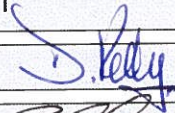
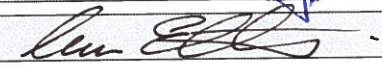


LABORATORY GENERAL TEST REPORT.

TEST REFERENCE No:	G2068
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)
ADDITIONAL INFORMATION:	Recommendation from the 18 th wiring regulations
CLIENT:	Hager Engineering
CLIENT CONTACT:	C.Howells
NUMBER OF SAMPLES:	1
DATE SAMPLES RECEIVED:	23/10/2019
DATE TEST STARTED:	23/10/2019
LABORATORY TEMPERATURE AND HUMIDITY:	20°C ± 5°C Ambient 50% ± 20% Relative humidity
REASON FOR TESTING:	New Product Introduction: JK101SPD Type 1+2 SPD Kit (Phoenix) JK102SPD Type 2 SPD Kit (Phoenix)
TEST SPECIFICATION OUTLINE:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification
RESULT:	<p>6.1 Assembly designation marking: Complies by inspection</p> <p>10.2 Strength of materials & parts: No change: Complies</p> <p>10.3 Degree of protection: No change: Complies</p> <p>10.4 Clearances & creepage distances: Complies by inspection</p> <p>10.5 Protection against electric shock: No change: Complies</p> <p>10.6 Incorporation of switching devices & components: Complies</p> <p>10.7 Internal electric circuits & connections: Complies by inspection</p> <p>10.8 Terminals for external conductors: No change: Complies</p> <p>10.9 Dielectric properties: No change: Complies by test</p> <p>10.10 Verification of temperature rise: No change: Complies.</p> <p>10.11 Short-circuit withstand strength: No change: Complies</p> <p>10.12 EMC: No change: Complies</p> <p>10.13 Mechanical Operations: No change: Complies</p>
OBSERVATION/COMMENTS:	Modification changes issued under TMN855T
TEST ENGINEER:	 D.Kelly
APPROVED BY:	 I. Ellis
DATE REPORT PREPARED:	23 rd October 2019

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"Opinions and interpretations expressed herein are outside the scope of accreditation."

REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18th edition Wiring Regulation Main Panel		

Note 1:
ASSEMBLY tested (**highlighted in yellow**) is the smallest Distribution Board in the range and is the most onerous for design verification.

JK1 125A Distribution Boards:-

JK104B	JK1 TPN 125A DBO 4 Ways Plain Door
JK104BG	JK1 TPN 125A DBO 4 Ways Glazed Door
JK106B	JK1 TPN 125A DBO 6 Ways Plain Door
JK112BG	JK1 TPN 125A DBO 6 Ways Glazed Door
JK108B	JK1 TPN 125A DBO 8 Ways Plain Door
JK108BG	JK1 TPN 125A DBO 8 Ways Glazed Door
JK112B	JK1 TPN 125A DBO 12 Ways Plain Door
JK112BG	JK1 TPN 125A DBO 12 Ways Glazed Door
JK116B	JK1 TPN 125A DBO 16 Ways Plain Door
JK116BG	JK1 TPN 125A DBO 16 Ways Glazed Door
JK118B	JK1 TPN 125A DBO 18 Ways Plain Door
JK118BG	JK1 TPN 125A DBO 18 Ways Glazed Door
JK124B	JK1 TPN 125A DBO 24 Ways Plain Door
JK124BG	JK1 TPN 125A DBO 24 Ways Glazed Door

New Products:-

JK101SPD JKD1 Type 1+2 125A Surge Protection Kit

JK102SPD JKD1 Type 2 125A Surge Protection Kit

JK104BGSPD JK1 TPN 125A DBO 4 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK112BGSPD JK1 TPN 125A DBO 6 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK108BGSPD JK1 TPN 125A DBO 8 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK112BGSPD JK1 TPN 125A DBO 12 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK116BGSPD JK1 TPN 125A DBO 16 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK118BGSPD JK1 TPN 125A DBO 18 Ways Glazed Door c/w 125A 4P Swd + T2 SPD
JK124BGSPD JK1 TPN 125A DBO 24 Ways Glazed Door c/w 125A 4P Swd + T2 SPD

TEST ENGINEER:

