RHEINMETALL

Supplier Packaging Manual

This document outlines the base requirements expected by Pierburg to be followed by all suppliers.
The information contained herein applies to all Pierburg and Pierburg Pump Technology plants.

Mechatronics Global Logistics
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RHEINMETALL AUTOMOTIVE

Supplier Packaging Manual

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Erstellt von/ created by:	*Josef Broich – M-OPLP*	Geprüft von/ verified by:	*S. Kosiedowski – M-OPLP*
Freigabe durch Dokumenteneigner/ approval by document owner:	*Stephan Kohlbaum – M-OPLP*	Freigabedatum/ approval date:	*26.10.2017*

1 List of Abbreviation / Glossary

Term	Definition
Packaging	Container or wrapper for a product that serves a number of purposes including protection and description of the contents, theft deterrence, and transportation safety. The packaging is the content. The ready packed product is the Packaging Unit. Several Packaging Units form a Handling Unit.
Packaging Unit (PU)	A packaging unit is the smallest possible order quantity. It consists of either returnable packaging (e.g. KLT) or one-way packaging.
Handling Unit (HU)	A handling unit consists of several packaging units bundled on one pallet (e.g. KLT). Pierburg distinguishes between two types of handling units (Pallet or Mixed Unit).
KLT	"**K**lein**l**adungs**t**räger" – Euro stacking containers. VDA standard small part container type. Size, weight and basic material fixed in VDA standards.
VDA	"**V**erband **d**er **A**utomobilindustrie e.V." - Association of the Automotive Industry.
ODETTE	**O**rganization for **D**ata **E**xchange by **T**ele **T**ransmission **E**urope – Nonprofit organization of the automotive industry with headquarter in Great Britain. Objective: standards in the area of the logistics, EDI and construction data exchange.
IPPC	**I**nternational **P**lant **P**rotection **C**onvention
IPSM 15	**I**nternational **S**tandards for **P**hytosanitary **M**easures – Guidelines for Regulating Wood Packaging Material in International Trade.
TRGS 615	"**T**echnische **R**egeln **f**ür **G**efahrstoffe" - Technical rules for hazardous substances. Use restrictions for corrosion inhibitors, in the case of which N-nitrosamines may occur.
EU Directive 94/62/EC	This Directive establishes measures designed to limit the production of packaging waste and to promote recycling, re-use and other forms of recovery of packaging waste. The final disposal of the packaging waste shall only be seen as the last possible solution.

2 Introduction

An essential factor for Pierburg's successful market positioning is a close and trustworthy collabora- tion with suppliers. The application of the packaging is integrated into the entire material flow - from the packaging process, to the dispatch, transport, goods receipt and storage until removal for assem- bly. It is therefore very important that suppliers carefully observe the systems and procedures de- scribed in this manual.

2.1 Objective of the document

The Packaging Manual familiarizes suppliers with the packaging requirements of Pierburg so that they can develop an optimized packing system on the basis of this manual. The objective of the manual is a rationalized packing system that allows a continuous flow of material, taking all qualitative, environ- mental and economic aspects into consideration.

The following instructions are intended to guarantee a rational, uninterrupted flow of materials by the use of standardized packaging. Environmental protection and logistics requirements shall be observed based on the following criteria:

- optimum packaging design
- standardized dimensions for containers, cardboard boxes and load carriers
- optimum protection of the parts
- agreed + fixed contents quantities of packaging
- optimization of freight or transportations
- correct and complete labeling of the packaging

2.2 Contact

The standard packaging is handled by the logistics departments at the production sites. All contacts are listed in attachment 1.

3 General requirements

It is the responsibility of suppliers, both internal and external, to ensure that all items being shipped are properly and adequately preserved, protected and packed for safe arrival at their destination. The supplier is responsible for the development of fit-for-purpose packaging systems which are in accord- ance with the requirements of the product, the Supplier Packaging Manual of Pierburg, and all appli- cable regulations established by federal, state provincial and local governments, including those appli- cable to the location where the package will be delivered. Returnable packaging is to be preferred. In the case of returnable packaging, which is not economically feasible, disposable packaging shall be used. Irrespective of the choice of packaging type, supplier needs to ensure that deliveries meet the following requirements:

