SPECIFICATION 108-120003

Formerly Raychem RK-6638
RBK-ILS-125

RBK-ILS-125 is a dual-wall, heat-shrinkable, flame-retarded tubing designed to provide environmental sealing of electrical splices in an automotive environment. Continuous operating temperature -40°C to +125°C (3000hrs)

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2. SCOPE

This Quality Assurance Specification establishes the quality standard for RBK-ILS-125.

The objective of this document is to specify tests that will qualify the performance of Automotive wiring in-line splices, protected and insulated by RBK-ILS-125 tubing using sequential and individual tests that simulate real use conditions.

For Qualification purposes standardized splice components are used to eliminate sample variation. It has been established that the wire insulation material will meet the requirements herein prior to commencement of testing.

3. REVISION HISTORY

As RK-6638

Revision Number	Change Request	Date
5	P1036	Sept 1995
6	CR04-DM-0095	July 2004
7	CR07-DM-135	Sept 2007
8	CR08-DM-067	May-2008
9	CR09-DM-049	Aug-2009

As 108-120003

A	Via PDMLink	February 2020
A1	Via PDMLink	21AUG2023

4. REQUIREMENTS

4.1 Composition, Appearance and colour

The tubing components shall be essentially free from pinholes, bubbles, cracks, defects and inclusions and shall be constructed as a dual-walled, heat shrinkable tubing having a hot melt adhesive inner wall with an outer wall of an irradiated, modified polyolefin material. The standard jacket colour shall be black (designated by suffix-0). The inner adhesive shall be light amber.

4.2 Dimensions

Specimens shall be prepared and tested as outlined in section 6.1. Dimensions shall meet the requirements shown in Table 9

4.3 Test Requirements

Unless otherwise stated, the requirements of Table 7 (individual tests) will be met by either tubing installed onto splices or tubing installed onto mandrels as appropriate when prepared as recommended in Clause 5. The requirements of Table 8 (sequential tests) will be met by tubing installed onto splices.
Unless stated otherwise, tests will be carried out on tube size NR1 and NR3 and this will qualify the product range.

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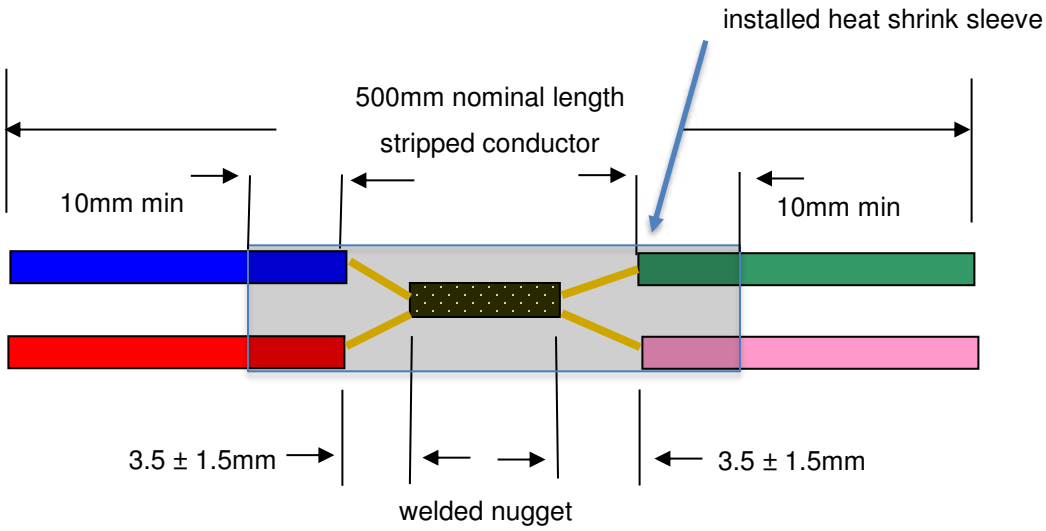
5.	**PREPARATION AND INSTALLATION OF TEST SPECIMENS**
5.1	**Sequential, Heat Ageing and Strain Relief Specimens** The overall length of the splice/wire/tube assembly shall be nominally 500 mm and it shall be established prior to testing that the wire insulation material will meet all the tests in the specification. Wire meeting this requirement would be ISO 6722 T3 XLPE wire. The splice assembly is constructed and installed as described in PIP-019 and shown in Fig 1, using components as described in Table 1.

Figure 1



5.1.1 Splice Components

Refer to Table 1 below for typical component combinations.

Table 1 Splice Components and Construction

Tube Size	Standard Tube Length (mm)	Splice Configuration	Wire Gauge (mm²)
RBK-ILS-125-NR1	50	2:2	0.5
RBK-ILS-125-NR3	65	7:4	1.5

NB: Splices can be manufactured by ultrasonic, resistance welding or crimping as required by the customer.

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5.1.2	**Product Application Equipment**
	Raychem RBK-ILS Processor UHI-250 Thermal Probe
5.1.3	**Splice Installation** The relevant size splice tubing shall be centred onto the splice area and shrunk into position using the RBK-ILS Processor as detailed in Product Installation Procedure PIP-019. The splices shall be allowed to cool naturally to ambient temperature for a minimum of 30 minutes prior to testing for Insulation Resistance as described in Clause 7.1 of this specification.
5.2	**Physical Property (Individual) Test Specimens** The installation procedures are given in the appropriate test clause. For Scrape Abrasion, Split Resistance, Thermal Indentation and Dielectric Strength, the components shall be selected according to the substrate selection guide in Table 2. The mandrels shall be manufactured from a solid steel rod. Unless otherwise specified, the tubing shall be installed using a TE Connectivity Thermogun Type CV 1981 PID at 350° C with a PR12 reflector (Ensuring splice is centralised) in order to achieve full recovery and flow of the adhesive. The specimens must be allowed to cool to ambient temperature prior to the start of the tests.

