China’s Explanation of HV Safety

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Answer Japan’ s comment-1

Add an alternative approach.

Alternatively, the calculation of total energy TEy may be conducted according to the formula below with using Vb.

$$TEy = TEy1 + TEy2 = 0.5 \times Cy \times Vb^2$$

Cy: Cy1 or Cy2 whichever is higher

Should be " < "

$$\because\ TEy_1 + TEy_2 = 0.5 * Cy_1 * {V_1}^2 + 0.5 * Cy_2 * {V_2}^2 < 0.5 * Cy * {V_1}^2 + 0.5 * Cy * {V_2}^2$$

$${V_1}^2 + {V_2}^2 < Vb^2$$

$$\therefore\ TEy_1 + TEy_2 < 0.5 * C_y * {V_b}^2 = TEy$$

- Review : the flowing formula , equivalent calculation of new GB, can be an alternative approach.

$$TEy = 0.5 * C_y * {V_b}^2$$

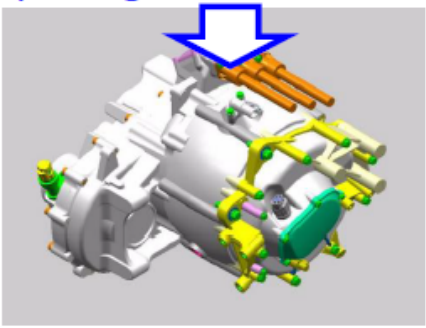
- Comment : in China’ s new GB ,Cy is defined as the sum of all capacitor in positive side or negative side which is higher .

Answer Japan’ s comment-2

➢ *Issues*

- What is the rationale of 10kPa? It seems appropriate because it means putting 10kg weight for the square measuring 10cm by 10cm.
- The evaluation method for 10kPa should be clarified.

10kPa (=10kg on 10cm*10cm)

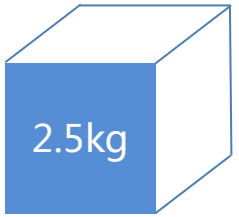


■ Review : the following test method can be used as reference.

Put the test tool on the housing from three sides .

Requirements for the test tool, as follow :

- Material : metal ;
- Contact area : ≥5cm×5cm ;
- Weight : ≥2.5kg ;



≥5cm*5cm

The reason is that the simulated elbow rests on the housing.

Answer Japan’ s comment-3

1) No need to require that the internal resistances are equivalent ;
Revise the formula and add text .

$$Ri = \frac{1}{\frac{1}{R0\left(\frac{U2'}{U2} - \frac{U1'}{U1}\right)} - \frac{1}{\neq ra}}$$

The internal resistance value of the voltmeter connected to U2’ side needs to be identified with a high accuracy. The manual or catalog of the voltmeter should be checked beforehand. If there is a deviation specified in a catalog, maximum resistance value should be used for calculation

- Review :agree with the comment.

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2)

$$R0 \times \left(\frac{U2'}{U2} - \frac{U1'}{U1}\right) = R0 \times \left(\frac{Uress - U2}{U2} - \frac{Uress - U1}{U1}\right) = R0 \times Uress \times \left(\frac{1}{U2} - \frac{1}{U1}\right)$$

China’s formula ← **Equivalent** → GTR20’s formula

- Review :agree with the proposal.

Answer Japan’ s comment-3

3)

Accuracy :

The accuracy of internal resistance of voltmeter is normally ±1% ,and the internal resistance is 10MΩ, if the voltmeter could meet those requirement :assume the situation the voltage of the REESS is 1000V, the safety isolation resistance is 500Ω/V, and using the test method we could get the result is 499.75Ω/V, and this is obviously acceptable.

So the requirement of the accuracy shall be ±1% or more precise.

$$Ri = \frac{1}{\frac{1}{R0\left(\frac{U2'}{U2} - \frac{U1'}{U1}\right)} - \frac{1}{\mp ra}}$$

Assumption :$m = R_0(\frac{U_2'}{U_2} - \frac{U_1'}{U_1})$

$$\frac{1}{Ri} + \frac{1}{r'} = \frac{1}{m} = \frac{1}{Ri'} + \frac{1}{r}$$

$$R_i = \frac{1}{\frac{1}{R_i'} - \frac{1}{r'} + \frac{1}{r}}$$

Ri——real isolation resistance value ;

Ri’ ——isolation resistance of test ;

r——10MΩ ;

r’ ——real resistance of voltmeter .

Thank you!

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