

SECTION 7 – PRE / FINAL ACCEPTANCE CHECKLIST

TABLE OF CONTENTS

	<u>Page</u>
7.1 General.....	7-2
7.2 Checklist	7-3

Bosch General Delivery Specifications for Machinery and Equipment

7.1 General

- 7.1.1 All tests conducted at equipment supplier are preliminary acceptance tests. Final acceptance will always be conducted at Bosch.
- 7.1.2 Bosch will provide qualified components for acceptance. Provision for gauges/measurement equipment and personnel to be coordinated with the project engineer.
- 7.1.3 Evaluation of quality will be done with statistical method, when applicable, described in Section 6.
- 7.1.4 Acceptance shall be based on the production result. Performance data and process time to be verified and documented.

Instructions:

Bosch Project Engineer/Leader is responsible for the completion of the Machinery & Equipment pre-acceptance checklist.

The first “Yes” column P/A is for Pre-Acceptance; the second “Yes” column F/A is for Final Acceptance.

Items that are Not Applicable shall be recorded as N/A in the comments section. **All items that have checks in the “No” column require corrective action unless deviations have been authorized.**

Project:		Project Leader:	
Date:			

GDS Section 1: General Procedure		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
1.1	Has supplier agreed to conform to "Robert Bosch General Delivery Specification" dated: ____?	1.2.2.9	☐	☐	☐		
1.2	Are all documentation, (drawings, service manuals, etc.) available and in English?	1.2.2.d 8.1.1	☐	☐	☐		
1.3	Are the quoted conditions achieved	1.2.1	☐	☐	☐		
1.3.1	▪ Cycle Time?	Quote	☐	☐	☐		
1.3.2	▪ Machine Utilization?	6.5.1	☐	☐	☐		
1.3.3	▪ Changeover Time Min.?	6.5.2	☐	☐	☐		
1.3.4	▪ Production Rate Pieces/Hr.?	Quote	☐	☐	☐		
1.3.5	▪ Tool Life?	Quote	☐	☐	☐		
1.3.6	▪ Gage Capability?	6.3.2	☐	☐	☐		
1.3.7	▪ Process Capability?	6.3.2	☐	☐	☐		
1.3.8	▪ Facility Utilities (i.e. power, steam, air, etc.)?	2.2.3.e	☐	☐	☐		

Section 2: N/A

GDS Section 3: Safety & Health Standards		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
Emergency Stop							
3.1	Are Emergency Stop buttons for electrical, pneumatic and hydraulic systems accessible and properly labeled?	OSHA 1910.212	☐	☐	☐		
3.2	Does Emergency Stop function and prevent additional movement?	OSHA 1910.212	☐	☐	☐		
3.3	Does Emergency Stop require Manual Release and pushing the Start Button for the machine to restart?	OSHA 1910.212	☐	☐	☐		

GDS Section 3 Safety & Health Standards		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
3.4	Is Emergency Stop located within close reach of operator and/or technician near point of operation?	OSHA 1910.212	☐	☐	☐		
Machine Guarding							
3.5	Are all hazard areas guarded (push, stroke, capture, retract, clip and squeeze areas, sharp edges, hot/cold surfaces):	OSHA 1910.212					
3.5.1	▪ Rotating shafts are enclosed?	OSHA 1910.212	☐	☐	☐		
3.5.2	▪ Belts, chains, etc., are enclosed?	OSHA 1910.212	☐	☐	☐		
3.5.3	▪ All pinch points guarded?	OSHA 1910.212	☐	☐	☐		
3.6	Are guards clear where viewing is required?	OSHA 1910.212	☐	☐	☐		
3.7	Are guards not easily removable by operator?	OSHA 1910.212	☐	☐	☐		
3.8	Are guards for setup interlocked and not easy to defeat?	OSHA 1910.212	☐	☐	☐		
3.9	Are protective barriers installed to protect other associates from flying objects (e.g. milling, grinding)?	OSHA 1910.212	☐	☐	☐		
Controls							
3.10	Two hand control: Is check function, anti tie-down, anti repeat, distance acceptable?	OSHA 1910.217	☐	☐	☐		
3.11	Are manual controls inoperative in automatic cycle?		☐	☐	☐		
3.12	Are all instructions/labels in English?		☐	☐	☐		
3.13	Are light barriers, light curtains, safety mats, etc., verified for proper operation?		☐	☐	☐		

