

Technical Terms of Delivery (TTD)

Huber+Suhner

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History of Changes

Version	Changes	Date	Name
K	Complete revision of the entire document including general supplier quality requirements and additional requirements per market segment	February 2025	Stefan Isler

1. Introduction

1.1 Purpose

The present Technical Terms of Delivery (TTD) have been developed to help suppliers understand the general quality requirements necessary to set the foundation for a successful partnership with Huber+Suhner.

Huber+Suhner expects suppliers to meet the following quality-related guiding principles: The supplier shall:

- Implement effective quality planning processes following a preventive quality management mindset
- Ensure that products are produced in conformance to our specifications
- Ship defect-free products on-time at the right place at the right quantity
- Manage facilities, processes, quality systems and personnel to consistently and cost-effectively manufacture products that meet the requirements of Huber+Suhner and its customers
- Be committed to continuous process improvements
- Apply strict-in and strict-out inspection controls, improve process controls and eliminate waste
- Ensure all products supplied meet all applicable product environmental compliance requirements
- Fully comply with all values, principles and guidelines defined in the H+S Supplier Code of Conduct

1.2 Scope

This document applies to suppliers – manufacturers or distributors – delivering one or several of the product types listed below:

- Raw materials such as metals (including but not limited to aluminum, copper, gold, palladium, silver, steel, tantalum, tin, tungsten, and all other alloys such as brass, beryllium copper, etc.) as well as chemicals and polymers used to manufacture H+S designed products
- H+S designed products (including components, semi-finished products, assemblies, third-party products, packaging material)
- Processes (including outsourced manufacturing or special processes) and related services delivered to H+S, which are eventually sold to customers of H+S and have an impact on product quality and product environmental compliance
- Commercial-off-the-shelf (COTS) products (products which are widely available standardized products designed by suppliers and to be used “as is” without the need for H+S custom development; examples include but not limited to normed parts or third party products)

This TTD is an integral part of each purchase order or of the General Purchase Agreement (GPA) signed between H+S and the supplier.

Please note that additional industry specific quality requirements are included in separate chapters of this document for those suppliers providing products or services used for Automotive, Railway or Aerospace and Defense applications.

For medical products, a separate Quality Assurance Agreement (QAA) must be signed by the supplier.

1.3 Document revision

Huber+Suhner reserves the right to make changes to this document and specifications referenced herein. Hard copies of this specification may not be updated. The latest version of this document is available on the Huber+Suhner web site at [Supplier information - HUBER+SUHNER](#).

Suppliers are responsible for ensuring that they are using the latest version of this document. Suppliers shall specify any exceptions to the requirements of this document. Exceptions shall be in writing and must be approved by Huber+Suhner.

2. Applicable internal and external documents

The following H+S and external reference documents constitute an integral part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies.

Following H+S documents are relevant for all suppliers:

Document number	Description
-	Huber+Suhner Supplier Code of Conduct
-	Huber+Suhner Product Compliance Requirements for Suppliers
-	H+S supplier requirements feasibility commitment
-	Huber+Suhner Packaging Instruction Suppliers (PINS)

Following H+S category-specific documents are only relevant for suppliers delivering products with relevant technology or process:

Document number	Description
0000450556	Category turned / milled parts
0000450586	Category Metal die casting parts and molds
0000450584	Category Injection-molded plastic parts and molds
0000707764	Category stamping / bending (English)
0000196272	Space requirements
0000242152	Pressing tools
0000450579	Surface treatment, finish and cleanliness
0000312778	Powder Coating
ORF10_in_guideline-for-welding_en	Guideline for Welding

Following international industry standards are referenced in this document in alphabetical order:

Document name	Description
EN 10204	Types of inspection documents
ISO 9001	Quality management systems requirements
ISO 14001	Environmental management systems- requirements with guidance for use
ISO 17025	General requirements for the competence of testing and calibration laboratories
ISO 22301	Security and resilience - business continuity management systems requirements
ISO 22514	Statistical methods in process management - capability and performance
ISO/IEC 27001	Information security, cybersecurity and privacy protection requirements
ISO 45001	Management systems of occupational health and safety
ISO 50001	Management system for energy management

Following manuals provided by the Automotive Industry Action Group (AIAG) and the VDA are referenced in this document:

Document name	Description
IATF 16949	Automotive quality management system standard
MAQMSR	Minimum Automotive Quality Management System Requirements for Sub-Tier Supplier – section of IATF 16949 selected for supplier QMS development
FMEA Handbook	Failure Mode and Effect Analysis – FMEA Handbook (AIAG & VDA)
APQP Manual	Advanced Product Quality Planning Manual (AIAG)
CP Manual	Control Plan Manual (AIAG)
PPAP Manual	Production Part Approval Process (AIAG)
SPC Manual	Statistical Process Control (AIAG)
MSA Manual	Measurement System Analysis (AIAG)
AIAG Special Processes	Special process assessments to provide a means of continual improvement, emphasizing defect prevention and reduction of variation and waste in the supply chain. Relevant are CQI-9 Heat Treat, CQI-11 Plating, CQI-12 Coating, CQI-15 Welding, CQI-17 Soldering, CQI-23 Molding, CQI-27 Casting

Following documents provided by the International Aerospace Quality Group (IAQG) or other aerospace and defense associations referenced in this document:

