



Logistics Requirements for Suppliers



Logistics Requirements

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Preface

Integrating our Suppliers into the supply chain requires smoothly functioning logistics. The following requirements result from the increasingly higher customer expectations regarding flexibility, reduced inventory within the supply chain, increased globalization, as well as the increased interdependence for supplies. These requirements shall:

- Ensure supply safety for ZF;
 - Represent minimum standards; and
- Be binding.

These requirements shall be part of the performance purchased and must be met no later than at the start of pre-series deliveries. In addition to these requirements, additional project-specific logistics requirements may be defined. Together with our Suppliers, the following objectives shall be met:

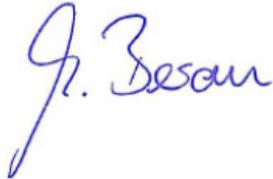
- Minimizing complexity in business processes;
- Increasing logistics chain flexibility despite short-notice order changes;
- Low throughput and process cycles;
- Simplified container handling and optimized component protection during delivery;
- Minimizing inventory in the supply chain;
- Optimum use of resources and a high degree of efficiency;
- A continuous improvement process.

If necessary, Supplier shall warrant its responsibility for its own supply safety, as well as that of its sub-suppliers, maintaining it by means of permanent improvement measures. This guideline shall also be applied accordingly to sub-suppliers.

If applicable, ZF will analyze, evaluate and agree on improvement measures for, the processes on-site with Supplier before or during series deliveries, based on this guideline.



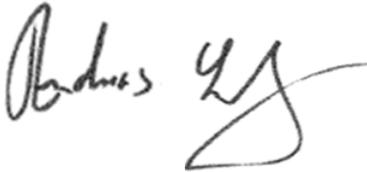
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1. Scope

This “Logistics Requirements for Suppliers” describes the plant-specific logistic processes in detail and base on Logistics Directive LR10 of the ZF Group. The following rules shall apply for supplying all receiving plants and warehouses of ZF Friedrichshafen AG and its subsidiaries (henceforth collectively: ZF) listed in Annex I. ZF reserves the right to change or amend these requirements. The most current version will be available on ZF’s website.

2. Basic requirements (across processes)

2.1. Knowledge of ZF processes

For a better understanding of the relevant processes within ZF (e.g., material planning, manufacturing or assembly processes, IT, etc.), it will be absolutely essential for Supplier to request information from ZF about these in order to be able to recognize effects of defective deliveries on the manufacturing process, in particular. Information can be obtained via the ZF contact responsible at the receiving plant.

2.2. Technical communication

All ZF suppliers are expected to be able to process logistic business processes via electronic data interchange.

This is generally handled by ZF using the EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) standard. The VDA standard can only be used in exceptional cases and after prior consultation.

In addition, modern means of communication such as email or the Internet shall be used.

2.3. Availability of contacts/authorizations for deciding on special measures

During the operating hours of the receiving ZF plant, a knowledgeable and competent contact shall be available at Supplier's. Information on each plant's operating hours is available from the plant. Supplier shall define the authorization for initiating special measures (such as in case of special transports), including providing a replacement contact, ensure its availability at any time, and communicate the arrangements to Customer. Internally, Supplier shall create a workflow for initiating and implementing special measures.

2.4. Initiating continuous improvement processes (CIP)

In order to meet the steadily increasing and changing requirements it will be necessary for Supplier to have a continuous improvement process in place also for the logistics area. For this purpose, employees shall be trained and the idea of CI shall be implemented. The results shall be periodically demonstrated and presented in a transparent manner.

2.5. Using emergency plans

In order to ensure smooth manufacturing and supply for the ZF plants, it will be necessary to create emergency plans. These shall include, but not be limited to, a failure of electronic data processing. If possible, the FMEA approach shall be used here.

Supplier is bound to ensure ZF's supply with the materials within 24 hours. This 24-hr-emergency supply mode shall be ensured independently of the agreed standard transport agreements.

If the above requirements cannot be met by Supplier's production site, a corresponding supply site shall be established in coordination with ZF. The emergency plan shall be submitted to ZF for inspection.

