

**Bosch General Delivery Specifications for Machinery and Equipment**  
**June 2005**

**Section I – Assembly Dept. 108**

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**Section 10.1 Preferred Mechanical Components**

<b>Springs:</b>	Lee Spring Co.
<b>Ball &amp; Roller Bearings:</b>	Preferred: Frelon or Teflon lined bushings Alternate: Ball/roller bearings (only if above is not feasible). SKF Industries, Inc. Thomson
<b>Shock Absorbers:</b>	ACE Controls, Inc.
<b>DU Bearings:</b>	Garlock Bearings, Inc.
<b>Slides &amp; Guides:</b>	THK Co, LTD. Thomson Industries Inc.
<b>Structural Sections and Work Tables:</b>	BOSCH
<b>Assembly Modules (Grippers, Pick &amp; Place Units):</b>	Techno-Sommer
<b>Robots:</b>	Adept
<b>Parts Feeders:</b>	Performance Feeders Vibromatic Inc.
<b>Stepping Motors:</b>	IA (Intelligent Actuator) with Device Net
<b>Servo Drives:</b>	IA (Intelligent Actuator) with Device Net Allen Bradley ULTRA
<b>Torque Systems:</b>	BOSCH
<b>Press Spindles:</b>	BOSCH
<b>Liquid Dispensing system:</b>	EFD
<b>Toggle Clamp:</b>	Must not be used.

**Section 10.2 Lighting**

All stations manual or automated must have their own general lighting system (fluorescent is typical). Any areas or tasks that are shadowed or require intricate operations should have in addition to the general lighting, specific task lighting.

All lighting systems should have protection against damage and impact.

All lighting systems should have easily replaced bulbs/tubes.

All lighting levels must conform to Section 4.3.3.

### **Section 10.3 Feeders, Rails, Hoppers and Dispensers**

**Bowl feeders/hoppers** Must have high and low level indicators  
Must be able to contain enough material for 4 hours of production at 100% of line rate  
Must have covers  
Must have automatic shutoff if material is run out or does not feed so that bowl does not run indefinitely  
Should have perforated bottoms (where practical) to aid in contamination control

**Rails/Chutes/Dispensers** Must have high and low level indicators  
Must be able to contain enough material for 4 hours of production at 100% of line rate (exceptions to this are allowed only by specific written permission by Bosch)  
Must have covers

### **Section 10.4 Marking Systems**

**Impact Marking:** Telesis with 2 \* 2" marking field and compact controller.

### **Section 10.5 Preferred Pneumatic Components**

**Cylinders:** Festo ISO 6431, 6432 with magnetic pistons and electronic sensors

**NOTE: ALL AIR CYLINDERS MUST BE SIZED TO OPERATE AT 60 PSI MAXIMUM.**

**Valves:** Festo ISO 5599 II

**Air Service Units:** Festo Filter + Regulator + soft start + lockout (see Appendix)

**Pneumatic Fittings & Airlines:** Parker Standard compression fittings for test circuits and Parker quick connect fittings for machine functions. Tubing must be high flexibility, non-kinking plastic tubing.

### **Section 10.6 Uniform Pneumatic Systems**

The vendor shall supply each station with a Festo valve manifold. Every valve must have a sandwich regulator. Every valve bank must use the same addresses from station to station.

The vendor shall supply all conditioning equipment such as chillers, dryers, filters, regulators as required to insure successful operation of the assembly line and long term durability. Festo will supply at least 60psi of relatively clean dry air for equipment operation and as such the equipment shall be designed to operate at 60psi or less.

The vendor shall supply a Festo Air Service Unit at a common location on every station.

All regulators (including the sandwich regulators on the valve bank) shall have a engraved (stamped) metal tag specifying the correct pressure setting (range), these tags should be mechanically attached (not with adhesive).

All stations will have an incoming pressure switch to monitor all incoming pressures / vacuums. These switches will provide a go/no go signal to the station for each air pressure.

### **Section 10.7 Preferred Drawing Format**

**Drawing Formats:** Drawings must be on CD in Native Solid Works and should include all part files, drawing files and assembly files.

**Numbering Systems:** The Bosch numbering system is based on several sections used to describe the part the number is being assigned to.

