

ECS SERIES INTRODUCTION OF A NEW LUBRICANT

For further information, please contact your regional Vishay office.

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Description of Change:

Implementation of a new lubricant for the wiper's sliding contact of all PN's from ECS series.

Note: the wiper is the part of the potentiometer that moves/slides along the resistive element.

Reason for Change:

The current lubricant is obsolete.

Expected Influence on Quality/Reliability/Performance:

The new lubricant exhibits similar performances to the old one under VISHAY laboratory test conditions.

See Qualification Test Report Ref. "244110" attached in appendix of this PCN.

Part Numbers/Series/Families Affected: ECS78*

Vishay Brand(S): Vishay Sfernice

Time Schedule:

Start Shipment Date: Mon Dec 2, 2024

Sample Availability: YES - Samples available on request

Product Identification: DATE CODE

Qualification Data: Yes - See Qualification Test Report Ref. "244110" attached in appendix of this PCN

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Wed Nov 20, 2024 or as specified by contract.

Issued By: Olivier Gaston, olivier.gaston@vishay.com

	Qualification Test Report New lubricant (ref 80937609) for ECS product range	N°: 2441103
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Company:	<i>VISHAY SA</i>
Address:	<i>199 bd de la Madeleine, BP1159 - 06003 Nice Cedex</i>
Production line	<i>Motion transducers</i>
Test type	<i>Life test + behavior in temperature range</i>

Summary	This document is the Qualification Test Report of the lubrication change of the ECS78 resistive element (named track).
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Conclusion	Parts with new lubrication (ref 80937609) meet the required criteria
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	Name	Function	Visa & Date	
Verify by	<i>Sylvain Bertrand</i>	<i>R&D</i>		Bertrand, Sylvain 2024.10.21 16:42:20 +02'00'
Approved by	<i>Aline Carriere</i>	<i>Quality</i>	Carriere, Aline	Numériquement signé par Carriere, Aline DN : cn=Carriere, Aline ou=Office Users Raison : I have reviewed this document Emplacement : Date : 2024-10-21 16:51+02:00

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1. Goal of the tests

The current grease using to lubricate the sliding contact between track and wiper is no longer produced

The aim these tests is to confirm the electrical performance (linearity and quality of the electrical contact) of ECS78 product using the new selected grease.

Major risks of this change are wear on the track and degradation of the quality of the electrical contacts over the operating life. Qualification will be judged on drift after the endurance test according to Vishay laboratory conditions and behavior in the operating temperature range.

2. Life test :

Parts on test

10 parts ECS standard ECS78RSA102 ohmic value 1KOhm

10 parts ECS standard ECS78RSA103 ohmic value 10KOhm

Lubrication with new grease (Vishay article 80937609) : quantity between 3 and 5 mg per track

Description of the test

- 5 000 000 cycles
- Stroke 90% of total stroke CET
- Centered at 50% of the total stroke
- Frequency : 1.5 Hz

Validation criteria:

- Independent linearity drift: 0.1% by million cycle.
- Contact resistance limit before test defined by FTEN019 (VISHAY production instruction sheet)
- Contact resistance drift: equal or lower than drift registered on current product definition (lubricated with SFER32058301).

Associated specification parameters:

- Life: 5M of cycles (Under Vishay laboratory conditions)
- Temperature range: 55°C ; +125 °C, Operating temperature range -30°C ; +85°C under Vishay conditions

Equipment of control:

- Electrical control bench VA63A : End of line control bench used in mass production workshop.
Calibration and conformity assessment according to Vishay procedure VI-ET/001

