DAIMLERCHRYSLER Ford GM

Part Submission Warrant

Part Name: M10 THREADED MOUNT TIE, BLACK | Cust. Part No.: FU5T-14E047-KA

Shown on Drawing No.: 20139-0 | Org. Part No.: 20139-0

Engineering Drawing Change Level: C | Dated: 1/5/2016

Additional Engineering Changes: N/A | Dated: N/A

Safety and/or Government Regulation: [ ] Yes [X] No | Purchase Order No.: Ongoing | Weight (kg): 0.00142

Checking Aid No.: N/A | Checking Aid Engineering Chg. Level: N/A | Dated: N/A

ORGANIZATION MANUFACTURING INFORMATION

Avery Dennison Fastener Division - 040089294
Organization Name & Supplier/Vendor Code

224 Industrial Road
Street Address

Fitchburg | MA | 01420 | USA
City | Region | Postal Code | Country

CUSTOMER SUBMITTAL INFORMATION

Nursan
Customer Name/Division

Erdem Ozcan
Buyer/Buyer Code

N/A
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? [X] Yes [ ] No [ ] n/a

Submitted by IMDS or other customer format: 373613164/2

Are polymeric parts identified with appropriate ISO marking codes? [ ] Yes [ ] No [X] n/a

REASON FOR SUBMISSION (Check at least one)

- [X] Initial Submission
- [ ] Engineering Change(s)
- [ ] Tooling: Transfer, Replacement, Refurbishment, or additional
- [ ] Correction of Discrepancy
- [ ] Tooling Inactive > than 1 year
- [ ] Change to Optional Construction or Material
- [ ] Supplier or Material Source Change
- [ ] Change in Part Processing
- [ ] Parts Produced at Additional Location
- [ ] Other - please specify below

REQUESTED SUBMISSION LEVEL (Check one)

- [ ] Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
- [ ] Level 2 - Warrant with product samples and limited supporting data submitted to customer.
- [X] Level 3 - Warrant with product samples and complete supporting data submitted to customer.
- [ ] Level 4 - Warrant and other requirements as defined by customer.
- [ ] Level 5 - Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location

SUBMISSION RESULTS

The results for [X] dimensional measurements [X] material and functional tests [ ] appearance criteria [X] statistical process package

These results meet all design record requirements: [X] Yes [ ] NO (If "NO" - Explanation Required)

Mold / Cavity / Production Process: MOLD #175-274, 8 CAVITY, INJECTION MOLDING

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of 24,253 pcs. per 8 hours. I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from this declaration below.

EXPLANATION/COMMENTS: N/A

Is each Customer Tool properly tagged and numbered? [ ] Yes [ ] No [X] n/a

Organization Authorized Signature: Linda Boyle | Date: 3/8/2023

Print Name: Linda Boyle | Phone No.: 978-345-8113 | FAX No.: 978-345-8157

Title: Manager, Documentation Control | E-mail: linda.boyle@averydennison.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: [ ] Approved [ ] Rejected [ ] Other

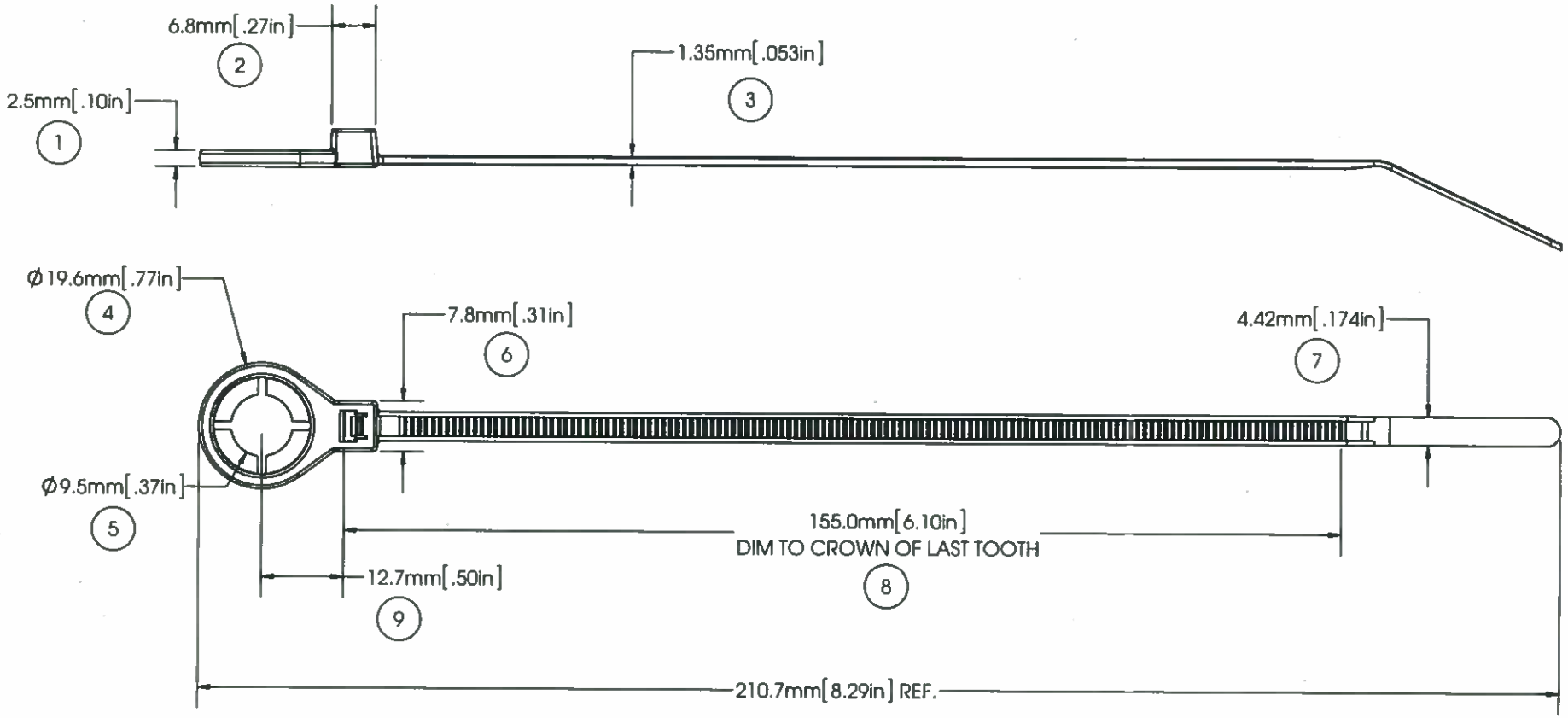
Customer Signature | Date

Print Name | Customer tracking number (optional)

AVERY DENNISON MARKETING SPECIFICATION

HISTORY

REV.	DATE	DESCRIPTION
A	14DEC12	PRODUCTION RELEASE
B	20DEC13	CHG DIM 8; ADDED NOTE DIM TO CROWN OF TOOTH
C	05JAN16	CHG THE PRIMARY DIM TO mm; MODIFIED DIM 8 TO BE 155.0mm



MOUNTING:	M10 STUD
TENSILE STRENGTH:	50 LBF / 222N MIN.
WEIGHT:	1.42 g
TEMPERATURE RANGE:	-40°F (-40°C) TO 239°F (115°C) CONTINUOUS AND 257°F (125°C) AT MAXIMUM EXPOSURE
BUNDLE DIAMETER:	Ø6.4mm TO Ø44.5mm
TOOL:	12001- HAND INSTALLATION TOOL 12500- PNUEM. INSTALLATION TOOL
TOOL TENSION SETTING:	6 - 8
PACKAGING:	500/BAG, 10 BAGS/MASTER

APPROVALS:

ENG. APPR. 11/5/16

Q.A. APPR. Caitlin E Vaillancourt 11/5/16

AVERY DENNISON

FASTENER DIVISION
FITCHBURG, MA 01420 U.S.A.
TEL. 1-800-225-5913
FAX. 978-353-8157

SPECIFIED TOLERANCES ARE:

.XX ± .03 INCHES .X ± .7 mm

.XXX ± .010 INCHES .XX ± .25 mm

ANGULAR: ± 2°

MATERIAL
NYLON 6/6,
IMPACT MODIFIED, HEAT STABILIZED

COLOR
BLACK

DESCRIPTION
M10 THREADED MOUNT TIE

STOCK NO. 20139-0

REV. C

5 4 3 2 1

Production Part Approval
Dimensional Test Results

DAIMLERCHRYSLER Ford GM

ORGANIZATION:	Avery Dennison - Fastener Division	PART NUMBER:	20139-0
SUPPLIER / VENDOR CODE:	040089294	PART NAME:	M10 Threaded Mount Tie Black
INSPECTION FACILITY:	Fitchburg Lab	DESIGN RECORD CHANGE LEVEL:	C
ENGINEERING CHANGE DOCUMENTS:		MOLD:	175-274

ITEM	DIMENSION / SPEC	TOLERANCE		TEST DATE	ORGANIZATION MEASUREMENT RESULTS (DATA)								OK	NOT OK
CAVITY NUMBER →					1	2	3	4	5	6	7	8		
1	2.5	1.8	3.2	12/21/22	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	X	
2	6.8	6.1	7.5	12/21/22	6.8	6.7	6.8	6.8	6.7	6.7	6.7	6.8	X	
3	1.35	1.10	1.60	12/21/22	1.37	1.36	1.34	1.35	1.33	1.33	1.31	1.33	X	
4	19.6	18.9	20.3	12/21/22	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	X	
5	9.5	8.8	10.2	12/21/22	9.4	9.3	9.3	9.4	9.4	9.3	9.4	9.4	X	
6	7.8	7.1	8.5	12/21/22	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	X	
7	4.42	4.17	4.67	12/21/22	4.46	4.44	4.49	4.47	4.44	4.44	4.44	4.46	X	
8	155.0	154.3	155.7	12/21/22	155.5	155.5	155.5	155.5	155.5	155.5	155.5	155.5	X	
9	12.7	12.0	13.4	12/21/22	12.3	12.3	12.2	12.3	12.2	12.3	12.2	12.3	X	

Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
C.Erlenmeyer	QA Tech	12/21/2022

Production Part Approval
Performance Test Results

DaimlerChrysler Ford GM

ORGANIZATION: **Avery Dennison Fastener Division**	PART NO.: **20139-0**
SUPPLIER/VENDOR CODE: **040089294**	PART NAME: **M10 THREADED MOUNT TIE, BLACK**
NAME of LABORATORY: **Fitchburg, MA**	DESIGN RECORD CHG. LEVEL: **C**
*CUSTOMER SPECIFIED SUPPLIER/VENDOR CODE:	ENGINEERING CHANGE DOCUMENTS:
*If source approval is req'd,include the Supplier (Source) & Customer assigned code.	

TEST SPECIFICATION / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA) / TEST CONDITION	OK	NOT OK
Minimum tensile:	50 LBF.	1/4/2023	125	See SPC, Capability data attached	X	
	Min. CpK 1.67			Actual CpK: 4.66	X	

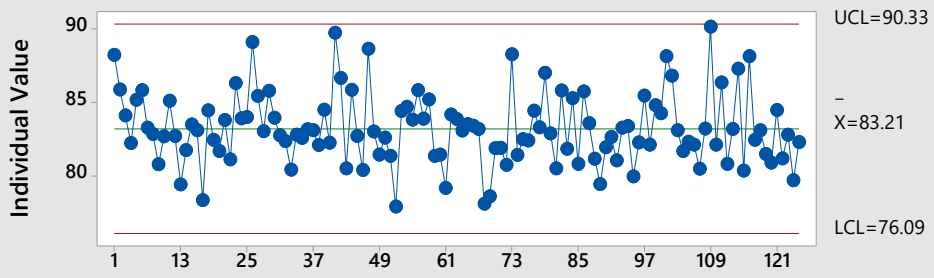
Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
Linda Boyle	Mgr. Doc. Control	1/4/2023

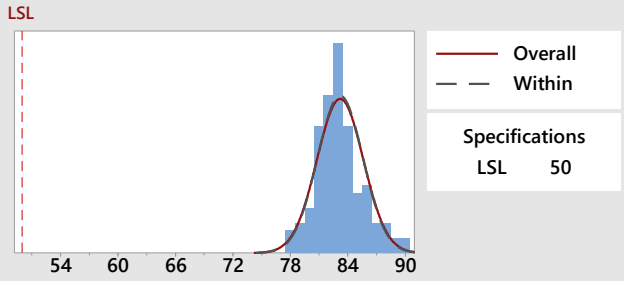
MARCH 2006 CFG-1001

Process Capability Sixpack Report for 20139-0 Mold-274 Tensile 01-04-23

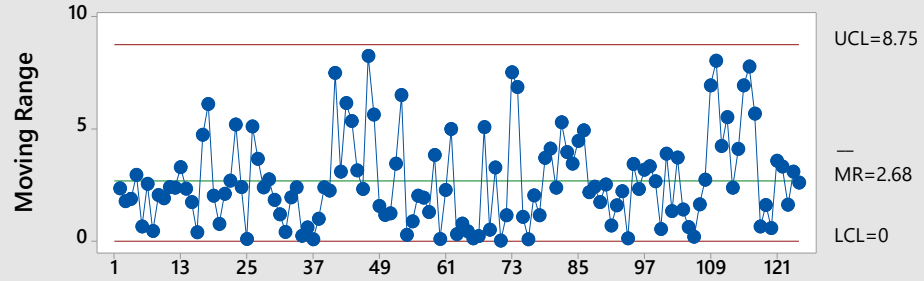
I Chart



Capability Histogram

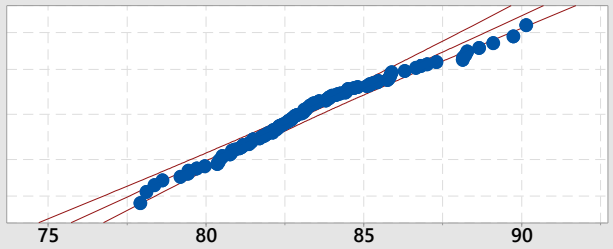


Moving Range Chart

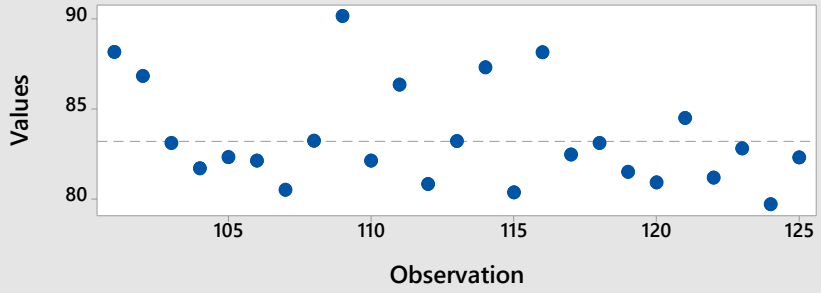


Normal Prob Plot

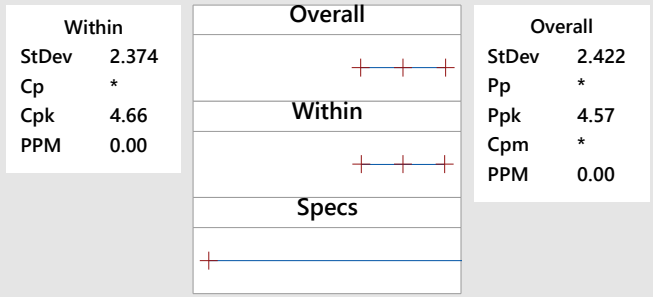
AD: 1.051, P: 0.009



Last 25 Observations



Capability Plot



The actual process spread is represented by 6 sigma.

