

## Part Submission Warrant

Part Name RET WIRH HRNS TIE STRAP Cust. Part Number FU5T-14E047-UA / FU5T-14E047-UA  
 Shown on Drawing No. FU5T-14E047-UA Org. Part Number 157-00218  
 Engineering Change Level AELE-E-12982958-026 Dated 28.05.2018  
 Additional Engineering Changes n/a Dated n/a  
 Safety and/or Government Regulation ☐ Yes ☒ No Purchase Order No. 157-00218 Weight (kg) 0,0025  
 Checking Aid No. n/a Checking Aid Engineering Change Level n/a Dated n/a

### ORGANIZATION MANUFACTURING INFORMATION

HellermannTyton GmbH DUNS: 315430892

Organization Name & Supplier/Vendor Code

Großer Moorweg 45

Street Address

Tornesch

25436

Germany

City

Region

Postal Code

Country

Production Location: USA

### CUSTOMER SUBMITTAL INFORMATION

Nursan

Customer Name/Division

( 30471 )

Gulcin Akbas

Buyer/Buyer Code

Ford

Application

### MATERIALS REPORTING

Has customer-required Substances of Concern information been reported?

☒ Yes ☐ No ☐ n/a

Submitted by IMDS or other customer format:

ID: 612512853

Are polymeric parts identified with appropriate ISO marking codes?

☐ Yes ☐ No ☒ n/a

### REASON FOR SUBMISSION (Check at least one)

- ☒ 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.  
☒ 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 organization's manufacturing location.

### SUBMISSION RESULTS

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package

These results meet all design record requirements: ☒ Yes ☐ No (If "No" - Explanation Required)

Mold / Cavity / Production Process

injection moulding / serial mold

### 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 confidential pcs / 24 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: We hereby affirm that our production rate is able to fulfill customer demands.

Is each Customer Tool properly tagged and numbered?

☐ Yes ☐ No ☒ n/a

Organization Authorized Signature i.A.

Date

6-Dec-18

Print Name i.A. S. Fölster

Phone No.

+49 4122 701 5722

Fax No.

+49 4122 701 241

Title Quality Assistant

E-mail

stefan.foelster@hellermanntyton.de

### FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Customer Signature

Date

Print Name

Customer Tracking Number (optional)





Internal PB-No.:

66960

## Production Part Approval Material Test Results

[illegible]

Blanket statements of conformance are unacceptable for any test results.

<u>SIGNATURE</u>	<u>TITLE</u>	<u>DATE</u>
	Quality Assistant	6-Dec-18





Ascend Performance Materials Operations LLC  
Nylon Plastics and Polymers  
3000 Chemstrand Road  
Cantonment, FL 32533  
Telephone: (850) 968-7000

TYTON CORPORATION  
P.O. BOX 23055  
Milwaukee, WI 53224  
Attention: QUALITY DEPARTMENT  
  
Customer Part No: UR0HIRHS9  
Container ID: 1777469

Certificate Date: 18-MAY-17  
Delivery No: 382377869  
Shipped Qty: 20,700.000 Lbs  
(9,389.520 Kgs)  
Customer P.O. No: 103253

### Certificate of Analysis

This certifies that the Nylon Resin shipped to you from Ascend Performance Materials Operations, LLC has been tested and found to meet the required specifications.

This material was produced under a Quality System that meets ISO/TS16949:2009 criteria.

This Nylon Resin meets the relevant requirements of Directive 2011/65/EU ("RoHS 2 Directive") including all amendments through Directive 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and Directive 2012/19/EU on waste electrical and electronic equipment ("WEEE Directive").

If you have questions or concerns about this Certificate of Analysis, please contact Ascend Performance Materials Customer Operations at 1-888-927-2363.

This product meets the requirements of the following specifications: SAE J1639, SAE J1639 PA0171, ASTM D6779-PA0161-Z1Z2, ASTM 4066 PA0161, FMVSS 302, Chrysler CPN-1826, ESB-M4D178-A2, WSS-M99P23-C1/C2, WSS-M99P9999-A1, WSS-M4D706B1, WSS-M99P1111-A, WSK-M4D706-A, GMW16447P-PA66-T2, GMW16558P-PA66-T1 and GMP.PA66.015.

Material Type: VYDYNE 47H NT Q527      Material No:10366059      Batch No FD17FY02      Date of Mfg 17-APR-2017

#### Ascend Performance Materials Operations LLC Specification

<u>Lot Data</u> <u>Property</u>	<u>Test Method</u>	<u>Min</u>	<u>Max</u>	<u>Result</u>	<u>Units</u>
Moisture	ASTM D6869	0.05	0.20	0.17	%
Strength @ Yld	ISO 527 1-2	60		63	MPa
Notched Izod	ISO 180 / 1A	12.0		18.5	kJ/m^2
Flex Modulus	ISO 178	1900		2404	MPa
Density	ISO 1183	1.09	1.11	1.10	g/cm^3
DTUL, 1.82 MPA	ISO 75 1-2	53.0		67.8	C

Note: This certificate is generated and controlled by electronic means. No signature is required. This document may not be reproduced, except in full, without written consent of the Nylon Plastics and Polymers Department, Ascend Performance Materials Operations LLC.

All information contained in this letter is provided for informational purposes only and is not meant to alter or waive the appropriate contractual product specifications. Moisture values are representative of the product at the time it was sampled. If numerical flame spread ratings appear herein, they are not intended to reflect the hazards presented by this or any other material under actual fire conditions. Each end user should determine whether potential fire hazards are associated with the finished product, and whether this resin is suitable for the particular end use.

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**POTENTIAL  
FAILURE MODE AND EFFECTS ANALYSIS  
(PFMEA)**

PFMEA Number: **MFMEA-1**

Part Number / Name: Cable Ties - Various Materials Process Responsibility: HellermannTyton Prepared by: Quality Assurance  
 Model Year(s) / Vehicle(s): NA Key Date: 3/11/1994 PFMEA Date Org: 3/11/1994 Rev. Date: See Footer  
 Core Team: Quality Assurance, Manufacturing, Automation, Receiving-Shipping Rev. Level: See Footer

