Standard Equipment Specification

Global Common

SD-010

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1. Scope

The following specification defines Nexteer Automotive's requirements for the quotation and purchase of Supplier standard pieces of equipment. Nexteer Automotive specifications have been developed without patent considerations. The Supplier assumes all patent liabilities.

Note: Changes since the last revision are highlighted.

Equipment encompassed by this specification include the following:

- Lathes
- Machining Centers
- Hob and Skive Machines
- Grinders (including ID, OD, Centerless, Disk, Centerless, and Thread Grinders)
- Other pieces of equipment that are manufactured as standard catalog items by the machine Supplier.

2. References

The following specifications shall apply to the equipment purchased through SD-010, unless otherwise amended via the equipment's Technical Specification (T-Spec):

Nexteer Automotive Specifications

SD-002	Manufacturing Equipment Statistical Qualifications Requirements
SD-003	General Drawing and Manual Specification
SD-011	Specification for Safety Circuits
SD-012	Design-In Health and Safety Specification
SD-017	Design-In Ergonomics Guideline
SD-1038	Specification for the Application of Automatic Operator-Interface Safety Doors
SD-1041	CNC Lathe Program Structure Specification
SD-1042	CNC Mill Program Structure Specification
SL 1.0	Nexteer Automotive Sound Level Specification

Industry Standards

IEC 60204-1	Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements Sixth Edition 2016
ISO 4413	Hydraulic fluid power – General rules relating to systems, 2010 Edition
ISO 4414	Pneumatic fluid power – General rules relating to systems, 2010 Edition
GM-1721	GM Maintenance Standard LS2 for Industrial Equipment and Machine Tools. This specification covers approved Nexteer machine lubricants.

NOTE: The latest revision of Nexteer Specifications can be found at www.nexteerdataexchange.com under Vendor Documents.

3. Specification Hierarchy

3.1 There are three (3) levels of specifications in the Nexteer Automotive hierarchy of Manufacturing Equipment Purchase Specifications in the following order of precedence.

3.1.1 The Technical Purchasing Specification (T-Spec) provides information specific to the equipment and process being purchased. Additionally, the T-Spec may also be used to clarify or provide guidance for deviations from individual Nexteer Automotive "SD" Specifications.

3.1.2 The SD-1000 Series of Specifications cover the basic requirements for a specific type of equipment where applicable (e.g. Draw Furnace). The SD-1000 Series specifications take precedence over SD-010 in the event of a conflict between the two.

3.1.3 The SD-010 Specification covers the basic requirements for Supplier standard equipment.

3.2 Definitions of Terms used in all Nexteer Automotive Specifications:

- Shall – indicates requirement.
- Should – indicates recommendation.
- May – indicates permission or allowance.

4. General Project Requirements

4.1 All approvals and project direction shall be communicated directly through the Manufacturing Engineer identified in the Nexteer Automotive T-Spec. The Nexteer Manufacturing Engineer is referred to as the ME through the remainder of this document.

4.2 In the event the machine Supplier does not understand or has conflicts with any of the Nexteer Specifications, it is their responsibility to contact the ME for clarification.

4.3 Project Requirements and Schedule of Events

Listed below are the typical steps associated for the purchase of a new piece of standard equipment.

4.3.1 Specification.

4.3.2 Submission of quote.

4.3.3 Analysis of the quotation by Nexteer Automotive.

4.3.4 Pre-award meeting (when applicable).

1. The Pre-Award meeting shall confirm all the requirements and terms of the quotation before a purchase order is issued.
2. The supplier shall specify, at the Pre-Award meeting, the individual in their organization who is the equipment's Project Coordinator.

4.3.5 Issuance of the purchase order.

4.3.6 Supplier project scheduling.

1. The Supplier should submit, within (2) weeks, after the receipt of the purchase order, a project schedule.
2. The project schedule should be updated monthly thereafter.
3. The project schedule should include the following items:
   - Initial design review.
   - Start date for engineering.
   - Submittal dates for mechanical, equipment layout, electrical, and fluid power approvals.
   - Expected design approval timetable.
   - Equipment build start date.
   - Equipment debug start date.
   - The date(s) required for the components and gages.
   - Equipment MQ1 qualification date.
   - Anticipated date the equipment shall be prepared for shipment.