Process Flow Diagram

MFG-PROCESS PFD REV. 0

Part Number : Refer to individual drawings	Review date / initial 9/19/1996 (RE)	Prepared by Rick Estano
Part Description :All Injection Molded Fasteners (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)	Last Revision: 2/16/2023	Title Quality Engineer
	Page 1 of 1	Phone Number 978-345-8108

Step #	Fab	Move	Store	Insp	Operation description	Product Characteristics	Process Characteristics	Control Methods
	◆	●	▲	■				
1		●	▲	■	Receive resin	Material content		Check Certificate of Conformance, annual flammability record (if required)
2	◆	●	▲	■	Prepare resin		Mix ratio, moisture	Password protection, tool design, record in log
3		●	▲	■	Set mold in machine		Set-up of mold in machine	Standard Work, Start-up inspection
4			▲	■	Setup machine process		Start-up checklist	Start-up inspection, CPP checklist
5	◆			■	Mold product	Visual and functional product specifications		Floor inspector sheet, PPAP (if required), Customer Specific Requirements, functional testing, CPP checklist, Appropriate 502Spec
6	◆	●		■	Package product	Count, water, sealing, carton pack, taping, skidding		Floor Inspector sheet
7				■	Final inspection	Outer box label		Floor Inspector sheet
8		●	▲	■	Move product to warehouse		Move to whse location	Cycle Count
9		●		■	Ship product	Outer box labels		Customer Specific Requirements, Automotive label audit

CONTROL PLAN

☐Prototype ☐Pre-Launch ☑Production

MFG-PROCESS CP REV.0

Control Plan Number	Key Contact/Phone	Date (Orig.)	Date (Rev.)
C001 PRODUCTION	**Romeo Duran (978-807-8510)**	**9/19/1996**	**2/16/2023**

Part Number/Latest Change Level	Core Team	Customer Engineering Approval/Date (If Req'd.)
REFER TO INDIVIDUAL DRAWINGS	G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)	**N/A**

Part Name/Description: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)	Supplier/Plant Approval/Date	Customer Quality Approval/Date (If Req'd.)
	N/A	**N/A**

Supplier/Plant	Supplier Code	Other Approval/Date (If Req'd.)	Other Approval/Date (If Req'd.)
Avery Dennison Fastener Div. Fitchburg MA	**DUNS 040089294**	**N/A**	**N/A**

PART/ PROCESS NUMBER	PROCESS NAME/ OPERATION DESCRIPTION	MACHINE, DEVICE, JIG,TOOLS, FOR MFG.	CHARACTERISTICS			SPECIAL CHAR. CLASS	METHODS		SAMPLE		CONTROL METHOD	REACTION PLAN
			NO.	PRODUCT	PROCESS		PRODUCT/PROCESS SPECIFICATION/ TOLERANCE	EVALUATION/ MEASUREMENT TECHNIQUE	SIZE	FREQ.		
1	**Receive resin**	Rec. Dock		Material content			Meet GM, FCA and Avery Dennison Internal specifications (as applicable)	C of A / C of C	every lot	Upon receipt	Check certif, lot traceability	Return to supplier
				Flammability		Δ	HB Rated (Automotive Only)	FMVSS302	1 lot	Annually	Check certif	Contact supplier
	EcoTach Product Line (Only)	7-60-0352-01 Additive		Handling and Storage			See 502Spec (0-502-400-01)	CoA	every lot	Upon receipt	Check certification and Lot Traceability+L36	Contact suppl+M21ier
2	**Prepare resin**	Blender Motan			Mix ratio		Regrind max 40%	Maguire mixer control box	100%	Continuous	Locked out by engineering	Stop distribution, check system, restart
		Closed loop grinder, Motan			Mix ratio		Regrind max 40%	Runner regrind max of 40% of shot weight	100%	Each set-up	Tool Design	Adjust / Recheck
	EcoTach Product Line (Only)	Closed loop grinder, Motan			Mix ratio		Regrind max 80%	Maguire mixer control box	100%	Each set-up	Material Handler	Adjust / Recheck
		Motan Dryer or Stand-alone Dryer			Refer to dryer critical parameter setup		Moisture <0.23%	Moisture Analyzer	1 test	Once every 24 hrs	Record in Raw Material Moisture log	Adjust / Recheck
3	**Set mold in machine**	Machine A1-A6, B1-B7, C1-C8, D1-D4			Set-up of mold in machine		Setup instructions/Startup Checklist	Checklist	N/A	Each set-up	Machine and Mold/ Pre-Start Checklist, Start up Verification Process, Floor Inspector Sheet, Tool Room Checklist	Adjust / Recheck
4	**Set up machine process**	Machine A1-A6, B1-B7, C1-C8, D1-D4			Start up Instructions		See process setup sheets for individual products	Checklist	N/A	Each set-up	Machine and Mold/ Pre-Start Checklist, Floor Inspector Sheet	Adjust / Recheck
5	**Mold product**	Machine A1-A6, B1-B7, C1-C8, D1-D4			See process setup sheets for individual products		Refer to CPPs on process set-up sheet for specific part number	Checklist	N/A	Once every 24 hrs	Record on process checklist	Reject via Non-conforming Product process (NCO W01), adjust or follow Deviation process
		Molds: 199, 208, 209, 211, 217, 221, 228, 250, 251, 252, 259, 261, 265, 266			Error proofing verification - use of part detection system		Must be turned on	Visual inspection of control box	N/A	Once per shift	Floor Inspector sheet, NCP containment	Reject via Non-conforming Product process (NCO W01), turn on system, retest
				DAM Loop Tensile Test			See spec 0-502-302-01, -02	Instron	If mold is 24 cav or less, check all. If mold is >24 cavities, check 20	Startup after mold or material change	Built-in DAM minimum specification	Reject via Non-conforming Product process (NCO W01), retest
				DAM Loop Tensile Test			See spec 0-502-302-01, -02	Instron	5 random pieces	Once every 24 hrs	Per Specified tensil limits	Reject via Non-conforming Product process (NCO W01), retest
				Functionality			See spec 0-502-302-01	Chinning	1 Full shot	Startup after mold or material change & 2x per shift	Floor Inspector sheet, NCP containment, Proper End-of-arm-tooling	Reject via Non-conforming Product process (NCO W01), retest
				Functionality			See spec 0-502-302-02	Fast Zip	1 Full shot	Startup after mold install	Floor Inspector sheet, NCP Containment	Reject via Non-conforming Product process (NCO W01), retest
				No brittleness			See spec 0-502-302-01	Reverse Bend Test	1 Full Shot	Startup after mold or material change	Startup Verification Process, Floor Inspector Sheet, NCP containment	Reject via Non-conforming Product process (NCO W01), retest
		Mold: 175-111 Swiftach Product		Functionality	Application		See spec 0-502-278-01	Appropriate Hand Tool	1 Full shot	Once per shift	Startup Verification Process, Floor Inspector Sheet, NCP containment	Reject via Non-conforming Product process (NCO W01), retest
		SKUs: 20098, 20105, 20140 (including HHBN versions)		No Fir Tree Breaks			See spec 0-502-302-01	Slow Bend Test: Instron	1 Full Shot	Once every 24 hrs	Accept/ Reject, NCP containment	Reject via Non-conforming Product process (NCO W01), retest
				No visual defects			See spec 0-502-302-01	Visual / Comparator	1 Full Shot	Startup after mold or material change & 2x per shift (unless noted differently on Floor Inspector Sheet)	Startup Verification Process, Floor Inspector Sheet, NCP containment, Proper End-of-arm-tooling, mold eject sequence, interval time, packer 2hr checks (MFG-Packing F02), machine re-start procedure, hold down limit switch (rotary degator only), air jet (mold 226 only), Air Knife (Molds: 227, 250, 256, 264, 266, 269); Tech Containment, mold clean	Reject via Non-conforming Product process (NCO W01), retest
				Multi-Machine Coverage	Packaging		Machine Burdon Rate < 0.85	Planning	N/A	Daily/shift	Missing/Mixed Bag Audit/Check	Staffing adjustments
											Audit use of Box Stands	Reject via Non-Conforming Product Process (NCO W01)
				PPAP Annual Layout			Product Spec Drawing	Comparator/Calipers	See Customer Specific Requirements	Annually	Production Part Approval Process (PPAP)	Make appropriate adjustments, document accordingly
				PPAP Conditioned Loop Tensile		Δ	See spec 0-502-302-01, -02	Instron	125 pieces (minimum)	Annually	Min Cpk 1.67 or cust specific requirements	Forward data to QE for analysis; review with Engineering, Production, Tool Room as needed to determine next steps
6	**Package product**				Place part in packaging		See p/n BOM	Scale	1 bag and 1 box	2x per shift	Floor Inspector sheet, floor markings/ colored workstations (where applicable), piece count on bag stands, sort procedure, Tech Containment	Reject via Non-conforming Product process (NCO W01), turn on system, retest
		SKUs: 20042, 20002			Place part in packaging (auto-bagger)		See p/n BOM	Laser Sensor, Scale	1 bag and 1 box	2x per shift	Floor Inspector sheet	Reject via Non-conforming Product process (NCO W01), turn on system, retest
7	**Final inspection**			Outer box label			Floor Inspector sheet	Visual	1 box per skid	Completed skids	Floor Inspector sheet	Review/Reinspect/Scrap/Accept
8	**Warehousing**				Move to whse location		Scan bar codes	Visual/ Scanner	1 bar code per skid	Continuous	Cycle Count	Move/ Scan/Verify
9	**Ship Product**			Automotive Customer labels			Shipper, AD outer box labels	Visual or Scanner	All boxes on order	4 orders per day min.	Automotive Customer Label verification	Correct error and re-conduct audit

AVERY DENNISON

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

MFG-PROCESS PFMEA REV 0

FMEA Number: 3105

Item: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)
Model Year(s)/Program(s): **All**

Process Responsibility: Avery Dennison Operations
Prepared by: R. Estano, S. Weir, R. Duran, R. Berg

FMEA Date (Orig.): 11-Nov-06
Latest Revision Date: 16-Feb-23
Key Date (annual review due): 16-Feb-23

Core Team: G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)

Process Step/Function Requirements	Potential Failure Mode(s)	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Process Controls Prevention	Current Process Controls Detection	Detection	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
1) Receive resin	Rec. wrong material	Product out of spec	5		Wrong labeling by supplier	3	Specs/ Pur Order/Certifications	Receiving WI	7	105	NONE						
		Contamination of mixes	5		Supplier error	3	Supplier certification	C of C	7	105	NONE						
		Equip damage	5		Miscommunication with suppliers	3	QAD, faxes, email	Incoming Insp (visual), CPP check	7	105	NONE						
	Does not meet Flammability requirement of a HB rating (if applicable)	Does not meet a burn rate spec of 102mm per minute or under	8	Δ	Incorrect material spec'd in for the application	1	Spec Reviews during Design Review Process, Incoming Material inspection	Cable ties of relevant resin sent out annually for Flammability testing per FMVSS-302	6	48	NONE						
	Put into wrong silo	Scheduling disruption	6		Operator error	2	Keyed access, visual color codes	CPP check Visual checks by Process Techs, Start-up inspection, Floor Inspection, daily product testing	7	84	NONE						
EcoTach Product Line Only	Material additive exposed to environment	Material is unusable	10		Torn/Ripped/Unsealed bags	2	Packaging Requirements	Vendor Specified	2	40	NONE						
							Shipping Requirements	Vendor Specified	2	40	NONE						
							Internal handling and storage practices	Training per 502Specification (0-502-400-01)	2	40	NONE						
2) Prepare resin	Pull wrong material	Nonconforming product	6		Operator training	3	Kanban color coding	WI Matl Handler Daily Inventory Lot Tracking, CPP check Visual checks by Process Techs, Start-up inspection, daily product testing	7	126	NONE						
	Contaminated Regrind	Nonconforming product	6		Improperly marked containers. Incorrect grinding of parts in grinding area	3	Color Coded buckets and grinders	Inspection CPP check	7	126	NONE						
			6		Incorrect grinding at machine	3	Color coded buckets	Material handler training CPP check	7	126	NONE						
EcoTach Product Line Only	Material additive exposed to environment	Material is unusable	10		Torn/Ripped/Unsealed bags	2	Internal handling and storage practices	Training per 502Specification (0-502-400-01)			NONE						
	Incorrect mix ratio	Nonconforming product	5		Wrong blender setting	2	Password protected % setting, Regrind % max limit setting, 502 spec	Floor Inspection (Brittle part checks, daily tensile), CPP check (Range maintained)	7	70	NONE						
		Nonconforming product	5		Equipment malfunction	3		Floor Inspection, CPP check	7	105	NONE						
	Material moisture out of spec	Nonconforming product	6		Faulty dryers	3	Material handling procedures	Moisture Analysis, CPP check	6	108	NONE						
			6		Incorrect settings	3	Audit of Dryer controls	Inspections	6	108	NONE						
		Production Scheduling Disrupted	6		Volume Fluctuation	3	Forecast, Schedule, Capacity analysis	Schedule Forms, Weekly scheduling meeting, Moisture Analysis	5	90	NONE						
			6		Lack of Maintenance	3	PM Schedule	Moisture Analysis	6	108	NONE						
	Invalid Reading	Non conforming product	5		Tester out of calibration	3	Annual calibration	Inspection	7	105	NONE						
			5		Tester Malfunction	3	Annual calibration	Moisture Analysis, air flow monitoring	6	90	NONE						
		Production Scheduling unnecessarily disrupted	5		Untrained Operator	3	WI Training	Inspection	7	105	NONE						
			5		Incorrect Set up	3	WI Daily Set up	Inspection	7	105	NONE						
	Wrong Mat'l at machine	Non conforming product	6		Matl Handler chooses wrong manifold.	3	Number coded, Matl Handler initials on Floor Inspector sheet that mat'l verified	Inspection, CPP check	7	126	NONE						
			6		Motan Matrix setup error	3	Training	Inspection, CPP check	6	108	NONE						
			6		MH - Out-of-date schedule or misread schedule	3	Training	Inspection, CPP check Automated SPC E-Mails - Minitab	6	108	NONE						

AVERY DENNISON

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

MFG-PROCESS PFMEA REV 0

FMEA Number: 3105

Item: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)
Model Year(s)/Program(s): **All**

Process Responsibility: Avery Dennison Operations
Prepared by: R. Estano, S. Weir, R. Duran, R. Berg

FMEA Date (Orig.): 11-Nov-06
Latest Revision Date: 16-Feb-23
Key Date (annual review due): 16-Feb-23

Core Team: G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)

Process Step/Function Requirements	Potential Failure Mode(s)	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Process Controls Prevention	Current Process Controls Detection	Detection	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results				
													Actions Taken & Effective Date	Severity	Occurrence	Detection	RPN
		Contamination	6		Incomplete cleaning of material system	3	Line clearance, purging, material system clean processes	Start-up inspection, Floor Inspection	6	108	NONE						
	Material does not move from dryers to machine(s)	Schedule disruption	2		Maintenance Failure	4	PM, call time, purge time	"Low material" signal	8	64	NONE						
3) Set mold in machine	Incorrect conversion	Nonconforming product	6		Inadequate documentation	3	Conversion book, Tool Room checklist	Tool Room checklist, Start-up inspection, Floor Inspection	4	72	NONE						
	Incorrect installation in machine	Damage equipment	7		Inadequate Documentation	3	Machine & Mold pre-start checklist	Start-up inspection, Floor Inspection, CPP check	5	105	NONE						
4) Set up machine process	Incorrect set up	Nonconforming product	6		Wrong settings documented.	3	Daily process checklist at machine	Start-up inspection, Floor Inspection, daily product testing	6	108	NONE						
			6		Wrong settings entered.	3	CPP daily review, Mold Program Settings from Last Run	Start-up inspection, Floor Inspection, daily product testing, CPP check	6	108	NONE						
		Damage equipment	8		Wrong settings entered.	2	CPP daily review Mold Program Settings from Last Run Robot program settings	CPP check, machine start-up form	6	96	NONE						
		Disrupt schedule	2		Wrong settings entered.	5	Machine Process Parameter daily review	CPP check	6	60	NONE						
		Nonconforming product	6		Running without machine Critical Process Parameters	4	Scheduler reviews approved CPP list before scheduling	CPP check	4	96	NONE						
5) Mold Product	Equipment failure	Flash/ Shorts	5		Worn/damaged mold components (ejector pin, pawl pin, side actions, valve seals/ pins, cavity blocks, vents), Delayed PMs	3	PM Work Instructions, Mold Repair & Maintenance Form, Clean Mold (in-machine or scheduled out of machine)	Start-up inspection, Floor Inspection, CPP check, 502 specifications	6	90	NONE						
			5		Inconsistent air pressure (valve gate system)	2	Auxiliary air pressure units, compressors to ensure adequate air pressure is maintained	Start-up inspection, Floor Inspection, CPP check, 502 specifications	6	60	NONE						
			5		Worn machine components (check rings, accumulators)	3	Machine PM schedule used based on machine run hours	Start-up inspection, Floor Inspection, CPP check, 502 specifications	6	90	NONE						
		Cut heads/ missing heads	5		Degating equipment misaligned	3	Machine set up WI, visual markings on floor and machine, Technician training, hold down limit switch	Start-up inspection, Floor Inspection	7	105	NONE						
		High gates	3		Worn degator blades, broken gate, worn gate	4	Gate modifications, degator modifications	Start-up inspection, Floor Inspection, CPP check, 502 specifications	6	72	NONE						
	(mechanical degator only)	Runner not degated from part	4		Worn machine components	3	Machine PM schedule	Start-up inspection, Floor Inspection, Packer check	6	72	NONE						
		Stringing	2		Nozzles not set up properly, valve gates not working properly	2	PM Work Instructions, Mach Process Parameter set-up	Start-up inspection, Floor Inspection, CPP check, 502 specifications	6	24	NONE						
		Missed delivery	6		Delayed PMs	3	PM Work Instructions	Prod Team monitors PM schedule daily	5	90	NONE						
		Damaged equipment	6		Delayed PMs	3	PM Work Instructions	Prod Team monitors PM schedule daily	5	90	NONE						
		Slipping/ Low tensile	6	Δ	Incorrect steel (mold) dimensions (worn, damaged, or original manufacturing)	2	NPD process, PM Work Instructions	Start-up inspection, Floor Inspection, daily product testing, CPP check, 502 specifications, Mold Component Qualification process	4	48	NONE						