3. Information logistics and order fulfillment

3.1. General

For all of ZF's supply partners, the contractual agreements made with Purchasing shall apply.

ZF's Purchasing Terms and Conditions specified in the purchase order (PO) shall be binding for all suppliers, even if they have specified on their forms that their T&C shall apply.

All of ZF's parts needs have been calculated electronically and will be transmitted or sent in the shape of LAB's and / or POs for each item.

3.2. Delivery call-off structure

For series call-offs, Supplier will generally receive a LAB. The delivery call-off may include a more precise schedule for the near term. ZF delivery call-offs are created and sent on a rolling basis, depending on needs and daily change planning results.

The deadlines listed in the POs / delivery call-offs shall always refer to reception dates, unless Supplier receives separate and accordingly highlighted pick-up deadlines in the delivery call-off.

The required flexibility to change may be specified separately per project or, if applicable, per component.

3.3. Delivery call-off transmission

Delivery call-offs should be transmitted to Supplier via electronic data interchange (EDI).

ZF may transmit delivery call-offs to its supply partners in the following data formats:

- EDIFACT Delfor D 97 (ZF standard);
- VDA 4905 (only in exceptional cases).

If a supplier is not equipped to use standard EDI processing, the supplier must request a WEB-EDI link via the SupplyON marketplace.

A catalog of EDI guidelines may be requested from the Logistics/Information Technology department contact of the receiving plant or via www.zf.com.

3.4. Delivery call-off processing at Supplier's

Supplier shall ensure that

- Permanent data reception is ensured;
- Delivery call-offs will be entered into Supplier's system and processed on the day received;
- All fields transmitted are transferred;
- Missing or incomplete data transfer is recognized and promptly reported;
- The data received is examined for plausibility;
- The agreed response periods are complied with.

3.5. Continuity of mechanical processing

The call-off information received at Supplier's via EDI (without media interruption) shall be entered fully automatically into Supplier's production, planning, and control system. This shall include, but not be limited to, processing into BOMs, automated generation of POs and integration into capacity planning, and checking availability.

Within 24 hours, the call-off changes must have been processed by the Shipping department including changes in semi-finished materials and, if applicable, feedback must have been sent to Customer.

3.6. Procuring semi-finished materials

For securing the procurement of semi-finished materials, Supplier is expected to do the following:

- Enter a Master Logistics Agreement with sub-supplier, representing capacities and flexibilities as agreed and in a transparent manner;
- Analyze and evaluate its supplier's entire logistics process chain;
- Hedge against emergencies in the procurement of semi-finished materials;
- Provide its sub-supplier at a minimum with the planning and order forecast provided by ZF.

3.7. Deliveries after QA complaints

If Supplier is notified of a complaint about a delivery received, Supplier shall **promptly** deliver a fault-free replacement at its own expense and free of charge.

Rejected goods will be returned to sender "DDP" through regional ZF freight forwarders. Supplier will be charged for the cost of return freight, as well as for the delivery of the defective parts.

4. Manufacturing process

4.1. Capacities

Supplier shall be able to supply ZF with products beyond the scope forecast by Purchasing and delivery call-off. Supplier must provide sufficient capacities for this.

4.2. Flexibility

In case of changes, Supplier must be able to cover a volume flexibility of $\pm 15\%$ with a response period of 5 days per item No., as well as for the entire program with a response time of 20 days.

Supplier's capacities and flexibility shall be shown using unambiguous criteria (layer models, capacity utilization levels, material inventory, etc.) in a transparent manner. The manufacturing status must be inspectable by ZF at its request at any time. The criteria must be aligned and documented at meaningful intervals.

4.3. Ramp-up/ramp-down control

Ramp-up and ramp-down (replacements) as well as technical changes to parts (as of initial sample production start) will require a capacity planning process.

Continuous manufacturing control from receipt of PO to shipping must be implemented.

These business transactions shall require particularly close monitoring and coordination with the material planners responsible.

5. Shipping and transport

5.1. Delivery terms & conditions

ZF generally works using two delivery terms according to Incoterms 2010:

- FCA: "Free Carrier" – Supplier's shipping location

Supplier may hand off its deliveries only to freight forwarders specified by ZF. Supplier must not hire an intermediary forwarder.