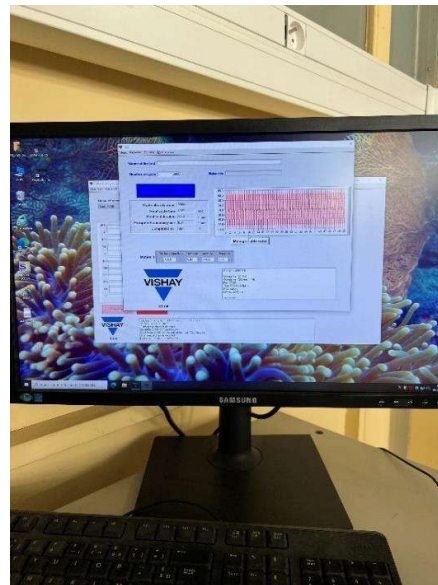


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Photography of test bench





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Results

After 5 000 000 cycles

Parts R 1KOhm

	Before test		After 5 millions cycles			Drift after 5 millions cycles	
	Lin ind ± (%)	RC (Ω)	Lin ind ± (%)	RC (Ω)		Lin ind ± (%)	RC (Ω)
1 k S/N 1	0.215	66.5	0.298	61.8		0.083	-7
1 k S/N 2	0.249	54.1	0.411	81.8		0.162	51
1 k S/N 3	0.150	55.5	0.443	104.4		0.293	88
1 k S/N 4	0.248	58.5	0.438	60.2		0.190	3
1 k S/N 6	0.262	71.9	0.501	90.3		0.239	26
1 k S/N 7	0.225	62.4	0.255	60		0.030	-4
1 k S/N 8	0.286	70.7	0.317	64.2		0.031	-9
1 k S/N 9	0.229	64.8	0.374	61.5		0.145	-5
1 k S/N 10	0.184	57.7	0.288	45.7		0.104	-21
1 k S/N 18	0.220	78.8	0.273	76.3		0.053	-3
					Average	0.133	12
					min	0.030	-21
					max	0.293	88



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Parts R 10KOhm

	Before test		After 5 millions cycles			Drift after 5 millions cycles	
	Lin ind ± (%)	RC (Ω)	Lin ind ± (%)	RC (Ω)		Lin ind ± (%)	RC (Ω)
10 k S/N 1	0.187	273	0.244	285		0.057	4
10 k S/N 2	0.293	326	0.565	421		0.272	29
10 k S/N 3	0.175	345	0.158	265		-0.017	-23
10 k S/N 4	0.131	320	0.139	340		0.008	6
10 k S/N 5	0.253	302	0.476	320		0.223	6
10 k S/N 6	0.142	328	0.203	481		0.061	47
10 k S/N 8	0.104	307	0.256	345		0.152	12
10 k S/N 9	0.174	288	0.410	286		0.236	-1
10 k S/N 10	0.150	327	0.230	301		0.080	-8
10 k S/N 11	0.219	385	0.253	449		0.034	17
					Average	0.111	9
					min	-0.017	-23
					max	0.272	47

Analysis of results:

The linearity drift is in the acceptance criteria.

After testing, a reduction of dynamic contact resistance in the operating area was observed.



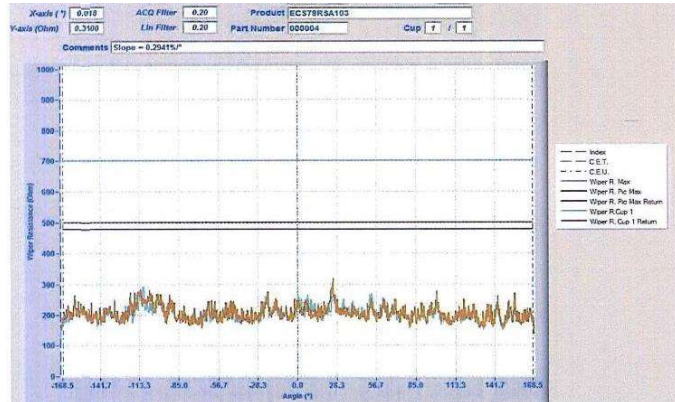
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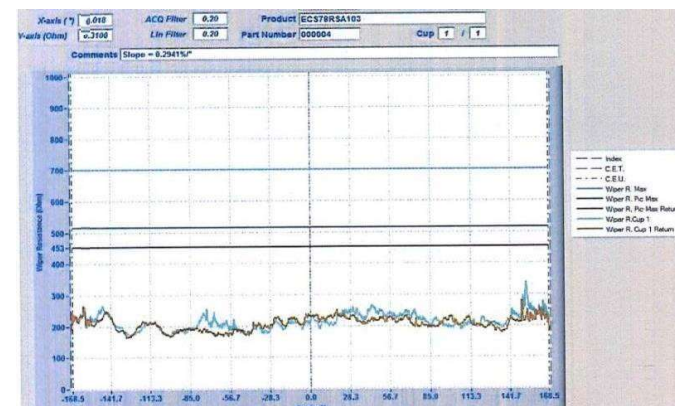
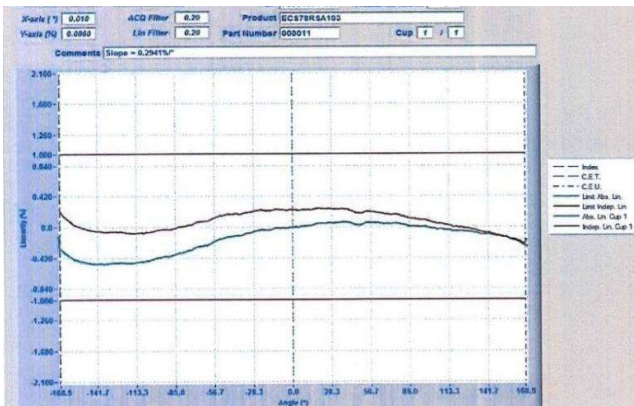
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Example of linearity and contact resistance curves after test. The totality of the curves are available on demand.
Examples of low drift of linearity and contact resistance