AVERY DENNISON

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

MFG-PROCESS PFMEA REV 0

FMEA Number: 3105

Item: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)
Model Year(s)/Program(s): **All**

Process Responsibility: Avery Dennison Operations
Prepared by: R. Estano, S. Weir, R. Duran, R. Berg

FMEA Date (Orig.): 11-Nov-06
Latest Revision Date: 16-Feb-23
Key Date (annual review due): 16-Feb-23

Core Team: G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)

Process Step/Function Requirements	Potential Failure Mode(s)	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Process Controls Prevention	Current Process Controls Detection	Detection	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results				
													Actions Taken & Effective Date	Severity	Occurrence	Detection	RPN
		Mold Mismatch	3		Deformed/degraded Pawl (Locking Mechanism)	3	Machine set up WI, visual markings on machine, Technician training	Start-up inspection, Floor Inspection, daily product testing, CPP check, 502 specifications, Mold Component Qualification process	3	27	NONE						
		Gas Burns and injector pin marks	4		Improper venting	3	PM Work Instructions, Process Tech procedure	Floor Inspection, Process Tech write-ups	8	96	NONE						
		Improper stretch-Cable Tie (on stretched product only)	6		Blown lamp	4	PM Work Instructions	Automated lamp current detection (11" ladder), Floor Inspection	4	96	NONE						
		Improper stretch-Swiftach (broken filaments, length, necking	6		Blown lamp	4	PM Work Instructions	Start-up inspection, Floor Inspection, daily product testing, CPP check, 502 specifications, Mold Component Qualification process	4	96	NONE						
		Broken Paddle Connections-Swiftach	6		Improper process parameters (setup)	4	PM Work Instructions	Start-up inspection, Floor Inspection, daily product testing, CPP check, 502 specifications, Mold Component Qualification process	4	96	NONE						
	Process Failure	Distorted part (i.e. bent fir tree)	5		Sticking, side actions not releasing parts	3	PM Work Instructions, Mach Process Parameter daily review, NPD process, proper End-of-arm-tooling	Part Detection System, Floor Inspection/ Startup Verification Process, CPP check, 502 specifications, machine restart procedure	5	75	NONE						
			5		Conveying system	2	Conveyors designed to keep parts from getting caught in conveyor, air blast conveying system	Floor Inspection/ Startup Verification Process, CPP check, 502 specifications	7	70	NONE						
			5		Mold closes on part due to hanging on runner or EOAT (sub-gated mold)	3	Provide adequate eject hold time and/or speed and/or robot method for parts to fall, separate parts from runner under mold, improved mold/ runner design, EOAT design	Part Detection System, Floor Inspector procedure/ Startup Verification Process, CPP check, 502 specifications	6	90	NONE						
			5		Mold closes on part before parts can clear it	3	Provide adequate Interval time and/or ejector sequence	Floor Inspection, Packer inspection, Process Tech containment, CPP check	7	105	NONE						
			5		Mold design	3	DFMEA, NPD Lessons Learned	New Product Design process	6	90	NONE						
		Flash/ Shorts or Nonfills	5		Over packing/ Under packing	3	Mach Process Parameter set-up and review process, moisture analysis, Tool Room PM process	Floor Inspector procedure/ Startup Verification Process, CPP check, 502 specifications, machine restart procedure	6	90	NONE						
			5		Non-conforming material	3	Material Control WI, Automated Mixer, 502 spec	Moisture Analyzer WI, Floor Inspector Procedure	6	90	NONE						
			5		Closed Loop Grinder failure	3	PM Work Instructions, Mixer/ Blender, Packer Training	CPP check, Floor Inspector procedure, Tech Containment, Restart Procedure	7	105	NONE						
			5		Mold not sealing off (material obstruction)	3	Part Detection system, Machine Process Parameter set-up and review process, mold design, EOAT design and robot program	CPP check (mold protect)	7	105	NONE						
		(Mold 226 and 248 only)	5			3	Air jet at receiver (removes string build-up)	Floor Inspection. Packer inspection	7	105	NONE						
		(Molds 227, 250, 256, 264, 266, 269)	5		Product not ejected from the cavity and cleared mold closure	3	Air Knife (to remove product from cavitation)	Floor Inspection. Packer inspection	4	60	NONE						

AVERY DENNISON

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

MFG-PROCESS PFMEA REV 0

FMEA Number: 3105

Item: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)
Model Year(s)/Program(s): **All**

Process Responsibility: Avery Dennison Operations
Prepared by: R. Estano, S. Weir, R. Duran, R. Berg

FMEA Date (Orig.): 11-Nov-06
Latest Revision Date: 16-Feb-23
Key Date (annual review due): 16-Feb-23

Core Team: G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)

Process Step/Function Requirements	Potential Failure Mode(s)	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Process Controls Prevention	Current Process Controls Detection	Detection	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
		Brittleness/ Breaking	5		Material degradation	3	Mach Process Parameter set-up and review process (screw speed, barrel/ manifold temps) Material Control WI, Automated Mixer, Shot Size to Barrel Ratio	Floor Inspection, daily product testing, Test protocol for changes to CPP check, machine restart procedure	6	90	NONE						
		Slipping/ Low tensile	6	Δ	Under packing	3	Mach Process Parameter set-up and review process (hold time), moisture analysis	Floor Inspection/ Startup Verification Process, CPP check, 502 specifications, machine restart procedure	6	108	NONE						
		Missing heads	5		Poor degating	3	Mach Process Parameter set-up, conveyor belt	Part Detection system, Floor Inspection, Manual Degate WI	6	90	NONE						
		Improper stretch (for stretched products only)	6		Too high or low temperatures	3	Process Parameter history	Floor Inspector procedure/ Startup Verification Process	6	108	NONE						
		Gas Burns	4		Material degradation	3	Mach Process Parameter set-up, shot size to barrel ratio	Floor Inspection/ Startup Verification Process, CPP check, 502 specifications, machine restart procedure	6	72	NONE						
6) Package product	No packaging	Scheduling disruption	2		Inventory Inaccuracies	7	Buyer ordering process, Back-up packaging sizes, safety stocks/ re-order points	Packager checks inventory daily, Buyer ordering process/ re-order points	6	84	NONE						
			2		Purchasing miscommunication	5	Buyer ordering process, Back-up packaging sizes, safety stocks/ re-order points	Packager checks inventory daily, Buyer ordering process/ re-order points	6	60	NONE						
			2		Supplier Issues	3	Back-up packaging sizes, safety stocks/ re-order points	Buyer ordering process/ re-order points	6	36	NONE						
	Mixed parts in the bag	Customer receives incorrect product	6		Failed line clear procedure (incl sorting)	3	Work instructions, Sort procedure	Floor Inspection, Line Clear procedure	6	108	NONE						
			6		Variation in packing process (incl sorting)	3	Standard work, Quality Alert procedure, Floor markings, Box stands, Training, Sort procedure	Floor Inspection	6	108	NONE						
			6		Packer overburden	3	Standardized packer burden, FM sorters	TLs review schedule/ packer burden daily	6	108	NONE						
	Mixed bags in the box	Customer receives incorrect product	6		Variation in packing process, pallets too close	3	Work instructions, Quality Alert procedure, Floor markings, Box stands	Floor Inspection	7	126	NONE						
			6		Failed line clear procedure (incl sorting)	3	Work instructions, Training, Sort procedure	Floor Inspection	7	126	NONE						
	Wrong packaging / labels on box	Customer receives incorrect product	6		Workstation set-up	3	Daily Schedule	Floor Inspection	7	126	NONE						
			6		Inadequate inventory at machine	3	Daily Schedule	Floor Inspection, Line Clear procedure	7	126	NONE						
			6		Product or packaging from previous task left in sort area	3	Sort work instruction, final inspection	Floor Inspection, Sort work instruction	6	108	NONE						
	Wrong count in bag (auto-bagger only)	Customer does not receive enough parts	4		Scale set-up	3	Floor Inspector procedure, LPA audit procedure, Bag piece count standard	Floor Inspection, LPA audit procedure	6	72	NONE						
			4		Messy 25-count bundles	3	Bucket design, automated bag piece count, visual aid	Molder/ Packer training	7	84	NONE						
	Wrong count in box	Customer does not receive enough parts	4		Operator error	4	Box stands, Box layout visuals	Floor Inspection, LPA audit procedure, Box layout visuals	7	112	NONE						
	Bad bag seal	Non conforming Product	4		Operator error	3	Work Instructions, Training	Floor Inspection, LPA audit procedure	7	84	NONE						
			4		Sealer malfunction	4	Floor Inspector procedure	Floor Inspection, LPA audit procedure	7	112	NONE						
	(auto-bagger only)		4		Sealer component failure	3	Set-up sheet	Heater temperature faults, Molder/ Packer training, Floor Inspection	5	60	NONE						
	(auto-bagger only)		4		Misaligned film	2	Film alignment guides	Molder/ Packer training, Floor Inspection	6	48	NONE						
	Bad tape seal on box	Poor visual ascetics	2		Operator error	6	Training	Floor Inspection, LPA audit procedure	7	84	NONE						

AVERY DENNISON

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

FMEA Number: 3105

Item: Avery Dennison Injection Molded Products (Cable Ties, Swiftach, Secur-A-Seal, Secur-A-Tie)
Model Year(s)/Program(s): **All**

Process Responsibility: Avery Dennison Operations
Prepared by: R. Estano, S. Weir, R. Duran, R. Berg

FMEA Date (Orig.): 11-Nov-06
Latest Revision Date: 16-Feb-23
Key Date (annual review due): 16-Feb-23

Core Team: G Garcia Plant manager (978-751-1469), S. Weir: Operations Manager (978-345-8199), R. Estano: Quality Engineer (978-345-8108), D. Gilbertson:Design Engineer (978-345-8156), K. Fossey: NPD/ R&D Manager (978-345-8133), L. Grandich: ELS/EHS Manager, (978-345-8129), M. Artuso: Operations Project Leader (978-345-8154), W. O'Malley: Quality Engineer (978-345-8179), R. Duran: Quality Manager (978-345-8115), R Berg Eng Manager (978-956-6734)

Process Step/Function Requirements	Potential Failure Mode(s)	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Process Controls Prevention	Current Process Controls Detection	Detection	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
			2		Defective Tape	3	Supply Chain Management procedures	Floor Inspection, Warehouse procedure	7	42	NONE						
	Not enough water added	Brittleness/ Breaking	5		Machine setup	2	Link sealer to water (pokayoke)	Floor Inspection, LPA audit procedure	7	70	NONE						
			5		Dispenser Malfunction / leak	2	Preventative Maintenance procedure	Floor Inspection, LPA audit procedure	7	70	NONE						
	Too much water added	Slipping/ Low tensile	6		Machine setup	2	Link sealer to water (pokayoke)	Floor Inspection, LPA audit procedure	7	84	NONE						
			6		Dispenser Malfunction / leak	2	Preventative Maintenance procedure	Floor Inspection, LPA audit procedure	7	84	NONE						
	Damaged strap (auto-bagger only)	Non conforming Product	5		Strap obstructs seal blade when closing	6	Film feed distance	Seal blade jam fault & automatic shut down, training	2	60	NONE						
	Damaged feature (auto-bagger only)	Non conforming Product	5		Jam gate closes on part	2	Jam gate, jam recovery procedure	Visual aid, training	7	70	NONE						
7) Final Inspection	Accept bad/ Reject good product	Schedule disruption	3		Inadequate documentation	3	Work Inst, Specs, Procedures	Daily Prod Meeting Monitor Non-conformance reports	7	63	NONE						
			3		Improper communication	3	Work Inst, Specs, Procedures	Daily Prod Meeting Monitor Non-conformance reports	7	63	NONE						
			3		Inadequate training	3	Work Inst, Specs, Procedures	Daily Prod Meeting Monitor Non-conformance reports	7	63	NONE						
		Deliver nonconforming product	6		Inadequate documentation	3	Work Inst, Specs, Procedures	Daily Prod Meeting Monitor Non-conformance reports	6	108	NONE						
			6		Improper communication	3	502 Specification	Daily inspection/ testing	6	108	NONE						
			6		Inadequate training	3	502 Specification	Daily inspection/ testing Performance Reviews	6	108	NONE						
8) Warehousing	Wrong warehouse status	Nonconforming product ships	6		NCP, improper communication	3	NCP containment process, QA Hold Smartsheet	QAD inventory/ shipment tracking Customer-specific instructions (CSI) located on Pick Sheet/WHS Turnover (TO) Report	6	108	NONE						
		Unapproved product ships	6		Improper communication or missing yellow labels	3	PART INSTRUCTIONS sheet, CS Hold, Daily Turnover report	CS Inventory/ allocation monitoring	6	108	NONE						
9) Ship product	Pick wrong parts or amounts	Ship incorrect parts to customer	6		Operator error	3	Work instructions	Auto Customer Label audit or scan	6	108	NONE						

AVERY DENNISON

DES F01 REV. 0

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

_____ System
_____ Subsystem
_X_ Component: Offset Mount Tie Family

FMEA Number: CB-0053
Page 1 of 5

Design Responsibility:
Prepared By: Dan Gilbertson

Model Year(s)/Program(s): N/A
Key Date: KEY DATES ON PAGE 5 OF 5
FMEA Date (Orig.): 1/24/2012 / 11/3/21

Core Team: SEE PAGE 5 OF 5

Applicable SKU's: SEE PAGE 5 OF 5

	Item/Function / Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Design Controls Prevention	Current Design Controls Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
1	Material Flammability Specification	Cable tie does not meet a flammability requirement of a HB rating	Cable tie does not meet a burn rate spec of 100mm per minute or under?	7	Δ	Incorrect material spec'd in for the application	1		All current automotive materials are sent out annually for flammability testing per FMVSS-302	3	21	None						
2	Cable tie wraps around bundle	Strap breaks when bending	Cable tie becomes unusable	7		Faulty strap design/strap radii missing	3	New product development process requires design reviews, 1st piece inspections and alpha testing		3	63	None						
				7		Improper material	2	New product development process requires design reviews, Manufacturing Material Cert; Specify impact modified material; New product development process requires alpha and beta testing		3	42	None						
				7		Improper moisture spec.	3	Alpha testing		2	42	None						
		Strap is difficult to bend	Decreased ergonomics, Cable tie performs poorly on smaller bundles, Increased possiblity of bundle slippage.	4		Faulty strap design	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
				4		Spec incorrect material	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
		Strap length too short for wire bundle	Cable tie won't fit around bundle	4		Faulty strap length dsign	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
				4		Marketing spec sheet calls out incorrect maximum bundle diameter	3	Marketing spec sheets require multiple functions to review and sign off prior to release; We supply samples to customers for PER		3	36	None						

