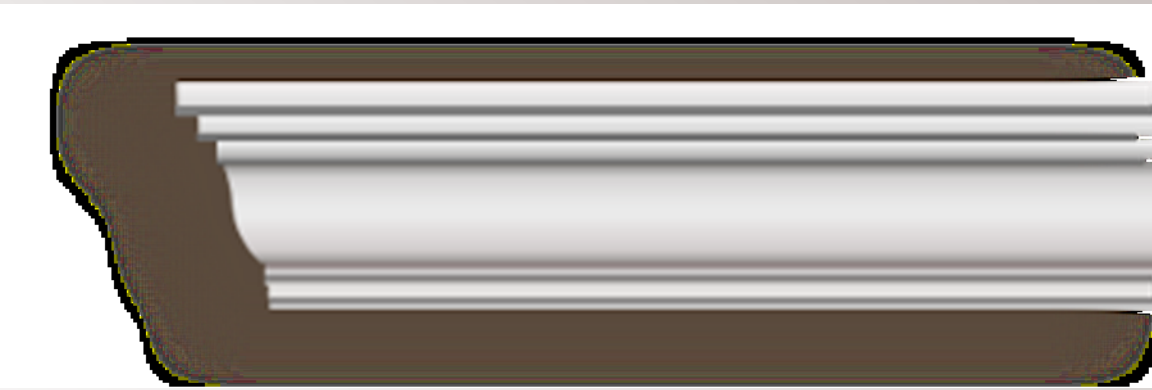
MICC

How to Calculate Temperature Tolerance with EMF



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合金丝电动势与温度的转换
Thermocouple temperature vs. EMF

定义：电动势是表示电源特征的一个物理量，电源中非静电力对电荷作功的能力，称为电动势

Definition：EMF(electromotive force) is a characteristic of a physical power, the power capacity of the Central African static electricity charge for power, called the electromotive force





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一般来说，我们的合金丝检测报告中不仅可以提供相应温度所对应的电动势(比如400℃/600℃/800℃/1000℃ 等等)，也可以算出温度允差。各个国家不仅仅需要热电动势，还要提供完整的温度允差. 所以为了更好的满足客户要求，我们再此教大家如何进行热电动势和温度允差的换算。由于每次的的检测数据都是针对成品的， 所以以下换算方式只做参考。客户可以针对我方提供的实际检测数据自行转换。

In general, our alloy wire test report can show EMF in some common temperature points, such as 400℃/600℃/800℃/1000℃ etc., and can also show exact the temperature tolerance.
Some countries Customer not only need the thermal electromotive force(EMF)， but also a complete temperature tolerance.

In order to meet customer requirements better, Here we'll list how to make a conversation between EMF and temperature tolerances. Because of different test data in every finished alloy wire, so the following conversion method just for reference. Customers can convert it personally after getting the actual test data which we will send you. If still couldn't understand, pls contact our customer manager to explain more.

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K-3.2mm bare wire



举例说明

For Example

我们用K-3.2mm 合金丝数据来换算一下

Here we use the alloy wire K-3.2mm as an example

Standard Specification	ASTM E230 & ANSI MC96.1 - GRADE THERMOCUPLE / SPECIAL TOLERANCE				
NO.	TYPE DIA	EMF VS Pt (mv)			
		400℃	600℃	800℃	1000℃
15110-10-276	KP-3.2MM	12.728	19.557	26.143	32.424
14116-10-562	KP-3.2MM	12.718	19.549	26.119	32.385
SUM	**KP-3.2MM**	____	____	____	____
15110-10-201	KN-3.2MM	3.633	5.325	7.141	8.888
15110-10-211	KN-3.2MM	3.628	5.321	7.133	8.875
SUM	**KN-3.2MM**	____	____	____	____

从上述数据表格，可以看出正极和负极在不同温度时所对应的电动势。在换算时， 我们需要参考二个数据：一个是固定温度下的标准电动势；二是固定温度下，相差1度所对应的电动势。当然了 这二个数据我们都是有做表格的， 客户也可以MICC网站页面查询。

From the table above, we can see clear that each EMF in different temperatures . During the conversation, we need refer to the two datas. One is standard EMF in fixed temperature, the other is the EMF with difference of 1 ℃. Of course you can get this two datas in our website: www.micc.cc

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How to calculate the temperature tolerance about K-3.2mm at 400 ℃ with EMF

Step 1： Find out the date of KP (12.728mV) KN(3.633mV) at 400 ℃

Step 2： Find out the related data we are need.