#### **Assignment of Numbers for Part / Title Block**

Machine Type + Project # (3 places) + Plant Acronym + Type of Drawing +  
Cell/Fixture # (3 places) + Detail # (3 places)

Machine types are (only the most common are listed here)

ED - Pneumatics, hydraulics

EM	- Assembly Fixture
EP	- Test Fixture
EY	- Material Handling (Racks, Bins etc)
ET	- Transport Equipment (Conveyors, Robots)
KA	- Cams
LY	- Gages
MP	- Magazines + Hoppers
MY	- Assembly equipment
VH	- Marking equipment
VX	- Welding and Soldering
WB	- Bushings, bearings
WG	- Handles and Wheels, Levers
WH	- Quick Change Mechanism
WT	- Jigs

Project #

To be assigned by keeper of the database (TEF group)  
0-499 Machining  
500-999 assembly

Plant Acronym

GIP (for Gallatin)

**Section 10.7 Preferred drawing format (Continued)**

Types of Drawings

G1	- Assembly Level
G2	- Spare Parts
G3	- Functional Diagrams
G4	- Hydraulics
G5	- Pneumatics
G6	- Electrical
G7	- Unassigned
G8	- Floor Layout
G9	- Unassigned
G10	- Table Top
G11	- Machine base
G12	- Fixture

Example #1: A drawing needs to have a number. The part is a mechanical detail. It is on a conveyor based assembly line with 10 stations. The detail is on the 4<sup>th</sup> station. It is the 3<sup>rd</sup> mechanical detail for that station. The assembly line is in the Gallatin Plant. This is the 15<sup>th</sup> project for assembly.

MY015GLWG12004003

Example #2: A drawing needs to have a number. The drawing is floor layout for a three station manual work cell. It is the second version of the layout drawing. The work cell is in the Gallatin Plant. This is the 99<sup>th</sup> project for assembly.

**MY099GLWG8001002**

**Assignment of File Names to Drawings / Parts**

In order avoid search problems when looking for a part that the description is known or partially known, but the drawing number is not known, the file name should have 3 parts:

1. A Description of the drawing (Unlimited Length)
2. The Drawing Number (As defined above)
3. The Sheet Number (3 Places, Should be set as 001 if only 1 sheet)

Using the above example #1 the File name would be:

Left Brace For Pin Press - MY015GLWG12004003 – 001

**Section 10.8 Structural Materials**

Structural Material: Nickel Plated Steel (Must be used for table tops)  
Surface Treated Aluminum

Tooling Material: Should be Black Oxide coated.

Machine Paint: NO PAINT ALLOWED.  
In some cases a baked powder coat finish may be allowed on purchased goods but explicit written permission must be obtained from project engineer.

**Section 10.9 Preferred Electrical Components**

**Connectors:** T&B  
Phoenix  
AMP

**Control Device, Two Hand:** Banner Opto-touch

**Control Devices:**

(Relays / Breakers / Contactors): Allen Bradley

Disconnect switches: Allen Bradley IEC Load Switches.

Motor starters: Allen Bradley

Push buttons / Selector Switches: Allen Bradley

Light Tower: Allen Bradley

Opto-couplers:	Phoenix
Overload Devices:	Allen Bradley
<b>Enclosures:</b>	Hoffman Aluminum Enclosures
<b>Control networks:</b>	Ethernet, Device Net
<b>Power supplies:</b>	Sola
<b>Sensor &amp; Cables:</b>	Effector Banner Keyence Lumberg Cable system Micro plug Lumberg multi connector blocks (Micro)

**Section 10.9 Preferred Electrical Components(Continued)**

<b>Terminal Blocks:</b>	Allen Bradley 1492-H1 /H2
<b>Terminal Fuse Blocks:</b>	Allen Bradley 1492-H5
<b>Circuit Protection / Fuses:</b>	Allen Bradley Bussman
<b>Transformers:</b>	Acme GE
<b>Safety Devices:</b>	STI Guardzman

**Section 10.10 Uniform Electrical Structure**

Bosch will provide 480VAC 60HZ power connections. The vendor will provide any voltage transformation, conditioning, protection required.

All wiring connections should use ferrules on the wire ends and should not be left as bare wires.

**Section 10.11 Programmable Logic Controllers & Computers**

<b>PLC's:</b>	Allen Bradley SLC505 with CMOS Ram & EEPROM with Ethernet + Devicenet capability where possible. Allen Bradley Micro Allen Bradley Pico
<b>I/O:</b>	Flex I/O
<b>Operator Interfaces:</b>	AB Touch screens: 900T / 600T (Interface: Ethernet / Device net).
<b>Vision Systems:</b>	Acuity

**Computers:** Contact Bosch For all Computers

The OEM shall use nicknames and symbol naming for all I/O and variables. Rung descriptions shall provide information from functions / scaling factors / algorithm / formulas and Logic.

For Logic and PLC programming the OEM will be given sample software for your review in order to maintain the same logic structure within our factory.

**Section 10.12 Gages and Instrumentation Specification:**

**Loadcells:** Sensotec  
Omega

**LVDT:** Balluff Micropulse with SSI Interface

**Pressure transducers:** 0-60PSI & VAC Omega  
0-30PSI Omega  
0-60PSI Omega  
0-200PSI Omega

**Pressure transmitter:** Yokogawa differential transmitter with digital display.

The OEM shall be responsible to collect and file all certificates of calibration of any gage used in the equipment.

