HellermannTyton | HellermannTyton GmbH internal remarks: | PB-No.: **33484** | Part Describtion: T50ROSFT6SO12.5R GPN

Part Submission Warrant

Part Name **T50ROSFT6SO12.5R** | Cust. Part Number **FU5T-14E047-JA**

Shown on Drawing No. **FU5T-14E047-JA** | Org. Part Number **15700165**

Engineering Change Level **AELE-E-11789584-925** | Dated **16.10.2014**

Additional Engineering Changes **n/a** | Dated **n/a**

Safety and/or Government Regulation ☐ Yes ☑ No | Purchase Order No. **15700165** | Weight (kg) **0,0024**

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 Region **25436** **Germany**
City Postal Code Country

Production Location: USA

CUSTOMER SUBMITTAL INFORMATION

Nursan Kablo Donanimlari (**30471**)
Customer Name/Division

Recep Beyhan
Buyer/Buyer Code

various
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☑ Yes ☐ No ☐ n/a

Submitted by IMDS or other customer format: **ID: 555148024**

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:

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a

Organization Authorized Signature i.A. S. Lütje Date 21-Feb-18

Print Name **i.A. O. Pracht** +49 (0) 4122 701 330 Fax No. +49 4122 701 241

Title **PRQM** E-mail O.Pracht@HellermannTyton.de

FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Customer Signature Date

Print Name Customer Tracking Number (optional)

Production Part Approval, Dimensional Results

HellermannTyton

Internal PB-No.: **33484**

Production Part Approval
Dimensional Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14E047-JA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSFT6SO12.5R**
INSPECTION FACILITY:	**QS Laboratory**	DESIGN RECORD CHANGE LEVEL:	11789584-925 16.10.2014
		ENGINEERING CHANGE DOCUMENTS:	

ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK
					mean	**min**	**max**		
1	**223,2**	**± 6**			**225,0**	**224,7**	**225,2**	☑	☐
								☐	☐
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Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
i.A. S. Lütje	Trainee QD	
i.A. O. Pracht	PRQM	21-Feb-18

Production Part Approval, Performance Test Results

HellermannTyton

Internal PB-No.: **33484**

Production Part Approval
Performance Test Results

ORGANIZATION:	**HellermannTyton GmbH**	PART NUMBER:	**FU5T-14E047-JA**
SUPPLIER/VENDOR CODE:	**DUNS: 315430892**	PART NAME:	**T50ROSFT6SO12.5R**
MATERIAL SUPPLIER:		DESIGN RECORD CHANGE LEVEL:	11789584-925 16.10.2014
*CUSTOMER SPECIFIED SUPPLIER/VENDOR		ENGINEERING CHANGE DOCUMENTS:	
*If source approval is req`d, include the Supplier (Source) Customer assigned code.			

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA) / TEST CONDITIONS			OK	NOT OK
								☐	☐
					mean	**min.**	**max.**	☐	☐
2	**Fir tree push in force**	**max. 10 lbs**			**8,5**	**8,0**	**8,7**	☑	☐
	in the applicable nominal							☐	☐
	hole size and a plate							☐	☐
	thickness of 1,8 mm							☐	☐
					mean	**min.**	**max.**	☐	☐
3	**Fir tree pull out force**	**min. 25 lbs**			**45,0**	**41,7**	**49,5**	☐	☐
	in the applicable nominal							☑	☐
	hole size and a plate							☐	☐
	thickness of 1,8 mm							☐	☐
								☐	☐
4	**Sheet metal thickness range**	**0,6- 8,25**			**thickness range is 0,6 - 8,25**			☑	☐
								☐	☐
5	**Applicable hole size**	**6,5+0,5/-0,4**			**applicable hole size is 6,1 - 6,9**			☑	☐
								☐	☐
6	**Bundle range**	**1,6 -50,0**			**bundle range is 1,6 - 50**			☑	☐
								☐	☐
7	**Part must be free of burrs,**				**Part is free of burrs, flash and**			☑	☐
	flash and sharp edges that				**sharp edges that may affect the**			☐	☐
	may affect the function,				**function, safe handling or removal**			☐	☐
	safe handling or removal				**of the part**			☐	☐
	of the part							☐	☐
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Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
i.A. S. Lütje	Trainee QD	
i.A. O. Pracht	PRQM	21-Feb-18

Production Part Approval, Material Test Results

HellermannTyton

Internal PB-No.: **33484**

Production Part Approval
Material Test Results

ORGANIZATION: **HellermannTyton GmbH**
SUPPLIER/VENDOR CODE: **DUNS: 315430892**
MATERIAL SUPPLIER:
*CUSTOMER SPECIFIED SUPPLIER/VENDOR
*If source approval is req`d, include the Supplier (Source) Customer assigned code.