Before test



After test



Comment:

We note no drift on linearity after test.

We note a decrease in the contact resistance in the working area (90° of the track)



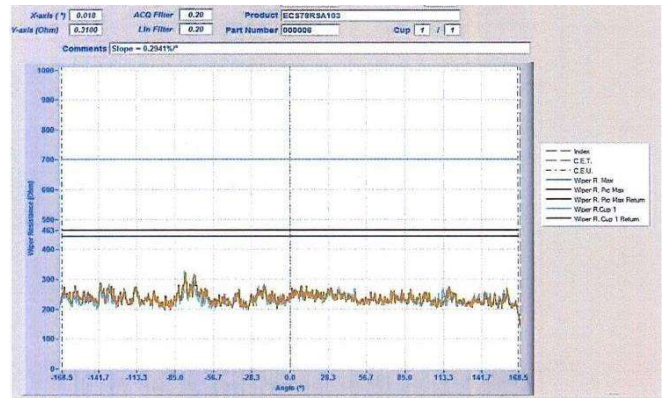
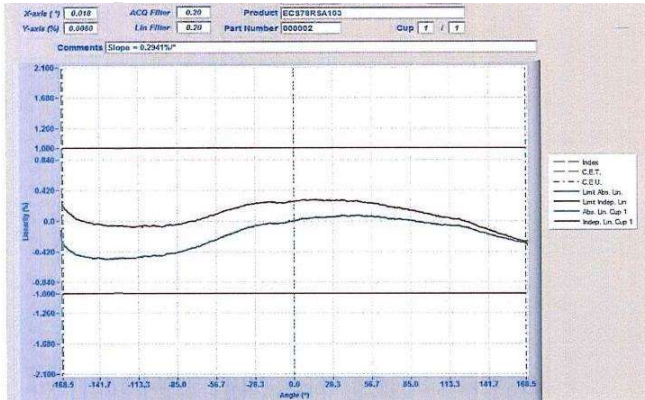
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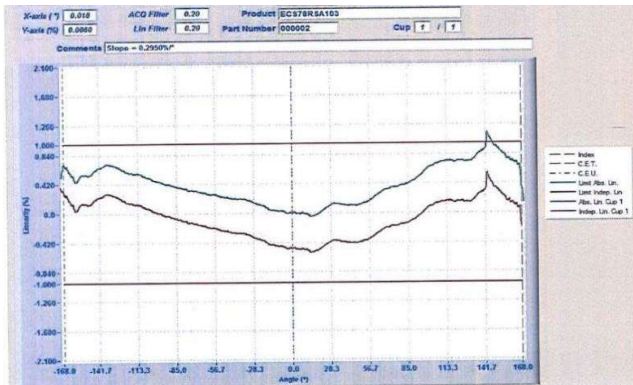
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Example of high drift of linearity and contact resistance

Before test



After test



Comment:

We note drift on linearity after test but it steels under the defined criteria.

