SCIENTIFIC TESTING INSTRUMENTS
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The Prospector

THERMOELECTRIC ALLOY SORTER

Part No. TE-3000-HD

https://www.koslow.com/metal-alloy-id/thermoelectric-alloy-sorter-te-3000-hd.html

The Prospector Kit Contains:

Quantity	Item	Part Number
1	ThermoElectric Alloy Sorter	TE-3000-HD
1	Certificate of Initial Calibration	TE-3000-CI
1	Instruction Manual (stowed behind lid foam)	TE-3000-D
1	The Hot Probe (hard wired to sorter)	TE-3000--P
1	Hot Spherical Tip (installed)	TE-3000-TS
1	Replacement Hot Probe Tip Conical	TE-3000-TC
1	Replacement Hot Probe Tip Blunt	TE-3000-TB
1	Replacement Hot Probe Tip Spherical	TE-3000-TS
1	Hot Tip Installation Pliers	TE-3000-F
1	AC Power Cord (removable)	TE-3000-AC
1	Heavy Block with BNC Connections Cold Circuit	TE-3000-HB
1	6 foot BNC cable (for use with the Heavy Block)	TE-3000-BC
1	Wand with BNC Connections Cold Circuit	TE-3000-W
1	Alligator Clip with BNC Connections Cold Circuit	TE-3000-G
1	Abrasive sheet	TE-3000-A
1	Standard Metal Coupon on a chain (D.Q.S.)	TE-3000-S
1	Soft Padded Case with window	TE-3000-SC
1	Hard Carry Case with custom foam	TE-3000-CC

INTRODUCTION

The Prospector, Thermoelectric Alloy Sorter (TEAS) uses a theory like that of a thermocouple, involving the direct conversion of temperature differences into electricity. This principle is also known as the Seebeck Effect. A thermocouple type circuit is formed when a heated metal probe makes contact with an unheated test metal. The thermal connection of these two junctions, one at an elevated temperature and the other at room temperature, generates a small voltage. The voltage varies with the type of test metal and can be consistently correlated. The energy produced is displayed numerically on the liquid crystal display as a TE-Reading. This thermal electric property of metals and temperature can be used to characterize most types of metal. Industrial quality control instruments use this as a method to identify metal alloys. This process known as thermoelectric alloy sorting.
http://en.wikipedia.org/wiki/Thermoelectric_effect. This widely-known and approved method (ASTM E977), is used for metal classification and verification. This instrument is also cited in the RB211-72-AG183 for aircraft use.

APPLICATIONS

Detects the presence of a coating or a plating on conductive surfaces.
Sort metal mix-ups: Stainless Steels, Aluminum, Specialty Steels, Tool Steels, Low Alloy Steels, and Titanium
Reclaim scrap
Inspect incoming and outgoing stock.
Verify alloy before repair or welding.
Use on pipe, tanks, wire, parts of any size or shape.

INSTRUCTIONS

Video instruction available:
http://koslow.com/metal_test_kits/ThermoElectric_Alloy_Sorter?cPath=1

1. Remove protective plastic boot from the metallic hot probe tip.

2. **Plug the TEAS into 110 Volt AC line power**.

3. **Connect the Cold Circuit.** Either the Alligator Clip, The Wand or Block to the BNC connector on the bottom side of the instrument. The BNC fitting requires pushing and twisting.

4. **Turn on the power switch.** Caution: the probe will get hot. **Do not touch the metal shaft or tip**. The amber light will remain constant for about one minute. The side holster is helpful for safely securing the thermal probe when not in use. Keep tip away from kit foam or other damageable materials.

5. **Wait about five (5) minutes** for the Hot Probe temperature to stabilize fully. At this time, the amber light will blink regularly, signaling the probe is at the correct operating temperature. The display LCD should read 0000 +/- 2.

6. **Operation Check:** Place the provided Daily Qualification Standard (DQS) into the jaw of the alligator clip. The standard is on a ball-chain attached to the instrument handle. Fig. B.

7. **Contact the Hot Probe tip to the test metal** for only two seconds. Apply just a little more pressure than when using a ballpoint pen, around (70 psi). The display should read 60 +/- 10. This re-standardization step shall be performed at the start and finish of each run and at least once during every hour of continuous operation. This concludes the Operation Check.