PART NUMBER: **FU5T-14E047-JA**
PART NAME: **T50ROSFT6SO12.5R**
DESIGN RECORD CHANGE LEVEL: 11789584-925 16.10.2014
ENGINEERING CHANGE DOCUMENTS:
NAME of LABORATORY:

	MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
						☐	☐
	Material:					☐	☐
8	**Nylon 6/6 acc. To**				**Material is Nylon 6/6 acc. To**	☑	☐
	WSS-M4D706-B1, black				**WSS-M4D706-B1, black**	☐	☐
						☐	☐
9	**Part must comply with restricted**				**Part complies with restricted**	☑	☐
	substance management stan-				**substance management standard**	☐	☐
	dard WSS-M99P9999-A1 to				**WSS-M99P9999-A1 to safeguard**	☐	☐
	safeguard health, safety and the				**health, safety and the environment**	☐	☐
	environment					☐	☐
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Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
i.A. S. Lütje S. Lütje	Trainee QD	
i.A. O. Pracht	PRQM	21-Feb-18

ASCEND
PERFORMANCE MATERIALS

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: UR0HIRHSUV0
Container ID: SLAY 6300

Certificate Date: 20-MAR-17
Delivery No: 0382369409
Shipped Qty: 46,600.000 Lbs
(21,137.760 Kgs)
Customer P.O. No: 99438-12

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 MS-DB-41 CPN1626, ESB-M4D178-A2, WSS-M99P23-C1/C2, WSS-M99P9999-A1, WSSM4D706B1, WSS-M99P1111-A, WSS-M4D706-A4, WSK-M4D706-A, GMW16447P-PA66-T2, GMW16558P-PA66-T1 and GMP.PA66.015.

Material Type: VYDYNE 47H BK0644 Material No: 10404298 Batch No FC15FY01 Date of Mfg 15-MAR-2017

Ascend Performance Materials Operations LLC Specification

Lot Data

Property	Test Method	Min	Max	Result	Units
Moisture	ASTM D6869	0.10	0.20	0.15	%
Copper	STM 00667	125	175	160	PPM
Strength @ Yld	ISO 527-1,2 / 1A	50	70	59	MPa
Flammability @ 0.8mm	UL 94HB	P	P	P	N/A

PROCESS FLOW DIAGRAM

Part Description: Cable Tie
Program Name: Cable Ties
HT Dwg.# and Rev: Various
Created By: Gwendolyn Benz
Customer P/N and Rev: Various
Creation Date: 03.11.94
Customer Name: Various

	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-8.1-4
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
15				☒	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				☒	Visual Appearance	Check Ties for Visual Defects	
17				☒	Final and Live Inspection	Quality Approval of Final Product	F-QA-10.4-21/ Share Point
18				☒	QA Testing	Verify Daily Testing Has Been Completed	Per Control Plan
19				☒	QA Testing	Verify Weekly Testing Has Been Completed	Per Control Plan
20		◆			Material Movement	Move Skid To Shipping Dock	Ready For Movement Placard ERP System

21		◆			Material Movement	Ship Product to Warehouse	Shipping Manifest ERP System
22				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

☐ Prototype ☐ Pre- ☑ Production

Control Plan

Control Plan Number: **MCP-1**	Key Contact/Phone: **414.355.1130**	Date (Orig.) **03.11.94**	Date & Revision **See Footer**
Part Number/Latest Change Level: **Cable Ties - Various Materials**	Core Team: **Quality Assurance, Manufacturing, Automation, Receiving-Shipping**	Customer Engineering Approval/Date (If Req'd) **NA**	
Part Name/Description **Cable Ties - Various Materials**	Supplier/Plant Approval/Date **07.28.05**	Customer Quality Approval/Date (If Req'd) **NA**	
Supplier/Plant: **HellermannTyton MKE** / Supplier Code: **NA**	Other Approval/Date (If Req'd) **NA**	Other Approval/Date (If Req'd) **NA**	

