

U-interface
protection

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1 Basic

U-interface protection should conform to Recommendation ITU-T K.20, referring to exposed and unexposed equipment.

Circuit testing methods used for three overvoltage and overcurrent conditions simulate:

- Electrical discharge
- Voltage induction
- Contact to public power network

1.1 Criteria

Criterion A requires that the equipment should endure the testing with no damage while the values of all relevant U-interface parameters after completed testing should be within specified tolerances. No requirements are specified as to the equipment regular operation during the testing. Exceptionally, the fuses belonging to U-interface or its protection interface may be replaced after completed testing.

Criterion B does not allow the occurrence of an open flame as a result of the testing. Any damage or durable disfunction occurred during the testing should be limited to a small number of U-interfaces.

Gas-discharge tubes provide the primary protection.

2 Electrical discharge

Protection of U-interface terminals from electrical discharge should satisfy requirements defined in tables 1 and 2.

Test	Between	Test circuit	Maximum test voltage and duration	Number of tests	Acceptance criteria
Discharge	A and E, B earthed	1a	$U_c=1$ kV	10	A
	B and E, A earthed	1a	$U_c=1$ kV	10	A
	A+B and E	1b	$U_c=1$ kV	10	A

Table 1: *Test conditions to electrical discharge for unexposed equipment*

Administrations may specify maximum value lower that the one presented in table 1.

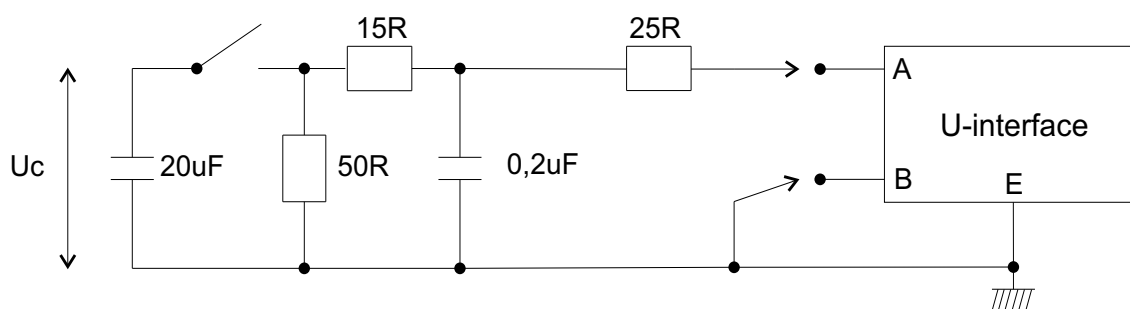
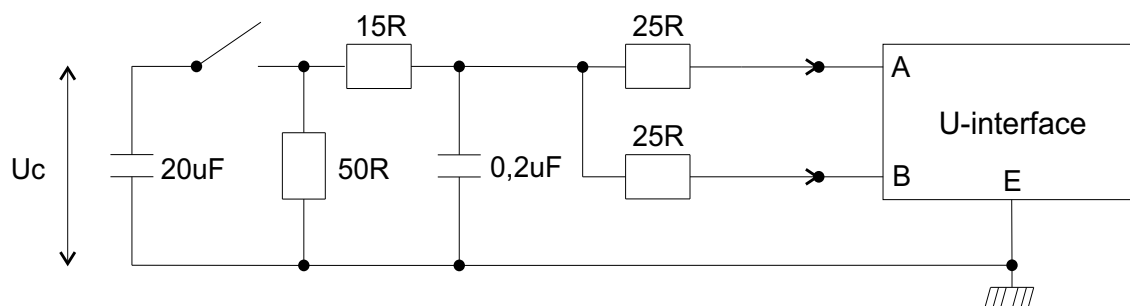
Test	Between	Test circuit	Maximum test voltage and duration	Number of tests	Added primary protection	Acceptance criteria
Discharge	A and E, B earthed	1a	$U_c=1$ kV	10	No	A
	B and E, A earthed	1a	$U_c=1$ kV	10	No	A
	A+B end E	1b	$U_c=1$ kV	10	No	A
Discharge	A and E, B earthed	1a	$U_c=4$ kV	10	Yes	A
	B and E, A earthed	1a	$U_c=4$ kV	10	Yes	A
	A+B and E	1b	$U_c=4$ kV	10	Yes	A

Table 2: *Test conditions to electrical discharge for exposed equipment*

When using primary protection with spark-over voltage less than 1 kV, administrations may choose to reduce the maximum value to the voltage applied below the value defined in table 2. This would refer to the part where the testing is performed without primary protection.

When using the primary protection, administrations may change the maximum voltage value in order to meet certain local requirements.

The figure 1 demonstrates Test circuit 1a while the figure 2 presents Test circuit 1b.

Figure 1: *Test circuit 1a*Figure 2: *Test circuit 1b*

3 Voltage induction

Protection of U-interface terminals from voltage induction should meet requirements specified in tables 3 and 4.