8. **Next, prepare your actual test metal**. Test metal and probe tips must be clean and free of scale. Wipe metal surface with a cloth or abrade with an abrasive.

9. **Select best Cold Circuit lead for your application (page 8 for details)**
   Either:
   A) Alligator Clip
   B) The Wand
   C) The Heavy Block

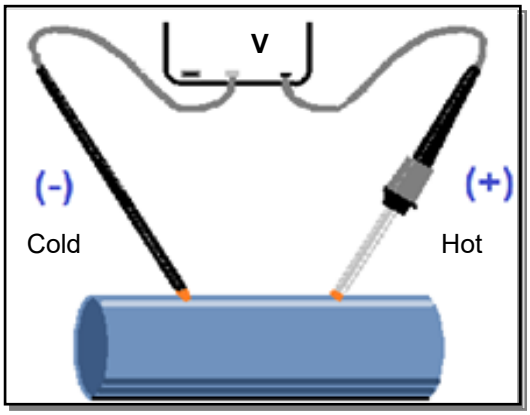

Fig A. *The Thermo-Electric Circuit*

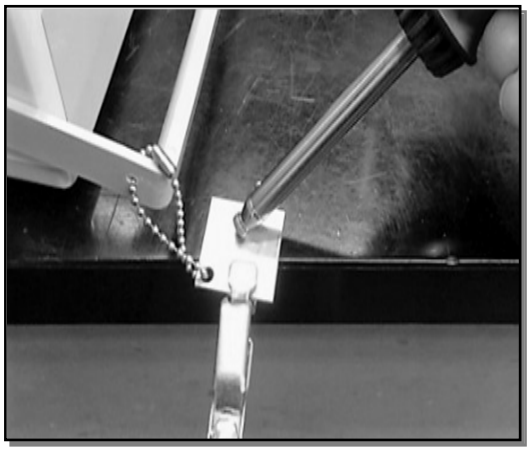

Fig B. *Maintain better contact with the DQS if Alligator Clip over-hangs the workbench.*

10. **Contact the Hot Probe tip against the test metal for one second** and read the displayed numeral. It might be necessary to press down on the sample one or two times for a precise reading. It is important not to keep the probe in contact with the metal for more than two seconds. After two seconds, the readings become erroneous because the values can drift due to heat dissipation. Wait two seconds between tests to allow the probe temperature to stabilize.

11. **Compare the displayed TE numeric readings** to acceptable metal standards, or the supplied chart. The chart provided is suggested values and is useful as a guide. The TE-3000 is a capable instrument as long as the variations of one metal have a 10 point 'buffer' from the fluctuations of a second metal. It is also possible that different alloys give the same TE reading. Some materials might provide slight variations in TE readings due to heat treatment during alloy formation. Ambient conditions can change, influencing test results.

12. When the instrument is not in use, **turn off the power.** The Hot Probe takes a few minutes to cool down.

UNKNOWN ALLOY IDENTIFICATION

The Prospector is best to be used as a *sorter,* not as an *identifier* or an *analyzer*. Measure the unknown alloy in several places on the surface to get a range of numbers. Then compare this reading with the table of Alloy TE Readings. If a match is found, it does not prove that the alloy is the one in the table, it only suggests it may be. More must be known about the possibilities, based on, for example, the alloys in use at your plant. Confirmation of the alloy type can often be made with Koslow chemical spot tests. An alloy reading between 3 and 14 is probably a 300 series stainless steel and a confirming color spot test for molybdenum would indicate the alloy is SS316.
Similarly, a reading of –110 could be a chrome-moly steel or CP titanium. A chemical color spot test for iron would confirm the chrome-moly steel because there is very little if any, iron in titanium. If the alloy is not found in the table, a chemical lab analysis must be performed. A sample of the alloy should be kept handy, and its TE number recorded.

The TE number has been compared to hardness. Just as it is possible for two different alloys to have the same hardness, two samples of the same alloy can have different hardness resulting from different heat treatment. Both the TE number and the hardness are affected by the crystal structure of the alloy.

