

SUPPLIER MANUAL



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1. INTRODUCTION

1.1. THE COMPANY

Tupy is a Brazilian multinational foundry, leader in the market of iron engine blocks and heads in the Western Hemisphere. Tupy develops and produces cast and machined components for the automotive sector and serves many industries and civil construction segments, with the production of malleable iron fittings, steel shot and continuous cast bars, becoming an international reference in Quality and productivity.

Founded on March 8, 1938 in the city of Joinville, the company has two manufacturing units located in Brazil, in the cities of Joinville/SC and Mauá/SP; in April 2012, in order to expand production capacity, the company also acquired two units in Mexico, in the cities of Saltillo and Ramos Arizpe Coahuila, which means that Tupy's first production base and foreign bases have added 312,000 tons to its annual production capacity, thus making the company the world's largest manufacturer of engine blocks and heads.

1.2. MISSION, VISION AND VALUES

Mission

Contribute to the success of its shareholders and customers by providing casted, machined products and high-value services, while contributing to achieve employees' objectives and supporting the communities in which it operates.

Vision

Be the global leader in the iron foundry and machining industry, with a differentiated business of high technology components and industrial hydraulics.
Recognized for being:

- » customers' first choice,
- » preferred employer,
- » attractive to capital markets.

Values

- » People
- » Health and safety
- » Economic excellence
- » Environment and community
- » Customer focus
- » Integrity
- » Commitment
- » Communication
- » Learning and Innovation

1.3. MANAGEMENT POLICY

Quality, Environment, Health, Safety and Social Responsibility

Tupy shall, in all of our plants and offices:

- » Value, recognize and develop people;
- » Deliver continuously outstanding results to our shareholders;
- » Exceed our customer' expectations in (terms of) quality, delivery and services;
- » Pursue the best from our internal and external suppliers;
- » Promote appropriate, opened and clear communications with our stakeholders;
- » Ensure that corporate actions are both ethical and socially responsible;
- » Pursue (continuous) solutions to improve our Management Systems while valuing learning and innovation;
- » Act with responsibility, proactiveness, sense of urgency and collaboration;

- » Comply with all legislation, norms and other applicable requirements, as well as internal procedures;
- » Care for quality, environment, health and safety of our employees, internal service providers, costumers and community by:
 - Prioritize safety, health and environment above any other demands;
 - Prevent hazards and treat non-conformities with due diligence;
 - Optimize use of natural resources that support sustainability.

1.4. ADDRESS OF TUPY UNITS

Joinville Unit

Rua Albano Schmidt, 3400
89227-901 - Joinville / SC - Brazil
PO Boxes: D-301 and 33
Phone no.: (47) 4009-8181
Fax: (47) 4009-8288

Mauá Unit

Avenida Manoel da Nóbrega, 424
09380-120 - Mauá / SP - Brazil
Phone no.: (11) 2763-9800
Fax: (11) 2763-9811

Saltillo Unit

Boulevard Isidro López Zertuche 4003
Área industrial
Saltillo, Coahuila, México CP 25230
Phone no.: + 52-844-411-2000

Ramos Unit

Rodovia Monterrey-Saltillo Km 21,5
Ramos Arizpe, Coahuila, México CP 25900
Phone no.: + 52-844-866-0600

Website: www.tupy.com.br

1.5. PURPOSE

This manual aims to:

- Establish the activities between Tupy and its Suppliers, focusing on the Quality Management System requirements
- Inform the procedures, requirements and recommendations for the following activities:
- Development of new suppliers, materials and services.
- Supplier performance monitoring.
- Treatment of deviations in materials and services.
- Inform suppliers about specific customer requirements and applicable international standards, and the need to meet them.
- Promote the development and continuous improvement of Suppliers.

1.6. SCOPE

This Manual applies to Suppliers of Materials / Services that have a direct impact on the Quality of products at Tupy units, approved or under development, which are part of the following groups:

Raw material

Material used in the manufacturing process, which is incorporated into the final product and/or is directly related to the physical, chemical, mechanical and dimensional characteristics of the final product.

Process material / cast fittings

Material necessary for the manufacturing process, which is not incorporated into the final product.

Components

Materials which are assembled in Tupy products in the Machining line.

Painting service

Applying paint to castings and/or Tupy parts to prevent corrosion.

Heat treatment services

Heating and cooling of parts under controlled conditions of time and temperature to modify their mechanical properties.

Machining services

Machining of parts by material removal, chip removal or abrasion.

Calibration services

Calibration and maintenance of measuring instruments, devices and equipment.

Inspection, rework and selection services

Work carried out on Tupy products, related to Quality Inspections and rework.

Transport services

Transport of Tupy products to the Client and raw materials to Tupy.

Internal services

Services performed at Tupy plant related to cleaning, material handling, property security, personnel transport, internal and general maintenance, etc.

Packaging

Materials used in the Tupy product packaging process.

Cargo handling devices

Equipment used to move parts.

Control devices

Devices used for dimensional control of parts.

Tooling

Molding tools.