Document name	Description
AS/EN 9100	Quality management systems requirements for aviation, space and defense
AS/EN 9102	First article inspection requirements (aerospace)
AS/EN 9103	Variation management of key characteristics (aerospace)
AS/EN 9120	Quality management systems requirements for distribution activities in A&D
AS/EN 9146	Foreign object damage (FOD) Prevention Program requirements
Nadcap AC7004	Nadcap accreditation for special processes in Aerospace and Defense, in particular Chemical Processing, Coatings, Heat Treatment, Sealing and Welding

Following documents provided by the International Rail Quality Board (IQRB) are referenced in this document:

Document name	Description
ISO 22163	Railway applications – railway quality management system – ISO 9001 and specific requirements for application in the railway sector
EN 15085-2	Welding of railway vehicles
EN 50155	European standard governing electronic equipment used in railway applications
IRQB Guideline 6 Special Processes Railway	Defines and describes the special processes that are relevant to the rail sector and supports the management of those processes in accordance with the ISO 22163 and IRIS Certification® Conformity assessment.

Following guideline for cargo transport units is referenced:

Document name	Description
CTU Code quick guide	A quick guide from the Cargo Integrity Group regarding best practices on cargo transport unit (CTU) packing process.

3. Environmental product compliance

Suppliers must ensure that all supplied products, processes, and services to H+S conform to the current applicable statutory and regulatory requirements in the production or shipping country of the supplier and are compliant with H+S customer requirements, in particular with regards to limited restricted, hazardous and prohibited substances. The supplier similarly undertakes to observe and ensure all environmental standards applicable to its business. Notice of any deviations from the foregoing must be provided in advance. Any updates or changes in the substance status must be communicated immediately.

Suppliers warrants compliance with REACH regulation (EC 1907/2006), RoHS Directive 2011/65/EU (and subsequent amendments), EU Packaging Directive (EU 94/62/EC), Persistent Organic Pollutants (POPs, EU/2019/1021), Section 6(h) of TSCA (Toxic Substance Control Act), California Proposition 65 and will provide certificates as required for regulatory changes or product updates. Upon request, suppliers shall provide the necessary information for SCIP notification to the European Chemicals Agency (ECHA), including details on SVHCs present in articles supplied under this agreement, in accordance with Article 9 of Regulation (EU) 2020/784. Suppliers must adhere to the Dodd-Frank Act and EU Regulation 2017/8821, Swiss Supply Chain Act (Art.9 VSoTr) ensuring that materials do not contain conflict minerals (tin, tungsten, tantalum, and gold) sourced from conflict regions. Furthermore, upon request, suppliers shall provide information regarding additional minerals, such as cobalt and mica. Automotive suppliers shall comply with IMDS requirements for the accurate submission of materials data via the IMDS platform. Please note that industry-specific product compliance requirements will be extended for suppliers providing products or services to the Automotive, Railway, Aerospace/Defense, or Medical sectors.

The supplier shall adhere to H+S standard Product Compliance Requirements for all deliveries. This standard is accessible on the H+S website at [Supplier information - HUBER+SUHNER](#), with the version applicable on the order date being binding. Written approval from H+S is required for any exceptions to this requirement.

4. General supplier quality management system requirements

4.1 The supplier's management systems

4.1.1 General requirements

Suppliers are expected to implement and maintain a quality management system that meets the requirements of ISO 9001 or higher (IATF 16949, ISO 22163, AS/EN 9100, ISO 13485). As a general rule, suppliers are required to be certified according to the latest version of the corresponding standard. All certifications shall be carried out by accredited certification companies. Suppliers shall send to H+S unrequested a copy of the latest valid certificate(s). Suppliers shall notify H+S within five working days in case one of their certificates has been suspended or withdrawn.

In exceptional cases, where no quality management certification exists, suppliers may be conditionally qualified if they can show written evidence of plans to become certified within two years and/or if they pass an ISO 9001 system audit conducted by H+S.

Furthermore, suppliers are encouraged to have following quality management systems in place:

- An environmental management system that is based on the requirements of ISO 14001
- A health and safety management system based on ISO 45001
- An energy management system based on ISO 50001

4.1.2 External laboratory accreditation

External laboratory providers that are performing any testing, inspection or measurement should be certified according to ISO 17025 or national equivalent by an accredited 3rd party certification body. The certificate of calibration or test report shall include the mark of the accredited 3rd party certification body.

4.1.3 Customer specific requirements

Suppliers shall have an effective process in place to cascade down customer specific requirements to its sub-tier suppliers. This includes but is not limited to all applicable H+S technical requirements, drawings, specifications, regulatory requirements, as well as customer specific requirements (CSRs) from H+S customers, typically tier 1 or OEMs.

4.2 Preventive quality requirements before series production

The requirements in this chapter are relevant to suppliers developing and manufacturing custom-made products, processes and services and which are based on drawings and/or specifications provided by H+S or its customers. If not otherwise specified, commercial-off-the-shelf (COTS) products and raw materials are excluded from this section.

4.2.1 Feasibility study

Before concluding a contract for a new product or a product with a new revision level, the supplier shall verify in a cross-functional team whether the requested product can be manufactured, assembled, tested, packaged and delivered in sufficient quantity on schedule at an acceptable cost to H+S during series production.

It is the supplier's obligation to discuss unclear requirements with H+S in advance and to obtain any additional information that might be needed. In addition, the supplier is required to review all specifications, in particular drawings, and to submit proposals for design improvements (DFM).

