General Specifications
For Machinery and Equipment

Statement of Requirements
Introduction

The attached specifications are intended to be a guide for production equipment suppliers. Information contained within these specifications contains quoting, design, build and run off requirements for equipment to be purchased by Dakkota.

It is expected that all vendors will adhere to these specifications in their entirety.

All machinery, equipment supplied to Dakkota must comply with all current applicable regulations including the following industry standards:

Occupational Health and Safety Act/Michigan Occupational Health and Safety Act
- General operator and maintenance safety
- Operator ergonomics
- Noise control
- Electrical controls

American Nation Standard/National Fire Protection Association
- NFPA96, Electrical Standard for Industrial Machinery
Table of Contents

1.0 Design Specifications and Miscellaneous Requirements
2.0 Electrical Specifications
3.0 Hydraulic Specifications
4.0 Pneumatic Specifications
5.0 Lubrication Specifications
6.0 General Safety Requirements
7.0 Over Head Fixtures

SOR Acknowledgment Sheet

Revision Record

Attachment A  Component Standards
Attachment B  Lockout Placard
Attachment C  Physical Demands Analysis
Attachment D  Sound Level Data Certification
Attachment E  Operational Hazard Distance
**Section One**

**Table of Contents**

1.0  Design and Miscellaneous Requirements
1.2  Approval Drawings
1.3  Machine Drawing Specifications
1.4  Machine Manuals
1.5  Tooling / Fixture / Gage Identification
1.6  Ergonomics and Safety
1.0 Design and Miscellaneous Requirements

1.1 Documentation and Drawings: AutoCAD (release 2000) diskettes of the following items are required to be supplied on or before the runoff on Dakkota’s floor.

1.1.1 Machine layout: Showing size and general outline, location of motors, hydraulic units, fixtures, chip removal, panel access door swings, operator position, foundation requirements, pits, leveling screws, anchor bolts, and location of service connections. For automatic machines, part entry and exit points must be indicated; direction of part flow, and bottom of part elevation above floor must be shown.

In addition, for plant layout purposes, a plan view shall be prepared showing size and general outline of machine, relative location of electrical panels, hydraulic units, coolant tanks, etc. Indicate as much detail from the machine layouts as practical.

1.1.2 Tool and Fixture Layout: Shall show all cutting tools, slides, adjustments and replacement means: Feeds, speeds, cycle time and motion chart of slides and/ or head, if applicable. Fixture layout will show means of clamping, locating, and set-up for multiple part use, if applicable.

1.1.3 Perishable Tools: Drawings of all special perishable tools shall be furnished including tools altered from standard, a reproducible drawing listing all standard tools shall be furnished and listed either in parts column of tool layout or on a separate sheet. Also set-up dimensions must be included.

1.1.4 Control drawings such as: Electrical, Hydraulic, Pneumatic and Lube System: Drawings shall include but not be limited to:

- **Index** - Shall be first sheet.
- **System Interconnection Diagrams** - Drawing shall show relative location and identifies all E-Stops, Fence Switches, Perimeter Guard switches, electrical boxes, and the cable and conduit runs. All cable and conduit runs should be labeled. Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.
- **Tool & Fixture Wire & Piping Diagrams** - Drawing shall show in schematic/symbol format all the wiring, piping, and system settings for all E-Stops, Fence Switches, Perimeter Guard switches, valves, filters, regulators, flow switches, cylinders, proximity switches, limit switches, etc in relative position to the equipment. (Shows where the device is located on the machine. Matches electrical identification such as 503sp02 for Press Perimeter switch to a physical location on the machine.) Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.
- **Hydraulic Wire & Piping Diagrams** - Drawing shall show in schematic/symbol format all the wiring, piping, and system settings for the hydraulic system. Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.
- **Chemical Wire & Piping Diagrams** - Drawing shall show in schematic/symbol format all the wiring, piping, and systems settings for the chemical system. Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.
• **Conduit Schedules & Pin Charts** - Drawing shall show the conductor numbers or pin numbers for all cable and conduits runs. Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.

• **Communication Network Drawings** - Drawing shall show all remote I/O, Data Highway Plus (DH+), Data Highway 485, DeviceNet, etc. connections and terminations. Each connection shall show pin number, wire color code, terminator type and value. Diagram shall also include bill of materials, in table format located upper right hand corner of drawing, for all devices shown on the diagram.

• **Sequence of Operations** - The tool’s sequence of operation drawing shall be in chart format and include the following information. Sequence step number, description of sequence step, valve or device energized, valve or device energized address, switch made, switch made address, and cycle time of the step.

• **Magnetics** - Drawing shall show all 480 VAC, 120 VAC, 24 VDC magnetic circuits.

• **I/O Drawings** - Drawing shall show all inputs, outputs, dipswitch settings, settings definition, channel configuration, etc.

• **Interface Drawings** - Drawing shall show all hardware, dipswitch settings, setting definition, and memory maps for interface between system and robots, drives, Panel views, RSView, DeviceNet, etc.

• **Panel Layouts** - Drawing shall show, to scale, panel layouts and push button layouts.

1.1.5 **Software Documentation** - Documentation shall include three printed copies and a disk copy for each of:
- PLC/SLC program logic with cross reference in RSLogix format,
- Panel View application file in Panel Builder format,
- RSView application file,
- DeviceNet application file,
- Robot programs (disk copy only)
- Drives configuration file,
- Any programmable device

1.1.6 **Manuals** - Shall all be original publications, in English, for all purchased subsystems and components.

1.1.7 **Documentation Distribution:** Upon shipment of equipment one (1) set shall be supplied to the Engineering Department of the plant where the equipment will be located.

1.1.8 If required, foundation drawings must be forwarded to Dakkota, at least, six (6) weeks prior to shipment date.
1.2 Approval Drawings

1.2.1 Two sets of prints for approval drawings must be submitted for approval before construction is begun. Machine, tool and fixture layouts and control system drawings are required. Approval of drawings does not relieve the vendor of responsibility for satisfactory performance of the equipment. Drawing numbers will be assigned with approval of drawings.

1.2.2 Approval drawings must have final approval before equipment is built with all engineering changes completed.

1.3 Machine Drawing Specifications

1.3.1 Assembly drawings – “E” size (36”) x 48” to 72” LG.

1.3.1.1 0.00 starts at floor for elevation and 0.000-0.000-center line of piece part.

1.3.1.2 Minimum of two (2) views (front elevation and plan view preferred).

1.3.1.3 3/4” to 1” plan views of complete system. Show electrical enclosures and guarding.

1.3.1.4 Station layouts viewed from operator’s position.

1.3.1.5 Assembly drawings start with sheet #2.

1.3.2 Stock list on “D” sizes sheet, sheet #1.

1.3.2.1 Manufactured details on right side numbered from bottom to top, part name—not stock size.

1.3.2.2 Assembly drawings and stock list to be listed on stock list before manufactured details.

1.3.2.3 Purchased details to use $ sign, appear on right side of stock list and also numbered from bottom to top.

1.3.2.4 Altered details to be called out as manufactured detail.

1.3.3 Detail balloons

1.3.3.1 5/8” Diameter split with sheet number in lower half and detail number in upper half of balloon.

1.3.3.2 ½” Diameter balloon with detail number only on detail sheets.