Table 2 Substrate Selection Guide

Product	Nominal Substrate Diameter	
	(mm)	(inches)
RBK-ILS-125-NR1	4.8	3/16
RBK-ILS-125-NR2	6.4	1/4
RBK-ILS-125-NR500	6.4	1/4
RBK-ILS-125-NR3	9.5	3/8
RBK-ILS-125-3A	11.0	7/16
RBK-ILS-125-NR4	12.7	1/2

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6.	**INDIVIDUAL PHYSICAL PROPERTY TESTS**
6.1	**Dimensions and Longitudinal Change** The test method shall be as specified in ASTM D2671. The length and inside diameter of five 254 mm long specimens of expanded tubing shall be measured. The specimens shall be recovered at 200°C ± 5°C for 3 minutes in a fan-assisted, air-circulating oven, and immediately quenched in water at room temperature and the dimensions re-measured. The longitudinal change shall be expressed as a percentage of the original length. The recovered jacket wall thickness shall be determined from four measurements equi-spaced around the circumference and the mean value shall be recorded. Blocking of the adhesive liner shall not constitute a failure. Note: The adhesive used in RBK-ILS-125 is designed to melt and flow around wire splices to create an environmental seal when installed in accordance with PIP-019. Consequently, the inner recovered bore and adhesive wall thickness cannot be reliably or consistently measured after full shrinkage. These dimensions are adequately controlled during the manufacturing process.
	PREPARATION AND INSTALLATION OF TEST SPECIMENS
6.2	**Inner Wall Flow Test** This test is carried out on standard length cut pieces of RBK-ILS-125 tubing material and is intended as a guide to adhesive flow. Five specimens shall be selected at random and conditioned at 200 ± 5°C for 3 minutes in a fan-assisted, air-circulating oven after which time approximately 5mm of one end is crimped together using flat faced pliers for approximately 30 seconds. The specimens are then allowed to cool for a minimum of 15 minutes then reconditioned at 200 ± 5°C for a further 3 minutes. Upon removal from the oven the specimens shall be allowed to cool for 15 minutes minimum and examined for adhesive blocking. The tests shall be considered satisfactory if all specimens are totally blocked in at least one area of the specimen length.

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6.3	**Split Resistance** Five standard length cut pieces of RBK-ILS-125 tubing material shall be selected at random and slid onto the appropriate mandrels as stated in Table 2. The specimens shall then be conditioned in a fan-assisted, air-circulating oven at 200 ± 5°C for 10 minutes ± 30 seconds ensuring the specimens do not come into contact with internal parts of the oven. Upon removal from the oven the specimens shall be examined visually for evidence of splitting. There shall be no splitting.
6.4	**Strain Relief** This test is carried out on splice assemblies constructed as described in Clause 5.1. Five specimens shall be tested. Secure one wire from any end in the upper jaw of a suitable tensile testing machine and any other wire from the same end in the lower jaw. The initial jaw separation shall be 100mm and rate of separation shall be 100mm per minute. The test shall be carried out at an ambient temperature of 23 ± 3°C. Each test specimen shall be loaded to 50N and the load immediately released. (Refer to Figure 2) All specimens shall then be checked for Insulation Resistance according to Clause 7.1 of this Specification. N.B For the 7:4 splice choose two wires randomly from the 7-wire side for the test as per Figure 2. **Figure 2** **Strain Relief** 

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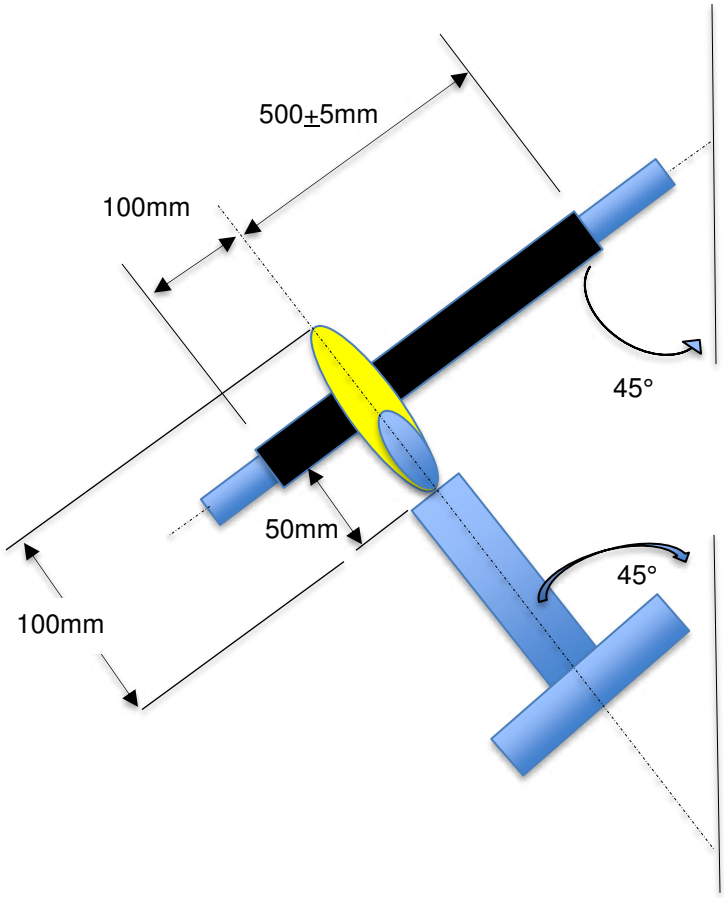
6.5	**Flammability** **Figure 3**  The test method shall be essentially in accordance with ISO6722. Five lengths of tubing approximately 500mm long shall be recovered onto metal mandrels having a diameter 75 ± 5% of the specified minimum expanded (as supplied) inside diameter of the tubing. This shall be conducted in a fan-assisted, air-circulating oven at a temperature of 200 ± 5°C for 3 minutes. Use a Bunsen burner with a 100mm (4 inch) tube. Adjust the burner to achieve a flame with an inner blue cone of approximately 50mm (2 inches). Suspend each specimen in a draught free environment in the configuration shown in Figure 3. The time of exposure to the test flame for each specimen shall be one 30 second application. Record the time for each specimen to self-extinguish after removal of the flame. The result shall be expressed as the average burn time for the five specimens.

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	INDIVIDUAL PHYSICAL PROPERTY TESTS (continued)
6.6	**Scrape Abrasion** The test method is essentially in accordance with that defined in ISO 6722 where a 0.125mm radius needle or profile is drawn back and forth over the splice material. The tests shall be carried out at an ambient temperature of 23 ± 3°C on five specimens of each size of tubing. The result shall be recorded as the average of the five determinations. A length of splice tubing approximately 150mm long shall be installed onto the appropriate mandrel as specified in Table 2 by conditioning in a fan-assisted, air-circulating oven at 200°C ± 5°C for 3 minutes. The samples shall then be allowed to cool naturally to room temperature. Each specimen shall be subjected to the test conditions shown below in Table 3 and shall meet or exceed the cycle requirements given in Table 7. A cycle is defined as one complete forward and backward reciprocation of the test probe and does not lift off at the end of each stroke. Refer to Figure 4.