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 NO.	CHARACTERISTICS PRODUCT	CHARACTERISTICS PROCESS	Special Char. Class	METHODS Product/Process Specification/ Tolerance	METHODS Evaluation/ Measurement Technique	METHODS SIZE Size	METHODS SIZE Freq	METHODS Control Method	Reaction Plan
1-4	Incoming Receiving		1	Material Characteristics			Per Certificate of Analysis	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 WI-TS-Mark 3	Mark 3 Tester	1 Sample/Material	Daily	Moisture 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
		Thermal Transfer Machine (If Needed)	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
	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
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	4	Test for			Minimum Wire Bundle		1 Shot	At Initial		Control of Non-Conforming Product

		Machine	4	Minimum Wire Bundle			Requirements Per Print	Wire Bundle Test	1 Shot	Validation Testing	SPC Software	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 Recheck / 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 Recheck / 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 (Utilizing Magnifying glass at work bench)	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 Recheck / Control of Non-Conforming Product PR-QA-13.1-2
15-16	Packaging Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance and Hand Insertions			Check Ties for visual defects	Visual	1 Shot	Per Hour	Inspection Stamp/Label (Initialed and Dated) on Box and 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	2	Proper Bag Seal			Bag Must Have a Complete and Un-Wrinkled Seal	Visual and Pull at Seams	1 bag	Twice per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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	3	Amount of Water Added Per Bag			Per Work Order	Scale WI-PRD-10.3-1	1 measurement	2 Times Per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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	4	Date Code Stamp			Bag and Box Must Have Correct Data Code S-PRD-8.1-6	Visual	Once	Per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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	5	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	2 Checks	Per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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	6	Hole Punch (Where Applicable)			Hole Punch Must Be Within Header Boundaries and Complete	Visual	Once	Per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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	7	Scale / Conveyor Verification for Count			Verify Scale is Counting Correctly / Conveyor has correct number of parts	Using Scales to Package Product WI-PRD-9.1-21 or Hand Count	Twice	Per Shift	Inspection Stamp/Label (Initialed and Dated) on Box and 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
		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	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	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Part Quality			T18RA and T30RA ran through a tool	Tool	1 Shot	Daily	Weekly Matrix/SPC Software	Adjust Process Retest / Control of Non-Conforming Product PR-QA-13.1-2
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 Retest / Control of Non-Conforming Product PR-QA-13.1-2
		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 Retest / Control of Non-Conforming Product PR-QA-13.1-2
20	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	Placard 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 Requirements	Per Customer Requirements	PPAP Matrix	Control of Non-Conforming Product PR-QA-13.1-2