SAFETY

- Do not touch any metal parts of the probe while in operation.
- Do not use the TEAS for any application other than its intended use.
- Let the hot probe cool to room temperature before changing tips.
- Let the probe cool to room temperature before storage.
- Never attempt to perform repairs, diagnostics, or maintenance while the unit is plugged in.
- Mishandling or leaving TEAS unattended can result in a burn or fire.
- Do not modify the hot probe or use it with damaged parts.
- The tip temperature of your hot probe can reach more than 120°C.
- Repairs should only be performed by a factory-qualified technician.

IMPORTANT CONSIDERATIONS

It is crucial for the user to consider the possible adverse effects of using TEAS on live power, components, or sensors. This is especially important where economic property loss or human life is involved. It is vital that the user employs a satisfactory system design of automated equipment. It is agreed between the Buyer and Koslow that safe system design is the buyer's responsibility. Do not use in a wet environment.

SELECTING A WORK LOCATION

- The workspace must have access to a properly grounded outlet whose output voltage matches that of your plug. If using the TEAS outside the USA, power transformers may be needed. Cord adapters may be necessary for plug configuration.
- Don't modify the factory supplied cord.
- Workspace is preferably on an inside wall, or at least away from windows.
- The workspace should not be in the direct path of airflow from AC or furnace vent.

HELPFUL HINTS

- Do not operate TEAS close to a fan or point of high air motion. Wind will dissipate the heat from the test area, causing poor readings.
- Hold the Hot Probe in contact with the test metal for only about 2 seconds & read the display. Lift probe off test metal for two seconds allowing probe temperature to stabilize. Repeat this cycle. Rushed testing without pauses may result in reading drift.
- Be sure the test metal and hot tip of the probe remains clean.
- If tip becomes marred or misshaped, unscrew and replace.
- Confirm that the tip is completely screwed tightly into the probe shaft. Loose tips could give weak readings. Use of a hand-held crimping tool (Part No. TE-3000 F) is recommended for proper torque without scratching tip.
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PREVENTATIVE MAINTENANCE & CALIBRATION

- The Thermoelectric Alloy Sorter Model TE-3000-HD is supplied with an *Initial Certificate of Calibration*. Koslow Scientific Co. recommends yearly calibration services known as a "field" *Certificate of Calibration* (Service No. TE-3000-C). This certificate contains before and after calibration data and the expected manufactures criteria. Aspects of the document are N. I. S. T. traceable.
- Maintain kit by storing in a cool, dark place.
- Annual calibration cycles can be logged on the last page of this instruction manual. Maintenance items are the responsibility of the customer/user. Failure to observe these recommendations may adversely affect the operation of the equipment.

SIGNAL JACKS

The TE-3000-HD is supplied with one black and one red female banana jack on the top of the instrument. These terminals can be used to interface with automation equipment, PLC's (Programmable Logic Controls) and data logging equipment. The output signal is an analog DC millivolt signal.