Table 3 Scrape Abrasion Test Conditions

	Test Temp	23 ± 3°C
	Test Mass	700g
	Probe Radius	0.125mm
	Cycle Rate	50-60 per minute
	Cycle Length	10mm minimum

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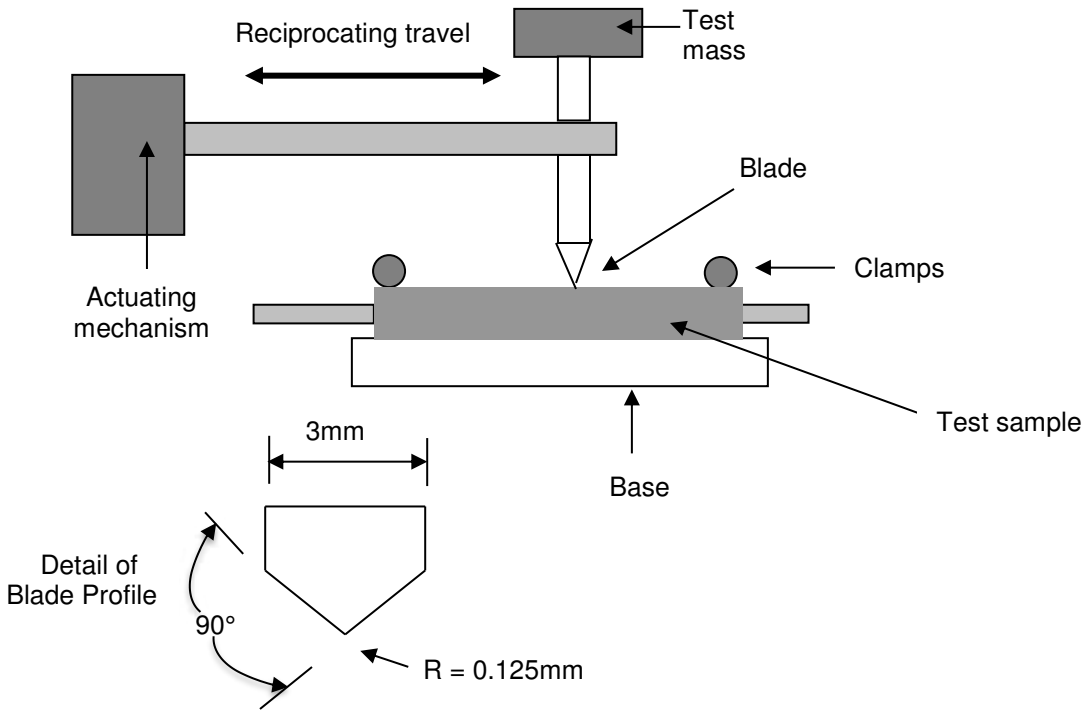
Figure 4 – SCRAPE ABRASION TEST RIG



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	INDIVIDUAL PHYSICAL PROPERTY TESTS (Cont'd)
6.7	**Heat Ageing (Long Term 3000hrs)** Twenty-five specimens shall be prepared as described in Clause 5.1. The specimens shall be suspended vertically in a fan-assisted, air-circulating oven and conditioned at 125 ± 3°C for 3000 hours. After conditioning, the specimens shall be allowed to cool naturally to room temperature and visually examined for signs of outer jacket cracking. Visual discolouration of the RBK-ILS jacket material or adhesive does not constitute failure. All specimens shall be subjected to the Insulation Resistance test per Clause 7.1.
6.8	**Tensile Strength** Five specimens shall be tested in accordance with ISO 37. The test shall be carried out using specimens recovered at 200 ± 5°C for 3 minutes. The tensile strength shall be calculated based on the wall thickness of the jacket material only. The result shall be expressed as the average value of the 5 determinations. Initial jaw separation shall be 50 mm and rate of jaw separation shall be 50 $\pm$ 5 mm/min. The test shall be carried out at a temperature of 23 $\pm$ 2°C
6.9	**Ultimate Elongation** Five specimens shall be tested in accordance with ISO37. The test shall be carried out using specimens recovered at 200 ± 5°C for 3 minutes.The result shall be expressed as the average value of the five determinations.
6.10	**2% Secant Modulus** Five specimens shall be tested in accordance with ASTM D882. The test shall be carried out using specimens of expanded tubing using a jaw separation rate of 25.4 mm/min. The 2% secant modulus shall be calculated based on the wall thickness of the jacket material only. The result shall be expressed as the average value of the five determinations. The test shall be carried out at a temperature of 23 $\pm$ 2°C
6.11	**Volume Resistivity** Five specimens shall be tested in accordance with ASTM D2671. The test shall be carried out using specimens recovered at 200 ± 5°C for 3 minutes. The result shall be expressed as the average value of the five determinations.

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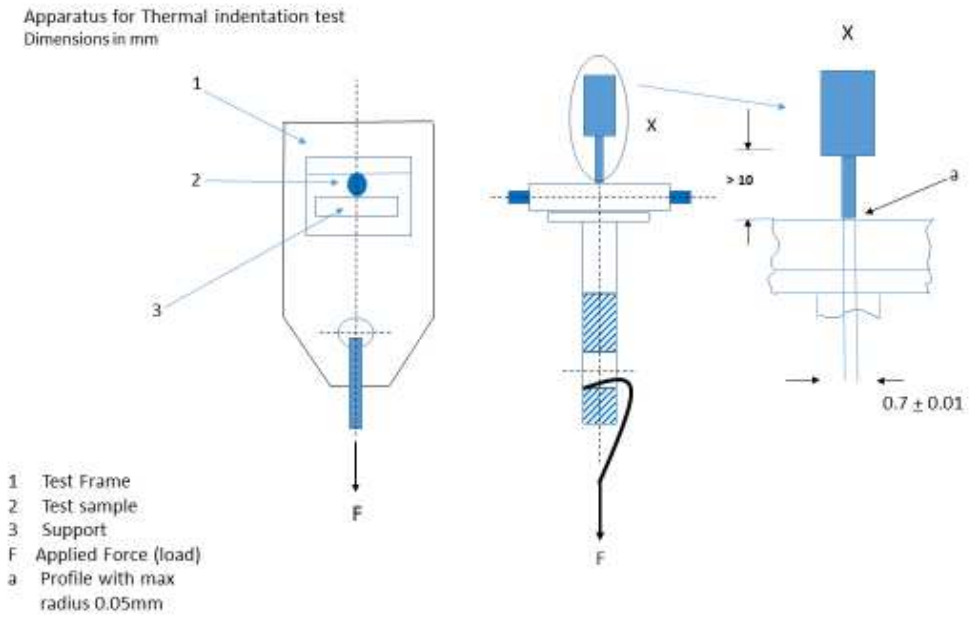
6.12	**Thermal Indentation** The test set up is shown below in Figure 5 Five standard length pieces of tubing shall be shrunk onto mandrels (Section 5.2 table 2) in a fan-assisted, air-circulating oven at 200°C ± 5°C for 3 minutes and allowed to cool naturally to room temperature. Position the specimen on the fixture and condition the assembly in an air-circulating oven at the conditions shown below. Total Load =150g (including test frame) Profile width = 0.7mm Temperature = 90°C Time = 1 hour After the exposure time carefully remove from the oven and quench the indented region in water at room temperature. The residual wall thickness shall be measured. The average value of the five determinations shall be 40% minimum of the original average wall thickness. The apparatus shall be essentially as shown in Figure 5. **Figure 5** 

