

Visit Report – Siemens Electrical Apparatus Ltd (SEAL)

To: SEK, GUOP

Cc: WNGJ, ZUP, TASH, HANR, LINR, KRGM, ZHOE, YVOY,

1 General

Customer (End User)	Siemens SEAL	EMS mat'l	TR 55 (Pot. 10t/a)
Application (Seg. code)	Electrical Apparatus (eg. 120)	Part name	Button
Competitor mat'l	N/A	SOP	Running (Since Mar.2015)
EMS	W.Liang (EMS)	Distributor	N/A
Customer	Zhi Li (SEAL SQA), Ye Ting (SEAL, SQA), Jianming Liu (SEAL R&D), Liu Song (SEAL, R&D)		

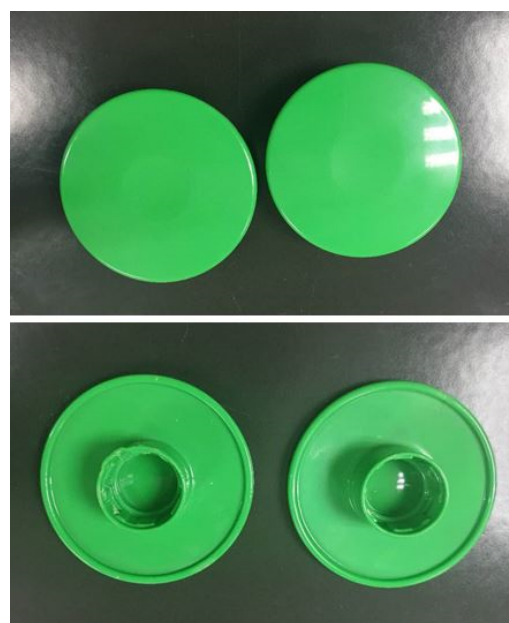
2 Target / Task of the visit:

Troubleshooting on SEAL Button Fragile/brittle fracture Issue (TR55 Green L10489.11)

3 Summary / Conclusion / Opportunities

- Very fragile/ brittle fracture were reported with SEAL's button part (TR55 green)
- Brittle fracture only happened with Green button produced before 2018, neither with newly produced blue button, nor other color button product (red, yellow, etc)
- Needs to investigate the brittle is accidental (due to processing etc.) or inevitable (due to weathering/ aging)

4 Part & Assembly & Defect pictures



5 Back ground information / Meeting details

1. Project information / Findings

- Problem: Very fragile/ brittle fracture) were reported with SEAL's button product (TR 55 Green). Facts gathered so far:**

	Produced before 2018 (Most in 2016)						Produced in 2019	
	Product in SEAL's customer, Exposure in outdoor/indoor		Product in SEAL's Exhibition Room (all dimensions) Exposure in indoor		Product in SEAL's warehouse, sealed in plastic bag		SEAL's Tian Tai factory	
	Product 1(Φ 60mm)	Product 2	Product 1	Product 2	Product 1	Product 2	Product 1	Product 2
TR 55 Green L10489.11	Very fragile Brittle fracture, (End user complained!)	N/A (No complaint so far)	Very fragile Brittle fracture	Very fragile Brittle fracture	OK, ductile fracture	N/A	OK, ductile fracture	OK, ductile fracture
TR 55 Red	OK (no complaint so far)							
TR 55 Yellow	OK (no complaint so far)							
Remark: Many differenret products are using this grade material; Product 1 were reported by end-user, and product 1,2 were internally investiged by SEAL, dosen't mean other products using same mateiral have or don't have the same issue								

- Influence factors analysis**

Influence factors	Root Cause	Possibility	Arguments
Material	Unstable mateiral performance	Low	+ NG material won't be shipped
	Blue pigment affect material performance	Low	+ Only products before 2018 showed problem; + Newly produced part in 2019 performed OK
Processing	Didn't use desiccant dryer	Middle-Low	+ SEAL's not farmiliar with TR - Other color (red & yellow) used same processing conditions OK and only Green showed problem
Service Environment	Chemical exposure (especially alchohol, acid, etc)	Low	+ Part in SEAL's exhibition room no direct contact with chemicals, while was also very fragile
	UV exposure & weathering	Middle	+ Exposure products (both in SEAL's customer, and in SEAL's exhibition room) + Product sealed in plastic bag still showed good performance + TR55 Nat listed UL f1 is suitable for outdoor used, while TR55 Green might not