The Vendor is required to provide the means (Tools / Fixtures / instruction / method) of calibration for any gage or transducer on the Equipment.

Also the OEM shall provide for each gage or transducer a Repeatability Study and a process CpK study in accordance with the MSA Reference manual.

Example: For LVDT's build gage block for Zero and Span Master calibration and the instruction or logic to provide a fast and simple way of ensuring calibration of the gage.

Shunt calibration values for transducers should be engraved and a tag attached to the transducer itself to aid in calibration and verification on an ongoing basis.

**Section 10.13 Manual Process / Operator MTM Requirements**

The vendor shall supply with the quotation a MTM (Motion Time Management) study for every station / process. Bosch will evaluate the validity of this study and will be the final authority on the feasibility of the process.

Any changes to the station(s) or process shall require the vendor to supply a new MTM study that is again subject to Bosch's evaluation and approval.

**Section 10.14 Line changeover process**

Changeover from part to part on the stations shall be done with a tooling swap. To the extent possible changeovers should be done with out any use of additional tools. All tooling, holes, changeover details, shall have an anodized aluminum screw as a color coded marker indicating the correct location and tooling for that part number. Every changeover detail should be logically integrated to the station to verify proper changeover.

The entire assembly line must be capable of being changed over reliably from one part to any other part within a maximum of 10 minutes utilizing 3 operators for changeover. This means from the end of production for one part, to the first piece produced of the next part it should take a maximum of 10 minutes. Included in this time is any time required to run masters on test equipment and or poke yoke verification.

**Section 10.15 Automation and Process Specification:**

**General Machine / Station specification:**

Every station in the assembly line should have a light stack tree indicating the following:

Green Light:	Automatic Mode Running
Blue Light:	Manual / Setup Mode
Amber Light Blinking:	Part Feeder Low Level
Red Light	Station Fault

The location of the stack light should be on top of the machine for visibility from longer distances.

Every Station will turn off its feeding equipment (feeder bowls / hoppers / conveyor belts...) automatically. If the station is idle for 15 minutes, the station feeder will turn off. In Sleep mode if any action (push button / Mode selector / part present / cycle start....) occurs feeders will reactivate.

For Test equipment and machinery it is required to build a master mode function where the machine will check its integrity with no-go masters for our certification. Use back check function to build diagnostics watchdog for sensors like proximity switches / photo eyes which will be used as Poka - Yoke's . Diagnostics for the test equipment shall provide Alarms and Fault indications and show status for the test result.

Fatal Alarm Faults shall occur for any station if an action (pneumatic cylinder extend) has not been ended for a given dwell time.

**Section 10.15 Automation and Process Specification (continued):**

Every station will Stop its cycle and activate a Fatal Fault on the display after the 3 consecutive rejects within the station.

For each station, which contains part change over details, the OEM shall provide the means of interlocking tooling with the PLC, so the station setup by part number can correlate with tools in use. If part code

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doesn't match the tool taken for setup, a Message should remind the operator to check the setup and the Station should inhibit Auto Mode function.

Example: Tool block holder with embedded Proximity switches will tell which tool has been taken for part change over setup.

For each Station the OEM is required to provide shelving for fixtures and tooling storage.

Touch screens for each station must have the display and functionality of the following:

**Display:**

Part Number / Good parts produced / Rejects / Total Counter/ Pass-Fail lights. Master mode / Auto Mode / Manual Mode / Failure Display message / Operator instructions / Test results from all measurements (Variable and Attribute) Diagnostic Functions / Statistics on failures

**Functionality:**

Reset for counters / Selection of Auto / Manual / Master - Mode's. Manual Control for any actuation device in station Step mode function (sequence process step by step)

Part number selection and Recipe option mode setup screen. Control /Teach / home functions for any PLC controlled servo drives. Calibration functions for gages.

All manual functions should be sufficiently interlocked to prevent machine crashes.

All calibration/verification buttons/screens must be password protected and should have sufficient instructions available on the panel to be able to perform the calibration/verification operation.

**Section 10.16 Contamination:**

The vendor shall realize that the master cylinder is a product that is extremely sensitive to contamination. The vendor shall provide contamination removal systems at any process that may generate or attract contamination. Examples of these but not limited to are: Impact marking, reservoir pin insertion, snap ring insertion. Also, each station should have proper covers to avoid contamination.

The vendor shall also address contamination from outside sources i.e.; hair, dust etc... through the use of covers on any exposed material handling systems. Examples of these systems would be: Bowl feeders, hoppers, delivery chutes, rails, conveyors etc...

**Section 10.17 Error Proofing:**

The vendor shall supply a completed version of the Poke –Yoke checklist as part of the quotation. This check list contains a majority of the common errors that must be error proofed against. The vendor should supply:

- A) The method of prevention/detection.