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	 Photo of Thermal indentation test equipment
6.13	**Copper Mirror Corrosion** The test shall be carried out in accordance with ASTM D2671 on five recovered specimens. There shall be no corrosion of the copper mirror. Test temperature = 150°C Duration of test = 16 hours
6.14	**Dielectric Strength** The test shall be carried out essentially in conformance with IEC 60243. Five 200mm lengths of tubing shall be shrunk onto mandrels as shown in Table 2 Substrate Selection Guide by conditioning in a fan-assisted, air-circulating oven at 200°C ± 5°C for 3 minutes. The average value of 5 measurements shall be taken.
6.15	**Specific Gravity** The test method shall be as specified in Method A of ISO 1183 on expanded specimens.
6.16	**Water Absorption** The test method shall be specified in Method 1 of ISO 62. For sleeving of recovered bore greater than 8mm, three disc specimens of diameter 25 $\pm$ 1mm shall be cut from sleeving. For sleeving of recovered bore less than or equal to 8mm, three tubular specimens 50mm long shall be cut from the sleeving.

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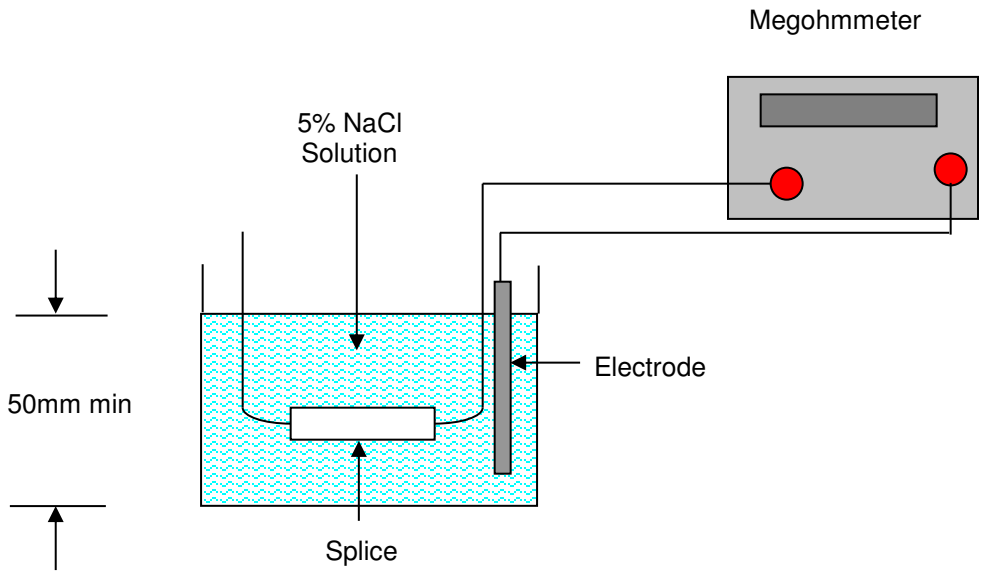
7	**SEQUENTIAL TEST PROGRAMME** 50 Test specimens shall be prepared as described in Clause 7.1 and subjected to the following sequence of tests shown in Clause 7.1 to 7.9.
7.1	**Insulation Resistance Test** The apparatus shall be essentially as shown in Figure 6 below. The fifty specimens shall be immersed in salt solution (5% by weight) at 23 ± 3°C for 24 ± 2 hours. After this conditioning period the resistance between each specimen and an immersed electrode (of surface area 100mm square) shall be measured by means of a suitable Megohmmeter. The reading shall be taken 30 seconds after application of 100V dc. Resistance of less than 2 x 10^8 Ohms shall constitute a failure. Subsequent Insulation Resistant tests both in the sequential cycle and individual test sections shall be carried out after 1hour immersion only. These fifty specimens shall then be subjected to test clause 7.2 (Cold Impact)
	Figure 6. Insulation Resistance Test 

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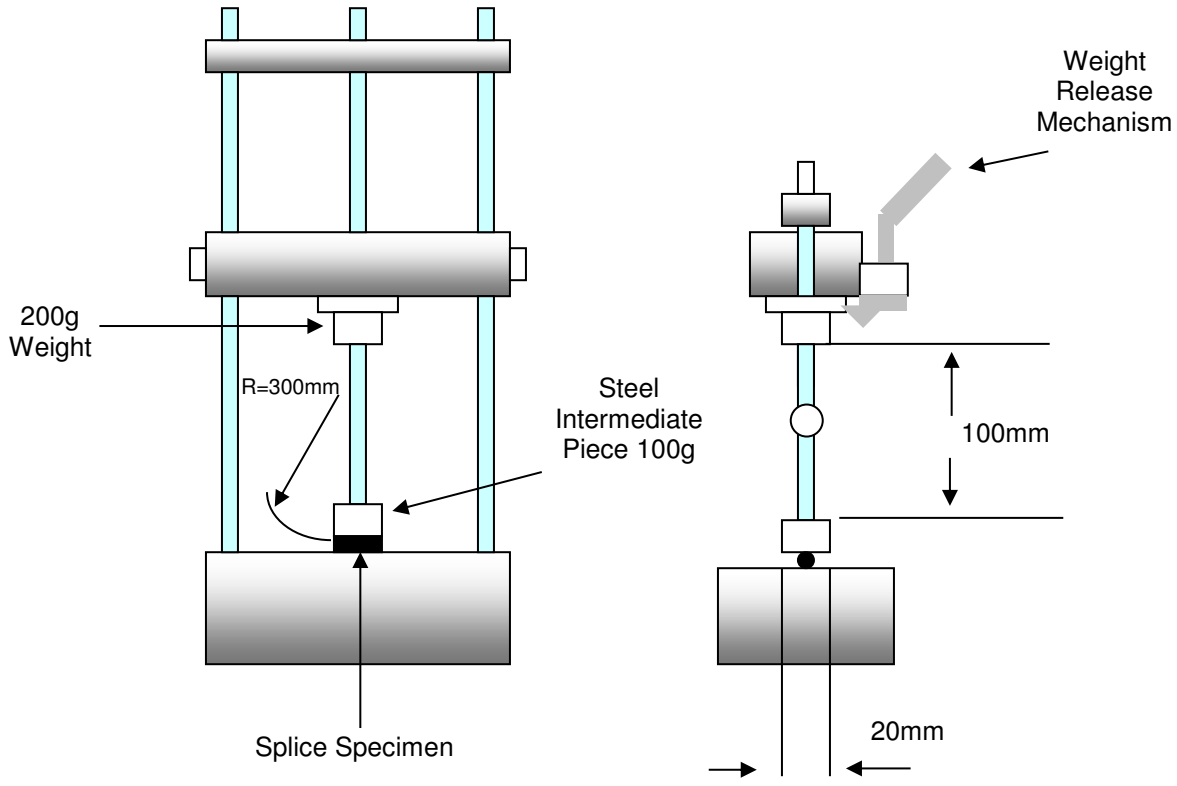
	SEQUENTIAL TEST PROGRAMME (Cont'd)
7.2	**Cold Impact (Sequential)** The test apparatus shall be essentially as shown in Figure 7 and the test method is based on ISO 6722. Fifty splice specimens shall be conditioned together with the test apparatus in a suitable cold chamber for a minimum of 4 hours at -40 ± 2°C. The apparatus shall be pre-conditioned for a minimum of 4 hours prior to the start of the test. Each specimen shall be subjected to a single drop of a 200g weight from a height of 100mm whilst still in the cold chamber ensuring that the weight centrally impacts the splice area. After the test the specimens shall be removed from the cold chamber, allowed to stabilize to room temperature and examined visually for signs of cracking of the outer jacket. Each specimen shall then be subjected to the insulation resistance test as per Clause 7.1. The fifty specimens shall then be subjected to test clause 7.3 (Accelerated Ageing).

