Technical Delivery Specification

TC01 – Technical Cleanliness

This document describes the requirements for the delivery and documentation of systems.

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1 General

1.1 Area of Application

This Hirschmann Automotive GmbH company standard specifies the delivery specification for the design of machines, systems and production equipment for the realisation of cleanliness requirements, as well as their acceptance.

1.2 Deviations

Deviations from this delivery specification which may appear necessary or appropriate to the manufacturer, require written approval from Hirschmann Automotive.

1.3 Regulations, Norms, and Industry Standards

In addition to the requirements specified in this technical delivery specification, the contractor is fully responsible for all requirements applicable to their service arising from regulations (e.g. EC directives, regulations and other applicable laws) as well as from standards and generally accepted rules of technology, even if this technical delivery specification does not specify such in detail.

As far as regulations, standards and technical rules are referenced in this technical delivery specification, the contractor themselves must check whether they are applicable for their work and whether other regulations, standards and rules are also to be adhered to.

If in doubt, the contractor must immediately contact the client.

In addition, the contractor shall immediately notify the client if the contractor recognises or identifies, on the basis of their knowledge, that the service to be rendered by the contractor is not suitable for the intended purpose or suited only to a limited extent.

2 General Cleanliness Requirements

The design and construction of the system must be implemented in such a way that contamination during the processing, due to the component and system, is minimized.

To achieve this, covers, extraction systems and the avoidance of design-related particle traps (blind holes, grooves, etc.) must be considered.

This should ensure that component contamination and further carry-over of contaminants into subsequent processes, which could negatively affect the product function, are minimized.

It should also prevent or reduce contamination that could lead to a process malfunction or premature wear of the system

3 Technical Cleanliness Requirement

The design and construction of the system must be implemented in such a way that contamination during the processing, due to the component and system, is avoided and the specified cleanliness requirements for the product are not negatively influenced or achieved.

To achieve this, covers, extraction systems and the avoidance of design-related particle traps (blind holes, grooves, etc.) must be considered. If these measures do not lead to the desired result, cleaning stations for the component and product carriers must be implemented. Cleaning in the system must be coordinated with Hirschmann Automotive and implemented.

The system must not create any contamination to the component due:

- moving components
- Drive units incl. fan systems
- tools
- goods carriers
- Auxiliary and operating materials

If cleaning stations are integrated, they must be designed in such a way that the removal of contamination from the component, fixtures or product carriers is as efficient as possible or, if cleanliness requirements for the product exist and are specified, these are fulfilled.

- Selection of the cleaning method (e.g. ionized air, brushes, CO2 snow jet cleaning, etc.)
- Arrangement of compressed air/suction nozzles
- Negative pressure level
- Suction direction/distance
- Accessibility to corresponding contamination areas vs. retention force of components in product carriers

The assessment of the cleanliness-compliant design and execution of the system is carried out by means of visual inspections of the following machine components:

- Goods carrier
- gripper
- Movable elements
- Press-in tools etc.

If necessary, qualitative measurements can also be carried out for assessment purposes, e.g. by means of particle traps or contact samples during no-load operation at accessible points on product-relevant contact surfaces in the system.

If necessary, appropriate cleaning and maintenance instructions must be established for any remaining sources/depots of contamination

4 Process Approval and Machine Acceptance

The process approval regarding cleanliness considers the influences of initial start-up, maintenance, repair, set-up and adjustment

4.1 Machine acceptance regarding cleanliness with integrated cleaning stations

In this case, the effectiveness of the installed cleaning stations is of interest. To this end, the cleaning effect must be verified by means of cleanliness tests on the respective assemblies or finished products as part of the acceptance tests at the supplier's plant and in the series plant:

- Three inspection lots with parts in front of the cleaning station (if applicable, at the beginning, middle and end of the production run/shift)
- Three inspection lots with parts after the cleaning station that were removed at the same times

4.2 Machine acceptance regarding cleanliness without cleaning stations

To determine the contribution of the machine design to cleanliness, the following tests must be carried out on cleanliness-relevant machines:

- Three inspection lots each on cleaned parts (if applicable, at the beginning, center and end of the performance run/shift)
- In the event of negative results on cleaned parts, subsequently one test per individual component used in the as-delivered condition to be able to assess its influence on the cleanliness of the system. These inspection lots must be taken in advance on site during the acceptance tests and, if necessary, ordered subsequently

In both cases, the approval criteria are the respective cleanliness requirements according to the assembly/finished product drawing.

This procedure applies to the acceptance of the machine at the supplier, as well as to the final acceptance and process approval in the series production plant. This means that these processes must be repeated in the series production plant because there are other or additional factors influencing cleanliness and these must be taken into consideration for the series production status.

The respective tests must be commissioned and documented via the TecC app in the nearest internal (TM, KE) or external laboratories (Clean Controlling RW, VS, FY; glasses SM, NT).

During the preliminary acceptance tests, the effective compressed air consumption of the cleaning stations must be measured and reported to the relevant series production plant.

5 Reference

Reference to VDA 19 ‘Quality management in the automotive industry’

6.1 Part 1 ‘Inspection of technical cleanliness’

6.2 Part 2 ‘Technical cleanliness in assembly’