

From: **Quality Assurance HellermannTyton GmbH**

Subject: PPAP Approval signature deadline

Dear customer:

As you are aware the PPAP process is an integral part of our business. With that in mind, we are informing our customers who are requesting a PPAP that there is a 30 day (calendar) deadline to which we are expecting your reply back with a signed copy of the PSW with a disposition regarding it's validity. It is important that we maintain compliance to the current AIAG PPAP manual.

As a part of compliance a signed and approved PSW is essential for our records.

We reserve the right to consider that PPAP valid and complete, if we do not receive a signed copy of the PSW within 30 days (calendar).

Once you have received our PPAP information please e-mail us a copy of your disposition with the appropriate signatures as soon as possible to the following person:

nescha.lohse@HellermannTyton.de

Quality Assistant

phone: +49 (0) 4122 701 5726

Your cooperation is greatly appreciated!

Respecting the procedure as described above, the documentation with HellermannTyton PB-No.:			
89913	with submission date	15.04.2021	will be considered as complete and valid auto-
atically on	15.05.2021	unless otherwise disposed!	

Part Submission Warrant

Part Name T50R0GSBL5U-SET Cust. Part Number 15601294
 Shown on Drawing No. 12-0637-112-CSU Org. Part Number 15601294
 Engineering Change Level 05.1 Dated 08.01.2019
 Additional Engineering Changes n/a Dated n/a
 Safety and/or Government Regulation ☐ Yes ☒ No Purchase Order No. 15601294 Weight (kg) 0,0031
 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

CUSTOMER SUBMITTAL INFORMATION

Nursan Kablo Donanimlari

(30471)

Customer Name/Division

Nadiye BARUTÇU

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:

653908787

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.

V. Solze

Date 15-Apr-21

Print Name i.A. N. Lohse

Phone No. +49 (0) 4122 701 5726

Fax No. +49 4122 701 241

Title Quality Assistant

E-mail nescha.lohse@HellermannTyton.de

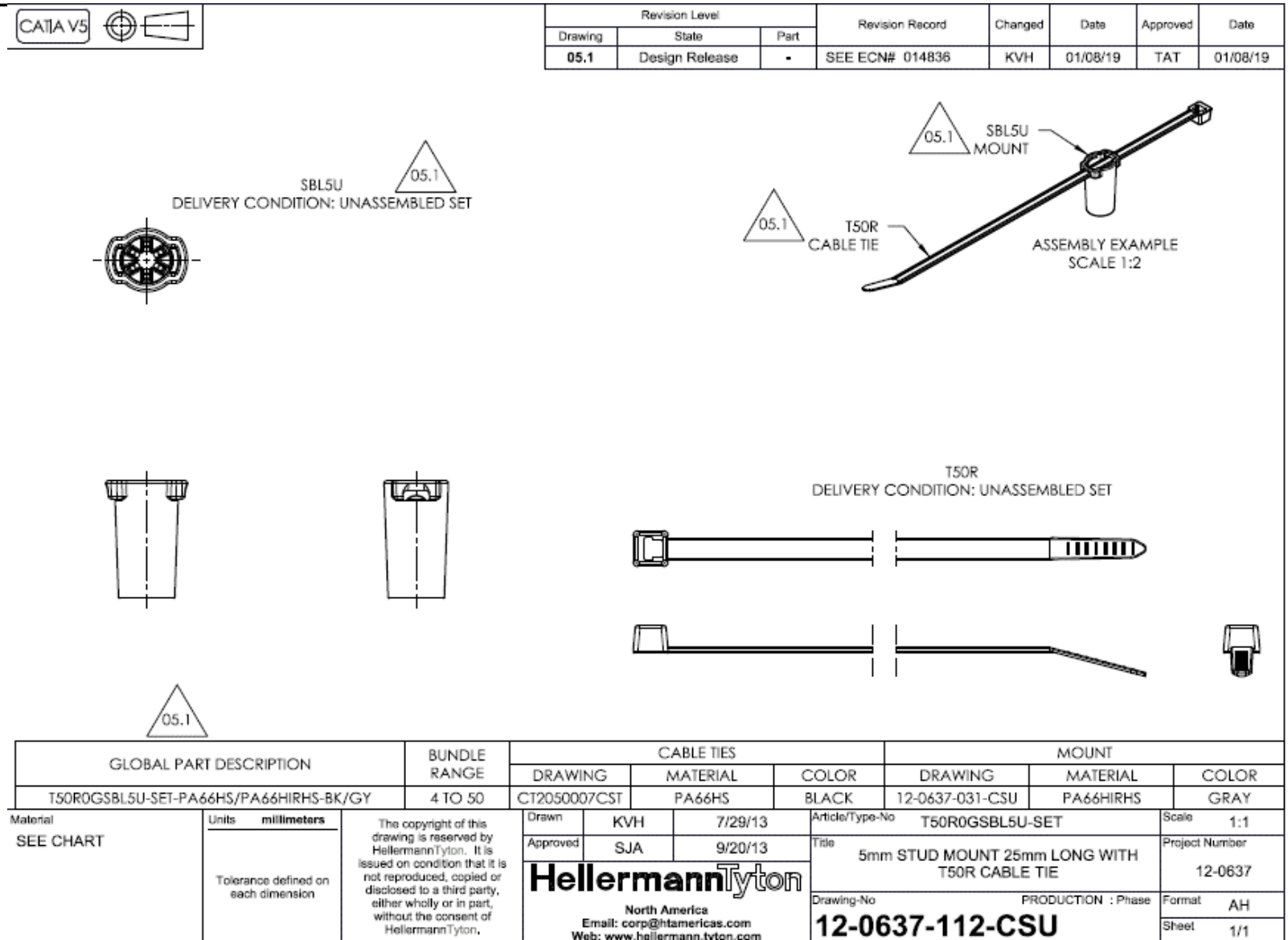
FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Customer Signature Date

Print Name Customer Tracking Number (optional)

Assembly Drawing



Part Drawing

Revision level		Revision Record		Changed	Date	Approved	Date
part	drawing						
—	11	See ECN 013096		A.A.C.	04/15/15	K.A.C.	04/15/15

PRODUCT CODE DESCRIPTION
T50R_HS
COLOR
(CONSULT FACTORY FOR AVAILABLE COLORS)

Aerospace Spec Tie SAE A033671-1 Type 1, Class 1	Type	Cable Range (mm)	Material	A	B	D	E	G	H	Min Loop Tensile Strength (newtons)
no	T50R	3.3 to 50	PA12	1.2 ±0.2	4.6 ±0.2	5.9 ±0.6	7.6 ±0.9	202.0 ±8.0	7.3 ±0.7	200
no		5.1 to 50	POM							
yes			PA66							
no	T50R	1.5 to 50	PA66HS	1.2 ±0.2	4.6 ±0.2	5.9 ±0.6	7.6 ±0.9	202.0 ±8.0	7.3 ±0.7	225
yes			PA66UV							
no			PA46							
no			PA66HIRUV							
no			PA66HIRHSUV							
no		3 to 50	PA66VO							

SEE CHART	Material	ACAD MECH 2014	Drawn J. STOLZ 2/14/96	Approved K.A.C. 04/15/15	Scale 2:1	Computer File Number CT\CT\2050007_11
Dimension tolerances unless otherwise specified .XXXX = .XXX = .XX = .X = NOTED ∠ =	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE EXCLUSIVE PROPERTY OF HELLERMANN TYTON		HellermannTyton 7930 N. Faulkner Rd. Milwaukee, WI 53224 Ph: (414) 355-1130 Fx: (414) 362-8338		Title T50R STANDARD CABLE TIE	
Dimension Units mm					Drawing-No CT2050007CST	Format AH Sheet 1 of 1
PERFORMANCE SPECIFICATION						

Dimensional Results

HT Part No. T50R	Customer Part No. 15601294	Part Description T50R STANDARD CABLE TIE	Supplier HellermannTyton
Drawing No. CT2050007CST	Drawing Date 4/15/2015	Drawing Revision 11	
Production Date 11/29/2020	Material UR066N0HS	Inspection Facility HT-Milwaukee	Inspector LH

Unit of Measurement: mm

Item #	A	B	D	E	G	H				
Gage ID	TGM-1107	TGM-1107	TGM-1107	TGM-1107	TGM-1107	TGM-1107				
Gage Type	Caliper	Caliper	Caliper	Caliper	Caliper	Caliper				
Dim	1.20	4.60	5.90	7.60	202.00	7.30				
Tol +	0.20	0.20	0.60	0.90	6.00	0.70				
Tol -	0.20	0.20	0.60	0.90	6.00	0.70				

Sample

1	1.310	4.700	5.920	7.760	197.950	7.030				
2	1.300	4.730	5.920	7.750	197.590	7.040				
3	1.290	4.710	5.820	7.730	197.660	7.040				
4	1.280	4.720	5.820	7.750	197.660	7.040				
5	1.280	4.700	5.880	7.720	197.660	7.020				
6	1.280	4.720	5.830	7.750	197.790	7.020				
7	1.280	4.720	5.840	7.750	197.870	7.030				
8	1.290	4.720	5.820	7.730	197.860	7.030				
9	1.280	4.750	5.860	7.780	197.870	7.070				
10	1.290	4.720	5.880	7.760	197.880	7.050				
11	1.280	4.700	5.860	7.770	197.880	7.050				
12	1.290	4.750	5.850	7.750	197.880	7.060				
13	1.290	4.750	5.870	7.790	197.620	7.070				
14	1.280	4.710	5.840	7.780	197.710	7.070				
15	1.280	4.720	5.830	7.780	197.710	7.070				
16	1.280	4.710	5.820	7.790	197.710	7.080				
17	1.280	4.710	5.850	7.780	197.670	7.080				
18	1.280	4.710	5.860	7.790	197.670	7.070				
19	1.280	4.750	5.810	7.780	197.760	7.020				
20	1.280	4.740	5.870	7.770	197.730	7.060				
21	1.280	4.740	5.840	7.770	197.690	7.070				
22	1.280	4.760	5.820	7.770	197.990	7.040				
23	1.280	4.760	5.860	7.780	197.800	7.040				
24	1.290	4.730	5.860	7.780	197.800	7.080				
25	1.300	4.750	5.840	7.780	197.800	7.070				
26	1.300	4.780	5.830	7.760	198.210	7.050				
27	1.290	4.780	5.860	7.750	197.770	7.050				
28	1.290	4.760	5.830	7.750	198.100	7.070				
29	1.280	4.770	5.860	7.750	197.660	7.030				
30	1.280	4.750	5.890	7.750	197.800	7.050				
31	1.280	4.740	5.880	7.740	197.800	7.020				
32	1.280	4.710	5.890	7.710	197.800	7.040				
OK	X	X	X	X	X	X				
NOT OK										