Packaging	Requirements
Cleanliness	- Free of contamination, oil and grease (mechanical / chemical damage)
Protection function	- Protected from physical damage and environmental hazards (e.g. corrosion)
Convenience	- Convenience of use and safe handling by users (3.1)
Loading and transportation	- Stackability (3.2) - Formation of rational handling units and efficient capacity utilization - Avoid objects, which exceed the outer contours of the handling unit - Safe and easy handling while removing parts from their packing and during unloading and handling with fork lift and pallet truck - If mixed containers cannot be avoided, parts must be clearly and visibly separated - All sensitive parts must be properly cushioned
Storage	- Packing must withstand the static and environmental loads to which it is exposed during storage
Communication	- Proper marking - Visibility of relevant consignment details and supplier data
Compliance function	- Environmental acceptability and ease of recycling and/or disposal and compliance with legal and regulatory requirements

Packaging waste, wasteful and/or excessive over-packaging should be avoided as specified in EU Directive 94/62/EC or equivalent other directives. Failure to comply with the general packaging manual may lead to a corrective action request. Furthermore the supplier may be held liable for any additional costs associated with repackaging work, handling operations or waste disposal, as well as for reductions in quality due to inadequate or contaminated packaging. If the supplier cannot deliver according to the regulations, the supplier shall report and confirm prior to the start of delivery.

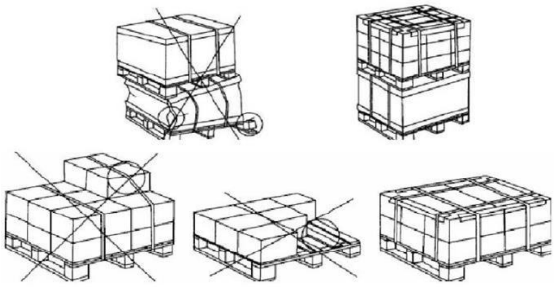
3.1 Material Handling

The following gross weights and heights shall be observed independently of the packaging type (expendable or returnable):

Packaging unit, which is moved manually in kg	Handling unit/pallet in kg	Maximum height of the handling unit in mm
15	800	1000

3.2 Stackability of handling units

The supplier must ensure that e.g. pallets can be stacked with or without stacking aids, without any impairment. If the quantity of a product cannot fill a layer completely, this layer must be filled with empty small part containers. Empty small part containers must then be labelled as empty.