1.3.3.3 Purchased details to have $ sign preceding number.

1.3.3.4 Manufactured details to start at detail number 1 and purchased detail to start at detail number $1.
1.3.4 Detail drawings

1.3.4.1 Standard English dimensions. (Request for metric or both English and metric print dimensioning will be specified in quote documentation if required.)

1.3.4.2 Datum line dimensioned.

1.3.4.3 Where possible put 0.00 on critical surfaces.

1.3.4.4 Details drawn on “D” size sheet, maximum of 4 details per sheet.

1.3.4.5 Large weldments or plates may be drawn on “E” size sheets, with no more than one detail per sheet.

1.3.4.6 Use decimals for hole diameter call out and dimensions.

1.3.4.7 Details to have detail number, part name, and quantity required, material, and hardness where applicable, and finish.

1.3.4.8 Weldments to have stock called out with letter, quantity received, stock size and material. Example: (a) 2 – REQ’D ½” x 6” x 3” 1020 HRS

1.3.5 Timing charts

1.3.5.1 All automatic and semi automatic stations to have timing chart.

1.3.5.2 Sequence, actuator and time for motion should appear on chart.

1.3.6 Tolerances

1.3.6.1 Dowels ± .0005.

1.3.6.2 Screws ± .005.

1.3.6.3 Drawings to have decal or stamp with tolerances as follows:

<table>
<thead>
<tr>
<th>Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 PLC. DIM. ± .0005</td>
</tr>
<tr>
<td>3 PLC. DIM. ± .005</td>
</tr>
<tr>
<td>2 PLC. DIM. ± .01</td>
</tr>
<tr>
<td>Angles ± 1/2°</td>
</tr>
<tr>
<td>Unless otherwise specified</td>
</tr>
</tbody>
</table>
1.3.7  Control Drawings

1.3.7.1  Size “A”, 8.5” x 11”

1.3.7.2  Utilizing Vendor’s Title Block with job number, address and phone number.

1.3.7.3  Drawing file name shall appear on all drawings in lower left hand corner going 90° up the side of the drawing outside of the title block.

1.3.7.4  All device names shall include I/O address.

1.3.7.5  Electrical drawings shall use ANSI standard AutoCAD symbols for electrical, pneumatic, and hydraulic devices. Each and every device (fuses, relays, relay contacts, switches, valves, etc) shall be annotated as follows:

<table>
<thead>
<tr>
<th>Default</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
<th>Example 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>System ID</td>
<td>Headliner Press</td>
<td>265 FIP</td>
<td>Metering Unit</td>
<td>Metering</td>
</tr>
<tr>
<td>Location on System</td>
<td>Loader</td>
<td>Carrier</td>
<td>Mix Head</td>
<td>Mix Head</td>
</tr>
<tr>
<td>Device Name</td>
<td>LH Front Clamp</td>
<td>Operator</td>
<td>Cleanout Piston</td>
<td>Retract</td>
</tr>
<tr>
<td>Function</td>
<td>Closed</td>
<td>E-Stop PB</td>
<td>Retracted</td>
<td>Clean Out Piston</td>
</tr>
<tr>
<td>Device ID - I/O Address</td>
<td>PX – I02/03</td>
<td>PB- I01/02</td>
<td>PX – I06/01</td>
<td>SV-005/02</td>
</tr>
</tbody>
</table>

Note: Device name and function switch position depending on type of device. See examples 3 & 4.

1.4  Machine Manuals

1.4.1  Three sets of machine manuals shall be furnished with each machine.

1.4.2  Manuals will be hard cover bound (loose-leaf type) with both cover and spine labels to identify machine number, machine description, and manufacturer.

1.4.3  Manuals will be delivered to the Engineering Department at the production facility where the equipment will be located. Manuals are expected to be delivered with the equipment.

1.4.4  Manuals will contain – but are not limited to – the following information:

- Operating instructions
- Set-up instructions
- Preventative maintenance procedures
- Equipment troubleshooting guidelines
- Recommended spare parts list with cost/availability
- Catalogs, user manuals on major machine components
• Electrical, pneumatic, hydraulic schematic diagrams (can be reduced size copies).
• PLC program logic and cross reference

1.5 Tooling / Fixture / Gage Identification

1.5.1 Machine Identification: Machines shall be identified with a permanently attached metal tag reflecting the machine number (M-XXXXX). Tag must be located in a prominent place, visible from the front of the machine.

1.5.2 GM Tooling must have the following:
   1.5.2.1 Must state Program Name / Number
   1.5.2.2 Must state “Property Of GM”
   1.5.2.3 Must have a VTAM number
      * Picture of tool and tag required

1.5.3 Ford Tooling must have the following:
   1.5.3.1 Must state Program Name / Number
   1.5.3.2 Must state “Property Of Ford”
   1.5.3.3 Tool Order Number
   1.5.3.4 Amendment Number
   1.5.3.5 Line Item Number
      * Combination of 1.5.3.3, 1.5.3.4, and 1.5.3.5 will make the Ford serial number.
      Line number is generated through the Ford WIPS system.
      * Picture of tool and tag required

1.5.4 DCX Tooling must have the following:
   1.5.4.1 Must state Program Name / Number
   1.5.4.2 Must have the STR number
   1.5.4.3 Must state “Property Of DCX”
      * Picture of tool and tag required

1.5.5 Fixture & Gage Identification: Fixtures and gages shall be identified with a permanently attached metal tag reflecting:
   1.5.5.1 Part name(s).
   1.5.5.2 Program Designation
   1.5.5.3 Less finish Part Number
   1.5.5.4 Part Math Data Level
   1.5.5.5 GD&T Drawing Level
   1.5.5.6 Final Certificate Date
   1.5.5.7 “Property of XXXXXXXX” (GM/FORD/DCX)

1.6 Quoting Requirements

1.6.1.1 To include delivery time and cancellation terms.

1.6.1.2 Tooling cost is to be separated from capital equipment cost. Tooling is to include part of work holding fixtures and any point of operation or perishable tooling that will come in contact with work piece.
1.6.1.3 Equipment Start-Up supervision and maintenance training shall be quoted as a separate item. Specify number of days required and cost.

1.6.1.4 Detail of equipment warranty must be included.

1.6.1.5 Equipment production capabilities must be estimated and outlined in quote. Cycle time to be defined.

1.6.1.6 All equipment shipped to Dakkota is to be FOB Dakkota dock.

1.6.1.7 Quote must include a statement of adherence to this specification and include an itemized list of any exceptions taken to this specification.

1.6.1.8 Runoff requirements for equipment approval.
   - 4 hr minimum dry cycle on vendor’s floor
   - 2 hr run at rate with parts on vendor’s floor
   - 8 hr run at rate with parts on Dakkota’s floor

1.6.2 Preferred vendors list – see attachment 1.

1.6.3 The vendor must provide any software or hardware, other than a standard PC, which is required to program, monitor or control the equipment. This may be waved if Dakkota has a current licensed copy.

1.7 **Ergonomics and Safety**

1.7.1 All machine-mounted devices shall be readily accessible per good ergonomic practices. Conduits, hydraulic piping or machine sections shall not limit the accessibility.