Unit of Measurement: mm										
Item #	A	B	D	E	G	H				
Gage ID	TGM-1107	TGM-1107	TGM-1107	TGM-1107	TGM-1107	TGM-1107				
Gage Type	Caliper	Caliper	Caliper	Caliper	Caliper	Caliper				
Dim	1.20	4.60	5.90	7.60	202.00	7.30				
Tol +	0.20	0.20	0.60	0.90	6.00	0.70				
Tol -	0.20	0.20	0.60	0.90	6.00	0.70				

F-QA-PPAP.2-PPAP Packet Template - Uncontrolled VIEW
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Performance Results

HT Part No. T50R	Customer Part No. 15601294	Part Description T50R STANDARD CABLE TIE	Supplier HellermannTyton									
Drawing No. CT2050007CST		Drawing Date 4/15/2015	Drawing Revision 11									
Production Date 11/29/2020	Material UR066N0HS	Inspection Facility HT-Milwaukee	Inspector LH									
<div>Wire Bundle Test</div> <table><tr><td>Wire Size</td><td>Pass/Fail</td><td></td></tr><tr><td>2MM</td><td>Pass</td><td></td></tr><tr><td></td><td></td><td></td></tr></table>				Wire Size	Pass/Fail		2MM	Pass				
Wire Size	Pass/Fail											
2MM	Pass											

Material Test Results

HT Part No. T50R		Customer Part No. 15601294		Part Description T50R STANDARD CABLE TIE	
Material UR066N0HS	Color Black	Blend 100%	Lot # IK16VY21	Supplier HellermannTyton	

Material/Color	Manufacturer	Trade Name
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Current Material		
PA 66 (PA66HS) Black	Ascend	Vydyne 22HSP

Contingency Material (Approved sources have similar material characteristics)		
PA 66 Nylon Black	Dupont	Zytel 103FHS

*Per AIAG PPAP Manual, fourth edition, HellermannTyton is responsible for the approval of supplier provided material and services.

<i>Karen Camacho</i>	3/31/2021
_____ Signature	_____ Date

Current Material Certificate



HELLERMANN TYTON
6701 W GOOD HOPE
Milwaukee, WI 53224
Attention: QUALITY DEPARTMENT

Customer Part No: UR066N0HS
Container ID: EVERGREEN A222

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

Certificate Date: 23-NOV-20
Delivery No: 0382542477
Shipped Qty: 43,820.000 Lbs
(19,876.752 Kgs)
Customer P.O. No: 137840-118

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 9001:2015 and IATF 16949:2016 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: ASTM D6779 PA0121, ASTM D4066 PA0121, ASTM D4000 PA012, GMP.PA66.018, WSK-M4D648A, MSDS 41 CPN 1076, MSDS 41 CPN 1899, MSDS 41 CPN 3490, ESF-M4D82-A, CMP NY057 AA, J1639 PA0121, FMVSS 302*, GMW 16036P-PA66, Ford WQ 100A.

Material Type: VYDYNE 22HSP BK Material No: 10404101 Batch No: IK16VY21 Date of Mfg: 16-NOV-2020

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Relative Visc.	STM 00012	45.0	48.0	46.4	N/A
VISCOSITY NUM. SULFURIC	STM 00012	136.9	142.8	139.7	ml/g
Moisture	STM 00835	0.12	0.20	0.13	%

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.

This Certificate of Analysis is provided by Ascend Performance Materials (or its authorized distributor) to its direct purchaser only and is intended for internal use. It is not valid if resold, conveyed or otherwise transferred to another party without Ascend's prior written consent. Ascend makes no warranties and assumes no liability for any product or certification obtained from an unauthorized source. Contact Ascend at +1 713-315-5700 to confirm the validity of any third party supplier.

Ascend and Vydyne are registered trademarks of Ascend Performance Materials Operations LLC.

Contingency Material Certificate

DU PONT ORDER NO: 2500835611

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DU PONT STANDARD SPECIFICATION

Product: ZYTEL® 103HSL NC010 25 KG BAG NYLON RESIN

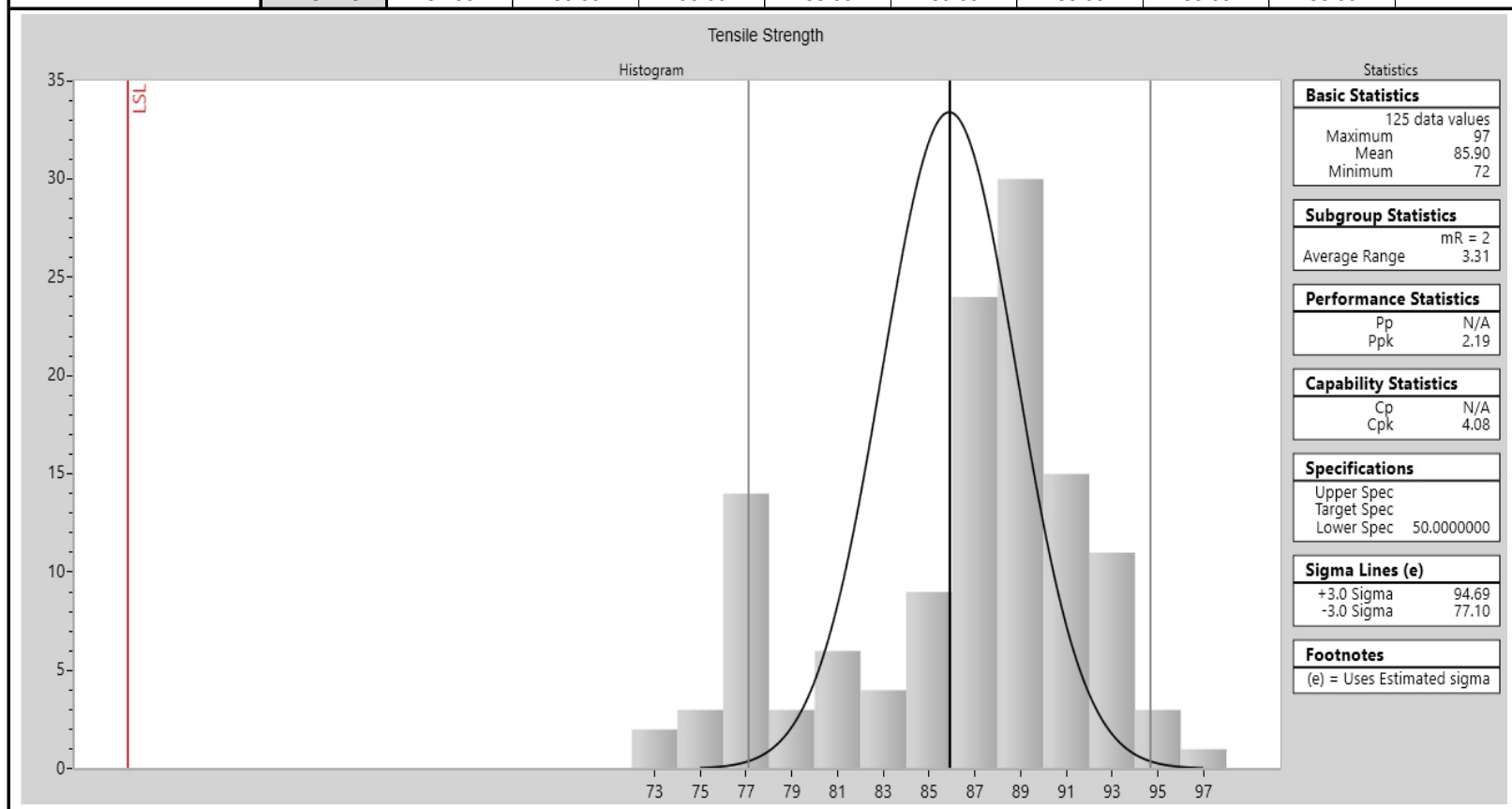
TESTS	TEST METHOD	LIMITS		RESULTS
		MIN	MAX	
<u>LOT TEST</u>				<u>LOT NO: N88UL2U103</u>
Copper, ppm	XRF	140	220	186
Relative Viscosity	ASTM D 789	45.0	50.7	48.2
Water Content at Packout, %	ISO 15512		0.18	0.17
<u>PERIODIC TEST</u>				<u>LAST TEST DATE: December 2020</u>
Deflection Temperature @1.80 MPa, °C	ISO 75-1&2			67
Density, g/cm3	ISO 1183/Method A			1.14
Notched Charpy Impact @ 23C, kJ/m2	ISO 179/1eA			5.4
Temp of melting,2nd melt,10°C/min °C	ISO 11357			262
Tensile Modulus, Mpa	ISO 527-1&2			3080
Tensile Stress @ Yield, 50 mm/min, MPa	ISO 527-1&2			88.2
<u>HISTORICAL TEST</u>				
Flammability (Burn Rate 1 of 5), mm/min	ISO 3795			DNI
Flammability (Burn Rate 2 of 5), mm/min	ISO 3795			DNI
Flammability (Burn Rate 3 of 5), mm/min	ISO 3795			DNI
Flammability (Burn Rate 4 of 5), mm/min	ISO 3795			DNI
Flammability (Burn Rate 5 of 5), mm/min	ISO 3795			DNI
Flammability, mm/min	ISO 3795		100	DNI
Plaque Thickness, mm	ISO 3795			1.91

THIS PRODUCT CERTIFICATION IS **NON-TRANSFERABLE** AND IS VALID ONLY TO THE FIRST END-USER PURCHASING THIS PRODUCT DIRECTLY FROM DUPONT OR FROM A DUPONT-AUTHORIZED DISTRIBUTOR. PRODUCT AND/OR PRODUCT CERTIFICATION OBTAINED FROM AN UNAUTHORIZED SOURCE IS ASSUMED COUNTERFEIT, AND DUPONT MAKES NO WARRANTIES AND ASSUMES NO LIABILITY IN CONNECTION WITH THE USE OF PRODUCT OR PRODUCT CERTIFICATION OBTAINED FROM AN UNAUTHORIZED SOURCE. Call 1-800-441-0575 for a list of authorized distributors in your area. Copyright © 2019 DuPont. All Rights Reserved. No portion of this work may be reproduced in whole or in part by any electronic, mechanical or other means, including xerography, photocopy, or any information storage or retrieval system, or otherwise distributed without the express permission of DuPont.