AVERY DENNISON

DES F01 REV. 0

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

_____ System
_____ Subsystem
_X_ Component Offset Mount Tie Family

Design Responsibility

FMEA Number CB-0053
Page 2 of 5
Prepared By Dan Gilbertson

Model Year(s)/Program(s) N/A

Key Date KEY DATES ON PAGE 5 OF 5

FMEA Date (Orig.) 1/24/2012 / 11/3/21

Core Team SEE PAGE 5 OF 5

Applicable SKU's: SEE PAGE 5 OF 5

	Item/Function / Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Design Controls Prevention	Current Design Controls Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
3	Tail inserts into head	Tail is difficult to insert into head	Decreased operator efficiency; Decreased ergonomics; Customer rejects parts	4		Improper taper on tail	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
				4		Faulty pawl beam design	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
4	Strap draws through head	Strap is difficult to draw through head	Decreased operator efficiency; Decreased ergonomics; Customer rejects parts	4		Faulty pawl beam design	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
				4		Faulty tooth design (Teeth Angles too steep)	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
5	Tension and cut	Cable tie fails during tensioning process	Reduced operator effiency; Customer rejects parts	4		Faulty pawl / tooth design	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		3	36	None						
				7		Pawl breaks (Popping pawls)	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets		3	63	None						
				7		Improper head design (allows strap to be cut too close to the pawl resulting in strap disengageing from pawl)	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets		3	63	None						

AVERY DENNISON

DES F01 REV. 0

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

_____ System
_____ Subsystem
_X_ Component Offset Mount Tie Family

Design Responsibility

FMEA Number CB-0053
Page 3 of 5
Prepared By Dan Gilbertson

Model Year(s)/Program(s) N/A

Key Date KEY DATES ON PAGE 5 OF 5

FMEA Date (Orig.) 1/24/2012 / 11/3/21

Core Team SEE PAGE 5 OF 5

Applicable SKU's: SEE PAGE 5 OF 5

	Item/Function / Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Design Controls Prevention	Current Design Controls Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken & Effective Date	Severity	Occurrence	Detection	RPN
6	Pack harness assembly into transportation container and Unpacking of harness assembly from transportation container	Pawl breaks in transport	OEM rejects the harness	7		Faulty design; Incorrect tension setting on the tool; Improper installation	4	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets; QA Loop tensile testing; Product Spec sheet		3	84	None						
		Cable tie rotates around or slips down harness (not applicable for 20186-0)	Improperly located or positioned cable tie	4		Faulty design; Incorrect tension setting on the tool; Improper installation	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets		5	60	None						
		Mount Feature breaks off	Impaired part functionality; Decreased operator efficiency; Increased harness rework; Halt assembly line	7		Faulty design; Insuffiecient radii on the mount feature or connection to head; Improper material	4	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Manufacturer Material Certification		3	84	None						
7	Harness assembly is prepared for installation and initially placed in vehicle	Mount feature is damaged	Impaired part functionality; Decreased operator efficiency; Increased harness rework; Halt assembly line	8		Faulty design; Insuffiecient radii on the mount feature or connection to head; Improper material	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Manufacturer Material Certification		2	48	None						
8	Installation of mount tie on bolt	Mount feature requires excessive force to install over bolt	Decreased ergonomincs; Decreased operator efficiency; Mount feature not fully installed onto bolt	6		Faulty design (Mount feature fins too thick); Incorrect insertion CTQ	3	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets		3	54	None						
				6		Incorrect bolt size CTQ; Improper installation	1	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Process control sheets		2	12	None						
		Mount feature does notfit onto bolt	Impaired part functionality; Decreased operator efficiency; Increased harness rework; Halt assembly line	8		Faulty design; Incorrect bolt size CTQ; Inner diameter of mount feature is too small	1	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing		1	8	None						

AVERY DENNISON

DES F01 REV. 0

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

_____ System
_____ Subsystem
_X_ Component Offset Mount Tie Family

Design Responsibility

FMEA Number CB-0053
Page 4 of 5
Prepared By Dan Gilbertson

Model Year(s)/Program(s) N/A

Key Date KEY DATES ON PAGE 5 OF 5

FMEA Date (Orig.) 1/24/2012 / 11/3/21

Core Team SEE PAGE 5 OF 5

Applicable SKU's: SEE PAGE 5 OF 5

	Item/Function / Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Occurrence	Current Design Controls Prevention	Current Design Controls Detection	Detection	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
														Actions Taken & Effective Date	Severity	Occurrence	Detection	RPN
8	Cont. from sheet 3	Cont. from sheet 3	Cont. from sheet 3	8		Flash on mount feature fins	1		Start up and in process inspections requires visual review of parts, insertion and extraction and loop tensile	1	8							
9	Cable tie retains harness assembly where installed for life of vehicle	Mount walks of bolt or breaks off from the body of cable tie	Cablte tie fails to perform its intended function; Improperly positioned wire harness	8		Faulty design; Incorrect mounting hole CTQ	2	New product development process requires design reviews, 1st piece inspections and alpha testing and beta testing; Specify impact modified material; Manufacturer Material Cert; Customer performs PER's		2	32							
10	Cable tie meets end of life	Material doesn't meet automaker's REACH and RoHS requirements	Cable tie pollutes environment	9		Cable tie contains banned materials.	1	Manufacturer Material Cert and conformance letter meeting all REACH and RoHS requirements; MSD Sheet;		1	9							

	SKU #	Key Dates	Core Team:	Comments:
1	20044-0	6/29/2001	AUTOMOTIVE TEAM	
2	20045-0	6/29/2001	AUTOMOTIVE TEAM	
3	20051-0	6/29/2001	AUTOMOTIVE TEAM	
4	20062-0	7/24/2002	AUTOMOTIVE TEAM	
5	20065-0	11/13/2002	AUTOMOTIVE TEAM	
6	20085-0	3/24/2004	AUTOMOTIVE TEAM	
7	20139-0	12/18/2012	Dan Gilbertson, Noah Dorsey, Rick Estano, Ken DeRoy, Pat Maas, Nathan Griggs	
8	20186-0	5/31/2018	Dan Gilbertson, Gardner Bradlee, Mike O'Regan, Lisa Asselin, Caitlin Vaillancourt, Kyle Fossey, Scott David	
9	20044-HHBN	11/3/2021	Chris Strakus, Bernardo Heirmans, Kyle Fossey, Lisa Asselin, Rick Estano	
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

Production Part Approval
Material Test Results

DAIMLERCHRYSLER Ford GM

ORGANIZATION: **Avery Dennison Fastener Division**	PART NUMBER: 20139-0
SUPPLIER/VENDOR CODE: **040089294**	PART NAME: M10 THREADED MOUNT TIE, BLACK
MATERIAL SUPPLIER: **BASF**	DESIGN RECORD CHANGE L C
*CUSTOMER SPECIFIED SUPPLIER/VENDOR CODE:	ENGINEERING CHANGE DOCUMENTS:
*If source approval is req'd,include the Supplier (Source) & Customer assigned code.	NAME of LABORATORY: BASF

MATERIAL SPEC.NO./REV/DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
NYLON 6/6, IMPACT MODIFIED,HEAT STABILIZED						
Moisture Content	.20 MAX.	1/9/2023		0.04	X	
Izod Impact ISO Notched	12.00 / 25.00	1/9/2023		17.00	X	
Tensile Stress at Yield ISO	56.0 / 70.0	1/9/2023		61.0	X	
COLOR: BLACK		1/9/2023		BLACK	X	

March 2006 CFG-1004

Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
Linda Boyle	Mgr. Doc. Control	1/9/2023

BASF CORPORATION

We create chemistry

Certificate of Analysis

Customer:		Product Number	:	50167804
		Product Name	:	ULTRAMID® A3L HP BK20465 POLYAMIDE
AVERY DENNISON CORPORATION 224 INDUSTRIAL RD FITCHBURG MA 01420-4634		Vehicle	:	46267
		Batch/Lot	:	0210742316
		Manuf.Date	:	Jan-09-2023
Attention:	HUGO.VITERI@AVERYDENNISON.COM	Shipped Date	:	Jan-10-2023
eMAIL:	Hugo.Viteri@averydennison.com	Shipped Quantity	:	20,476.000 KG
Cust Prod:	0-083-231-04	Delivery Date	:	Jan-11-2023
Cust Prod Name:	ULT.A3L HP BK20465	Order Number	:	118873578 000010
Cust P.O.:	FQ42967			
Cust P.O. Line:	10	Delivery Note	:	147105286 000010

Inspection Certificate 3.1 according to EN 10204

Characteristic	Result	UOM	-----Specification----- Minimum	Maximum	Test Method
Moisture Content	0.04	%		0.20	ASTM D6869 / ISO 15512B
Izod Impact ISO Notched	17.00	kJ/m2	12.00	25.00	ISO 180/A
Tensile Stress at Yield ISO	61.0	MPa	56.0	70.0	ISO 527

Comments :

Results shown are the means of individual test values for those samples taken during production of the lot specified.

This product is approved for the following specifications:

MSDB-41 CPN 1826, 2055
WSK-M4D-706-A
WSS-M4D706-B1
GMP.PA66.015
GMW16447P-PA66-T2
ASTM D6779 PA0161

We create chemistry

Performance Materials

2022 Certificate of Compliance

Annual Test Data for Ultramid® A3L HP BK20465 and UNC

Properties	Test Method	Units	Mean Value	Stellantis Range	Ford Range	General Motors Range
Melt Point	ISO 11357	°C	261		250-265	250-270
Density/Specific Gravity	ISO 1183	g/cm^3	1.10	1.08-1.12	1.08-1.12	1.07-1.13
Notched Izod Impact Strength at 23°C	ISO 180A	kJ/m^2	16.3			10 min
Notched Charpy Impact Strength at 23°C	ISO 179eA	kJ/m^2	18.0	9.0 min	10 min	
Tensile Modulus	ISO 527	MPa	2422	1700 min	1700 min	1800-2900
Tensile Strength	ISO 527	MPa	60	52 min	56 min	50-70
Tensile Elongation	ISO 527	%	9.3		5.0 min	
Deflection Temperature under Load	ISO 75/A	°C	65	50 min	57 min	50 min

This data was generated from lot number 0210379553, manufactured 06/2022.

This product is approved to Stellantis Specifications MS-DB41 CPN 2521 (NAT), 1826 and 2055 (BK); Ford Motor Company Specifications WQ 100A, WSK-M4D706-A and WSS-M4D706-B1; as well as General Motors Corporation Specifications GMP.PA66.015 and GMW16447P-PA66-T2. (ASTM D6779 PA0161Z1Z2)

dht

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.:
12244B-2007-AQ-HOU-IATF

Valid:
09 June, 2021 – 22 May, 2024

IATF Certificate No:
0404047

This is to certify that the management system of

BASF Corporation

200 Iris Drive, Sparta, TN, 38583, USA

and, if applicable, the remote supporting locations as mentioned in the Appendix accompanying this Certificate

has been found to conform to the Quality Management System standard:

IATF 16949:2016

This certificate is valid for the following scope:

DESIGN AND MANUFACTURE OF COMPOUNDED ENGINEERING RESINS INCLUDING POLYAMIDES, THERMOPLASTIC POLYESTERS AND POLYACETALS

EXCLUSION: NONE

Place and date:
Katy, TX, 09 June, 2021

For the issuing office:
DNV - Business Assurance
1400 Ravello Drive, Katy, TX, 77449-5164, USA

Sherif Mekkawy
Management Representative

Certificate no.: 12244B-2007-AQ-HOU-IATF
IATF Certificate No: 0404047
Place and date: Katy, TX, 09 June, 2021

Appendix to Certificate

BASF Corporation

Remote Support Locations included in the certification are as follows:

Site Name	Site Address	RSL Activities	Certification Body
BASF Corporation	450 Clark Drive, Bud Lake, NJ, 07828, USA	Product Design, R&D	DNV
BASF Corporation	1609 Biddle Ave., Wyandotte, MI, 48192, USA	Contract Review, Quality System Management, Customer Service, Internal Audit Management, Management Review, Marketing, Purchasing, Sales, Supplier Management	DNV

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

BASF CORPORATION
SEPC Operations
Quality Control Laboratory
200 Iris Drive
Sparta, TN 38583
Brian Tupper Phone: 931 738 7257

MECHANICAL

Valid To: March 31, 2024 Certificate Number: 1217.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following engineering tests on plastics:

Test Method	Test
ASTM D256	Izod Impact
ASTM D618	Conditioning
ASTM D638	Tensile Properties of Plastics (except Annex A3 Poisson Ratio)
ASTM D648 B	Deflection Temperature of Plastics Under Flexural Load
ASTM D790	Flexural Properties of Plastics
ASTM D792	Specific Gravity by Displacement - Electronic Densimeter (Method A Density)
ASTM D1238	Melt Flow Rate (Procedure A and B)
ASTM D3418	DSC Melt Point
ASTM D5630-13[1]	Percent Ash Content (Procedure B)
ASTM D6869	Percent Moisture (Automated Karl Fisher Titrimetry) Coulometric Method
ASTM E1331	Color Difference (Reflectance)
ISO 75-2	Deflection Temperature Under Load
ISO 178	Flexural Properties

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Test Method	Test
ISO 179-1	Charpy Testing
ISO 180	Determination of Izod Impact Strength
ISO 307	Determination of Viscosity Number - Polyamides
ISO 527-1, -2	Tensile Properties (except section 10.4 Poisson Ratio)
ISO 1133-1, -2	Melt Flow Rate (Procedure A and B)
ISO 1183-1	Density
ISO 1628	Determination of the Viscosity of Polymers in Dilute Solution using Capillary Viscometers
ISO 3451-1	Determination of Ash (Method A)
ISO 11357-1, -3	DSC Melt Point
ISO 15512 B	Determination of Water Content

[1] This laboratory's scope contains withdrawn or superseded methods. As a clarifier, this indicates that the applicable method itself has been withdrawn or is now considered "historical" and not that the laboratory's accreditation for the method has been withdrawn.

Accredited Laboratory

A2LA has accredited

BASF CORPORATION

Sparta, TN

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 11th day of April 2022.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1217.01
Valid to March 31, 2024

For the tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.

GHESQUIERE PLASTIC TESTING, INC.
20450 HARPER AVENUE • HARPER WOODS, MI 48225 • PHONE (313) 885-3535 • FAX (313) 885-1771 • WWW.GPTESTING.COM

Report Date: June 13, 2022
Test Date: May 26 - June 10, 2022

Report #2205-86727-D
Performed for:
Avery Dennison Retail Information Services LLC
224 Industrial Road
Fitchburg, MA 01420

Attention: Mr. Rick Estano

WORK REQUESTED:

Perform Flammability test on samples submitted.

DESCRIPTION OF SAMPLES:

Samples submitted were molded parts identified as BASF A3L HP BK20465 (Black).

(P. O. #453433)

WORK PERFORMED:

Test specimens were prepared as necessary and conditioned for a minimum of 24 hours at standard laboratory conditions prior to testing.

Flammability tests were performed in accordance with the procedures of FMVSS 302 (1998). Five specimens were tested.

RESULTS:

The following determinations were made based upon the above tests:

RESULTS: (cont.)

FLAMMABILITY

Requirement: 102 mm/minute maximum

Results

	Burn Distance (mm)	Burn Time (seconds)	Burn Rate (mm/minute)
Specimen 1	70	87	SE*/48.3
Specimen 2	0	0	SE*
Specimen 3	0	0	SE*
Specimen 4	0	0	SE*
Specimen 5	70	106	SE*/39.6

GHESQUIERE PLASTIC TESTING, INC.