**D.Kelly
Complies**

AP 01 Issue 2 02/03/2016

REPORT No: **G2068**

DATE OF TEST **23/10/2019**

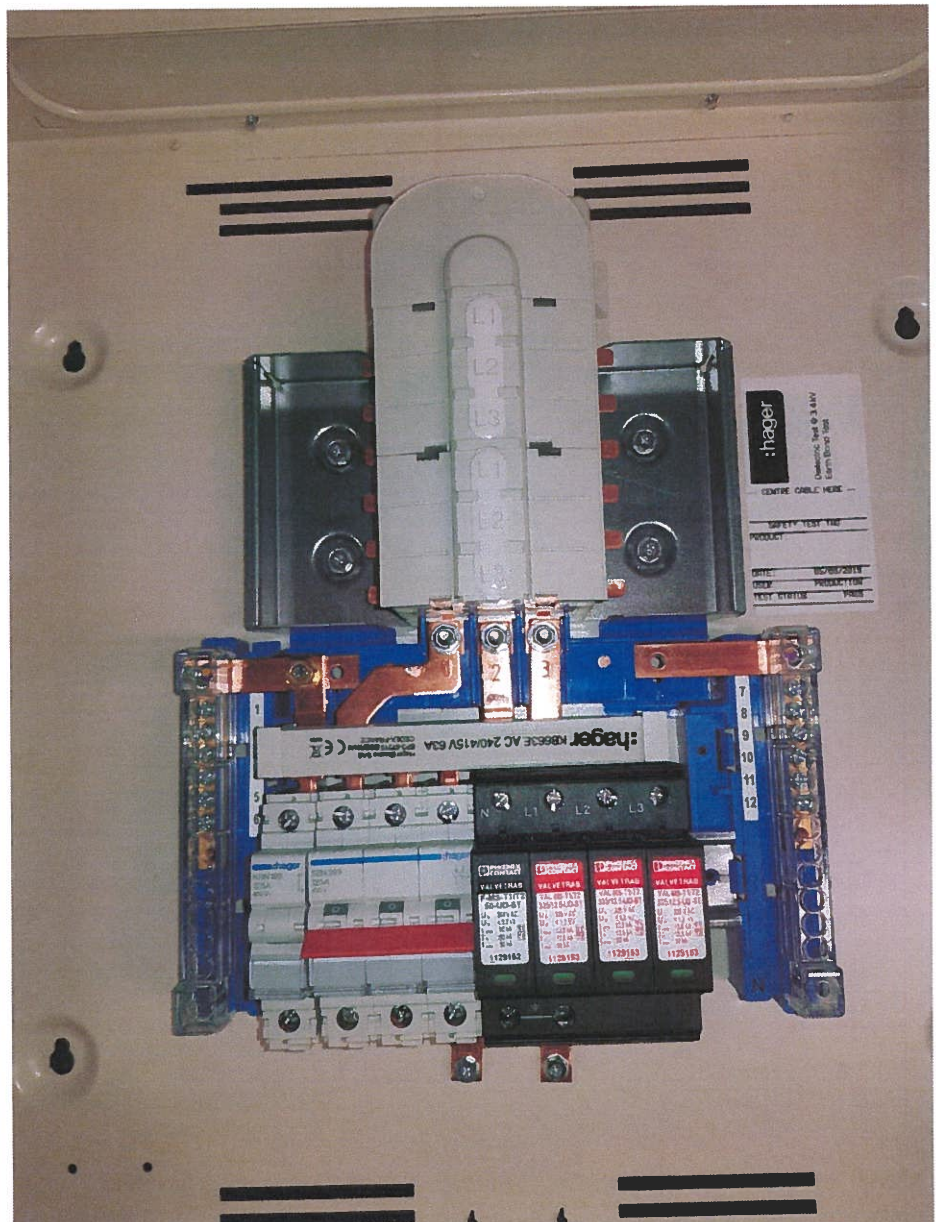
PRODUCT TESTED: **UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)**

APPLICABLE STANDARD: **BS EN 61439-3:2012 incorporating corrigendum 2013/15
Clause 10 Design Verification**

REASON FOR TESTS: **Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB
Distribution Board for 18th edition Wiring Regulation Main Panel**

Kit reference : JK101SPD

Type 1+2 Surge Kit



TEST ENGINEER:

**D.Kelly
Complies**

AP 01 Issue 2 02/03/2016

REPORT No: **G2068**

DATE OF TEST **23/10/2019**

PRODUCT TESTED: **UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)**

APPLICABLE STANDARD: **BS EN 61439-3:2012 incorporating corrigendum 2013/15
Clause 10 Design Verification**