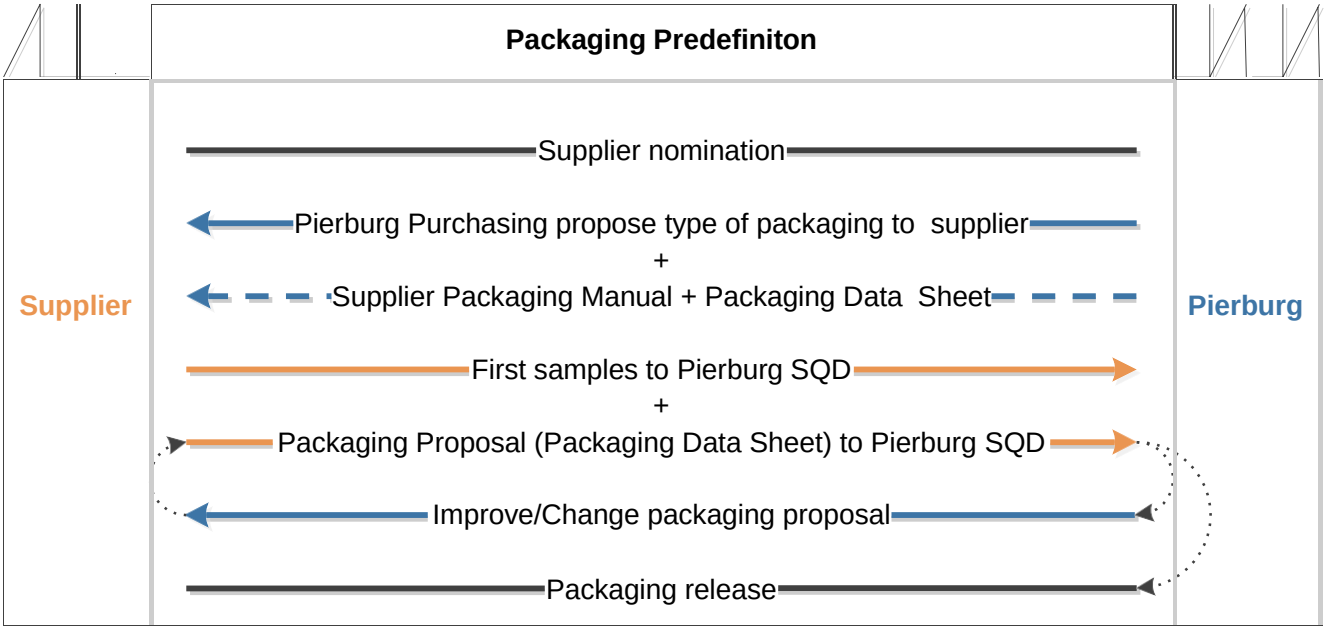
3.3 Sea and air freight

Sea freight packaging must be such that the effects of cold, moisture, or heat and the extreme loads caused by goods movements cannot prove detrimental to the product quality. In addition, the packaging shall exhibit a space saving, convenient design that is suitable for loading with ground conveyors. At the same time, the measurements and weights must be adapted under economic aspects to all transport means in the logistics chain. The provisions applying in the countries of destination must be observed.
Air freight consignments shall be placed in space saving, lightweight, and robust packaging that must also protect the goods for extreme climatic and mechanical effects both to and from the airport.

3.4 Packaging development and approval

The packaging predefinition process is based on the general packaging manual and the packaging data sheet. The aim is to draw up a cooperative packaging agreement between the supplier and Pier- burg.

Suppliers are advised to discuss with the Pierburg contact any specific requirements of the receiving Pierburg manufacturing facility. The supplier shall submit a packaging proposal in writing, which shall comply with the requirements of this packaging manual. Additionally to the packaging proposal the packaging costs per piece must be stated. Suppliers are responsible for designing their own expendable packaging.
Deviations in justified cases (e.g. alternative packaging for series production, extraordinary production processes or insufficient supply of empty packaging by Pierburg) must be agreed in due time with the corresponding contact person at Pierburg. A corresponding note (“alternative packaging”) shall be entered in the delivery note.



3.5 Packaging data sheet

The packaging data sheet is the official document containing all packaging information for every material number. Packaging data sheet is signed by Pierburg responsible and supplier responsible before start of serial deliveries. The packaging data sheet can be found in attachment 3.

Please enter your address in these fields. If you have more than one plant, enter the address of the plant from which you will ship. Provide the contact details of the responsible person for packaging in your company.

SUPPLIER address	
company name:	
street:	
city:	
ZIP:	
contact person:	
contact mail:	

Please enter your material part number, the name of the product and the weight in these fields. The net weight of a single product shall be indicated. In addi- tion, a current photo of the product is to be inserted in this field.

PART INFORMATION	
Rheinmetall part Nr.:	part photo / 3D drawing
supplier part Nr.:	
part name:	
part weight (kg):	

Please enter in these fields the information about the packaging unit. This includes:

- type of the packaging unit and owner
- size of the packaging unit
- net and gross weight
- quantity of layers in one packaging unit
- quantity of products per layer
- total quantity of products per packaging unit
- a current photo of the packaging unit

INNNER PACKAGING UNIT (PU)			
packaging type:			
SAP Nr.:			
material specification: *		percentage of recycled material:*	
QTY of parts in PU:	QTY of PU on pallet	PU dimension	tare weight (kg)
returnable:	owner:		
ESD sensitive:	bulk material:		
additional inner packaging 1 (if applicable):			
packaging type:		qty:	
material specification: *		percentage of recycled material:*	
returnable:	owner:		
QTY of parts in:	size LxWxH (mm):	packaging weight (kg):	
additional inner packaging 2 (if applicable):			
packaging type:		qty:	
material specification: *		percentage of recycled material:*	
returnable:	owner:		
QTY of parts in:	size LxWxH (mm):	packaging weight (kg):	

Please enter in these fields the information about the shipping unit. This includes:

- type of the shipping unit and the owner
- size of the pallet
- net, gross and up load weight
- quantity of layers per pallet
- quantity of products per layer
- total quantity of products per pallet
- stackability factor
- validation of mixed loading
- a current photo of the shipping unit

OUTER PACKAGING UNIT (HU)		
packaging type:		
SAP Nr.:		
material specification: *		percentage of recycled material:*
QTY of parts in HU:	pallet (or box) size LxWxH	pallet (or box) wght (kg):
0		
returnable:	owner:	
additional outer packaging 1 (if applicable):		
packaging type:		qty:
material specification: *		percentage of recycled material:*
returnable:	owner:	
ESD sensitive:	size LxWxH (mm):	packaging weight (kg):
additional outer packaging 2 (if applicable):		
packaging type:		qty:
material specification: *		percentage of recycled material:*
returnable:	owner:	
ESD sensitive:	size LxWxH (mm):	packaging weight (kg):

Please put a piece price of each packaging item in the packaging.

PACKAGING PIECE PRICE (EUR) (1 PC)				
				overal:
				0

4 Standard packaging

In order to keep the cost of the packaging as low as possible by reducing cost-intensive special packaging, the use of standard packaging is to be preferred. The choice of the packaging type depends on the product characteristics, the protection requirements, the kind of transport and the conditions at the supplier. Procurement of the required special and expendable packaging is, as long as these are not provided by Pierburg, the responsibility of the supplier.

4.1 Returnable packaging

Returnable packaging must be designed in such a way, that labels can be fixed without gluing them. The handling, loading, storage, intermediate storage, opening and transport of handling units must be possible with standard storage equipment without special aids. An overview of the approved standard returnable packages can be found in attachment 2. This includes standard returnable small part containers (according to DIN 30 820 and VDA 4500), standard returnable full size container, returnable pallets (according to DIN EN 13698-1 and DIN 55 520) and loose lids.

If returnable packaging is provided by Pierburg, at the end of life of project all returnable packaging must be returned to Pierburg. Suppliers are expected to store excess returnable packaging during the lifetime of the project.

4.2 Special containers

The use of special containers is only permitted if no standard containers can be used due to product requirements (surface, ESD, geometry, etc.). In order to be able to use special containers, approval must be given by Pierburg. For example, this is:

- deep drawn tray's
- EPP molded container
- Self-supporting container
- Other plastic containers, optionally with adapter/blister and/or electrical conductivity
- GLT’s, e.g. grid box pallets with inserts

4.3 Expendable packaging

When using expendable packaging, the primary goal must be the limitation to the essential, without affecting the quality of the products. For all expendable packaging, environmentally compatible, material-usable materials, which are accepted for recycling all over the country, must be used.
Opening the packaging with a sharp item shall not damage the parts. The following table lists the approved and non-approved packing aids according to DIN 55405. For plastic packaging, DIN 6120-2 must also be observed. When using anti-corrosion papers and films, the TRGS 615 must be complied with. Wood packaging from non-EU countries must comply with IPPC standard ISPM 15.
The use of other materials or the use of composites requires prior written and material-related approval. Material combinations must be kept to a minimum and must be easy to separate after use.

Packaging type	Approved materials	Examples of non-approved materials
Anticorrosive paper	VCI papers which have been proven to be recyclable together with paper / cardboard (TRGS 615)	Paper with incompatible impregnation, incompatible impregnated or soaked paper
Plastics	PE, PP, PS (foams) (DIN 6120-2), VCI (Plastic foils, foams, chips) (TRGS 615)	Plastic mixtures, rubber compounds, metal-plastic composite films, incompatible impregnated films
Metals	Steel (also galvanized or lacquered), aluminum	Galvanized metals (e.g., tinplate)
Wood	Impregnated solid and plywood, from non-EU countries: IPPC standard (ISPM 15)	Chipboard, coated or lacquered wood

4.3.1 Cardboards

Corrugated board boxes can be used as single packing units or as outer packing units. Ensure that corrosion-sensitive parts are not in direct contact with the carton. Ensure that parts are properly secured inside the box so that there will be no damage or loss during transportation and handling.