Requiring from SEAL:

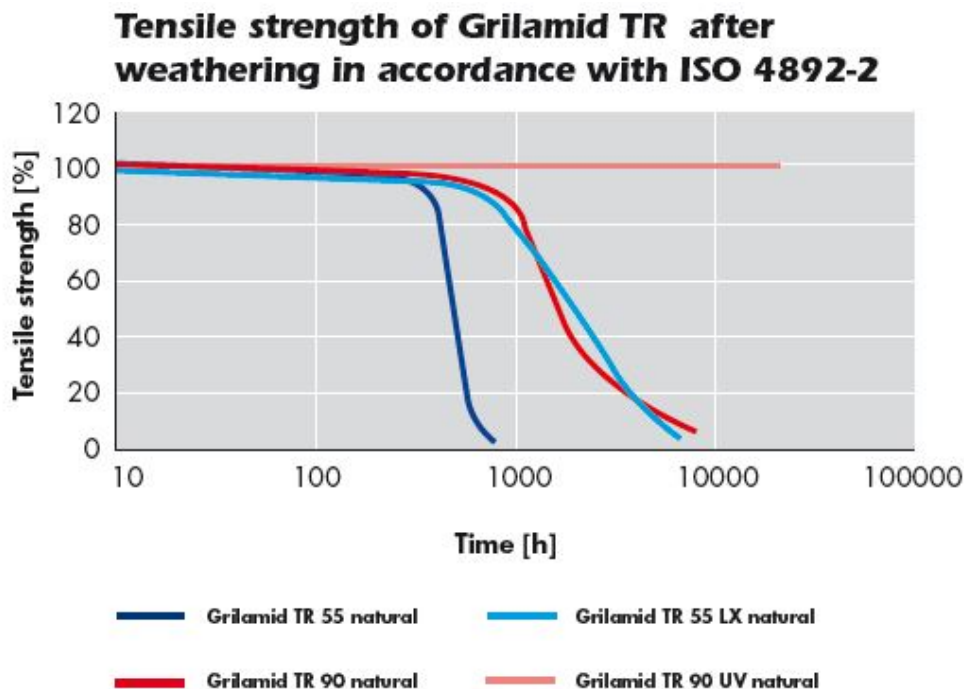
- Ø Is this broken issue accidental (due to processing issue, etc) or inevitable (due to poor weathering resistance?)
- Ø How to verify above assumption and prevent its happening in the future?
- Ø Could SEAL continue ship this green button product to its customer?

2. Part & test requirement

- Cycle test (>100,000 times push, detailed not provided yet)
- Impact test (detailed not provided yet)
- UV test (detailed not provided yet)

3. Argument / Main Challenges / Risk

- TR55 are listed as f1 according to UL746C and is therefore suitable for outdoor applications
- However, will TR 55 Green show similar weathering performance as natural grade, or is it sufficient for this application?



Test method: ISO 4892-2
Test specimen: ISO 294-2 3x3 mm

- SEAL's Tiantai didn't use desiccant dryer at the very beginning of production (installed later around in 2017).
- Is this poor performance due to not sufficient material drying?
- But Red button, yellow button were also ever produced at the same time with Green button, and didn't show problem so far

4. Correction / solutions

- Possible test plan

Test item	NG Green button, Produced before 2018	OK Green button, Produced in 2019	OK Red button	OK Clean color button
Viscosity	a	a	a	a
DSC	a	a		
TGA	a	a		
Weathering/ Aging (ISO 4892-2)		a		a

6 Action plan

No.	Measures	Resp.	Date
1	Seek expertise advice from ECCH	LIAW	15/06/2020
2	Initiate TI for related test	GUOP	17/06/2020

