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Subject: NOE 25-046 Risk Assessment- Elongation Failure- 55A011X-22 and 24 Manufactured in Tijuana Plant (Cage Code: SU473)

Summary

TE Connectivity has identified elongation failures in 55A011X-22 and 24 AWG wire products from our Tijuana manufacturing facility. While these products fail to meet the minimum 75% elongation requirement per AS22759 specifications, comprehensive testing demonstrates that other critical performance characteristics remain within specification limits.

Background

TE's Wire and Cable engineering team is investigating 55A011X series wires (22 and 24 AWG) manufactured at the Tijuana facility that fail to meet the minimum 75% elongation requirements specified in AS22759 standards. The root cause investigation is in progress, with testing being conducted across multiple wire gauges to confirm the failure is isolated to 22 and 24 AWG sizes only.

Risk Assessment: Impact of Elongation Failure on the Performance of Wire

We have evaluated different lots of 55A011X-22 and 24 wires that are failing to meet the elongation requirement to ensure this failure doesn't impact other characteristics of the products. This testing is performed in accordance with TE 55A and 22759/32 spec requirements. The risk assessment matrices (Tables 2, 3, and 4) demonstrate that elongation failure poses low risk to other performance parameters.

In addition, to assess whether reduced elongation affects wire flexibility, flexural endurance testing was performed comparing failed lots against compliant samples. It should be noted that while flexural endurance is not a specified requirement in 22759/32, this testing was performed as a supplementary validation measure for this risk assessment. Results presented in Table 5 indicate no statistically significant difference in flexural endurance performance between lots exhibiting elongation failures and those meeting specification requirements. This suggests that reduced elongation does not adversely affect wire flexibility under operational flex conditions.

Conclusion

Based on the testing and risk analysis, elongation failures in the evaluated lots do not compromise other critical wire characteristics or functional performance.



Table 1. Products Potentially Impacted by Elongation Failure**

TE Part Description	NAVAIR 22759 Part Description
55A0111-22-X	22759/32-22-X*
55A0111-24-X	22759/32-24-X*
55A0114-22-X	22759/33-22-X*
55A0114-24-X	22759/33-24-X*
55A0112-22-X	22759/44-22-X*
55A0112-24-X	22759/44-24-X*
55A0113-22-X	22759/45-22-X*
55A0113-24-X	22759/45-24-X*
55A0116-22-X	22759/46-22-X*
55A0116-24-X	22759/46-24-X*

* "X" represents various color code designations.

** These products serve as component parts for certain TE Connectivity devices. See Notice of Escape 25-046 for the list of affected Part Number families.



Table 2. Risk Assessment Matrix

Characteristics	Requirement Paragraph	Test Method	Requirements	22759/32-22-9 Lot# 0231615516		22759/32-22-9 Lot# 0231612802		Risk Evaluation Rational
				Results	Risk Evaluation Index	Results	Risk Evaluation Index	
Insulation Tensile Strength and Elongation	3.5.1	5.3.1.2	5000 PSI Min	Pass 7412 PSI	No Risk	Pass 8275 PSI	No Risk	All lots exceed minimum by 48-87%
Insulation Elongation	3.5.1	5.3.1.2	75% Min	Fail 52%	High Risk	Fail 62%	High Risk	Primary failure mode under investigation
Crosslinking proof test	3.5.11	5.3.10	300 ± 3°C for 7 hours	Pass	No Risk	Pass	No Risk	CPT is tested on every Lot as part of QC
Insulation Blocking	3.5.12	5.3.11	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode for blocking is the degree of crosslinking, which CPT is an indicator for that.
Insulation Shrinkage	3.5.13	5.3.12	6 hours at 200 °C, 0.125-inch Max diameter change	Pass 0.006 inch	No Risk	Pass 0.047 inch	No Risk	Shrinkage is tested on every Lot as part of QC
Insulation Resistance	3.6.2	5.4.2	Min 5000 Megaohms per 1000 ft)	Pass 15000 MOhm-k	No Risk	Pass 15000 MOhm-k	No Risk	IR is tested on every Lot as part of QC
Insulation surface resistance	3.6.3	5.4.3	Min 500 Megaohm per inch	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode is related to the conductivity of additives used on primary insulation compound polymer system. There hasnot been any changes in the compound formulation
Wet Dielectric Voltage	3.6.4	5.4.4	2.5 kV for 5 min	Pass	No Risk	Pass	No Risk	WDV is tested on every Lot as part of QC
Insulation stripping	3.7.3	5.5.3		Pass	No Risk	Pass	No Risk	Stripping is tested on every Lot as part of QC
Concentricity and wall thickness	3.7.5	5.5.5	Min 70% Min 0.005 inch	Pass 0.006/0.007 86%	No Risk	Pass 0.0065/0.007 93%	No Risk	Concentricity measurements are done on every lot as part of QC
Wrap back bend	3.9.2	5.7.2	2 hours at 200 °C	Pass	No Risk	Pass	No Risk	Wrap back is tested on every lot as part of QC
Cold bend	3.9.3	5.7.3	4 hours at -65 °C	Pass	No Risk	Pass	No Risk	Cold bend is tested on every lot as part of QC
Thermal shock	3.9.4	5.7.4	150 °C Max change 0.06 inch	Pass 0.004/0.003 inch	No Risk	Pass 0.004/0.005 inch	No Risk	Thermal shock is tested on every lot as part of QC
Life cycle	3.9.5	5.7.5	500 hours at 200 °C	Pass	No Risk	Pass	No Risk	The lots that had elongation failure were tested for LC (this test is a qualification only test) and all of them passed
Fluid resistance	3.9.7	5.7.7	Max diameter increase, 5%	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for fluid immersion are related to the polymer system and degree of crosslinking. There hasn't been any change in the polymer system and degree of crosslinking is checked by CPT
Humidity resistance	3.9.8	5.7.8	Min 5000 megaohms per 1000 ft	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for humidity resistance are related to the hydrophilicity of the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Smoke resistance	3.9.9	5.7.9	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for smoke resistance are related to the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Flame resistance	3.9.10	5.7.10	Self-extinguish 3 sec, burn length 3-inch, Facial tissue: no incendiary tissue allowed	Pass 0 sec, 1.8 inch	No Risk	Pass 0 sec, 1.7 inch	No Risk	Flammability is tested on every lot as part of QC