If nothing has been agreed in this regard, it will be handled according to the general or site-specific shipping terms.

- DAP: "Delivered at Place" – Destination ZF plant

Supplier shall select freight forwarder so that the ordered products arrive at ZF's receiving plant on time and in perfect condition. The freight forwarder selected must have an emergency plan in place.

ZF reserves the right to provide unloading time slot for delivery.

5.2. Notification

Notification for all German sites shall be according to "General Forwarding Instructions for Deliveries to ZF Friedrichshafen AG and its Subsidiaries."

Notification for all non-German sites (delivery notification to ZF) shall include the following:

- Weight, number, and type of freight containers, number of loading meters
- Receiving plant
- Loading date; if applicable, loading time (for "FCA" deliveries)
- Arrival date; if applicable, arrival time (for "DAP" deliveries)
- Hazardous goods classification
- Declaration, customs status (EC goods yes / no)
- Name of ZF material planner
- Staging of goods at Supplier's

Notification in writing shall be made no later than 4 PM on the day before delivery to the corresponding regional freight forwarder or the material planner.

Any additional costs due to differences between the notified dates and actual staging shall be at Supplier's expense.

In addition, the "General Forwarding Instructions for Deliveries to ZF Friedrichshafen AG and its Subsidiaries" at www.zf.com shall apply.

5.3. Costing upon quotation submission

In the interest of joint optimization of resources, a delivery according to Incoterm FCA may be more economical for both partners than a delivery according to Incoterm DAP. The reverse is also possible.

Stating transport costs will allow optimizing transports to and from ZF suppliers early on.

For this purpose, the quotation shall be structured such that the purchase price for products according to both Incoterms FCA and DAP can be seen. The framework conditions, such as delivery cycle, empties return, etc. shall also be stated.

We recommend completing our "Logistics Standard Concept", "Cost overview" and/or "Packaging Proposal" supplier questionnaires that can be requested from the Purchasing/Logistics contact responsible.

5.4. Shipping process

Supplier agrees to stage the goods properly and load them according to driver's instructions. Loading shall be performed in a weather-proof environment.

Staging for shipping must have been completed by 7:00 AM on the pick-up/call-off day at the latest.

Only completely filled containers according to the applicable shipping regulations may be registered for shipping. This shall not apply in case of batch splitting.

The scheduled alternate packaging may only be used with prior approval.

The delivery note data shall be transmitted to ZF via electronic data interchange (DFÜ/EDI).

ZF can process delivery notes/notifications in the following data formats:

- EDIFACT-Desadv D 97 (ZF standard)
- VDA 4913 (only in exceptional cases)

The EDI delivery notifications must be triggered promptly after the vehicle has been loaded. If a different volume is loaded, the material planner must absolutely be notified.

If a supplier is not equipped to use standard EDI processing, the supplier must request a WEB-EDI link via the SupplyON marketplace.

A catalog of EDI guidelines is available on ZF's website.

5.5. Delivery note/freight forwarder PO

In order to ensure smooth goods receiving at ZF, all shipments shall include a delivery note according to DIN 4991 / DIN 4994 or VDA 4912 (*DFÜ-Warenbegleitschein*). Suppliers may use their own forms complying with the standard.

The packaging used and the loading means (load carriers incl. inserts, etc.) shall be stated separately on the delivery note. The ZF material number of the means of packaging (e.g., 91.000.007=Gitterbox/steelmesh box) shall also be stated in the Delivery note.

All ZF Suppliers shall hand the freight forwarder a correctly completed delivery note at hand-over of the goods, as well as a freight forwarder PO (*Speditonsauftrag*) according to VDA 4922.

5.6. Goods tags/labels

The goods tags attached by Supplier are used to unambiguously identify the goods. Supplier must ensure that all packages and containers have a valid goods tag. All old and thus invalid goods tags must be removed.

Using the standardized goods tags according to VDA 4902 Version 4 will allow both partners to use bar-code-ready detection systems.

ZF considers the wrong identification of products a quality issue that will result in an increase in the ppm figures.