1.7.2 Machine is to be painted utilizing Sherwin – Williams, “White” SW4029 (B54W101), “Safety Yellow” B54Y37, “Safety Orange” B54E39
Section Two

Table of Contents

2.0 Electrical Specifications
2.1 Standards
2.2 Utilities and Power
2.3 Motors
2.4 Power Factor Correction
2.5 Control Enclosure
2.6 Control Panel and Devices
2.7 Serial Communication Standard
2.8 Machine Mounted Devices
2.9 Diagrams and Documentation
2.10 Combination Motor Starters
2.11 Disconnect Switches
2.12 E-Stop Circuits
2.0  **Electrical Specifications:**

2.1 Standards

2.1.1 Design and installation of electrical components shall conform to the latest NEC, MIOSHA and N.M.T.B.A. Standards.

2.1.2 All electronic equipment shall conform to the latest electronic standards for Industrial Equipment. The equipment is to be housed in NEMA 12 - or better—enclosures. Enclosures shall be sized to **NOT REQUIRE** cooling.

2.1.3 All wiring shall be machine tool grade, heat and oil resistant. The wire color shall be as follows: BLACK = 120 VAC, GREEN = Earth Ground, RED = 120 VAC, BLUE = DC & DC components, YELLOW = Remote Power, WHITE = 120 VAC common, WHITE / BLUE STRIPE = 24 VDC common.

2.1.4 Dakkota Engineering must approve any deviation from the Standard or the above Standards.

2.2 Utilities Power

2.2.1 Dakkota will supply 120volts, 240volts, or 480 volts three phase (Y) at the amperage specified for each piece of equipment. Dakkota has a three-conductor buss system, no neutral. Any deviation requires approval.

2.3 Motors

2.3.1 Motors are to meet NEC & UL or equivalent.

2.3.2 All motors are to be single shaft, foot mounted and totally enclosed; motors are to be fan cooled.

2.3.3 Flange mounted integral brakes, special shaft lengths or other special motors require approval.

2.3.4 Motors (½ HP and up) Motor Circuit

   2.3.1.1 Each motor will have its own motor starter, instantaneous time delay current protection and time delay overload protection.

   2.3.1.2 Motor starters shall be size 0 or greater.

   2.3.1.3 Shall operate on 480 VAC 3 phase 60 Hertz.

2.3.5 Motors shall be clearly set forth in the quotation with the rating in volts, amperes, HP, Frame, RPM, and compliance with Dakkota specifications.

2.3.6 Any motors other than 480 VAC 3ph 60cy or 120 VAC 1ph 60cy shall require approval.
2.4 **Power Factor Correction**

2.4.1 Power factor correction shall be included on all equipment rated 10 HP and above.

2.4.2 Size, make and rating to be stated in quotation if known.

2.4.3 Enclosure to be dust proof.

2.5 **Control Enclosure**

2.5.1 Disconnect switch shall be installed so that minimum bending radius for line leads brought in from side will comply with that shown in NEC table 373-6(a). Single or odd number of doors will require a flange mounted disconnect.

2.5.2 All I/O racks shall be clearly marked and wires labeled with corresponding PLC address. All discrete input and outputs shall be wired to a terminal strip.

2.6 **Control Panel and Devices**

2.6.1 The bottom of the lowest panel mounted control device shall not be less than 18” above the operating floor line or machine base plate.

2.6.2 All circuits and devices greater than 120 Volts shall be “Safe Touch”. Safe Touch is defined as the ability to work on or near device without being exposed to electrical hazard. Examples of Safe Touch: plastic covers with probe access over 480 fuses and distribution blocks, terminals with recessed contacts and screws, etc.

2.6.3 All fuses and circuit breakers shall be labeled and mounted on back plate where possible. Where not mounted on back plate, fuses must be guarded. Each fuse shall have its own discrete input to the PLC for diagnostic.

2.6.4 E-Stop buttons and all devices in the MCR circuit shall have their own input for diagnostic purposes.

2.6.5 Cable trays are to be the slotted type, with no covers longer than 36 inches.

2.6.6 All control circuits shall be 24 VDC unless otherwise approved.

2.6.7 All pilot and indicator lights shall be oil tight.

2.6.8 Push buttons and selector switches:

2.6.8.1 Shall be oil tight and arranged on operator panel in order (left to right) to follow the manual operating sequence.

2.6.8.2 There shall be a push button or a selector switch to control every machine function in both directions.

2.6.9 Ground detector pilot lights must be used on all machines having control transformers of 500 VA or larger.
2.6.10 All solenoids, devices and relays will have 24VDC coils with free wheeling diodes (rated at 600 volts or higher). Each device will be wired to it's own PLC output; solenoids shall be fused with individual indicating devices besides.

2.6.11 Motor starters shall have at least one N.O. interlock contact for use in the control circuit.

2.6.12 All relays and other devices in the control panel shall be arranged in consecutive numerical order. A permanent nameplate held by some mechanical means, adjacent to, but not on, the device shall identify each device. This nameplate shall be on the panel and visible when panel is completely wired.

2.6.13 Control panel shall have terminal blocks numbered in numerical order and containing test points for all machine mounted devices. Terminal block mounting channel shall have 1-1/2” metal spacers behind them for ease of wiring and sufficient space on both sides to permit easy installation and checking of wires.

2.6.14 All wires in the panel shall be numbered on both ends to conform to schematic diagram. 10% spare wires shall be provided. Wire numbers and letters shall be of 7/8” vinyl cloth labels or equivalent.

2.6.15 Panel shall include an external PLC programming connector and 115 VAC programming power duplex plugs for access without opening the cabinet. Location pre approved by Dakkota.

2.6.16 Solid State Devices and Programmable Controllers:

2.6.16.1 Programmable controllers and solid-state devices are to be used.

2.6.16.2 PLC's shall be Allen-Bradley SLC 5/05 or better (with Ethernet connection available).

2.6.16.3 PLC’s remain powered up with the loss of control power.

2.6.16.4 All screens shall be AB network compatible.

2.6.16.5 Programmable controllers shall have a minimum of 15% spare (unused) inputs, outputs and memory space.

2.6.16.6 A 115 VAC duplex receptacle shall be mounted and wired in control panel for use of programmable controller auxiliary equipment.

2.6.16.7 Programmable controller logic shall be supplied to Dakkota on diskette and a minimum of one printed copy in RSLogix500 for SLC.

2.6.16.8 All non-industrial electronic equipment to be powered on a separate Sola transformer. Not to exceed 80% loading.
2.6.17 Each PLC output card shall be separately fused on its power input.

2.6.18 Each PLC will have a modem for remote troubleshooting.

2.6.19 Reversing starters are to be electrically and mechanically interlocked and require approval.

2.6.20 All machine position indication devices will be solely wired to dedicated PLC inputs.

2.7 **Serial Communication Standard**

2.7.1 Communications will use AB RIO if possible. A map, to be included in the documentation, of the communication wiring will detail the location, address, baud rate and termination of all remote devices.

2.7.2 The RS-232 standard will be used for other miscellaneous serial communication if required.

2.8 **Machine Mounted Devices: (IF REQUIRED)**

2.8.1 The machine shall have an operator's diagnostic panel mounted where it is easily visible to the operator.

2.8.1.1 Panel lamps or display are to show activity of limit switches and machine function status.

2.8.1.2 Optional: Panel shall show a graphic picture layout of machine and physical approximation of location of limit switches.

