

# Technical Delivery Specification

M05 – Mechanical Systems





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

**Revision status:**

This delivery regulation M05 replaces all previous regulations.

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<b>Responsible:</b>	Hirschmann Automotive
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# 1 General

## 1.1 Area of Application

This Hirschmann factory standard specifies the delivery regulations for the mechanical systems of machines, machinery systems and production facilities.

## 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 Milieu

The dimensions of the system, individual cells and sub-assemblies must be declared during the Hirschmann Automotive construction consultation (to take into account the transport route and site of installation).

Hirschmann Automotive shall be notified of the following information at the latest 3 weeks before delivery:

- Total weight and dimensions (L x W x H)
- Number of parts, individual weights and pallet size of the delivery
- Compressed air quantity l/min
- Electrical main connection
- Additional supplies (cooling water, extraction, etc.)
- Machine layout with labelling of the required empty spaces for system equipping (waste vat, shuttle tables, loading and unloading equipment, etc.) location and range of movement of doors and booms.
- Environmental pollution such as oscillations, noise or heat
- Special requirements and conditions regarding fire protection, environmental protection, health protection or work safety.

If materials are used in the system which damage plastic flooring (cleaner, casting compound, inkjet printer, etc.), this area /system must be placed on a sheet of grade V2A or higher. The exact dimensions of the protective cover must be clarified with Hirschmann Automotive.

## 3 Setup

### 3.1 Test stations and measuring instruments/devices which require testing

The contractor shall coordinate the design and provision of the test equipment and setting masters for test stations as well as testable measuring instruments/equipment with the client.

### 3.2 Transport

Machine frames / system worktables of all assemblies must be designed so that they can be safely transported with a pallet truck (minimum height 100 mm). It's also necessary that there is a width in the length of at least 600mm to guarantee a safe transport. The surface where it's possible to lift the machine should be at least 500mm. System worktables are to be reinforced with suitable profiles. The centre of gravity and certain points on the chassis on which it can be

raised or transported, are to be documented in the operating manual and labelled on the machine frame.

### 3.3 System setup

Beneath the base plates, the system is to be provided with apertures (if necessary, with quick releases for maintenance).

Machines/machinery must be generally equipped with machine feet which are designed as levelling feet in order to enable the installation of the system.

The maximum size of a system or a cell should not be larger than the following dimensions:

- Width 2.1 m, length 3 m, height 2.2 m

The machine is to be completely enclosed in the safety circuit (incl. roof). The machine walls made from Makrolon may not be pushed into a profile.

Install doors in all setup and assembly locations which require it. The number and position of the doors must be clarified with Hirschmann Automotive.

### 3.4 Attachment parts

Attachment parts (e.g. feeding devices, control cabinets, reels, side tables etc.) must be screwed to the main machine.

Attachment parts, assemblies and stations on their own base plates must be able to be separated via plug couplings (air, power and water).

Hoses, cables, etc. must never be laid on the ground.

### 3.5 Operating instructions

Accessibility for repairs to the systems must be designed in such a way that repairs can be carried out without major disassembly work.

(Applies to all components in order to achieve a higher availability of the systems)

The distance between the single stations must facilitate working and adjustment tasks. Machine elements and parts are to be designed and arranged so that they can be easily and quickly repaired, inspected, and replaced.

For a fully automated machine, the control panel must be accessible at all points at which setup and adjustment work is to be carried out.

With moveable screens (booms, rails), it is to be ensured that the screen cannot be hit at any point by the machine, or that there are no pinch or shearing points.

Screen booms which are below 2.1 m and under which you can walk must be covered with edge protection to protect against head injuries.

### **3.6 Setup and replacement parts**

It must be possible to replace set-up and replacement parts in as little time as possible, without disassembling major assemblies and configuration work. These parts must be stored in suitable storage spaces of the system and also labelled accordingly (colour code or label). For necessary electrical or pneumatic connections on set-up and replacement parts, always use safe, lockable quick releases. Deviations are permitted only after written agreement from Hirschmann Automotive.

System components with increased positional accuracy to each other are to be connected with pins.

Complete replacement assemblies must be pinned onto the base plate with an intermediate plate. However, the assembly must still be adjustable.

Stations or machine parts which are mounted on cross tables must be secured against accidental adjustment.

Moving component masses (e.g. rotary cylinder with boom) are to be kept as small as possible.

### **3.7 Good/reject parts release**

All OK and nOK boxes must be enclosed on all sides with polycarbonate. In the case of the OK boxes, a door must be provided at the front which is closed by a magnetic seal. OK boxes should also be equipped with guide rollers so that the OK boxes are easy to remove. It must also be possible to hang a bag in the OK boxes without damaging it. All nOK boxes must be lockable with a key. (Supplier: DIRAK; Lock: DIRAK 1333 ordering number: 200-9302; tongue: 200-0414).