We note a decrease in the contact resistance in the working area (90% of the track)



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3. Temperature characterization:

Parts on test

ECS standard ECS78RSA102 ohmic value 1KOhm

ECS standard ECS78RSA103 ohmic value 10KOhm

Lubrication with new grease (Vishay article 80937609) : quantity between 3 and 5 mg per track

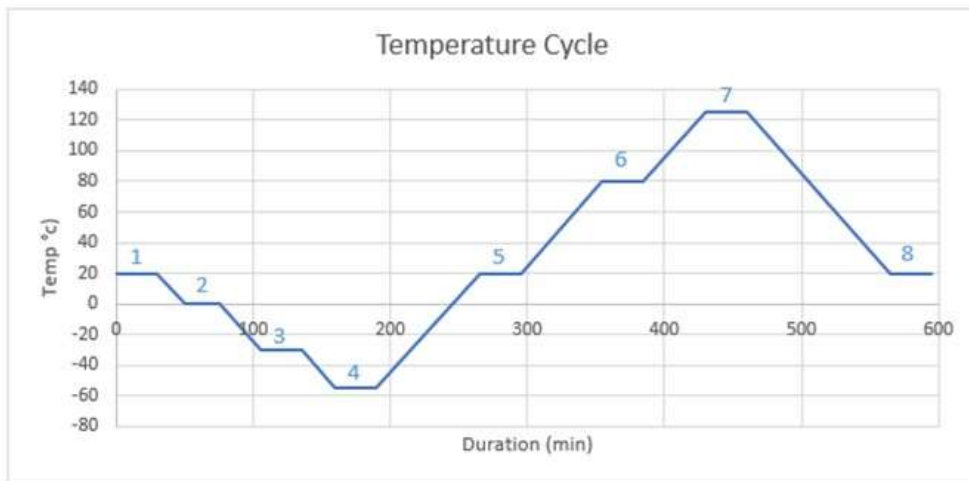
Compare with same parts lubricated with current grease (SFER32058301)

Description of the test

Movement cycle :

- 50% of total stroke
- Centered at 50% of the track
- Frequency : ≈ 1.5 Hz

Temperature profile : $-55^{\circ}\text{C} + 125^{\circ}\text{C}$



- 8 temperature stop (20 / 0 / -35 / -55 / 20 / 80 / 125 / 20°C)
- 30 min at each stop
- Curve slope $1^{\circ}\text{C}/\text{min}$

The contact resistance is recorded during the test with a constant current of 1 mA

Validation criteria:

- Contact resistance at end of test equal to initial value
- Max value less than 2% of Total Resistance (according to Vishay instruction FTEN019)
- Contact resistance value similar to the common value observed with current product definition (using lubricant SFER32058301)

Equipment of control:

- Electrical control bench VA63A : End of line control bench used in mass production workshop.
Calibration and conformity assessment according to Vishay procedure VI-ET/001
- During test: Sefram 20 track / NI001706

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Material of control on bench:

- Multimeter: MX59HD NAMGE00000508

Test results:

Contact resistance monitoring during test:

ECS 1 K Ω

			Temperature	20°C	0°C	-30°C	-55°C	20°C	80°C	125°C	20°C
			Palier N° :	1	2	3	4	5	6	7	8
Average (Ω)											
SN12	New lubricant	1K		22.4	19.1	10	73.6	19.9	13.6	18.7	20
SN10	Current definition	1K		22.5	35.5	19.2	46.1	31.4	18	20.6	26
Max value (Ω)											
SN12	New lubricant	1K		65.3	72.2	38.4	481.5	83.7	53.8	58.4	62.2
SN10	Current definition	1K		64.9	58.7	46.5	133	95.5	57.2	57.2	99.3