M. W. Ghesquiere Jr.
President

MWGj/tm

* Self-extinguishing

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

GHESQUIERE PLASTIC TESTING, INC.
20450 Harper Avenue
Harper Woods, MI 48225
Evan Gregory Phone: 313 885 3535
Fax: 313 885 1771
E-mail: evan@gptesting.com

MECHANICAL

Valid To: December 31, 2023 Certificate Number: 0079.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following automotive tests on Plastics, Rubber, Foams, Paper/Paperboard, Composites, Textiles, Leather, Adhesives, Paints, and related materials:

Test:	**Test Method:**
Abrasion:	
Falling Sand	ASTM D968; GM9542P (8/89)[1]
Gakushin	HES D6511 Section 4.12; JIS L0849; NES M0602 Sections 20-22
Martindale	ASTM D4966; Ford FLTM BN 158-01; GMW15651; ISO 5470-2; VDA 230-210
RCA	ASTM F2357-10[1], ASTM F3152; GM9304P (9/88)[1]; Nissan NES M0136
Seatbelt	FMVSS 209 S5.1(d)
Stolle	ASTM D3886; Ford FLTM BN 108-01, FLTM BN 112-01 (9/90)[1]
Taber	ASTM D1044, ASTM D3884, ASTM D4060, ASTM G195; Chrysler LP-463KB-21-01; Ford FLTM BN 108-02; GM9337P (12/98)[1], GM9515P (9/88)[1]; GMW3208; Honda HES D6506, HES D6507; SAE J948, SAE J1530, SAE J1847, SAE Z26.1

Test:	**Test Method:**
Abrasion (cont'd):	
Wyzenbeek	ASTM D4157; Chrysler LP-463KB-06-01, LP-463KC-22-01; GM9082P (11/88)[1], GM 9222P (9/88) [1]; SAE J948, SAE J1530
Chemical Stress Resistance	ASTM D896, ASTM D1693; Ford FLTM BO 101-05, FLTM BO 127-03, FLTM BO 130-01, FLTM BO 158-03, FLTM BP 008-05, FLTM BI 113-08; GM9308P (7/95)[1]; GMW14334, GMW14445; ISO 4599, ISO 22088-3; Tesla TP-0000703
Chip Resistance / Gravelometer	ASTM D3170; Chrysler LP-463PB-52-01; GMW14700; SAE J400
Cleanability	Chrysler LP-463KC-04-01, LP-463KC-04-02, LP-463KC-04-03; Ford FLTM BN 112-03, FLTM BN 112-08, FLTM BN 110-02; GM9156P (4/89) [1]; GMW3402, GMW14334, GMW15377; Hyundai/Kia MS-210-05[1]; ISO 26082-1; Nissan NES M0133
Color Evaluation	AATCC TM 173 (Evaluation Procedures 1, 2, and 8), AATCC EP1, AATCC EP2, AATCC EP8; ASTM D1003, ASTM D2244, ASTM E313; GM9101P (1/13)[1]; ISO 105-A02, ISO 105-A03; SAE J1545, SAE J1767
Compression	ASTM D395, ASTM D695, ASTM D1056, ASTM D1621, ASTM D1667, ASTM D3574, ASTM D3575; DIN 53457, DIN 53517, DIN 53577; Ford FLTM BN 015-06, FLTM BN 115-07, FLTM BO 013-02, FLTM BO 111-01, FLTM BO 111-02, FLTM BO 113-03, FLTM BO 113-04; Honda HES D6002; ISO 604, ISO 815, ISO 844, ISO 1856, ISO 3386; Nissan NES M0142; SAE J1352
Conditioning	ASTM D618; GMW3221; ISO 291; JIS Z8703
Crocking	AATCC TM 8; Chrysler LP-463PB-54-01; Ford FLTM BN 107-01, Ford FLTM BN 107-02; GM9033P (7/13)[1]; GMW3274; ISO 105-X12, ISO 20433; SAE J861

Test:	Test Method:
Density / Weight	ASTM D297 (Hydrostatic Method s.16.3), ASTM D792, ASTM D1056, ASTM D1475, ASTM D3574, ASTM D3575, ASTM D3776; Chrysler LP-463NB-15-01; DIN 53420, DIN 53479 (Method A); Honda HES D6002; ISO 171, ISO 845, ISO 1183-1 (Method A); SAE J315, SAE J860
Filler	ASTM D586, ASTM D1278, ASTM D1506, ASTM D2584, ASTM D4218, ASTM D5630 (Method B); DIN EN 60; Ford FLTM BO 006-01, FLTM BO 006-02, FLTM BV 150-10, FLTM BV 150-12; GM9010P (3/11)[1], GM9077P (9/88)[1], GM9194P (7/88)[1]; ISO 1172, ISO 3451, ISO 6964
Film Thickness	ASTM D4138 (Procedure A); GM9518P (7/88)[1]; ISO 2808 (Methods 6A-1, 6B)
Flammability	ASTM D635, ASTM D3801, ASTM D5132, ASTM D6413; BMW GS97038; Chinese GB 8410; Chrysler MS-JP-9; DIN 75200; Fiat 7-G2000; FMVSS 302; Ford FLTM BN 024-02; ES-E97B-1011014-AA; Fuji/Subaru TS 420-00-002; GM6090M (4/89)[1]; GMW3232; Honda HES D6003; HES C206; Hyundai/Kia MS-300-08; ISO 1326, ISO 3795; Mazda MES CF050C; Mercedes DBL5307.10; Mitsubishi ES-X60410; Nissan NES M0094, NES M0142; SAE J369; Toyota TSM 0500G, BSDM 0500; Volkswagen TL 1010; Volvo 104-0001
Flex	ASTM D790, ASTM D2097, ASTM D4475, ASTM D4476, ASTM D6182; DIN 53452, DIN 53457; Ford FLTM BN 002-03, FLTM BN 102-02, FLTM BN 102-04, FLTM BN 162-01; GM9143P (6/15)[1], GM9216P (1/93) [1]; GMW3390; Honda HES D6501; ISO 178, ISO 5402, ISO 14125; Jaguar Land Rover TPJLR.52.413; SAE J949; Toyota TSM 0501G, BSDM 0501

Test:	Test Method:
Flex Fold	Chrysler LP-463KB-28-01 (Method A and C), LP- 463LB-9-01; Ford FLTM BN 102-04, FLTM BO 113-04
Fluid Immersion / Extraction	ASTM D471, ASTM D570, ASTM D629, ASTM D870, ASTM D1667, ASTM D1815, ASTM D2842; Chrysler LP-463PB-31-01, LP-463TB-1-01, LP-463TB-13-01, LP-463PB-57-03; Coast Guard CGD 77-145; Ford FLTM BI 104-01, FLTM BO 029-03, FLTM BO 129-02, FLTM BO 157-01, FLTM BP 010-01, FLTM BP 117-01, FLTM BS 004-02; GM9454P (7/10)[1], GM9514P (2/03)[1]; Honda HES D2008[2], HES D6501; ISO 62, ISO 175, ISO 1817, ISO 6427, ISO 6916-1 (Annex E); SAE J913
Fogging	ASTM D1003, ASTM D5393-93[1]; Chrysler LP-463DB-12-01; DIN 75201; Ford FLTM BO 116-03 (7/90)[1]; Fuji/Subaru TS 420-00-032; GMW3235; Honda HES D6508; Hyundai/Kia MS-300-54; ISO 6452; Mazda MES MN401; Mitsubishi ES-X83217, ES-X83231; Nissan NES M0161, NES M7081; SAE J1756; Toyota TSM 0503G, BSDM 0503; Volkswagen PV 3015; Volvo 420-0003
Friction	ASTM D1894; Chrysler LP-463KB-29-01; Ford FLTM BN 014-03, FLTM BP 003-02; ISO 8295
Fungus / Mildew	AATCC TM 30 (Parts II, III); ASTM D5590, ASTM G21, ASTM E1428; Chrysler LP463KB-34-01; ES-8G13-19A672-AA; Ford FLTM BN 012-03; GM 9215P (9/88)[1;] GMW3259, GMW16124, GMW16128; ISO 846; Mahindra E01 1269; MIL STD 810C (Method 508); Nissan NES M0076
Gloss	ASTM C584, ASTM D523, ASTM D1455; Chrysler LP-463PB-11-01; Ford FLTM BI 110-01, FLTM BI 010-02; Honda HES D6501; ISO 2813

Test:	Test Method:
Hardness	ASTM D785 (R Scale), ASTM D2240 (Shore A, D), ASTM D3363; DIN 53505; Ford FLTM BI 151-01; Honda HES D6501; ISO 868, ISO 2039-2, ISO 7619-1; Nissan NES M0142
HDT (Heat Deflection Temperature) / VICAT / SOFT POINT	ASTM D648 (Method B), ASTM D1525; Chrysler LP-463TB-14-01; ISO 75, ISO 306; Toyota TSM 0501G; BSDM 0501
Humidity	ASTM D1735, ASTM D2247, ASTM D4585; Ford FLTM BQ 104-02; GM9329P (2/03)[1]; GMW14729; Honda HES D2008[2], HES D6501
Impact	ASTM D256, ASTM D3763, ASTM D4812, ASTM D5420, ASTM D6110; Chrysler LP-463KB-28-01-B, LP-463NB-13-01, LP-463TB-9-01; DIN 53453; Ford FLTM BI 108-01, FLTM BO 117-02, FLTM BO 151-01, FLTM BO 163-01, FLTM BV 101-01, FLTM BV 101-02; GM9011P (7/14)[1], GM9528P (7/94)[1], GM9904P (1/11)[1]; GMW14093, GMW17141; Honda HES D2500, HES D6501; ISO 179, ISO 180, ISO 6603-1, ISO 6603-2; Nissan NES M0134; Toyota TSM 0501G (Section 9.4); Volkswagen PV3905
Infrared Scan	ASTM D2124, ASTM E168, ASTM E1252 (Section 9.0); GM9740P (9/88)[1]
Low Temperature Brittleness	ASTM D746, ASTM D751 (Section 60), ASTM D1329, ASTM D1790, ASTM D1912, ASTM D2137; Chrysler LP-463DD-7-01, LP-463-LB-11-01; Ford FLTM BI 107-02, FLTM BN 102-01 (Method A), FLTM BN 128-01, FLTM BU 152-04; GMW14126, GMW14127; ISO 812, ISO 974; SAE J323 (Method A)
Melt Flow	ASTM D1238, ASTM D3364; Ford FLTM BO 021-01; ISO 1133, ISO 4440
Minking / Pilling	Chrysler LP-463KB-37-01; Ford FLTM BN 108-03, FLTM BN 108-14
Moisture Content	ASTM D6869; Ford FLTM BI 102-01, FLTM BI 120-08, FLTM BO 024-02; ISO 960 (Method A), ISO 15512 (Methods A and B); SAE J315
Moisture Vapor Transmission	Ford FLTM BU 001-01, FLTM BU 001-02; GM9450P

Test:	**Test Method:**
Odor	ASTM D4339; BSDM 0505 *(excluding water extraction);* Chrysler LP-463KC-09-01; Ford FLTM BO 131-01, FLTM BO 131-03; Fuji/Subaru TS300-00-001; GME 60276 (7/78)[1]; GMW3205; Honda HES D6507; Hyundai/Kia MS-300-34; PV3900; SAE J1351; Toyota TSM 0505G *(excluding water extraction);* VDA 270; Volvo 429-0001;
Oven / Exposure Cycle	ASTM D573, ASTM D751, ASTM D1056, ASTM D1509, ASTM D3012, ASTM D3045, ASTM D3574, ASTM D3575; Chrysler LP-463CB-10-01, LP-463DD-8-02, LP-463KC-15-01, LP-463LB-12-01, LP-463LB-13-01, LP-463PB-22-01, LP-463PB-36-01; Ford FLTM BN 113-02, FLTM BN 113-03, FLTM BO 012-01, FLTM BQ 104-07, FLTM BO 040 Procedure B; GM9131P (7/94)[1], GM9142P (6/15)[1], GM9200P (7/88)[1], GM9231P (10/99)[1], GM9504P (2/03)[1], GM9758P (3/98)[1]; GMW3221, GMW14124; Hyundai/Kia MS-210-05[2]; ISO 188, ISO 2578, ISO 2796, ISO 4577, ISO 2440; Nissan NES M0131, NES M0132, NES M0142; Tesla TP-0000706
Paint Adhesion	ASTM D3359, ASTM D5402; Chrysler LP-463LB-19-01; Ford FLTM BI 104-04, FLTM BI 106-01; GM4489P (6/97)[1], GM9160P (6/15)[1], GM9502P (11/88)[1], GM9506P (11/88)[1], GM9507P (9/88)[1]; GMW14333, GMW14829, GMW15891, GMW16745, GMW16746; Honda HES D6501; ISO 2409
Peel	ASTM D413, ASTM D751, ASTM D903, ASTM D1000, ASTM D3330; Chrysler LP-463AB-37-01, LP-463LB-10-01, LP-463TB-3-01, LP-463TB-11-01; Ford FLTM BN 113-01, FLTM BN 151-05, FLTM BO 101-06, FLTM BP 008-03; GM9207P (9/88)[1], GM9210P, GM9758P (3/98)[1], GM9795P (3/90)[1], GM9797P (3/11)[1]; GMW3220, GMW14132; Honda HES D6511; ISO 2411, ISO 6133, ISO 8033, ISO 8510-2; Magna WI-7145; SAE J912, SAE J1600 (4/87)[1], SAE J1907

Test:	**Test Method:**
Plastic (General)	BSDM 0501; GM7400M (12/13)[1,2], GM 7451M (1/11)[1,2], GM 7452M (3/07)[1,2]; Honda HES D2500, HES D2501, HES D2502; ISO 1923, ISO 4591; Toyota TSM 0501G;
Salt Spray / Corrosion	ASTM B117, ASTM B368, ASTM D1654, ASTM D2059; Fiat 50180; Ford FLTM BI 004-03, FLTM BI 103-01, FLTM BQ 007-02, FLTM BQ 105-01, GMW3286, GMW14458, GMW15282, GMW16862; Honda HES D6501; ISO 4611, ISO 4628-1, ISO 4628-2, ISO 4628-3, ISO 4628-8, ISO 9227; Nissan NES M0140, NES M4063 (Section 4.5.2); SAE J1389
Scuff / Mar	Chrysler LP-463DD-18-01, LP-463PB-54-01, LP-463PF-10938; Ford FLTM BN 108-04, FLTM BN 108-10, FLTM BN 108-13, FLTM BO 162-01; GMW14130, GMW14698; GMW14125 (Appendix F and H); SAE J365; Volvo 1024 3113
Seam Strength	ASTM D751, ASTM D1117, ASTM D1683, ASTM D4884; Chrysler LP-463KB-13-01; Ford FLTM BN 106-02, FLTM BN 119-01; GMW3405, GMW14145; Honda HES D6506, HES D6511; ISO 13935; Jaguar/Land Rover TPJLR.S2.414
Shear Strength	ASTM D732, ASTM D2344, ASTM D3163, ASTM D3164, ASTM D3846; Chrysler LP-463CB-1-02, LP-463CB-8-01; Ford FLTM BV 101-06; ISO 4585, ISO 4587, ISO 6237, ISO 6238; SAE J1523, SAE J1525
Shrinkage / Dimensional Stability	ASTM D955, ASTM D1204; Chrysler LP-463TB-10-01, LP-463TB-12-01; Ford FLTM BN 005-02, FLTM BN 105-01, FLTM BN 105-03, FLTM BO 129-01; GMW4217; ISO 294-4; Nissan NES M0602; SAE J315, SAE J883, SAE J1717

Test:	Test Method:
Stain	AATCC TM 15, AATCC TM 23, AATCC TM 107, AATCC TM 118; ASTM D925 (Methods A and B), ASTM D1712, ASTM D1913; Chrysler LP-463DD-06-01, LP-463KC-01-01, LP-463KC-03-01, LP-463NB-14-01, LP-463LB-05-01, LP-463PB-57-02, LP-463KC-21-01, LP-463KC-04-04, 7.M0021; Ford FLTM AN 101-01, FLTM AN 102-01, FLTM BI 113-01, FLTM BI 113-02, FLTM BI 113-03 (3/01), FLTM BI 113-05, FLTM BI 113-07, FLTM BN 103-01, FLTM BO 112-06, FLTM BP 115-01, FLTM BP 153-01, FLTM BU 105-01, FLTM BV 107-01, FLTM BO 061-01; GM9027P (9/88)[1], GM9214P (9/88)[1], GM9240P (9/88)[1], GM9317P (7/96)[1], GM9517P (11/88)[1], GM9689P (6/14)[1], GM9736P (7/88)[1], GM9902P (7/17)[1]; GMN8170 (8/02)[1], GMN10033 (4/04)[1]; GMW14069 (8/05) [1], GMW14102, GMW14131, GMW14141, GMW14296, GMW14445, GMW14864, GMW15891; ISO 105-G02, ISO 15701, ISO 3865 (Method A, B.1 and B.2), ISO 2812-4, ISO 5978, ISO 14419; Nissan NES M0142; SAE J322, SAE J1326; VDA 230-223
Stiffness	ASTM D747; Chrysler LP-463KB-25-01; Ford FLTM BN 157-01, FLTM BN 157-02; GMW16190; ISO 17235
Tear Strength:	
Die "C"	ASTM D624, ASTM D1004; ISO 34
Elmendorf	ASTM D751, ASTM D1117, ASTM D1424, ASTM D1922, ASTM D5734 (2008)[1]; ISO 6383
Stitch	ASTM D4705; GM9149P (6/15)[1]
Tongue	ASTM D751, ASTM D1117, ASTM D1938, ASTM D2261; Chrysler LP-463KB-3-01; DIN 53507; Honda HES D6511; ISO 4674-1 (Method B), ISO 6383, ISO 8067, ISO 13937-2
Trapezoid	ASTM D1117, ASTM D4533, ASTM D5587, ASTM D5733-99; Chrysler LP-463KB-3-01; GMW3326; Honda HES D6506