Item & Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occurrence	Current Design Controls -Prevention -Detection	Detection	R P N	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	Severity	Occurrence	Detection	R P N
1-4 Incoming Receiving	Cert matches material and P.O. request	Unacceptable Moisture Levels	Cannot Manufacture	5	PTC	Shipping Damage	2	D - Incoming Inspection P - Material Certs	8	80	None						0
				5	PTC	Material received with moisture too high/low	2	D - Incoming Inspection P - Material Certs	8	80	None						0
		Improperly labeled	Delay in Manufacturing	4		Material received with wrong/missing label	2	D - Incoming Inspection P - Material Certs	8	64	None						0
5-8 Material Ratio  Central Material Handling System Operation	Acceptable material for production	Unacceptable Moisture Levels	Part Non-Compliance	5		Dryer malfunction	2	D - Dryer Alarms D - Moisture Testing P - Filter Cleaning P - Moisture Testing	2	20	None						0
		Contamination	Part Non-Compliance	5		Foreign Matter in Material	2	D - Visual Inspections P - Material Handling Work Instruction w/ color-coded containers	6	60	None						0
			Part Non-Compliance	5		Unlike Materials Mixed Together	2	D - Visual Inspections P - Material Handling Work Instruction	5	50	None						0
		Incorrect Material	Part Non-Compliance	6		Wrong material hook-up at press	2	D/P - Visual to Work Order	5	60	None						0
9 Molding Machine Set-up	Instructions for production	Work Order Set Up Incorrectly	Delay in Manufacturing	4		Work Order read incorrectly	2	D/P - Work Order D - Set-up Verification P-Computers at workstations	5	40	None						0
		Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material blender set incorrectly	2	D/P - Visual to Work Order D- Quality Tree	7	70	None						0
		Excess Plastic on Ties	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - Process Inspections	7	70	None						0

				5		Improper start-up	1	D - Visual Inspection, Quality Tree D - LPA at startup P - Final Inspections	5	25	None						0
		Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D-Audible alarms added to all Thermolator to detect temp. dev. D - Process Inspections P - First Piece Approvals D - Hand Insertion	3	15	None						0
				5		Incorrect Tonnage	2	D- Visual Inspections D- Hand Insertions P - First Piece Approvals P - In Process PM's	5	50	None						0
				5		Start-up/Cycle Interruptions	4	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	80	None						0
				5		Fast Cycle Time	2	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals	5	50	None						0
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	60	None						0
		Plugged Sprue Tips / Gates (Hot Manifold/Valve-Gated Molds)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D- Visual Inspections, Quality Tree D - Process Inspections P - Magnets in Hopper and Melt Filters on Nozzle	5	30	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Automation equipment started too early after start up of process re-start.	4	P - Visual Inspection P - Work Instructions P - Automation disable switch	5	60	None						0
10 First Piece Approval  Injection Molding Process	Manufacturing a conforming part per specifications	Sinks in heads and straps	Part Non-Compliance Tensile and Wire Bundle Failures	3		Insufficient Hold Pressure	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	36	None						0
				3		Cycle Time Too Fast	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	36	None						0

Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material Handling Error	2	D/P - Visual to Work Order, Quality Tree	6	60	None							0
Burnt tips	Part Non-Compliance / Cosmetic Issues / Short	3		Plugged/Worn Vents	3	D- Visual Inspections, Quality Tree P - First Piece Approvals P - In process PM's using Ice Blasting	6	54	None							0
Sticking in mold	Part Non-Compliance / Mold Damage	5		Excessive Mold Temperatures	2	D- Visual Inspections P - First Piece Approvals D - Audible alarms added to all Thermolator to detect temp. dev.	5	50	None							0
		5		Excessive Hold Pressure	2	D- Visual Inspections, Quality Tree P - First Piece Approvals	6	60	None							0
		5		Residue Build-Up	2	D- Visual Inspections, Quality Tree P - First Piece Approvals D - Audible alarms added to all Thermolator to detect temp. dev.	5	50	None							0
		5		Water hooked up incorrectly	2	D-Visual Inspection	6	60	None							0
		3		Packaging interruptions Degator Jams	3	D- Visual Inspections P - First Piece Approvals	8	72	None							0
		5		Heater band malfunctions	2	D- Visual Inspection D - Process Inspection P - PM	5	50	None							0
Excess Plastic on Ties	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections, Quality Tree P - Process Inspections	7	70	None							0
Blocked / Misformed Head	Part Non-Compliance	5		Broken Insert/Ejector Blade	2	D - Visual Inspection, Quality Tree P - Final Inspection	7	70	None							0
Cut Head	Part Non-Compliance	5		Automation Malfunction	2	D - Visual Inspection P - Final Inspection D - Alarms allowing Operators to scrap parts after cups are emptied	7	80	None							0



Missing or Extended Pawl	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None							0
		5		Restart(Mold Cleaning)	1	D/P- Visual Inspections D/P - Hand Insertion	5	25	None							0
		5		Improper start-up	1	D - Visual Inspection, Quality Tree D - LPA at startup P - Final Inspections	5	25	None							0
		5		Cycle Time Too Fast	1	D - Visual Inspections, Quality Tree P - Final Inspections	6	30	None							0
		5		Worn inserts	1	D - Visual Inspections P - Final Inspections P - PM Schedule	6	30	None							0
Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None							0
		5		Cycle Time Too Fast	1	D - First Piece D - Visual Inspection, Quality Tree P - Process Inspections	6	30	None							0
Shorts	Part Non-Compliance / Cosmetic	3		Insufficient Injection Pressure compatibility of Press / mold	3	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's	5	45	None							0
		3		Plugged/Worn Vents	3	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's	5	45	None							0
		3		Residue Build-Up	2	D- Visual Inspections, GO/NOGO Gages P - First Piece Approvals P - In process PM's using Ice Blasting for mold cleaning	5	30	None							0
		3		Lot / Moisture Variations	2	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	30	None							0
		3		Process Interruption	2	D- Visual Inspections, GO/NOGO Gages D - First Piece Approvals P - Material Certs P - Moisture Analysis	5	30	None							0

Flash	Part Non-Compliance / Insertion Failures / Cosmetic	5		Excessive Injection Pressure	3	D- Visual Inspections, Quality Tree, GO/NOGO Gages D- Hand Insertions P - First Piece Approvals P - In Process PM's	5	75	None							0
		5		Incorrect Tonnage	2	D- Visual Inspections D- Hand Insertions P - First Piece Approvals P - In Process PM's P - Press Size Callout on Routing	5	50	None							0
		5		Water hook up incorrect on sub gated tools	4	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	80	None							0
		5		Start-up/Cycle Interruptions	3	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	60	None							0
		5		Clamp pressure on press	3	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	60	None							0
		5		Worn inserts	4	D- Visual Inspections D - Tool Tests D - Process Inspections D- Hand Insertions	3	60	None							0
		5		Broken Insert/Ejector Blade	3	D- Visual Inspections, Quality Tree D - Process Inspections D- Hand Insertions	5	75	None							0
Breakage	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion D - Audible alarms added to all Thermolator to detect temp. dev.	3	15	None							0
		6		Barrel Heat Malfunction	4	D - Visual Inspections D - Process Inspections D - Parameter/Heat Checks D - Hand Insertions P - First Piece Approvals P - SPC Setup to Trigger Faults	3	72	None							0