2.8.1.3 All servo systems require approval.

2.8.1.4 Motion control, to achieve position, will use an encoder. Position will be displayed on the operator panel.

2.8.2 All machine-mounted devices shall be numbered to correspond to schematic diagram by means of a permanent engraved plate adjacent to, not on the device, and held by mechanical means. ADHESIVE TAGS ARE NOT ACCEPTABLE.

2.8.3 When possible, limit switches, proximity switches and other machine-mounted devices shall be a quick disconnect design, oil tight, and labeled by means of an engraved plate which is traceable to the appropriate wiring, diagram for title and I/O number.

2.8.3.1 Proximity switches are preferred. PX and limit switches shall have only one normally open contact. Other contact arrangements require approval.

2.8.3.1.1 A limit or proximity switch shall be used to indicate full travel at both ends on all mechanical functions. TIMERS OR CYLINDER PRESSURE SWITCHES ARE AN UNACCEPTABLE MEANS OF INDICATING OR ASSUMING FULL MOVEMENTS. Exception: a pressure switch can be used in addition to limit or proximity switches to indicate required force needed for a particular function.
2.8.4 Photoelectric devices shall include an indicator light to indicate correct alignment and actuation.

2.8.5 Proximity switches shall have a visible indicator on the prox or as part of the connector.

### 2.9 Diagrams and Documentation: (Also see Design Section)

2.9.1 A reproducible schematic diagram shall be supplied and be so drawn that:

2.9.1.1 Wire numbers are in numerical order or per PLC I/O numbers.

2.9.1.2 Relays are in numerical order (MS-1, CR-2, SR-1, etc.), and may not be numbered by any other code.

2.9.1.3 Proximity switches (PX-1, PX-2) and limit switches (LS-1, LS-2, etc.) are in numerical order with a chart showing contact locations, when operated, and by what means.

2.9.1.4 All relay contact usages are to be fully cross-referenced.

2.9.1.5 Title block shall identify machine by name and serial number, builder, and job number.

2.9.1.6 Views of the machine shall show by schematic symbol, the approximate location of limit switches, pressure switches, control panel, motors, etc.

2.9.1.7 A complete parts list is given showing quantity, manufacturer, and catalog number with schematic nameplate marking.

2.9.1.8 Motor shown on schematic shall show HP, Frame, RPM, volts and amps.

2.9.1.9 Any 'black box' shown on schematic shall show in the Material List, the manufacturer's number of the device along with its diagram and instruction book number.

2.9.1.10 Electrical, hydraulic, pneumatic and lubrication diagrams are cross-referenced on drawings.

2.9.1.11 All programmable controller print outs shall be labeled as to I/O numbers and functions. Included with the PLC program will be a file allocation and usage description. The cross reference shall include descriptions for all internal bits, integers, timers and counters.

2.9.1.12 Wiring diagrams will indicate the primary function of all devices in their respective circuits and include a systems communication map including data highway addresses and termination.
2.9.2 Maximum size of sheet shall be 24” x 36”, excluding machine layout.

2.9.2.1 All sheets shall be of the same uniform size.

2.10 **Combination Motor Starters:**

2.10.1 Combination starters shall be of the fusible type, minimum size 0 with three overload devices in a NEMA 12 enclosure.

2.10.2 No holes are to be cut in the top of starter enclosure.

2.11 **Disconnect Switches:**

2.11.1 Non-fusible disconnect switches shall be installed at all remote motor locations. Disconnects shall have a N.O. and N.C. interlock, the N.O. interlock shall make last and open first when the disconnect is operated and shall be wired into the motor starter control circuit.

2.12 **E-Stop Circuits:**

2.12.1 The E-stop circuit will be safety wired per OSHA and MIOSHA.

2.12.2 The E-stop circuit will have at least one reset push button to reset the circuit. Resetting individual E-stop PB’s shall not re-enable machine operation.

2.12.3 The robot controller shall be wired into the E-stop circuit. All robot motion must stop immediately.

2.12.4 The entire E-stop circuit must be hard wired with a safety relay or equivalent. A PLC shall not be used for the E-stop switches or the safety relay.
# Section Three

## Table of Contents

- 3.0 Hydraulic Specifications
- 3.1 Pressure and Pressure Controls
- 3.2 Pumps
- 3.3 Solenoids
- 3.4 Fluids
- 3.5 Reservoirs
- 3.6 Filters, Strainers, and Flow Meters
- 3.7 Marking of Devices
- 3.8 Hydraulic Piping and Tubing
- 3.9 Diagrams
- 3.10 Gages
3.0 Hydraulic Specifications

3.0 Pressure and Pressure Controls:

3.0.1 Hydraulic systems shall be designed to operate within a maximum pressure of 3,000 psi. (When applicable.)
3.0.2 Hydraulic equipment shall be designed to withstand the maximum pressure to which they may be subjected plus 50% over-rating.
3.0.3 All pressure controls shall be marked to indicate minimum and maximum pressures by means of stamped metal or engraved plastic plates held by mechanical means adjacent to the control. ADHESIVE TAGS ARE NOT ACCEPTABLE.

3.1 Pumps:

3.1.1 Pumps shall not be mounted inside the oil reservoir.
3.1.2 Flexible couplings shall be used between pump and motor.
3.1.3 Where pumps are operated in parallel, valves shall be installed to permit removal of one pump while other pumps remain in operation.
3.1.4 A detachable safety guard shall be fastened over the coupling and shafts.
3.1.5 Direction of rotation of each pump shall be clearly indicated on the pump by a metal identification plate. Printed or decal arrows are not acceptable.

3.2 Solenoids:

3.2.1 Quick Disconnect type with indicator lights.
3.2.2 Standard Wet Core.
3.2.3 All pilot and directional valves shall be spring center or spring return types. DETENT TYPE VALVES REQUIRE APPROVAL.

3.3 Fluids:

3.3.1 All fluids power components, seals, external paint, etc. shall be compatible with the fluid to be used.
3.3.2 Each hydraulic reservoir shall have metal tag affixed near reservoir fill spout to identify the appropriate hydraulic fluid.
3.3.3 List of inventoried hydraulic fluids.
3.4 Reservoirs:

3.4.1 Filler holes shall have a strainer for straining the fluid when filling.

3.4.2 Reservoir shall be provided with markings to continuously show high and low levels of fluids with the pump running and high level with the pump stopped.

3.4.3 Ample and readily accessible means shall be provided for cleaning the reservoir completely.

3.4.4 Temperature gauges required on all tanks.

3.5 Filters, Strainers, and Flow Meters:

3.5.1 Replaceable, cartridge type, non-absorptive, 30-micron absolute, full flow, by-pass when cartridge is plugged, filters shall be installed on the pressure side of the pump for all systems operating at 500 psig or less. Systems operating at pressures over 500 psig may incorporate the filter in the return line.

3.5.2 Hydraulic systems utilizing solenoid-actuated hydraulic valves shall incorporate an additional 10-micron minimum absolute telltale hydraulic filter to further protect the valves.

3.5.3 Filters shall have an external indicator to show degree of contamination. A simple gauge recording pressure drop across the filter is not acceptable.