GDS Section 3 Safety & Health Standards		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
3.14	Do all safety switches/ protective gates operate properly?		☐	☐	☐		
3.15	Are all safety door interlocks verified to operate properly?		☐	☐	☐		
3.16	Does the exhaust system operate properly (must stop/ must not stop) if emergency stop is activated?	3.4.3	☐	☐	☐		
3.17	Are machine controls accessible and away from revolving spindle, moving tools or other hazards?	OSHA 1910.212	☐	☐	☐		
3.18	Is control panel access adequate with no blockage?		☐	☐	☐		
3.19	Are general operating controls configured for safe operation?		☐	☐	☐		
3.20	Are there interlocks for point of operation guarding?	OSHA 1910.212	☐	☐	☐		
Labeling							
3.21	Are the following labels posted (in English):	OSHA 1910. 1200	☐	☐	☐		
3.21.1	▪ Danger Signs?		☐	☐	☐		
3.21.2	▪ Caution Signs?		☐	☐	☐		
3.21.3	▪ Confined Space?		☐	☐	☐		
3.21.4	▪ Notice Signs?		☐	☐	☐		
3.21.5	▪ Safety Instructions?		☐	☐	☐		
3.21.6	▪ Hazardous Materials?		☐	☐	☐		
3.21.7	▪ Utilities?		☐	☐	☐		
3.21.8	▪ Fluids and Lubricants?		☐	☐	☐		
Lockout/Tagout (LO/TO)							
3.22	Are lock-out devices provided for all utility shutoffs (Pneumatic, hydraulic and electrical systems)?	3.2.2	☐	☐	☐		

GDS Section 3 Safety & Health Standards		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
HAZCOM							
3.23	Are MSDS's available and in English for all associated hazardous materials?	3.4.1	☐	☐	☐		
3.24	Is safe storage provided for all hazardous materials?		☐	☐	☐		
3.25	Are flammable liquids in metal (OSHA approved) safety containers? Is grounding provided?	OSHA 1910.106	☐	☐	☐		
General							
3.26	Is potential oil & coolant leakage controlled?	3.4.1.f	☐	☐	☐		
3.27	Have all operational hazards been identified (Job Safety Hazard Analysis)?	OSHA 1910.119	☐	☐	☐		
3.28	Have special requirements for Division I Class I areas been addressed?	OSHA 1910.307	☐	☐	☐		
3.29	Are sensors provided for Division I Class I areas?	OSHA 1910.307	☐	☐	☐		
Sound							
3.30	Does sound level not exceed 80 dB(A) under normal operating conditions?	3.3	☐	☐	☐		
Lasers							
3.31	Does laser comply with all requirements of ANSI Z136.1 Safe Use of Lasers?	3.2.6	☐	☐	☐		
3.32	Is laser labeled, classified and certified?	3.2.6	☐	☐	☐		
Robotic Operations:							
3.33	Do robotic operations comply with ANSI/RIA R15.06 dated ____?	3.2.4	☐	☐	☐		
3.34	Are all power disconnects and interlocks installed as required?	R15.06	☐	☐	☐		
3.35	Have all mechanical stops and range of motion stops been verified?	R15.06	☐	☐	☐		
3.36	Is there full envelope guarding?	R15.06	☐	☐	☐		