- B) Its likely hood to find the problem ( on a 1-10 scale based on APQP manual )
- C) The frequency the poke yoke checks for the error.
- D) The vendor must provide the method and any Tooling/Masters required to verify that every poke yoke is working.

**Section 10.18 Reject Control:**

The vendor shall supply each station with a reject box (or tube) for the placement of rejected parts. The box should have two sets of photo eyes (2 eyes to discourage operators falsely tripping the sensor) mounted in a tube going to the box (or an equivalent system). The tube should drop the part into the reject box. The reject box should be designed to hold a reject rate of 2% for an entire shift. The box should be Red (Plastic or Stainless Steel). The station should not allow the operator to continue the running of the station until the reject has been properly placed in the reject box. There should be a counter on the touch screen to show the number of rejects in the box. There should be a button under the counter to reset the count to zero.

**Section 10.19 Process Ownership:**

Bosch Personnel will provide the machine builder with as much assistance as possible. This will usually take the form of providing expertise in the manufacture and testing of the TMC8 master cylinder. In some cases Bosch personnel may provide sketches, models or drawing of current tooling or conceptual tooling. It is the responsibility of the machine builder to determine suitability of this information for use in the assembly line. Therefore it is important that the machine builder (vendor) understands that they are 100% responsible for the ALL machine and tooling design, implementation, and suitability for use in the master cylinder assembly line.

**Section 10.20 General Procedures:**

Confidentiality agreement:

The OEM is required to complete the Confidentiality agreement form and return signed prior to receive Drawing packages form Robert Bosch Corporation for this bidding package.

Terms of payment attachment:

Terms of payment structure for Robert Bosch Corporation Gallatin are as follows:

- 25% of the purchase price at initial project release.
- 10% of the purchase price after acceptance of final design review.
- 25% of the purchase price at 1<sup>st</sup> acceptance Run
- 15% of the purchase price at 2nd acceptance Run
- 15% of the purchase price after final acceptance runs at Aguascalientes floor
- 10% of the purchase price after delivery of all final documents.

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## **II 10.1 Preferred Components**

### **II 10.1.1 Preferred Mechanical Components**

#### **II 10.1.1.1 Machines/Cells**

- All external connections must be permanently identified as to their purpose.
- Machines or equipment must be tagged with a model & serial number within view of the main control panel.

#### **II 10.1.1.2 Fixtures**

##### Basic Requirements:

- Fixture must permanently identify the parts as to fixture and load number for part traceability issues
- Fixture tolerances shall meet the following:
  - pocket locations are to be within 0.025 mm of each other in X, Y, Z planes
  - Fixture sides are to be perpendicular to each other and the base within 0.025 mm
  - Fixture is to be square to the machine spindle within 0.025 mm when mounted on pallet
- Written documentation of applicable fixture dimensions to qualify the fixtures to specification is required
- Hydraulic clamping methods must use internally manifolded devices and be without external plumbing, except as pre-build approved
- Fixture must contain a hydraulic pressure gage and a permanently marked fixture number
- Fixture must contain a reference point in the X, Y, Z planes
- Fixture should have the ability to be run without parts present in each load
- Fixture shall have included a Poka Yoke to prevent misloading
- Fixture must be able to be sent into Machine while in a fully released or unclamped position
- Tooling holes are required to indicate X & Y position in each load
- All fixture designs require to be approved and agreed upon print. Acceptance of delivery contingent upon dimensional verification.

##### Preferred Fixture Components:

- ENERPAC CDB 18202 Hydraulic Cylinder
- VEKTEK 32-1264-24 Dual Path Rotating Union
- VEKTEK 15-0213-20 Hydraulic Cylinder
- YUASA brand indexers
- CARR-LANE CL-6875-SLFK SINE KEYS
- CARR-LANE CLM-12-SLFK SINE KEYS

#### **II 10.1.1.3 Auxiliary Components**

##### Coolant system:

- Chip conveyor sizing: Chip conveyor filtering capacity must be greater than sum of all flow rates of all installed coolant pumps

- Chip conveyor: the current systems in house are Turbo conveyor – MICORFINE model and CHIP BLASTER 1000psi / 8gpm
- Chip hoppers:
  - Dept. 109 recommended: Rubbermaid 0.5 yd<sup>3</sup> tilt, plastic
  - Dept. 105 recommended: steel hopper 0.5 yd<sup>3</sup> with semi-steel casters
- High pressure coolant through spindle MIN 1000psi @ 8gpm, 12gpm for “large” machining centers
- The system must have a 5 micron particle filtering capability
- The system must integrated to machine provide an alarm when high pressure drops below an agreed upon set point or at power disconnect. Alarm shall put Machine into a minimum of feed hold condition. System to be activated through use of “M”-Codes in CNC program.
- High pressure filter plugged alarm shall be provided as well as high pressure feed tank level low alarm.
- The method of checking coolant level in main sump shall be external and other than sight glass (example: float stick)
- A sump coolant low alarm shall be provided (ex.: float switch)
- Main sump tank volume to be minimum of twice conveyor filtering flow rate (ex.: 200g sump with 100gpm conveyor filter capacity).
- Coolant is chosen by plant, no input here by MFE2
- Recommended Coolant pumps:
  - FUJI ELECTRIC w/ 100l/min
  - HYDRA-CELL for high pressure
  - GRUNDFOS
  - GORMAN-RUPP Pumps