1). One is standard EMF in temperature 400 ℃, we called it A(16.397 mV)

2). The other is the EMF with 1 ℃ difference in 400 ℃, we called it B(42.24μV)

Step 3： Calculating

First: (No.15110-10-276 + No.15110-10-201)

1).KP+KN= 16.361
2).(KP+KN)- A= - 0.036mV= -36μV
3). {(KP+KN)-A } / B = -0.8 ℃

Second time (No.14116-10-562 + No.15110-10-211)
1). KP+KN= 16.346
2).(KP+KN)- A= - 0.051mV= -51μV
3). {(KP+KN)-A } / B = - 1.2 ℃

Step 4： Conclude the two couple alloy wire temperature tolerance and it is (-1.2° C and -0.8° C)

如何换算K-3.2mm 400 ℃的温度允差:

步骤一： 找出400 ℃的数据 KP (12.728mV) KN(3.633mV)

步骤二： 查看那二个参考数据
1.在400 ℃温度下，标准电动势 A (16.397mV)
2.在400 ℃温度下，相差1度所对应的电动势 B(42.24μV)

步骤三： 第一次开始换算(1V=1000mV, 1mV=1000μV)
(编号15110-10-276 + 编号15110-10-201)

1).KP+KN= 16.361mV
2).(KP+KN)- A= - 0.036(毫伏)= -36(微伏)
3). {(KP+KN)-A } / B = -0.8 ℃

第二次开始换算
(编号14116-10-562 + 编号15110-10-211)

1). KP+KN= 16.346
2).(KP+KN)- A= - 0.051(毫伏)= -51(微伏)
3). {(KP+KN)-A } / B = - 1.2 ℃

步骤四： 归纳总结得出两对的温度允差是(-1.2° C 和 -0.8° C)

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算出的所有结果整理如下：客户已经全部通过
Show all the results we have calculated as below:
the TR result got the client's approval.

Standard Specification	ASTM E230 & ANSI MC96.1 - GRADE THERMOCUPLE / SPECIAL TOLERANCE					
NO.	TYPE DIA	EMF VS Pt (mv)				Weight (KGS)
		400℃	600℃	800℃	1000℃	
15110-10-276	KP-3.2MM	12.728	19.557	26.143	32.424	19.32
14116-10-562	KP-3.2MM	12.718	19.549	26.119	32.385	12.35
SUM	**KP-3.2MM**	____	____	____	____	**31.67**
15110-10-201	KN-3.2MM	3.633	5.325	7.141	8.888	20.76
15110-10-211	KN-3.2MM	3.628	5.321	7.133	8.875	10.87
SUM	**KN-3.2MM**	____	____	____	____	**31.63**
TEMP TOLERANCE		-1.2°C ~ -0.8°C	-0.82°C ~-0.54°C	-0.56°C ~ +0.22°C	-0.41°C ~+0.92°C	
RESULT		OK	OK	OK	OK	

The EMF with difference of 1 ℃ at a fixed temperature (μV)

Type	300℃	400℃	500℃	600℃	700℃	800℃	1000℃
S	9.13	9.57	9.90	10.21	10.53	10.87	11.54
K	41.45	42.24	42.63	42.51	41.90	41.00	38.98
N	35.42	37.13	38.27	38.96	39.26	39.26	38.61
E	77.91	80.06	80.93	80.66	79.65	78.43	75.16
J	55.35	55.15	55.99	58.49	62.15	64.63	59.26

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谢谢

Thank you!

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