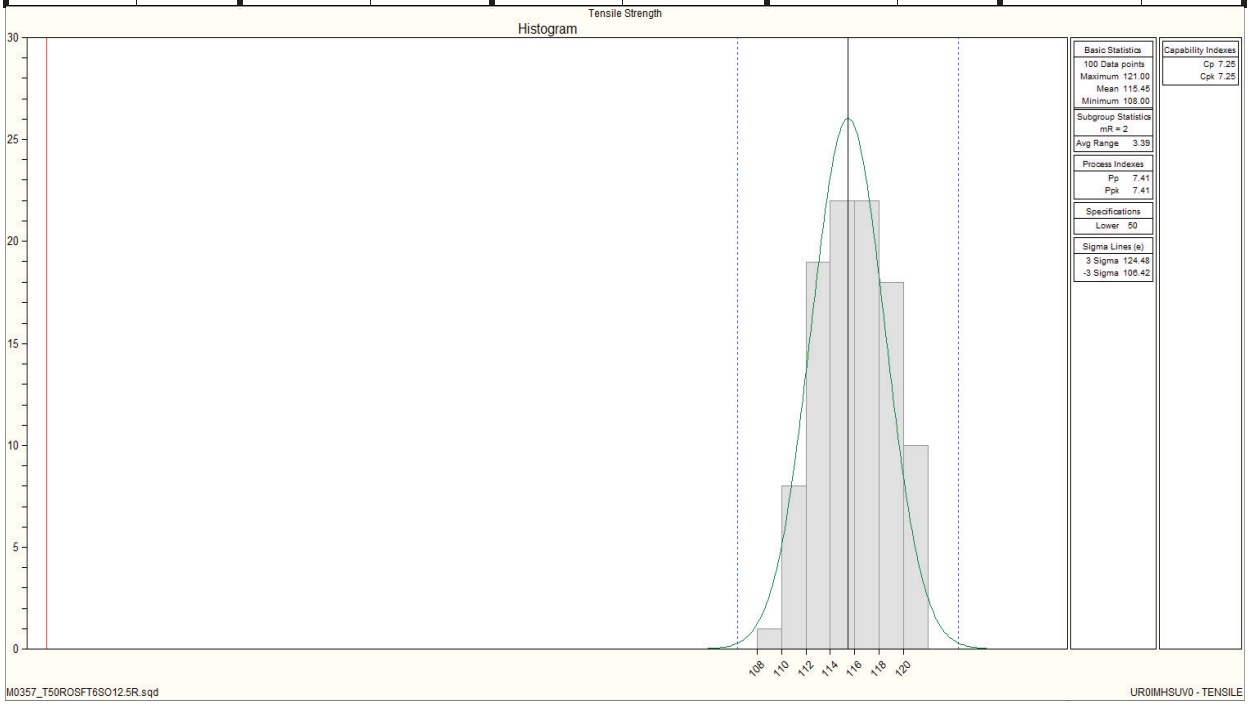
Parts Include:

T18 Series	IT Ties
T30 Series	All Wide Straps
T40 Series	All releasable
T50 Series	SR255
T120 Series	Double Headed
T150 Series	DCT 9 & 11
T250 Series	SDCT
T255 Series	Screw Mount
CTT Series	All Outside Serrated Ties

NOTE * All Series Include: PE, PER, TAS, SM, OSSFT, WPM'S, SF, RTM, DP,OSFT

Test Date: 2.25.15		**HellermannTyton**							
Tested By: TM		**Test Data Sheet**							
Prod. Date: 2.24.15		**Part:** 157-00165		**Mold:** M0357		**Color:** Black			
Units: Lbs.		**Material:** UR0IMHSUV0		**Lot No:** N86PBQU302		**Blend:** 75/25			

Sample #	Tensile	Sample #	Tensile	Sample #	Tensile	Sample #	Tensile	Sample #	Tensile
1	116	**21**	117	**41**	116	**61**	114	**81**	118
2	119	**22**	119	**42**	118	**62**	111	**82**	116
3	115	**23**	116	**43**	113	**63**	114	**83**	120
4	111	**24**	113	**44**	112	**64**	117	**84**	115
5	112	**25**	118	**45**	118	**65**	115	**85**	117
6	118	**26**	116	**46**	120	**66**	117	**86**	117
7	116	**27**	116	**47**	112	**67**	113	**87**	120
8	116	**28**	113	**48**	113	**68**	114	**88**	121
9	114	**29**	112	**49**	120	**69**	118	**89**	119
10	118	**30**	120	**50**	111	**70**	117	**90**	116
11	116	**31**	114	**51**	120	**71**	114	**91**	112
12	111	**32**	117	**52**	112	**72**	111	**92**	115
13	112	**33**	112	**53**	115	**73**	115	**93**	119
14	115	**34**	119	**54**	112	**74**	112	**94**	114
15	110	**35**	112	**55**	116	**75**	120	**95**	111
16	108	**36**	115	**56**	119	**76**	118	**96**	119
17	115	**37**	115	**57**	111	**77**	115	**97**	117
18	116	**38**	117	**58**	112	**78**	118	**98**	119
19	112	**39**	112	**59**	120	**79**	115	**99**	119
20	114	**40**	115	**60**	114	**80**	117	**100**	120