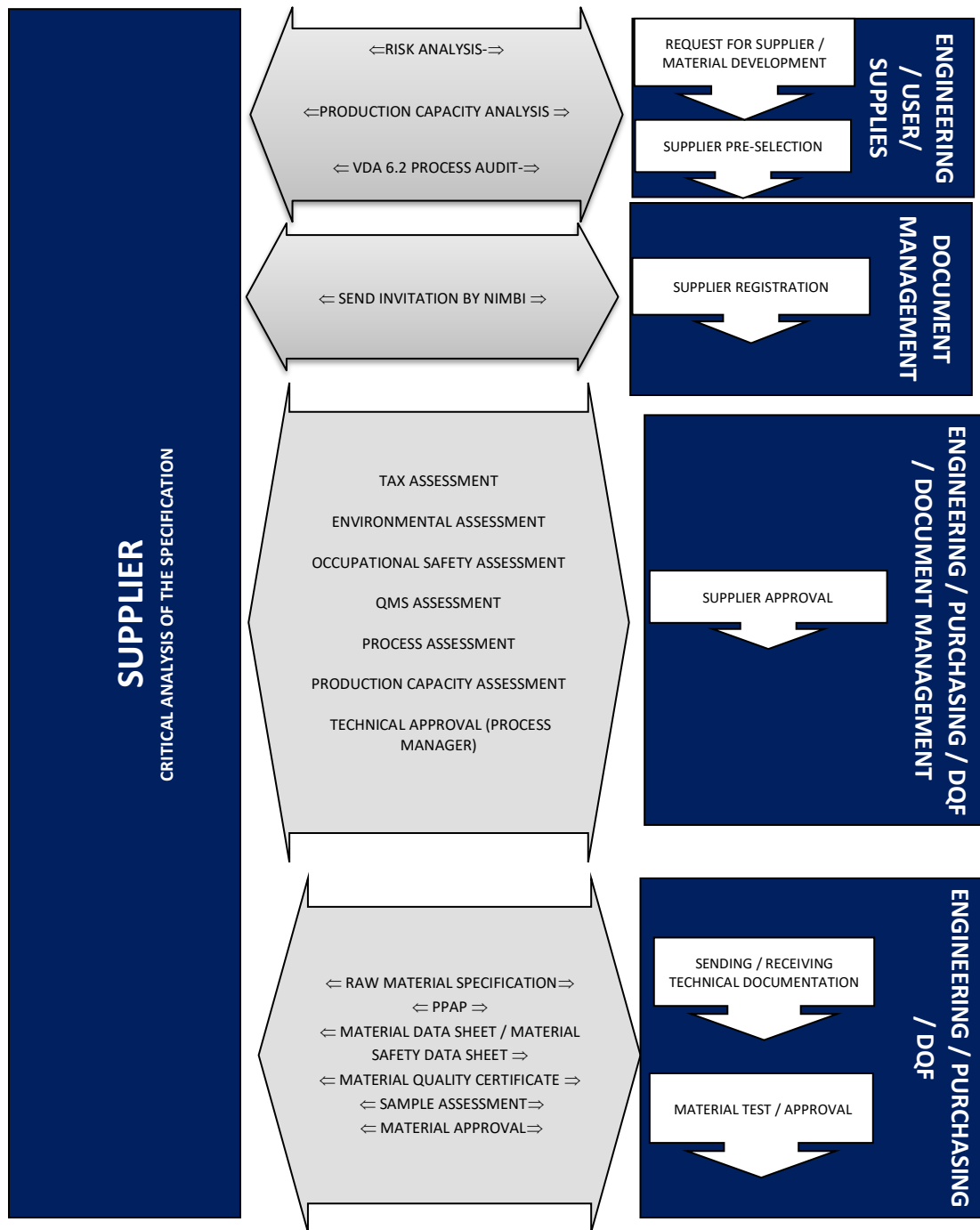
Cutting tools

Tools used in the machining process of Tupy products.

2. SUPPLIER AND MATERIAL DEVELOPMENT PROCESS

2.1. FLOWCHART FOR SUPPLIER / MATERIAL DEVELOPMENT

The figure on the next page shows the Supplier / Material development steps. Documentation exchanged between Tupy and the Supplier varies according to the family of the material supplied.



2.2. SUPPLIER PRE-SELECTION

As part of the pre-selection process, the supplier will be evaluated according to the following criteria:

- Risk analysis, which aims to verify the Supplier's business profile and determine possible supply risks.
- Production Capacity Analysis, which aims to verify the supplier's supply capacity.
- VDA 6.3 Process Audit, which aims to verify the degree of compliance with a Quality Management System.

The information contained in the aforementioned assessments will be analyzed and approved by the Supplier Management team. In case of rejection, the supplier registration process will not be started.

2.3. SUPPLIER ASSESSMENT IN DEVELOPMENT AND CAPACITY ANALYSIS

The potential analysis is carried out through the Risk Analysis Assessment, in order to detect potential risks in relation to the future supply of the potential Supplier.

The capacity analysis is carried out through the Production Capacity Analysis, in order to establish the supply capacity of the supplier under development. If the Supplier is approved, the Capacity Analysis will be evaluated according to the frequency established in the procedure described in each Tupy organization.

2.3.1 Process Audit

The purpose of the Process Audit is to verify the degree of implementation of a Supplier Quality Management System, and it applies to current and developing Suppliers.

The Supplier will be periodically evaluated at intervals determined by Tupy, on its premises or by self-assessment.

For on-site assessment, the Supplier must allow Tupy access to its facilities and/or its subcontractors to verify the product compliance with the specified requirements.

For the self-assessment, the Supplier is responsible for delivering the information on the dates indicated by Tupy.

For the development of new Materials and/or new Suppliers, the process will be evaluated based on elements P3 and P4 of the VDA 6.3 Process Audit standard.

Product and process development planning (P3);

Verification of issues related to the item / process in the planning phase of the process development;

Execution of product and process development planning (P4);

Verification of problems related to the item / process in the execution phase of the process development;

For current suppliers, the production process is evaluated based on elements P5, P6 and P7 of the VDA 6.3 Process Audit standard.

Supplier Management (P5):

Approval of Suppliers and Purchased Materials, storage, identification and Quality of Purchased Materials, handling of Materials received from customers;

Production Process Analysis (P6):

Batches / quantities, Means of production / installation, movement of products, storage, packaging, means of measurement, defect analysis, corrective / preventive actions and continuous improvement;

Customer service, customer satisfaction, service (P7):

Customer support, handling and compliance with complaints and specific requirements.

Tupy may perform system, process, product and/or safety audits, when necessary.

If the qualification level in the audit result is “C”, the Supplier cannot supply to Tupy until an action plan is presented and a new audit is carried out with the increase of the qualification level result.

2.4. SUPPLIER REGISTRATION

The Purchasing Analyst and/or Purchasing Coordinator defines the Supplier classification and request the registration through the Nimbi platform <https://ss001.nimbi.com.br>

The Supplier must accept the invitation and upload the necessary documents according to the assigned classification.

To complete the registration process, the Supplier must accept the conditions of this Supplier Manual, Code of Ethics and Terms and Conditions contained on Nimbi <https://ss001.nimbi.com.br>

2.5. ACTIVATION OF SUPPLIERS

Based on the documentation collected in the Supplier Registration Request, depending on the type of Supplier and the information provided, the Purchasing Department activates the Supplier in the Supplier Registration.

2.6. ENVIRONMENTAL ASSESSMENT

Based on the information collected in the Supplier Registration Request, and depending on the type of Supplier, compliance with environmental requirements is verified.

2.6.1 ENVIRONMENTAL MANAGEMENT SYSTEM

It is recommended that the Suppliers defined in the scope of this Manual have a Management System certification according to the ISO14001 Standard, by an accredited body, and the accreditation certificate must be submitted to the Supplier Development area.

Note: For VW group suppliers, see requirements in section 7

2.6.2 Environmental operation license (applicable to Tupy Brazil)

This requirement applies to the following groups:

- Casting fittings and components;
- Raw materials;
- Process materials;
- Contracted plant services.
- Machining and painting service provider.
- Transport services.

The Supplier is requested to send the Environmental Operating License, which document is a mandatory requirement for supply to Tupy.

2.6.3 Transport of hazardous products

For suppliers that provide transport services for hazardous products (waste, chemical and flammable products) it is recommended to have:

Requirements	Mexico	Brazil
A plan for dealing with external emergencies;	X	X
Driver's certification and updated federal driver's license in accordance with the relevant regulations	X	X
Authorization for transport of hazardous products and waste	X	X
An internal self-inspection program and correct fleet maintenance - in the case of Brazil, as required by IBAMA Ordinance 85/1996	X	X
Vehicle identification according to ANTT 420/2004 and NBR 7500/2013 resolution;		X
Environmental license for the transport of hazardous products;		X
Liability insurance	X	

2.7. OCCUPATIONAL SAFETY ASSESSMENT

All Suppliers defined according to this Manual and which provide services in any of Tupy's facilities should have the following documents:

- APP (Accident Prevention Program)
- PCMSO (Occupational Health Medical Control Program)

2.8. ASSESSMENT OF THE SUPPLIER'S QUALITY SYSTEM

2.8.1 ISO9001 Certification

Raw Material Suppliers must have a Quality Management System certified by the ISO 9001 Standard in the current version, by an accredited body.

For Process Material Suppliers, a Quality Management System certified by the ISO 9001 Standard in the current version, by an accredited body, is also recommended.

However, according to the needs of the different Tupy locations, or due to Specific Customer Requirements, ISO 9001 certification will be required for this group of Suppliers.

For Scrap Suppliers in Mexico plants, a plan for alignment with the requirements of ISO 9001, current version, will be required.

2.8.2 IATF 16949

Automotive Suppliers providing Components, Painting Services, Heat Treatment and Machining, must have the Quality Management System certification by the IATF 16949 Standard in the current version, by an accredited body.

2.8.2.1 Automotive Suppliers Not Certified by IATF 16949

Automotive suppliers without IATF 16949 certification must comply with the Minimum Automotive Quality Management System Requirements (MAQMSR) which will be verified through Tupy's audit and which are available at the following link.