Test	Between	Test circuit	Maximum test voltage and duration	Number of tests	Acceptance criteria
Induction	A+B and E	2. $R_1=R_2=600\ \Omega$	$U_{ac}=300\ V_{eff}$ 200 ms	5	A

Table 3: *Test conditions to voltage induction for unexposed equipment*

S2 switch is not used during the testing while the tests are repeated for each position of S1 switch. Administrations may lower the maximum voltage value specified in table 3. Furthermore, time specified for test duration may be modified in order to comply with certain local requirements.

Test	Between	Test circuit	Maximum test voltage and duration	Number of tests	Added primary protection	Acceptance criteria
Induction	A+B and E	2. $R_1=R_2=600\ \Omega$,	$U_{ac}=300\ V_{eff}$ 200 ms	5	Yes	A
Induction	A+B and E	2. $R_1=R_2=200\ \Omega$,		1	Yes	B

Table 4: *Test conditions to voltage induction for exposed equipment*

Maximum value to the applied voltage and test duration in section with $R_1=R_2=200\ \Omega$ values should conform to ITU-T directives or limitations set by certain administrations.

S2 switch is active during the testing. For $R_1=R_2=600\ \Omega$ values, the administrations may lower the maximum voltage value and test duration.

Figure 3 shows Test circuit 2.

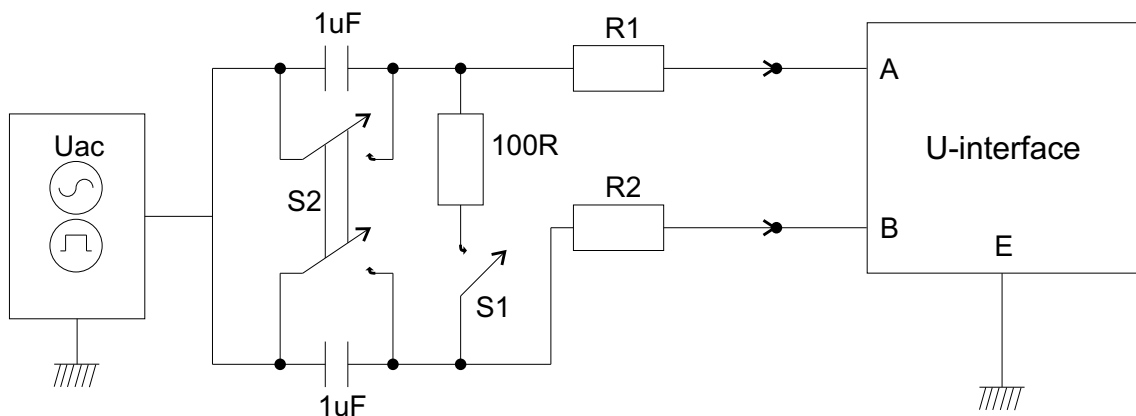


Figure 3: *Test circuit 2*

4 Contact to public power network

Protection of U-interface terminals from contact to public power network should meet requirements specified in table 5.

Test	Between	Test circuit	Maximum test voltage and duration	Number of tests	Acceptance criteria
Contact	A+B and E	3	$U_{ac}=220 V_{eff}$ 15 min	1	B

Table 5: *Test conditions to the public network contact for unexposed equipment*

Figure 4 demonstrates Test circuit 3.

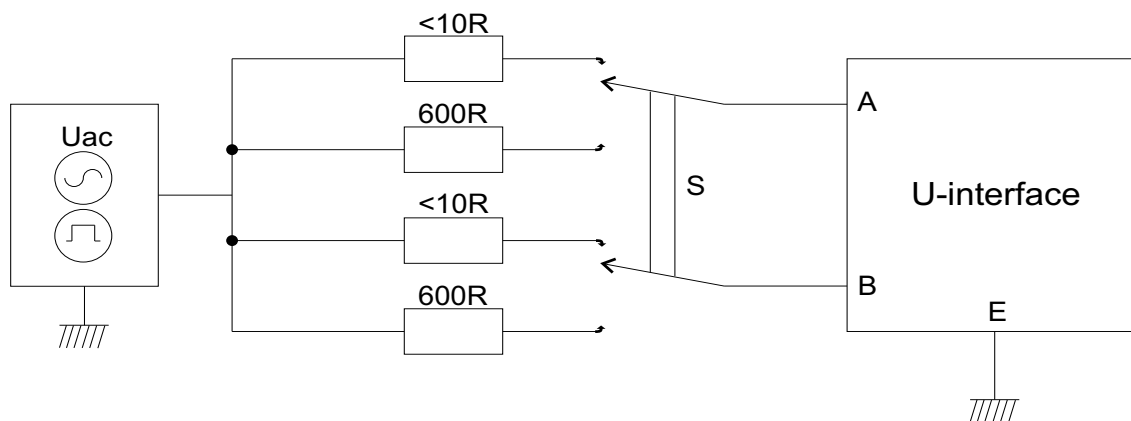


Figure 4: *Test circuit 3*

The tests are performed for all S switch positions. Administrations may specify maximum voltage value and test duration lower than those specified in table 5.