Slippage	Part Non-Compliance / Strap Engagement Failure	5		Worn inserts	1	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	30	None							0
		5		Fast Cycle Time	1	D - Visual Inspection, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	30	None							0
		5		Dirty Inserts	1	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions D - Parameter/Heat Checks P - First Piece Approvals P - In Process PM	6	30	None							0
		5		High oil temperature on press due to insufficient water to cool	3	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	75	None							0
Mold Mismatch	Part Non-Compliance/High Insertion Force	6		Poor Mold Alignment	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	60	None							0
		6		Leader Pin/Sidelock Wear	1	D - Visual Inspections, Quality Tree D - Process Inspections, Tech now conduct inspections, doing cleaning schedule D - Hand Insertions P - First Piece Approvals P - In Process PM	6	36	None							0
Deep ejector pins	Part Non-Compliance/High Insertion Force	3		Excessive Hold Pressure	3	D - Visual Inspections D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	6	54	None							0
		3		Thermolator Malfunction	2	D - Visual Inspections D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	3	18	None							0
		3		Fast Cycle Time	2	D - Visual Inspections, Quality Tree D - Process Inspections D - Hand Insertions P - First Piece Approvals P - In Process PM	5	30	None							0

		Plugged Sprue Tips / Gates (Hot Manifold/Valve-Gated Molds)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D- Visual Inspections D - Process Inspections P - Magnets in Hopper and Melt Filters on Nozzle	8	48	None						0
				3		Mold Heater Malfunction	2	D- Visual Inspections D - Process Inspections	8	48	None						0
				3		Valve Gate Malfunction	2	D- Visual Inspections D - Process Inspections	8	48	None						0
		Elongated Sprues	Part Non-Compliance / Cut Heads and Missing Pawls	6		Inadequate Cooling	2	D- Visual Inspections D - Process Inspections	7	84	None						0
		Start up scrap packaged	Customer Dissatisfaction	3		Automation equipment started too early after start up of process re-start.	3	P - Visual Inspection, Quality Tree P - Work Instructions, Training Manual P - Automation disable switch during changeover D - Final Inspection D - Process Inspection	5	45	None						0
11 First Piece Approval	Product Conforms per specifications before production	First Piece Not Hung	Delay in Manufacturing	6		Failure to hang First Piece	1	D/P - Tool Evaluation Sheet	8	48	None						0
12 Validation Testing	Validation and Documentation of New Tooling	Validation is Not Completed	Part Non-Compliance	6		Validation Testing Forgotten	1	D/P - New Tool Evaluation Sheet	8	48	None						0
13-16 Packaging and Automation	Package product per customers specifications	Incorrect or Missing Date Code on the Bag/Box	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45	None						0
				3		Wrong/no date code on packaging	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions	7	63	None						0
		Degator Jams	Part Non-Compliance	5		Parts Not Aligned	4	D - Visual Inspection p - Degator Guides P - Machine Alarms	4	80	None						0
			Loss Production	5		Dull Cutter Blades	2	D - Visual Inspection D - Process Inspection P - PM P - Warped Sprue Detection	6	60	None						0
				5		Cylinder Failure	2	D - Visual Inspection D - Process Inspection P - PM	3	30	None						0

Incorrect Degator alignment	Cut Heads	5		Improper Set-up	2	D- Visual Inspection D - Process Inspection P - Degator Guides - PM	5	50	None							0
				Manual Degator Jams	4	D- Visual Inspection D - Process Inspection P - PM	4	80	None							
				Automated Degator Jams	3	D- Visual Inspection D - Process Inspection P - PM P- Degater Alarm	4	60	None							
				Improper part feed	2	D- Visual Inspection D - Process Inspection P - PM P- Degater Guides w/ Alarms	3	30	None							0
				Part missing from lead in edge of runner	2	D- Visual Inspection D - Process Inspection P - PM P- Degater Alarm	5	50	None							
Greasy Parts Packaged	Part Non-Compliance	4		Robot Drags the Parts Across the Leader Pins	1	D - Visual Inspection D - Process Inspection P - PM	7	28	None							0
Incorrect Moisture in Bags	Part Non-Compliance / Parts Conditioned Incorrectly	3		Water Dosing system failure	2	D - Monitoring Water D - Final Inspection  P - Preventative Maintenance P - dosing system monitors flow	5	30	None							0
		3		Water Supply Not On	2	D - Monitoring Water D - Final Inspection  P - Preventative Maintenance P - dosing system monitors flow	2	12	None							0
		3		Dirty or Clogged Filter	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	2	12	None							0
		3		Improper Timer Setting	3	D - Monitoring Water P-dosing system monitors flow	5	45	None							0
		3		Bad Bag Seals leak water	2	D - Visual Inspection D - Monitoring Water D - Final Inspection P - Preventative Maintenance	6	36	None							

	Mis-labeling	Customer Dissatisfaction	3	Printer Ribbon not Inserted Properly	2	D - Visual Inspections D - Final Inspections P-Work order sign-off	7	42	None							0
			3	Wrong Labels Placed on Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None							0
			3	Wrong Pre-labeled Bag for Product	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None							0
			3	Excess Labels not Removed From Production Area	4	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	84	None							0
			3	Wrong label provided	3	D - Visual Inspections D - Final Inspections P - LPA P-Work order sign-off	7	63	None							0
	Insufficient Bag Seals	Part Non-Compliance	3	Sealer Tape Worn	4	D - Visual Inspection D - Final Inspection P - Electronic Shift Log	6	72	None							0
			3	Bag Wrinkled/Bag Mil Thickness Inconsistencies	4	D - Visual Inspection D - Final Inspection	7	84	None							0
			3	Sealer Malfunctions	2	D - Visual Inspection D - Final Inspection	7	42	None							0
			3	Material stuck on sealer	4	D - Visual Inspection D - Final Inspection P - Incoming Inspection	7	84	None							0
			3	Improperly Adjusted Timer	4	P - Work Instruction D - Visual Inspection	7	84	None							0
			3	Teflon coating worn (Rennco baggers)	2	P - Work Instruction D - Visual Inspection P-In-process PM's	6	36	None							0
	Insufficient Packaging	Customer Dissatisfaction	3	Issues with the Bag Stock (Not Quantity)	3	D - Visual Inspection D - Final Inspection	7	63	None							0
			3	Insufficient Packaging Supplies	4	D - Visual Inspection D - Final Inspection	7	84	None							0