3.5.4 Filters and strainers shall be so installed so that it will not be necessary to drain the reservoir or disturb the piping for servicing.

3.5.5 Filter identification tag shall include cartridge number.

3.5.6 Pump suction, risers shall include strainer of appropriate size, at least 74 micron strainer.

3.6 Marking of Devices:

3.6.1 All devices shall be identified by means of a stamped metal plate mounted adjacent to, but not on the device and held by some mechanical means. ADHESIVE TAGS ARE NOT ACCEPTABLE. Identification shall match component identification shown on hydraulic diagram.

3.7 Hydraulic Piping and Tubing:

3.7.1 Copper tubing shall not be used for conveying hydraulic fluids. Tubing shall conform to the following specifications:

3.7.1.1 Hydraulic piping and tubing shall not be bundled. It shall be laid in parallel runs and securely fastened to the machine.

3.7.1.2 Piping and tubing shall not be routed where it can serve as a step for personnel operating or repairing the machine. Cast iron clamps and one-hole pipe straps are not acceptable.
3.8.2 Heating and cooling water lines shall be copper, galvanized, PVC or stainless steel. Steel tubing or black pipe shall not be used.

3.8 Diagrams: (See Design Section)

3.8.1 Maximum size of sheet shall be 24” x 36”.

3.8.2 The hydraulic schematic diagram shall show relative location of limit switches, pressure switches, etc., coded to electrical schematic.

3.8.3 The hydraulic schematic diagram shall show complete hydraulic parts list giving quantity, model and manufacturer coded to the electrical schematic drawing.

3.8.4 Any standard component that has been modified in any way must be listed and the changes described.

3.9 Gages:

3.9.1 All pressure gages shall be liquid filled with isolators.
Section Four

Table of Contents

4.0 Pneumatic Specifications
4.1 Operating Pressures
4.2 Safety Shut-Off Values
4.3 Filters
4.4 Regulators
4.5 Lubricators
4.6 Directional Control Valves
4.7 Mufflers
4.8 Cylinders
4.9 Air Receivers
4.10 Marking of Components
4.0 Pneumatic Specifications:

4.1 Operating Pressures:

4.1.1 Pneumatic systems shall be designed to operate within a pressure range of 60 to 70 pounds per square inch gauge.

4.1.2 Pressure control required at each valve.

4.1.3 Pressure gauge required at each valve.

4.2 Safety Shut-Off Valves:

4.2.1 Only one source of air supply shall be used for each piece of equipment. All pneumatic supply lines shall contain a 3-way shut-off valve with provisions for locking it in the off position. This valve shall comply with OSHA standard 29 CFR 1910.147 for general safety. By pushing the handle inward you block in-line pressure and relieve down-line system pressure after “locking” with a padlock, which ensures safety by preventing accidental actuation of cylinders. All system piping shall be arranged to drain pressure from all prime movers when the main shut-off is in the closed or off position.

4.3 Filters:

4.3.1 Airline filters shall be with replaceable shatter-proof transparent bowl and automatic drain.

4.4 Regulators:

4.4.1 Airline regulators shall be relieving type with gauge. Use filter-regulator combination assembly where ever possible in order to reduce piping.

4.5 Lubricators:

4.5.1 Airline lubricators shall be with replaceable shatter-proof bowl.

4.6 Directional Control Valves:

4.6.1 Pneumatic direction control valves should be manifold or panel mounted where piping can be simplified.

4.6.2 All valves shall have indicator lights.

4.6.3 Plug in style mandatory.

4.6.4 Valves shall be spring center or spring return types. DETENT TYPE VALVE REQUIRES APPROVAL.

4.7 Mufflers:

4.7.1 All air exhausts shall be equipped with mufflers.
4.8 **Cylinders:**

4.8.1 Cylinders shall have interchangeable mounting dimensions and shall have adjustable cushions on both ends.

4.9 **Air Receivers:**

4.9.1 Air receivers shall be constructed per A.S.M.E. code. Vendor shall provide a copy of A.S.M.E. form “Manufacturers Data Report for Uniform Pressure Vessels”, complete and signed by licensed A.S.M.E. inspector.

4.10 **Marking of Components:**

4.10.1 All pneumatic components shall be labeled for identification by means of a stamped metal plate or engraved plastic tags mounted adjacent to, but not on the device and held by some mechanical means. ADHESIVE TAGS ARE NOT ACCEPTABLE. Identification shall match component identification shown on pneumatic diagram.
Section Five

Table of Contents

5.0 Lubrication Specifications
5.1 Lubrication Gages
5.2 Prevention of Over Lubrication
5.3 Automatic Lubrication Systems
5.4 Manual Lubrication Points
5.0 Lubrication Specifications:

5.1 Lubrication Gages:

5.1.1 Gages located four (4) feet or less from the floor level shall be flush mounted to or recessed within, reservoir walls.

5.2 Prevention of Over-Lubrication:

5.2.1 Positive means shall be used to prevent damage caused by over-lubrication.

5.3 Automatic Lubrication Systems:

5.3.1 Automatic lubrication systems shall be designed to operate only during the operation of the machine.

5.3.2 Automatic lubrication systems shall have a hi-low adjustable pressure switch to disable any further cycling of the machine, if a high or low condition occurs. Setting to be specified by means of a stamped metal plate adjacent to, not on device and held by mechanical means. ADHESIVE TAGS ARE NOT ACCEPTABLE.

5.3.3 Minor fault shutdown of machine if low level is achieved on lubricator reservoir.

5.4 Manual Lubrication Points:

5.4.1 Lines from overhead or inaccessible points will be run to ground level where they are accessible.
### Section Six

**Table of Contents**

6.0  **General Safety Requirements**
6.1  **Safety Representative Check**
6.2  **Machine Guarding**
6.3  **Machine Controls**
6.4  **Control of Hazardous Energy**
6.5  **Operator Ergonomics**
6.6  **Noise Levels**
6.7  **Ventilation**
6.0 General Safety Requirements of all Machines:

6.1 Safety Representative Check:
A Dakkota safety representative, prior to delivery, shall check machinery and equipment supplied to Dakkota. The equipment shall be operated with a full load of parts to check for regulatory acceptable:

6.1.1 Guarding
6.1.2 Controls
6.1.3 Control of Hazardous Energy
6.1.4 Operator Ergonomics
6.1.5 Noise Levels
6.1.6 Ventilation

6.2 Machine Guarding:
One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by pinch points, point of operation, rotating parts, and flying chips. All guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible, or if the guarding is an access point to the machine. The guard shall be electrically interlocked to disrupt all machine functions if it is not in place. The guard shall be such that it does not offer an accident hazard itself.

6.2.1 Point of operation guards shall prevent entry of hands or any other body parts into the point of operation by reaching through, over, under, or around the guard.

6.2.2 The guard shall conform to the maximum permissible opening requirements set forth by 29 CFR 1910.217 subpart O, table 10. (See attachment E)

6.2.3 It shall, in itself, create no pinch point or sheer point between the guard and moving machine parts.

6.2.4 It shall utilize fasteners requiring tools to remove, so as to minimize the possibility of misuse or removal.

6.2.5 Point of operation devices includes gates and presence sensing device. Dakkota preference for point of operation devices are presence-sensing devices, (i.e. light curtains or mats), any deviation in design must be approved by the Dakkota Safety Department.