<https://www.iatfglobaloversight.org/wp/wp-content/uploads/2016/12/Minimum-Automotive-Quality-Management-System-Requirements-for-Sub-tier-suppliers-2ndEd-rev2.pdf>

However, Tupy also requires that its Automotive Suppliers have ISO 9001 / IATF 16949 certification.

2.8.3 ISO / IEC 17025 certification: 2017

Laboratories providing Calibration and Testing Services must have a Quality Management System certified under ISO / IEC 17025 in the current version by an accredited body, as well as the certification of the Standards Accreditation Entity and/or Employers of the country of origin.

2.9. SUPPLIER APPROVAL

After the analysis performed by the departments involved and upon fulfillment of the minimum requirements in the pre-selection phase (Commercial, Environmental, Quality System, Potential Assessments), the Supplier may be approved.

Supplier will be deemed approved if it provides and meets the information needed in the assessments described above. Otherwise, if any assessment is not approved, the Supplier may be conditionally approved, according to the consensus of the areas involved.

2.10. INFORMATION FOR THE SUPPLIER

Material inspection requirements are communicated through a purchase order. For Mexico, the physical-chemical requirements are communicated through raw material specification format; for Brazil, they are specified on the SAP portal.

Requirements for inspection and/or rework on castings are communicated through the Inspection Service Order.

Requirements for calibrations are communicated via purchase order.
The Purchase Order is assigned by the buyer and uploaded on Tupy's Supplier Portal.

The legal requirements for the provision of materials and services are described in:

- Terms and Conditions Policy Applicable to Material Purchase Orders
- Terms and Conditions Policy Applicable to Service Purchase Orders

Located on the Nimbi platform: <https://ss001.nimbi.com.br>

Customer Specific and Regulatory Requirements are described in section 7 of this Supplier Manual and must be implemented by the Supplier in its subcontractors.

2.11. SUPPLIER REASSESSMENT

Accredited suppliers that have not supplied any material or service for more than 2 years must go through the process described in items 2.2 to 2.8.

Note: For these groups in Brazil, the following rule applies:

Refractory material suppliers - 5 years

Cutting tools (MM16) - 3 years

3. PRODUCT APPROVAL PROCESS

3.1. PRODUCTION PART APPROVAL PROCESS - PPAP

This requirement is mainly applicable to automotive products: Components and Machining, Painting and Heat Treatment Services.

The Production Part Approval Process is carried out in accordance with the requirements set forth in Section 2.2 of the PPAP Manual issued by the AIAG, current version.

In Mexico, in the case of raw materials and process materials, the Bulk Materials Requirements format will apply.

In the case of the Brazilian plant, the PPAP requirements will be adopted. Level 3 will be taken as the standard for all submissions for Automotive items, unless otherwise specified. Tupy reserves the right to request additional requirements.

The purpose of the Production Part Approval Process - PPAP is to ensure that the Supplier fully understands the technical requirements of Tupy's Engineering Specification, and the Supplier's manufacturing process has the capacity to produce the product according to these requirements, during current production and in the quoted production ratio.

Questions about specific PPAP requirements should be addressed to the responsible Tupy representative.

The Supplier must obtain PPAP approval from Tupy in the following situations:

- A new material or component
- Correction of a material or component discrepancy
- Engineering change on a material or component
- Changes affecting the shape, durability or performance of the material or component
- Changes in the manufacturing process, equipment, and facilities.
- Tupy update request.

At the end of the PPAP process, the Part Submission Warrant - PSW is issued, indicating that the part or material meets all Tupy's requirements, and the Supplier is authorized to supply the agreed product quantities. The supplier must ensure that future production continues to satisfy all requirements.

3.1.1. PPAP Requirements

Parts for PPAP should be taken from normal production runs. These production runs must last from one to eight hours, with a minimum sample of 30 consecutive parts, unless otherwise specified by Tupy. Also, they must be carried out at the production site, in the defined production ratio, using tools, meters, processes, materials and production operators.

No quantity is specified for bulk materials. The sample must be collected in such a way as to ensure it represents the production. For bulk material, production history of current products may be used to estimate capacity or initial process performance for new or similar products. In cases where there is no production history of similar technology, product or material, a containment plan will be applied until a sufficient volume of production demonstrates capacity or performance, unless otherwise specified by Tupy.

During the PPAP stage, any out-of-specification result is ground for suspending the shipment of the PPAP sample part/product, documentation, and/or records. In such cases, Tupy must be immediately notified and the Supplier must correct the process. If, upon receiving the request for any item quotation, the Supplier identifies that it is not able to meet the PPAP requirements, it must then notify Tupy before sending the quotation to determine the most appropriate corrective action.

3.1.2. Requirements for submitting/retaining information

The Supplier must perform the appropriate and functional tests and/or validations, prepare and maintain detailed documentation, and ensure the availability of information demonstrating compliance with all PPAP requirements established in the AIAG Manual, current version, and present it to Tupy when necessary, regardless of the requested requirements.

PPAP and PSW documents must be dated, scanned and submitted to the e-mail address:

gestaofornecedores@tupy.com.br and Gestion.Proveedores@tupy.com.mx

The purpose of this request is to keep our System up to date.

If the requested information is not received, through an escalation process, the actions described in the section 4.4.4.

Advanced Product Quality Planning - APQP (Components)

As a phase prior to the Production Part Approval Process, the development of a new component, discrepancy correction, engineering change, change affecting shape or performance, change in the manufacturing process, Materials, equipment or current facilities, the guidelines established in the current version of the AIAG APQP Manual must be followed.

The documents listed below, and described in the APQP Manual, must be presented with the PPAP information.

- Project / Process FMEA (Failure Mode and Effect Analysis)
- Drawing
- Checklist for new equipment, tools and test equipment
- Product / Process Quality Results
- Process Flow Diagrams
- Control Plans
- MSA (Measurement System Analysis)
- Process Capability Studies

The PPAP process is performed according to the following criteria:

- A. Components and Machining, Painting and Heat Treatment Services require issuance.
- B. For Mexico, if the Material is incorporated into the final product and/or is directly related to its production, the PPAP requirements must be conducted according to the Requalification Materials List.
- C. If the Material is not incorporated into the final product, it is not subject to PPAP issuance.
- D. Any material is subject to PPAP issuance at the customer's request.

3.1.3. IMDS (International Material Data System) Restricted Substances

To meet the requirements of our customers regarding the prohibition and/or restriction of heavy metals, such as Mercury, Cadmium, Lead and Hexavalent Chromium, in vehicles and automotive parts, Suppliers must register the raw material components and their chemical composition in the International Material Data System - IMDS (www.mdssystem.com) and the declaration of conformity.

This registration is also necessary for development of new items or replacement of components and/or changes in the manufacturing process, in any other applicable situation and/or when required by Tupy.

To submit the IMDS registration, use ID 7096. This submission is part of the PPAP documentation and a mandatory requirement for approval.

3.2. MATERIAL DEVELOPMENT

Requirement applicable to the development of Raw Materials and Process Materials.

The pilot batch of these Materials must be delivered and identified as described in item 4.1.3, and the Supplier must simultaneously submit the following documents to the Technical and Supplier Development Department:

- Data sheet;
- Chemical Material Safety Data Sheet (MSDS), in accordance with the Globally Harmonized System.
- Material Quality Certificate.