## II 10.1.2 Preferred Pneumatic Components

### Cylinders

- BOSCH-Components shall be use (if available)
- SMC, BIMBA or PARKER

### Valves

- BOSCH-Components shall be use (if available)
- NUMATICS (if Bosch not available)
- SMC or PARKER

#### Solenoid Valves 1/4“ ISO-1

- Single Solenoid 5/2 Valve – 24V, DC, 1/4“
- Double Solenoid 5/2 Valve – 24V, DC, 1/4“
- Double Solenoid 5/3 Valve – 24V, DC, 1/4“

#### Solenoid Valves 1/8“

- Single Solenoid 5/2 Valve – 24V, DC, 1/8“
- Double Solenoid 5/2 Valve – 24V, DC, 1/8“
- Double Solenoid 5/3 Valve – 24V, DC, 1/8“

### Fittings

- Preferred are SMC, PARKER
- BOSCH if available

### **II 10.1.3 Preferred Electrical Components**

All Equipment w/ light curtain or safety.

- Recommended light curtains:
  - STI
  - MICROGUARD
- Recommended coolant pumps:
  - FUJI ELECTRIC
  - HYDRA-CELL for high pressure
  - GRUNDFOS
  - GORMAN-RUPP Pumps
- Connectors:
  - The current connectors in house are produced by: ALLEN BRADLEY, MICROSWITCH
- Sensors:
  - In Gallatin Plant, the used sensors were produced by KEYENCE, ALLEN BRADLEY, MICROSWITCH, BALLUF and EFFECTOR
- Control Devices:
  - The current control devices, which are used in house, were produced by following manufacturer: ALLEN BRADLEY, MICROSWITCH, OMRON and REXROTH
- Cables:
  - There are many different types of cables used in the plant. Normally the cables come in a kit with the sensors and connectors or will order for specific functions.

### **II 10.1.4 Preferred Programmable Logic Controllers and Computers**

- Controller: GE-Fanuc or Fanuc 16 (or higher) for the CNCs are strongly recommended

Preferences: (some of these must be and some are preferred)

- Helical Interpolation is a must
- RS 232 Port is a must
- Extended memory is preferred
- Tool 30+ is preferred
- Custom macro variable are preferred
- Background editing is preferred
- Minimum registerable program preferred
- Integrated tool breakage detection

- Spindle-load monitor (to measure, evaluate, stop, machine with excess current)
  - Maintenance history
- PLC: Allen Bradley is preferred and these types are what we use currently in the Machining Department in the Gallatin Plant:
    - Allen Bradley – PLC 2
    - Allen Bradley – PLC 5
    - Allen Bradley – SLC 5/02
    - Allen Bradley – MICROLOGIX 1000

## **II 10.2 Uniform Structure**

### **II 10.2.1 Uniform Pneumatic Structure**

Impact Marking (Scriber):                      • Air filter and regulator

### **II 10.2.2 Uniform Electrical Structure**

Bosch will provide a 480V AC3 phase 60Hz power connection with sufficient current capability for usage of any production process. The vendor will provide any voltage transformation, conditioning and protection required.

E-Stop requirements: All motion must stop and return to zero energy state.

## **II 10.3 Further Demands**

### **II 10.3.1 Gages and Process References**

Thread Detection: The current systems in house is the NCTP-100 DWA in different implementations and the NEMA 12 Enclosure

*Broken Tool Detection: type, speed, intend*

### **II 10.3.2 Marking Systems**

Impact Marking (Scriber):                      GTS STYLINER MARK 4 or following editions

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- 4" x 4" marking field
- Column mounted stylus marking head
- Tall Nema enclosure with monitor window and keyboard drawer
- 16 I/Os (8 inputs / 8 outputs)
- 8' master control cable
- Fixture to support & locate parts, mounting base plate to locate the entire fixture under the styliner marking head
- One complete standard Stylus assembly  
Optimum working distance of 3/32"
- Style 40 (DOS based operating system)

**II 10.3.3 Lighting**

All stations manual or automated must have their own general lighting system (fluorescent is typical). Any areas or tasks that are shadowed or require intricate operations should have in addition to the general lighting , specific task lighting.

All lighting systems should have protection against damage and impact.