		Incorrect Quantity in Bag	Customer Dissatisfaction	4		Robot grippers failed to place parts	3	D - Visual Inspection P - Final Inspection	7	84	None						0
				4		Pick and Place Grippers Drop Parts	3	D - Visual Inspection P - Final Inspection	7	84	None						0
				4		Degator Jams	3	D - Visual Inspection P - Final Inspection	5	60	None						0
				4		Inconsistent Bag Width	3	P/D - Visual Inspection	7	84	None						0
		Missing or Incorrect Hang Hole	Customer Dissatisfaction	4		Bag register mark Inconsistencies	2	P/D - Visual Inspection	8	64	None						0
				4		Bags not Webbed Correctly	2	P/D - Visual Inspection	8	64	None						0
				4		Too Much Air in Bag	2	P/D - Visual Inspection	8	64	None						0
				4		Cylinder Failure	2	D - Visual Inspection P - PM	8	64	None						0
		Incorrect Quantity in Box	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspection D - Final Inspection P - Bag Counter (T18R-C)	5	60	None						0
				4		Scale Out of Calibration	1	D - Visual Inspection D - Final Inspection P - Calibration Schedule	5	20	None						0
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	None						0
17 Final and Live Inspection	Product conforms per specifications after production run.	Bad Product Shipped	Customer Dissatisfaction	8		Inspection Not Performed by QA	1	D/P - Final and Live Inspection	1	8	None						0
				7		Bad Product not Found in Random Sampling	2	D /P- Final and Live Inspection	7	98	None						0
		Water Verification Incomplete	Part Non-Compliance	6		Water not Verified During Process Inspection	1	D/P - Shift Log or Share Point. P- Final and Live Inspection	1	42	None						
18-19 QA Testing	Validation and documentation of product per specifications	Daily Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix, First Piece Acceptance. Daily Production Meeting	3	18	None						0
		Weekly Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix Daily Production Meeting	3	18	None						0
				5		Damaged Shipment	2	D - Visual Inspection D - Final Inspection	8	80	None						0

				5		Customer Specific Requirements Not Met	2	D - Visual Inspection P - Final Inspection	8	80	None						0
20-21 Material Movement  Shipping	Ship Product per Specifications to Warehouses	Shipped Incorrectly	Customer Dissatisfaction	5		Late Shipment	2	D - Visual Inspection D - Final Inspection	8	80	None						0
				5		Damaged Shipment	2	D - Visual Inspection D - Final Inspection	8	80	None						0
				5		Customer Specific Requirements Not Met	2	D - Visual Inspection P - Final Inspection	8	80	None						0
22 Annual Validation (if required)	Meet customer requirements	Annual Validation not Completed	Customer Dissatisfaction	5		Customer Specific Requirements Not Met	2	D/P - PPAP Matrix Training Quality Personnel	P-	2	20	None					0

PTC = Pass Through  
Characteristic



# PROCESS FLOW DIAGRAM

Part Description: Cable Tie  
 HT Dwg.# and Rev: Various  
 Customer P/N and Rev: Various  
 Customer Name: Various

Program Name: Cable Ties  
 Created By: Gwendolyn Benz  
 Creation Date: 03/11/94

	Process "n"	Move "u"	Store "l"	Inspect "x"	Operational Description:	Special Characteristics / Descriptions	Control Methods
1	■				Incoming Receiving QA Receives C of A from Raw Material Supplier	C of A	ERP system
2	■				Incoming Receiving Receive in Raw Materials From Suppliers	Quality Approval of Material	ERP system
3				☒	Incoming Receiving Shipping and Receiving Inspects Raw Material	Review Container, Packaging, Lot Numbers and Quantity of Material	ERP system
4				☒	Incoming Receiving QA Inspects Color of Material (If Needed)	Review Color of Material	ERP system
5		◆			Material Movement	Move Raw Materials into Storage	ERP system
6			●		Material Movement	Store Raw Materials until needed	FIFO By Lot
7		◆			Material Movement	Move Materials to material handling system and Verify Correct Material Moisture Check on Silo Materials	Material Process Log F- PRD-8.1-4 and Moisture Log F-QA-10.3-9
8	■				Material Ratio	Verify Correct Material	Material Process Log F- PRD-8.1-4
9	■				Molding Machine Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-9.6-1
10				☒	First Piece Approval QA Completes (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	First Piece Acceptance F-QA-10.3-5
11	■				First Piece Approval	Hang First Piece	Visual At Press
12				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
13	■				Work order set-up  LPA	Validate work order to materials, labels, etc. LPA-Random Audit	Visual, Signed Set-up Stamp on Work Order F-PRD-9
14				☒	In Process Checks ( Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	Per Control Plan

# PROCESS FLOW DIAGRAM

Part Description: Cable Tie  
 HT Dwg.# and Rev: Various  
 Customer P/N and Rev: Various  
 Customer Name: Various

Program Name: Cable Ties  
 Created By: Gwendolyn Benz  
 Creation Date: 03/11/94

	Process "n"	Move "u"	Store "l"	Inspect "x"	Operational Description:	Special Characteristics / Descriptions	Control Methods
15				<input checked="" type="checkbox"/>	Packaging	Verify Seals, Water, Date Code, Labels, Hole Punch, Box Quantity	Inspection Stamp/Label (Initialed and Dated) on Box / Share Point / Shift Log F-PRD-1.1 / Placard
16				<input checked="" type="checkbox"/>	Visual Appearance	Check Ties for Visual Defects	
17				<input checked="" type="checkbox"/>	Final and Live Inspection	Quality Approval of Final Product	
18				<input checked="" type="checkbox"/>	QA Testing	Verify Daily Testing Has Been Completed	Per Control Plan
19				<input checked="" type="checkbox"/>	QA Testing	Verify Weekly Testing Has Been Completed	Per Control Plan
20		◆			Material Movement	Move Skid To Shipping Dock	ERP System
21		◆			Material Movement	Ship Product to Warehouse	Shipping Manifest ERP System
22				<input checked="" type="checkbox"/>	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