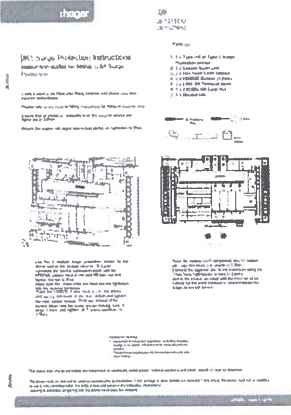
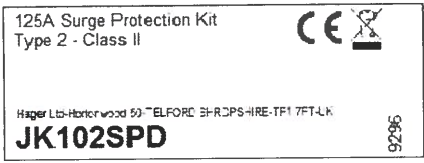
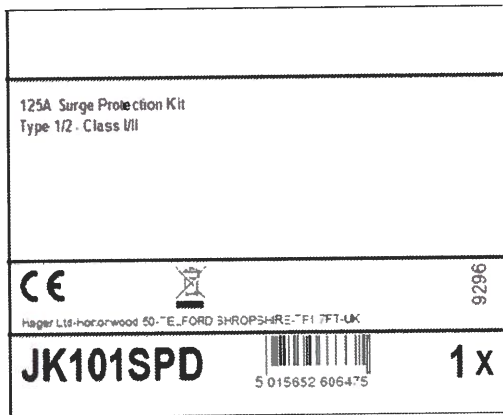
REASON FOR TESTS: **Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18th edition Wiring Regulation Main Panel**

Clause 6 Assembly designation marking

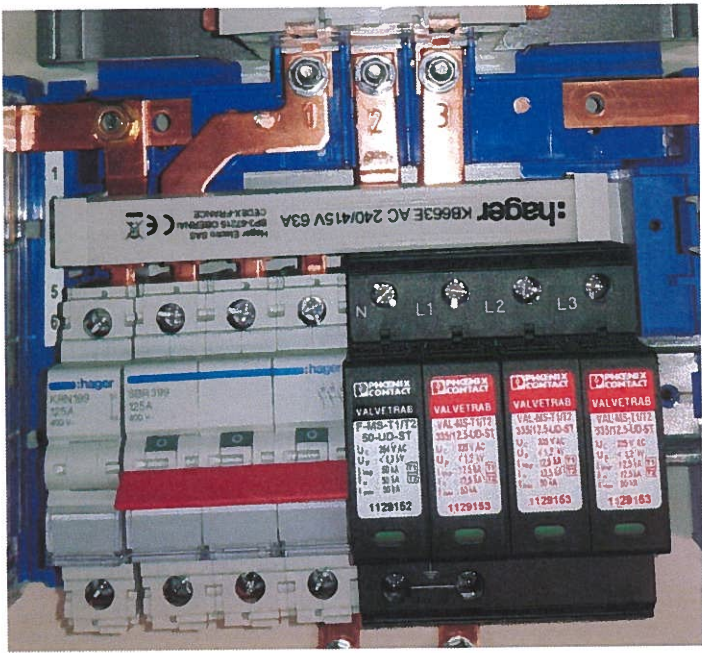
Carton label JK101SPD

Rating Label JK102SPD

ZD0868 User Instructions



Device marking Phoenix Type 2



TEST ENGINEER: **D.Kelly
Complies**

REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Clause 10.3 Degree of Protection of ASSEMBLIES

No change to enclosure : Assessed
Refer to Test Report G1866-2a

Complies

Clause 10.4 Clearances & Creepage Distances

SPD Type 1+2

Declared Ratings (Clearances) :

Uimp = 4kV:

Pollution degree = 2, From Table 1, minimum clearance in air = 3.0mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	8.9mm	> 3.0mm ✓
SPD L2 – SPD L3	8.9mm	> 3.0mm ✓
SPD L1 – SPD N	9.0mm	> 3.0mm ✓
SPD N – SBR399 L3	7.7mm	> 3.0mm ✓

Smallest clearance recorded = 7.7mm

Refer to Test Report G1866-2a for previous clearances around main Swd incomer & busbar stack.