Initial Process Study

HT Part No. T50R	Customer Part No. 15601294	Part Description T50R STANDARD CABLE TIE	Supplier HellermannTyton
Drawing No. CT2050007CST	Drawing Date 4/15/2015	Drawing Revision 11	
Production Date 11/29/2020	Material UR066N0HS	Inspection Facility HT-Milwaukee	Inspector LH

Study	Sample	Data								
Loop Tensile Strength	1-9	88.00	76.00	79.00	75.00	75.00	76.00	77.00	77.00	77.00
	10-18	79.00	73.00	72.00	76.00	82.00	77.00	77.00	79.00	76.00
	19-27	81.00	76.00	75.00	82.00	76.00	81.00	76.00	80.00	77.00
	28-36	88.00	87.00	87.00	92.00	87.00	86.00	89.00	80.00	81.00
	37-45	88.00	81.00	88.00	88.00	87.00	85.00	86.00	88.00	84.00
	46-54	86.00	93.00	91.00	84.00	94.00	91.00	93.00	97.00	88.00
	55-63	89.00	94.00	89.00	92.00	85.00	93.00	87.00	87.00	89.00
	64-72	91.00	89.00	88.00	88.00	88.00	85.00	87.00	88.00	90.00
	73-81	87.00	86.00	87.00	88.00	83.00	90.00	92.00	92.00	90.00
	82-90	92.00	87.00	86.00	89.00	77.00	87.00	83.00	91.00	86.00
	91-99	89.00	86.00	88.00	88.00	85.00	86.00	91.00	91.00	84.00
	100-108	93.00	91.00	95.00	93.00	88.00	89.00	89.00	88.00	91.00
	109-117	85.00	91.00	88.00	87.00	90.00	93.00	90.00	87.00	86.00
	118-126	84.00	86.00	90.00	88.00	89.00	88.00	88.00	86.00	



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 "I"	Inspect "x"	Process Name/ Operation Description	Product/Process Characteristics	Control Methods
1		◆			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
2	■				Material Ratio	Verify Correct Material	Material Process Log F-PRD-8.1-4
3	■				Molding Machine/Automation Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-9.6-1
4				☒	First Piece Approval QA Completes (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	First Piece Acceptance F-QA-10.3-5
5	■				First Piece Approval	Hang First Piece	Visual At Press
6				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
7	■				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
8				☒	In Process Checks (Injection Molding)	Short Shots, Any Flash, Color, and Hand Insertions	Per Control Plan
9	■				Packaging - Automation and Inspection	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
9A	■				Packaging - Manual and Inspection	Verify Seals, Water, Date Code, Labels, Hole Punch, Box Quantity	
10				☒	Visual Appearance	Check Ties for Visual Defects	Per Control Plan
11				☒	Final and Live Inspection	Quality Approval of Final Product	F-QA-10.4-21/ Share Point
13				☒	QA Testing	Verify Weekly Testing Has Been Completed	Per Control Plan
14		◆			Material Movement	Move Skid To Shipping Dock	ERP System
15				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

☐ Prototype ☐ Pre-Launch ☒ 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			Special Char. Class	METHODS					Reaction Plan
			NO.	PRODUCT	PROCESS		Product/Process Specification/ Tolerance	Evaluation/ Measurement Technique	SIZE		Control Method	
								Size	Freq			
1	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	Notify Team Supervisor and QA, Isolate Lot per WI-PRD-13.1-3 & PR-QA-13.1-2
			2		Check moistures in Silo Materials		Perform Moistures per TS-WI-MAX400XL	Computrac Max 4000XL	1 Sample/ Material	One /Shift	Raw Material Moisture Content Test Log F-QA-10.3-9	Notify Production Team Supervisor and QA, Adjust Dryers and Re-check. Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
2	Material Ratio	Material Handling System	1		Material Ratio		Set up Per Work Order	Visual machine setting	Each material Change	Each Material Change	Material Process Log F-PRD-8.1-4	Notify Production Team Supervisor and QA, Adjust Ratio Isolate, Product per WI-PRD-13.1-3 & PR-QA-13.1-2
			2		Colorant (When Needed)		Mix Ratio Setting According to S-PRD 9.1-19 / Set Up Per Work Order	Visual machine setting	Each Lot	Each Colorant	Material Process Log F-PRD-8.1-4	Notify Production Team Supervisor and QA, Adjust Ratio, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
3	Molding Machine / Automation Setup	Injection Molding Machine	1		Machine Set-Up		Mattec, F-PRD-9.6-1: Part specific Process Sheet, WI-PRD-202: Process Technician Training Manual, F-PM-9.8-3: Tool Evaluation.	Review of Set-Up Specs and fill out applicable sections of F-PM-9.8-3: Tool Evaluation.	Each Set Up	Each Set Up	Part specific Process Sheet F-PRD-9.6-1 and PLC	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & 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, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Camera Vision Inspection (If applicable)	3		In process Cable Tie Head inspection		No blocked Head or Missing Paw	Vision system	Each cable tie	100%	Run Master Sample through the Vision System one per day (MP2)	Adjust Process/Recheck, Isolate Product per WI-PRD-13.1-3 & PR-QA-13.1-2
4-5	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked/cut Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Notify Team Supervisor/Process Tech, Adjust Process
	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	Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & 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 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	Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
6	Validation Testing	Injection Molding Machine	1	Push In / Push On Force (If Needed)			Per Drawing / SQC Pack	Force Tester or Tensometer	1 Shot	At Annual 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 Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
		Injection Molding Machine	3	Dimensional			Perform Dimensional on the Part per Print	Calibrated Gages per Dimensional Study	1 shot	At Annual 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 Annual 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 Annual Validation Testing	SPC Software	Control of Non-Conforming Product/PR-QA-13.1-2
7	Work Order Set-Up Team Supervisor or Cell Leader	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 per WI-PRD-13.1-3 & 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 per WI-PRD-13.1-3 & PR-QA-13.1-2 (if applicable)
8	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	Every 2 Hours	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 per WI-PRD-13.1-3 & 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 per WI-PRD-13.1-3 & PR-QA-13.1-2
		Injection Molding Machine	3	Part Quality			Check For Flash, Shorts, Mismatch, Blocked/cut Heads, Missing Paw/Fir Tree, Burning/Splay, Broken Insert/Pin, and 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
												Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & 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		
9-10	Packaging Auto Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Ties for Visual Defects - WI-PRD-200: Packaging Operator Training Manual	Visual	1 Shot	Every 2 Hours	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA (WI-PRD-13.1-3)
												Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & 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 per WI-PRD-13.1-3 & PR-QA-13.1-2
		Waters in Bag	4	Amount of Water Added Per Bag			Per Work Order	Actual value on PLC or manually measure.	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 per WI-PRD-13.1-3 & PR-QA-13.1-2
		Date Code	5	Date Code Stamp			Bag Must Have Correct Data Code Date Code Calendar S-PRD-8.1-6	Visual	Once	One 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 per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	6	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	One box One bag	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 per WI-PRD-13.1-3 & PR-QA-13.1-2
		Packaging Equipment	7	Hole Punch (Where Applicable)			Hole Punch Must Be Within Header Boundaries and Complete	Visual	Once bag	One 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 per WI-PRD-13.1-3 & 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		
9A-10	Packaging Manual Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Ties for Visual Defects - WI-PRD-200: Packaging Operator Training Manual	Visual	1 Shot	Every 2 Hours	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Notify Supervisor, Processing Tech and QA
		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	Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Water in Bag	4	Amount of Water Added Per Bag			Per Work Order	Manually measure.	1 measurement	2 Times Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor or QA
		Date Code	5	Date Code Stamp			Operator inspection Sticker Must Have Correct Date Code S-PRD-8.1-6	Visual	Once	Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	6	Bag and Box Labels			Bag and Box Labels Must Match Work Order	Visual	One box One bag	Twice Per Shift	Inspection Label (Initialed and Dated) / Share Point or F-PRD-1.1	Adjust Process/ Notify Supervisor and QA
		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	Recheck / Control of Non-Conforming Product per WI-PRD-13.1-3 & 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	Once	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 per WI-PRD-13.1-3 & 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		
11	Final Inspection at the Cell	Injection Molding Machine	1	Part Quality			Check For Flash, Shorts, Blocked/cut Heads, Mismatch, Color(If Needed)	Visual	1 Shot	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	2	Box Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Labels	3	Bag Label			Per Work Order Check for Correct Label Placement; if Required	Visual match	1 label	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Waters in Bag	4	Water Verification			Verify Water is in Bag where required	Visual	1 Bag	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Sealer	5	Proper Bag Seal			Bag Must Have a Complete Seal	Visual and Pull at Seams	1 bag	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & 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	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Packaging	7	Packaging Requirements			Verify per Work Order correct Box	Visual	1 check	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2
		Stamp	8	Date Code Stamp / Printer			Date Code Calendar S-PRD-8.1-6	Visual match	1 check	Once Per Shift	Share Point or Final Inspection F-QA-10.4-21	Notify Team Supervisor/Process Tech Adjust Process
												Control of Non-Conforming Product per WI-PRD-13.1-3 & 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		
12-13	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	Notify Team Supervisor/Process Tech Adjust Process	
											Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2	
		Injection Molding Machine	2	Test for Tensile Strength		Tensile Strength of Tie Must Meet Minimum Requirements Per Print	Tensile Tester	1 Shot	Weekly	SPC Software	Notify Team Supervisor/Process Tech Adjust Process	
											Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2	
		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	Notify Team Supervisor/Process Tech Adjust Process	
											Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & 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	Notify Team Supervisor/Process Tech Adjust Process	
											Retest / Control of Non-Conforming Product per WI-PRD-13.1-3 & PR-QA-13.1-2	
14	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
15	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 per 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
PAT100 Series	Stud Mounts

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

**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
1-2 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
3 Molding Machine/ Automation 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	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