6.2.6 A presence-sensing device (PSD) shall protect the operator by preventing or stopping the normal operations of the machine if any body part is placed into the point of operation. The supplier will provide the formula and calculations used to size and place the PSD.

6.2.7 A PSD shall not be used as a tripping means to initiate machine motion.

6.2.8 A PSD shall be constructed so that failure within the PSD system does not prevent the normal stopping action from being applied to the machine, but does prevent the initiation of a successive motion until the failure is corrected. The PSD or machine shall indicate the failure.
6.3 Machine Controls:

A mechanical or electrical power control shall be provided on each machine to make it possible for the operator to cut off the power from each machine without leaving his/her position at the point of operation.

6.3.1 All emergency stop buttons shall be maintained push/pull type, red in color and all remotely located operator stations shall be equipped with their own device.

6.3.2 After power failures, provisions shall be made to prevent machines from automatically restarting upon restoration of power.

6.3.3 In the event that a guard, gate or PSD cannot protect a point of operation, two-hand controls must be used for each operator.

6.3.4 The two-hand controls shall be the anti-tie down type and located in a manner to prevent bridging between the two controls.

6.3.5 Operation shall require manual activation of both controls until a point is reached in the cycle where the operator cannot remove his/her hands and place them within the point of operation.

6.3.6 If machine cycle repeating would cause an injury, an anti-repeat device shall be incorporated into the control system.

6.4 Control of Hazardous Energy:

The supplier shall supply Dakkota with information on all calculations used for sizing and placement of the PSD. As well as all safety precautions that should be taken for the safe operation of the equipment, including zero state, during maintenance and service of the equipment. Energy sources that must be considered are:

6.4.1 Electrical

6.4.2 Pneumatic

6.4.3 Hydraulic

6.4.4 Gravity momentum and stored mechanical energy

6.4.5 Special energy such as steam, water, chemical and thermal

6.4.6 All energy sources shall be equipped with a lockable energy-isolating device.

6.4.7 Energy isolating devices shall be designed to accept a lockout in accordance with Occupational Health and Safety Act and the Michigan Occupational Health and Safety Act.
6.4.8 The supplier shall submit a Dakkota Lockout Placard (see attachment B) detailing each energy source, energy isolating devices, method of disconnect, release of stored energy, and lockout verification.

6.4.9 The placard shall be located on the main electrical panel or the main energy source.

6.4.10 Each energy-isolating device shall be clearly labeled to match placard.

6.4.11 On vertical or inclined slides or rams, means shall be provided to prevent any drop when hydraulic or pneumatic power is shut off.

6.5 **Operator Ergonomics:**

The goal of Dakkota’s workstation design is to promote ease and efficiency for the person working. Productivity relative to both quality and quantity will be enhanced if the operator is comfortable, and if the layout of the workstation is conductive to performing the task well. Keeping this in mind, Dakkota advises to establish an ideal workstation and work environment first and to make concessions to practical limitations only if absolutely necessary.

6.5.1 Plan the ideal, then the practical.

6.5.2 Plan the whole, then the detail.

6.5.3 Plan the work process and equipment around the system requirements.

6.5.4 Plan the workstation layout around the process and equipment.

6.5.5 Plan the final enclosure around the workplace layout.

6.5.6 Use mockups to evaluate alternative solutions and to check final design.

6.5.7 Dakkota’s design considerations are primarily, but not limited to the following:

6.5.7.1 Clearance for the operator's body for entrance and egress. (Including emergency exit)

6.5.7.2 Suitable body posture at work. (Including space for changing positions)

6.5.7.2.1 Standard working table / product height while standing 32”

6.5.7.2.2 Standard reach while standing for operator XXXX

6.5.7.2.3 Standard visual for eye contact while standing XXXX

6.5.7.3 Operation of controls and equipment without bumping elbows, knees, head, etc.

6.5.7.4 The avoidance of excessive forces.
6.5.8 A Physical Demands Analysis shall be performed on all equipment prior to Dakkota acceptance. (Attachment C)

6.6 Noise Levels:

The goal of this specification is the purchase of equipment by Dakkota, which incorporates feasible sound level controls. Equipment operating in normal automatic mode with parts shall not exceed 80 dBA.

6.6.1 A sound level meter or dosimeter conforming, as a minimum, to the requirements of the American National Standards Institute (ANSI) Specification for Sound Level Meters, S1.4-1983, Type S2A of ANSI S1.25-1991 Specification for Personal Noise Dosimeters, should determine the sound pressure level.

6.6.2 The measurement device should be set to use a scale with a slow response.

6.6.3 A measurement must be taken at operator’s hearing zone also at the highest sound-producing device if above the acceptance level.

6.6.4 Measurements must be taken with equipment under no load and under full load production operating conditions.

6.6.5 Examples of sound generating equipment:
- Pneumatic Tools
- Electric Motors
- Transformers
- Air Moving Devices
- Pressure Filling Devices
- Metal Shearing
- Hydraulic Pump Whine
- Robotic Water Jet Cutting

6.6.6 Sound leveling methods such as baffling, insulation, deadening, etc. must be built into the machine design rather than “retro-fitted” after building.

6.6.7 Certification Form see attachment D.

Note: Waiver Conditions - If equipment exceeds the applicable sound limit or the “best achievable” sound limit quoted and acceptable by Dakkota, the supplier shall request written permission to ship the equipment. The supplier must submit in writing, upon request to ship, detailing of the feasible engineering controls currently designed into and/or installed on the equipment. Shipping the equipment does not release the supplier from the responsibility to meet the specified sound limitations.
6.7 Ventilation:

Dakkota is dedicated to maintaining a clean, uncontaminated atmospheric industrial work environment. However the use of hazardous and non-hazardous materials that result in the creation of particulate, gases, vapors and/or mists are common in the modern work place. The use of a correctly designed Local Exhaust system greatly reduces the amount of the for mentioned atmospheric contaminants.

6.7.1 All ventilation systems must be designed using an approved American Conference of Governmental Industrial Hygienist method.
Section Seven

OHS Assembly Fixture Specifics

Table of Contents

7.0 Frame Construction
7.1 Swing Arms
7.2 Monitors
7.3 Controls
7.4 Air values / controls
7.5 Torque control guns
7.6 E-Stop and E-stop locations
7.7 Glue Equipment
7.8 Laser lights
7.9 Chicago specifications
7.0 Frame Construction

7.01 The preferred frame construction is 802 extruded aluminum
7.02 The substrate supports shall be full contact where necessary for
countermeasures backup, air bag label back up, front console and dome lamps.
7.03 Contoured supports shall be used for positioning the substrate on the
assembly fixture
7.04 The assembly fixture shall use 4 way - 2 way locators for the substrate
positioning
7.05 Center supports shall be minimal
7.06 The base frame shall have minimum of four tooling balls. 1 on each side, 1
front 1, rear
7.07 The working height shall be within ergonomic standards
7.08 The assembly fixtures shall be manually adjustable +/- 6” from nominal
height. The adjustments will be in 1” increments
7.09 The assembly fixture shall have removable 6” casters (swivel)
7.10 The assembly fixture shall have (4) duplex 110vac, 15 amps outlets. The
outlets shall be independent of the control panel. One outlet shall be positioned on
each side of the fixture.