4.3.7 Design reviews as required: including the equipment, as tooled, Machine Risk Assessment.

4.3.8 Engineering Approvals:

1. Design Approval – The supplier shall receive written approval for all equipment, fixturing, or tooling designs before ordering components, material, or tooling.
2. Controls Approval – Approval of all electrical and fluid power documentation shall be completed before the formal MQ1 run is initiated.
3. 3D Equipment models shall be supplied at the time of the initial tooling or fixture design submittals (Design Review).

4.3.9 Verification of the equipment's cycle and pre-qualification requirements should be completed before the MQ1 equipment qualification is initiated (Ref. SD-002).

4.3.10 MQ1 qualification (Ref. SD-002 and the equipment Safety Checklist, X3260)

1. After a review of the MQ1 data, and action item summaries, the supplier shall provide a schedule for correction actions.
2. Shipping approval, for all equipment, shall only be given after a successful MQ1 run and approval from the Nexteer Automotive Manufacturing Engineering Manager.
3. Submittal of invoice.

4.3.11 Shipping of equipment and approved drawings and manuals.

4.3.12 Equipment Installation.

4.3.13 MQ2, Qualification for equipment acceptance (Ref. SD-002).

4.3.14 Training in Nexteer Automotive's facility

4.3.15 Equipment drawings shall be submitted to Nexteer Automotive's Data Exchange (Ref. SD-003).

4.3.16 Final equipment acceptance – final payment.

1. After a review of the MQ2 data, and the completion of all open action item summaries.
2. Final payment approval, for all equipment, shall only be given after a successful MQ2 run and after the ME receives approval from the appropriate Nexteer Automotive Manufacturing Engineering Manager.

NOTE: The Nexteer Automotive MQ2 approval process may take several weeks to complete.

4.4 Warranty

4.4.1 The Supplier's warranty on the equipment shall include a minimum of the following:

1. Purchased parts: Manufacturer's warranty.
2. Workmanship and material: Minimum one year after the start of production on the machine.
3. The Supplier shall check with Nexteer Automotive's Purchasing Department for Nexteer Automotive's standard terms and conditions.

4.5 Quotation

4.5.1 The quotation shall contain the statement, "We agree to conform to Nexteer Automotive Specifications outlined in the Manufacturing Engineering Equipment Specifications (i.e. T-Spec)." Where the Supplier cannot conform to the T-Spec, an itemized list of deviations and costs to comply shall be included with the quotation.

4.5.2 The Supplier shall discuss these requirements with the Nexteer Automotive ME before the proposal is submitted. If the quotation is not reviewed with the ME prior to submittal, it may be removed from further consideration.

4.5.3 The quotation shall be written in the English language. The Supplier should quote the equipment in US dollars ($) and in the currency of the country of the equipment's ultimate destination.

4.5.4 Sketches or drawings illustrating fixturing concepts, chucking, tools, material handling, and equipment layouts should accompany the quotation.

4.6 Commercial Issues

4.6.1 Payment and shipping terms as specified by Nexteer Automotive's Purchasing Department.

1. It is the Supplier's responsibility to check with Nexteer Automotive's Purchasing group for exceptions to the standard purchasing terms and conditions / requirements.

4.6.2 Any alterations, modifications, or additions to the equipment that have an impact on the equipment delivery or cost shall not be started until the Supplier receives an official PO or confirmation from Nexteer Automotive's Purchasing Department.

5. General Equipment Requirements

5.1 All equipment shall be designed and manufactured with considerations relating to the ease of machine service, changeover, and maintainability.

5.2 All equipment shall be self-contained and provide single point utility connections. The Supplier shall reference SD-001's section on "Utilities and Facilities" for the utility requirements at the destination facility.