The box quality must ensure stacking stability and withstand the stress impact during transportation, handling and storage. The quality must comply with DIN 55468 at least, depending on the stacking height and transport conditions. The cardboards shall be closed with adhesive tape and/or staples (ensure that prongs of all staples should be completely bent into a closed position). Lining/covers are to be used in a proper way so as to protect packed items from external influences, maintain interior cleanliness and keep the contents intact. To arrange rational load units, boxes must allow secure stacking. Ensure that pallets which are not suitable for stacking are marked accordingly on top.

Simple cardboard boxes and corrugated cardboard boxes shall be used exclusively in the following module size (external dimensions). The highlighted fields show the preferred dimensions of cardboards.

Cardboard dimensions in mm						
Possible heights	300 x 200	400 x 300	600 x 400	800 x 400	1200 x 800	1200 x 1000
1.	≤ 50	≤ 150	**≤ 150**	**≤ 150**	**≤ 1000**	≤ 600
2.	≤ 90	≤ 200	≤ 200	-	-	≤ 750
3.	≤ 125	≤ 300	≤ 250	-	-	≤ 100
4.	**≤ 150**	**≤ 320**	≤ 300	-	-	-
5.	≤ 200	-	-	-	-	-

4.4 Packaging aids

The packaging aids are divided into five groups according to their type and application.

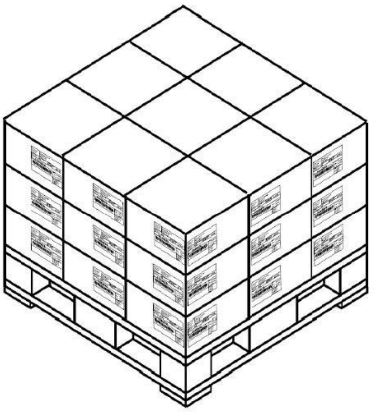
No.	Group	Example	Remark
1.	Plastic	PE-pockets and bags	
2.	Glue	Labels	- Residue-free removal
3.	Filling material	Crumpled paper	- No Styrofoam - No packing foam - No fillers from food (e.g. corn chips)
4.	Strapping	Plastic tape	
5.	Anticorrosive paper	VCI-Paper	

5 Labeling and marking

A clear and systematic identification of packaging and handling units as well as the transfer of re- quired information accompanying the goods are essential for the clear and fast identification of the delivered parts.

5.1 Labeling

Each packaging unit must be marked clearly and visibly on a long side. At least one visible outer surface has to be marked on each outer packaging in order to ensure a clear and fast identification of the packaging units. In case of deliveries of sample parts, the products and the accompanying documents must be clearly marked as sample parts delivery. Each indi- vidually handled container (container, KLT, cartons, etc.) is to be marked with barcode labels according to the valid standard of the recipient country (VDA, Odette, Galia, AIAG etc.).



The marking shall be such that:

- All labels must be flat and completely self-transparent
- An overlap e.g. with transparent film is not permitted
- the labels can be removed when using reusable pack- aging
- it is clearly visible during transport and storage, is not lost or becomes illegible
- in the case of barcode labels, these are arranged in such a way that they can be processed electronically without further measures

In order to avoid confusion of parts in the process, only the actual marking on the package may be used. All old labels, including glued labels, shall be removed. In the case of incorrectly labeled deliver- ies, Pierburg reserves the right to refuse acceptance of the consignment or to continue to charge any additional costs. When different material numbers are delivered on a pallet, it must be marked as a mixed pallet and marked on the delivery note. Deliveries without mixed pallets are to be preferred.

Each delivery shall be accompanied by at least the following delivery or freight documents:

- delivery note
- hazardous material data sheets (if necessary)

Each shipment will only be accepted with full shipping documents. Further documents requested by Pierburg for delivery, such as, for example, quality documents shall be enclosed in a separate enve- lope of the delivery, separate from the delivery note. Each delivery must be accompanied by a packing list with an exact table of contents and the order number. Pierburg reserves the right to reject non- identifiable deliveries at the supplier's expense!

5.1.1 European standard label

The following tables show samples for the pallet label and the small part container label, which are compiled according to the VDA and Odette standard. Each individually handled container (small part container, cartons, etc.) is to be marked with barcode labels according to the valid standard of the recipient country!