For goods tags according to VDA 4902 Version 4, paper or cardboard shall be used. Adhesives must not be used for attaching them, in particular with the VDA small load carrier system.

If the holders provided on containers are not used, adhesive dots shall be used that can be removed easily and without leaving any residue. In case of non-compliance, Supplier will receive a logistics complaint that will be integrated into the ppm, and according to ZF's QA Guideline, into Supplier's evaluation.

To prevent accidents, goods tags must not be attached using wire or wire rings (please use wire clamp pockets).

Any additional expenses due to wrong, invalid or ambiguous identification of goods will be charged to Supplier.

5.7. Goods deliveries from foreign suppliers

Foreign suppliers shall take into account holidays and the corresponding driving bans.

6. Packaging planning/instructions

6.1. Preamble

The increasing significance of load carriers within the material flow has resulted in an increased joint responsibility for suppliers and ZF.

The following provisions shall be a basis for this joint task.

The objectives of environmental law with regard to waste handling shall be met jointly with our suppliers according to the following priorities:

Avoid: Limitation to the most essential (saving resources and reducing transport volume).

Reduce: Using and improving reusable packaging from recyclable materials.

Recycle: Using environmentally compatible, recyclable materials; recycling close to the location of origin in order to avoid a return via the supply chain with the related transport volumes.

6.2. General

The packaging instructions shall apply for all of ZF's suppliers. If there are no packaging instructions for a delivery program, they may be requested from the Logistics contact of the receiving plant, stating the currently used packaging and fill volumes.

When determining packaging - in addition to the waste handling-related objectives - special aspects of material flow, quality assurance and efficiency shall be taken into account.

Independently of the packaging type selected, Supplier shall warrant the delivery quality of its products. Supplier shall be liable for decreases in quality due to insufficient or soiled packaging.

If the packaging rules issued are not complied with, ZF reserves the right to charge the resulting additional costs, such as for re-packaging, etc., to Supplier.

Non-compliance with the packaging instructions will be considered a quality issue and integrated into Supplier's assessment (ppm) and evaluation.

6.3. Reusable packaging

ZF generally wants to use reusable packaging with its suppliers in order to contribute to waste avoidance. Leveraging efficiency potentials through joint use and a continuous logistics chain is one objective.

Primarily, an attempt will be made to use existing ZF standard containers.

The Packaging Catalog (LMN 459) provides an overview of the standard packaging currently in use at ZF; if necessary, it may be requested from the Quality Management and Methods Team.

Optimizations shall be coordinated with the Logistics contact from the receiving plant, who will be responsible for coordination.

6.4. Non-returnable packaging

For transport by land, using non-returnable packaging shall generally be avoided.

However, if using non-returnable packaging has been agreed for a variety of reasons (economy due to high return costs or short product lifecycles, alternate packaging during supply bottlenecks, loading aids, etc.), the following shall be taken into account:

Approved packaging materials

The following Table shows all materials approved for non-returnable packaging. For reasons of ensuring recycling and of the required effort, the following selected materials have been approved only:



	Approved material	Material NOT approved
Carton	Carton with the RESY symbol, papers and carton free of materials representing a hazard in paper production	Papers and carton with coatings or adhesives that are not water-soluble
Anti-corrosion paper	VCI papers and films that are documented to be recyclable	Paper saturated or treated with substances (e.g. tar, oil, wax)
Plastic (if possible, natural color)	Formed parts PE Protective caps PP Films PE Strapping PE (green) PP (black)	Plastic mixes Metal/plastic laminated films Metal closures on PP/PE strapping
Metals	Steel, galvanized or painted Aluminum	Steel strapping Galvanized metals (e.g. tin)
Wood	Untreated solid wood and plywood Wood shavings Wood treated according to IPPC Standard ISPM 15 according to BBA (Bundesbehörde der Bundesforschungsanstalt)	Particle board Coated or painted wood

Packaging for electrostatic discharge-sensitive devices (ESDS) must be designed and identified according to DIN EN 61340-5-1 and 5-2.