5.3 All machines shall include leveling pads. When required by the application, vibration isolation pads shall be included in the base price of the equipment.

5.4 The machine is to be floor mounted.

5.4.1 Where pit mounting is required (for the application), all controls items shall be floor level mounted.

5.4.2 In the cases where pit mounting of the equipment is required, the Supplier should supply their recommended foundation layout requirements.

5.5 Equipment Error Proofing Requirements

All equipment should be error-proofed to prevent the following conditions:

5.5.1 Part oriented incorrectly before machine cycle.

5.5.2 Part being processed twice.

5.5.3 Processing of the incorrect part model.

5.5.4 Processing of a part missing the previous operation.

5.6 Paint Requirements

5.6.1 A rust preventative coating shall be provided on all equipment, fixtures, and tooling where rust may cause alignment, set-up or location problems. Paint shall not be allowed on locating or mounting surfaces.

5.6.2 Epoxy based, or equivalent performance paints, should be used on all equipment. Paint shall be applied evenly without blistering, peeling, or fading.

5.6.3 Supplier standard paint colors shall be specified in the equipment quotation. If requested by the T-Spec, the Supplier shall quote the following paint colors as an option:

Machine	Cream White, RAL 9001, or FID 27780
Guarding	Safety Yellow, RAL 1021
Mesh or Wire Guarding	Black, RAL 9011

6. Equipment Tagging Requirements

6.1 Nexteer Automotive shall supply machine tag verbiage translations for equipment being shipped to non-English speaking countries.

6.1.1 The machine Supplier shall provide an English verbiage list for all device tags, control screens, and fault displays.

6.1.2 The verbiage list shall be supplied in a Microsoft Excel file.

6.1.3 The verbiage shall be given to the Nexteer Automotive ME.

6.1.4 A minimum of (2) weeks shall be given for the completion of the documents' translation.

6.2 Operator's Console

6.2.1 For all Nexteer Automotive international operations, the console shall use international symbols. For US operations, the English version shall be provided.

6.2.2 The Operator's HMI console shall have a set of screens in English and in the language of the country of the machine's destination. The language shall be selectable from the HMI control's console main screen. Nexteer Automotive has HMI templates available for Allen-Bradley Control Systems on the www.nexteerdataexchange.com website, if required.

6.2.3 For devices on the machine's HMI that are configurable, tags shall be in the language of the country of the machine's destination. Additionally, the tags in English may be provided, as space allows.

6.3 Tags for other equipment devices which are to be provided by the machine Supplier:

6.3.1 Tags for input / output devices shall be in the language of the country of machine's destination and indicate the device's I/O address and functional description (e.g. in English: valve - advance clamp; sensor - clamp advanced).

6.3.2 All tags should be mounted adjacent to the device they are identifying, or in a manner which clearly identifies the individual device.

6.3.3 Alternative solutions for the device tags shall be approved by the Nexteer Automotive's ME in advance of the tag installation.

6.4 All devices with displays or readouts (e.g. gages, flow meters, pressure regulators, etc.) shall have tags describing the device's functional description and normal operating ranges and settings. Tags should be mounted adjacent to the device.

7. Safety Requirements

7.1 Safety for all process and equipment shall comply with requirements specified in Nexteer Automotive's Design-In Health and Safety Specification (SD-012).

7.2 A Machine Risk Assessment shall be completed by Nexteer Automotive personnel and the equipment Supplier (per SD-012).

7.3 Suspended vertical loads shall comply with Nexteer Automotive Design-In Health and Safety Specification (SD-012).

7.4 Equipment should comply with the guidelines detailed in the Design-In Ergonomics Guidelines (SD-017).

7.5 For Europe: all equipment shall be designed and manufactured in accordance with the "European Machinery Directive." All equipment shall have a CE Mark and a declaration of conformity. NOTE: The declaration of conformity shall be written in the language of the equipment's destination.