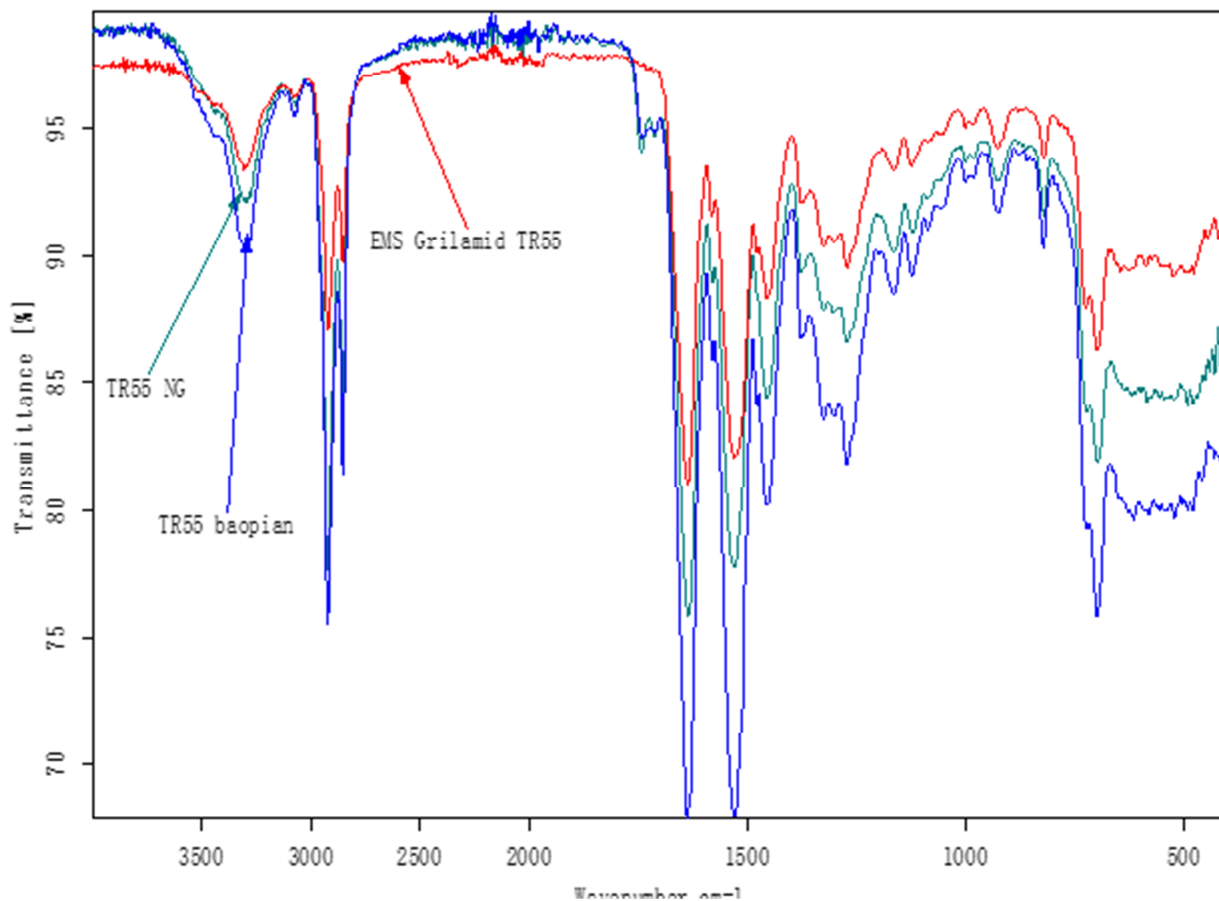
7 Attachment

- #1: Brittle fracture video

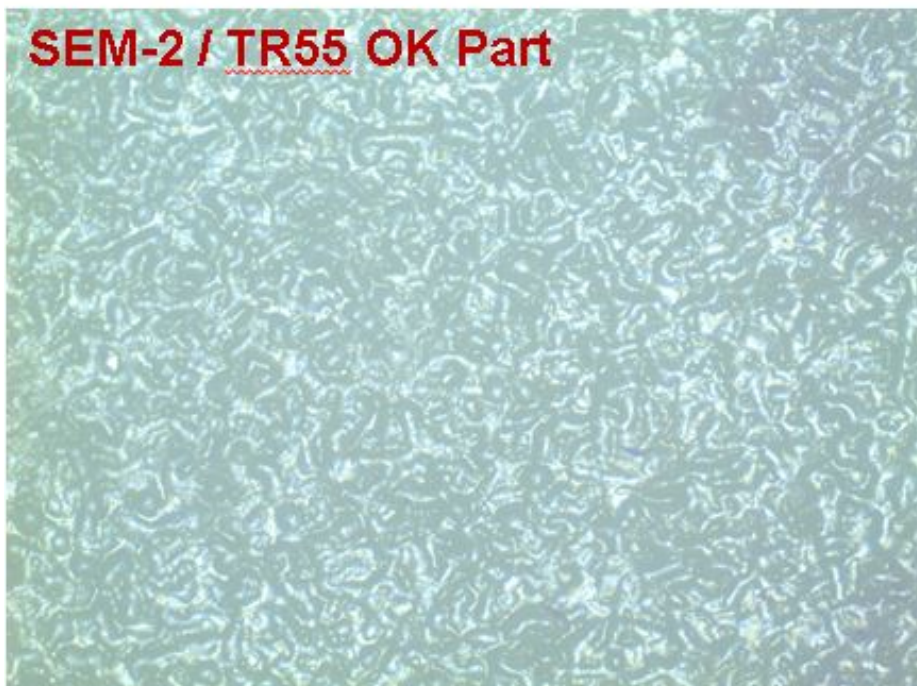