Waste boxes must be fixed in place (e.g. chad box)

The size of the waste boxes is to be selected in such a way that a time autonomy of at least 8 hours is ensured, or a total weight of 7 kg is not exceeded. In case of doubt, this point is to be clarified with Hirschmann Automotive.

There has to be a possibility to add a brake mechanism to slow down the parts in the good part drop off.

Part slides must be enclosed on all sides and be visible on at least one side.

The discharge channel has to be designed in such a way that the parts are evenly distributed in the box, and there is no cone formation. Thus, no parts can fall beside the box, and there can be no backing up into the discharge channel.

The discharge speed and height must be as low as possible, so that no damage or alteration of the assembly occurs (dampening).

### 3.8 Workpiece carrier

In systems where the goods carriers are queried, it must also be possible to produce with missing goods carriers. The insertion position of the container must be predefined.

For systems with a WT system, at delivery (final acceptance) at least one complete replacement WT is also to be supplied.

With mounting nests, an empty check is to be performed after part removal, which detects the whole geometry of the mounting nests. Particles > 0.2mm must be detected.

For additional points, see the "Technical Delivery Instructions – Conveyor Technology F03".

## 4 Preferred Suppliers components

Couplings:	Atlas Copco
Valves:	Festo, SMC
Non-return valves:	SMC VQ1000-FPG-, Festo HGL-,, Balluff, Baumer, Bernstein, IFM, Sick
Gripper:	Schunk, AFAG, SMC, Zimmer, Gimatic, Sommer
Cylinders:	Festo, Schunk, AFAG, SMC
Suction:	ULT, BOFA, Ries
Transfersystem:	AFAG, Bosch, Servus
Machine Elements:	Halder, Elessa Ganter, Kipp, AMF, Misumi
Linear Guides:	THK, Bosch Rexroth, Igus, Schneeberger

Profile System: Item, Bosch, Heron

## 5 Undesirable components

Gripper:	Festo: Greifer HGP, HGR
Drives:	Festo: Schwenk-/Drehantriebe DSR, DSM
Valves:	Festo: MLC-8-378-B Ventil Festo: MFHE Einschaltventil
Pressure regulator:	Festo: Druckminderer analog (MS4-LR/Artikelnummer 527690)
Couplings:	Euro Kupplungen

## 6 Pneumatics

### 6.1 General

The system must be designed and constructed in such a way that pneumatic components, including the pipes, are accessible, and installed so that they do not interfere with adjustment and maintenance tasks.

All types of pneumatic process control devices (e.g. clock feed valve) require the approval of Hirschmann Automotive.

Units with high air consumption are to be connected with separate valve blocks to prevent pressure losses or repercussions (from exhaust air) on other cylinders.

Pneumatic drives are generally to be mounted with exhaust air throttling. Hirschmann Automotive must be made aware of supply air throttling and apertures in lines.

For machines with sizes larger than 1,000 mm x 2,000 mm, a 3/8 inch air connection (see 3.1.a) is to be attached to the longitudinal side, which is fed from the X-distributor in the maintenance unit (e.g. for air gun).

Air connections are to be distributed so that they can be used by system operator in a radius of approx. 2,500mm (e.g. for air guns with a spiral hose)

Connection coupling and manual slide valve must be arranged for free access and be visible.

## 6.2 System pressure

At 6 bar system pressure, perfect functioning of the machine/machinery must be guaranteed.

## 6.3 Maintenance unit

The pneumatic system must have a maintenance unit which is in a readily accessible position on the machine/machine system.

For protection, the maintenance unit is to be mounted behind the front of the system; no parts may protrude over the system level.

The maintenance unit should be 3/8" inch in size.

Minimum requirements for setting up the maintenance unit:

1. Lockable manual on-off valve
2. Compressed air filter
3. Control valve
4. Distributor
5. Electr. on-off valve
6. Digital pressure monitor

## 6.4 Pneumatic valves

### 6.4.1 General

The valve type must be selected considering the intended function, tightness and resistance to withstand foreseeable mechanical influences and environmental influences.

No modifications shall be made to the valves by the machine supplier.

### 6.4.2 Installation

When installing valves, the following should be considered:

- Easy disconnectability of the valve from the lines or connections connected to it

- Good accessibility for replacement, repair or adjustment work
- Influences of gravity, shock or vibrations upon the valve
- Sufficient space for tightening and loosening of screws and electrical connections
- Good access must be ensured for manual actuation.
- Precautions to prevent incorrect installation of valves
- Positioning as close as possible to the associated drive, without impairing accessibility
- Directional valves with pistons must be mounted horizontally in relation to the position of the piston.

## 6.5 Non-return valves

Pneumatic drives which have to remain in the end position for a ventilation of the pneumatics are to be equipped with lockable non-return valves.

## 6.6 Cylinders

Preferably use cylinders with a C, T or trapezoidal groove.