☐Prototype ☐Pre-Launch ☒Production

## Control Plan

Control Plan Number: <b>MCP-1</b>			Key Contact/Phone: <b>414.355.1130</b>				Date (Orig.) <b>03/11/94</b>		Date & Revision <b>See Footer</b>			
Part Number/Latest Change Level: <b>Cable Ties - Various Materials</b>			Core Team: <b>Quality Assurance, Manufacturing, Automation, Receiving-Shipping</b>				Customer Engineering Approval/Date (If Req'd) <b>NA</b>					
Part Name/Description <b>Cable Ties - Various Materials</b>			Supplier/Plant Approval/Date <b>07/28/05</b>				Customer Quality Approval/Date (If Req'd) <b>NA</b>					
Supplier/Plant: <b>HellermannTyton MKE</b>		Supplier Code: <b>NA</b>		Other Approval/Date (If Req'd) <b>NA</b>				Other Approval/Date (If Req'd) <b>NA</b>				
Quality Assurance		Material Handler		Process Tech / Auto Technician			Operator		QA and/or Team Supervisor		Shipping and/or Receiving	
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS				Reaction Plan	
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE			Control Method
1-4	Incoming Receiving		1	Material Characteristics			Per Certificate of Analysis DTL/D of FMVSS302	Visual Material Cert	Each Lot	Each Lot	ERP System	Isolate lot PR-QA-13.1-2
			2	Quantity			Per Packing List	Gaylord Count	Each Lot	Each Lot	ERP System	Notify Purchasing
			3	Packaging Requirements			Packaging meet Requirements	Gaylord Visual	Each Lot	Each Lot	WI-SR-10.2-1	Notify Purchasing and QA
			4	Lot Number			Per Packing List	Gaylord Visual	Each Lot	Each Lot	ERP System	Notify QA
			5	Material Color			Per Color Chip	Material Visual	Each Lot	Each Lot	ERP System	Isolate lot PR-QA-13.1-2
5-7	Material Movement	Material Handling System	1		Move Material to Material Handling System		Correct Material is set up in the Material Handling System per Work Order	Visual	Each Material Change	Each Material Change	Material Process Log F-PRD-8.1-4	Isolate Lot PR-QA-13.1-2
			2		Check moistures in Silo Materials		Perform Moistures per TS- WH-MAX400XL	Computrac Max 4000XL	1 Sample/Ma terial	Daily	Moisure Log F-QA-10.3-9	Check and Adjust Dryers / Control of Non-Conforming Product PR-QA- 13.1-2
8	Material Ratio	Material Handling System	1		Material Ratio		Set up Per Work Order	Visual	Each material Change	Each Material Change	Material Process Log F-PRD-8.1-4	Isolation PR-QA-13.1-2 Adjust Ratio
			2		Colorant (When Needed)		Mix Ratio Setting According to S-PRD 9.1- 19 / Set Up Per Work Order	Ratio Setting	Each Lot	Each Colorant	Material Process Log F-PRD-8.1-4	Isolation PR-QA-13.1-2 Adjust Ratio
9	Molding Machine Set- up	Injection Molding Machine	1		Machine Set-Up		Per Mattec, Set-Up Sheet, and Acceptable Visual Part and Hand Insertion	Review of Set-Up Specs	Each Set Up	Each Set Up	Machine Set-Up Sheet F-PRD-9.6-1	Adjust Process/Recheck Isolation PR-QA-13.1-2
			2		Machine Set-Up		Set up Foil Applicator for Stripes (If Necessary)	Review of Set-Up Specs	Each Set Up	Each Set Up	Work Order	Adjust Process/Recheck Isolation PR-QA-13.1-2
10-11	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Adjust Process
												Retest / Control of Non-Conforming Product PR-QA-13.1-2

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator		QA and/or Team Supervisor		Shipping and/or Receiving	
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
	First Piece Approval Hand Insertion	Injection Molding Machine	2	Insertion Properties of Cable Tie			No Hard Insertions, Slippage or Cracked Inserts Allowed. Breakage Testing According to WI-QA-10.3-2	Hand Insertion Process Inspection Check Per WI-QA-10.3-2	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Adjust Process  Retest / Control of Non-Conforming Product PR-QA-13.1-2
	First Piece Approval Check Diaphragm (dimension to print at first pc if applicable)	Injection Molding Machine	3	Part Quality			Per Drawing	Caliper	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Control of Non-Conforming Product PR-QA-13.1-2
12	Validation Testing	Injection Molding Machine	1	Push In / Push On Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Pull Out/Pull Off Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Dimensional			Perform Dimensional on the Part	Calibrated Gages per Dimensional Study	1 shot	At Initial Validation Testing	Dimensional Study F-QA-10.4-2	Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	4	Test for Minimum Wire Bundle			Minimum Wire Bundle Requirements Per Print	Wire Bundle Test	1 Shot	At Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	5	Tensile Strength			Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester WI-QA-10.3-14	1 Shot or 100pcs Minimum	At Initial Validation Testing	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
13	Work Order Set-Up TEAM SUPERVISOR or MOLD TECH	Packaging Equipment	1	Packaging Requirements			Validate Material and Packaging Requirements per Work Order	Visual	1	Each Work Order	Signed Set-Up Stamp on Work Order	Adjust Process Control of Non-Conforming Product PR-QA-13.1-2
	Layered Process Audit	Production Process	2		Production process		Per questions on LPA form F-PRD-9	Visual	1	Shift	Layered Process Audit Form F-PRD-9	Adjust Process Control of Non-Conforming Product PR-QA-13.1-2 (if applicable)
14	In Process Checks Completed Hand Insertion/Visual Process Inspection	Injection Molding Machine	1	Hand Insertions			No Hard Insertions, Slippage or Cracked Inserts Allowed. Breakage Testing According to WI-QA-10.3-2	Hand Insertion Process Inspection Check Per WI-QA-10.3-2	1 Shot	Twice per Shift	Share Point or Shift Log F-PRD-1.1	WI-PRD-13.1-3 Adjust Process/ Notify Supervisor and QA  Rerecheck / Control of Non- Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Process Set-Up			Work Order Matches MIU / Cavity Count Matches Actual / Cycle Time is to Standard or Adjusted Notes	Visual	Once	Per Shift	Share Point or Shift Log F-PRD-1,1	WI-PRD-13.1-3 Adjust Process/ Notify Supervisor and QA  Rerecheck / Control of Non- Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	1 Shot	4x per Shift and 1 x per each start- up	Share Point or Shift Log F-PRD-1.1	WI-PRD-13.1-3 Adjust Process/ Notify Supervisor and QA  Rerecheck / Control of Non- Conforming Product PR-QA-13.1-2