Table 3. Risk Assessment Matrix

Characteristics	Requirement Paragraph	Test Method	Requirements	22759/32-22-9 Lot# 0231470142		22759/32-24-9 Lot# 023135858		Risk Evaluation Rational
				Results	Risk Evaluation Index	Results	Risk Evaluation Index	
Insulation Tensile Strength and Elongation	3.5.1	5.3.1.2	5000 PSI Min	Pass 7732 PSI	No Risk	Pass 7596 PSI	No Risk	All lots exceed minimum by 48-87%
Insulation Elongation	3.5.1	5.3.1.2	75% Min	Fail 66%	High Risk	Fail 68%	High Risk	Primary failure mode under investigation
Crosslinking proof test	3.5.11	5.3.10	300 ± 3°C for 7 hours	Pass	No Risk	Pass	No Risk	CPT is tested on every Lot as part of QC
Insulation Blocking	3.5.12	5.3.11	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode for blocking is the degree of crosslinking, which CPT is an indicator for that.
Insulation Shrinkage	3.5.13	5.3.12	6 hours at 200 °C, 0.125-inch Max diameter change	Pass 0.013 inch	No Risk	Pass 0.008 inch	No Risk	Shrinkage is tested on every Lot as part of QC
Insulation Resistance	3.6.2	5.4.2	Min 5000 Megaohms per 1000 ft)	Pass 36000 MOhm-k	No Risk	Pass 9000 MOhm-k	No Risk	IR is tested on every Lot as part of QC
Insulation surface resistance	3.6.3	5.4.3	Min 500 Megaohm per inch	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode is related to the conductivity of additives used on primary insulation compound polymer system. There haven't been any changes in the compound formulation
Wet Dielectric Voltage	3.6.4	5.4.4	2.5 kV for 5 min	Pass	No Risk	Pass	No Risk	WDV is tested on every Lot as part of QC
Insulation stripping	3.7.3	5.5.3		Pass	No Risk	Pass	No Risk	Stripping is tested on every Lot as part of QC
Concentricity and wall thickness	3.7.5	5.5.5	Min 70% Min 0.005 inch	Pass 0.0065/0.007 93%	No Risk	Pass 0.007/0.0075 93%	No Risk	Concentricity measurements are done on every lot as part of QC
Wrap back bend	3.9.2	5.7.2	2 hours at 200 °C	Pass	No Risk	Pass	No Risk	Wrap back is tested on every lot as part of QC
Cold bend	3.9.3	5.7.3	4 hours at -65 °C	Pass	No Risk	Pass	No Risk	Cold bend is tested on every lot as part of QC
Thermal shock	3.9.4	5.7.4	150 °C Max change 0.06 inch	Pass 0.010/0.015 inch	No Risk	Pass 0.017/0.013 inch	No Risk	Thermal shock is tested on every lot as part of QC
Life cycle	3.9.5	5.7.5	500 hours at 200 °C	Pass	No Risk	Pass	No Risk	The lots that had elongation failure were tested for LC (this test is a qualification only test) and all of them passed
Fluid resistance	3.9.7	5.7.7	Max diameter increase, 5%	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for fluid immersion are related to the polymer system and degree of crosslinking. There hasn't been any change in the polymer system and degree of crosslinking is checked by CPT
Humidity resistance	3.9.8	5.7.8	Min 5000 megaohms per 1000 ft	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for humidity resistance are related to the hydrophilicity of the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Smoke resistance	3.9.9	5.7.9	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for smoke resistance are related to the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Flame resistance	3.9.10	5.7.10	Self-extinguish 3 sec, burn length 3-inch, Facial tissue: no incendiary tissue allowed	Pass 0 sec, 1.8 inch	No Risk	Pass 0 sec, 2inch	No Risk	Flammability is tested on every lot as part of QC