7.1 Swing Arms

7.1.1 All swing arms for component placements shall have a minimum of 2 tooling
balls on each arm.
7.1.2 All swing arms that exceed 5 pounds shall have a counter balance (air
cylinders with flow controls)
7.1.3 The component best will be full contour
7.1.4 The swing arms shall hold the components with vacuum
7.1.5 The swing arms shall have part presence sensors for the component
7.1.6 The swing arms shall be sensed in the open and closed position
7.1.7 The swing arm shall be adjustable to locate the component directly to the
substrate.
7.1.8 The swing arms shall lock in place with an adjustable timer.
7.1.9 The swing arms will have AB style lighting to communicate to the operator
swing arm cycle.
7.1.10 The swing arm shall open to a near horizontal position for hot melt glue
application
7.1.11 The swing arm shall be adjustable for component placement and lock down
7.1.12 The swing arm shall have cushion stops in the open position.
7.1.13 The swing arm shall be guarded for pinch points approved by Dakkota
7.2 **Monitors**

7.2.1 Each fixture shall have AB panel view 1000 monitor

7.2.2 The monitor shall have multiple screens for:

7.2.2.1 Setup
7.2.2.2 Maintenance
7.2.2.3 Manual run mode
7.2.2.4 Production
7.2.2.5 Error reporting

7.2.3 The Font size shall be readable from 8 to 10 feet away

7.2.4 Typical items displayed are:

7.2.4.1 CMI numbers
7.2.4.2 Serial numbers
7.2.4.3 Part numbers

7.2.5 The details of the displays will be finalized at the design reviews

7.2.6 The monitors are to be mounted (fixed pedestal) on a flex cable that is 10’ ft long and will be finalized at the design reviews.

7.3 **Controls**

7.3.1 The PLC controller shall be Allen Bradley 505

7.3.2 The control system shall have a 50% spare I/O

7.3.3 The control cabinet shall be sized for 25% increase of I/O above the spare I/O

7.3.4 All connections to and from control cabinet shall be twist lock bulk head connectors

7.3.5 All communications cabling and voltage wiring shall be in separate cable trays

7.3.6 The fixture control shall be mounted on the side of the fixtures. Controls to be broken into 2 cabinets left / right and the devices will be broken out to left / right side as well.

7.4 **Air Valves and Controls**

7.4.1 All air valves, air lines and controls shall be sized for 100% over capacity

7.4.2 All air valves and manifolds shall be located on the side of the fixtures for unobstructed access. The valve packs need to have a Plexiglas cover to keep the operators from bumping or hitting the valves.

7.4.3 Labeling of the air valves and manifolds shall be of a size that is readable from 36 inches away
7.5 **Torque guns and controllers**

7.5.1 The torques guns and controllers will be supplied by Dakkota Integrated Systems

7.5.2 Dakkota shall be responsible for the torque gun programming and parameters setup.

7.5.3 The supplier of the assembly fixtures shall provide

7.5.3.1 Controller mounting on the assembly fixture

7.5.3.2 Holster for torque gun

7.5.3.3 PLC error proofing programming for established parameters

7.5.3.4 PLC programming subtract “one” from the batch count when gun is put in reverse

7.6 **E-Stops and Locations**

7.6.1 Each assembly fixture shall have two e-stops

7.6.1.1 1 on control panel

7.6.1.2 1 on each fixture on the underside of the plate or in an area where it can not be hit by mistake.

7.7 **Hot Melt Glue Equipment**

7.7.1 The hot melt glue equipment and hot melt glue shall be supplied by Dakkota Integrated Systems

7.7.2 The fixture programming must include part presence to enable pump to turn on.

7.7.3 The fixture programming must include a timer to shut off pump at “X” amount of time that will be decided by Dakkota engineering.

7.7.4 Fixtures need to have holsters for the glue guns. Dakkota engineering will determine the location of the holsters during the design reviews.

7.8 **Laser Lights**

7.8.1 Should visual aid be required for components locations or routing be required for components such as: stuffers, NVH Pads, Washer hose, Wire harnesses and or brackets we will use laser lights.

7.8.2 Laser lights shall be placed under the substrate assuming that the beam will shine through the material.

7.8.3 If substrate material does not allow the laser beam light to show through then laser will have to be mounted over head.
7.9 **Ergonomics, guarding, and safety features**

7.9.1 All ergonomic, guarding, and safety features must meet OSHA standards and requirements.

7.9.2 The fixture base plate needs to allow the operators to get as close as possible to the edge of the part.

7.9.3 Swing arms needs be small as possible as well as low profile to allow the operator to get a close to the part as possible.

7.10 **Chicago bound fixtures**

7.10.1 Fixtures going to Chicago must have UL approved components.

7.10.2 A Chicago code inspection and certification is required.

7.10.3 It is the responsibility of the fixture builder to meet codes and get certifications prior to shipping.
SOR ACKNOWLEDGMENT SHEET

Please retain a copy of this sheet in your Statement of Requirement (SOR) and return an original signed copy, indicating that you have received, reviewed and accepted in principle the contents of this SOR. All communications with respect to the contents of this SOR are to be addressed initially to Advanced Purchasing & Supplier Development at Dakkota Automotive - Interiors. This is a controlled document and revisions will be sent to the name indicated.

Supplier Contact Information:

Supplier Name

Address

City State Zip Code

Telephone        Fax        E-mail

Supplier:

Authorized Signature:

Name and Title:

Date Signed:

Dakkota:

Authorized Signature:

Name and Title:

Date Signed:
# Revision History

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<td>Sept 7, 2004</td>
<td>Initial Release</td>
<td>Rick Wells</td>
</tr>
<tr>
<td>B</td>
<td>12/22/8</td>
<td>Updated tooling ID for Ford, GM and DCX</td>
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General Specifications for Machinery and Equipment
Statement of Requirements Rev A

Page 40 of 48
## ATTACHMENT A - COMPONENT STANDARDS

### ELECTRICAL

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<td></td>
<td>I/R</td>
</tr>
</tbody>
</table>

### PNEUMATIC

<table>
<thead>
<tr>
<th>Category</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinders</td>
<td>PARKER</td>
</tr>
<tr>
<td></td>
<td>FESTO</td>
</tr>
<tr>
<td>Valves</td>
<td>PARKER</td>
</tr>
<tr>
<td></td>
<td>NUMATIC</td>
</tr>
<tr>
<td></td>
<td>MAC</td>
</tr>
<tr>
<td>Filter / Regulators</td>
<td>WATTS</td>
</tr>
<tr>
<td></td>
<td>NUMATIC</td>
</tr>
<tr>
<td></td>
<td>WILKERSON</td>
</tr>
<tr>
<td></td>
<td>NEUMATICS</td>
</tr>
</tbody>
</table>

### CHEMICAL

<table>
<thead>
<tr>
<th>Category</th>
<th>Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters</td>
<td>NORMAN</td>
</tr>
<tr>
<td>Mixheads</td>
<td>KRAUSS MAFFIE (L-STYLE 8/12)</td>
</tr>
<tr>
<td></td>
<td>ADVANCED CONTROLS &amp; ENGINEERING</td>
</tr>
<tr>
<td></td>
<td>KONAL</td>
</tr>
<tr>
<td>Spray Guns</td>
<td>DEVILBISS</td>
</tr>
<tr>
<td>Pumps</td>
<td>GRACO</td>
</tr>
<tr>
<td></td>
<td>ARO</td>
</tr>
</tbody>
</table>
**MECHANICAL**