3.3. REACH - REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS

All product suppliers for the European market must comply with REACH EC 1907/2006 legislation - regulations and guides can be found on the European Chemicals Agency (ECHA) website: http://echa.europa.eu/home_pt.asp

Information needed for new developments:

- 1) Contact details of the team responsible for REACH legislation (representing all production units - different CNPJ / Corporate tax number) - name, company, telephone and e-mail.
- 2) Chemical Composition - substances present in the supplied products, including their CAS number (Unique Identifier of the substance - see www.cas.org) and their average percentage in the composition. Also inform the product weight (kg).

For Suppliers of polymeric materials, inform the monomer used.

- 3) Report substances that do not require pre-registration / registration. For this task, ECHA has provided a “browser” which can be accessed at the following address to facilitate the process: http://reach.jrc.it/navigator_en.htm

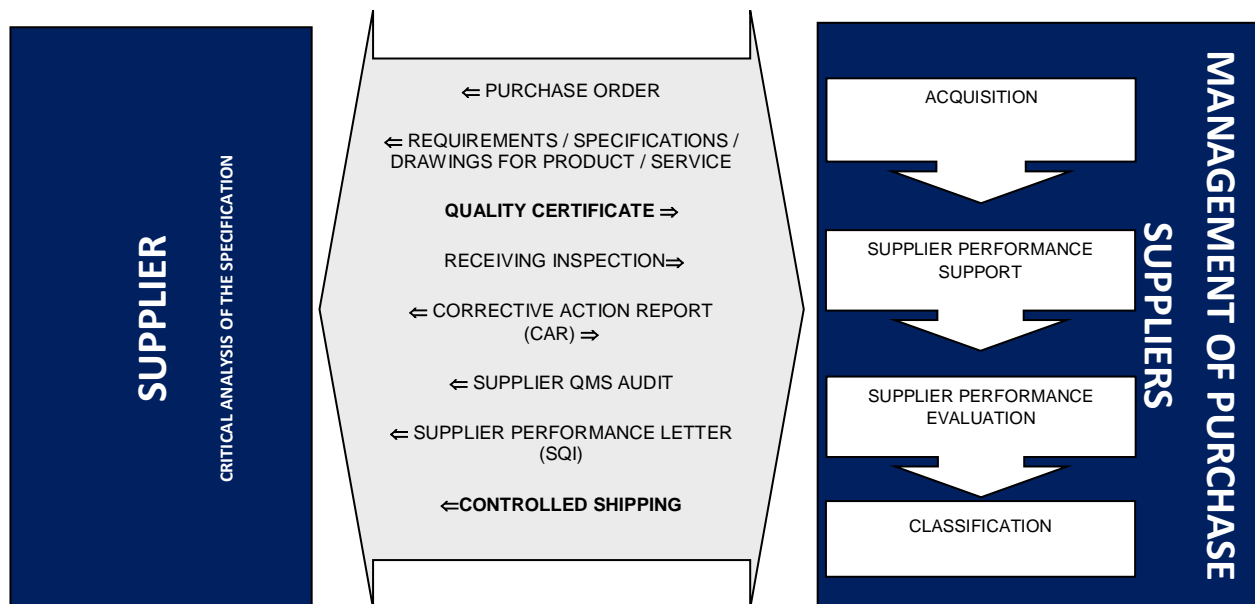
3.4. PRODUCT APPROVAL

After the item is evaluated by the areas involved regarding technical, commercial, quality, environmental and safety requirements, it finally can be approved. If any department does not approve it, the approval will then be subject to the group's evaluation.

During the approval process, the Supplier will receive the technical specification from Tupy with the product requirements (applicable to Suppliers of Raw Materials and Process Materials).

4. SUPPLIER MONITORING, PERFORMANCE EVALUATION AND CORRECTIVE ACTION

In general, the process used for Supplier monitoring, performance evaluation and corrective action is shown in the figure below:



4.1. PRODUCT REQUIREMENTS

4.1.1 Material Inspection

The Materials supplied can be inspected in accordance with Tupy - Receiving Inspection specification. IN Mexico, Raw Material or Material Non-conformities are reported through the Raw Material and Parts Rejection report; in Brazil, the results are communicated through SAP.

4.1.2 Material Quality Certificate

All Material delivered to Tupy must have a Material Quality Certificate.

The absence of these documents constitutes a reason to reject or conditionally release the product. It is noteworthy that the batch without the relevant certificate will reduce the Material Quality Index.

4.1.2.1 Content of the Material Quality Certificate:

The Quality Certificate must mention at least:

- Material provided;
- Quantity of material supplied;
- Tupy code or item and product description;
- Supplier's batch number;
- Acceptance range and measured result of the Material's features as specified in the Tupy Technical Standards;
- Invoice;

4.1.2.2 E-mail to send the Quality Certificate

Certificates must be sent by e-mail in advance or on the day of material shipment, to ensure that the certificate will be available at the moment of the receiving inspection to approve and release the Material.

Certificates must be sent to the following addresses:

- **Saltillo plant:** inspeccion.recibo@tupy.com.mx
- **Ramos plant:** recibo.ramos@tupy.com.mx
- **Joinville plant:** insprec@tupy.com.br

4.1.3 Product Identification

Unless otherwise specified in the Tupy Technical Specification of the item, product or part supplied, it must be identified, with the following information at least:

- Supplier's name;
- Product description;

- Tupy product / item code;
- Expiration date (if any), which must be legible and highlighted;
- Batch number;
- Quantity.

4.1.4 Calibration certificate

The measuring equipment sent for maintenance, verification and/or calibration must be delivered to Tupy containing the corresponding calibration certificate.

4.1.5 Products, tools and equipment owned by Tupy and/or Customers

The products supplied by Tupy and/or by customers (products, tools, measuring equipment, packaging, transport) must be identified and registered as “Owned by Tupy” and must be controlled in order to allow their quick location and verification of their status of conservation. For tools owned by the end customer, the identification must comply with Tupy requirements. The Supplier is responsible for verifying, storing, transporting, handling, maintaining the quality and validity, and identifying the product owned by the customer.

4.1.6 Packaging

The Supplier must develop a packaging that guarantees the integrity of the supplied product and that facilitates handling and storage. The use of returnable and recyclable materials is recommended.

For wooden packaging, the Supplier must meet the requirements of ISPM 15 - International Standard on Phytosanitary Measures - and carry out the phytosanitary treatment.

4.1.7 Violations - Non-Conformity

The following cases of non-conformity are subject to the issuance of a Corrective Action Request and a penalty on the Supplier's performance index:

- Incorrect, incomplete or not submitted product documentation as requested in section 4.1 of this Manual.
- Material sent with characteristic not compliant with Tupy's technical specifications, detected in the receiving inspection, in process at the Customer plant or in Process at Tupy plant.

- Expired materials;
- Mixed products;
- Damaged package;
- Wrong identification;
- Delay in responses and/or breach of agreements signed with Tupy.
- Downtime or Lost Time in the Production Line, at the Customer plant or at Tupy plant, due to Non-Conformity of Raw Material, Material or Service.
- Interruption of Raw Material, Material or Service supply.
- Monthly performance <80%

The following cases of non-conformity do not require the issuance of the Corrective Action Request; however, they are subject to the issuance of an action plan and a penalty in the performance index.

- Early / late delivery;
- Exceeding or missing quantity of material delivered;

4.1.8 Non-conforming product awareness - Non-quality costs

The Supplier must raise awareness among its employees about the consequences of shipping products with quality failures, rework, production stoppages, as well as the Non-Quality Costs associated with these failures detected at Tupy or the Customer plant.

The Supplier may be subject to claims for Non-Quality Costs, leading to production stoppages, or even claims at Tupy or the Customer plant, arising from Quality Failures in the Materials, components or services provided.

4.1.9 Deviation Request

A product with deviation is considered to be one that was produced or for any reason should be produced with a characteristic that does not meet Tupy's specifications.