ECS 10 K Ω

			Temperature	20°C	0°C	-30°C	-55°C	20°C	80°C	125°C	20°C
			Palier N° :	1	2	3	4	5	6	7	8
Average (Ω)											
SN17	New lubricant	10K		249	219.3	228.3	273.7	255.4	212.1	217.1	194.6
SN15	Current definition	10K		286.7	279.9	301.5	364.3	422.1	242.8	210.2	219
Max value (Ω)											
SN17	New lubricant	10K		389.3	337.1	370.9	532.1	602.8	496.8	389.3	311
SN15	Current definition	10K		455.9	443.6	301.5	953.2	1300.6	406.9	335	354.9

Comment:

No significant deviation identified

Overall, the average values recorded with the new configuration are lower than with the reference configuration

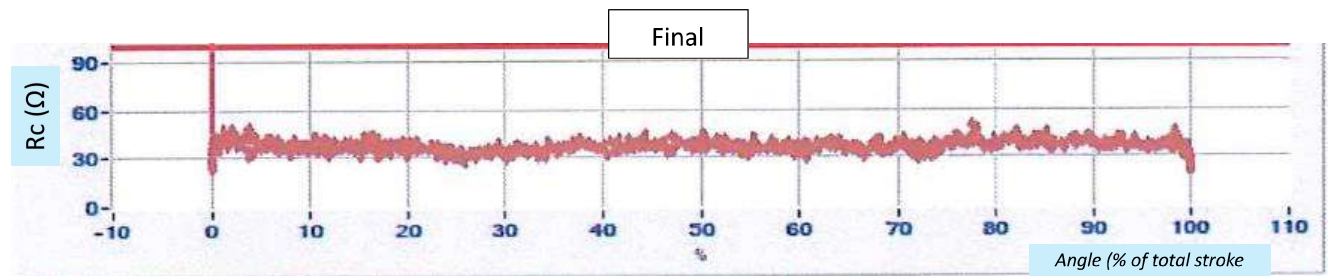
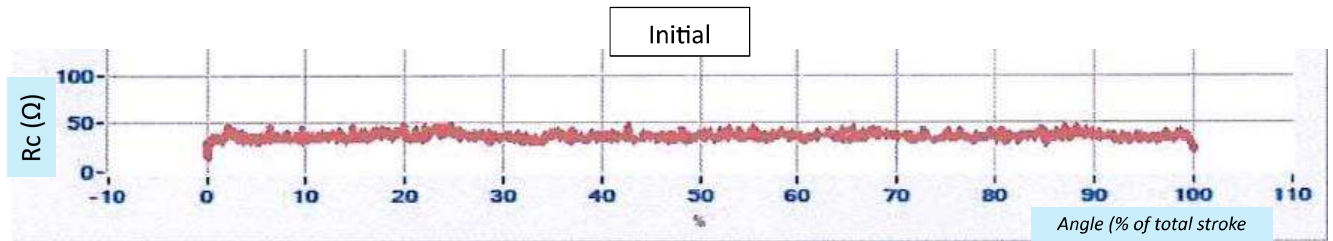