All change requests shall be documented in written form using the supplier feasibility commitment template of H+S and shall be agreed in advance with H+S prior starting any sampling activities.

4.2.2 Design and process risk assessment

Suppliers shall implement a systematic risk approach to identify and mitigate potential failures in products, systems or processes during product and process development, pre-launch and series production. It is recommended to follow the FMEA (Failure Mode and Effects Analysis) methodology; further information can be found in the AIAG & VDA FMEA Handbook.

In case of specification changes or new applications, the risk assessment should be reviewed to ensure and improve product quality, reliability and safety by implementing targeted actions to prevent or reduce the impact of failures.

4.2.3 Process controls

The supplier shall plan and develop production processes and equipment to ensure they are able to produce the required features and characteristics within the agreed specifications at required capacities.

Drawings and/or purchasing specifications of H+S or its customers may indicate special characteristics for the product, which means any feature of a material, process, part, assembly or test that has a significant influence on product fit, form, function, safety or any other expected deliverable.

Therefore, if not otherwise specified by H+S or its customers, it is recommended that supplier will adopt the following approach to ensure that the quality of product being produced is both known and controlled:

- **Special characteristics:** Special characteristics shall be controlled by the supplier through process capability studies according to ISO 22514 with an acceptable level of process capability and performance defined by H+S. Unless otherwise specified, a long-term process capability index of 1.33 Cpk is required. If the process is not under statistical process control or process capability/performance cannot be met during serial production, a 100% inspection after production (through automatic detection, manual inspection using go/no-go gauges or other test equipment) or other error proofing during production (Poka Yoke) shall be applied by the supplier.
- **Process capability study:** Independent from special characteristics defined by H+S, the supplier shall evaluate and define critical to quality characteristics (fit, form, function, safety) for each product based on the supplier's equipment and processes and control these parameters through process capability studies. The supplier shall show data or evidence of performance when requested by H+S.

4.2.4 Inspection and test equipment

Unless otherwise specified by H+S or its customers (typically by a measurement instruction), the supplier shall create a testing and inspection plan which includes all characteristics (incl. special characteristics) to be inspected and tested along with the associated test equipment, methods, frequencies and type of documentation for every procedure.

It is recommended that the capability of all inspection processes and measuring equipment shall be verified and documented by the supplier by means of a Measuring System Analysis (MSA) in accordance to the MSA AIAG reference manual.

In case test gauges, test equipment and/or test software is provided by H+S, the supplier shall have procedures in place to protect equipment from damage, contamination, deterioration, or other factors that may adversely affect the integrity of the equipment and include such equipment and/or software in the test equipment monitoring of the supplier. Such test gauges and equipment shall be labeled accordingly and assigned to the corresponding product.

The supplier shall ensure regular calibration of test gauges and test equipment. Test records must be shared with H+S upon request.

4.2.5 Control plan

Suppliers shall develop and maintain a control plan for following H+S defined products:

- High risk or critical applications: Typically products where H+S has defined special characteristics (see chapter 4.2.3) or measurement instructions
- Process with high variability with process parameters to be monitored (i.e. injection molding or die casting)

The control plan shall detail the control and inspection activities that have been implemented to ensure conformity to H+S specifications. Special characteristics shall be marked with their respective reference number(s) and all other characteristics should also be included.

The control plan is a living document and shall be revised as changes are made to the product, process and when quality issues are found (control plans shall be reviewed and updated, as necessary, as part the supplier complaint process as defined in chapter 4.5).

4.2.6 Preventive maintenance

Suppliers shall follow a risk-based approach to identify key processing equipment, provide appropriate resources for equipment maintenance and develop an effective preventive maintenance program. The preventative maintenance system should include maintained documented information for planned and scheduled maintenance activities, as well as providing guidance for the preservation of equipment, tooling and gauges.

4.2.7 First samples

Before a product is launched or supplier products are incorporated into a H+S final product, a first sample report conducted by the supplier is required. The scope of the first sample report depends on the criticality of the product, but as minimum, a dimensional results report and a raw material certificate according to chapter 4.3.6 have to be submitted. First samples must be produced in accordance with the work sequence intended for series production and with the serial equipment, materials, tools and operators envisaged for series production. Tests in production and final inspection must be carried out using the test equipment and gauges intended for series production. Deviations from specifications and requirements must be marked on the first sample report.

The first sample report shall be always submitted to H+S together with first samples. Series production may only start with written approval received from H+S.

If the first sample report on the first samples is rejected, the supplier shall initiate corrective actions and, after agreement with H+S, re-submit samples conforming to the specification (re-sampling).

In addition, re-sampling is required in case of modified specifications by H+S or in case of any changes requested by the supplier, which could affect form, fit or function (see chapter 4.3.8 for more details).

4.3 Quality assurance during series production

This chapter is relevant for all suppliers and product types listed in chapter 1.2.

4.3.1 Specification and document review

The supplier is responsible for verifying using the most current revision level of all documents referenced on the drawings and specifications called out on the purchase order.

Furthermore, the supplier shall establish a process to ensure the timely review, distribution and implementation of authorized drawing and document changes.

4.3.2 Quality inspection and testing

The supplier shall continuously conduct appropriate incoming inspection (strict-in), quality assurance tests throughout the entire production process and outgoing inspection tests (strict-out) prior to any delivery of products to H+S to ensure defect-free products.

4.3.3 Quality records

The supplier agrees to keep records used for quality management and quality assurance measures with regard to the deliverables supplied to H+S, i.e. records concerning feasibility studies, measurements and test results.