Products with deviations can only be shipped with the prior approval of Tupy's technical department. For this, the Supplier must request and complete the Deviation Request form and submit it to the Supplier Development area.

4.2. NON-CONFORMITY TREATMENT

In the event of a Non-Conformity, the Supplier will receive a Corrective Action Request (CAR) to determine the root cause of the problem and establish definitive corrective actions. Late response results in demerit in the Supplier Quality Index.

The Corrective Action Request must be responded to within the following deadlines; delayed response incurs a demerit in the SQI - Supplier Quality Index as follows:

- 24 hours to define containment actions
- 5 business days for complete CAR response in the system.

If the Supplier exceeds the deadline for more than 30 days, it may be blocked for new developments. If, even so, the term is exceeded by more than 60 days, the process of disqualification of the Supplier described in item 4.12 may be initiated.

It is the responsibility of the Supplier:

- Collection, re-inspection and replacement of non-conforming material delivered to Tupy;
- Retention and re-inspection of non-conforming material, in transit or at the Supplier's premises;
- Quick response process to resolve the issue;
- Reimbursement of defects, line stoppages and quality deviations caused by failures.
-

4.2.1. Containment of Materials at Tupy or Customer Plant

If there are application problems with the Material supplied, the Supplier may be required to carry out immediate containment at Tupy or to hire a third-party company to conduct a 100% inspection.

If a recurrence is detected after 100% inspection, the Supplier will enter Controlled Shipping Level I status. (See section 4.8).

4.2.2. Containment of Materials at the Supplier's Plant

When a Non-Conformity is reported, the Supplier shall conduct a 100% inspection of the relevant product inventory in its factory. These parts must be identified by the Supplier as 100% inspected batches.

4.2.3. Disposal of Materials

If necessary, the disposal of Non-Conforming Material can be done at Tupy's facilities.

Tupy reserves the right to return or dispose Non-Conforming Materials in the most convenient way for Tupy, if the Supplier failures to do so in a timely manner.

4.2.4. Controlled Shipping

It is a process of inspection of non-conforming material in a separate location from the production line, where out-of-specification characteristics must be inspected, ensuring that non-conforming parts are detected and segregated, and ensuring that the actions taken work directly on the cause of the problem and prevent its recurrence.

4.2.4.1 Determination of the Need for Controlled Shipping

If the organization's corrective actions are not effective, Tupy will determine the need for Controlled Shipping. One or more of the following issues may be considered in determining the implementation of controlled freight:

- Defect(s) detected at Tupy;
- Recurrent failures;
- Line stops and/or major interruptions;
- Problem severity;
- Improper containment action causing non-conforming parts to reach TUPY or its customers' facilities.
- Incapable production process.

Based on the severity of the problem, Tupy will decide whether Level I or Level II is more appropriate.

4.2.4.2 Notification for Controlled Shipment Status

Tupy's Supplier Development department notifies the person responsible at the Supplier's premises, requesting a written agreement through the controlled shipment communication letter.

4.2.4.3 Level I Controlled Shipping

The Supplier implements 100% inspection process in its plant to ensure the supply of parts without failures.

4.2.4.4 Level II Controlled Shipping

If non-conforming materials are detected in the Level 1 Controlled Shipping stage, the Supplier will be classified as Level 2 Controlled Shipping automatically.

In this case, the products will be inspected at the Supplier's or Tupy's premises, by a third-party company (hired by Tupy), which will represent Tupy's interests specific to the containment activity. The third-party company is approved by Tupy and paid by the Supplier.

After notified of controlled shipping status, the Supplier must take the following steps:

- Control all non-conforming parts in its facilities, in warehouses, in transit and at Tupy.
- Provide an inspection area, separate from the common production area. This inspection area must be clearly identified and must be properly lit and equipped.
 - Review all necessary PPAP documentation and submit it to Tupy again.
 - Define and implement a corrective action plan.
 - Failure to repair and rework the containment area. The containment process must be conducted independently of the production process and, whenever possible, containment may be applied to the defect-originating process.
- Store all necessary information in graphs and tables. These must be updated and continuously revised by the supervisors. This information should be used to guide troubleshooting, establish controls, and avoid errors.
- Clearly establish an efficient material flow in the containment area, avoiding mixing Defective Materials with Approved Materials (define material entry and exit areas).

Note: If the Supplier enters the controlled shipping process, Level I or II, it may be suspended for new business until the process is completed.

4.2.4.5 Identification Tag

The Supplier must identify with an identification tag each of the packages shipped with products under controlled shipment.

Note: Inform the name of the inspectors authorized to conduct the final release and sign the identification tag.

4.2.4.6 Submitting results

Records of these inspections must be maintained and the Supplier must submit the Controlled Shipping Data Sheet weekly.

4.2.4.7 Controlled Shipping Termination Criteria

The period to remain under this regime is subject to the criteria listed below:

- Absence of recurrence of Non-conforming Material for a minimum period of 60 days after the implementation of the action plan.
- Evidence that a complete troubleshooting process was used, that the root cause of the problem was discovered, and that corrective actions were implemented and validated.
- The Supplier must remain under controlled shipment status until receiving written authorization from Tupy to terminate this process.
- Statistical Process Control shall be used, where appropriate, to confirm process stability and capability for 60 days after implementation of the corrective action plan.

4.3. LESSONS LEARNED

In case of customer complaint about warranty issues involving Tupy Suppliers, Tupy may share the information of lessons learned with other Tupy Suppliers from the same segment of the Supplier that originated the complaint, as long as it is considered applicable, in critical analysis.

The Supplier shall collect information resulting from experience, both from previous projects and from ongoing projects (e.g., field and production area failures, project performance, product safety), and apply it as lessons learned in new projects and work in progress, its production operations and its supply chain.

4.4. PERFORMANCE MONITORING

4.4.1. Supplier Quality Index - SQI

The Supplier Quality Index - SQI is evaluated according to the type of supply considering Material Quality Index, Corrective Action Index, Deadline Response Index, Delivery Quality Index, Commercial Performance Index, Quality System Index, and Process Quality Index. The Supplier is notified by e-mail.

4.4.2. Quality Goals

The Supplier must establish a continuous improvement process in order to achieve zero quality defects in the delivered products. The minimum performance level accepted by Tupy is 80%.

Supplier Classification		
Classification	SQI	SQI Classification
Excellent Supplier	$98 \leq \text{SQI} \leq 100$	+ A
Reliable Supplier	$90 \leq \text{SQI} < 98$	A
Acceptable Supplier	$80 \leq \text{SQI} < 90$	B
Does not meet expectations	$\text{SQI} < 80$	C

4.4.3. Criteria for the development of the Supplier

Supplier performance (SQI) is evaluated monthly. Suppliers with monthly performance < 80 are eligible for a Corrective Action Request.

Monthly SQI	SQI CLASSIFICATION		CRITERIA FOR CORRECTIVE ACTION.
$98 \leq \text{SQI} \leq 100$	A +	EXCELLENT	1) Possibility of Corrective Action Request.
$90 \leq \text{SQI} < 98$	A	RELIABLE	1) Possibility of being called to a meeting at Tupy 2) Possibility of Corrective Action Request
$80 \leq \text{SQI} < 90$	B	OPPORTUNITY FOR IMPROVEMENT	1) Possibility of being called to a meeting at Tupy 2) Possibility of Corrective Action Request 3) Verification of the Corrective Action Request at Tupy, if Corrective Action is applicable
$\text{SQI} < 80$	C	DOES NOT MEET EXPECTATIONS	1) Corrective Action Request Issuance. Note: Exception for cases of delivery delays or specific problems handled by users.