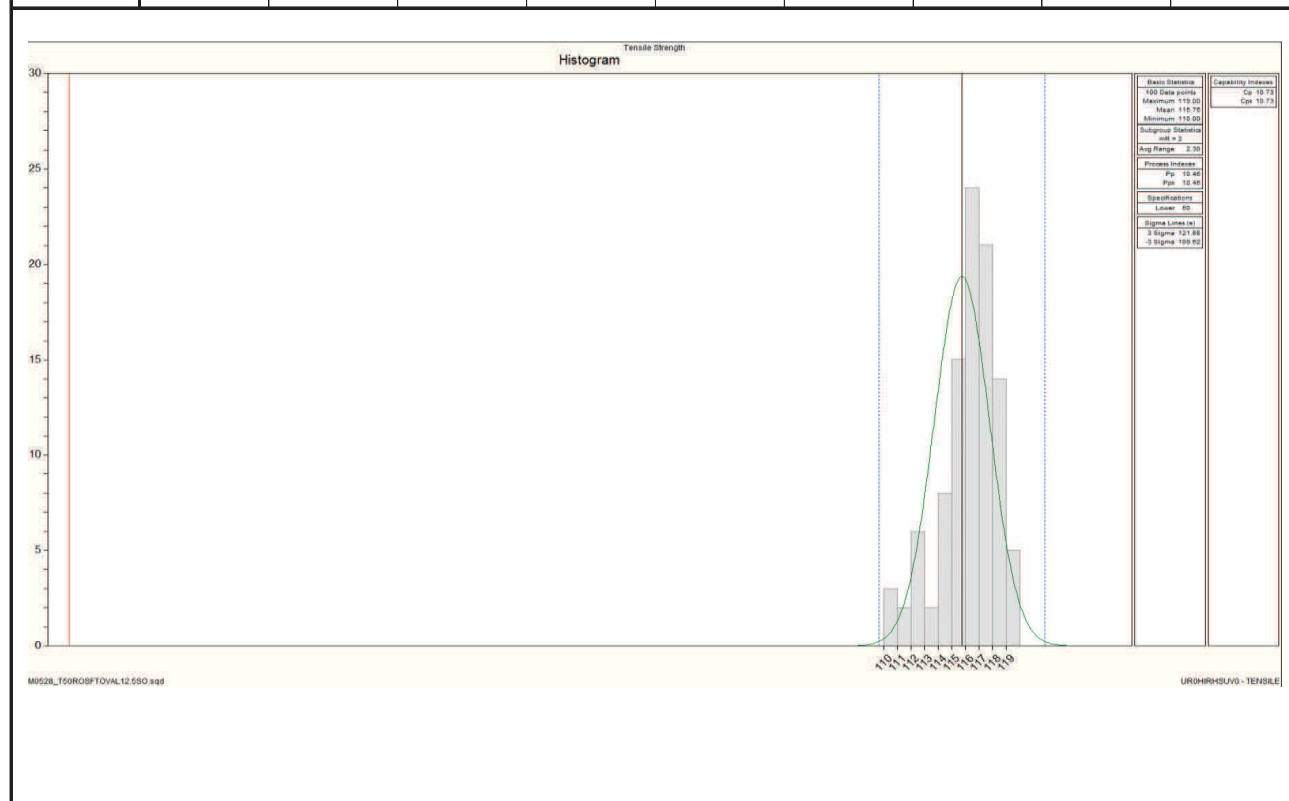
Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator		QA and/or Team Supervisor		Shipping and/or Receiving	
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
15-16	Packaging Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance		Check Ties for Visual Defects	Visual	1 Shot	Per Hour	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Hand Insertions		No Hard Insertions	Hand Insertion Process Inspection Check per WI-QA-10.3-2	1 Shot	Per Hour for molds under 38 cavities, Every Other Hour for cavitation over 38	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Sealer	3	Proper Bag Seal		Bag Must Have a Complete and Un-Wrinkled Seal	Visual and Pull at Seams	1 bag	Twice per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor or QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Waters in Bag	4	Amount of Water Added Per Bag		Per Work Order	Scale WI-PRD-10.3-1	1 measurement	2 Times Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor and Quality Assurance / Adjust Process	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Date Code	5	Date Code Stamp		Bag and Box Must Have Correct Data Code S-PRD-8.1-6	Visual	Once	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Labels	6	Bag and Box Labels		Bag and Box Labels Must Match Work Order	Visual	2 Checks	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Packaging Equipment	7	Hole Punch (Where Applicable)		Hole Punch Must Be Within Header Boundaries and Complete	Visual	Once	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Scale / Conveyor Check	8	Scale / Conveyor Verification for Count		Verify Scale is Counting Correctly / Conveyor has correct number of parts	Using Scales to Package Product WI-PRD-16 or Hand Count	Twice	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA	
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
17	Final Inspection at the Cell	Injection Molding Machine	1	Part Quality		Check For Flash, Shorts, Blocked Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	

Quality Assurance		Material Handler	Process Tech / Auto Technician				Operator		QA and/or Team Supervisor		Shipping and/or Receiving	
Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for MFG.	CHARACTERISTICS			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
									Size	Freq		
		Labels	2	Box Label		Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Labels	3	Bag Label		Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Waters in Bag	4	Water Verification		Verify Water is in Bag where required	Visual	1 Bag	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Sealer	5	Proper Bag Seal		Bag Must Have a Complete Seal	Visual and Pull at Seams	1 bag	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Correct Amount of Parts in Box	6	Quantity in Box		Boxes Must Have Specified Amount of Bags per Box	Hand Count	1 Sample	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Packaging	7	Packaging Requirements		Verify per Work Order correct Box	Visual	1 check	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
		Stamp	8	Date Code Stamp / Printer		S-PRD-8.1-6	Visual match	1 check	Twice per 24 hours	Share Point or Final Inspection F-QA-10.4-21	Control of Non-Conforming Product PR-QA-13.1-2	
18	QA Daily Testing	Injection Molding Machine	1	QA Lab Tech Hand Insertion		No Hard Insertions, Slippage or Cracked Inserts Allowed. Breakage Testing According to WI-QA-10.3-2	Hand Insertion Process Inspection Check Per WI-QA-10.3-2	1 Shot	Daily	Weekly Matrix F-QA-10.3-8	Adjust Process	
											Retest / Control of Non-Conforming Product PR-QA-13.1-2	
		Injection Molding Machine	2	Part Quality			Check For Flash, Shorts, Blocked Heads, Mismatch, Color(if Needed)	Visual	1 Shot	Daily	Weekly Matrix F-QA-10.3-8	Adjust Process
		Injection Molding Machine	3	Part Quality		T18RA and T30RA ran through a tool	Tool	4 pcs welded together	Daily	Weekly Matrix F-QA-10.3-8 / SPC Software	Adjust Process	
19	Weekly Testing	Injection Molding Machine	1	Test for Minimum Wire Bundle		Minimum Wire Bundle Requirements Per Print	Wire Bundle Test	1 Shot	Weekly	SPC Software	Adjust Process	
											Retest / Control of Non-Conforming Product PR-QA-13.1-2	
		Injection Molding Machine	2	Monitor Tensile Strength			Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester	1 Shot	Weekly	SPC Software	Adjust Process
		Injection Molding Machine	3	Force Testing Push On, Push In, Pull Off, Pull Out (If Required)		Per Print	Tensile Tester / Force Gauge	1pc	Weekly	SPC Software	Adjust Process	
20	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
21	Material Movement		1		Ship Product to Warehouse		Per Shipping Requirements	Visual	Each Skid	Each Shipment	Shipping Manifest and ERP System	Notify Supervisor
22	Annual Validation (If Required)		1		Validation of Product		Re-Validation of Product to Customer Requirements	PPAP	Per Customer Requireme nts	Per Customer Requireme nts	PPAP Matrix	Control of Non-Conforming Product PR-QA-13.1-2