Figure 7 Cold Impact Test Rig



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	SEQUENTIAL TEST PROGRAMME (Cont'd)
7.3	**Accelerated Ageing (Sequential)** Fifty splice specimens of each size shall be suspended vertically in a fan-assisted, air-circulating oven and conditioned for 168 ± 2 hours at 130 ± 5°C. After the conditioning period the specimens shall be removed from the oven and allowed to cool naturally to room temperature and visually examined for signs of cracking of the outer jacket. Discolouration of the RBK-ILS-125 jacket material or adhesive liner does not constitute a failure. Each specimen shall then be subjected to the Insulation Resistance test per Clause 7.1. These fifty specimens shall then be subjected to test clause 7.4 (Thermal Shock).
7.4	**Thermal Shock (Sequential)** Fifty splice specimens of each size shall be suspended vertically in a fan-assisted, air-circulating oven and conditioned for 1 hour ± 5 minutes at 130 ± 5°C. Immediately after this conditioning period the sealed splice area of the specimens shall be immersed in a saline solution (5% by weight) at a temperature of 0 to 5°C and conditioned for 30 ± 2 minutes. This cycle shall be repeated for a total of five cycles and the samples should be visually examined for signs of cracking of the outer jacket. Each specimen shall then be subjected to the Insulation Resistance test per Clause 7.1. These fifty specimens shall then be subjected to test clause 7.5 (Temperature/Humidity Cycling).
7.5	**Temperature/Humidity Cycling (Sequential)** Fifty splice specimens shall be hung vertically and subjected to the following test regime shown in Table 4 for a total of five cycles. Figure 8 shows typical ramp up and down times together with the dwell periods. After completion of the test cycle each specimen shall be tested for Insulation Resistance per Clause 7.1. These fifty specimens shall then be subjected to test clause 7.6 (Mechanical Vibration). *Note 1: Humidity should be checked periodically to ensure it is running at the correct level*
	Table 4 Temperature/Humidity Cycling

12 hours	at	95% RH at 40°C +/- 3°C
4 hours	at	-40°C +/- 3°C
3 hours	at	95% RH at 40°C +/- 3°C
5 hours	at	23°C +/- 3°C

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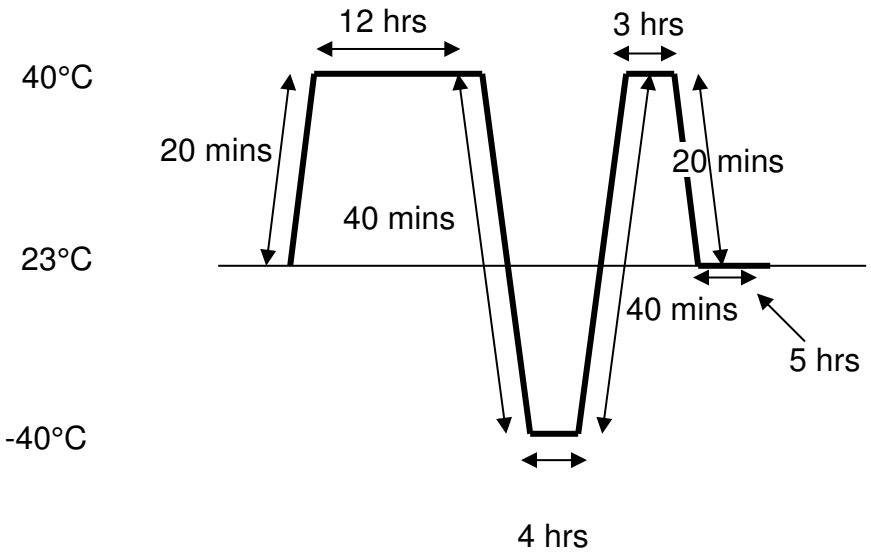
Figure 8 Temperature and time profile



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7.6

SEQUENTIAL TEST PROGRAMME (Cont'd)

Mechanical Vibration (Sequential)

The test method shall essentially be in accordance with IEC 60068-2-6.

Fifty splice specimens shall be subjected to the following vibration regime shown in Table 5. Each specimen shall be clamped horizontally as shown in Figure 9. The wires should be clamped so that they are not under tension ensuring that the vibration is transferred to the splice area of the test piece. At the completion of the test, each specimen shall be subjected to the Insulation Resistance Test per Clause 7.1. These fifty specimens shall then be subjected to test clause 7.7 (Flex Test).

Table 5 Vibration Regime

Frequency range	Acceleration level m/s^2	Acceleration Rate Note 1 Octave /min
10-25Hz	9.8 (1G)	1
25-500Hz	44 (4.5G)	1
Test Duration		8 hrs ± 15 minutes
Vibration axis		x axis only

Note 1:
1 octave /minute acceleration rate is the doubling of the frequency each minute, e.g. if starting at 25Hz the frequency will be 50Hz after 1 minute, 100Hz after 2 minutes, 200Hz after 3 minutes etc.