Complies

SPD Type 2

Declared Ratings (Clearances) :

Uimp = 4kV:

Pollution degree = 2, From Table 1, minimum clearance in air = 3.0mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	8.9mm	> 3.0mm ✓
SPD L2 – SPD L3	8.9mm	> 3.0mm ✓
SPD L1 – SPD N	9.0mm	> 3.0mm ✓
SPD N – SBR399 L3	7.7mm	> 3.0mm ✓

Smallest clearance recorded = 7.7mm

Refer to Test Report G1866-2a for previous clearances around main Swd incomer & busbar stack.

Complies

TEST ENGINEER:

	D.Kelly Complies
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REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18th edition Wiring Regulation Main Panel		

Clause 10.4 Clearances & Creepage Distances - cont

Declared Ratings (Creepages) :

- Ui = 690V, Pollution degree = 2, Table F1 x = 1.0mm
- From Table 2, minimum creepage distance = 3.2mm
- For Nylon PA6 & PA66 SPD housing (Material group 1, CTI = 600), Min creepage distance = 3.2mm

All creepage distances > x2 clearance in air (6.4mm)

Creepage distances not affected by fitting of SPD's - Assessed
Refer to Test Report G1866-2a for previous creepage distances

Complies

Clause 10.6 Incorporation of switching devices and components

Incomer Arrangement

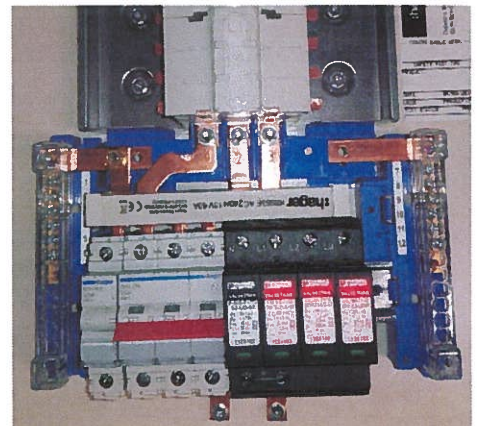
No change to Swd position

Outgoing Circuits

No Change

Accessory Kits

- SPD : Type 1+2 – suitable for all types of earthing
- SPD : Type 2 – suitable for TT/TN-S earthing systems
- SPD : Suitable for Indoor Use only
- SPD : Type 1 EN 61643-11, Type 2 IEC 61643-11
- SPD : Temperature range -40°C to +80°C
- SPD : Relative Humidity (RH) 5% - 95%
- SPD : IP20 – basic insulation



Assessed and being used in accordance with Manufacturer's Instructions

Complies

TEST ENGINEER:

**D.Kelly
Complies**

REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18th edition Wiring Regulation Main Panel		

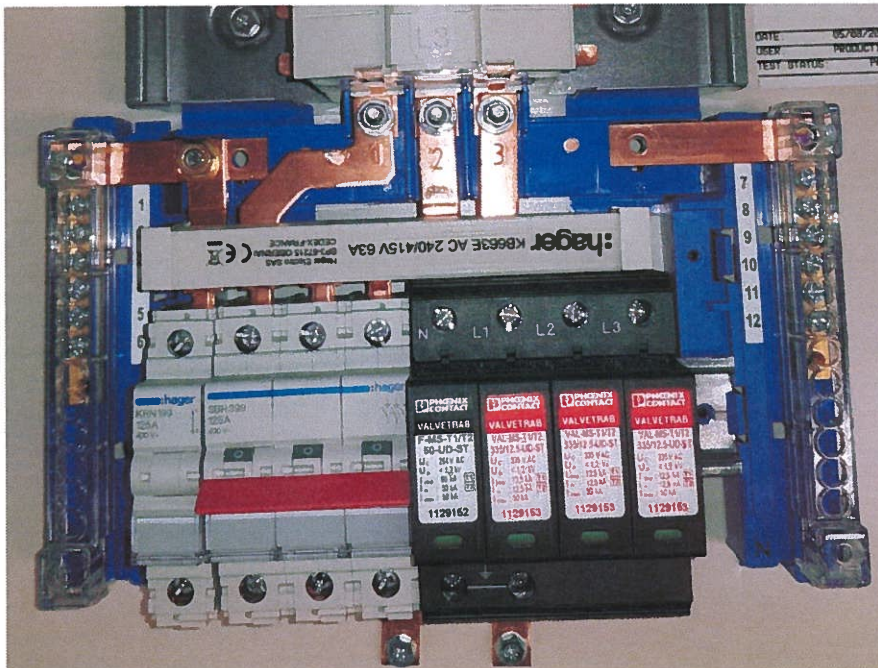
Clause 10.7 Internal electrical circuits and connections

Compliance with the design requirements of 8.6 for internal electrical circuits and connections shall be confirmed by the original manufacturer's inspection.