Test:	**Test Method:**
Tensile	ASTM D412, ASTM D461, ASTM D638, ASTM D751, ASTM D882, ASTM D1056, ASTM D1117, ASTM D2208, ASTM D2209, ASTM D2211, ASTM D2256, ASTM D3574, ASTM D3575, ASTM D3759, ASTM D3826, ASTM D4632, ASTM D5034, ASTM D5035; Chrysler LP-463KB-2-01, LP-463KB-22-01; DIN 53455, DIN 53457, DIN 53504, DIN 53571, DIN 53857; Ford FLTM BN 013-07, FLTM BN 121-01, FLTM BN 150-04, FLTM BP 116-01; GMN6753 (10/12)[1]; GMW3010, GMW3211, GMW14148, GMW14695; Honda HES D6506, HES D6507, HES D6511; ISO 37, ISO 527, ISO 1184, ISO 1421, ISO 1798, ISO 1926, ISO 2062, ISO 13934; Nissan NES M0142; SAE J855; Toyota TSM 0501G, BSDM 0501
Textile Construction	ASTM D737, ASTM D1777, ASTM D1813, ASTM D2061, ASTM D3774, ASTM D3775, ASTM D3776, ASTM D3882, ASTM F778, ASTM D751, ASTM D3887; Chrysler LP-463KB-14-01, LP-463LB-7-01; DIN 53584, DIN 53855; Ford FLTM BN 106-01, FLTM BN 108-08; GM 9146P (7/88)[1]; GMW3182, GMW3387, GMW4089, GMW4090, GMW4141, GMW4726, GMW14777; Honda HES D6506; ISO 2286-2, ISO 2286-3, ISO 2589, ISO 5084, ISO 9073-1, ISO 9073-2 (Method A); NES M7081; SAE J882;
Thermal Analysis	ASTM D3418, ASTM D3850, ASTM D3895, ASTM D4065, ASTM D5028, ASTM D5279, ASTM E793, ASTM E794, ASTM E1131, ASTM E1269, ASTM E1356, ASTM E1640; GM9094P (11/88)[1]; ISO 3146:1985[1] (Method C), ISO 11357-1, ISO 11357-2, ISO 11357-3, ISO11358-1, ISO 11359-1, ISO 113592, ISO 11359-3, ISO 1218 (Method B)
Thermal Expansion	ASTM D696, ASTM E831, ASTM E1545; Fiat 50560
Thermal Shock	Chrysler LP-463PB-64-01, LP.7M061; Ford FLTM BI 107-05; GM9525P (9/88)[1]; GMW15919; Hyundai/Kia MS-210-05[2]
Viscosity	ASTM D789 (Section 9.3), ASTM D1200, ASTM D2196; Ford FLTM BI 102-03, FLTM BI 111-01; ISO 307, ISO 1628

Test:	**Test Method:**
Volatile Loss	ASTM D1203; Chrysler LP-463DD-4-01, LP-463NA-1-01; Honda HES D6511; ISO 176
Warpage	Ford FLTM BS 002-01; SAE J315
Weathering	AATCC TM 16.2; ASTM D822, ASTM D1499, ASTM D2565, ASTM D4355, ASTM D4459, ASTM D5031, ASTM D5071, ASTM D7869, ASTM G152, ASTM G153, ASTM G155; Chrysler LP463 KB-12-01; Fiat 50451/01 (Method A); Ford FLTM BN 017-02, FLTM BN 117-01, FLTM BN 117-03, FLTM BO 015-03, FLTM BO 115-01, FLTM BO 115-02, FLTM BO 116-01; GM9125P (7/91)[1], GMW14162 (Method D); Honda HES D6501, HES D6511; ISO 105-B06 (Procedure 5), ISO 4892-1, ISO 4892-2, ISO 4892-4; JIS D0205; Nissan NES M0135, NES M0142; SAE J1885 (3/05)[1], SAE J1960 (10/04)[1], SAE J2412, SAE J2527; Toyota TSL 0601G (Methods A and E); Tesla TP-0000701
Wrinkling	Chrysler LP-463KB-24-01, LP-463-KB-32-01

[1] *This laboratory's scope contains withdrawn or superseded methods. As a clarifier, this indicates that the applicable method itself has been withdrawn or is now considered "historical" and not that the laboratory's accreditation for the method has been withdrawn.*

[2] *The laboratory is accredited for the test methods listed above. The accredited test methods are used in determining compliance with any material specifications included on this Scope; however, the inclusion of these material specifications on this Scope does not confer laboratory accreditation to the material specifications. Inclusion of these material specifications on this Scope also does not confer accreditation for every method embedded within the specification. Only the methods listed above on this Scope are accredited.*

Accredited Laboratory

A2LA has accredited

GHESQUIERE PLASTIC TESTING, INC.

Harper Woods, MI

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 11th day of January 2022.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 0079.01
Valid to December 31, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Mechanical«field» Scope of Accreditation.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that

Avery Dennison Fasteners Americas
224 Industrial Road
Fitchburg, MA 01420
USA

has established and applies
a Quality Management System for

Design and Manufacture of
Plastic Cable Tie, Swift and Staple Fastener products.
(with Product Design as per Chapter 8.3).

An audit was performed and has furnished proof
that the requirements according to

IATF 16949
First Edition 2016-10-01

are fulfilled.

Issue date: **2021-05-25**

Expiry date: **2024-05-24**

Certificate Registration No.: **12 111 23750 TMS**

IATF Certificate No.: **0401115**

Head of Certification Body
Munich, 2021-05-25

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstrasse 57 • 80339 München • Germany
www.tuev-sued.de/certificate-validity-check

TÜV®

ZERTIFIKAT • CERTIFICATE • 認證證書 • СЕРТИФИКАТ • CERTIFICADO • CERTIFICAT

America

CERTIFICATE

The Certification Body of
TÜV SÜD AMERICA INC.

hereby certifies that

Avery Dennison Fasteners Americas
224 Industrial Road
Fitchburg, MA 01420 USA

Has implemented a Quality Management System in accordance with:

ISO 9001:2015

The scope of this Quality Management System includes:

Design and Manufacture of Plastic Cable Tie, Swift and Staple Fastener Products

Certificate Expiry Date: July 1, 2024

Certificate Registration No: 951 12 5854

Issue Date: July 2, 2021

Reissue Date: N/A

Greg Bates
Director Business Assurance America

UCB_F_12.03 2012-02

Orion Registrar, Inc.

Thorough and Fair Auditing

Certificate of Certification

This is to certify the Environmental Management System of:

Avery Dennison Fastener Division

224 Industrial Road
Fitchburg, MA 01420 USA

Has been assessed by Orion Registrar and found to be in compliance with the following Environmental Management Standard:

ISO 14001:2015

The Environmental Management System is applicable to:

The Manufacturer of Plastic Injection Molded Fasteners

The Certification period is from

April 9, 2021 to April 28, 2024

This certification is subject to the company maintaining its system to the required standard, and applicable exceptions, which will be monitored by Orion.

Client ID: 1265 Certificate ID: 1022070

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17021-1 MANAGEMENT SYSTEMS CERTIFICATION BODY

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

Paul M. Burck, President — April 28, 2021 Date

7502 W. 80th Avenue, Suite 225, Arvada, Colorado 80003 | 303-456-6010 | FAX 303-456-6681 | www.orion4value.com
To authenticate this certificate, please visit: www.orion4value.com/about-orion/registered-companies/

Orion Registrar, Inc.

Thorough and Fair Auditing

Certificate of Certification

This is to certify the Occupational Health and Safety Management System of:

Avery Dennison Fastener Division

224 Industrial Road
Fitchburg, MA 01420 USA

Has been assessed by Orion Registrar and found to be in compliance with the following Occupational Health and Safety Standard:

ISO 45001:2018

The Occupational Health and Safety Management System is applicable to:

The Manufacturer of Plastic Injection Molded Fasteners

The Certification period is from

April 9, 2021 to April 28, 2024

This certification is subject to the company maintaining its system to the required standard, and applicable exceptions, which will be monitored by Orion.

Client ID: 1265 Certificate ID: 1022072

April 28, 2021

Paul M. Burck, President Date

7502 W. 80th Avenue, Suite 225, Arvada, Colorado 80003 | 303-456-6010 | FAX 303-456-6681 | www.orion4value.com
To authenticate this certificate, please visit: www.orion4value.com/about-orion/registered-companies/

Gage R&R

Calipers: ADC-503

Part Number: Cable Tie Thickness 5.567mm ± 0.7mm

Average & Range Method

		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
Appraiser 1	Trial 1	5.52	5.54	5.92	5.77	5.47	5.45	5.50	5.45	5.56	5.49	
Enter your data here->	Trial2	5.51	5.54	5.92	5.77	5.47	5.45	5.49	5.45	5.56	5.49	
	Trial3	5.50	5.54	5.92	5.78	5.47	5.45	5.49	5.46	5.56	5.49	
	Trial4											Reference
	Trial 5											5.567
Appraiser 2	Trial 1	5.52	5.50	5.95	5.78	5.47	5.45	5.50	5.44	5.56	5.48	
Enter your data here->	Trial2	5.52	5.50	5.95	5.79	5.47	5.45	5.50	5.45	5.56	5.48	
	Trial3	5.52	5.50	5.95	5.78	5.47	5.45	5.50	5.44	5.56	5.49	
	Trial4											Reference
	Trial 5											5.567
Appraiser 3	Trial 1	5.51	5.54	5.95	5.78	5.47	5.45	5.49	5.45	5.56	5.49	
Enter your data here->	Trial2	5.51	5.54	5.95	5.78	5.47	5.45	5.49	5.45	5.56	5.49	
	Trial3	5.51	5.54	5.95	5.78	5.47	5.45	5.49	5.45	5.56	5.48	
	Trial4											Reference
	Trial 5											5.567

Spec Tolerance	0.7

AIAG - Automotive Industry Action Group Formulas

	% Using TV	% Using Tolerance
EV (Equipment Variation)	0.0018	
%EV	**1.1%**	**1.5%**
AV: (Appraiser Variation)	0.00136	
%AV	**0.9%**	**1.2%**
R&R (Gage Capability)	0.0022	
%R&R	**1.4%**	**1.9%**
PV (Part Variation)	0.1545	
%PV	100.0%	132%
TV (Total Variation)	0.1545	

Gage System Okay

# Parts	#Trials	#Ops
10	3	3

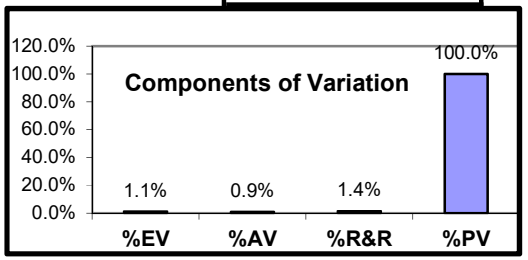
NDC 98

Equipment Variation (EV)	
% of Total Variation (TV)	
Appraiser Variation(AV)	
% of Total Variation (TV)	
Repeatability and Reproducibility (R&R)	
% of Total Variation (TV)	
Part Variation (PV)	
% of Total Variation (TV)	
Total Variation (TV)	

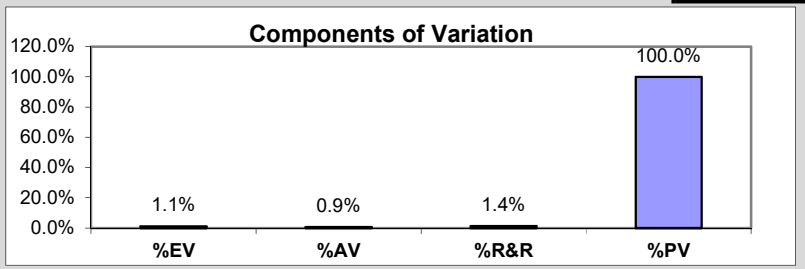
Wheeler GageR&R	
%EV	0%
%AV	0%
%R&R	0%
%PV	100%
	100%

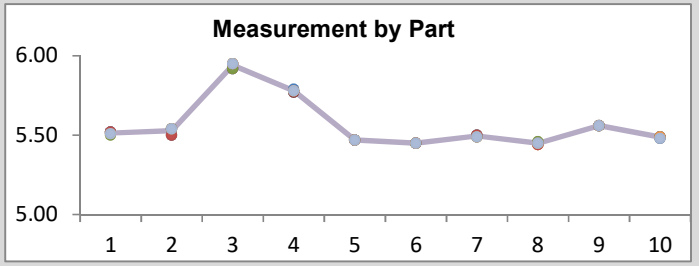
Calculate GageR&R using Anova

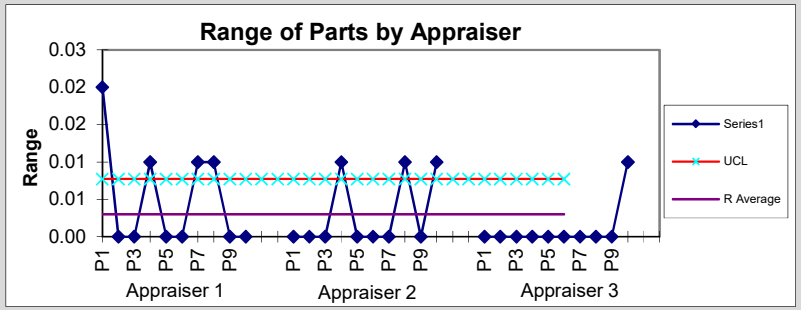
				With Interaction		Without Interaction	
Anova Source	**df**	**SS**	**MS**	**F**	**P**	**F**	**P**
Appraiser	2	0.0001	0.0001	6.4	0.008	0.886364	0.416
Parts	9	2.1361	0.237348	21361.29	0.000	2958.417	0.000
Appraiser x Part	18	0.0056	0.000311	27.95556	0.000		
Gage w AP Interaction	60	0.0007	0.0000				
Gage w/o AP Interaction	78	0.0063	0.0001				
Total	89	2.142529					

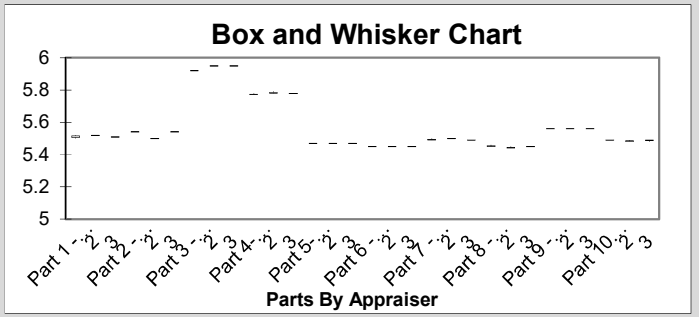


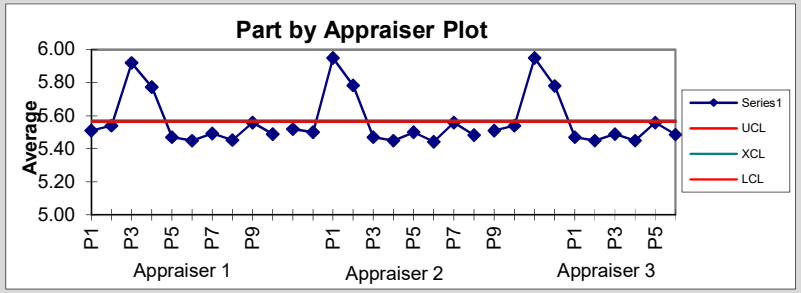
Gage Name:	ADC-503	Reported By:	William O'Malley, Quality Engineer
Date:	9/9/2022	Tolerance:	+-0.7mm
		Misc:	Gage System: OK/Passed

