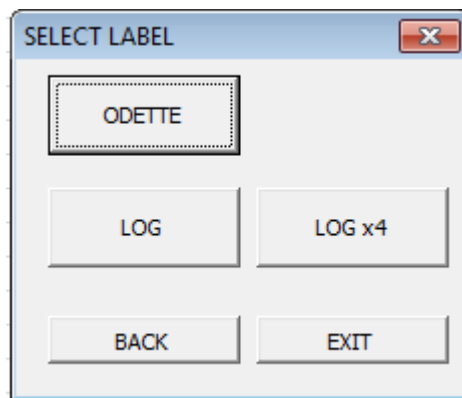
A new window opens where you can choose from two paper sizes (A4 and A5) and label enlargement on paper. When you change the setup, you have to save the entered by clicking »SAVE«.

9.9.11 Exit program

By clicking on the tab »EXIT« in the main menu, the sheet is saved and closed.







9.9.12 Error types

With this programme we can print ODETTE or logistic labels that are designed to identify manipulation and packaging units.



9.9.12.1 ODETTE label

We mark the contents of the manipulation unit - transportation label.

(1) ship-to party MAHLE Electric Drives Slovenija, Polje 15, SI-5290 ŠEMPETER PRI GORICI		(2) unloading point - storage - usage MAHLE Electric Drives Slovenija, Polje 15, SI-5290 ŠEMPETER PRI GORICI	
(3) order no. (K)  1634567890		(4) vendor address (short name, plant, ZIP, city) NAZIV, ADD1, ADD2	
(8) customer ref. no. (P)  1121351456259		(5) net weight 987654000	(6) gross weight 98765400
(9) quantity (Q)  987654		(7) number of packages 1	
(12) vendor no. (V)  x5789		(10) description of delivery, service pokrov	
(11) supplier ref. no. (305)		(13) date of production 6/12/2015	
(15) package no. (S) 1		(14) engineering change status 12345678 	
		(16) batch number (H)  123ewdwf	

9.9.12.2 Logistic label

We mark one packaging unit.

Vendor name, Vendor address, Vendor postcode		
IDENT: 335020131		
NAROČILO (ORDER NO.): 1600002549	NAZIV ARTIKLA (DESCRIPTION): pocket FI 5x25 DMD klasa F 41DMD05025R73	
KOLIČINA (QUANTITY): 10	BRUTO TEŽA (GROSS WEIGHT): 0,01	
SERIJA (BATCH NUMBER): 12345	St. Spremembe (engineering change): 23d	
		
(240)335020131(30)10(10)12345		
		
(400)1600002549(91)23d Mahle Letrika d.o.o., Polje 15, SI-5290 ŠEMPETER PRI GORICI		

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Polje 15

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Slovenia

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