7.6 The equipment's Operator safety door(s) shall comply with the Specification for Application of Automatic Operator-Interference Safety Doors (SD-1038)

7.6.1 Special consideration shall be given for magnetically coupled door cylinders and their guidance systems on metal removal equipment. If these components cannot be protected or mounted in a way to prevent contamination from the process metals, then a magnetically coupled door cylinder is prohibited.

8. Coolant System Requirements

8.1 The coolant system shall be self-contained and piped complete.

8.1.1 The coolant system's piping shall include all necessary lines to facilitate coolant and chip flow from the cutting tools, parts, work area, and to flush chips from moving and stationary machine slide interfaces.

8.1.2 Coolant nozzles should be secured in the correct position for proper coolant flow and direction. In applications where specific coolant flow and direction are required for product quality, coolant lines shall be hard piped.

8.2 Self-contained coolant systems shall include a method to continuously circulate the equipment's coolant. Coolant circulation is required to prevent bacteria from developing in the coolant system when equipment has been shut down for extended periods of time.

8.3 All equipment shall be designed and manufactured to ensure a dry floor operation.

8.4 Equipment Mist Control shall comply with the requirements outlined in SD-012. For applications requiring a mist separator, the manufacturer 3nine should be used.

8.5 All non-standard Nexteer coolant shall be approved via the process outlined in SD-012 (Design-In Health & Safety Specification). An SDS and a technical specification sheet shall be provided for all coolants not presently being used at Nexteer.

8.6 An in-line filter shall be provided to ensure the coolant lines do not plug. The equipment shall shut itself down at a cycle stop position and indicate the reason for the shutdown condition if decreased coolant pressure or a dirty filter condition is sensed.

9. Refrigerant Requirements

9.1 The specified equipment shall not contain Class I / Class II refrigerants, or any other chemicals phased out (or targeted for phase) out by the year 2020.

9.2 The Supplier shall reference the individual manufacturing site's regional and local regulations (e.g. The Montreal Protocol, EPA SNAP, F-Gas, or the ECCC) regarding Chemical / Refrigerant acceptability.

9.3 Common refrigerants that may be considered for use in all regions include: R1234ze, R1233zd, R290, R32, R407A, R426A, R437A, R452B, R454B, Isobutane, NH3, and CO2.

9.4 Refrigerants not included above may still be considered for use, however, they shall be approved through consultation with the various regions' Environmental Departments.

9.5 Refrigerants that may pose a toxicity or flammability hazard (i.e. NH3 or CO2) shall have prior approval by the Hazardous Materials Control Committee (HMCC) before use in any new equipment.

9.6 Quotes shall specify the type of refrigerant being used in the equipment.

9.6.1 Equipment Suppliers should indicate the refrigerant system capacity, refrigerant type, and compatible lubricants.

9.6.2 Equipment Suppliers should provide a Safety Data Sheet (SDS) for all chemical substances used in the equipment if not currently in use at Nexteer Automotive. The Supplier should use chemicals from Nexteer Automotive's locally approved SDS material list.

10. Tooling and Fixture Requirements

10.1 All equipment shall be tooled complete. Tooling shall include (3) sets of perishable tools and tool holders. Modifications to the required tooling requirements shall be documented in the Manufacturing Engineering Equipment Specification (i.e. T-Spec).

10.2 Tooling and fixtures shall be designed to provide minimal downtime, tool setup, required adjustments and have all dimensions on mean or at new tool starting dimension points. Fixtures shall have clearly indicated and positively located setup positions and enable changing equipment over without the use of hand tools. This is possible through workplace organization and the use of clamps, toggles, lock pins, etc. Model changeover should be less than the cycle time (see Nexteer Specification SD-015, Sections 2.4.6 and 2.4.7, for further information).

10.3 Part clamping and work holding shall not dent, bend, scratch, or in any way distort the workpiece.

10.4 Part Counters: all equipment should be provided with the following – (1) non-resettable hard non-HMI based) counter, and (1) resettable counter.