5.1.1.1 Sample Pallet master label

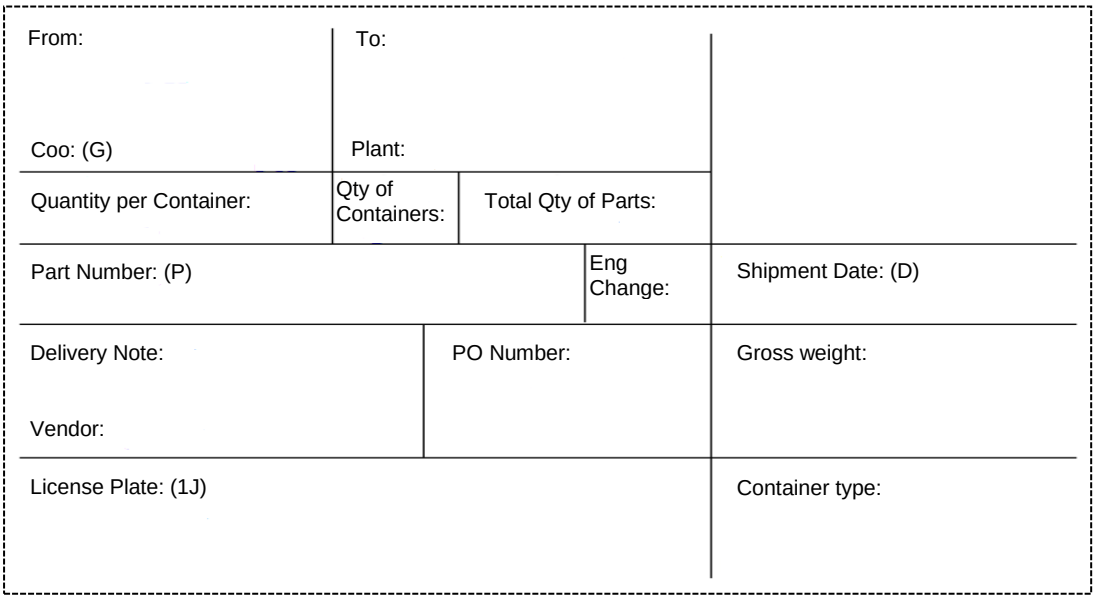
(1) Receiver		(2) Dock / Gate	
(3) Advice Note No. (N)		(4) Supplier Address	
	(5) Net Wt.	(6) Gross Wt. (KG)	(7) No. of Packs
(8) Part No. (P)			
(9) Quantity (Q)		(10) Description	
		(11) Package Type (B)	
(12) Supplier (V)			
		(13) Expiry	(14) Engineering
(15) Serial No. (S, M,G)		(16) Lot No. (H)	

5.1.1.2 Sample small part container label

(1) Receiver	(2) Dock / Gate	(3) Advice Note No. (N)	
(8) Part No. (P)			
(9) Quantity (Q)		(10) Description	
		(11) Package Type (B)	
(12) Supplier (V)			
		(13) Expiry Date	(14) Engineering
(15) Serial No. (S, M, G)		(16) Lot No. (H)	

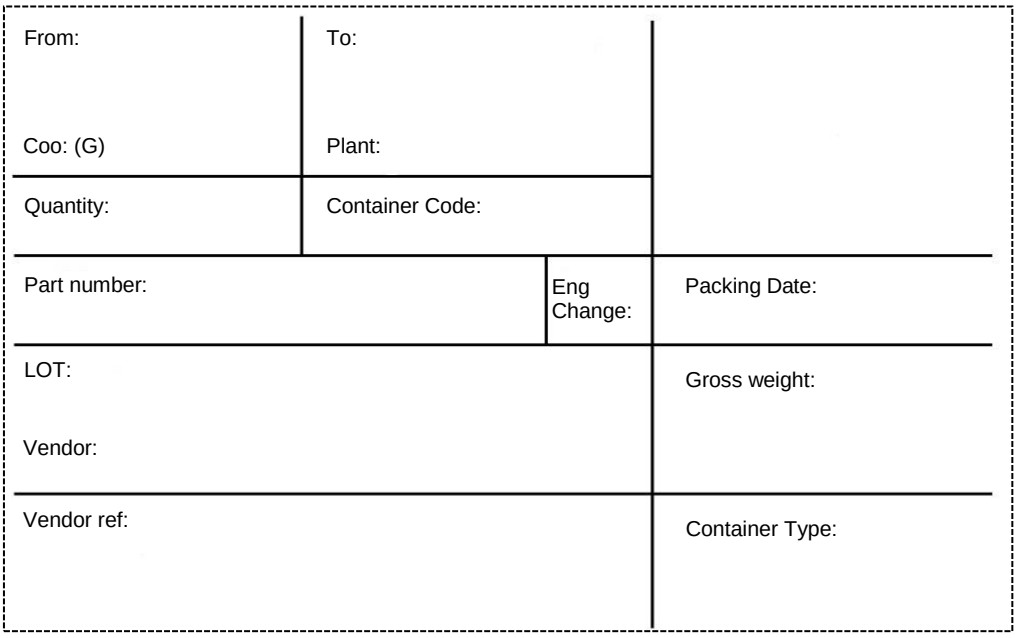
5.1.2 Sample master label according to AIAG standard