HellermannTyton

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: 11.03.1994 | PFMEA Date Org: 11.03.1994 | 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	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken	Action Results: Severity	Action Results: Occurrence	Action Results: Detection	Action Results: RPN
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	5	50	Upgrade to Novatech system. Increase Moisture test freq.	Maintenance - 3/4/13 Mike Wendt - 830/13	New Dryer system New moisture analyzers	5	2	2	20
		Contamination	Part Non-Compliance	5		Foreign Matter in Material	2	D - Visual Inspections P - Material Handling Work Instruction	8	80	Develop new material handling procedure	Mike Wendt - 8/30/13	Added color-coded container	5	2	6	60
			Part Non-Compliance	5		Unlike Materials Mixed Together	2	D - Visual Inspections P - Material Handling Work Instruction	8	80	New material ID system	John Gleason - 1/1/13	Material ID added to WO, New process for stickers on Material	5	2	5	50
		Incorrect Material	Part Non-Compliance	6		Wrong material hook-up at press	2	D/P - Visual to Work Order	8	96	Upgrade to Novatech system.	Maintenance - 3/4/13	ID proofing in new system upgrade	5	2	5	50
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	8	64	Electronic Shift Log	John Gleason/Ross H. - 6/13	Computers added to work station. Sharepoint logs implemented	4	2	5	40
		Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material blender set incorrectly	2	D/P - Visual to Work Order	8	80	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	7	70
		Excess Plastic on Ties	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections P - Process Inspections	8	80	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	7	70
				5		Improper start-up	1	D - Visual Inspection D - LPA at startup P - Final Inspections	8	40	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	1	5	25
		Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals	6	30	Add audile warning	Manit. - 9/13	Audible alarms added to all Thermolator to	5	1	3	15

								D - Hand Insertion					detect temp. dev.				
				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 D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	60	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	5	50
				6		Leader Pin/Sidelock Wear	2	D - Visual Inspections D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	72	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	6	2	5	60
		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	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	2	5	30
		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 during changeover D - Final Inspection D - Process Inspection	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 P - First Piece Approvals	8	48	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	2	6	36
				3		Cycle Time Too Fast	2	D- Visual Inspections P - First Piece Approvals	8	48	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	2	6	36
		Incorrect Blending	Part Non-Compliance / Breakage and Color Match Failures	5		Material Handling Error	2	D/P - Visual to Work Order	8	80	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
		Burnt tips	Part Non-Compliance / Cosmetic Issues / Short	3		Plugged/Worn Vents	3	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	72	- Increase Visual inspection - PM	John Gleason/Dean Anderson - 7/14 - Mike Wendt - 9/12	- Implemented Quality tree -Ice Blasting to clean mold per shift	3	2	6	36
		Sticking in mold	Part Non-Compliance / Mold Damage	5		Excessive Mold Temperatures	2	D- Visual Inspections P - First Piece Approvals	8	80	Add audible warning	Manit. - 9/13	Audible alarms added to all Thermolator to detect temp. dev.	5	2	5	50
				5		Excessive Hold Pressure	2	D- Visual Inspections P - First Piece Approvals	8	80	Increase frequency of functional testing.	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
				5		Residue Build-Up	2	D- Visual Inspections P - First Piece Approvals	8	80	- PM Schedule - Increased Visual inspection	Mike Wendt - 9/12	- Ice Blasting to clean mold per shift - Implemented Quality Tree	5	2	5	50

				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 P - Process Inspections	8	80	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	7	70
		Blocked/Misformed Head	Part Non-Compliance	5		Broken Insert/Ejector Blade	2	D - Visual Inspection P - Final Inspection	8	80	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	7	70
		Missing or Extended Pawl	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion	6	30	Add audible warning	Manit. - 9/13	Audible alarms added to all Thermolator to detect temp. dev.	5	1	3	15
				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 D - LPA at startup P - Final Inspections	8	40	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	1	5	25
				5		Cycle Time Too Fast	1	D - Visual Inspections P - Final Inspections	8	40	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	1	6	30
				5		Worn inserts	2	D - Visual Inspections P - Final Inspections	6	60	Replace fir tree inserts M0340	Replace inserts M0340 Kevin Paske 6/14	All Inserts replaced and insert check on mold checklist	5	1	6	30
		Soft Insertions	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals	6	30	Add audible warning	Manit. - 9/13	Audible alarms added to all Thermolator to	5	1	3	15
				5		Cycle Time Too Fast	1	D - First Piece P - Process Inspections	6	30	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	1	6	30
		Shorts	Part Non-Compliance / Cosmetic	3		Insufficient Injection Pressure compatibility of Press / mold	4	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	96	Gauges to Detect insertion force	Dean Anderson - 11/13	Developed and implemented Go/No Gauges	3	3	5	45
				3		Plugged/Worn Vents	4	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	96	Gauges to Detect insertion force	Dean Anderson - 11/13	Developed and implemented Go/No Gauges	3	3	5	45
				3		Residue Build-Up	4	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	96	- PM Schedule - Gauges	Mike Wendt - 9/12 Dean Anderson - 11/13	Ice Blasting to clean mold per shift Go/No Go Gauges	3	2	5	30