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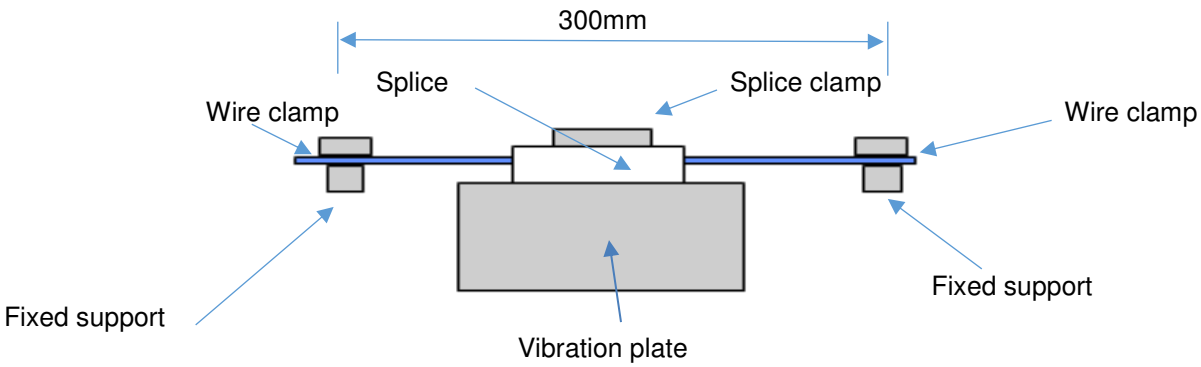
Figure 9 Vibration Jig Layout



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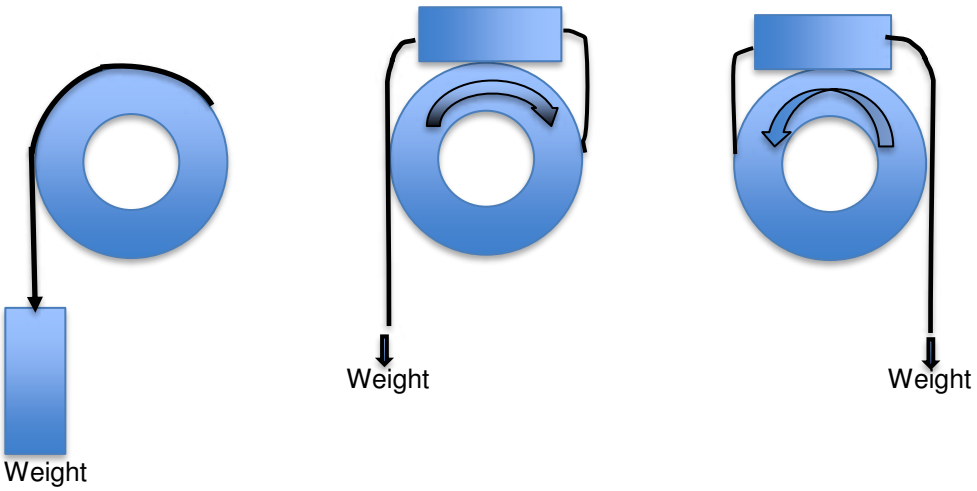
7.7	**Flex Test (Sequential)** Fifty splice specimens shall be flexed at Room temperature around a 50.8mm (2”) diameter mandrel as follows. Attach one end of the specimen to the mandrel and the other end to a weight (see below). Rotate the mandrel sufficiently to cause the splice area to wrap around the mandrel and the wires on the opposite side of the splice to contact the mandrel. Rotate the mandrel in the opposite direction until the splice is again wrapped around the mandrel. This shall constitute one cycle. Test each sample for 5 cycles. Refer to Figure 10. At the completion of the test, each specimen shall be subjected to the Insulation Resistance Test per Clause 7.1. These fifty specimens shall then be subjected to test clause 7.8 Voltage Withstand. Weight for RBK-ILS-125-NR1 = 2.27 kg Weight for RBK-ILS-125-NR3 = 4.54 kg **Figure 10 FLEX TEST** 
7.8	**Voltage Withstand Test (Sequential)** The test method and apparatus shall be essentially as described in IEC 60243 (refer to Figure 11). Fifty splice specimens shall be subjected to the following test. Each specimen shall be immersed in a 5% (by weight) salt solution at 23 ± 3°C for 4 hours ± 5 minutes with the wire ends overhanging the solution bath. The test voltage shall be applied between each conductor and the salt solution at a rate of 500 volts per second until a voltage of 1 kV AC is reached. The voltage shall be maintained for 1 minute. There shall be no flashover of the splice sleeve. These fifty specimens shall then be subjected to test clause 7.9 (Fluid Compatibility).

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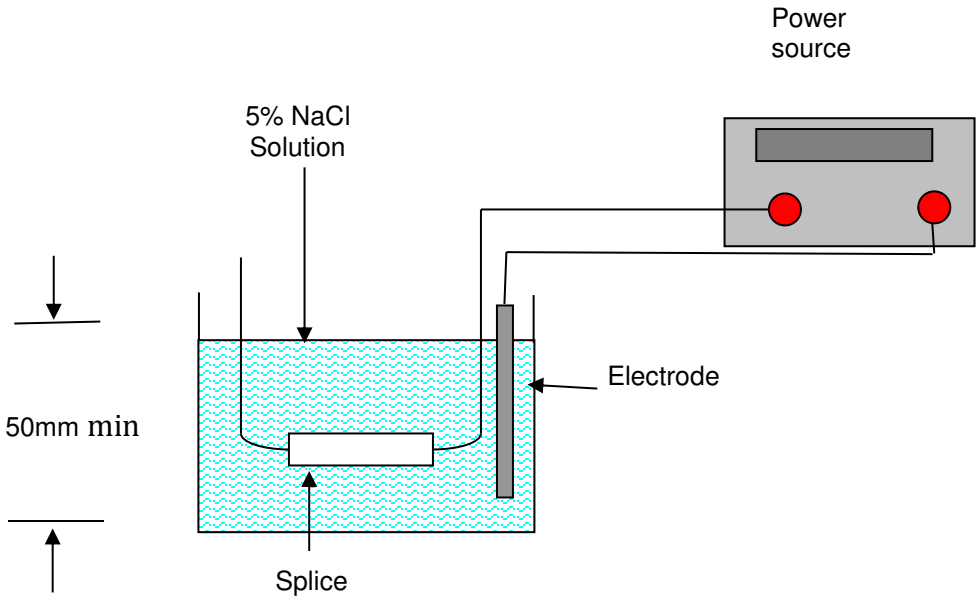
Figure 11



7.9	**Fluid Compatibilty (Sequential)** Fifty splice specimens shall be divided into groups of five and subjected to the Fluid Soak in clause 7.9.1.
7.9.1	**Fluid Immersion** Five splice specimens shall be immersed in each of the fluids as specified in Table 6 A new group of five specimens shall be used for each fluid. After immersion, the specimens shall be removed from the fluids, allowed to cool naturally to room temperature, wiped dry and subjected to the insulation resistance test detailed in clause 7.1.