If not otherwise specified, the supplier shall retain quality records for each product specified by H+S or its customers for a minimum period of ten years.

Quality records including those of sub-tier suppliers shall be made retrievable to H+S upon request and shall be treated as confidential. Other parties shall only get access to the records after written approval from H+S.

4.3.4 Identification and traceability of products

Deliveries to H+S must be clearly labeled according to the specifications or additional instructions on the purchase order. The supplier is obliged to ensure the traceability of the products delivered to H+S in order to be able to narrow down the error source (part, product, batch, delivery date) in the event of a complaint. In addition, the supplier shall establish a traceability system of linking the raw material batch from their sub-tier suppliers with the production batch.

The traceability system of the supplier shall comply with the FIFO (First In – First Out) principles for incoming and outgoing material.

4.3.5 Packaging and labeling

Following key requirements regarding transportation packaging shall be followed by suppliers:

- Basic principle: Packaging shall be designed in accordance with the relevant provisions of the CTU Code.
- Quality of packaging materials: Packaging should be made out of high-quality materials that provide adequate protection against damage, dust, moisture and other external influences.
- Accuracy of fit: The packaging must be dimensionally accurate to hold the product securely and prevent it from slipping or tipping during transport.
- Cushioning and protection: For sensitive or fragile products, additional padding material shall be used to protect the product.
- Closure/security: Packaging must be securely fastened to prevent unauthorized opening or loss of product.
- Labelling and marking: The packaging must be clearly marked with the sender's name, address, product description and any special instructions (e.g. Caution: "Fragile").
- Environmental friendliness: Wherever possible, environmentally friendly packaging materials shall be used that are recyclable or biodegradable.

Further information on packaging and labeling can be found in the separate Huber+Suhner Packaging Instruction Supplier (PINS), available on the Huber+Suhner supplier information web site at [Supplier information - HUBER+SUHNER](#).

4.3.6 Certificate of conformance

The supplier is responsible for maintaining and supplying accurate and legible conformance documentation as objective evidence of meeting all requirements identified in the H+S purchase order and all associated reference documents.

The supplier shall include a certificate of conformance with each delivered product against a purchase order line. Unless otherwise specified, H+S requires a certificate of conformance according to EN 10204 type 2.1, either by a corresponding remark on the delivery note or by a separate declaration of compliance.

In addition, for H+S designed products where a separate raw material specification is provided, a material certificate according to EN 10204 type 3.1 or equivalent shall be provided to H+S. The supplier sourcing such raw material from its sub-tier suppliers is responsible for checking the correctness of the material certificate.

4.3.7 Re-qualification

Unless otherwise specified by H+S or its customers, products designed or specified by H+S shall be subject to a regular re-qualification inspection, in which at least all special characteristics should be checked to prove a stable quality level during series production. The frequency for carrying out a re-qualification shall be defined by the supplier. The re-qualification results shall be made available to H+S on request.

4.3.8 Change management

The supplier shall establish its own process to ensure that every intended change regarding an approved scope of products or processes must be assessed, verified, validated and approved by the supplier in regards to potential impacts prior to implementation. The supplier shall maintain appropriate change management records.

In principle, all changes to a product designed or specified by H+S or its customers that could adversely affect form, fit or function (including any change that will alter product content and/or product compliance status) are subject to the approval of H+S.

Changes include but are not limited to:

- Use of other raw material than what was previously approved through first samples
- Production from new, additional, replacement or modified tools, dies, molds, patterns, etc.
- Production equipment modifications or replacements
- Changes to the manufacturing process including process parameters
- Changes to test procedures and test equipment
- Production from tooling and equipment transferred to a different plant site or from an additional plant
- Changes of sub-tier suppliers (including new source of raw material) or subcontractors
- Changes to the product packaging specified by H+S
- Changes of the regulatory status of the product

If at least one of the above-mentioned changes applies, H+S must be informed immediately in writing about the intended change and written approval must be obtained from H+S in accordance with the to be agreed procedure before the planned change can be implemented.

4.3.9 Sub-tier supplier controls

The supplier is responsible for the management of its sub-tier suppliers to ensure that raw materials and components used in the manufacturing of H+S products meet H+S specifications and comply with H+S requirements. As such, the supplier shall apply appropriate controls to ensure that its sub-tier suppliers comply and are capable of meeting specified requirements. The supplier is required to manage both directed and non-directed sub-tier suppliers and to maintain part qualification and quality for products purchased through them.

Furthermore, the supplier shall establish a formal supplier management process to manage sub-tier suppliers including (i) sub-tier supplier qualification and risk assessment, (ii) supplier audits, (iii) performance monitoring, rating and development, (iv) nonconformance, corrective and preventive action as well as (v) change control management.

4.3.10 Obsolescence management

For commercial-off-the-shelf (COTS) products, the supplier shall notify H+S regarding part or raw material obsolescence as soon as the information becomes available, with the expectation to provide notification at least six months prior to the last date a purchase order will be accepted.