The following layout shows a sample for the pallet label, which are according to the AIAG standard. Refer to the table below for specifications regarding the layout.



5.1.3 Alternative label size/layout: 203x96 mm

The following is a layout of all the fields that are contained within the label. Refer to the table below for specifications regarding the layout.



5.2 Marking

If the packaged goods require a special kind of handling, this is to be made visible by clearly visible indications, externally on the packaging. The symbols for the handling marks of packaging are defined internationally in ISO R / 780 and in DIN 55 402. The symbols must not be dispensed with, since these are always explained by themselves and thus language problems in international traffic are avoided. The symbols listed here are the usual symbols; all others are shown in the ISO R / 780.

Designation	Marking	Designation	Marking
Fragile packaging		Permissible pile load	
Up here		Electrostatically endan-gered component	
Protect from heat		Do not damage the barrier layer	
Protect from moisture		Stacking prohibited	

6 Disposal and cleaning

6.1 Disposal

Repair or, where appropriate, disposal of defective packing aids and container is carried out according to the polluter pays principle. Disposal of expendable packaging is carried out by the recipient.

Only fully functional returnable packaging must be used. If this is not the case, these must be replaced before use by the supplier. The reusable packaging used must be managed in a stock system. At least once a year, container stocktaking is to be carried out at Pierburg's request. The book stock is to be matched monthly by the supplier about the receipt of movement lists and stocks. Complaints must be made within 14 days after receipt of the adjustment data. Otherwise, the duration is considered accepted. Euro pallets are generally not to be exchanged with the carrier, unless this has been agreed explicitly in the packaging agreement and noted.

6.2 Cleaning

It is the supplier's responsibility to keep all packaging clean including removing old labels and to inspect all containers for damage before use. Only clean containers shall be used to transport product. The packaging is cleaned according to the polluter pays principle.

7 Supplier Check List

To help ensure Pierburg's supplier packaging requirements are followed, please use the following checklist as a manual. All deviations from the Pierburg requirements must have written consent from Pierburg plant logistics department.

1.	Supplier has access to and understands Pierburg's supplier packaging requirements	
2.	Supplier employees are trained regarding Pierburg's packaging requirements	
3.	Have the packaging data sheet submitted and maintain a copy for each part number supplied to Pierburg	
4.	Containers & pallets selected are an approved Pierburg standard size or otherwise have written consent from Pierburg packaging	
5.	Selected container has sufficient strength to contain the products through the entire distribution cycle.	
6.	Containers have been right-sized and have been filled to capacity	
7.	Containers & pallet load are within the Pierburg weight restrictions (packaging unit: 12 kg; handling unit/pallet: 800 kg)	
8.	All solid wood packaging material must comply with ISPM15 requirements.	
9.	Containers are palletized, aligned, do not overhang the pallet, and are supported by loose lids.	
10.	Pallet loads are within the loading height required by Pierburg to enable efficient stacking during transport and storage (maximum 1000 mm)	
11.	Containers are secured to the pallet with approved stretch film or approved plastic banding and no metal is used	
12.	All labels are applied according to the labeling requirements.	
13.	Packaged goods that require a special kind of handling are marked on the outside of the packaging.	
14.	All shipping documents are attached to the load in a document bag.	