When using non-returnable packaging, the following requirements shall be met:

- Pallets with a design and dimensions corresponding to EURO pallets (1,200 x 800 mm, with a max. stacking height of 970 mm);
- Carton or wooden structure with a max. height of that of a EURO steelmesh box. Stacking height must allow at least 3 layers. Contents must be protected from damage. Corner reinforcements are required for carton packaging.

For overseas transports, container-optimized packaging will be required. This container-optimized packaging, as well as all change requests, must be coordinated in advance with the receiving plant.

6.5. Packaging planning

In order to achieve optimum and cost-efficient container handling, packaging should generally be determined jointly.

The following process shall be used for this purpose:

In a first step, Supplier shall generate a packaging proposal, taking into account the following criteria:

- Ensuring component quality (during transportation and storage);
- Realizing the optimum fill level while meeting German Workplace Guidelines (e.g. a max. of 15 kg for small load carriers);
- Accessibility by vehicle from all four sides;
- Minimizing efforts at Supplier's and installation location (ease of filling, ability to reduce volume, cleaning, removing components, etc.);
- Reducing the use of non-returnable loading aids (ZF Multiuse Pool Systems)

ZF will then review Supplier's proposal. The final decision will then be made by Supplier or ZF (including alternate packaging).

The result should be binding packaging instructions according to VDA 4931 or plant-specific packaging instructions per component.

6.6. Purchasing

Load carriers will be purchased, or their purchase coordinated, by ZF for each project, based on economic aspects.

6.7. Supplier's cost sharing

Since using reusable packaging (as opposed to non-returnable packaging) has economic advantages for all parties involved, the suppliers shall share the costs. ZF will agree on a supplier share with the suppliers for letting them use the reusable packaging.

7. Empties supply control

Unless agreed on otherwise, ZF will control the empties supply, based on inventory management and the specified use days, transport times, as well as dwell time at Suppliers'.

Unless agreed on otherwise, ZF will control the empties supply, based on inventory management and the specified volumes in circulation. Supply control shall only include proprietary reusable packaging (steel containers & small load carriers). Supply control for DB steelmesh boxes (gray) and wooden DB pallets within Germany shall be the responsibility of the regional freight forwarder with the corresponding supplier.

7.1. Needs assessment/circulating volumes

The load carriers provided shall only serve as a means of transportation. The need will be assessed by ZF at the time the packaging is determined. Supplier shall ensure early on that the empties required for its delivery volumes according to the ramp-up curve will be available.

The Logistics team, in coordination with ZF's manufacturing sites and Supplier, shall determine the number of reusable packaging units required for the total volume in circulation. In general, the following volumes in circulation are desirable:

Container type	Domestic supplier	Foreign supplier
LM 65 Liter container (01)	Max. 6 days	Max. 2 weeks
LM 500 Liter container (02)	Max. 6 days	Max. 2 weeks
EURO meshbox (03)	Within Germany, needs will be handled via the regional freight forwarder	
Small load carrier boxes (10-16)	Pool containers will be provided as needed	
Special load carriers	As needed	As needed
Flat Euro pallet (30)	Within Germany, needs will be handled via the regional freight forwarder	

The time periods listed in the Table include all transportation times, i.e. delivery to Supplier and delivery to ZF.

7.2. Staging

Empties shall be periodically staged by the empties handling department. If sufficient standard packaging is not available for a delivery, approval for using “unscheduled empties” shall be requested from the receiving plant’s material planner responsible. This will result in supply options, as well as deadline and volume being reviewed. If empties cannot be supplied promptly, special approval will be provided using the above form.

If such an approval is not issued, ZF reserves the right to charge Supplier for resulting repackaging costs and to treat this as a quality problem that will be integrated into the Supplier’s assessment (ppm) and evaluation.

7.3. Stocktaking and inventory management

Supplier will be notified at regular intervals (monthly) by ZF or a service provider, of the empties account per load carrier.

Supplier shall determine its inventory and report differences to the empties department within 14 days so that any differences can be balanced. If this is not done, the inventory numbers will be managed by ZF as the new actual numbers.

In addition, annual balancing of book inventory numbers with the actually available inventories (container stocktaking) shall be required. Supplier shall count its empties and report its results by January 10th to the empties handling department. If Supplier does not provide an inventory report, Supplier will be supplied based on the unbalanced empties account balance.