<table>
<thead>
<tr>
<th>Category</th>
<th>Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEARINGS</td>
<td>TIMKEN, THOMPSON, RHP, SKF, NTK, BROWNING</td>
</tr>
<tr>
<td>GEARS / SPROCKETS</td>
<td>MARTIN</td>
</tr>
<tr>
<td>CHAINS</td>
<td>MARTIN</td>
</tr>
<tr>
<td>EURODRIVE (MOTORS &amp; GEARS)</td>
<td>SEW EURODRIVE</td>
</tr>
<tr>
<td>COUPLINGS</td>
<td>DAKKOTALOY, LOVEJOY</td>
</tr>
</tbody>
</table>
ATTACHMENT B - LOCKOUT PLACARD

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>LOCATION</th>
<th>PROCEDURE</th>
<th>VERIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical-</td>
<td>Pull Down Disconnect, Attach The Lockout Device, Hasp, Lock, And Photo I.D. Tag</td>
<td>Press Master Start Button; Machine Should Remain Off</td>
<td></td>
</tr>
<tr>
<td>Pneumatic-</td>
<td>Turn Ball Valve To Off Position; Attach The Lockout Device, Hasp, Lock, And Photo I.D. Tag</td>
<td>Check Gages &amp; Manual Override For No Residual Pressure</td>
<td></td>
</tr>
</tbody>
</table>
## ATTACHMENT C - PHYSICAL DEMANDS ANALYSIS

<table>
<thead>
<tr>
<th>PHYSICAL DEMANDS</th>
<th>MAX WT. LBS/KG</th>
<th>CHECK IF REQ.</th>
<th>FREQUENCY *</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S T Lifting</td>
<td>1-5 lbs</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>R R Carrying</td>
<td>6 lbs</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>N N Pushing</td>
<td>1-5 lbs</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>T T Pulling</td>
<td>30 lbs</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>H H Fine Finger Movements e.g. Keying</td>
<td>1-5 lbs</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>M M Handling Materials Specify</td>
<td>Both Hands, One Hand</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>E E Gripping</td>
<td>Both Hands, One Hand</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>C C Reaching</td>
<td>Above Shoulder</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>B B Sitting</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>O O Standing</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>S S Walking</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>I I Climbing stairs, step ladder</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>L L Bending / Stooping</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>C C Crouching</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>K K Crawling / Kneeling</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>Y Y Twisting</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>T T Balancing</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>S S Hearing (Conversation/Other Sounds)</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>E E E Vision (Far/Near/Colour/Depth)</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>N N N Feeling</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>S S S Reading</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>O O O Writing</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>Y Y Y Speech</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>W W Inside Work</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>O O Outside Work</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>R R Hot/Cold</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>K K Humid/Dry</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>E E Dust/Vapor Fumes</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>N N Noise</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>V V Moving Objects</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>I I Hazardous Machines</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>R R Electrical</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>O O Sharp Tools</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>N N Slippery</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>M M Congested Worksite</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>E E Work Alone</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>N N Work Independent But In Group</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>T T Deadline Pressures</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>I I Interact With Public</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>O O Operate Equipment/Machinery</td>
<td>x</td>
<td>x</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
</tbody>
</table>

*FREQUENCY: 0 = Not Required
1= Seldom Required: Not Daily
2= Minor Daily Activity: Less Than 1 Hour
3= Required Job Demand: Frequent Repetition For 1-3 Hours Daily
4= Major Job Demand: Maximum Ability Required: Frequent Repetition For More Than 3 Hours Daily
ATTACHMENT D - VENDORS SOUND LEVEL DATA AND CERTIFICATION FORM

VENDOR MUST COMPLETE AND SUBMIT TO THE ENGINEER WHO IS RESPONSIBLE FOR EQUIPMENT ACCEPTANCE, THE INFORMATION AND DATA REQUIREMENTS STATED IN SECTIONS A, B AND C OF THIS FORM, PRIOR TO MACHINE/EQUIPMENT SHIPMENT AND/OR ACCEPTANCE.

A. MACHINE SPECIFICATIONS

BUILDER: ________________________________________________________________

MACHINE/EQUIPMENT IDENTIFICATION NAME: ________________________________

DAKKOTA PURCHASE ORDER NUMBER: ________________________________

TYPE: ______________________ MODEL: ________________________________

SERIAL NO: ______________________ SIZE: ________________________________

CAPACITY: ______________________ SPEED: ________________________________

HORSEPOWER: ______________________ AUXILIARIES: ______________________

B. INSTRUMENTATION USED FOR CERTIFICATION

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>MODEL</th>
<th>SERIAL NO.</th>
<th>CALIB. DATE</th>
</tr>
</thead>
</table>

C. CERTIFICATION

THE UNDERSIGNED CERTIFIES THAT THE ABOVE EQUIPMENT WAS TESTED IN ACCORDANCE WITH THE SOUND LEVEL SPECIFICATION FOR THE PURCHASE OF MACHINERY AND EQUIPMENT.

SOUND LEVEL/SOUND POWER LEVEL QUOTED/ACCEPTED = ______ dBA (TWA)

MEASURED MACHINE SOUND LEVEL/POWER LEVEL = ______ dBA (TWA)

DATE ______________________ SIGNED ________________________________

TITLE ______________________ COMPANY ________________________________

NOTE:
Written authorization to ship machines/equipment exceeding the Dakkota Sound Level Specification limit must be obtained from the authorized plant representative, prior to shipment.
ATTACHMENT E - OPERATIONAL HAZARD DISTANCE

GUARDING
MACHINE CLEARANCE vs. OPENING SIZE

DISTANCE OF OPENING FROM POINT
OF OPERATION HAZARD.

<table>
<thead>
<tr>
<th>DISTANCE OF OPENING FROM POINT</th>
<th>MAXIMUM WIDTH OF OPENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>½” TO 1 ½”</td>
<td>¼”</td>
</tr>
<tr>
<td>1 ½” TO 2 ½”</td>
<td>3/8”</td>
</tr>
<tr>
<td>2 ½” TO 3 ½”</td>
<td>½”</td>
</tr>
<tr>
<td>3 ½” TO 5 ½”</td>
<td>5/8”</td>
</tr>
<tr>
<td>5 ½” TO 6 ½”</td>
<td>¾”</td>
</tr>
<tr>
<td>6 ½” TO 7 ½”</td>
<td>7/8”</td>
</tr>
<tr>
<td>7 ½” TO 12 ½”</td>
<td>1 ¼”</td>
</tr>
<tr>
<td>12 ½” TO 15 ½”</td>
<td>1 ½”</td>
</tr>
<tr>
<td>15 ½” TO 17 ½”</td>
<td>1 7/8”</td>
</tr>
<tr>
<td>17 ½” TO 31 ½”</td>
<td>2 1/8”</td>
</tr>
</tbody>
</table>

OSHA PENETRATION DEPTH & DIAMETER GAGE