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Table 6 Soak Test Fluids

	Fluid Description	Fluid Specification	Immersion Time (mins)	Immersion Temp (°C)
a)	Engine Oil	ISO 1817 Oil No. 1 (IRM 901)	30 ± 2	100 ± 3
b)	Automatic Transmission Fluid (ATF)	Dexron VI™	30 ± 2	100 ± 3
c)	Diesel Fuel	90% ISO 1817 Oil Number 3 + 10% p-xylene	30 ± 2	23 ± 2
d)	Brake Fluid	DOT 4	30 ± 2	23 ± 2
e)	Engine Cleaner	Gunk™ Degreaser	30 ± 2	23 ± 2
f)	Petrol (without oxygen compounds)	ISO 1817 Liquid C*1	30 ± 2	23 ± 2
g)	Screen Wash	50% Iso-propanol + 50% Distilled H_2O by volume	30 ± 2	23 ± 2
h)	Multi-Purpose Detergent (Carwash)	1% Teepol + 99% Distilled H_2O by volume	30 ± 2	23 ± 2
i)	Battery Acid	H_2SO_4 + H_2O (SG 1.25)	30 ± 2	23 ± 2
j)	Engine Coolant	50% Ethylene Glycol + 50% Distilled H_2O by volume	30 ± 2	23 ± 2

*1 Use fresh fluid for Liquid C for each batch test. Seal in airtight containers when not in use to avoid evaporation.

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8. RELATED DOCUMENTS

ASTM D2671	Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use
ASTM D882	Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
DOT 4	Hydraulic Brake Fluid
IEC 60068-2-6	Environmental Testing - Test Fc and Guidance: Vibration (Sinusoidal)
IEC 60243-1	Electrical Strength of Insulating Materials - Test Methods - Tests At Power Frequencies
ISO 37: 2011	Rubber, vulcanized or thermoplastic - Determination of Tensile Stress-Strain Properties
ISO 1817 - Oil No 1 - Oil No.3 - Liquid C	Rubber, vulcanized - Determination of the effect of liquids (Engine Oil) (Diesel Fuel) (Petrol)
ISO 6722	Road Vehicles - 60 V And 600 V Single-Core Cables - Dimensions, Test Methods and Requirements
PIP-019	Size Selection & Installation of RBK-ILS-125

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9	**SAMPLING**
9.1	**Qualification** Qualification tests are those performed on tubing submitted for qualification as a satisfactory product and when a change of formulation takes place and shall consist of all tests listed in this Specification. Tube sizes NR1 and NR3 shall qualify the product range. Qualification test samples shall be cut to the specified lengths and installed onto either splices or the appropriate mandrels. Product is tested on wire configurations or mandrels as specified in Section 5 of this Specification "Preparation and Installation of Test Specimens". The minimum number of specimens to be tested shall be as follows: For Sequential Tests: 50 specimens For Individual Tests: 5 specimens unless otherwise stated Refer to the Qualification Flow Chart for more details Figure 12
9.2	**Production Routine** Production Routine tests must be carried out on every batch of finished tubing and shall consist of the following: Visual Appearance, Dimensions, Longitudinal Change, Inner Wall Flow and Split Resistance. A minimum of 5 tests shall be carried out on sample lengths taken at random from each batch of finished tubing. A batch of tubing is defined at that quantity of tubing of the same size from the same production run and offered for inspection at the same time.
10	**PACKAGING** Packaging shall be in accordance with good commercial practice. Each package shall bear an identification label showing material quantity, description, size, batch number and maximum storage temperature. Additional information shall be supplied as specified in the contract or order.

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Qualification Flow Chart Figure 12