11. Electrical Requirements

The equipment shall comply with requirements specified in IEC 60204-1, Edition 6.0, 2016-10. Safety of machinery – Electrical equipment of machines – Part 1: General requirements. The following are additional requirements:

11.1 The equipment's overcurrent protective and power distribution devices shall be suitable for use on circuits capable of delivering 50,000 amperes symmetrical (rms), 50/60 hertz of short circuit current. [add to IEC-60204-1, Section 7.2.1]

Note: Two common solutions in order to comply with this requirements are:

11.1.1 Add a self-enclosed disconnect with Class-J fuses supplying the equipment's main disconnect, or

11.1.2 Add a three-phase transformer supplying the equipment's disconnect and verify the system is suitable for (can withstand) the available short circuit current from the transformer.

11.2 The continuity of the protective bonding circuit shall be ensured by protective conductors only. Equipment enclosures, painted sub-plates, hinges, metal duct / conduit, and conductive structural parts of equipment are not permitted as the protective bonding path. Galvanized sub-plates are permitted as a protective bonding path. [append to IEC-60204, Section 8.2.3]

11.3 All socket-outlets external to a control enclosure shall be provided with a maximum of 30mA Residual Current Protection Device (RCPD) or equivalent protection. Equipment being delivered to North America shall be provided with a maximum of 6mA Ground Fault Circuit Interrupter (GFCI) protection. [add to IEC-60204-1, Section 15.1]

11.4 All socket-outlets external to a control enclosure and subject to dirt, oil, or other contaminants shall be provided with a cover when device(s) are not plugged in. [add to IEC-60204-1, Section 15.1]

11.5 Fault annunciation shall include any and all conditions that prevent a machine from starting (e.g. station not in auto, loading sequence error, light curtain blocked) and abnormal conditions that stop the machine while automatically cycling (e.g., depressed emergency stop push-button, overtravel, overtime). [add to IEC-60204-1, Section 9.2.6]

11.6 Chip conveyors shall be provided with a local method of starting and stopping. Status indication that the equipment is stopped shall be provided for appropriate process control. [add to IEC-60204-1, Section 10.1.2]

11.7 Any new or revised electrical or fluid power documents shall require approval of the Bill of Material documented by the Nexteer Automotive Controls Engineering Department. All approvals are required prior to the implementation of the design or the purchase of the components.

11.8 The equipment safety circuits shall comply with the requirements specified in SD-011, Specification for Safety Circuits. These specifications include the requirements for Emergency Stop circuits, all safeguarding circuits, and safety devices.

11.9 All supporting software provided with the machine shall be registered to Nexteer Automotive. For proprietary machines, enough software shall be provided to allow a complete recovery of

machine programs in the event of a catastrophic failure (i.e. passwords, system backups, ghost files of hard drives, etc.).

12. Hydraulic Requirements

The equipment shall comply with requirement specified in ISO 4413 Hydraulic fluid power - General rules relating to systems and their components. The following are additional requirements.

12.1 Pressure compensators, on compensating pumps, shall not be considered as overpressure protection devices. [add to ISO 4413, Section 4.4.3]

12.2 Intensified pressure shall not exceed 20,680 kPa (3000 PSI). [add to ISO 4413. Section 4.4.3]

12.3 The maximum stabilized fluid temperature shall be no more than 49° C (120° F). Where the equipment requires operation within a specific temperature range, the minimum and maximum temperatures shall be specified and the controls agreed to in writing by the Nexteer Automotive ME. [add to ISO 4413, Section 5.9.2]

12.4 Reservoirs shall have a temperature switch to indicate an over temperature condition when the fluid temperature is in excess of 54° C (130° F). [add to ISO 4413, Section 8.2.3]

12.5 Steel tubing shall conform to SAE J524 or ISO 3304. [add to ISO 4413, Section 9.2.1]

12.6 Hoses shall conform to SAE J517, ISO 1436/11, 3862-1, or ISO 18752. [add to ISO 4413, Section 9.5.1]

12.7 Hose connectors shall terminate at an anchored connector or bulkhead connector fixed to a rigid machine member. [add to ISO 4413, Section 9.5.2]

13. Pneumatic Requirements

The equipment shall comply with requirements specified in ISO 4414 Pneumatic fluid power - General rules relating to systems and their components. The following are additional requirements.