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
				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 during changeover D - Final Inspection	5	60	None						0
		Camera stop working	Customer Dissatisfaction	8		Mechanical, power failure, lenses blocked, conveyor belt dirty, component failure.	2	Master sample (Known Bad and Good parts)	2	32	None						0
		Pass Blocked Head and Missing Paw part	Customer Dissatisfaction	8		Mechanical failure and background light	1	Master sample (Known Bad and Good parts)	8	64	None						0
		Rejecting Non-blocked Head and part with Paw	High scrap rate	4		Mechanical failure and background light	1	Master sample (Known Bad and Good parts)	2	8	None						0
4 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

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
		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

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	Occurrences	Detection	R P N
				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

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
				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	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

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
		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	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

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
5 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
6 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
7 Work order setup	Work order	Work order not sign off	Word order has in corrective BOM	8		Incorrect setup BOM in (JDE)	6	D-Cell lead checklist P- IE Setup BOM (IMLS)	2	96	None						0
			Incorrect BOM used	8		Wrong label on material	2	P-Work instruction D-Flag system	2	32	None						0
				8		Operator Error	3	P-Work instruction D-Flag system	2	48	None						0
8 In Process Checks	Control Plan	Checks not completed	Nonconformance products ship to customer	3		Process issues/Operator error	3	D-Operator hourly check D-Quality check 2 times in 24 hours D-Process Tech check every other hour. P-SharePoint/Shift Log P-Work instruction /Process sheet	2	18	None						0
9-10 Packaging - Automation and Inspection	Package product per customers specifications	Incorrect or Missing Date Code on the Bag	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 - Operator Error	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/cut heads	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	5	50	None						0
						Manual Degator Jams	4	D - Visual Inspection D - Process Inspection P - PM	4	80	None						0
						Automated Degator Jams	3	D - Visual Inspection D - Process Inspection P - PM P - Degator Alarm	4	60	None						0

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
						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						0
		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	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						0
		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

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
				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
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	None						0

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
9A-10 Packaging - Manual and Inspection	Package product per customers specifications	Incorrect or Missing work order number on Bag	Traceability Loss	3		Printer Malfunction	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45	None						0
				3		Operator error	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar	5	45							
		Incorrect or Missing Date Code on the Box	Traceability Loss	3		Operator error	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions P-SharePoint/Shift Log	3	27	None						0
		Incorrect Moisture in Bags	Part Non-Compliance / Parts Conditioned Incorrectly	3		Operator error	2	D - Monitoring Water D - Final Inspection P - Preventative Maintenance P - dosing system monitors flow	3	18	None						0
				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	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						

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	Occurrences	Detection	R P N
		Mis-labeling	Customer Dissatisfaction	3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Final Inspections P - LPA <u>P-Work order sign-off</u>	7	84	None						0
				3		Wrong Pre-labeled Bag for Product	4	D - Visual Inspections D - Final Inspections P - LPA <u>P-Work order sign-off</u>	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections D - Final Inspections P - LPA <u>P-Work order sign-off</u>	7	84	None						0
				3		Wrong label provided	3	D - Visual Inspections D - Final Inspections P - LPA <u>P-Work order sign-off</u>	7	63	None						0
		Insufficient Bag Seals	Part Non-Compliance	3		Sealer Tape Worn	4	D - Visual Inspection D - Final Inspection <u>P - Electronic Shift Log</u>	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 <u>D - Final Inspection</u>	7	42	None						0
				3		Material stuck on sealer	4	D - Visual Inspection D - Final Inspection <u>P - Incoming Inspection</u>	7	84	None						0
				3		Improperly Adjusted Timer	4	<u>P - Work Instruction</u> <u>D - Visual Inspection</u>	7	84	None						0
		Incorrect Quantity in Bag	Customer Dissatisfaction	4		Scale issue	3	<u>P - Work Instruction</u> D - Visual verification D-SharePoint/Shift Log <u>P-Calibration</u>	2	24	None						0
				4		Operator error	3	<u>P - Work Instruction</u> D - Visual verification <u>D-SharePoint/Shift Log</u>	5	60	None						0
		Incorrect Quantity in Box	Customer Dissatisfaction	4		Improper Scale Set Up	3	D - Visual Inspection D - Final Inspection <u>P - Bag Counter (T18R-C)</u>	5	60	None						0
				4		Scale Out of Calibration	1	D - Visual Inspection D - Final Inspection <u>P - Calibration Schedule</u>	5	20	None						0
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product	2	D - Visual Inspection D - Final Inspection	6	48	None						0
11 Final and Live Inspection	Product conforms per specifications after production run.	Bad Product Shipped	Customer Dissatisfaction	8		Inspection Not Performed by Cell Lead	1	D /P- In Process Checks	1	8	None						0
				7		Bad Product not Found in Random Sampling	2	D /P- In Process Checks	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. <u>P- Final and Live Inspection</u>	1	42	None						

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
12-13 QA Testing	Validation and documentation of product per specifications	Weekly Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix Daily Production Meeting P-	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
14 Material Movement	Move products from Injection Molding work station to FG	Good product put in Hold	Delay shipment to customer	5		Incorrect cone put on product at Molding Work Station	2	D - Visual Inspection P - Hold ticket attached P-Work instruction	3	30	None						0
		Bad Product Shipped	Customer Dissatisfaction	8	PTC	Incorrect cone put on product at Molding Work Station	1	D - Visual Inspection P - Hold ticket attached P-Work instruction	9	72							0
15 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

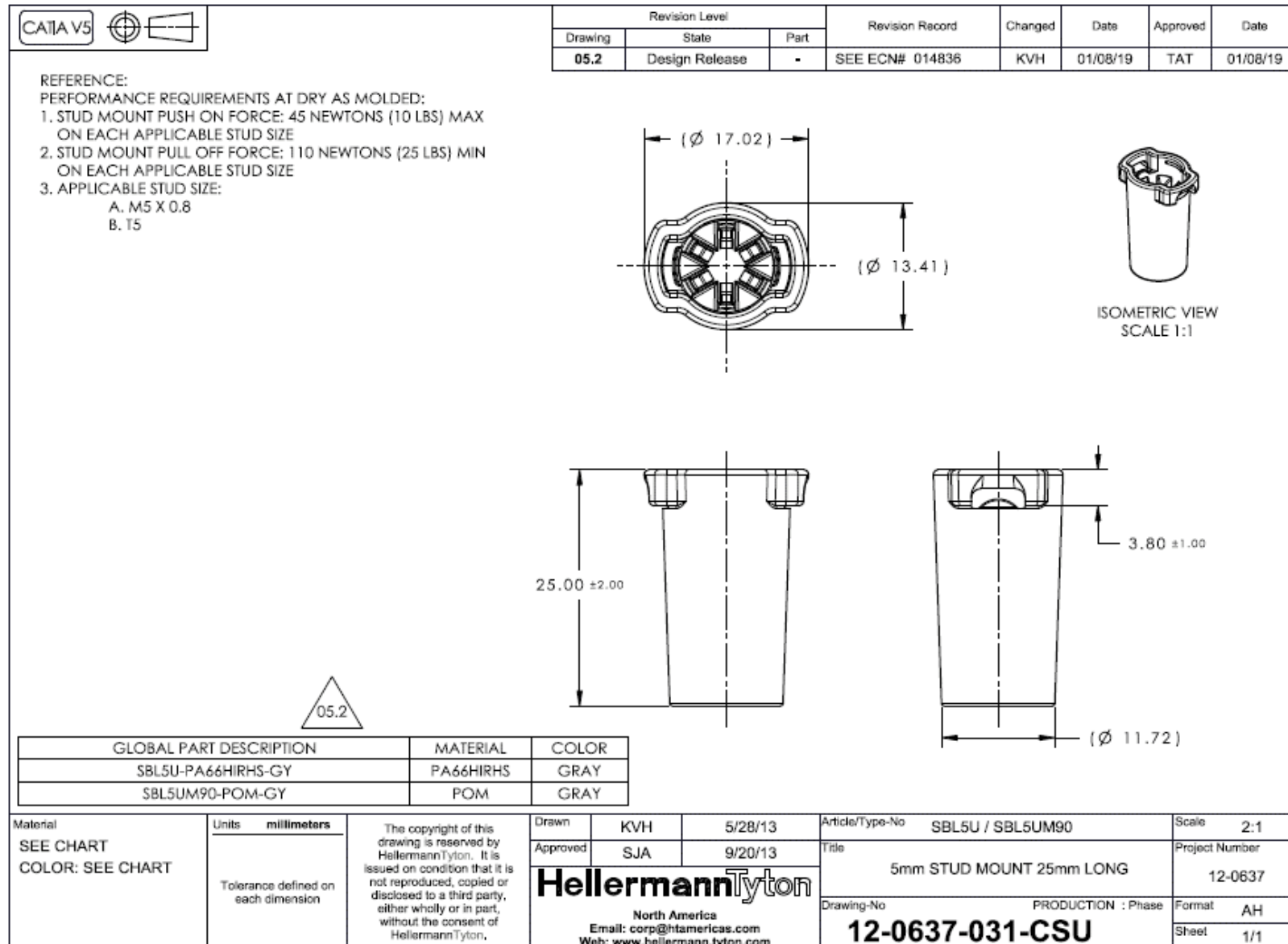
FORD PN

BU5T-14E047-DA - Cable Tie Portion (156-00303)

DU5T-14G317-MA - Wide Strap (111-12300)

W703646-S2300 - Cable Tie (T50R0HSM4)

Part Drawing





Dimensional Results

HT Part No. SBL5U-PA66HIRHS-GY (151-01046)	Customer Part No. 15601294	Part Description 5mm STUD MOUNT 25mm LONG	Supplier HellermannTyton
Drawing No. 12-0637-031-CSU		Drawing Date 1/8/2019	Drawing Revision 05.2
Production Date 2/25/2020	Material UR0HIRHS9	Inspection Facility HT-Milwaukee	Inspector JD

Unit of Measurement: mm

Item #	1	2	3	4	5
Gage ID	TGM-1107	TGM-1107	TGM-1107	TGM-1107	TGM-1107
Gage Type	Caliper	Caliper	Caliper	Caliper	Caliper
Dim	17.02	13.41	25.00	3.80	11.72
Tol +	REF	REF	2.00	1.00	REF
Tol -	REF	REF	2.00	1.00	REF