For products or raw materials where the supplier has design responsibility, the supplier shall develop and implement a process for obsolescence management to avoid any product delivery disruption. This process shall include the following elements at a minimum:

- Annual assessment of product bill of material(s) (BOMs) to identify any obsolescence that will potentially impact delivery of product to H+S
- Proactive identification and detection of raw material, part or manufacturing/test equipment obsolescence issues
- Life time buy inventory management plan to ensure long term ability to produce product (if requested)
- Immediate notification of H+S of any potential interruption in the ability to meet H+S forecasted demand due to an obsolescence issue
- Action plan to resolve each obsolescence issue, including forecast analysis and product support decision(s) (including last time buy option, redesign or product end of life)

4.4 Request for product deviation

If the supplier is unable to deliver the products as agreed in accordance with the purchase order or the contract by reason of non-conformities identified prior to delivery and if the deviations cannot be solved by special efforts and emergency measures before the agreed delivery date, in exceptional cases the supplier may request approval for the delivery of non-conforming products by means of a deviation request (waiver).

Request for deviation from requirements shall be brought to the attention of the H+S. Approval or disapproval of supplier deviation requests will be documented and communicated to the supplier.

Supplier shall identify, store, and ship approved deviated nonconforming product in such a manner as to keep it separate from conforming product. The waived products shall be clearly marked on each box, container or other packaging and on the delivery note.

4.5 Complaint management

Suppliers are expected to have an effective and documented corrective action process in place in the event that faulty or defect products are detected at H+S or its customers. In such a case, H+S will issue a supplier complaint to the supplier using the 8-D method. The supplier complaint will contain a detailed description of the non-conformance and any applicable information needed for immediate containment. A supplier complaint reference number will also be provided. This number needs to be referenced on all future communications involving the indicated non-conformance.

H+S expects the processing of an 8-D report according to following timelines:

- a confirmation of receipt within 24 hours,
- a written initial report including problem description and interim containment actions (3-D) within three working days,
- a completed 8-D report including root-cause analysis, implemented and validated corrective actions within 10 working days. Any generally recognized problem-solving tools (5-Why, Ishikawa, etc.) are acceptable.

Extensions to these timelines may be requested and will be considered on a case-by-case basis. Not-meeting these timelines can negatively impact the supplier's quality rating.

4.6 Lessons learned and continuous improvement process

Every problem solved generates at least one lessons learned once corrective actions have been implemented. In addition to the correction of the documented problem, suppliers are expected to use the lessons learned from each incident (including but not limited to non-conformities from section 4.5) to improve production process, product design, or underlying business systems. The goal is to eliminate the possibility of similar incidents in other projects or products, not only by making procedural and process adjustments on the production floor, but by removing the environment that allowed the issue to occur.

Furthermore, suppliers should use statistical data to continually evaluate and refine their processes. This evaluation should include analysis of quality out of control indications, high PPM, scrap, downtime, launch issues and warranty failures. The clear objective of this analysis must be reduction of variation with the product provided to H+S. Suppliers shall have on-going, active improvement projects that target the largest problem areas and shall be able to demonstrate a positive trend in reducing incidents and repeating occurrences.

4.7 Audits

H+S, its customers or any authority on behalf of H+S shall be entitled to conduct audits upon reasonable prior notice at the supplier site. The audit may be conducted as a system, process or mixed audit during normal business hours. The supplier shall grant H+S, its customers and authorities access to all relevant production sites, testing laboratories and equipment and will allow H+S to get access to all relevant quality records. The supplier shall assist in planning and carrying out such audits. Necessary and reasonable restrictions by the supplier to protect its IP rights will be accepted during this process.

In case of quality issues caused by a sub-tier supplier, the supplier will support H+S and its customers to organize and conduct an audit at the sub-tier supplier. If the sub-tier supplier has legitimate objections to the participation by H+S or its customer in such an audit, H+S shall have the option to arrange an audit to be conducted by a neutral third party representing the interests of H+S and its customers.

H+S will inform the supplier about the audit results. In case corrective measures are necessary, the supplier shall implement the corrective actions set out in the audit report within a mutually agreed period and inform H+S proactively about the implemented actions.

4.8 Business continuity

The supplier shall implement an effective Business Continuity Management System (BCMS). The BCMS shall first and foremost protect the suppliers' employees as well as any H+S employees that could be onsite during an event. The system shall be consistent with ISO 22301 or similar and shall manage the risks and potential business impacts associated with an interruption of critical operations that could affect supply of products into H+S. The BCMS shall also address the ability to notify H+S for any business disrupting events that could potentially affect/delay shipments of product or the inability to meet obligations set forth in written agreements between supplier and H+S.

Furthermore, the supplier should establish, implement, maintain and continually improve an information security management system according to ISO/IEC 27001 or similar in order to protect all information and data provided by H+S and its customers and to identify and mitigate all risks related to cybersecurity.

5. Additional requirements for products sold to automotive

For suppliers delivering products used in automotive applications, additional requirements apply. This chapter outlines these requirements and where there is a conflict in section 5 to other sections within this document then this section shall take precedence.

5.1 Quality system requirements

5.1.1 General requirements

Suppliers delivering automotive products are required, as a minimum to be certified according to ISO 9001 by an accredited 3rd party certification body. The scope of the registration must include the products, materials or services supplied to H+S. Suppliers also agree to further develop their quality management system towards IATF 16949. If required by H+S or its customers, suppliers with ISO 9001 certification shall participate in a MAQMSR (Minimum Automotive Quality Management System Requirements) audit done by H+S auditors.