All lighting systems should have easily replaced bulbs/tubes.

All lighting levels must conform to Section 4.3.3.

**II 10.3.4 Format of CAD-Files / Drawings**

Drawings and bill of material must be on the Bosch title block, provided by the project engineer. Drawings must be provided electronically in the AutoCAD version 14 or greater DWG/DXF format, per **Bosch-Norm N51**.

- A bill of material must be contained on the 1<sup>st</sup> sheet of the drawings, using the format specified in the Bosch drawing block. (i.e. item, qty, description, material, SH No., remarks) including subassemblies.
- Multiple sheet drawings follow this format.
  - 1<sup>st</sup> sheet contains the bill of materials. The main assembly views can be contained on the 1<sup>st</sup> sheet if space allows.
  - Sheets 2-X contain main and sub assembly drawings.
  - Detail component drawings follow.
  - All sheets must have the Bosch assigned drawing number in the title block and the "Sheet XX of XXsheet" information filled out correctly.
  - Multiple details are allowed on a single sheet. Each sheet must be a separate file (do not combine several sheets in one file).
  - Electronic file name format example is "VY00100BG "space" SHT9" for each applicable sheet.
  - A revision to any sheet must also be noted in the change block of the 1<sup>st</sup> sheet. The 1<sup>st</sup> sheet will reflect the highest revision of any subsequent sheets.

*Example:* MF12345BG

**Machine Paint:** BOSCH Standard Grey (RAL 9002 HR )

Mixed code:      Base = Industrial Enamel White  
                         1/128 Gold + 1/64 Black  
                         13/32 + 1/128 Umber  
                         1/64 + 1/128 Green  
                         1/4 cup D64F100 bloss modified.

### **II 10.3.5 Manual Process / Operator MTM Requirements**

The vendor shall supply with the quotation a MTM (Machine Time Management) study for every station / machine / process. Bosch will evaluate the validity of this study and will be the final authority on the feasibility of the process.

Any changes to the station(s), machine(s) or process shall require the vendor to supply a new MTM study that is again subject to Bosch's evaluation and approval.

### **II 10.3.6 Process Specification**

A value of  $C_{pK} \geq 1.33$  must be proven by a sample size  $>100$  pieces;  $C_{pK} \geq 1.67$  for designated characteristics

Runoff at customer required before shipment

Verification of runoff required in plant after received

All Equipment designs require to be approved and agreed upon print. Acceptance of delivery contingents upon dimensional verification.

For further Requirements see also Section 6, Quality Standards and Runoff conditions.

### **II 10.3.7 Error Proofing**

None

## **II 10.4 General Procedures**

### 1. Confidentiality agreement:

The OEM is required to complete the Confidentiality agreement form and return signed prior to receive Drawing packages form Bosch Braking Systems for this bidding package.

### 2. Terms of payment attachment:

Terms of payment structure for Bosch Braking Systems Gallatin are as following:

- 15% of the purchase price at initial Project Release
- 15% of the purchase price after acceptance of final design review
- 15% of the purchase price at the Debug / Tryout project mile stone
- 35% of the purchase price after final acceptance test at Bosch floor
- 20% of the purchase price after delivery of all final documents

### 3. Final acceptance Test attachment:

#### **Bosch Braking Systems additional requirements for the run off is:**

- 4 hour duration production Test run to include report and logging of performance data and process data. (see section 7)
- Additional requirements over and above section 6 (Quality standards and run-off conditions) in order to reflect the equipment effectiveness increase to higher than 90 %

### 4. General Objective:

To provide Bosch Braking Systems with innovative, high quality equipment designed and fabricated in a manner that results in lower cost solutions without sacrificing process and machine performance.

Proposals will be evaluated to determine the highest value ratio (Function/Cost) and the proposal considered to be in the best interest of BOSCH will be given the highest consideration.

## **II 10.5 List of Attached Items**

None

**Gallatin Plant****III. Change History**

<b>Edition No.</b>	<b>Date of implementation</b>	<b>Written by</b>	<b>Changes</b>
3rd	04-Oct-02	Morgan Machunze/ B. Miller	Identified #1 choices, Updated some brand names, clarified some materials and choices, added attachments, updated machining changes
4 <sup>th</sup>	7-Nov-03	Fred Morris	Added to Section I.10.1 “Spring detangle”, “Dominion clamp”, and “Reservoir Seal”; Added to Section I.10.3 a sentence under “Bowl feeders”, Added to Section I.10.4 under “Impact Marking”; Added to Section I.10.5 under “Cylinders”, “Valves”, and “Air Service Units”; Added to Section I.10.6 a sentence regarding air service units; Removed two paragraphs under Section I.10.7; Added to Section I.10.9 “Control Device, One Hand”, also added to “Light Tower” under “Control Devices”; Removed in Section I.10.10 a sentence, “The Electrical Panel must provide the power source...”; Removed in Section I.10.15 under statement 1 constraints for piezo buzzer, and under statement 2 changed constraints on “light stack tree”; Added 1 <sup>st</sup> paragraph to Section I.10.16
5 <sup>th</sup>	10-Jan-05	D. Elliott	Replaced Section I (Assembly); Updated acronyms; Changed Document Expert B. Miller to A. Pindrock and S. Middleton to D. Elliott, also changed Management Approval from A. Matlock to K. Nelson
6 <sup>th</sup>	14-Jun-05	D. Elliott	Updated the date on page 1 which was inadvertently missed on the previous update; changed Nelson’s acronym from MFC to PM