Sample

1	17.120	13.440	24.980	3.800	11.730
2	17.130	13.440	25.010	3.810	11.730
3	17.110	13.440	25.010	3.820	11.710
4	17.120	13.420	24.980	3.810	11.720
5	17.110	13.460	25.020	3.810	11.720
6	17.110	13.450	25.020	3.810	11.730
7	17.100	13.420	25.000	3.820	11.730
8	17.100	13.440	24.980	3.790	11.730
9	17.110	13.460	24.990	3.800	11.740
10	17.110	13.440	25.020	3.790	11.720
11	17.300	13.450	25.010	3.790	11.710
12	17.110	13.440	24.990	3.800	11.720
13	17.120	13.420	25.000	3.780	11.730
14	17.120	13.450	24.990	3.800	11.730
15	17.120	13.450	24.980	3.800	11.720
16	17.120	13.450	25.000	3.800	11.720
OK	REF	REF	X	X	REF
NOT OK	REF	REF			REF

Performance Results

HT Part No. SBL5U-PA66HIRHS-GY (151-01046)	Customer Part No. 15601294	Part Description 5mm STUD MOUNT 25mm LONG	Supplier HellermannTyton
Drawing No. 12-0637-031-CSU		Drawing Date 1/8/2019	Drawing Revision 05.2
Production Date 2/25/2020	Material UR0HIRHS9	Inspection Facility HT-Milwaukee	Inspector JD

Test	Push On	Pull Off	Push On	Pull Off						
Feature	Stud Mount	Stud Mount	Stud Mount	Stud Mount						
Size	M5	M5	T5	T5						
Thickness	5.0mm	5.0mm	5.0mm	5.0mm						
Type	Stud	Stud	Stud	Stud						
Gage ID	TGM-851/852	TGM-851/852	TGM-851/852	TGM-851/852						
Max Spec.	10 LBS		10 LBS							
Min Spec.		25 LBS		25 LBS						
Unit	lb-ft	lb-ft	lb-ft	lb-ft						

Cavity ID / Sample

[illegible]

[illegible]

Material Test Results

HT Part No. SBL5U-PA66HIRHS-GY (151-01046)		Customer Part No. 15601294		Part Description 5mm STUD MOUNT 25mm LONG	
Material UR0HIRHS9	Color Gray	Blend 75/25	Lot # IB14FY01	Supplier HellermannTyton	
Material/Color		Manufacturer		Trade Name	

Current Material

PA 66 Impact Modified (PA66HIRHS) Natural	Ascend	Vydyne 47H
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Contingency Material (Approved sources have similar material characteristics)

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*Per AIAG PPAP Manual, fourth edition HellermannTyton is responsible for the approval of supplier provided material and services.

Karen Camacho

Signature

3/31/2021

Date

Current Material Certificate



HELLERMANN TYTON
6701 W GOOD HOPE
Milwaukee, WI 53224
Attention: QUALITY DEPARTMENT

Customer Part No: UR0HIRHS9
Container ID: SLAY 5302

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

Certificate Date: 18-FEB-20
Delivery No: 0382513176
Shipped Qty: 46,700.000 Lbs
(21,183.120 Kgs)
Customer P.O. No: 1037842-8

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 9001:2015 and IATF 16949:2016 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, MS-DB-41 CPN 2055, ESB-M4D178-A2, WSS-M99P23-C1/C2, WSS-M99P9999-A1, WSS-M4D706B1, WSS-M99P1111-A, WSK-M4D706-A, GMW16447P-PA66-T2, GMW16558P-PA66-T1, GMP-PA66.015, Ford WQ 100B.

Material Type: VYDYNE 47H NT Q527 Material No: 10404322 Batch No: IB14FY01 Date of Mfg: 14-FEB-2020

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Moisture	ASTM D8869	0.05	0.20	0.06	%
Strength @ Yld	ISO 527 1-2	60		65	MPa
Notched Izod	ISO 180 / 1A	12.0		15.6	kJ/m ²
Flex Modulus	ISO 178	1900		2458	MPa
Density	ISO 1183	1.09	1.11	1.10	g/cm ³
DTUL, 1.82 MPA	ISO 75 1-2	53.0		67.3	C

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Ascend and Vydyne are registered trademarks of Ascend Performance Materials Operations LLC.

Current Material Certificate



HELLERMANN TYTON
8701 W GOOD HOPE
Milwaukee, WI 53224
Attention: QUALITY DEPARTMENT

Customer Part No: UR0HIRHS9
Container ID: NATIONAL EX 283

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

Certificate Date: 05-MAR-21
Delivery No: 0382555851
Shipped Qty: 37,950.000 Lbs
(17,214.120 Kgs)
Customer P.O. No: 146563

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 9001:2015 and IATF 16949:2016 criteria.

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This product meets the requirements of the following specifications: SAE J1639, SAE J1639 PA0171, ASTM D6779-PA0161-Z1Z2, ASTM 4066 PA0161, FMVSS 302, MS-DB-41 CPN 2055, ESB-M4D178-A2, WSS-M99P23-C1/C2, WSS-M99P9999-A1, WSS-M4D706B1, WSS-M99P1111-A, WSK-M4D706-A, GMW16447P-PA66-T2, GMW16558P-PA66-T1, GMP-PA66.015, Ford WQ 100B.

Material Type: VYDYNE 47H NT Q527 Material No: 10366059 Batch No JB22FY05 Date of Mfg 22-FEB-2021

Ascend Performance Materials Operations LLC Specification

Lot Data Property	Test Method	Min	Max	Result	Units
Moisture	ASTM D6869	0.05	0.20	0.06	%
Strength @ Yld	ISO 527 1-2	60		68	MPa
Notched Izod	ISO 180 / 1A	12.0		13.1	kJ/m ²
Flex Modulus	ISO 178	1900		2418	MPa
Density	ISO 1183	1.09	1.11	1.10	g/cm ³
DTUL, 1.82 MPa	ISO 75 1-2	53.0		71.6	C

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Current Material Certificate

Clariant Plastics & Coatings USA Inc.
926 Elliot Road
Albion, MI, 49224

CLARIANT 

HELLERMANN TYTON CORP
7930 N FAULKNER RD
MILWAUKEE WI 53224-3423
USA

C e r t i f i c a t e o f A n a l y s i s

Date: 08/03/2020
Page: 1 / 1

Material : GREY NY ASCEND 21 SP
Old Material No. : AB73632643
Material-no. : AB73632643
Batch No. : USPC034783

On the batch, of which the consignment is a part, the following values were determined.

Inspection characteristic/-method	Specification	Result
COLOR - VISUAL		
CONTAMINATION - VISUAL		
PELLET COUNT		49 Pel./g
PELLET LENGTH		0.130 IN
PELLET DIAMETER		0.092 IN
Let Down Ratio (%)		2

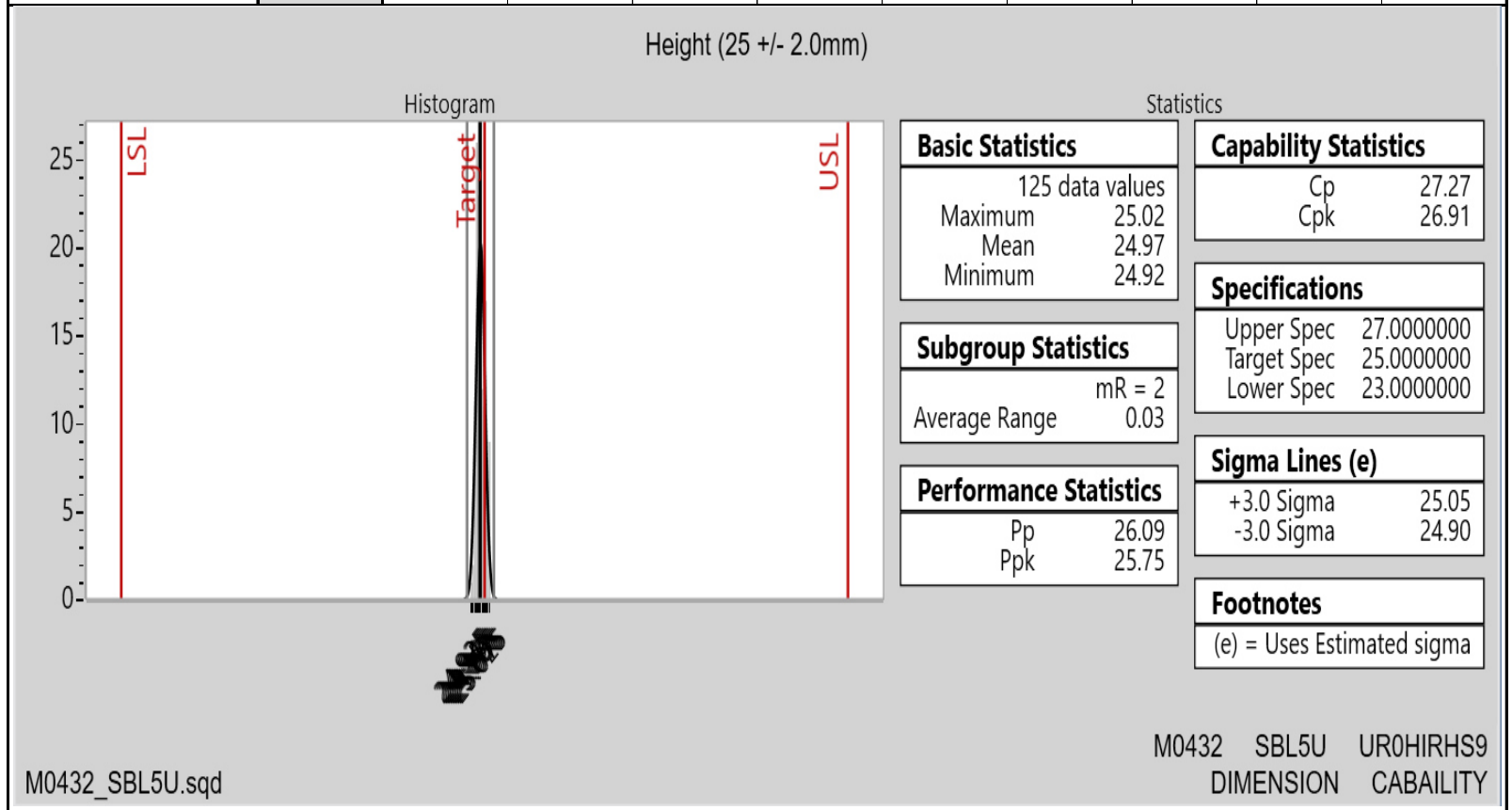
The above particulars do not release the customer from the obligation to carry out an inspection of goods received.