Table 4. Risk Assessment Matrix

Characteristics	Requirement Paragraph	Test Method	Requirements	22759/32-24-9 Lot# 0231154193		22759/32-24-9 Lot# 0231585561		Risk Evaluation Rational
				Results	Risk Evaluation Index	Results	Risk Evaluation Index	
Insulation Tensile Strength and Elongation	3.5.1	5.3.1.2	5000 PSI Min	Pass 7487 PSI	No Risk	Pass 9344 PSI	No Risk	All lots exceed minimum by 48-87%
Insulation Elongation	3.5.1	5.3.1.2	75% Min	Fail 68%	High Risk	Fail 62%	High Risk	Primary failure mode under investigation
Crosslinking proof test	3.5.11	5.3.10	300 ± 3°C for 7 hours	Pass	No Risk	Pass	No Risk	CPT is tested on every Lot as part of QC
Insulation Blocking	3.5.12	5.3.11	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode for blocking is the degree of crosslinking, which CPT is an indicator for that.
Insulation Shrinkage	3.5.13	5.3.12	6 hours at 200 °C, 0.125-inch Max diameter change	Pass 0.013 inch	No Risk	Pass 0.013 inch	No Risk	Shrinkage is tested on every Lot as part of QC
Insulation Resistance	3.6.2	5.4.2	Min 5000 Megaohms per 1000 ft)	Pass 15000 MOhm-k	No Risk	Pass 6000 MOhm-k	No Risk	IR is tested on every Lot as part of QC
Insulation surface resistance	3.6.3	5.4.3	Min 500 Megaohm per inch	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure mode is related to the conductivity of additives used on primary insulation compound polymer system. There hasnot been any changes in the compound formulation
Wet Dielectric Voltage	3.6.4	5.4.4	2.5 kV for 5 min	Pass	No Risk	Pass	No Risk	WDV is tested on every Lot as part of QC
Insulation stripping	3.7.3	5.5.3		Pass	No Risk	Pass	No Risk	Stripping is tested on every Lot as part of QC
Concentricity and wall thickness	3.7.5	5.5.5	Min 70% Min 0.005 inch	Pass 0.0075/0.008 94%	No Risk	Pass 0.007/0.0075 93%	No Risk	Concentricity measurements are done on every lot as part of QC
Wrap back bend	3.9.2	5.7.2	2 hours at 200 °C	Pass	No Risk	Pass	No Risk	Wrap back is tested on every lot as part of QC
Cold bend	3.9.3	5.7.3	4 hours at -65 °C	Pass	No Risk	Pass	No Risk	Cold bend is tested on every lot as part of QC
Thermal shock	3.9.4	5.7.4	150 °C Max change 0.06 inch	Pass 0.013/0.006 inch	No Risk	Pass 0.041/0.004 inch	No Risk	Thermal shock is tested on every lot as part of QC
Life cycle	3.9.5	5.7.5	500 hours at 200 °C	Pass	No Risk	Pass	No Risk	The lots that had elongation failure were tested for LC (this test is a qualification only test) and all of them passed
Fluid resistance	3.9.7	5.7.7	Max diameter increase, 5%	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for fluid immersion are related to the polymer system and degree of crosslinking. There hasn't been any change in the polymer system and degree of crosslinking is checked by CPT
Humidity resistance	3.9.8	5.7.8	Min 5000 megaohms per 1000 ft	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for humidity resistance are related to the hydrophilicity of the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Smoke resistance	3.9.9	5.7.9	200 °C	Not tested for this lot	Low Risk	Not tested for this lot	Low Risk	The main failure modes for smoke resistance are related to the polymer system and the additives in the insulation compound. There hasn't been any change in the compound formulation
Flame resistance	3.9.10	5.7.10	Self-extinguish 3 sec, burn length 3-inch, Facial tissue: no incendiary tissue allowed	Pass 0 sec, 2.3 inch	No Risk	Pass 0 sec, 2.2 inch	No Risk	Flammability is tested on every lot as part of QC



Table 5. Flex Endurance Results

Test Parameters:

Mandrel (in): 0.500

Mandrel Spacing (in): 0.072

Weight (lb): 2.01

CPM: 18

Part Description	Lot#	Elongation%	Flex Endurance
22759/32-22-9	0231615516	52%	724 cycles
22759/32-22-9	0231612802	62%	602 cycles
22759/32-22-9	0231470142	66%	670 cycles
55A0111-22-9	476750	94%	681 cycles
22759/32-24-9	0231585561	62%	712 cycles
22759/32-24-9	0231353858	68%	1252 cycles
22759/32-24-9	0231154193	68%	611 cycles
55A0111-24-9	980794	106%	649 cycles