**III. Review and Approval**

Document expert review:

GIP /MFE2- A. Pindrock  
(Signature on file)

Date:

GIP/MFE1-D. Elliott  
(Signature on file)

Date:

Management representative review:

GIP / QMM/TEF- G. Withrow  
(Signature on file)

Date:

Management approval:

GIP / OM- K. Nelson  
(Signature on file)

Date:

# **ROBERT BOSCH CORPORATION; CHASSIS DIVISION**

## **CONFIDENTIAL DISCLOSURE AGREEMENT**

This AGREEMENT made and entered into this \_\_\_ day of \_\_\_\_\_, 20xx by and between Robert Bosch Corporation; Chassis Division, it's parent and all affiliates having its principal offices in South Bend, IN, (hereinafter referred to as "BOSCH") and \_\_\_\_\_, having its principal offices in \_\_\_\_\_, (hereinafter referred to as "RECIPIENT").

WHEREAS BOSCH has in its possession certain information it considers as confidential and proprietary to it relating to: RFQ #

WHEREAS RECIPIENT desires to receive and BOSCH is willing to disclose said confidential information for the limited purpose of enabling RECIPIENT to: provide quotation information; and, if requested by Bosch, produce and deliver samples and production parts.

NOW THEREFORE in consideration of the above premises and in further consideration of the mutual covenants herein contained, it is agreed as follows:

All information transmitted hereunder shall be considered as Confidential Information' whether contained in a written document, drawings, product samples, in verbal form or otherwise.

RECIPIENT agrees that all Confidential Information disclosed by BOSCH hereunder, in whatever form, will be maintained in confidence by RECIPIENT, its agents and employees, and RECIPIENT will not reduce to practice or use, nor publish or disclose to third persons, any such information without the express written consent of BOSCH, unless or until such information is:

- (a) already in the possession of RECIPIENT prior to its disclosure hereunder as evidenced by written documentation in the records of RECIPIENT;
- (b) now or at any time hereafter becomes part of the public domain through no fault of RECIPIENT; or
- (c) lawfully obtained on a non-confidential basis by RECIPIENT from any other source which did not receive it in confidence from BOSCH.

In the event RECIPIENT believes that it is entitled to rely on one or more of the above exceptions, (a), (b) or (c), RECIPIENT will give BOSCH written notice of such belief with substantiating evidence within thirty (30) days of the date of first receipt of the Confidential Information from BOSCH.

All Confidential Information disclosed hereunder and all tangible property delivered to RECIPIENT hereunder shall at all times remain the exclusive property of BOSCH. RECIPIENT agrees to return promptly upon request from BOSCH prototypes, samples and parts thereof, written materials, drawings and descriptions received by RECIPIENT from BOSCH under this agreement, along with all copies thereof. The obligations contained herein shall be binding upon RECIPIENT, its agents, employees, successors, and assigns and shall inure to the benefit of BOSCH, its parents, and affiliated companies, successors and assigns.

Wherefore the parties hereto have caused their duly authorized representatives to execute this agreement as of the date first written above.

All obligations on nondisclosure shall cease seven (7) years from the date of disclosure.

ROBERT BOSCH CORPORATION; CHASSIS DIVISION      SUPPLIER:

By: \_\_\_\_\_

By:

**ROBERT BOSCH CORPORATION; CHASSIS DIVISION**  
**CONFIDENTIAL DISCLOSURE AGREEMENT**

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Title:

	<b>Fault Condition</b>	<b>Poke Yoke</b>
<b>Stick Primary Piston Assembly Conventional</b>	Missing Bell	
	Wrong Bell	
	Wrong primary screw	
	Cage height out of spec	
	Missing Spring	
	Wrong spring	
	Missing spring retainer	
	Wrong spring retainer	
	Missing pumping cup	
	Reversed pumping cup	
	Wrong pumping cup	
	Wrong piston	
	Missing pressure seal	
	Wrong pressure seal	
	Reversed pressure seal	
<b>Stick Primary Piston Assembly Center Port</b>	Missing Top Hat	
	Wrong Top Hat	
	Missing Poppet Spring	
	Wrong Poppet Spring	
	Missing Poppet	
	Wrong Poppet	
	Missing pumping cup	
	Wrong pumping cup	
	Missing Center Comp Pin	
	Wrong Center Comp Pin	
	Missing Pressure Seal	
	Reversed Pressure Seal	
	Wrong Pressure Seal	
	Wrong Piston	
	Wrong Main Spring	
Missing Main Spring		
<b>Recessed Primary Piston Assembly Conventional</b>	Missing Bell	
	Wrong Bell	
	Wrong primary screw	
	Cage height out of spec	
	Missing Spring	