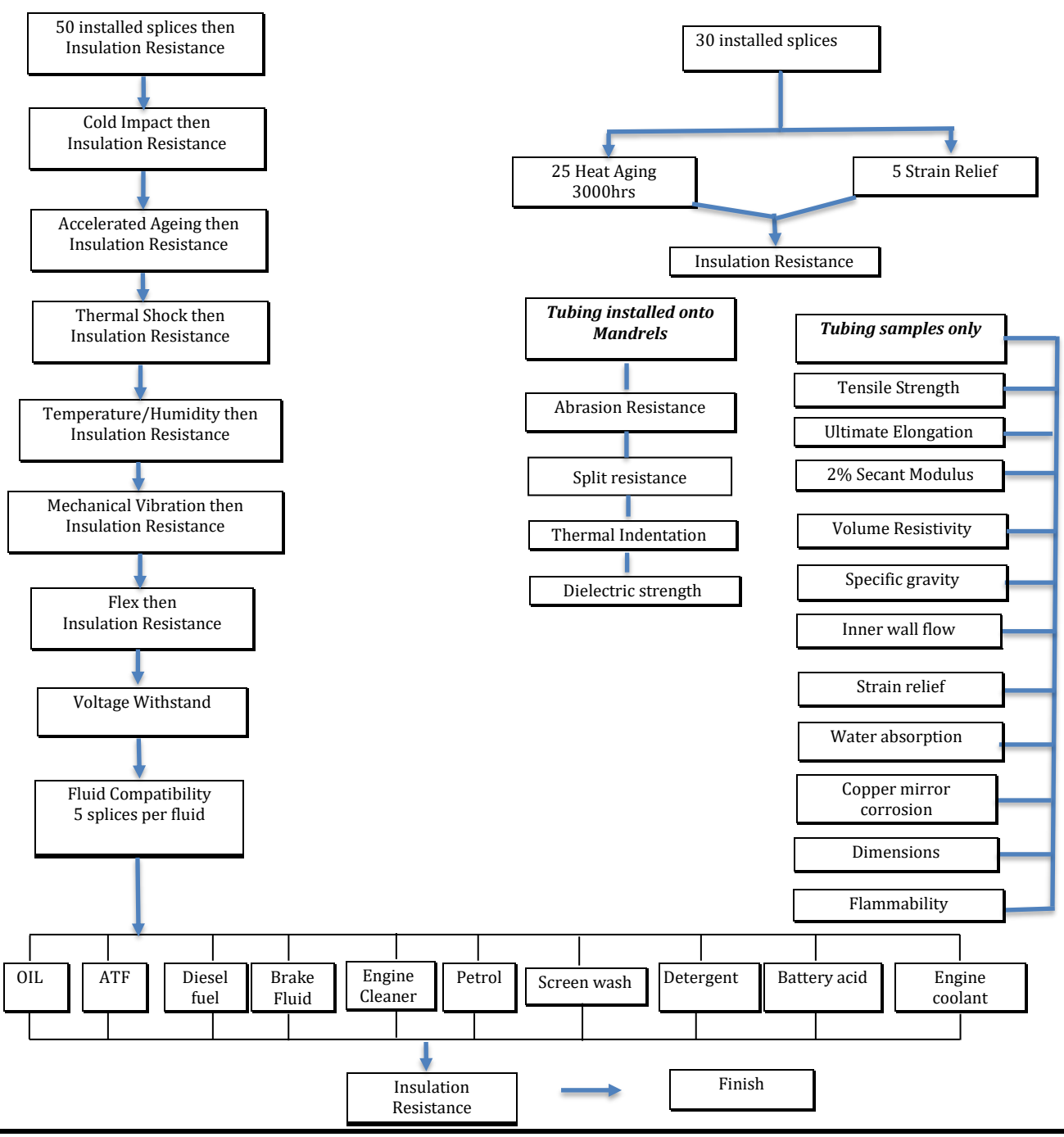

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TABLE 7 Test Requirements - INDIVIDUAL TESTS

Test	Test Method	Test Requirements
Dimensions	Clause 6.1 ASTM D2671	As per Table 9
Longitudinal Change	Clause 6.1 ASTM D2671	0 to - 10%
Inner Wall Flow	Clause 6.2	Total blocking (in at least one area of the splice length)
Split Resistance	Clause 6.3	No splitting at 200°C
Strain Relief, 50N - Insulation Resistance	Clause 6.4 Clause 7.1	 2 x 10^8 Ohms minimum
Flammability	Clause 6.5	Self -extinguishing within 30 seconds
Scrape Abrasion	Clause 6.6 ISO 6722	NR 1 500 cycles min NR 3 5,000 cycles min
Heat Ageing Long Term (3000 hrs.) - Visual - Insulation Resistance	Clause 6.7 Clause 7.1	 No cracking of tubing jacket after 3000 hours at 125°C 2 x 10^8 Ohms minimum
Tensile Strength	Clause 6.8 ISO 37	10MPa minimum
Ultimate Elongation	Clause 6.9 ISO 37	250% minimum
2% Secant Modulus	Clause 6.10 ASTM D882	137 MPa minimum
Volume Resistivity	Clause 6.11 ASTM D2671	1.0 x 10^{12} Ohm-cm minimum
Thermal Indentation	Clause 6.12 ISO 6722	Minimum of 40% residual wall thickness
Copper Mirror Corrosion	Clause 6.13 ASTM D2671	No Corrosion of the copper mirror
Dielectric Strength	Clause 6.14 IEC 60243	16 MV/m min
Specific Gravity	Clause 6.15 ISO 1183	1.20 max
Water Absorption	Clause 6.16 ISO 62	0.5% max

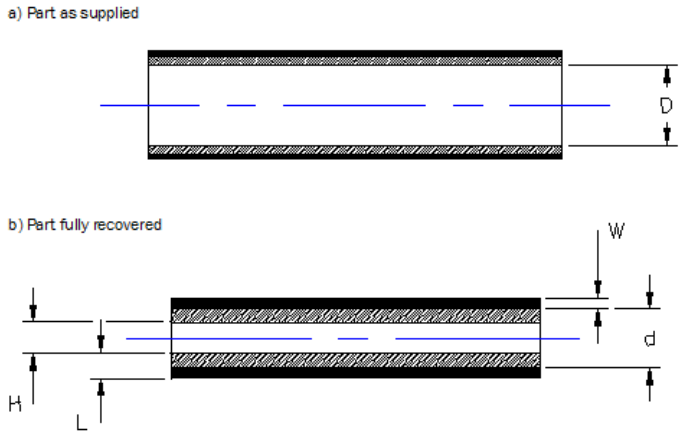
| Indicates Change

TABLE 8 Test Requirements – SEQUENTIAL TESTS

Test	Test Method	Test Requirements
Insulation Resistance Test	Clause 7.1	2 x 10^8 Ohms minimum after 24 hours immersion
Cold Impact - Visual - Insulation Resistance	Clause 7.2 ISO 6722 Clause 7.1	No cracking of tubing jacket at -40°C. 2 x 10^8 Ohms minimum after 1hour immersion
Accelerated Heat Ageing - Visual - Insulation Resistance	Clause 7.3 Clause 7.1	 No cracking of tubing jacket after 168 hours at 130°C 2 x 10^8 Ohms minimum after 1hour immersion
Thermal Shock - Visual - Insulation Resistance	Clause 7.4 Clause 7.1	 No cracking of tubing jacket after 1 hour at 130°C/30 min immersion at 0 to 5°C (5 cycles) 2 x 10^8 Ohms minimum after 1hour immersion
Temperature Humidity Cycling - Insulation Resistance	Clause 7.5 Clause 7.1	 2 x 10^8 Ohms minimum after 1hour immersion
Mechanical Vibration - Insulation Resistance	IEC 60068-2-6 Clause 7.6 Clause 7.1	 2 x 10^8 Ohms minimum after 1hour immersion
Flex Test (Ambient) - Insulation Resistance	Clause 7.7 Clause 7.1	 2 x 10^8 Ohms minimum after 1hour immersion
Voltage Withstand	Clause 7.8	No breakdown at 1kV after 1 minute
Fluid Compatibility - Insulation Resistance	Clause 7.9 Clause 7.1	30 minutes immersion 2 x 10^8 Ohms minimum after 1hour immersion

| Indicates Change

Table 9 Dimensional Requirements



OUTER JACKET: - Irradiated modified polyolefin **COLOUR Black**
INNER LINER: - Hot-Melt polyamide adhesive **COLOUR Amber**

Part no	D DIA min Expanded (mm)	Jacket & liner H DIA [1] (mm)	Jacket d DIA max (mm)	Jacket W(wall) Min (mm)	Jacket & Liner L[1] (mm)
RBK-ILS-125-NR1	5.75	1.25	2.65	0.60	1.15
RBK-ILS-125-NR2	7.50	1.65	3.45	0.70	1.40
RBK-ILS-125-NR3	11.00	2.40	4.65	0.8	1.80
RBK-ILS-125-3A	14.00	3.00	5.90	0.90	2.15
RBK-ILS-125-NR4	18.30	4.35	7.40	0.90	2.20

Notes:-
1 Dimension H & L (jacket & Liner) value is for reference only

| Indicates Change