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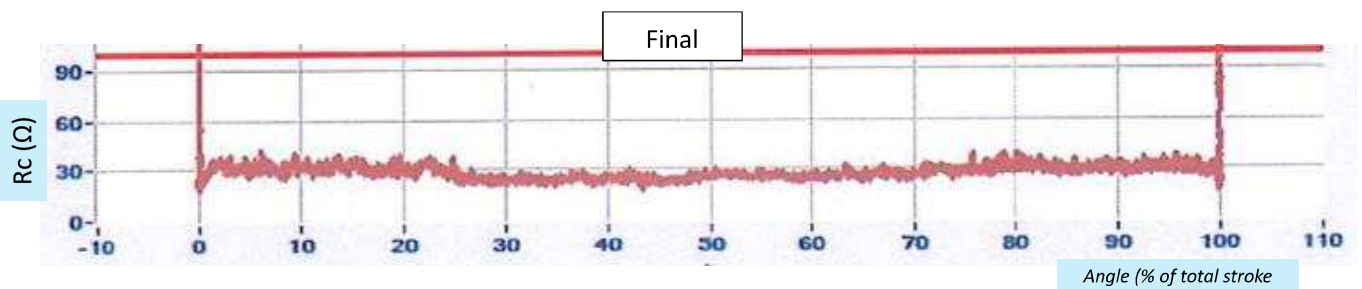
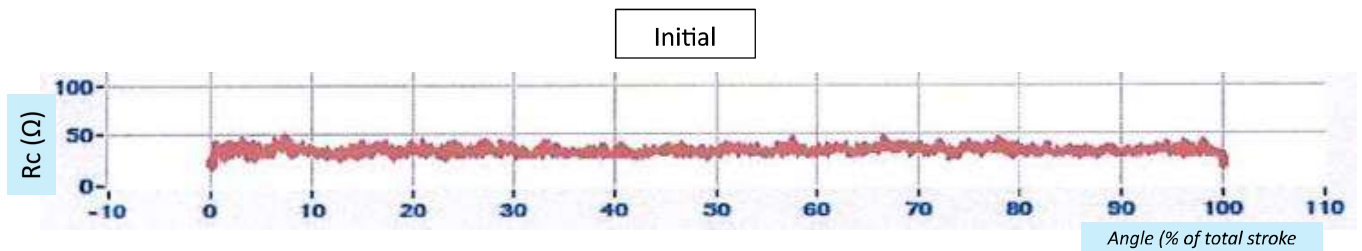
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SN10



SN12



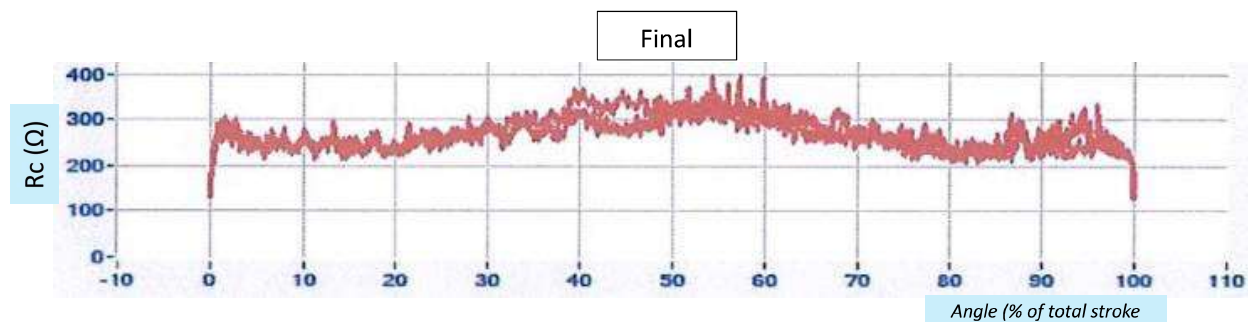
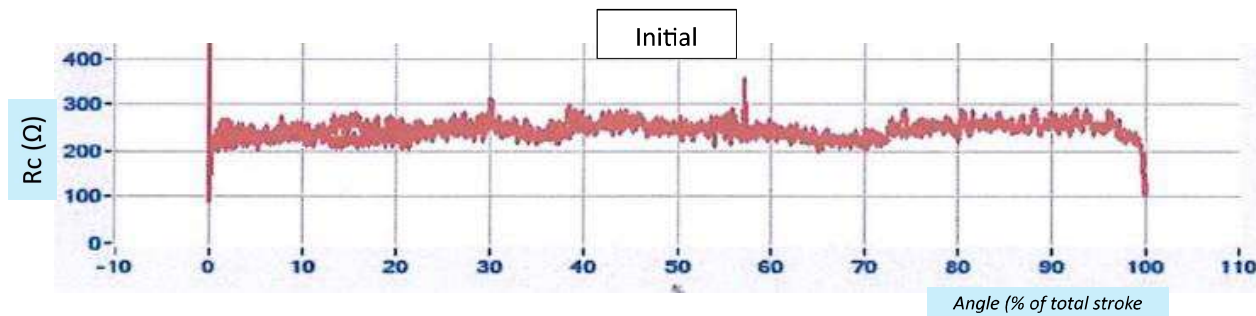


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SN15



SN17