This report does not require a signature.
Management System Certified according to ISO 9001, ISO 14001 and OHSAS 18001

Initial Process Study

HT Part No. SBL5U-PA66HIRHS-GY (151-01046)	Customer Part No. 15601294	Part Description 5mm STUD MOUNT 25mm LONG	Supplier HellermannTyton
Drawing No. 12-0637-031-CSU	Drawing Date 1/8/2019	Drawing Revision 05.2	
Production Date 2/25/2020	Material UR0HIRHS9	Inspection Facility HT-Milwaukee	Inspector JD

Study	Sample	Data								
Dimension & Tolerance 25 +/- 2.0 mm	1-9	24.94	24.96	24.95	24.96	24.99	24.94	24.93	24.93	24.98
	10-18	24.96	24.96	24.96	24.96	24.98	25.00	25.00	24.95	24.97
	19-27	24.95	24.96	24.92	24.97	25.02	24.95	24.94	24.99	25.00
	28-36	24.98	25.01	24.95	24.94	24.94	25.00	24.99	25.00	24.98
	37-45	24.99	25.00	24.94	24.96	24.99	24.96	24.97	25.02	24.97
	46-54	24.99	25.01	25.02	24.95	25.00	24.99	24.95	24.98	24.95
	55-63	24.95	25.01	25.00	25.02	25.02	25.00	24.96	24.99	24.98
	64-72	24.95	24.97	25.00	24.96	24.99	24.95	24.95	24.98	25.00
	73-81	24.96	25.02	25.01	24.95	24.95	25.02	24.95	25.00	24.95
	82-90	25.01	25.00	24.94	25.02	24.96	24.98	24.99	25.01	24.95
	91-99	24.99	24.95	24.95	25.00	24.98	25.01	25.01	24.95	24.96
	100-108	24.98	24.96	24.96	24.98	25.00	24.95	24.96	24.95	24.95
	109-117	25.02	24.96	24.98	24.96	24.96	24.97	24.96	25.00	24.96
	118-126	24.95	24.95	24.95	25.00	24.96	24.97	24.94	24.94	



PROCESS FLOW DIAGRAM

Part Description: Customary Clips/Mounts-Unassembled
 HT Dwg.# and Rev: Various
 Customer P/N and Rev: Various
 Customer: Various

Program Name: N/A
 Created By: Chris Burbank
 Creation Date: 09/01/09

	Process "n"	Move "u"	Store "l"	Inspect "x"	Operational Description:	Special Characteristics / Descriptions	Control Methods
1	■				QA Receives C of A from Raw Material Supplier	C of A	ERP System
2	■				Receive in Raw Materials From Suppliers	Quality Approval of Material	ERP System
3				☒	Shipping and Receiving Inspects Raw Material	Review Container, Packaging, Lot Numbers and Quantity of Material	ERP System
4				☒	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 Storage	Store Materials until Needed	FIFO By Lot
7		◆			Material Movement	Move Materials to material handling system and verify correct material. Check moisture on Silo Materials	Material Process Log F-PRD-8.1-4 and F-QA-10.3-9
8	■				Material Ratio	Verify Correct Material	Material Process Log F-PRD-8.1-4
9		◆			Material Movement Component Parts	Move Component Parts to Press	ERP System
10	■				Molding Machine Set Up	Verify Mold Machine is Set Up	Per Set-Up Instructions F-PRD-8.1-4
11				☒	QA Completes First Piece Approval (Injection Molding)	Short Shots, Any Flash, Warpage, or Burning.	First Piece Acceptance F-QA-10.3-5
12	■				Quality Approval of First Piece	Hang First Piece	Visual At Press
13				☒	Validation Testing	Validate Parts	Measurements - Refer to Control Plan
14	■				Work Order Set Up LPA	Validate materials, labels, etc. to work order LPA Random Audit	Visual, Signed Set Up Stamp on Work Order F-PRD-9
15				☒	In Process Checks (Injection Molding)	Short Shots, Any Flash, Warpage, or Burning.	Per Control Plan
16	■				Packaging Requirements Add Component Parts	Add Component Parts Per Work Order	Share Point / F-PRD-1.1
17				☒	Final Product and Packaging is Verified	Check Parts for Visual Defects. Seals, Date Code, Labels, Box Quantity, Component Parts Verified.	Inspection Stamp/Label (Initialed and Dated) on Box / Share Point / F-PRD-1.1
18	■				Full Skid/ Order Complete	Verify and Mark Skid Ready for Inspection	Cone placed on Skid
19				☒	Final Inspection	Quality Approval of Final Product	F-QA-10.4-21 / Share Point
20				☒	QA Testing	Verify Part Testing Has Been Completed	Per Control Plan
21		◆			Material Movement	Move Skid to Shipping Dock	ERP System
22		◆			Material Movement	Ship Product to Warehouse	Shipping Manifest ERP System
23				☒	Annual Validation (If Required)	PPAP Parts on Yearly Basis if Required	PPAP Matrix

☐ Prototype ☐ Pre-Launch ☒ Production

Control Plan

Control Plan Number: MCP 62			Key Contact/Phone: 414-355-1130				Date (Orig.) 09/01/09		Date (Rev.)			
Part Number/Latest Change Level: Various			Core Team: Quality Assurance, Engineering, Manufacturing, Processing				Customer Engineering Approval/Date (If Req'd) N/A					
Part Name/Description Customary Clips/Mounts- Unassembled			Supplier/Plant Approval/Date N/A				Customer Quality Approval/Date (If Req'd) N/A					
Supplier/Plant: HellermannTyton MKE		Supplier Code: N/A		Other Approval/Date (If Req'd) N/A				Other Approval/Date (If Req'd) N/A				
Quality Assurance		Team Supervisor		Material Handler		Mold Technician		Operator		QA and/or Team Supervisor		Shipping/Receiving/PIC
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			
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 meets 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 Moisture in Silo Materials		Perform Moistures per TS-WI-MAX4000XL	Computrac Max 4000XL 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 / 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	Material Movement		1		Move Component Parts to Press		Correct component parts are set-up per Work Order	Visual	Each Work order	Each Work Order	ERP System	Notify Supervisor
10	Injection Molding Part	Injection Molding Machine	1		Machine Set-Up		Per Mattec, Set-Up Sheet, and Acceptable Visual Part	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
11-12	First Piece Approval Visual	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp that will effect Fit, Form or Function of the Clip/Mount	Visual Inspection	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5 and Hung at Press	Adjust Process
			2	Stud Verification			Check M6 and M5 Studs on Fixture for size	WI-QA-10.4-8	1 Shot	Each Set Up	First Piece Acceptance F-QA-10.3-5	Recheck / Control of Non-Conforming Product PR-QA-13.1-2
												Notify Supervisor and Tool Room.
13	Initial Validation Testing	Injection Molding Machine	1	Dimensional			Perform Dimensional on the Part to Print	Calibrated Gages	1 Shot	At Capability	Dimensional Study F-QA-10.4-2	Control of Non-Conforming Product PR-QA-13.1-2
			2	Push In/Push On Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 Shot	At Initial Validation	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
			3	Pull Out / Pull Off Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 Shot	At Initial Validation	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2
			4	Capability Study			Per Drawing/SQCPack File	Calibrated Gages	100pcs	At Capability	SPC Software	Control of Non-Conforming Product PR-QA-13.1-2

Quality Assurance		Team Supervisor	Material Handler		Mold Technician		Operator		QA and/or Team Supervisor		Shipping/Receiving/PIC	
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			
14	Work Order Set-Up TEAM SUPERVISOR or PROCESSING TECH	Packaging Equipment	1	Packaging Requirements			Validate Material and Packaging Requirements per Work Order	Visual	Once	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	Once	Shift	Layered Process Audit Form F-PRD-9	Adjust Process Control of Non-Conforming Product PR-QA-13.1-2 (if applicable)
15	Processing Tech Completed Visual Process Inspection	Injection Molding Machine	1	Part Quality			No Burns, Shorts, Flash, Warp or Part Damage Allowed.	Visual Inspection	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
		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	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
16-18	Packaging Operator Process Inspections	Injection Molding Machine	1	Visual Appearance			Check Parts for Visual Defects	Visual	1 Shot	Per Hour	Inspection 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
		Component Parts	2	Packaging Requirements	Add Component Parts		Add Component Parts Per Work Order	Visual	Each Box	Each Box	Share Point or F-PRD-1.1	Notify Supervisor/PIC
		Scale / Conveyor Check	3	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	Two Checks	Shift	Inspection 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
		Date Code	4	Date Code Stamp			Bag and Box Must Have Correct Date Code S-PRD-8.1-6	Visual	Once	Shift	Inspection 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	Two Checks	Shift	Inspection 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
		Sealer	6	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) 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
19	Final Inspection at Cell	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp	Work Order	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 Where Required	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

Quality Assurance		Team Supervisor	Material Handler		Mold Technician		Operator	QA and/or Team Supervisor		Shipping/Receiving/PIC		
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	
		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
20	QA Testing	Injection Molding Machine	1	Part Quality			Check for Burns, Shorts, Flash and Warp that will effect Fit, Form or Function of the Clip/Mount	Visual Inspection	1 Shot	Daily	Shift Log F-PRD-1.1 or Weekly Matrix	Adjust Process
												Recheck / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	2	Push In/Push On Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 part	Weekly	SPC Software	Adjust Process
												Retest / Control of Non-Conforming Product PR-QA-13.1-2
		Injection Molding Machine	3	Pull Out / Pull Off Force (If Required)			Per Drawing / SQC Pack	Force Tester or Tensiometer	1 part	Weekly	SPC Software	Adjust Process
												Retest / Control of Non-Conforming Product PR-QA-13.1-2
21	Material Movement		1		Move Parts to Shipping Dock		Per ERP System	Visual	Each Skid	Each Skid	ERP System	Notify Supervisor
22	Material Movement		1		Ship Product		Per Shipping Requirements	Visual	Each Skid	Each Shipment	Shipping Manifest and ERP System	Notify Supervisor
23	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