## Initial Process Study

Part No. 157-00218	Part Description 12mm Stand Off Cable Tie With	Supplier HellermannTyton	
Drawing No. 13-0226-021-CSU	Drawing Date 8/5/2015	Drawing Revision 01.1	Inspection Facility HT-Milwaukee
Production Date 2/25/2016	Material UR0HIRHSUV0	Tool No. M0528	Inspector F.B.

DATA	Tensile Strength (lbs)								
1-9	118.00	116.00	115.00	117.00	118.00	117.00	116.00	118.00	112.00
10-18	115.00	117.00	116.00	117.00	117.00	117.00	114.00	115.00	118.00
19-27	115.00	118.00	111.00	112.00	117.00	116.00	117.00	116.00	116.00
28-36	119.00	114.00	116.00	116.00	118.00	119.00	117.00	116.00	110.00
37-45	116.00	113.00	116.00	118.00	115.00	117.00	117.00	118.00	115.00
46-54	115.00	117.00	116.00	114.00	116.00	112.00	117.00	116.00	115.00
55-63	118.00	114.00	114.00	118.00	116.00	117.00	117.00	118.00	116.00
64-72	110.00	115.00	116.00	115.00	116.00	110.00	116.00	119.00	116.00
73-81	114.00	112.00	118.00	112.00	119.00	119.00	118.00	113.00	117.00
82-90	116.00	117.00	117.00	117.00	115.00	117.00	117.00	115.00	114.00
91-99	115.00	116.00	118.00	111.00	115.00	116.00	116.00	114.00	115.00
100-108	112.00								



## R&R Study Results Using Specifications

Gage number: TGM-850	Done by: Donna Szczepanski
Gage description: Tensile Tester	Part name: T150MOX2
Gage type: Tensile Tester	Characteristics: TENSILE
Study name: Annual Gage R & R	Specifications: LSL=350 Nominal=400 USL=450
Study date: 09/05/2016	Number of Distinct Cate 33.77499

Objective:

Comment:

Interpretation guidelines

<b>&lt; 10%</b>	generally considered to be an acceptable measurement system
<b>10%-30%</b>	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
<b>&gt; 30%</b>	considered to be not acceptable - every effort should be made to improve the measurement system