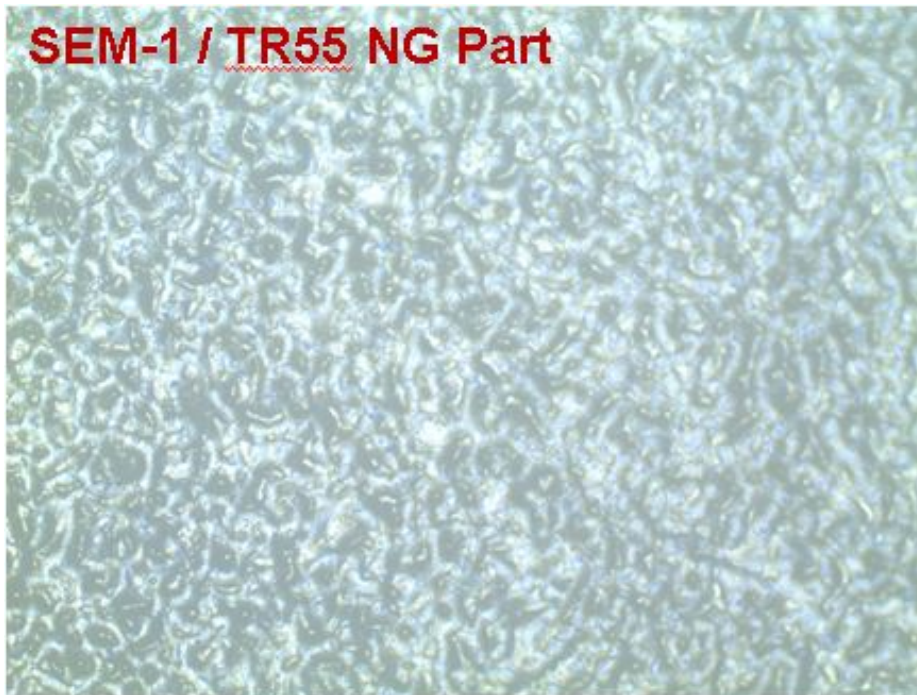


视频1.mp4

- #2: FT-IR Test results by SEAL



- #3: SEM test by SEAL



Best Regards

William Liang
TCS Engineer