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

FMEA Number: **MFMEA 62**

Part Number / Name: Customary Clips/Mounts- Unassembled Process Responsibility: HellermannTyton Prepared by: Quality Assurance
 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
1-4 Raw Material Receiving Inspection	Cert matches material and P.O. request	Unacceptable Moisture Levels	Cannot Manufacture	5		Shipping Damage	2	D - Incoming Inspection D-Moisture Testing P - Material Certs	8	80	None					0	
				5		Material received with moisture level too high/low	2	D - Incoming Inspection D-Moisture Testing P - Material Certs	8	80	Add moisture analyzing prior to receiving	Mike Wendt - 8/30/13	Moisture Samples taken all material prior to receiving	5	2	2	20
		Incorrect Material Certification	Delay in Manufacturing	5		Material lot received does not match cert	2	D- Incoming Inspection P-Certs Faxed Prior to Arrival	8	80	None					0	
		Improperly labeled	Delay in Manufacturing	4		Material received with wrong or missing label	2	D - Incoming Inspection P - Material Certs	8	64	None					0	
4-9 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	5	50	Upgrade to Novatech system. Increase Moisture test freq.	Maintenance - 3/4/13 Mike Wendt - 8/30/13	New Dryer system	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	5	2	5	50
		Incorrect Material	Part Non-Compliance	6		Wrong material hooked up to press	2	D/P - Visual to Work Order	8	96	Upgrade to Novatech system.	Maintenance - 3/4/13	ID proofing in new system upgrade	6	2	5	60
10 Injection Molding Process	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	7	56	Electronic Shift Log	John Gleason/Ross H. - 6/13	Computers added to work station. Sharepoint logs implemented	4	2	5	40
		Burning	Part Non-Compliance / Cosmetic Issues	3		Plugged/Warn Vents	3	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule	7	63	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	3	6	54
		Sticking in mold	Part Non-Compliance / Mold Damage	5		Excessive Mold Temperatures	2	D- Visual Inspections P - Mold Cleaning Schedule P-PM	7	70	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
				5		Excessive Hold Pressure	2	D- Visual Inspections P - Mold Cleaning Schedule P-PM	7	70	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	5	2	6	60
				5		Residue Build-Up	2	D- Visual Inspections P - Mold Cleaning Schedule P-PM	7	70	- PM Schedule - Gauges	Mike Wendt - 9/12 Dean Anderson - 11/13	Ice Blasting to clean mold per shift Go/No Go	5	2	5	50
				5		Water hooked up incorrectly	2	D-Visual Inspection	8	80	None					0	
				5		Heaterband malfunctions	3	D- Visual Inspection D - Process Inspection	8	120	None					0	

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 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results					
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N	
MFMEA 62-Customary Pins	Shorts	Part Non-Compliance/Cosmetic/Low Extraction Force	Part Non-Compliance/Cosmetic/Low Extraction Force	6		Insufficient Injection Pressure compatibility of Process / mold	3	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	144	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	72	
				3		Plugged/Warm Vents	4	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule	7	84	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	72	
				3		Residue Build-Up	4	D- Visual Inspections P - First Piece Approvals P - Mold Cleaning Schedule P-PM	7	84	- PM Schedule - Gauges	Mike Wendt - 9/12 Dean Anderson - 11/13	Ice Blasting to clean mold per shift Go/No Go	3	1	5	15	
	Flash	Part Non-Compliance / Cosmetic / High Insertion Force	3		Excessive Injection Pressure	4	D- Visual Inspections P - First Piece Approvals P - In process PM's	4	48	None							0	
			3		Incorrect Tonnage	4	D- Visual Inspections P - First Piece Approvals P - In process PM's	4	48	None						0		
	Mold Mismatch	Parting Line Flash	6		Poor Mold Alignment	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	8	96	None							0	
			6		Leader Pin/Sidelock Wear	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	8	96	None							0	
	Deep ejector pins	Part Non-Compliance	6		Excessive Hold Pressure	3	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	4	72	None								0
			6		Thermolator Malfunction	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	8	96	Add audible warning	Manit. - 9/13	Audible alarms added to all thermalators to detect temps	6	2	3	36		
			6		Fast Cycle Time	2	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	8	96	None							0	
	Sinks	Part Non-Compliance	3		Insufficient Hold Pressure	2	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	48	None								0
			3		Cycle Time Too Fast	2	D- Visual Inspections P - First Piece Approvals P - In process PM's	8	48	None							0	
	Incorrect Blending	Part Non-Compliance / and Color Match Failures	5		Material blended incorrectly	2	D/P - Visual to Work Order	8	80	Upgrade to Novatech system.	Maintenance - 3/4/13	New Blending System	5	2	2	20		
	Excess Plastic	Part Non-Compliance	5		Hot Excess Runner	2	D - Visual Inspections P - Process Inspections	8	80	None								0
	Blocked thru holes/windows	Part Non-Compliance	5		Broken Insert/Ejector Blade	2	D - Visual Inspection P - Final Inspection	8	80	None								0
	Missing Retainer tab insert	Part Non-Compliance	5		Thermolator Malfunction	1	D - Visual Inspections D - Process Inspections P - First Piece Approvals P - In process PM's	6	30	None								0
			5		Improper start-up	1	D - Visual Inspection D - LPA at startup P - Final Inspections	8	40	None								0

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

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 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
				5		Cycle Time Too Fast	1	D - Visual Inspections P - Final Inspections	8	40	None					0	
				5		Worn inserts	2	D - Visual Inspections P - Final Inspections	8	80	None					0	
				5		Washed out vents	2	D - Visual Inspections P - Final Inspections	8	80	None					0	
		Plugged Sprue Tips / Gates (Hot Manifold)	Part Non-Compliance / Unbalanced Fill	3		Material Contamination	2	D- Visual Inspections D - Process Inspections P - Magnets in Hopper and P - Final Inspections	8	48	None					0	
				3		Mold Heater Malfunction	2	D- Visual Inspections D - Process Inspections	8	48	None					0	
		Start up scrap packaged	Customer Dissatisfaction	3		Operator packages parts too soon	4	P - Visual Inspection P - Work Instructions D - Final Inspection	8	96	Increase Visual inspection	John Gleason/Dean Anderson - 7/14	Implemented Quality tree	3	4	6	72
11-12 First Piece Acceptance	Product conforms per specifications before production	First Piece Not Hung	Delay in Manufacturing	8		First Piece Not Submitted	1	D- Visual/No First Piece at press. P-Training of Production	5	40	None					0	
13 Validation Testing	Validation and documentation of new tooling	Validation is Not Completed	Part Non-Compliance	8		Validation Testing Forgotten	1	D/P-PPAP Matrix	2	16	None					0	
14 Packaging and Automation	Package product per customers specifications	Incorrect or Missing Date Code on the Box	Traceability Loss	3		Wrong/ No date code put on packaging	3	D - Visual Inspections D - Final Inspections P - Date Code Calendar P - Work Instructions	7	63	- Improved Proecdure	- John Gleason - 7/14 - Mike Wendt/Gary	- Electronic shift log - Supervisor	3	4	5	60
		Greasy Parts Packaged	Part Non-Compliance	4		Ejector Pin / Machine Grease	1	D - Visual Inspection D - Process Inspection P - PM	7	28	None						0
		Incorrect / Missing Labels	Customer Dissatisfaction	3		Printer Ribbon not Inserted Properly	2	D/P - Visual Inspections	7	42	None						0
				3		Wrong Labels Placed on Product	4	D - Visual Inspections D - Box and Package Inspection log P - LPA	7	84	None						0
				3		Excess Labels not Removed From Production Area	4	D - Visual Inspections P - LPA	7	84	None						0
				3		Wrong label provided	4	D - Visual Inspections D - Final Inspections P - LPA	8	96	None						0
		Insufficient Packaging	Customer Dissatisfaction	3		Insufficient Packaging Supplies/ Component parts	4	D - Visual Inspection D/P- ERP System	8	96	Kanban System	John G. 3/13	- All packaging order by a KANBAN System	3	4	4	48
		Incorrect Quantity in Box	Customer Dissatisfaction	4		Improper Scale Set Up	3	D- Visual Inspection/Hand Count D/P-Scale Inspection @ Shift and Package Change	5	60	None						0
				4		Scale Out of Calibration	1	D/P- Calibration Schedule and Program	5	20	None						0

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

FMEA Number: **MFMEA 62**

Part Number / Name: Customary Clips/Mounts- Unassembled Process Responsibility: HellermannTyton Prepared by: Quality Assurance
 Model Year(s) / Vehicle(s): N/A Key Date: N/A PFMEA Date Org.: 9/1/2009 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) of Failure	Occurrence	Current Process Controls P-Prevention D-Detection	Detection	R P N	Recommended Action	Responsibility & Target Completion Date	Action Results				
													Actions Taken Completion Date	Severity	Occurrence	Detection	R P N
		Incorrect Component Parts	Part Non-Compliance	6		Wrong component parts brought to press	2	D/P - Visual to Work Order	8	96	- Improved Proecdure	- John Gleason - 7/14 - Mike Wendt/Gary Schultz - 5-14	- Electroinic shift log - Supervisor CheckList	3	4	5	60
		Parts mixed	Customer Dissatisfaction	4		Operator mixed product from previous work order	2	D - Visual Inspection D - Final Inspection	6	48	None						0
15-18 In Process Inspection	Manufacturing a conforming part per specifications	Bad Product Packaged	Customer Dissatisfaction	6		Inspection Not performed by Mold Tech or Operator	1	D/P-Production Inspection Log	7	42	None						0
				6		Bad Product not Found in Random Sampling	2	D/P- Production Inspection Log	7	84	None						0
19 Final Inspection (Roku)	Product conforms per specifications after production run	Bad Product Assembled	Customer Dissatisfaction	7		Inspection Not Performed by QA	1	D/P - Final and Live Inspection	7	49	None						0
				7		Bad Product not Found in Random Sampling	2	D /P- Final and Live Inspection	7	98	None						0
20 QA Testing	Validation and documentation per specifications	Testing Incomplete	Part Non-Compliance	6		Testing Not Performed by QA	1	D/P - Weekly Matrix, First Piece Acceptance. P- Daily Production Meeting./Training Quality	7	42	None						0
21-22 Shipping	Ship product per specifications to warehouse	Shipped Incorrectly	Customer Dissatisfaction	5		Damaged Shipment	2	D - Visual Inspection P - Skid Wrap	8	80	None						0
				5		Customer Specific Requirements Not Met	2	D - Visual Inspection D/P - Final Inspection	8	80	None						0
23 Annual Validation (If	Meet Cutstomer 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