5.1.2 Core automotive tools

Suppliers are expected to be fully familiar with the requirements of the following automotive core tools according to Automotive Industry Action Group (AIAG) and VDA (latest editions):

- Advanced Product Quality Plan (APQP) Handbook
- Control Plan (CP) Manual
- Statistical Process Control (SPC) Manual
- Measurement System Analysis (MSA)
- Failure Mode and Effects Analysis (FMEA) Manual
- Production Part Approval Process (PPAP) Manual

5.1.3 IMDS

Suppliers must be familiar with the International Material Data System (IMDS) and submit declarations for all materials supplied to H+S, including any usage of conflict minerals.

5.2 Preventive quality requirements before series production

The requirements in this chapter are relevant to all suppliers developing custom-made products, processes and services, which are based on specifications provided by H+S or its automotive customers. Unless otherwise specified, commercial-off-the-shelf (COTS) products and raw materials (metals, chemicals, polymers, compounds) are excluded from this section.

5.2.1 Special processes

If required by H+S or customer specifications, the supplier shall comply with the following AIAG standards:

- CQI-9 Special Process Heat Treat System Assessment
- CQI-11 Special Process Plating System Assessment
- CQI-12 Special Process Coating System Assessment
- CQI-15 Special Process Welding System Assessment
- CQI-17 Special Process Soldering System Assessment
- CQI-23 Special Process Molding Assessment
- CQI-27 Special Process Casting Assessment

5.2.2 Advanced product quality planning (APQP)

Suppliers are expected to implement Advanced Product Quality Planning (APQP) activities to communicate and ensure timely, high-quality product development. APQP must be consistent with the latest version of the “Advanced Product Quality Planning – APQP” and “Control Plan – CP” requirements.

The supplier shall carry out the relevant APQP activities on all new materials, products and processes supplied to H+S. In addition, a Control Plan (“CP”) according to the latest requirement from AIAG has to be established and applied for all new materials, products and processes. The supplier is responsible for appointing an individual to organize and manage the APQP process. Updates of the APQP status shall be shared with H+S on H+S request. The supplier may be required to participate in the H+S product development process and attend product development team meetings.

Depending on the complexity of the product to be supplied to H+S, following deliverables are typically required by H+S during the development gates:

- Design review:
 - D-FMEA
 - Prototype build control plan
 - New equipment, tooling and facilities
 - Special product/process characteristics
 - Gauge and test equipment readiness
- Process review:
 - P-FMEA
 - Pre-launch control plan
 - MSA plan
 - Special characteristics plan
- Supplier readiness:
 - Special characteristics
 - Control plan
 - MSA
 - Significant production run

Suppliers shall have personnel trained on FMEA techniques and Statistical Process Control. It is expected that the current version of SPC and FMEA manuals published by AIAG & VDA shall be used as guidance when implementing these techniques.

5.2.3 Process and Design Failure Mode and Effects Analysis (P-FMEA / D-FMEA)

Suppliers shall implement FMEA methodology for a systematic risk assessment to identify and mitigate potential failures in products, systems or processes during product and process development, pre-launch and series production. Guidelines and further information can be found in the AIAG & VDA FMEA Handbook.

In case of specification changes, production process changes (see also chapters 4.3.8 and 5.3.1), claims or new applications the risk assessment should be reviewed to ensure and improve product quality, reliability and safety by implementing targeted actions to prevent or reduce the impact of failures.

5.2.4 Measurement system analysis (MSA)

The analysis of measuring systems is an integral part of the APQP process. H+S expects suppliers to conduct measuring systems analysis evaluation on all measuring and test equipment referenced on the control plan. The process shall be conducted per the latest version of Measurement System Analysis (MSA) manual.

5.2.5 Production part approval process (PPAP)

The submission and approval of production products (initial sample approval) is an integral part of the automotive supply chain. Production part approval (PPAP) is required prior to the first production shipment of products. The supplier shall follow the AIAG published PPAP procedure for each PPAP submission. PPAP submissions shall be according to level 3 requirements unless otherwise specified by H+S. The actual PPAP documentation shall be submitted following the sections defined in the AIAG PPAP manual. All reports, accreditations, and certifications should be less than one year old at the time of PPAP submission.

5.2.6 Control of special characteristics

Drawings or specifications of H+S or its customers may indicate special characteristics for the product, such as Critical Characteristics (CC) or Significant Characteristics (SC). Critical Characteristics (CC) refer to special characteristics which affect safety. Significant Characteristics (SC) refer to special characteristics which can affect compliance with regulations, form, fit, function and performance, or subsequent production process steps. Due to the severity of these defined characteristics, H+S requires from suppliers to appropriately state and control such special characteristics within the applicable processes. Hence, all process related documentation such as, FMEA's, control plans, work instructions and process plans must note the appropriate special characteristics where applicable.

H+S has following requirements regarding process capabilities:

- For all features identified as a Critical Characteristic (CC), a minimum long-term capability of Cpk 1.67 is required, unless otherwise specified by H+S or customer specific requirements.
- For all features identified as a Significant Characteristic (SC), a minimum long-term capability of Cpk 1.33 is required, unless otherwise specified by H+S or customer specific requirements.

Data records resulting from Statistical Process Control (SPC), automated checking, and inspection results shall be available for review upon request by H+S or its customers.

In case Cpk levels cannot be demonstrated, alternative control methods such as mistake proofing or 100% testing and/or inspection are required.

H+S expects that suppliers producing products with special characteristics ensure that proper training is provided to its personnel to ensure that all who affect the product have a clear understanding of the reason for the significance of the special characteristics and how their operation may affect such.