## 6.7 End position damping

Overloading of the internal end position damping as a result of excessive mass deceleration, must be carried out, e.g. through additional external shock absorbers.

## 6.8 Stroke end stops

Adjustable external stroke end stops must be secured against displacement by suitable means.

## 6.9 Piston stroke

The piston stroke must be larger than the required stroke.

## 6.10 Gripper

If another manufacturer is used, this must be clarified with Hirschmann Automotive in advance.

## 6.11 Manometer

Each adjustable pressure must be easy to read via a manometer or a pressure gauge.

## 6.12 Pressure regulator

Specific pressures must be labelled on the individual stations and in the documentation. They must be regulated via a lockable digital pressure regulator.

## 6.13 Sound muffler

All exhaust openings of the pneumatic system must be fitted with sound mufflers. Only low-noise nozzles and diaphragms may be used. They must not be mounted at head height.

## 6.14 Oiler

If an oiler is required, the oil drop quantity on the maintenance unit is to be documented and it is to be ensured that only the part of the machine requiring oiling is misted (2-circuit system).

If possible, oilers should be avoided. If one is to be installed, this is to be in consultation with Hirschmann Automotive.

The oiled exhaust air must be discharged from the cell via a filter/separator.

## 6.15 Vacuum

Vacuum generator nozzles should have an air-saving function so that compressed air costs are reduced to a minimum.

## 6.16 Labelling

All cylinders, valves, connectors, separating points, devices within a system including the hose lines must be clearly and unmistakably marked.

Labelling signs must principally

- Be made of aluminium or two-layer plastic, etched or lasered
- have good legibility
- be permanently attached to a well visible point (permanently)
- be attached next to the components, assemblies and devices
- for covered installed devices be attached next to the installation space.

The identification plates may not be attached to interchangeable components, assemblies or devices.

## 7 General processing

OK parts must always be removed before nOK parts.

No nOK parts may be transported alongside the OK parts (e.g. pallet, chute).

If OK parts and nOK parts are unloaded with the same handling, the basic position of the OK part discharge duct must be locked. This duct may only open for an OK part.

Processes, the interruption of which can lead to a deterioration in quality, must finish processing before a manual machine stop is carried out. In the event of an immediate interruption of the process (e.g. emergency stop, control system off, etc.), the part must be disposed of as a reject.

In the event of a machine stop due to random faults (e.g. also for pneumatic pressure loss), it must be ensured that there is no risk of collision due to the system restarting. It must also be ensured that no process fault occurs that could affect the sorting sequence (OK/nOK).

Parts may not be damaged during the process or distorted in shape (e.g. seals).

Residues caused by working and processing, lubrication, cooling etc. must be safely removed and must not affect the quality of parts and processes.

Positioning, holding and clamping of the parts must take place via positive locking.

Depending on the raw material, press-in stamps are to be designed to be wear-proof (e.g. HMI for spring steel, punch CuSn6) and must be height-adjustable.

No residual materials may fall onto the floor, they are to be collected in boxes or other devices.

For components with different quality characteristics, such as surfaces, press-fits, etc., these zones must be exempted for the entire processing.

## 8 Structural requirements for the system

### 8.1 Use of standard parts

The contractor shall supply commercially available parts (feather keys, bearings, packings, seals,

washers, lock plugs, fastening elements, etc.) and parts configurations

(dimensions of the shaft and keyway, connection sizes, fixings, connection diagrams, etc.) which have been produced in accordance with existing national and higher standards and which ensure a uniform designation.

Locating pins must be hardened and have an internal pull-out thread when the locating pin is not accessible from both sides.

## 9 Preparation for transportation

### 9.1 Labelling of the line system

When systems are dismantled for transport, pipelines and line connections must be clearly marked. The labelling shall comply with the information given in the wiring diagram and the piping plan.

### 9.2 Packing

All components must be packaged in such a way that they are protected against damage, deformation, contamination and corrosion during transport and that their labelling is protected.

### 9.3 Protection of openings

Unprotected openings in pneumatic systems/components/pipelines must be sealed and outer threads must be protected during transport. The closure elements must be designed in such a way that the installation of the system is only possible after removal of the closure elements (for example, stoppers with collars and caps). The protection must not be removed until immediately before reassembly.

### 9.4 Notes

Industrial shock absorbers must not be used as end stops.

Covers must be individually removable.



## 9.5 Maintenance requirements

To facilitate maintenance, the system must be designed and built in such a way that maintenance relevant components can be accessed, adjusted, maintained, and repaired.

Care should be taken to avoid the need for extensive dismantling of adjacent components.

## 9.6 Lifting devices

All components and assemblies having a mass greater than 15 kg should be lifted with the aid of lifting devices. For this purpose, corresponding free spaces must be available.

# 10 Changes

All changes by the contractor on the machines may only be implemented after written approval by the client. The changes must be documented, and this documentation must be made available to the client.