			<p>2) Audit to verify the implementation and effectiveness of the Corrective Action at the Supplier's plant</p> <p>3) Possibility of being called to a meeting at Tupy</p> <p>4) Possibility of entry into controlled shipment Level 1 or 2 status (Valid for productive parts and services).</p> <p>5) Possibility of being blocked for new business.</p> <p>6) Possibility of deactivation.</p>
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Note 1: The criteria described above may be applied, regardless of the monthly performance result, to:

- a) Inappropriate response to product approval process - PPAP
- b) Inappropriate response to corrective action request process
- c) Inappropriate response to the Supplier Quality Management System Assessment Process.
- d) Lack of response or inappropriate response by the Supplier to the Tupy QMS Requirements, described in this Manual.
- e) Monthly performance SQI <80% for two consecutive months or more.

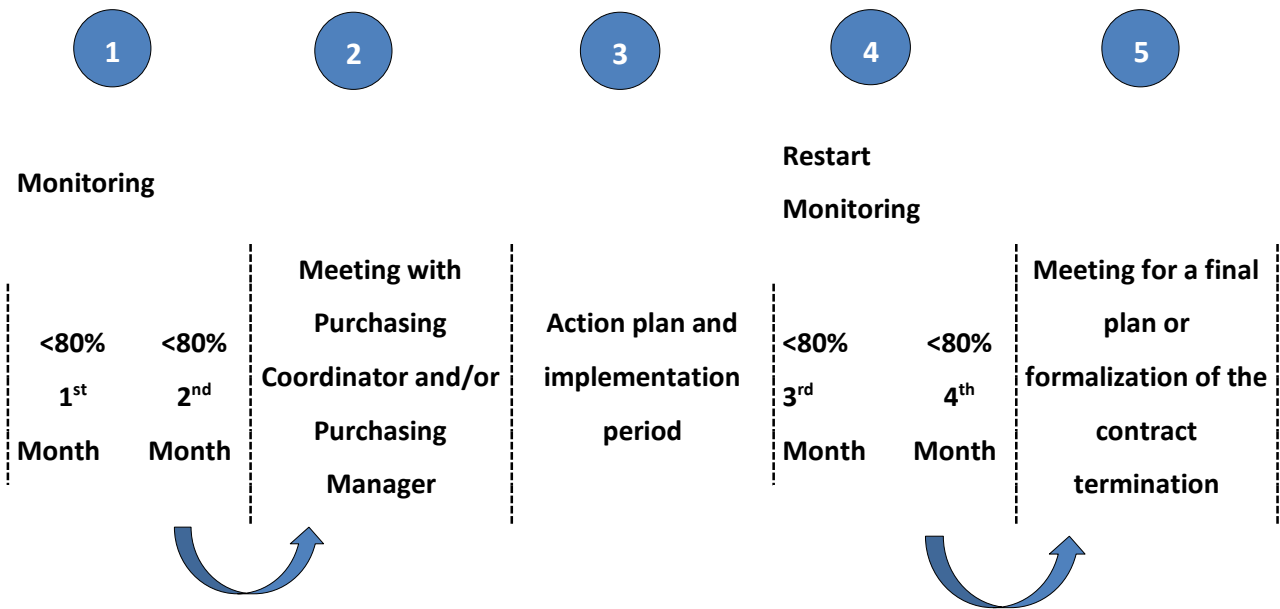
4.4.4. Delivery times

The Supplier must establish a system that allows 100% delivery performance within the required delivery time.

Note: The Supplier will not be penalized in the Delivery Quality Index - DQI for discrepancies in relation to the delivery of items under development, but it is expected that the products are delivered within the agreed deadlines.

4.4.5. Disqualification Process

If the Supplier presents a performance level <80% for 2 consecutive months (unless otherwise stated in the contract), the following criteria will be adopted to implement the improvement plan, until the Suppliers are disqualified:



Step 1 - Monitoring

When observing performance below 80% for two consecutive months, the Supplier will receive a Corrective Action Request (CAR), where it is necessary to define and implement the corrective action on the related problem, in writing, in accordance with item 4.5 of this Manual, and may also be called to a meeting at Tupy.

Step 2 - Meeting with Tupy Purchasing Coordination

The Supplier must present an action plan for performance improvement, and the deadline for implementing the improvements must not exceed 30 days, subject to validation of the complexity of such actions.

Step 3 - Action Plan Implementation Period

Supplier shall implement corresponding improvements. During this period, if there are recurrences in the initial cause, no new CARs will be issued.

Step 4 - Restart monitoring

After implementing the improvement plan, we will restart performance monitoring - SQI, based on the same criteria as in Step 1. If the occurrence of 2 consecutive months with performance below 80% occurs again, the Supplier will be called for a new meeting.

Step 5 - Meeting for a new plan or formalization of the contract termination

If the presented action plan is considered ineffective, the Supplier will be called to establish a final plan or the contract disqualification will be established, thus initiating the gradual exclusion process.

5. DEVELOPMENT OF THE SUPPLIER QUALITY MANAGEMENT SYSTEM

The development, implementation and improvement of a Supplier Quality Management System should consider:

- a) Compliance with ISO 9001 through second-party audits
- b) ISO 9001 Certification by 3rd Accredited Party
- c) ISO 9001 Certification in compliance with customer-specific requirements through customer audits
- d) ISO 9001 Certification in compliance with IATF16949 por through second-party audits.
- e) IATF 16949 Certification by Accredited Third-Party (Applicable to automotive suppliers only).

The Supplier must apply the same criteria to its subcontractors.

For Calibration Services provider, they must meet the requirements defined in the ISO / IEC 17025 Standard.

5.1. RECOMMENDATIONS FOR THE DEVELOPMENT OF THE QUALITY MANAGEMENT SYSTEM

For the development of their Quality Management System, Suppliers are recommended to use the following AIAG Management Manuals and Systems in the most recent versions:

- FMEA Manual - Potential Failure Mode and Effect Analysis;
- APQP Manual - Advanced Product Quality Planning;
- MSA Manual - Measurement Systems Analysis;
- SPC Manual - Statistical Process Control;
- PPAP Manual - Production Part Approval Process

5.2. SUPPLIER QUALITY STRUCTURE

The Supplier must have a Quality organizational structure that guarantees the satisfaction of Tupy's demands and needs and that allows it to supply products with the desired quality, quantity and punctuality.

6. RESPONSIBILITIES OF SUPPLIERS

6.1. MANUFACTURING PROCESS MONITORING

The Supplier must monitor the performance of its manufacturing processes, through applicable charts and/or indicators, such as performance, productivity, lead time, etc. This monitoring will be verified through process audits carried out by Tupy, when necessary.

6.2. CONTINUOUS IMPROVEMENT

The Supplier must use continuous improvement methods, such as:

- 6 sigma - DMAIC
- Failure mode and effect analysis (FMEA);
- Statistical techniques (SPC - Statistical Process Control);
- Analysis and problem-solving methods (MASP, 8D's, Ishikawa), etc.

6.3. CONFIDENTIALITY

The Supplier undertakes to keep confidential all information related to contracted services, whether technical information or not, patentable or not, and other data related to the analyzed, executed or monitored works, during and after the term of this agreement, subject to applicable legal penalties.

The parties may not, directly or indirectly, disclose or facilitate access to third parties or use outside the company, during or after the term of this agreement, any information obtained by any means of communication, direct or indirect, established between the parties, without prior authorization in writing from the Coordinator appointed by the parties.