13.1 Exhausted air shall comply with OSHA regulations 29CFR, Part 1910, Subpart Z, Section 1910.1000 Air Contaminants (TLV-TWA). Exhaust reclassifiers shall be used on lubricated systems. [add to ISO 4414, Section 4.3.7]

13.2 This standard shall apply to all pneumatic applications on industrial equipment which operates at a maximum pressure of 861 kPa (125 PSI). Actuators shall be sized, and components selected, based on a maximum operating pressure of 482 kPa (70 PSI). All components shall have a minimum service rating of 1034 kPa (150 PSI). [add to ISO 4414, Section 4.4]

13.3 Surge tanks shall meet the ASME Unfired Pressure Vessel Code (Section 8, Division 1) for North American operations. For European and Asian operations, the tank shall meet the Unfired Pressure Vessel Standard EN/13445 for pressures greater than 0.5 Bar and have the CE mark.

13.3.1 Tank information. Independent of application location, the following information shall be permanently indicated on each tank:

1. Name of manufacturer
2. Maximum allowable working pressure
3. Manufacturer's serial number
4. Date of manufacture
5. Design working pressure
6. Standard or code designation to which the vessel was manufactured
7. The volumetric capacity (total vessel)
8. Label stating: "CAUTION: PRESSURE VESSEL"
9. Detailed service instructions
10. Maximum temperature

13.4 Steel tubing shall conform to SAE J524 or ISO 3304. [add to IS 4414, Section 9.2]

14. CNC Parameters & Part Programming Requirements

14.1 Lathes / Mills utilizing FANUC CNC controls shall adhere to either SD-1041 (CNC Lathe Program Structure Specification) or SD-1042 (CNC Mill Program Structure Specification).

14.2 The following shall apply for the programming of all other types of equipment identified in Section 1 (above).

14.2.1 A means shall be provided to backup and restore the following where applicable:

1. Part programs and custom macros
2. CNC parameters
3. Tool offsets
4. Pitch errors
5. Work offsets
6. Macro variables

14.2.2 At a minimum, part programs should be documented with embedded comments on an operation by operation basis.

14.2.3 Part programs shall not be encrypted or hidden in any fashion.

14.3 The part program headers should list the machine prefix and equipment number (for example, SD100001), production part number, name of the production part, operation number with description, and date of revision. The first line of the part program should list as much of the above information as possible.

14.4 A communications port, accessible from outside the equipment's control panel, shall be provided to connect a detachable storage device without removing any other connector. The rating of the enclosure shall be maintained to IP 54 or NEMA-12.

14.5 A copy of all program macros shall be provided to the ME. Files shall be date stamped and labeled with the machine prefix including the Site Code and equipment number.

14.6 An electronic copy of the final "as-shipped" part program(s) shall be supplied with the service manual. Additionally, an electronic copy of all part programs used in the equipment shall be supplied to the ME.

15. Drawing Requirements

All drawing (2D and 3D) shall comply with the requirements of SD-003 (General Drawings and Manuals Specification) with the following exceptions or clarifications.

15.1 Machine and Tooling Drawings

15.1.1 Drawings for a Supplier's standard piece of equipment may be provided in the Supplier's standard design format (i.e. PDF drawings within Nexteer's drawing structure).

15.1.2 Where the standard equipment drawings have been designed for multiple pieces of equipment or with multiple options, the drawing(s) shall be updated to clearly reflect the piece of equipment as purchased.

15.1.3 Designs for new and non-standard components, including tooling and fixturing, shall comply with SD-003.

15.1.4 All standard and purchased details, which have been altered, shall be drawn / detailed on a separate Nexteer Automotive drawing sheet. Drawings should only include the dimensions related to the detail alteration as well as any reference dimensions that define the modification(s) being made.