				3		Lot / Moisture Variations	3	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	8	72	Develop moisture testing schedule	Mike Wendt - 8/13	Purchased Moisture Analyzers. Implemented testing procedure	3	2	5	30
				3		Process Interruption	3	D- Visual Inspections D - First Piece Approvals P - Material Certs P - Moisture Analysis	3	27	Gauges to Detect insertion force	Dean Anderson - 11/13	Developed and implemented Go/No Gauges	3	2	5	30
			Flash	Part Non-Compliance / Insertion Failures / Cosmetic	5		Excessive Injection Pressure	4	D- Visual Inspections D- Hand Insertions P - First Piece Approvals P - In Process PM's	6	120	Increase frequency of functional testing (insertion).	John Gleason/Dean Anderson - 7/14	Implemented Quality tree Go/No Gauges	5	3	5	75
					5		Incorrect Tonnage	4	D- Visual Inspections D- Hand Insertions P - First Piece Approvals P - In Process PM's	6	120	- Upgrade Presses (Replace Van Dorn) - Capacity Plan/Controls on Routing Changes - Increase visual inspection	Rick R - Ongoing - John Gleason - John Gleason/Dean Anderson - 7/14	Replaced Toggle with hydraulic/electric clamp style. Introduce MIE Group to manage proper routing	5	2	5	50
					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	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	2	D- Visual Inspections D - Process Inspections D- Hand Insertions	4	40	T18RA and T30RA add a tool test to see if the product performs in the tool	Gwen B & Taleala W. 9/25/14	Tool test implemented 1 time per day.	5	4	3	60
					5		Broken Insert/Ejector Blade	4	D- Visual Inspections D - Process Inspections D- Hand Insertions	6	120	Increase frequency of functional testing.	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	3	5	75
			Breakage	Part Non-Compliance	5		Thermolator Malfunction	4	D - Visual Inspections D - Process Inspections P - First Piece Approvals D - Hand Insertion	6	120	Add audible warning	Manit. - 9/13	Audible alarms added to all Thermolator to detect temp. dev.	5	1	3	15
					6		Barrel Heat Malfunction	4	D - Visual Inspections D - Process Inspections D - Parameter/Heat Checks D - Hand Insertions P - First Piece Approvals	7	168	Add automated controls	Danny Shereran - 12/8	SPC setup to trigger faults	5	4	3	60
			Slippage	Part Non-Compliance / Strap Engagement Failure	5		Worn inserts	2	D - Visual Inspection D - Process Inspections D - Hand Insertions P - First Piece Approvals	6	60	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	1	6	30
13-16 Packaging	Package product per		Missing or Incorrect Hang	Customer Dissatisfaction	4		Cylinder Failure	2	D - Visual Inspection P - PM	8	64	None						0

and Automation	customers specifications	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. P- Daily Production Meeting	3	18	None						0
		Weekly Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix P- 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
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 P-Training Quality Personnel	2	20	None						0

PTC = Pass Through Characteristic

T18 Series
T30 Series
T40 Series
T50 Series
T60 Series
T120 Series
RT/T150 Series
RT/SR/T 250 Series
RT/SR/T 255 Series

T50MR
SDCT
DCT 9 & 11
Outside Serrated Ties

R&R Study Results
Using Specifications

Gage number:	TGM-850	Done by:	Donna Szczepanski
Gage description:	Tensile Tester	Part name:	T150M0X2
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
< 10%	generally considered to be an acceptable measurement system
10%-30%	may be acceptable based upon importance of application, cost of measurement device, cost of repair etc.
> 30%	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