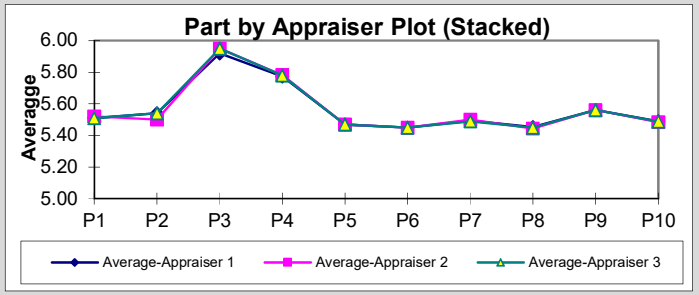












	Without Interaction				NDC 26		With Interaction				NDC 21	
Without Interaction	Estimate of Variance	Std. Dev		Total Variation	% Contribution	Total Variation Using Tolerance	Estimate of Variance	Std. Dev		Total Variation	% Contribution	Total Variation Using Tolerance
Repeatability	0.00008	0.008957	EV	**5.5%**	0%	**7.7%**	0.00001	0.003333	EV	**2.0%**	0%	**2.9%**
Appraiser	3.04E-07	0.000551	AV	**0.3%**	0%	**0.5%**	7.98E-06	0.002826	AV	**1.7%**	0%	**2.4%**
AppraiserxPart	0	0	INT	0.0%	0%	0.0%	9.98E-05	0.009992	INT	6.1%	0%	8.6%
R&R	0.00008	0.008974	R&R	**5.5%**	0%	**7.7%**	0.00012	0.010906	R&R	**6.7%**	0%	**9.3%**
Part	0.02636	0.162367	PV	99.8%	100%	139.2%	0.02634	0.162288	PV	99.8%	100%	139.1%
			TV	0.975689		0.116667			TV	0.97593		

Form # M&M F01 Rev 0

Gage R&R

OGP Vision System: Serial # SVL3024861 Part Number: Strap length 25.758mm ± 0.7mm Date: 09/09/2022

Average & Range Method

		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
Appraiser 1	Trial 1	25.324	25.756	26.238	26.391	24.587	24.892	25.756	25.273	26.645	26.822	
Enter your data here->	Trial2	25.324	25.705	26.213	26.391	24.587	24.917	25.730	25.248	26.645	26.822	
	Trial3	25.324	25.705	26.213	26.391	24.562	24.917	25.730	25.248	26.645	26.822	
	Trial4											Reference
	Trial 5											25.758
Appraiser 2	Trial 1	25.321	25.733	26.227	26.394	24.584	24.852	25.725	25.242	26.649	26.82	
Enter your data here->	Trial2	25.32	25.735	26.228	26.379	24.58	24.87	25.72	25.249	26.652	26.822	
	Trial3	25.315	25.737	26.228	26.381	24.584	24.871	25.733	25.243	26.652	26.822	
	Trial4											Reference
	Trial 5											25.758
Appraiser 3	Trial 1	25.322	25.714	26.227	26.384	24.589	24.891	25.73	25.248	26.645	26.821	
Enter your data here->	Trial2	25.321	25.712	26.226	26.379	24.585	24.891	25.73	25.248	26.645	26.825	
	Trial3	25.321	25.711	26.225	26.378	24.587	24.894	25.75	25.248	26.645	26.821	
	Trial4											Reference
	Trial 5											25.758

Spec Tolerance: 0.7

AIAG - Automotive Industry Action Group Formulas

	% Using TV	% Using Tolerance
EV (Equipment Variation)	0.0058	
%EV	**0.8%**	**5.0%**
AV: (Appraiser Variation)	0.00249	
%AV	**0.4%**	**2.1%**
R&R (Gage Capability)	0.0063	
%R&R	**0.9%**	**5.4%**
PV (Part Variation)	0.7044	
%PV	100.0%	604%
TV (Total Variation)	0.7045	

Gage System Okay

# Parts	#Trials	#Ops
10	3	3

NDC 158

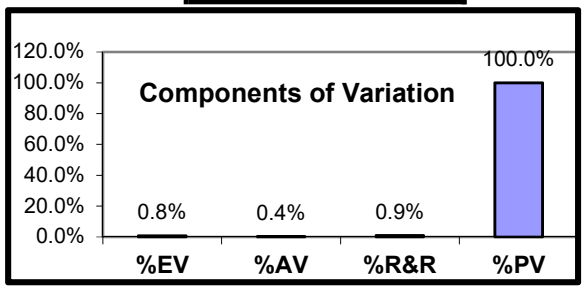
Equipment Variation (EV)	
% of Total Variation (TV)	
Appraiser Variation(AV)	
% of Total Variation (TV)	
Repeatability and Reproducibility (R&R)	
% of Total Variation (TV)	
Part Variation (PV)	
% of Total Variation (TV)	
Total Variation (TV)	

Wheeler GageR&R

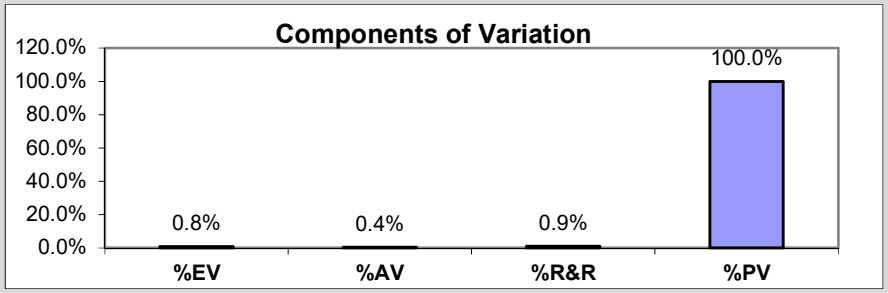
%EV	0%
%AV	0%
%R&R	0%
%PV	100%
	100%

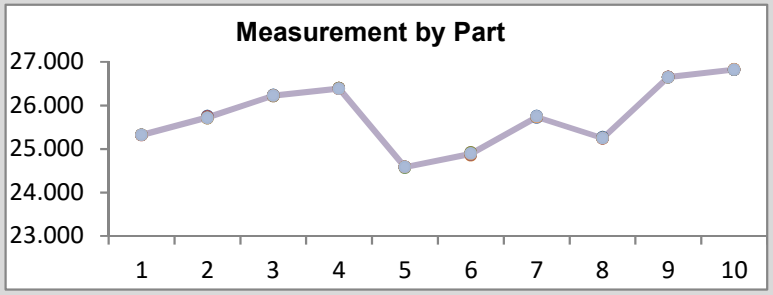
Calculate GageR&R using Anova

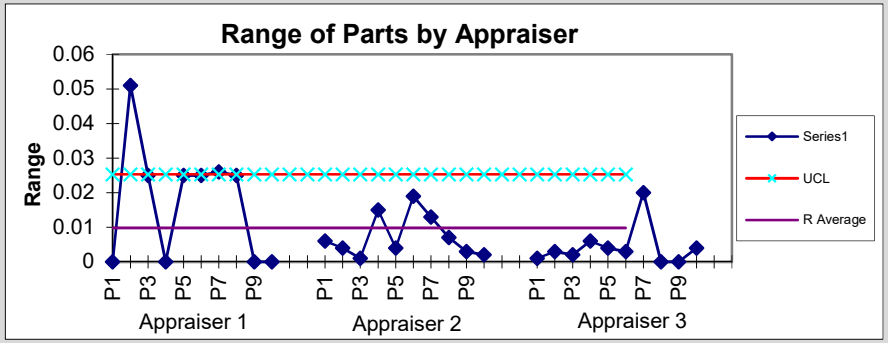
				With Interaction		Without Interaction	
Anova Source	**df**	**SS**	**MS**	**F**	**P**	**F**	**P**
Appraiser	2	0.0004	0.0002	2.7084	0.094	1.8350169	0.166
Parts	9	46.0995	5.1221683	65454	0.000	44347.777	0.000
Appraiser x Part	18	0.0043	0.0002396	3.0624	0.001		
Gage w AP Interaction	60	0.0047	0.0001				
Gage w/o AP Interaction	78	0.0090	0.0001				
Total	89	46.108947					

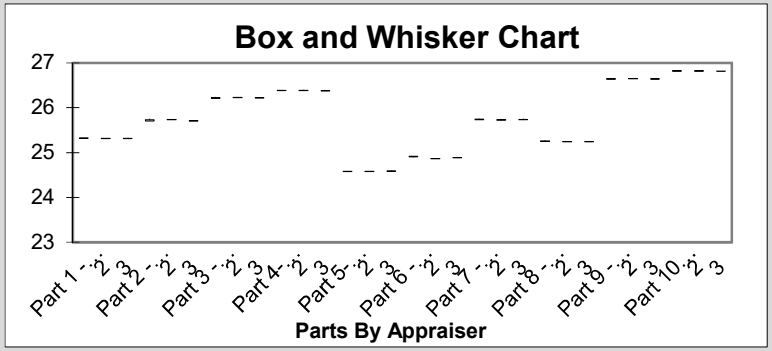


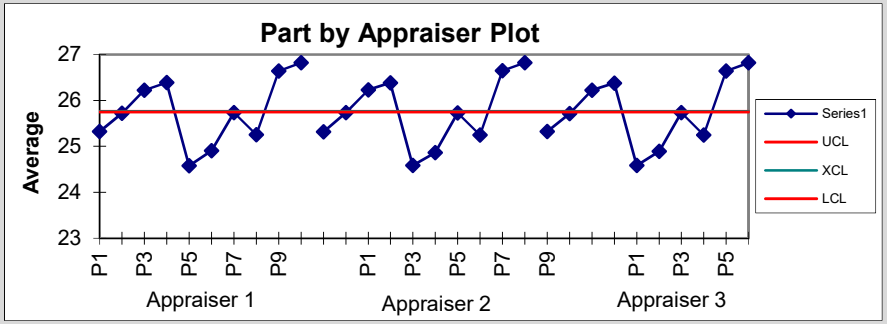
Gage Name:	SVL3024861	Reported By:	William O'Malley, Quality Engineer
Date:	9/9/2022	Tolerance:	+-0.7mm
		Misc:	Gage System: OK/Passed

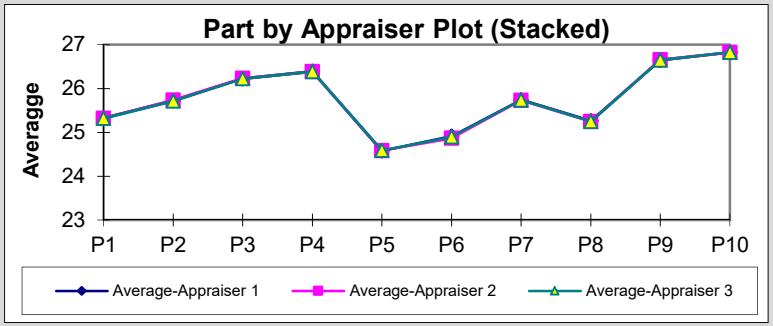












	Without Interaction				NDC 98		With Interaction				NDC 92	
Without Interaction	Estimate of Variance	Std. Dev		Total Variation	% Contribution	Total Variation Using Tolerance	Estimate of Variance	Std. Dev		Total Variation	% Contribution	Total Variation Using Tolerance
Repeatability	0.00012	0.0107471	EV	**1.4%**	0%	**9.2%**	0.00008	0.0088462	EV	**1.2%**	0%	**7.6%**
Appraiser	3.215E-06	0.001793	AV	**0.2%**	0%	**1.5%**	9.235E-07	0.000961	AV	**0.1%**	0%	**0.8%**
AppraiserxPart	0	0	INT	0.0%	0%	0.0%	5.38E-05	0.0073347	INT	1.0%	0%	6.3%
R&R	0.00012	0.0108956	R&R	**1.4%**	0%	**9.3%**	0.00013	0.0115315	R&R	**1.5%**	0%	**9.9%**
Part	0.56912	0.7543984	PV	100.0%	100%	646.6%	0.56910	0.7543893	PV	100.0%	100%	646.6%
			TV	4.5269		0.1166667			TV	4.52686		

Accredited Laboratory

A2LA has accredited

QUALITY DISCOUNT CALIBRATION (QDC)

North Andover, MA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets *R205 – Specific Requirements: Calibration Laboratory Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 27th day of November 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4699.01
Valid to November 30, 2022

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

Accredited Laboratory

A2LA has accredited

QUALITY DISCOUNT CALIBRATION (QDC)

North Andover, MA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets *R205 – Specific Requirements: Calibration Laboratory Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 27th day of November 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4699.01
Valid to November 30, 2022

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200972-0

Essco Calibration Laboratory

Chelmsford, MA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Calibration Laboratories

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2022-06-21 through 2023-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

Certificate US95/0293

The management system of

INSTRON

825 University Ave.
Norwood, MA 02062, United States

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities:

Design, development, manufacture and order fulfilment carried out in the Norwood CoE on instruments, systems, and associated accessories used worldwide to determine the physical properties and characteristics of materials. Administration of Sales & Service operations in the US and Canada, including installation and training are also covered.

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.

This certificate is valid from 12 September 2020 until 12 September 2023
and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 60 days before the expiration date.
Issue 13. Certified since October 1995.

The audit leading to this certificate commenced on 24/08/2020.
Previous issue certificate validity date was until 12/09/2020.

Authorized by:

Dan Seal

Dan Seal
Technical Accreditation Manager, Certification &
Business Enhancement North America
SGS North America, Inc.
201 Route 17 North, Rutherford, NJ 07070, USA
t (201) 508-3000 f (201) 935-4555 www.us.sgs.com

This certificate remains the property of SGS and shall be returned upon request.

CERTIFICATE OF CALIBRATION

ISSUED BY: INSTRON CALIBRATION LABORATORY

DATE OF ISSUE:
29-Jul-2022

CERTIFICATE NUMBER:
025072922093237

NVLAP CALIBRATION
NVLAP Lab Code 200301-0

Instron
825 University Avenue
Norwood, MA 02062-2643
Telephone: (800) 473-7838
Fax: (781) 575-5750
Email: service_requests@instron.com

APPROVED SIGNATORY

Type of Calibration: **Force**
Relevant Standard: **ASTM E4-21**
Date of Calibration: **29-Jul-2022**
Customer Requested Due Date: **31-Jul-2023**

Customer

Name:	Avery Dennison
Address:	224 Industrial Road Fitchburg, MA 01420 United States
Contact:	William O'Malley
Email:	william.omalley@averydennison.com
Service Order No.:	SV2206100067@@1
P.O./Contract No.:	CONT2218_5

Machine

Manufacturer:	Instron
Serial No.:	5943B11114
System ID:	5943B11114
Range Type:	Single

Transducer

Manufacturer:	Instron
Serial No.:	2580-105/304302
Capacity:	112.4045 lbf
Type:	Tension/Compression

Classification

Indicator 1. - Service Port - PASSED**

Certification Statement

This confirms that the forces calibrated with machine indicator(s) (listed above) that are identified as “PASSED” are WITHIN ±1% accuracy, 1% repeatability, and zero return tolerance. The assessment of the testing machine was conducted on site at the above customer location in accordance with ASTM E4-21 "Standard Practices for Force Verification of Testing Machines" using Instron procedure ICA-8-69. The Simple Acceptance decision rule has been agreed to and employed in the determination of conformance to the identified metrological specification. The verification is based on runs 1 and 2 only. A third run is taken to satisfy uncertainty requirements according to ISO 17025 specifications.

The calibration and equipment used conform to a controlled Quality Assurance program which meets the specifications outlined in ANSI/NCSL Z540.1-1994, ISO 10012:2003, ISO 9001:2015, ISO/IEC 17025:2017.