GDS Section 4 – Mechanical Design Ergonomics		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
4.1	Are workplace dimensions according to the Bosch Workplace Measurement specifications?	4.3.2	☐	☐	☐		
4.2	Is task lighting adequate, no glare?	4.3.3	☐	☐	☐		
4.3	Are all secondary tasks at proper working heights (actuating or reading controls, handling parts bins, etc.)?	4.3.4	☐	☐	☐		
4.4	Are all lifting tasks within NIOSH limits (changing of tools, fixtures, bins, etc.)?	4.3.5	☐	☐	☐		
4.5	Are lifting aids provided for heavy items?	4.3.5	☐	☐	☐		
4.6	Is maximum lifting weight 30 lbs.?	4.3.5	☐	☐	☐		
4.7	Is the following assessed:						
4.7.1	▪ Improper/unnecessary lifting?		☐	☐	☐		
4.7.2	▪ Repetitive motions?		☐	☐	☐		
4.7.3	▪ Operator posture?		☐	☐	☐		
4.8	Is accessibility for material handling, adjusting, maintenance, and cleaning adequate?	4.3.6.b	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.1	Are electrical drawings created with CAD and provided in plant specific format and also in Adobe Acrobat pdf format?	5.3.1	☐	☐	☐		
5.2	Are electrical drawings provided on paper in “A”, “B”, “DIN A4” or “DIN A3” size?	5.3.1	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.3	Can Bosch make changes to all software?	5.3.2	☐	☐	☐		
5.4	Is a functional plan provided?	5.4	☐	☐	☐		
5.5	Are controls designed so that loss of power (electrical, pneumatic, hydraulic) does not present a hazard to personnel or damage to equipment or damage to work in process?	5.4.1	☐	☐	☐		
5.6	Are manual controls provided and interlocked to prevent damage to machine or work in process?	5.4.2	☐	☐	☐		
5.7	Are separate control systems used for each individual machine?	5.4.3	☐	☐	☐		
5.8	Do machine controls include diagnostic indication for all machine states?	5.4.4	☐	☐	☐		
5.9	Are abnormal continuous consecutive machine cycles prevented?	5.4.5	☐	☐	☐		
5.10	Do passwords limit access to parameters?	5.4.6	☐	☐	☐		
5.11	Do out of tolerance process values cause the machine to stop?	5.4.6	☐	☐	☐		
5.12	Do field bus systems meet plant specific requirements?	5.4.7	☐	☐	☐		
5.13	Can all lamps be tested?	5.4.8	☐	☐	☐		
5.14	Are cycle counters present?	5.4.9	☐	☐	☐		
5.15	Is input power 480 VAC, 3 phase 60 Hz.?	5.5.1	☐	☐	☐		
5.16	Is control voltage regulated 24 VDC?	5.5.1	☐	☐	☐		
5.17	Are receptacles for 115 VAC standard US grounded 3 prong?	5.5.1	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.18	Do machine voltages comply with plant specific tolerances?	5.5.1	☐	☐	☐		
5.19	Is equipment built with plant specific "Preferred Electrical Components"?	5.5.2.a	☐	☐	☐		
5.20	Are control transformers and power supplies sized 30% above maximum load?	5.5.2.b	☐	☐	☐		
5.21	Are functional and electrical components permanently labeled with their corresponding schematic designation?	5.5.3	☐	☐	☐		
5.22	Do controller output circuits have individual circuit protection?	5.5.4	☐	☐	☐		
5.23	Do enclosures have room for 20% expansion?	5.5.5.a	☐	☐	☐		
5.24	Do enclosures larger than 0.425 cu. m (15 cu. ft.) have lighting controlled by a door switch?	5.5.5.b	☐	☐	☐		
5.25	Do enclosures with programmable devices have a 115 VAC GFCI receptacle labeled "For programming device only"?	5.5.5.c	☐	☐	☐		
5.26	Do programmable devices have a readily accessible programming interface?	5.5.5.c	☐	☐	☐		
5.27	Does wiring to enclosures that are not mounted on the machine have connectors?	5.5.5.d	☐	☐	☐		
5.28	Are plugs and sockets permanently labeled per plant specific requirement?	5.5.5.d	☐	☐	☐		
5.29	Are enclosures at least 100 mm (3.75") off floor?	5.5.5.e	☐	☐	☐		
5.30	Are the control enclosures positioned so the machine can be observed while working in the enclosures?	5.5.5.e	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.31	Are control cabinet working space clearances maintained? <i>Note!</i> Depth – 1m, Width – the greater of either 750 mm or cabinet width.	5.5.5.f, Sec 9 Appen. 5.2	☐	☐	☐		
5.32	Are control cabinet doors removable or able to open at least 90 degrees?	5.5.5.f	☐	☐	☐		
5.33	Are AC motors High Energy Efficient TEFC, 480 VAC, 3 Φ , 60 Hz?	5.5.6	☐	☐	☐		
5.34	Do motors 25hp and above have continuous conductors between control enclosure and motor?	5.5.6	☐	☐	☐		
5.35	Do motors 25hp and above have power factor corrected to above 90%?	5.5.6	☐	☐	☐		
5.36	Are all transformer neutral conductors and power supply common conductors grounded at the source?	5.6.1	☐	☐	☐		
5.37	Does all control and power wiring have readily accessible test points in electrical enclosures?	5.6.2	☐	☐	☐		
5.38	Where screw or screw clamp termination systems are used, are all wires fitted with either ferrules or crimp connectors?	5.6.3	☐	☐	☐		
5.39	Are all wires labeled, terminated and identified in the electrical prints?	5.6.3	☐	☐	☐		
5.40	Are all enclosure outgoing control conductors except conductors from controller I/O terminated at terminal blocks or attachment plugs with receptacles?	5.6.3	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.41	Are all wires labeled at each end?	5.6.3	☐	☐	☐		
5.42	Are 'wire numbers' or 'termination labels' used exclusively?	5.6.3	☐	☐	☐		
5.43	Where 'wire numbers' are used, does each wire have the same number at all termination points?	5.6.3	☐	☐	☐		
5.44	Where 'wire numbers' are used, are wires connecting to controller I/O labeled Ixxx for inputs or Qxxx for outputs?	5.6.3	☐	☐	☐		
5.45	Where 'termination labels' are used, are wires labeled with the terminal name?	5.6.3	☐	☐	☐		
5.46	Are all conductors installed without wire splices?	5.6.4	☐	☐	☐		
5.47	Do wireways outside enclosures have 15% spare wire?	5.6.5	☐	☐	☐		
5.48	Are only stranded copper conductors used?	5.6.6	☐	☐	☐		
5.49	Is MTW wire jacketing used on wires not leaving control enclosures?	5.6.6	☐	☐	☐		
5.50	Is PUR cable used in oil, coolant or VISCOR splash/mist areas, and PVC cable used in brake fluid splash/mist areas?	5.6.6	☐	☐	☐		
5.51	Do wire colors meet plant specific requirements?	5.6.7	☐	☐	☐		
5.52	Is maximum flexible conduit length one meter?	5.6.8	☐	☐	☐		
5.53	Does computer hardware and operating system meet plant specific requirement?	5.7	☐	☐	☐		
5.54	Does computer software meet plant specific requirement?	5.7	☐	☐	☐		