6.4. CONTINGENCY PLANS

Suppliers must identify the risks that impact supply and have Contingency Plans (e.g., alternative manufacturing, packaging, transportation, use of third-party capacity in cases of power outage, failures in critical equipment and product returns, etc.) with the purpose of ensuring the supply of products and/or services in emergency situations.

6.5. CHANGE OF APPROVED PRODUCT AND/OR PROCESS SPECIFICATIONS

Modifications in the manufacturing process, product design, components, packaging, subcontractors or changes in the manufacturing location of previously approved products must follow the recommendations of the most recent version of the PPAP Manual and/or as defined by Tupy in section 3.1 of this Manual.

No technical modifications are allowed without prior consent by Tupy. The Supplier must inform the Supplier Development Department and the Tupy Technical Department of any modification in the manufacturing process in relation to the approved one, when this means any change in the performance of the product supplied at Tupy. For this, the Supplier must request and complete the Deviation Request form.

6.6. SOCIAL RESPONSIBILITY

Tupy expects its Suppliers to have a minimum standard of social responsibility in accordance with applicable legislation, and its service is a mandatory component of all Tupy's businesses, covering the following aspects:

a) Respect employees

The Supplier must always act in accordance with all labor laws applicable to its activity, including those related to the free choice of employment, working hours and working hours limits (regulated and overtime), freedom of association for its employees, as well as maintain salary and benefit levels that meet the basic needs of its employees. Tupy will not maintain a commercial relationship with any entity that uses forced or slave labor, or similar.

b) Maintain a safe and healthy workplace

The Supplier must maintain a safe and healthy work environment, not tolerating (moral and sexual) harassment, discrimination (race, color, religion, sex, age or physical condition), and encouraging creativity and enthusiasm in accordance with applicable health and safety laws.

c) Environmental protection

The Supplier must always carry out its activities in accordance with applicable environmental laws and regulations, in any case avoiding waste, preventing pollution and saving energy. We encourage suppliers to seek external inspection of their environmental performance, for example, ISO 14001 certification.

d) Safety in the supply of products and services

The Supplier shall apply all safety measures in the minimum reasonable conditions to the design, execution and supply of products and/or services. It is mandatory to report any deviation related to the safety of a product and/or service offered to Tupy.

6.7. BUSINESS CONDUCT

a) Gifts, favors and entertainment

Gifts, commissions, advantages and favors, whose value and/or circumstances may raise suspicion of any undue favor, should not be offered or accepted, except for courtesies that are mere courtesy in the relationship, such as business and non-personal dinners and institutional gifts, such as pens, t-shirts, caps, key chains etc. It is not allowed to influence the choice of a process through undue favoring (discrepancy in Quality and price criteria of products and/or services).

b) Fair and honest trading

The exchange of information, during negotiations prior to delivery, must be accurate and comply with all applicable laws (including those relating to competition and unfair practices).

c) Business relationship

The practice of the behaviors described above contributes significantly to the commercial relations with Tupy, creating an ethical, respectful and dignified environment for everyone and for society.

Environmental responsibility

Tupy expects the Supplier to support our efforts to promote awareness of environmental aspects and impacts, both on its own businesses and on Tupy. This must be demonstrated by a proper management policy and an environmental program.

The supplier's responsibilities are:

- Observe and comply with current environmental legislation and its requirements;
- Keep updated the authorizations or licenses required by environmental agencies (operating license, transport license, emergency plans, etc.) necessary for the supply of products and/or services to Tupy;

- Commitment to sustainable development, prevention of pollution and conscious consumption of natural resources;
- Keep environmental documentation always up to date and available to Tupy, when necessary;
- Have a Management team responsible for compliance with legal requirements to prevent government interventions that may lead to interruptions in the supply and/or delivery of products to Tupy.

6.8. SAFETY AND ENVIRONMENTAL REQUIREMENTS FOR THE PRODUCT

Tupy requires that all products and materials be delivered in accordance with all legal regulations in force, especially those applicable to the environment, health and safety, including those related to controlled products, restricted substances, toxics and hazardous materials (proper handling, recycling, hazardous material disposal, operating license, extraction, transport etc.).

Suppliers must comply with all necessary process regulations in their own country and the finished product must comply with the governmental, environmental and safety regulations of the destination country.

6.9. HAZARDOUS MATERIALS AND CONTROLLED PRODUCTS

When delivering hazardous materials, the regulations regarding packaging, identification and transport must be observed.

Only chemical products whose Material Safety Data Sheets are in accordance with the requirements of the Global Harmonized System and have been previously approved by Tupy's environment, safety and occupational health department may be delivered.

The supplier must notify Tupy in advance in writing of the modifications in materials, compositions and ingredients and receive Tupy's approval prior to shipment for production.

Before and during the shipment of the Hazardous Materials and products, the Supplier must provide Tupy and the carriers with written notices, including appropriate labels on the products, containers and packaging, together with all special handling instructions, safety measures and precautions, which may be necessary to comply with applicable regulations as well as all applicable legal requirements to avoid accidents and damage during handling, transport, processing, use or disposal.

Hazardous products must only be transported by means of transport authorized by the competent authorities and must have the required licenses.

6.10. CERTIFICATION UPDATES

The Supplier is responsible for keeping Tupy informed about the updated certifications of its Quality, Safety and Environment Management System. Once the certification expires and updates are not conducted, certificates will be considered invalid and, depending on the impact of the product supplied to Tupy, it will prevent the material purchase.

Suppliers with an expired ISO 9001 certification will be considered non-compliant and, if the updated certificate is not provided, supply may be suspended.

6.11. ENVIRONMENTAL LICENSE

It is a mandatory requirement for the supply of any product, productive service or transport of hazardous materials that the supplier has an Environmental License applicable to its activity, which must be kept up to date in accordance with the applicable law of its country. The Supplier must submit the Environmental License related to its updated activity or the protocol for requesting renewal upon expiration to Tupy.

6.12. LOGISTICS COMMITMENTS WITH TUPY

6.12.1 Logistical commitments:

The invoice must indicate the Purchase Order number. The Supplier must respect the quantities and terms agreed in the Purchase Orders, through the Supplier Portal.

6.12.2 Logistic incidents:

Any logistical incidents will be considered in the Supplier performance analysis, positively or negatively affecting future purchases.

6.13. WASTE

All Materials and products, owned or subcontracted by the Supplier, entering Tupy's facilities must be disposed of by the Supplier according to the applicable regulations.

The Supplier must comply with all Tupy environmental standards and regulations. All waste arising from any work carried out at Tupy must be treated in accordance with the internal procedures relating to Waste Management.

The companies responsible for the transport and final disposal of waste must be authorized, and follow all current legislation and dispose of waste in accordance with applicable legislation.

Companies responsible for the disposal of waste must issue the Certificate of Final Destination and forward it to Tupy's Waste Management department, together with the Waste Transport Manifest.

7. CUSTOMER REQUIREMENTS

Suppliers must comply with Customer Specific Requirements, where the same criteria must be applied to subcontractors.

The Supplier may be required to demonstrate compliance with these requirements, either in a timely manner or through the VDA 6.3 Process Audit.

Note: To find out which customer requirements apply to the product and/or service they provide, please contact Supplier Management.