**** within ±0.5% accuracy and 0.5% repeatability.**

Method

The system was calibrated in the 'As Found' condition with no adjustments or repairs carried out. This is also the 'As Left' condition.

Instron CalproCR Version 3.50

CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
025072922093237

The load cell indicated on this certificate was removed from the force measuring system and verified per ASTM E4, Annex A1.3.

Summary of Results

Temperature at start of calibration: 73.00 °F.

Indicator 1. - Service Port (lbf)

Range Full Scale (%)	Tested Force Range (lbf)	Mode	ASTM E4 Max Error (%)	ASTM E4 Max Repeat Error (%)	Zero Return	Resolution (lbf)	ASTM E4 Lower Limit (lbf)
100	0.231375 to 112.3727	T	0.09	0.03	Pass	0.00028101	0.056202
	-0.231375 to -112.4013	C	0.08	0.11	Pass	0.00028101	0.056202

Temperature at end of calibration: 73.50 °F.

Data Summary - Indicator 1. - Service Port (lbf)

TENSION

% of Range	Run 1 Error (lbf)	Run 1 Error (%)	Run 2 Error (lbf)	Run 2 Error (%)	Run 3 Error (lbf)	Run 3 Error (%)	ASTM E4 Repeat Error (%)
100% Range (Full Scale: 112.3727 lbf)							
0.2	0.0001	0.05	0.0001	0.05	0.0000	0.01	0.00
0.4	0.0002	0.04	0.0003	0.06	0.0002	0.04	0.02
0.8	0.0003	0.03	0.0005	0.05	0.0006	0.06	0.02
1.4	0.0005	0.03	0.0007	0.05	0.0004	0.03	0.02
2	0.0002	0.01	0.0009	0.04	0.0006	0.03	0.03
4	0.0047	0.09	0.0029	0.06	-0.0002	0.00	0.03
8	0.0062	0.07	0.0040	0.04	0.0001	0.00	0.03
14	0.0052	0.03	0.0042	0.03	-0.0065	-0.04	0.00
20	0.0029	0.01	0.0055	0.02	-0.0150	-0.07	0.01
40	0.0142	0.03	0.0011	0.00	-0.0147	-0.03	0.03
60	0.0241	0.03	0.0049	0.01	0.0101	0.01	0.02
80	0.0404	0.04	0.0271	0.03	0.0138	0.02	0.01
100	0.0546	0.05	0.0483	0.04	0.0317	0.03	0.01

Data Summary - Indicator 1. - Service Port (lbf)

COMPRESSION

% of Range	Run 1 Error (lbf)	Run 1 Error (%)	Run 2 Error (lbf)	Run 2 Error (%)	Run 3 Error (lbf)	Run 3 Error (%)	ASTM E4 Repeat Error (%)
100% Range (Full Scale: -112.4013 lbf)							
0.2	-0.0001	0.05	00.0000	0.01	-0.0001	0.05	0.04
0.4	-0.0003	0.06	0.0000	0.00	-0.0002	0.04	0.06
0.8	-0.0005	0.05	-0.0007	0.08	-0.0005	0.05	0.03
1.4	-0.0011	0.07	-0.0008	0.05	-0.0011	0.07	0.02
2	0.0013	-0.06	-0.0010	0.05	-0.0010	0.05	0.11
4	-0.0004	0.01	0.0000	0.00	0.0004	-0.01	0.01
8	0.0005	-0.01	-0.0011	0.01	-0.0004	0.00	0.02

CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
025072922093237

Data Summary - Indicator 1. - Service Port (lbf)

COMPRESSION

% of Range	Run 1 Error (lbf)	Run 1 Error (%)	Run 2 Error (lbf)	Run 2 Error (%)	Run 3 Error (lbf)	Run 3 Error (%)	ASTM E4 Repeat Error (%)
100% Range (Full Scale: -112.4013 lbf)							
14	0.0022	-0.01	-0.0036	0.02	-0.0002	0.00	0.03
20	-0.0038	0.02	-0.0067	0.03	-0.0052	0.02	0.01
40	-0.0155	0.03	-0.0140	0.03	-0.0157	0.03	0.00
60	-0.0307	0.04	-0.0366	0.05	-0.0324	0.05	0.01
80	-0.0446	0.05	-0.0504	0.06	-0.0480	0.05	0.01
100	-0.0692	0.06	-0.0701	0.06	-0.0657	0.06	0.00

Data - Indicator 1. - Service Port (lbf)

TENSION

% of Range	Run 1 Indicated (lbf)	Run 1 Applied (lbf)	Run 2 Indicated (lbf)	Run 2 Applied (lbf)	Run 3 Indicated (lbf)	Run 3 Applied (lbf)	Uncertainty of Measurement* Relative %	Uncertainty of Measurement* (+/- lbf)
100% Range (Full Scale: 112.3727 lbf)								
0 Return	-0.0094		-0.0211		-0.0382			
0.2	0.2315	0.231375	0.2315	0.231375	0.2314	0.231375	0.15	0.00035
0.4	0.4409	0.440715	0.4410	0.440715	0.4409	0.440715	0.14	0.00060
0.8	0.8817	0.881429	0.8819	0.881429	0.8820	0.881429	0.13	0.0012
1.4	1.5430	1.5425	1.5432	1.5425	1.5429	1.5425	0.13	0.0020
2	2.2038	2.20357	2.2045	2.20357	2.2042	2.20357	0.13	0.0029
4	5.1549	5.1502	5.1124	5.1095	5.0323	5.0325	0.14	0.0070
8	8.9459	8.9397	8.9800	8.976	8.9123	8.9122	0.13	0.012
14	15.7319	15.7267	15.7056	15.7014	15.6190	15.6255	0.14	0.021
20	22.2240	22.2211	22.1760	22.1705	22.2941	22.3091	0.14	0.031
40	45.2682	45.254	45.2485	45.2474	45.1997	45.2144	0.13	0.060
60	70.3020	70.2779	70.3301	70.3252	70.2759	70.2658	0.13	0.090
80	90.2701	90.2297	90.3459	90.3188	90.3304	90.3166	0.13	0.12
100	112.4273	112.3727	112.4078	112.3595	112.4363	112.4046	0.13	0.14

Data - Indicator 1. - Service Port (lbf)

COMPRESSION

% of Range	Run 1 Indicated (lbf)	Run 1 Applied (lbf)	Run 2 Indicated (lbf)	Run 2 Applied (lbf)	Run 3 Indicated (lbf)	Run 3 Applied (lbf)	Uncertainty of Measurement* Relative %	Uncertainty of Measurement* (+/- lbf)
100% Range (Full Scale: -112.4013 lbf)								
0 Return	0.0448		0.0246		0.0200			
0.2	-0.2315	-0.231375	-0.2314	-0.231375	-0.2315	-0.231375	0.15	0.00035
0.4	-0.4410	-0.440715	-0.4407	-0.440715	-0.4409	-0.440715	0.14	0.00061
0.8	-0.8819	-0.881429	-0.8821	-0.881429	-0.8819	-0.881429	0.13	0.0012
1.4	-1.5436	-1.5425	-1.5433	-1.5425	-1.5436	-1.5425	0.13	0.0020
2	-2.2023	-2.20357	-2.2046	-2.20357	-2.2046	-2.20357	0.15	0.0033
4	-5.1011	-5.1007	-5.0721	-5.0721	-5.1333	-5.1337	0.13	0.0065

CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
025072922093237

Data - Indicator 1. - Service Port (lbf)

COMPRESSION

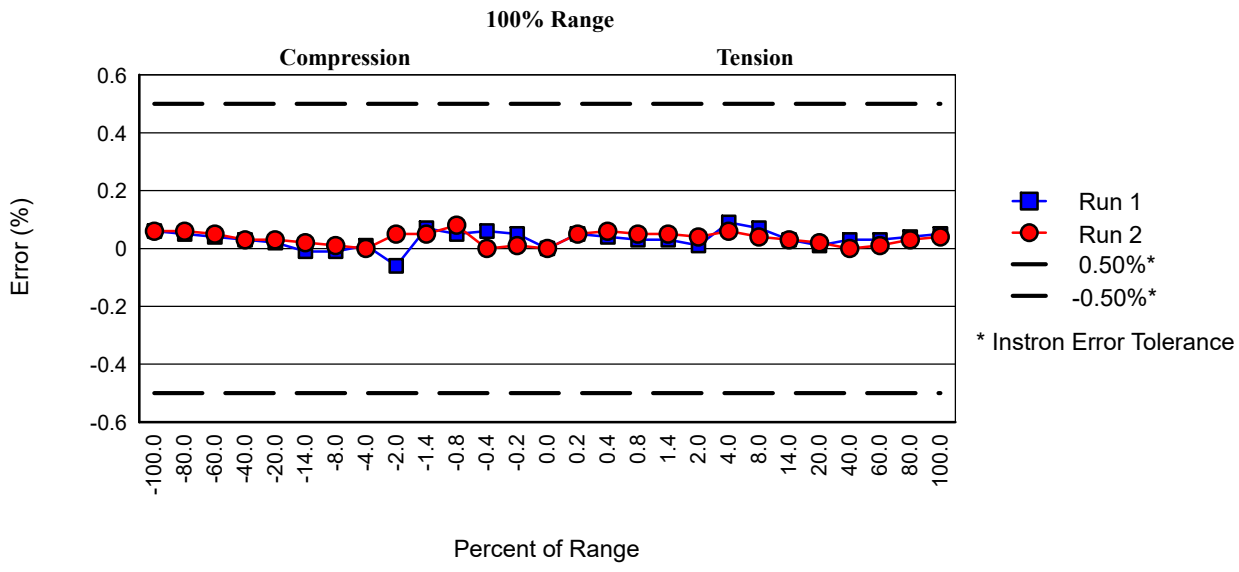
% of Range	Run 1 Indicated (lbf)	Run 1 Applied (lbf)	Run 2 Indicated (lbf)	Run 2 Applied (lbf)	Run 3 Indicated (lbf)	Run 3 Applied (lbf)	Uncertainty of Measurement* Relative %	Uncertainty of Measurement* (+/- lbf)
100% Range (Full Scale: -112.4013 lbf)								
8	-9.1812	-9.1817	-9.0728	-9.0717	-9.2470	-9.2466	0.13	0.012
14	-16.1832	-16.1854	-16.2110	-16.2074	-16.2274	-16.2272	0.13	0.021
20	-22.1831	-22.1793	-22.2157	-22.209	-22.2571	-22.2519	0.13	0.028
40	-45.4180	-45.4025	-45.4143	-45.4003	-45.3984	-45.3827	0.13	0.058
60	-70.3042	-70.2735	-70.3112	-70.2746	-70.3697	-70.3373	0.13	0.090
80	-90.4745	-90.4299	-90.5045	-90.4541	-90.5175	-90.4695	0.13	0.12
100	-112.4672	-112.398	-112.4714	-112.4013	-112.4516	-112.3859	0.13	0.14

** The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.*

The uncertainty stated refers to values obtained during the calibration and makes no allowances for factors such as long-term drift, temperature and alignment effects - the influence of such factors should be taken into account.

The Return to Zero tolerance is +/- the indicator resolution, 0.1% of the maximum force calibrated in the range, or 1% of the lowest force calibrated in the range, whichever is greater.

Graphical Data - Indicator 1. - Service Port (lbf)



CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
025072922093237

Calibration Equipment

The measurement results produced with Instron standards are traceable to the SI (The International System of Units) through internationally recognized National Metrology Institutes (NIST, NPL, PTB, Inmetro, etc.).

Make/Model	Equipment ID	Description	Calibration Agency	Capacity	Cal Date	Cal Due
Extech 445580	1006278	temp. indicator	Masy	NA	01-Mar-2022	01-Mar-2024
Flintec 10529872	10529872	load cell	Instron	245 lbf	21-Sep-2021	21-Sep-2022
Interface 9840	93106	force indicator	Instron	NA	11-Feb-2021	11-Feb-2023
Troemner Dead Weights - Metric	79 (Metric)	dead weight set	Instron	NA	14-Nov-2017	14-Nov-2022

The value of acceleration due to gravity used to calculate the force exerted by the mass was 9.80349 m/s².

Calibration Equipment Usage

Range Full Scale (%)	Mode	Equipment ID	Percent(s) of Range	Lower Limit for Standard (lbf)	Accuracy (+/-)
100	T	79 (Metric)	0.2/ 0.4/ 0.8/ 1.4/ 2	NA	0.1% of nominal mass
		10529872	4/ 8/ 14/ 20/ 40/ 60/ 80/ 100	Class A1: 5	0.1% of reading
100	C	79 (Metric)	0.2/ 0.4/ 0.8/ 1.4/ 2	NA	0.1% of nominal mass
		10529872	4/ 8/ 14/ 20/ 40/ 60/ 80/ 100	Class A1: 4	0.1% of reading
All	T/C	1006278	All	NA	1.8 °F

The standard Class A lower limit is used for systems with an accuracy of +/-1.0% and the standard Class A1 lower limit is used for systems with an accuracy of +/-0.5%.

The accuracy of the force indicator used with an elastic device is incorporated into the device's stated accuracy.

The accuracy of the calibration equipment used was equal to or better than the accuracy indicated in the table above.

Standard forces have been temperature compensated as necessary.

Comments

Verified by: Alex Belanger
Field Service Engineer

NOTE: Clause 16 of ASTM E4 states; It is recommended that testing machines be verified annually or more frequently if required. In no case shall the time interval between verifications exceed 18 months (except for machines in which long term test runs beyond the 18 month period). Testing machines shall be verified immediately after repairs that may in any way affect the operation of the weighing system or values displayed. Verification is required immediately after a testing machine is relocated and where there is a reason to doubt the accuracy of the force indicating system, regardless of the time interval since the last verification.

CERTIFICATE

TÜVRheinland®
Precisely Right.

TUV Rheinland of North America, Inc.
295 Foster Street, Suite 100, Littleton, MA 01460

Hereby certifies that

AMETEK Brookfield
3375 N. Delaware Street
Chandler, AZ 85225
USA

has established and maintains a quality management system for the

Design, Manufacturing, Service, Repair, Field Support and Calibration of AMETEK Brookfield Moisture and Toxic Gas Analyzers and Accessories

An audit was performed and documented in Report No 4189/01.
Proof has been furnished that the requirements according to

ISO 9001:2015

are fulfilled.
Further clarification regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by contacting TRNA.

This certificate is valid only when used in conjunction with certificate 74 300 4189

Certificate Registration No.

74 300 4189/01

Certificate Issue Date
August 1, 2020

Certificate Expiration Date
July 31, 2023

Reissue Date: 5/14/2020

Certification of Management Systems

CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

New Bedford Scale & White Scale Co

144 Francis Street
New Bedford, MA 02740

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 25 July 2023
Certificate Number: AC-2485

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

New Bedford Scale & White Scale Co

144 Francis Street
New Bedford, MA 02740
Tammy Correia
800-562-9042

CALIBRATION

Valid to: **July 25, 2023** Certificate Number: **AC-2485**

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Ultra-Micro Balance [1] (1 µg resolution)	Up to 5 g	0.000 018 g	ASTM Class 1 weights
Micro Balance [1] (0.001 mg resolution)	Up to 21 g	0.000 38 g	
Semi-micro Balance [1] (0.01 mg resolution)	Up to 210 g	0.000 18 g	
Analytical Balances [1] (0.1 mg resolution)	Up to 120 g	0.000 41 g	ASTM Class 1 weights
Semi-analytical Balances [1] (0.001 g resolution)	Up to 5 200 g	0.002 7 g	ASTM Class 1 weights
Precision Balances [1] (0.01 g resolution)	Up to 14 000 g	0.026 g	ASTM Class 1 weights
Precision Balances [1] (0.1 g resolution)	Up to 150 kg	0.13 g	ASTM Class 1 weights
Scales [1]			ASTM Class F weights
(0.001 lb resolution)	Up to 10 lb	0.001 3 lb	
(0.005 lb resolution)	Up to 50 lb	0.006 5 lb	
(0.01 lb resolution)	Up to 100 lb	0.012 lb	
(0.05 lb resolution)	Up to 500 lb	0.059 lb	
(0.5 lb resolution)	Up to 5 000 lb	0.08 lb	

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 (k=2), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2485.

R. Douglas Leonard Jr., VP, PILR SBU