- Supplementary checks for SPD kit
- KB663E 240/415V ac 63A (for voltage only)
- KRN199 125A 1P Neutral Terminal for 3P Swd Kits
- Neutral solid link 125A
- Installation leaflet declares 3.5Nm for electrical connections

- KB663E busbar sits on top of existing phase links.
- Increased copper CSA inside cage terminals
- Cage terminal upper contact area slightly reduced
- Cage terminal lower contact area same
- Temperature rise results show there is more than 17K before exceeding limit

Complies



TEST ENGINEER:

	D.Kelly Complies
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AP 01 Issue 2 02/03/2016

REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Clause 10.9.2 Di-Electric Properties (Power Frequency Withstand Voltage)

Declared Ratings :

Ui = 690V, Uimp = 4kV, 50/60Hz, Pollution degree = 2
From Table 8, di-electric test voltage **1890V a.c. r.m.s.**

SPD's are not designed to be connected when this type of test is carried out.
ALL copper links should be disconnected to SPD when voltage testing is applied. Assessed

SPD cartridges removed:

Tests between phases:-	Complies	Current	
L1 – L2 + L3 + N + E	1930V	<3mA	} ✓ OK
L2 – L1 + L3 + N + E	1920V	<3mA	
L3 – L1 + L2 + N + E	1920V	<3mA	
N – L1 + L2 + L3 + E	1930V	<3mA	
E – L1 + L2 + L3 + N	1920V	<3mA	

Time > 5 seconds ✓
Overcurrent equipment did not trip ✓ OK
No disruptive discharge during the tests ✓ OK

Complies

Clause 10.9.3 Impulse Withstand Voltage

Declared Ratings :

Ui = 690V, **Uimp = 4kV**, 50/60Hz, Pollution degree = 2

SPD's are not designed to be connected when this type of test is carried out.
ALL copper links should be disconnected to SPD when voltage testing is applied. Assessed

SPD cartridges removed:

Tests between phases:-	Peak Voltage	Peak Leakage Current	
E – L1 + L2 + L3 + N	+4745 / -4696V	8 / 2A ✓	} ✓ OK
N – L1 + L2 + L3 + E	+4755 / -4628V	6 / 1A ✓	
L1 – L2 + L3 + N + E	+4740 / -4687V	6 / 1A ✓	
L2 – L1 + L3 + N + E	+4770 / -4657V	6 / 1A ✓	
L3 – L1 + L2 + N + E	+4770 / -4691V	7 / 1A ✓	

Time interval = 7 seconds (lowest machine setting @ 4800V)
Overcurrent equipment did not trip ✓ OK
No disruptive discharge during the tests ✓ OK
Main switch in ON position.

Complies

TEST ENGINEER:

D.Kelly
Complies

REPORT No:	G2068	DATE OF TEST	23/10/2019
PRODUCT TESTED:	UK JK101SPD / JK102SPD Surge Protection Kits (for JK1 DBO's)		
APPLICABLE STANDARD:	BS EN 61439-3:2012 incorporating corrigendum 2013/15 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1+2 SPD inside JK1**B(G) 125A MCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Clauses not affected or requiring further validation:-

- 6.1 Assembly designation marking: **Complies by inspection**
- 6.2 Documentation: **Complies by inspection**
- 6.3 Device Identification: : **Complies by inspection**
- 10.2 Strength of materials & parts: No change: Complies G1866-2a
- 10.3 Degree of protection: No change: Complies G1866-2a
- 10.4 Clearances & creepage distances: **Complies by inspection**
- 10.5 Protection against electric shock: No change: Complies G1866-2a
- 10.6 Incorporation of switching devices & components: **Complies by inspection**
- 10.7 Internal electric circuits & connections: No change: **Complies by inspection**
- 10.8 Terminals for external conductors: No change: Complies G1866-2a
- 10.9 Dielectric properties: No change: **Complies by test**
- 10.10 Temperature Rise: Complies G1866-2a
- 10.11 Short Circuit Withstand: Complies G1866-2a
- 10.12 EMC: Complies G1866-2a
- 10.13 Mechanical Operations: Complies G1866-2a

TEST ENGINEER:

D.Kelly Complies