### Results based on specifications

#### Measurement Unit Analysis

#### Specification Spread (USL-LSL)/

#### Repeatability - Equipment Variation (EV)

EV = 0.5977558

%EV = 3.586535

#### Reproducibility - Appraiser Variation (AV)

AV = 0.3549044

%AV = 2.129426

#### Repeatability & Reproducibility (R&R)

R&R = 0.6951756

%R&R = 4.171054

#### Part Variation (PV)

PV = 16.65216

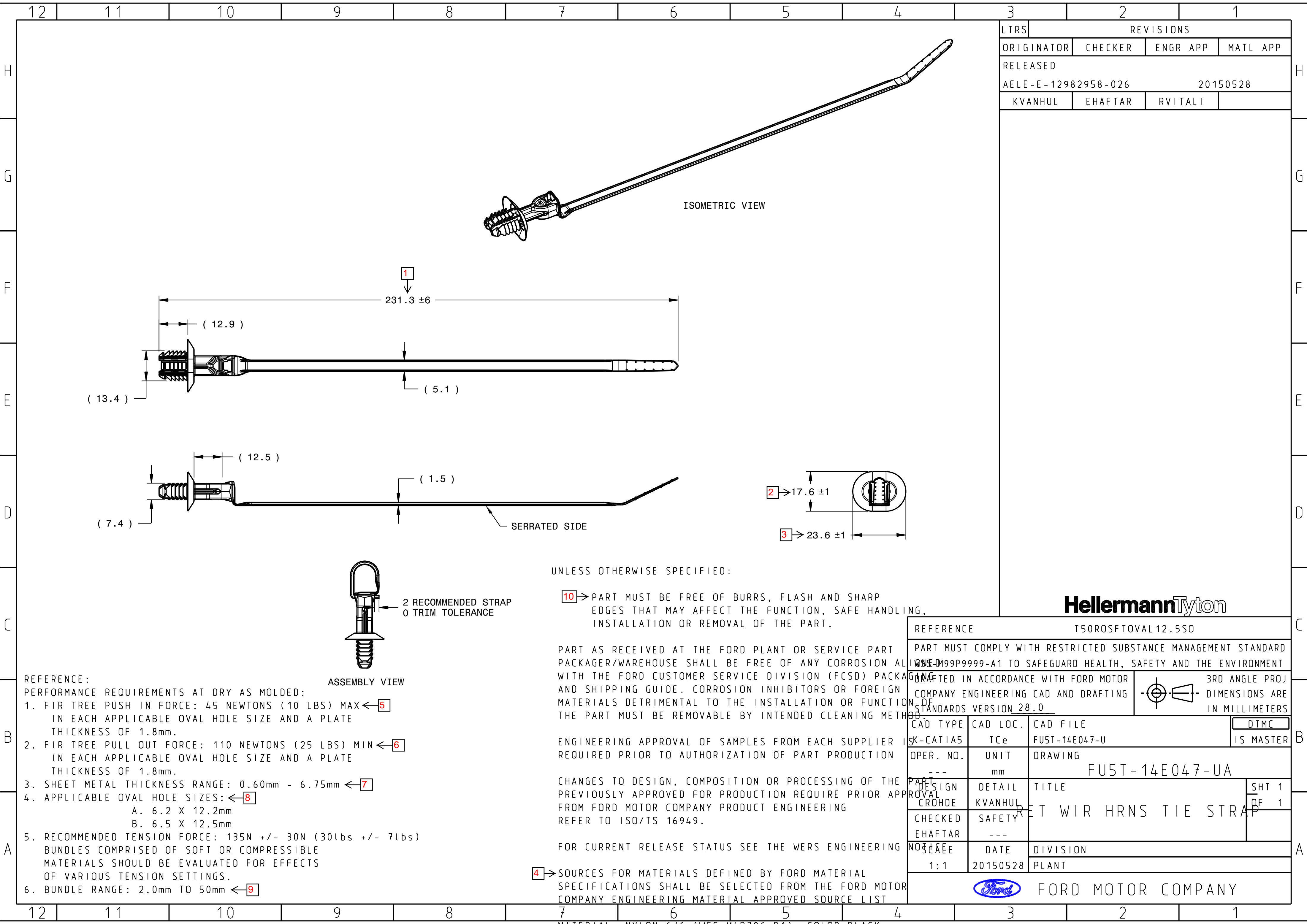
%PV = 99.91298

#### Specification Spread (USL-LSL)/

(USL - LSL) = 16.66667

Appraiser	Replicate	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Donna	1	412.72	397.78	404.6	408.78	396.05	402.22	405.73	410.82	389.22	407.63
Donna	2	412.57	399.11	403.87	409.73	396.68	402.27	405.44	410.15	390.27	408.1
Donna	3	414.47	397.85	403.65	408.79	396.13	403.21	406.39	410	390.24	407.69
Taleala	1	414.82	397.63	404.83	408.97	395.15	400.96	405.76	410.05	391.3	407.32
Taleala	2	414.04	398.32	404.53	408.52	395.75	399.79	405.35	411.83	390.51	407.42
Taleala	3	416.31	396.93	404.84	408.78	395.51	400.03	405.39	410.34	391.35	406.07
Marreall	1	412.83	397.2	403.15	408.01	393.95	399.72	405.5	410.07	392.4	406.62
Marreall	2	414.54	396.58	403.48	407.64	395.16	400.1	405.05	410.25	391.75	406.23
Marreall	3	413.5	397.36	403.25	408.07	395.29	401.18	405.65	408.24	391.7	406.4





LTRS	REVISIONS			
ORIGINATOR	CHECKER	ENGR APP	MATL APP	
RELEASED				
AELE-E-12982958-026		20150528		
KVANHUL	EHAFTAR	RVITALI		

HellermannTyton

- REFERENCE:  
PERFORMANCE REQUIREMENTS AT DRY AS MOLDED:
- FIR TREE PUSH IN FORCE: 45 NEWTONS (10 LBS) MAX ← 5  
IN EACH APPLICABLE OVAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm.
  - FIR TREE PULL OUT FORCE: 110 NEWTONS (25 LBS) MIN ← 6  
IN EACH APPLICABLE OVAL HOLE SIZE AND A PLATE THICKNESS OF 1.8mm.
  - SHEET METAL THICKNESS RANGE: 0.60mm - 6.75mm ← 7
  - APPLICABLE OVAL HOLE SIZES: ← 8
    - 6.2 X 12.2mm
    - 6.5 X 12.5mm
  - RECOMMENDED TENSION FORCE: 135N +/- 30N (30lbs +/- 7lbs)  
BUNDLES COMPRISED OF SOFT OR COMPRESSIBLE MATERIALS SHOULD BE EVALUATED FOR EFFECTS OF VARIOUS TENSION SETTINGS.
  - BUNDLE RANGE: 2.0mm TO 50mm ← 9

UNLESS OTHERWISE SPECIFIED:

- 10 → PART MUST BE FREE OF BURRS, FLASH AND SHARP EDGES THAT MAY AFFECT THE FUNCTION, SAFE HANDLING, INSTALLATION OR REMOVAL OF THE PART.

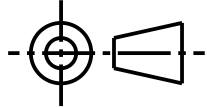

PART AS RECEIVED AT THE FORD PLANT OR SERVICE PART PACKAGER/WAREHOUSE SHALL BE FREE OF ANY CORROSION ALIEN TO THE FORD CUSTOMER SERVICE DIVISION (FCSD) PACKAGING AND SHIPPING GUIDE. CORROSION INHIBITORS OR FOREIGN MATERIALS DETRIMENTAL TO THE INSTALLATION OR FUNCTION OF THE PART MUST BE REMOVABLE BY INTENDED CLEANING METHOD.

ENGINEERING APPROVAL OF SAMPLES FROM EACH SUPPLIER IS REQUIRED PRIOR TO AUTHORIZATION OF PART PRODUCTION

CHANGES TO DESIGN, COMPOSITION OR PROCESSING OF THE PREVIOUSLY APPROVED FOR PRODUCTION REQUIRE PRIOR APPROVAL FROM FORD MOTOR COMPANY PRODUCT ENGINEERING REFER TO ISO/TS 16949.

FOR CURRENT RELEASE STATUS SEE THE WERS ENGINEERING

- 4 → SOURCES FOR MATERIALS DEFINED BY FORD MATERIAL SPECIFICATIONS SHALL BE SELECTED FROM THE FORD MOTOR COMPANY ENGINEERING MATERIAL APPROVED SOURCE LIST

REFERENCE		T50ROSFTOVAL12.5SO	
PART MUST COMPLY WITH RESTRICTED SUBSTANCE MANAGEMENT STANDARD WSS-M99P9999-A1 TO SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT			
DESIGNED IN ACCORDANCE WITH FORD MOTOR COMPANY ENGINEERING CAD AND DRAFTING STANDARDS VERSION 28.0			3RD ANGLE PROJ DIMENSIONS ARE IN MILLIMETERS
CAD TYPE	CAD LOC.	CAD FILE	<div>DTMC</div>
SK-CATIA5	TCe	FU5T-14E047-U	IS MASTER
OPER. NO.	UNIT	DRAWING	
---	mm	FU5T-14E047-UA	
PART DESIGN CROHDE	DETAIL KVANHUL	TITLE	SHT 1 OF 1
CHECKED EHAFTAR	SAFETY ---	DET WIR HRNS TIE STRAP	
NO SCALE	DATE	DIVISION	
1:1	20150528	PLANT	
		FORD MOTOR COMPANY	

MATERIAL: NYLON 6/6 (WSS-M4D706-B1), COLOR:BLACK

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