5.2.7 Managing pass-through characteristics

Pass-through characteristics (PTCs) are features or attributes of a product that originate from a supplier and are incorporated into the final customer product without modification or further testing by H+S. Since PTCs are not inspected or modified by H+S, any issues related to form, fit or function may go undetected until the final product reaches the customer. Therefore, in order to avoid any issues with such products, suppliers are required to conduct the following:

- Ensure that PTCs are considered during the suppliers' APQP activities and that relevant controls are identified and applied in the D-FMEA, P-FMEA and control plan
- Identify each pass-thru characteristic as PTC listed on their control plan
- Communicate PTCs to their sub-tier suppliers and require proper control

5.3 Quality assurance during series production

5.3.1 Notification/approval of product or process changes

Once PPAP has been reviewed and approved the supplier must not make any changes to the product, raw material, the manufacturing process or the manufacturing location without the written permission of H+S.

The supplier shall notify H+S in writing of all proposed changes prior to the implementation of any change. The planning and release of any agreed changes shall be done in strict coordination with H+S. Unless otherwise specified by H+S and its customers, PPAP will be required before production start for every agreed change.

5.3.2 Containment

Suppliers are expected to implement effective containment to isolate nonconforming product/material or services. The supplier is responsible for determining the necessary actions to establish an effective containment program. H+S reserves the right to mandate increased levels of containment based on the nature or severity of the non-conformance.

6. Additional requirements for products sold to aerospace and defense

There are additional requirements that suppliers delivering aerospace and defense (A&D) products shall meet and agree. This chapter outlines these requirements and where there is a conflict in section 6 to other sections within this document then this section shall take precedence.

6.1 Quality system requirements

Suppliers delivering aerospace and defense products are expected to implement and maintain a robust quality management system according to ISO 9001. In general, ISO 9001 certification by an accredited 3rd party certification body is required. Suppliers also agree to further develop their quality management system towards AS/EN 9100.

In exceptional cases, where no ISO 9001 certification exists at manufacturers of H+S designed products, H+S may conduct a system audit according to ISO 9001 at the supplier to ensure that supplier meets minimum quality management system requirements and has processes established according to the aerospace and defense standards.

Distributors or brokers that resell, distribute, and warehouse commercial-off-the-shelf (COTS) products and related parts found in aircraft and other aerospace components are encouraged to be certified according to AS/EN 9120.

6.2 Preventive quality requirements before series production

The requirements in this chapter are relevant to all suppliers developing custom-made products, processes and services, which are based on specifications provided by H+S or its aerospace and defense customers. If not otherwise specified, commercial-off-the-shelf (COTS) products and raw materials are excluded from this section.

6.2.1 Special processes

The supplier and its sub-tier suppliers are required to validate and control all special processes and shall maintain evidence that supports the ability of the processes to achieve the specified results. Validation includes, but is not limited to, defined process criteria, approved and trained personnel, approved equipment, specific methods, or procedures specified by the design authority, retention of records, test reports, and re-validation plans. H+S reserves the right to verify or validate by any means necessary the special processes that are used on H+S products.

If requested by H+S or its customers, suppliers or sub-tier suppliers providing special processes shall be certified according to Nadcap AC7004.

Note: Special process categories are defined by the Performance Review Institute (PRI) or International Laboratory Accreditation Cooperation (ILAC).

6.2.2 Project management

If required by H+S or its customers, the supplier shall implement a project management process or new product development process, addressing the applicable areas of project management, describing roles and responsibilities, integrating all relevant functions of the organization into a multidisciplinary team including scope management, time management, cost management, quality management, human resources management, communication management, risk and opportunity management and configuration management.

6.2.3 First article inspection

For products manufactured according to H+S or its customers' specifications, a First Article Inspection (FAI) Report is typically required unless otherwise stated. FAI approval shall be granted by H+S before shipment of product and in accordance with the latest revision level of AS/EN 9102, including, but not limited to, the recording of actual dimensions, test data results, process controls and build traceability.

6.3 Quality assurance during series production

6.3.1 Inspection requirements

All products supplied to H+S shall have traceability to inspection reports and material certificates from receipt of materials through processing and delivery. This traceability shall include accountability for all product and evidence that all manufacturing operations have been completed as planned.

Supplier shall verify that inspections have been completed on products prepared for delivery. When sampling is used as the means of product acceptance, the sampling plan shall be statistically valid and appropriate and shall not allow acceptance of lots whose samples have known nonconformities.

6.3.2 Verification of purchased products

The supplier shall check material test reports against specification requirements. When incoming products from sub-tier suppliers have been accepted on the basis of certificates of conformity, periodic scheduled checks shall be made of samples of product. The frequency of checks shall be based on a risk-based approach using historical performance and other objective data concerning the sub-tier supplier or subcontractor.

6.3.3 Quality records

If not otherwise specified, the supplier shall retain quality records for each product specified by H+S or its customers for a minimum period of thirty years.

6.4 Prevention of counterfeit products

Suppliers delivering products to H+S shall plan, implement and control processes for the prevention of counterfeit or suspect counterfeit part use as outlined in clause 8.1.4 of the AS/EN 9100 standard. The counterfeit part prevention process should consider

- Training of appropriate personnel in the awareness and prevention of counterfeit parts
- Application of a parts obsolescence monitoring program
- Controls for purchasing products from original or authorized manufacturers, authorized distributors or other approved sources only
- Assuring traceability of parts and components to original or authorized manufacturers
- Implementation of test and inspection equipment to detect counterfeit parts
- Monitoring of counterfeit parts reporting from external sources (i.e. the Suspected Unapproved Parts (SUP) Program from the FAA)
- Establishing of quarantine and reporting of suspect or detected counterfeit parts

Suppliers shall provide written notification to H+S within 24 hours if supplier becomes aware or suspects counterfeit material was delivered to H+S.