7.4. Maintenance and cleaning

Empties will be delivered to Supplier (packager) in a functional state. Damaged load carriers / pool containers and load carriers / pool containers requiring repairs shall be promptly reported to ZF or the corresponding regional freight forwarder.

Storage must be such that usability and cleanliness are ensured.

When accepting empties, packager shall review them with regard to quantity, and usability that may impact the quality of the product to be supplied. Complaints that were visible during reasonable controls must be reported to the empties handling department within 24 hrs. from receipt of empties.

If needed, packager shall determine and meet its own higher requirements for packaging cleanliness.

Please direct any questions to your contact in the corresponding plant.



8. Assessing logistics performance

8.1. General

Once a week, deadline and quantity reliability will be measured for all suppliers, based on the Bensberg Tool under SAP. If a need for improvement has been identified for a supplier, a series of measures will be generated with the supplier, including periodic supplier meetings, process analyses, and studies for improvement potential. They will be used to define and agree on the required measures for continuous prevention and elimination of weak spots. Goals will be agreed on and reviewed. We do, however, expect you to have a natural desire to effect your own development. To support you in this process, we will provide you with the monthly assessments of your supply reliability. The basis for how supply reliability is calculated and measured can be found in the LR10 Logistics Guidelines.

8.2. Logistics quality (quality ppm)

8.2.1. General

In addition to measuring supply reliability, logistics quality will also be assessed. For this purpose, all defective deliveries during the period in question, including initial sample delivery, will be entered and treated like complaints.

8.2.2. Ppm rules and criteria

The following issues will count according to the ppm rules:

- Wrong delivery (parts delivered with wrong parts numbers);
- Mixing of parts;
- Packaging not OK (accompanying documents or packaging are not OK, such as missing initial sample test report / factory test report, wrong carton size).

These defects will be integrated into a review report with an assessment (ppm) to the suppliers, as well as into the annual and semi-annual supplier evaluation. Suppliers will be ranked according to the ppm results.

Deviations in deadlines and quantities shall not be ppm-relevant through the above measuring of supply reliability.

Corrections in the quantities of evaluated defective parts or delivered parts can be made at any time and are mandatory if they affect the ppm complaint rate.

9. Glossary

LMN 459	ZF Transportmittelkatalog / Packaging Catalog
DFÜ	Datenfernübertragung / Electronic data interchange
VDA	Verband der deutschen Automobilindustrie / German Automotive Manufacturers' Association
VDA 4922	VDA Speditionsauftrag / Freight forwarder PO
VDA 4913	Standard zur DFÜ von Liefer- und Transportdaten nach VDA / VDA standard for electronic data interchange of delivery and transport data
VDA 4931	VDA Verpackungsvorschrift / VDA Packaging Regulation
VDA 4912	DFÜ-Warenbegleitschein nach VDA / VDA electronic data interchange goods document
DIN 4991	Lieferschein nach DIN / Delivery note as per DIN
DIN 4994	Lieferschein nach DIN / Delivery note as per DIN
LAB	Lieferplanabruf / Delivery call-off
SupplyON	Internet-Marktplatz (SupplyON.com) / Internet marketplace
	EDIFACT Electronic Data Interchange for Administration, Commerce and Transport
EDI	Electronic Data Interchange
VDA 4905	Standard zur DFÜ von Lieferplanabrufen nach VDA / VDA standard for electronic data interchange of delivery call-offs
LT	Ladungsträger / load carrier
FCA	"Free Carrier" Incoterms 2010
DAP	"Delivered At Place" Incoterms 2010
WEB – EDI	Electronic Data Interchange via Internet
KVP	Kontinuierlicher Verbesserungs-Prozess / Continuous improvement process (CIP)
FMEA	Methode der Fehler-Möglichkeiten- und Einfluss-Analyse / Failure modes and effects analysis
PPS	Produktions- Planungs- und Steuerungs-System / Production, planning and control system
ppm	parts per million
VCI	Volatile Corrosion Inhibitor
RESY	Recycling System



10. List of Annexes

- Annex I Scope for Logistics Requirements for Suppliers