Brazil: gestaofornecedores@tupy.com.br

Mexico: gestion.Proveedores@tupy.com.mx

Client:	Tupy Unit	CSR - Customer Specific Requirements
Caterpillar	Mexico	Caterpillar - PDF
Cummins	Mexico / Brazil	Caterpillar - PDF
FCA	Mexico / Brazil	FCA - PDF
Fiat	Mexico	Fiat - PDF
Ford	Mexico / Brazil	Ford - PDF
GM	Mexico / Brazil	GM - PDF
Groupe PSA	Brazil	Groupe PSA - PDF
Honda	Brazil	Honda - PDF
John Deere	Mexico	John Deere - Requisitos del Programa - PDF John Deere - Métodos y Ejemplos - PDF John Deere - Formularios de Muestra - PDF
Mercedes Benz	Mexico / Brazil	Mercedes Benz - PDF

Navistar	Mexico / Brazil	Navistar - PDF
Paccar	Mexico / Brazil	Paccar - PDF
Renault	Brazil	Renault - PDF
Scania	Mexico / Brazil	Scania - PDF
Volvo	Brazil	Volvo - PDF
VW	Mexico / Brazil	VW - CSR's - PDF
		VW - Formel Q Konkret - PDF
		VW - Fórmula Q Concreta - PDF
		VW - Fórmula Q Capacidade - PDF
		VW - Fórmula Q Capacidade Anexo - PDF

7.1. QSB

Material Suppliers with direct product application for GM and FIAT clients must practice the GM QSB (Quality Systems Basics) and specific requirements.

7.2. REQUIREMENT FOR SAFETY FEATURES

If Tupy's Customer Product Engineering (Part Designs) specifies Safety Features that imply a risk to the safety or health of people, these characteristics shall be communicated to the Supplier.

The Supplier shall identify these characteristics in its process control documentation and shall comply with the applicable legal and regulatory requirements.

7.3. PRODUCT SAFETY & CONFORMITY REPRESENTATIVE (PSCR) – VW

The Volkswagen Group requires a Management function defined as Product Safety & Conformity Representative (PSCR), and the implementation of organizational and technical measures (Risk Management System) to ensure the safety of the product in its partners and their subcontractors, to minimize Product liability risks.

This function applies to components whose end use involves risks to the safety or health of people.

Currently, products manufactured by Tupy are not classified as risk components to health or safety; If our customers change the classification of our products, the PSCR function or the requirements defined in 4.4.1.2 of the IATF, our Suppliers must meet them.

7.4. CONFLICT MINERALS

Tupy is concerned about the origin of the mineral used in the manufacture of tin. These minerals must not be obtained in countries considered conflict zones, especially Congo. The Tupy's Tin Supplier declares to be aware of this restriction and that tin supplied to Tupy does not come from conflict zones. This information can be verified in subsequent audits.

7.5. RESTRICTED SUBSTANCE MANAGEMENT STANDARD

Material Suppliers with direct product application to the Ford Client must comply with the latest version of the Ford Restricted Substance Management Standard - WSSM99P9999-A1. The IMDS report must be included.

7.6. RECORD RETENTION

Records control must meet legal, regulatory, organizational and customer requirements. They must be retained in most cases for as long as the product is active, in accordance with production and service requirements, plus one calendar year, unless otherwise specified by the customer.

8. GLOSSARY

Corrective Action - CAR (Corrective Action Request)

It is the action taken to eliminate the causes of existing Non-Conformities and/or prevent recurrences.

Preventive Action

It is the action taken to eliminate the causes of potential Non-Conformities or prevent their occurrence.

Environment

These are all conditions that affect the manufacture and quality of a part or product. Environment may vary for each floor and area, but generally includes: cleanliness, lighting, noise and safety risks related to storage activities (cleaning or 5S program).

Failure Mode and Effects Analysis (FMEA)

It is a method to identify potential problems in processes, to mitigate or eliminate the effects of product failures.

Audit

It is a sample-based, on-site verification activity used to determine the effective implementation of a Supplier Quality Management System.

Assessment / Evaluation

It is a process in which a critical analysis of the documentation is carried out, based on an Audit at the Supplier's premises and the issuance of a report. There is also the self-assessment, where the analysis process is carried out by the Supplier.

Comparative Assessment

It is a technique used to determine "best" practices for a particular process or product.

Calibration

Comparison of values obtained by an inspection, measurement or test equipment, with measurement standards traceable to national or international measurement standards.

Capability

It is the way to assess whether a certain manufacturing process is capable of meeting a certain specification. Cp and Cpk are the indexes that measure capacity. See the initial process studies.

Special Features

They are product characteristics or manufacturing process parameters, designated by the customer or defined by the Supplier, which may affect the safety or compliance with standards, operation and performance of the product.

Part Submission Warrant (PSW)



It is the guarantee issued by the Supplier ensuring that the product supplied meets the requirements established by the customer. It is considered a legal document and is supported by information from the PPAP.

Components

Any product mounted on the Tupy product. Example: seal, valve guide, etc.

Statistical Process Control (SPC)

It is a set of statistical resources used to monitor and control processes and identify sources of variation.

Supplier development

It refers to all activities defined to improve the performance of the Supplier Quality System.

Process Flow Diagram

It is the description of the sequence of operations in the manufacturing process of a given product, from the receipt of raw material to shipment.

Packaging

These are materials used to protect the product during handling. Transport and/or storage.

Air Emissions:

Particles, dust, gases, which are emitted into the environment.

Initial Process Studies

They are short-term statistical studies of one or more process features to determine the capability level or initial performance of the process.

R&R studies

It is a study that assesses the interaction between the measuring instrument, the operator and the environment. The acronym R&R stands for repeatability and reproducibility.

SDM - Supplier Development Management

Multifunctional group, whose function is to evaluate and develop new items and suppliers, products and services.

Laboratories

Installation for chemical, physical or dimensional testing.

Qualified / Accredited Laboratory

Installation approved by an accredited third party in accordance with ISO / IEC 17025.

Material

Raw material, process material or components.

Non-conforming material

Product or Material that does not meet Tupy's or customer's specifications.

Non-conformity

It is a violation of Tupy's or customer's specifications.

Defects per Million Opportunities (DPMO)

Method for describing the performance of a process based on the number of defects found. It is the relationship between the quantity of non-conforming material and the quantity of inspected material.

Corrective Action Plan

A document that describes the actions to be implemented, to correct a Non-Conformity or Quality problem of a process, Material or Service, appointing responsibilities and dates.

Control Plan

It is a description of the controls used in production processes to monitor and control the product or process variables that impact the quality of the final product.

Reaction Plan

Immediate action to contain a Non-Conformity in a Process, Material or Service.

Quality Records

It is documented evidence that the processes were conducted in accordance with the Quality Management System documentation (e.g., inspection and test results, calibration data) and results records.

Regulation

Laws, Decrees, Resolutions, Instructions, Regulations prepared by the Government or Legislative Branch.

Repeatability

It is the variation of measurement results, obtained with an instrument or device, measured on the same part or feature, several times by the same operator.

Reproducibility

It is the variation of measurement results, obtained with an instrument or device, measured on the same part or feature, several times by different operators.

9. SUGGESTED LITERATURE

IQA - INSTITUTO DE QUALIDADE AUTOMOTIVA

Website: www.iqa.org.br

AIAG - AUTOMOTIVE INDUSTRY ACTION GROUP

Website: www.aiag.org

ISO9001: 2015 - Quality Management Systems

IATF16949: 2016 - Quality Management Systems

ISO14001: 2015 - Environmental Management Systems

ISO / IEC 17025: 2017 - Management System for Test and Calibration Laboratories

NOM-018 STP 2015

NOM-144 Semarnat 2017

ISPM-15 International Standard for Phytosanitary Measures

FMEA - Potential Failure Mode and Effect Analysis;

APQP - Advanced Product Quality Planning;

MSA - Measurement Systems Analysis;

SPC - Statistical Process Control;

PPAP - Production Part Approval Process.