6.5 Foreign object damage (FOD)

The supplier shall implement and maintain a process enabling Foreign Object Damage (FOD) prevention and detection according to AS/EN 9146 standards to ensure that risk of Foreign Objects and subsequent FOD is minimized from all products prior to shipment. All suppliers shall strive towards a FOD free environment during machining, manufacturing, assembly, maintenance, inspection, storage, packaging and shipping. Specific attention should be given, where applicable, to items such as:

- Housekeeping and cleanliness
- Food and beverage control
- Tool and small part accountability
- Loose objects
- Material handling and parts protection
- External cleaning following evidence of external contamination

Supplier shall ensure that the responsibility for the FOD prevention program is clearly defined and appropriate personnel have received FOD awareness training. Finally, suppliers are responsible for the flow down of these requirements to their sub-tier suppliers to ensure FOD free products.

7. Additional requirements for products sold to railway

There are additional requirements that suppliers delivering railway products shall meet and agree. This chapter outlines these requirements and where there is a conflict in section 7 to other sections within this document then this section shall take precedence.

7.1 Quality system requirements

7.1.1 General requirements

Suppliers delivering railway products are required, as a minimum to be certified according to ISO 9001 by an accredited 3rd party certification body. The scope of the registration must include the products, materials or services supplied to H+S. Suppliers also agree to further develop their quality management system towards ISO 22163.

7.1.2 Requirements towards electronic equipment used in rolling stock

Suppliers delivering electronic equipment used in railway applications, specifically on rolling stock, must be familiar with the requirements of the EN 50155 standard and must have the corresponding processes and controls in place for operating conditions (regarding environment, electrics, EMC), technical construction features, reliability, maintenance, service life as well as related testing processes and standards (i.e. EN 61373 vibration and shock or EN 50121-3-2 EMC).

7.2 Preventive quality requirements before series production

The requirements in this chapter are relevant to all suppliers developing custom-made products, processes and services, which are based on specifications provided by Huber+Suhner or its railway customers. If not otherwise specified, commercial-off-the-shelf (COTS) products and raw materials are excluded from this section.

7.2.1 Special processes

The supplier and its sub-tier suppliers are required to validate and control all special processes and shall maintain evidence that supports the ability of the processes to achieve the specified results. Validation includes, but is not limited to, defined process criteria, approved and trained personnel, approved equipment, specific methods, or procedures specified by the design authority, retention of records, test reports, and re-validation plans. H+S reserves the right to verify or validate by any means necessary the special processes that are used on H+S products including processes.

If requested by H+S or its customers, suppliers or sub-tier suppliers providing special processes for welding shall be certified according to ISO 15085. Furthermore, welding suppliers agree to implement and follow the instructions according to the H+S welding guideline.

Note: Special process categories for railway are defined in the IRQB Guideline 6 Special Processes Railway.

7.2.2 Tender management

Prior submission of the quotation to H+S, the supplier should have a multidisciplinary process (including sub-tier suppliers when appropriate) in place to ensure that H+S, customer and statutory/regulatory requirements are:

- individually checked for compliance (e.g. clause by clause)
- negotiated and updated with impact on the offer identified
- evaluated and taken into account
- properly transferred, understood, acknowledged and committed to all relevant parties involved
- complete, clear, precise, unequivocal, verifiable, testable, maintainable and feasible

The supplier shall confirm and document the technical, qualitative and commercial feasibility of the proposed product in the tender. During the tender review done by the supplier, the organization shall approve the offer including planning, resources and pricing. As a minimum, project and product requirements as well as risks and opportunities shall be identified, controlled and validated.

7.2.3 Project management

If required by H+S or its customers, the supplier shall implement a project management process or new product development process, addressing the applicable areas of project management, describing roles and responsibilities, integrating all relevant functions of the organization into a multidisciplinary team including scope management, time management, cost management, quality management, human resources management, communication management, risk and opportunity management and configuration management.

7.2.4 Design and development inputs

Reliability, Availability, Maintenance and Safety (RAM and Safety) and Life Cycle Costs (LCC) shall be considered as design inputs (where applicable) by the supplier.

End of life of product should be considered as design input (where applicable).

7.2.5 First article inspection

For products manufactured according to H+S or its customers' specifications, a First Article Inspection (FAI) Report may be required. FAI approval shall be granted by H+S before shipment of product and in accordance with the latest revision level of ISO 22163 (IRIS), including set of inspection and verification activities in order to validate a production process, but not limited to, the recording of actual dimensions, test data results, process controls and build traceability.

7.3 Quality assurance during series production

7.3.1 Verification of purchased products

The supplier shall define the requirements for delegating verification of purchased products and services to sub-tier suppliers.

The supplier shall check material test reports against specification requirements. When incoming product has been accepted on the basis of certification or test reports, periodic scheduled checks shall be made of samples of product. The frequency of checks shall be based on historical performance and other objective data concerning the sub-tier supplier.

7.3.2 Quality records

If not otherwise specified, the supplier shall retain quality records for each product specified by H+S or its customers for a minimum period of thirty years.