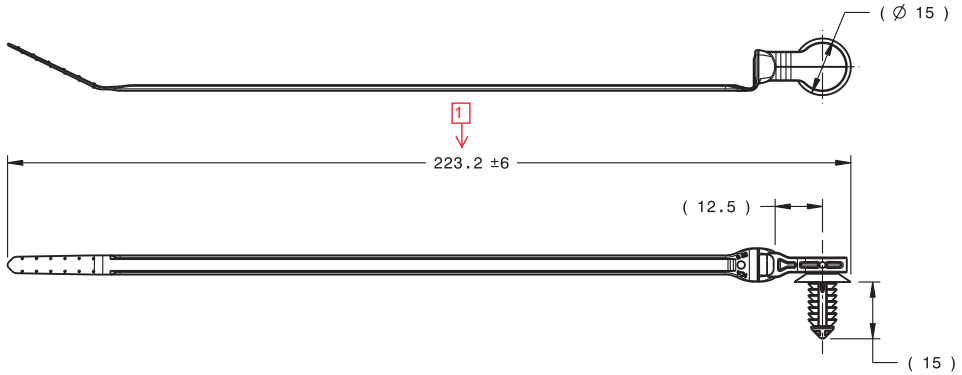
Part Variation (PV)
PV = 16.65216

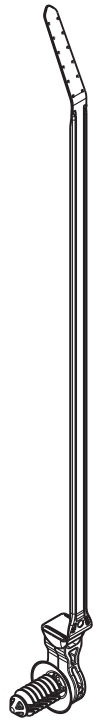
%PV = 99.91298

Specification Spread (USL-LSL)/
(USL - LSL)/ = 16.66667

Appraiser	Replicati	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

ASSEMBLY VIEW





ISOMETRIC VIEW

LTRS	REVISIONS			
ORIGINATOR	CHECKER	ENGR APP	MATL APP	
RELEASED				
AELE-E-11789584-925		20141016		
KVANHUL	EHAFTAR	RVITALI		

REFERENCE:
PERFORMANCE REQUIREMENTS AT DRY AS MOLDED:
1. FIR TREE PUSH IN FORCE: 45 NEWTONS (10 LBS) MAX [2]
   IN THE APPLICABLE NOMINAL HOLE SIZE AND A
   PLATE THICKNESS OF 1.8mm.
2. FIR TREE PULL OUT FORCE: 110 NEWTONS (25 LBS) MIN [3]
   IN THE APPLICABLE NOMINAL HOLE SIZE AND A
   PLATE THICKNESS OF 1.8mm.
3. SHEET METAL THICKNESS RANGE: 0.60mm - 8.25mm [4]
4. APPLICABLE HOLE SIZE:
   A. 6.5mm + 0.5 / - 0.4 [5]
5. RECOMMENDED TENSION FORCE: 135N +/- 30N (30lbs +/- 7lbs)
   BUNDLES COMPRISED OF SOFT OR COMPRESSIBLE
   MATERIALS SHOULD BE EVALUATED FOR EFFECTS
   OF VARIOUS TENSION SETTINGS.
6. BUNDLE RANGE: 1.6mm TO 50.0mm [6]

UNLESS OTHERWISE SPECIFIED:

[7] 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 ALIGNED WITH 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 PART 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 NOTICE

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

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

HellermannTyton

[9] REFERENCE T50ROSFT6SO12.5R

PART MUST COMPLY WITH RESTRICTED SUBSTANCE MANAGEMENT STANDARD WSS-M99P9999-A1 TO SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DRAFTED 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	DTMC
K-CATIA5	TCe	FU5T-14E047-J	IS MASTER
OPER. NO. ---	UNIT mm	DRAWING FU5T-14E047-JA	
DESIGN SADAMS	DETAIL KVANHUL	TITLE RET WIR HRNS TIE STRAP	SHT 1 OF 1
CHECKED EHAFTAR	SAFETY ---		
SCALE 1:1	DATE 20141010	DIVISION	
		PLANT	

FORD MOTOR COMPANY

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