	Wrong spring	
	Missing spring retainer	
	Wrong spring retainer	
	Missing pumping cup	
	Reversed pumping cup	
	Wrong pumping cup	
	Wrong piston	
	Missing Guide	
	Wrong Guide	
	Reversed Guide	
	Missing Guide O-Ring	
	Wrong Guide O-Ring	
	Missing Guide Rear Seal	
	Wrong Guide Rear Seal	
	Reversed Guide Rear Seal	
	Missing Piston Protector	
	Wrong Piston Protector	
<b>Recessed Primary Piston Assembly Center Port</b>	Missing Top Hat	
	Wrong Top Hat	
	Missing Poppet Spring	
	Wrong Poppet Spring	
	Missing Poppet	
	Wrong Poppet	
	Missing pumping cup	
	Wrong pumping cup	
	Missing Center Comp Pin	
	Wrong Center Comp Pin	
	Wrong piston	
	Wrong Main Spring	
	Missing Main Spring	
	Missing Guide	
	Wrong Guide	
	Reversed Guide	
	Missing Guide O-Ring	
	Wrong Guide O-Ring	
	Missing Guide Rear Seal	
	Wrong Guide Rear Seal	
	Reversed Guide Rear Seal	
	Missing Piston Protector	
	Wrong Piston Protector	
<b>Secondary Piston Assembly Conventional</b>	Wrong Main Spring	
	Missing Main Spring	

	Missing spring retainer	
	Wrong spring retainer	
	Wrong piston	
	Missing Pressure Seal	
	Reversed Pressure Seal	
	Wrong Pressure Seal	
	Reversed pumping cup	
	Wrong pumping cup	
<b>Secondary Piston Assembly Center Port</b>	Missing Top Hat	
	Wrong Top Hat	
	Missing Poppet Spring	
	Wrong Poppet Spring	
	Missing Poppet	
	Wrong Poppet	
	Missing pumping cup	
	Reversed pumping cup	
	Wrong pumping cup	
	Missing Center Comp Pin	
	Wrong Center Comp Pin	
	Missing Pressure Seal	
	Reversed Pressure Seal	
	Wrong Pressure Seal	
	Wrong piston	
	Wrong Main Spring	
	Missing Main Spring	
<b>Operation</b>	<b>Fault Condition</b>	
<b>Final Assembly</b>	Wrong Size Primary Comp Hole	
	Wrong Location Primary Comp Hole	
	Wrong Size Secondary Comp Hole	
	Wrong Location Secondary Comp Hole	
	Wrong Size Primary Replenish Hole	
	Wrong Location Primary Replenish Hole	
	Wrong Size Secondary Replenish Hole	
	Wrong Location Secondary Replenish Hole	
	Wrong Bore Depth	
	Scratches and voids in bore	
	Missing Reservoir Retention Holes	
	Missing Tube Seat Primary	
	Missing Tube Seat Secondary	
	Wrong/Missing Primary Outlet Port Thread	
	Wrong/Missing Secondary Outlet Port Thread	
	No outlet breakthrough hole to bore	
	Missing snap ring groove	
	Wrong Snap Ring	

	Two snap rings	
	Missing snap ring	
	Wrong Bleed Screw	
	Missing Bleed Screw	
	Incorrectly Tightened Bleed Screw	
	Wrong Proportioning Valve	
	Missing Proportioning Valve	
	Incorrectly Tightened Proportioning Valve	
	Wrong Stop Bolt	
	Missing Stop Bolt	
	Incorrectly Tightened Stop Bolt	
	Wrong Cruise Switch	
	Missing Cruise Switch	
	Incorrectly Tightened Cruise Switch	
	Wrong Reservoir	
	Reservoir not fully seated	
	Functionality of fluid level switch	
	Wrong or damaged barcode label	
	Missing Reservoir Pin/Pins	
	Missing reservoir cap	
	Missing shipping plugs	
	Missing grommet(s)	
	Pinched grommets	
	Twisted square cut seal	
	Missing square cut seal	
	Chips/damage to square cut seal	
	Chips/damage to square cut seal groove	
	Ball plug seal missing	
	Ball plug seal installed to deep	
	Ball plug seal installed to shallow	
	Not enough friction is ball plug seal	
	Too much friction in ball plug seal	