15.1.5 All 3D equipment drawings shall be submitted to Nexteer utilizing the "Solidworks" solid modeling software (Version 2018). 3D equipment models do not need to be detailed complete. At a minimum, the 3D models shall include the following:

1. The equipment's exterior, as well as ancillary equipment shall be present and true to size.
2. Only the equipment's basic structure shall be modeled. The equipment's 3D file shall not contain a "nut and bolt" level of detail.
3. Equipment models should not include any animation.
4. Equipment's fixturing shall be developed to a level where a workpiece can be "set" into the fixturing.
5. All models shall be saved as an object, not as individual surfaces.
6. If the equipment supplier cannot supply the 3D equipment model in Solidworks, they shall note the exception(s) in their quotation. All exceptions shall include the file type to be provided by the Supplier.

15.1.6 Drawing Parts List

1. Parts list for Supplier's standard equipment may be provided in the Supplier's standard format.
2. Any new, non-standard, or modified equipment parts or tooling shall be included in the Nexteer DPL format per SD-003.

15.2 Controls Drawing Standards

15.2.1 Controls drawings for a Supplier's standard piece of equipment may be provided in the Supplier's standard design format (i.e. PDF drawings within Nexteer's drawing structure). File and sheet naming conventions shall comply with SD-003.

15.2.2 New and non-standard designs shall comply with SD-003.

15.2.3 At a minimum, the following drawings shall be provided:

1. Control and Processor Power
2. Input Sheets
3. Output Sheets
4. Special Electronic Modules
5. Instrumentation
6. Interlocks
7. Main Panel / Operating Interface Panel Layouts
8. Fluid Power

15.2.4 All drawings shall be electronic. Nexteer Automotive prefers CAD drawings in AutoCAD or AutoCAD compatible files (i.e. *.dwg or *dxf), however, PDF files are acceptable.

16. Operation and Service Manuals Requirements

All operation and service manuals shall comply with the requirements of SD-003 (General Drawings and Manuals Specification) with the following exceptions or clarifications:

16.1 One (1) hard copy of the operation and service manual, for all equipment and related accessories, shall be supplied at the time of the shipment of the equipment. Where multiple, identical pieces of equipment are provided, for a single plant location, only one (1) hard copy of the manual may be provided.

16.2 The hard copy of the equipment service manual should be in a three-ring binder, which includes dividers to define the different individual sections.

16.3 The operation and service manuals shall also be provided in an electronic PDF format.

RECORD OF REVISIONS

Revision No	Date	Section	Description
001	15JN99	ALL	Final approval & issue date.
002	01MR03	ALL	Revised to be consistent with revised procedure 100.
003	31MY09	ALL	Revised as global common specification and replaces SD-010.
004	06NO09	ALL	Company name updated, and "GC" removed from specification number. All SD documents are global common. Sections 4.4, 5.7, and Appendix A have been updated.
005	01NO13	2, 8	Section 2 SD-002 and SD-011 revision and added reference to SD-1038. Section 8.2 has been added.
006	15OC15	10,11,6	Added the requirement to include the Site Code with the Folder Type in the Prefix definition. Added Chongqing, Liuzhou, and Wuhu Site Codes. Added Saginaw requirement for 3nine model green mist separators.
007	05OC17	5,9,10,11	Added required Nexteer approval for changes from standard machine. Clarified Safety Circuits, Residual Current, Software Backup, and Chip Conveyor requirements. Added SD-1041 and SD-1042 Specifications. Statements added to add and retain original Site codes in Title Blocks. Added Indonesia, Wuhan, and Morocco Site Codes.
008	12NO18	ALL	Reformatted entire document. Added clarification for Purchasing Manufacturing Engineer. Added Environmental Statements to Section 5.3, 5.6 – 5.8.
009	07OC19	8, 11	Clarification added to Section 8 (Safety) and the addition of required 3D Models in Section 11 (Drawings).
010	15MY20	ALL	Document rewritten.
011	14DE20	10.2	Updated to align with other Specifications.
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