GDS Section 5: Electrical Design		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
5.55	Do program printouts and remarks meet plant specific requirement?	5.7	☐	☐	☐		
5.56	Does use of software modules meet plant specific requirement?	5.7	☐	☐	☐		
Data Management and Networking							
5.57	Will the machinery be connected to the BCN?	5.8 5.8.1	☐	☐	☐		
5.58	Is all 3 rd party software properly licensed? (Proof of ownership and original media are required.)	5.8.4	☐	☐	☐		
5.59	Have virus protection measures be considered/implemented? (Please explain.)	5.8.2	☐	☐	☐		
5.60	Is CAT5 UTP cabling used for all data network connections?	5.8.1	☐	☐	☐		
5.61	Is TCP/IP protocol used?	5.8.1	☐	☐	☐		
5.62	Have security measures been implemented to protect against loss or theft of data? (Please explain.)	5.8.3	☐	☐	☐		
5.63	Will the machinery be integrated into an existing data collection system?	5.8.1 5.8.3	☐	☐	☐		
5.64	Is there a contingency plan that will provide for "continuous production" in the event of hardware/ software failure or virus infection? (Please explain.)	5.8.1 5.8.2 5.8.3 5.8.4	☐	☐	☐		

GDS Section 6: Quality Standards and Run-off Conditions		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
6.1	Are sample sizes selected per Appendix 6.1?	6.2.3	☐	☐	☐		
6.2	Are production samples divided equally among work piece locations?	6.2.4	☐	☐	☐		

GDS Section 6: Quality Standards and Run-off Conditions		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
6.3	Are Gage, Machine and Process capability studies conducted per paragraph 6.3 and Plant Specific Requirements?	6.3	☐	☐	☐		
6.4	Do results meet the following acceptance criteria: Gage Capability: a) $\leq 10\%$ of tolerance; or b) Alternatively, ISOPlot^(sm) Discrimination Ratio $DR > 12.5$?	6.3	☐	☐	☐	Test Results:	
6.4.1	Machine Capability: ($C_{mk} \geq 1.67$)?	6.3	☐	☐	☐	Test Results:	
6.4.2	Process Capability: ($C_{pk} \geq 1.33$)?	6.3	☐	☐	☐	Test Results:	
6.5	Is gage scale least count or least division $\leq 10\%$ of smallest part tolerance?	6.4	☐	☐	☐		
6.6	Do gages display variable data unless otherwise specified?	6.4.2	☐	☐	☐		
6.7	Is technical availability $\geq 95\%$ as per Appendix 6.2?	6.5.1	☐	☐	☐		
6.8	Does changeover time meet BPS guidelines (< 10 min. for equipment, < 5 min. for assembly)?	6.5.2	☐	☐	☐		
6.9	Is dry-cycle run for durability conducted?	6.5.3	☐	☐	☐		
6.10	Are process data or set-up sheets available:	6.6.1	☐	☐	☐		
6.10.1	Set-up parameters included?		☐	☐	☐		
6.10.2	Tool change/ adjustment procedures included?	6.6.2	☐	☐	☐		
6.11	Are frequency of operational adjustments adequate?	6.6.2	☐	☐	☐		

GDS Section 6: Quality Standards and Run-off Conditions		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
6.12	Is at least one change per tool, using equipment supplier set up procedure, accomplished during run-off trial?	6.6.2	☐	☐	☐		
6.13	Are all modes and features of software operation and data output demonstrated:						
6.13.1	▪ Test plan available?	6.7	☐	☐	☐		
6.13.2	▪ Calculations verified?	6.7	☐	☐	☐		
6.13.3	▪ Remote access verified?	6.7	☐	☐	☐		
6.13.4	▪ Data transmission to Bosch network?	6.7	☐	☐	☐		

Section 7: N/A

GDS Section 8: Documentation and Shipping Instructions		Ref. GDS/ Other	P/A Yes	F/A Yes	No	Comments/Test Results or N/A	Date Needed
8.1	Is machine documentation provided as per Section 8.1 of the GDS?	8.1.2	☐	☐	☐		
8.2	Does service manual format meet Appendix 8.1 guidelines of the GDS?	8.1.2.b	☐	☐	☐		

Section 9: N/A

Section 10: Plant Specific Additional Requirements