Gage R&R USA

R&R Study Results Using Specifications

1/11/2021

Gage number:	TGM-888	Done by:	April Gary
Gage description:	Digital Caliper	Part name:	BS6U
Gage type:	Caliper	Characteristics:	Height
Study name:	Annual Gage R & R	Specifications:	LSL=19.5 Nominal=21.5 USL=23.5
Study date:	01/07/2021	Number of Distinct Cate	57.2191

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 = 0.01594824	%EV = 2.392236
Reproducibility - Appraiser Variation (AV)	
AV = 0.003920693	%AV = 0.588104
Repeatability & Reproducibility (R&R)	
R&R = 0.0164231	%R&R = 2.463464
Part Variation (PV)	
PV = 0.8664644	%PV = 99.999966
Specification Spread (USL-LSL)/	
(USL - LSL) = 0.8666667	

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
April	1	21.43	21.42	21.44	21.41	21.43	21.44	21.43	21.43	21.41	21.45
April	2	21.45	21.42	21.43	21.44	21.43	21.45	21.4	21.46	21.41	21.44
April	3	21.43	21.44	21.46	21.42	21.39	21.45	21.41	21.43	21.42	21.45
Sam	1	21.46	21.43	21.45	21.43	21.43	21.41	21.42	21.42	21.44	21.41
Sam	2	21.44	21.42	21.42	21.4	21.44	21.38	21.41	21.45	21.39	21.39
Sam	3	21.44	21.43	21.4	21.43	21.43	21.43	21.41	21.43	21.38	21.42
Felicia	1	21.46	21.43	21.44	21.44	21.4	21.43	21.4	21.43	21.39	21.44
Felicia	2	21.43	21.41	21.43	21.42	21.43	21.4	21.42	21.44	21.44	21.43
Felicia	3	21.43	21.42	21.41	21.42	21.4	21.42	21.4	21.41	21.4	21.45

Gage R&R USA

R&R Study Results Using Specifications

1/7/2021

Gage number:	TGM-917	Done by:	April Gary
Gage description:	Digital Scale	Part name:	133-01340
Gage type:	Scale	Characteristics:	weight
Study name:	Annual Gage R & R	Specifications:	LSL=141.3 Nominal=143.4 USL=145.5
Study date:	01/07/2021	Number of Distinct Cate	14.34138

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)10%

Repeatability - Equipment Variation (EV)

EV = 0.05512843 %EV = 7.875495

Reproducibility - Appraiser Variation (AV)

AV = 0.04064414 %AV = 5.80631

Repeatability & Reproducibility (R&R)

R&R = 0.06849153 %R&R = 9.784511

Part Variation (PV)

PV = 0.6966407 %PV = 99.52016

Specification Spread (USL-LSL)/

(USL - LSL)10% = 0.6999995

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
April	1	145.5	143.7	145.4	143.6	145.5	143.6	145.4	143.6	145.3	143.6
April	2	145.5	143.8	145.5	143.5	145.5	143.6	145.4	143.7	145.5	143.6
April	3	145.5	143.7	145.4	143.6	145.4	143.7	145.3	143.6	145.5	143.7
Sam	1	145.4	143.6	145.3	143.5	145.3	143.6	145.4	143.4	145.3	143.6
Sam	2	145.5	143.7	145.4	143.4	145.4	143.6	145.3	143.5	145.4	143.5
Sam	3	145.5	143.7	145.4	143.5	145.4	143.6	145.2	143.5	145.4	143.5
Felicia	1	145.4	143.6	145.3	143.5	145.5	143.6	145.4	143.5	145.3	143.5
Felicia	2	145.4	143.6	145.4	143.5	145.4	143.6	145.3	143.6	145.5	143.5
Felicia	3	145.5	143.6	145.4	143.5	145.4	143.6	145.3	143.6	145.4	143.4

Gage R&R USA

R&R Study Results Using Specifications

1/8/2021

Gage number:	TGM-988	Done by:	April Gary
Gage description:	Global Performance 7-10-7	Part name:	133-00878
Gage type:	CMM Coordinate Measuring Machine	Characteristics:	
Study name:	Annual Gage R & R	Specifications:	LSL=97.65 Nominal=97.85 USL=98.05
Study date:	01/08/2021	Number of Distinct Cate	20.41457

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 = 0.00228942 %EV = 3.434116

Reproducibility - Appraiser Variation (AV)

AV = 0.003982459 %AV = 5.973665

Repeatability & Reproducibility (R&R)

R&R = 0.004593628 %R&R = 6.890416

Part Variation (PV)

PV = 0.06650847 %PV = 99.76232

Specification Spread (USL-LSL)/

(USL - LSL) = 0.06666692

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Kelly	1	97.9652	98.0049	98.131	97.9914	98.1238	98.0363	97.9892	97.9869	97.9821	98.1249
Kelly	2	97.9665	98.008	98.1287	97.9873	98.121	98.0342	97.9884	97.9812	97.9795	98.1267
Kelly	3	97.9688	98.0012	98.136	97.9943	98.1274	98.035	97.994	97.9872	97.9838	98.1318
Sam	1	97.9715	97.9991	98.1284	97.9866	98.1199	98.0331	97.9847	97.9768	97.9745	98.1231
Sam	2	97.9661	98.006	98.1283	97.9869	98.1215	98.0332	97.986	97.9781	97.9759	98.1242
Sam	3	97.969	98.0022	98.1312	97.9886	98.1216	98.0327	97.987	97.9785	97.976	98.1254
Rob	1	97.9659	98.0004	98.1248	97.9803	98.1176	98.0313	97.9783	97.9688	97.9747	98.1231
Rob	2	97.9653	98.0029	98.1251	97.9791	98.1125	98.0301	97.9803	97.9748	97.9726	98.1209
Rob	3	97.9655	97.9981	98.1231	97.9794	98.1137	98.0282	97.981	97.9738	97.9713	98.1227

Gage R&R USA

R&R Study Results Using Specifications

1/11/2021

Gage number:	TGM-983	Done by:	April Gary
Gage description:	Indicator	Part name:	SBS6U
Gage type:	Indicator	Characteristics:	HEIGHT
Study name:	Annual Gage R & R	Specifications:	LSL=19.5 Nominal=21.5 USL=23.5
Study date:	01/07/2021	Number of Distinct Cate	70.28216

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 = 0.01191175 %EV = 1.786762

Reproducibility - Appraiser Variation (AV)

AV = 0.006076173 %AV = 0.9114259

Repeatability & Reproducibility (R&R)

R&R = 0.01337197 %R&R = 2.005795

Part Variation (PV)

PV = 0.8665326 %PV = 99.97988

Specification Spread (USL-LSL)/

(USL - LSL) / = 0.6666667

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
April	1	21.474	21.451	21.47	21.4	21.417	21.48	21.423	21.441	21.439	21.501
April	2	21.463	21.46	21.488	21.4	21.421	21.453	21.443	21.433	21.41	21.484
April	3	21.466	21.459	21.458	21.417	21.418	21.456	21.417	21.439	21.427	21.495
Felicia	1	21.441	21.444	21.451	21.413	21.421	21.42	21.419	21.443	21.421	21.451
Felicia	2	21.441	21.441	21.449	21.429	21.413	21.437	21.441	21.415	21.439	21.455
Felicia	3	21.46	21.448	21.451	21.427	21.417	21.452	21.442	21.423	21.424	21.424
Sam	1	21.444	21.449	21.459	21.427	21.403	21.45	21.426	21.431	21.396	21.464
Sam	2	21.484	21.445	21.446	21.395	21.411	21.481	21.407	21.408	21.414	21.471
Sam	3	21.447	21.443	21.454	21.426	21.404	21.478	21.396	21.421	21.419	21.434

Gage R&R USA

R&R Study Results Using Specifications

1/8/2021

Gage number:	TGM-1325	Done by:	April Gary
Gage description:	Artifact	Part name:	133-00878
Gage type:	CT Scanner Artifact	Characteristics:	WIDTH
Study name:	Annual Gage R & R	Specifications:	LSL=10.6 Nominal=10.85 USL=11.1
Study date:	01/08/2021	Number of Distinct Cate	29.50656

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 = 0.003815655

%EV = 4.578786

Reproducibility - Appraiser Variation (AV)

AV = 0.001123519

%AV = 1.348223

Repeatability & Reproducibility (R&R)

R&R = 0.003977627

%R&R = 4.773152

Part Variation (PV)

PV = 0.08323835

%PV = 99.88602

Specification Spread (USL-LSL)/

(USL - LSL)/ = 0.08333334

Appraiser	Replicati	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Part 9	Part 10
Joseph	1	10.9022	10.9052	10.884	10.7757	10.8663	10.9206	10.8999	10.8872	10.4341	10.8906
Joseph	2	10.8957	10.8979	10.8891	10.7747	10.8642	10.9109	10.8994	10.8843	10.4421	10.8888
Joseph	3	10.9	10.8977	10.8845	10.7671	10.861	10.9172	10.9031	10.8912	10.4337	10.8862
James	1	10.903	10.9058	10.8884	10.7642	10.8687	10.9198	10.8952	10.8934	10.4378	10.8846
James	2	10.9	10.9009	10.8799	10.7704	10.8745	10.9239	10.9056	10.8957	10.435	10.8914
James	3	10.906	10.8987	10.8826	10.7722	10.8674	10.9228	10.9021	10.8944	10.4372	10.889
Gwen	1	10.899	10.9032	10.8839	10.7697	10.8662	10.9298	10.9077	10.8861	10.4401	10.8865
Gwen	2	10.9051	10.9005	10.8813	10.774	10.8761	10.9188	10.9035	10.891	10.4345	10.8855
Gwen	3	10.9032	10.9035	10.885	10.775	10.875	10.9212	10.9029	10.8949	10.4353	10.8919