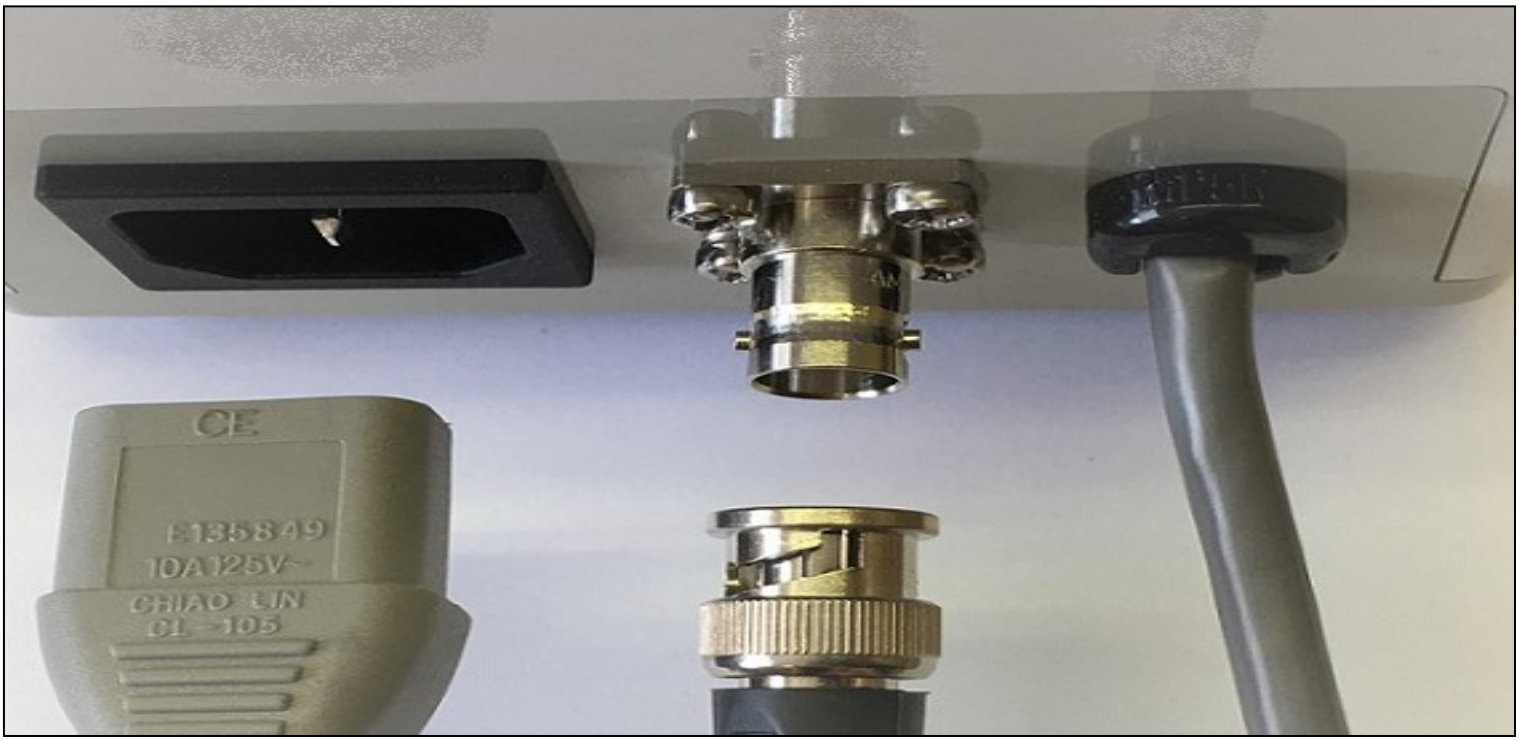
DAILY QUALIFICATION STANDARD

The kit includes a *Daily Qualification Standard*, (DQS) a 1-inch square plate of a nickel alloy. The DQS is attached to the side of the machine with a small chain. The DQS is principally used to confirm repeatability. It acts as a calibration registration point for all the other readings.

COLD CONTACTS

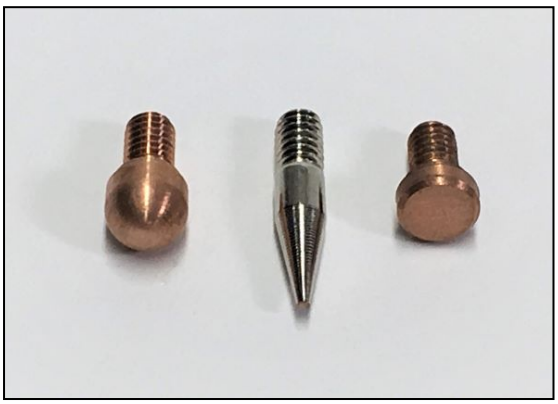
The TE-3000-HD contains three choices for the “cold contact” part of the circuit. One cold circuit must be connected with the BNC connector to the Alloy Sorter before taking a test. Be sure the cold circuit makes solid contact with test metal first, then make contact with a hot probe.

- **The Alligator Clip**: Hands-free contact with the metal surface of small and large parts. Clipping it on ensures good electrical connection.
- **The Heavy Copper Block**: Choice for non-clamp or delicate plated surfaces. It can also hold cylindrical bearings, spherical bearings, and small parts. The heavyweight of the block also allows it sit securely on a workbench. Use the 6 foot male to male BNC to connect the TEAS.
- **The Wand**: Requires two hands. Is very fast to use. Leave test metal in place and move Wand and Hot Probe to part. Wand contacts metal first then thermal probe.



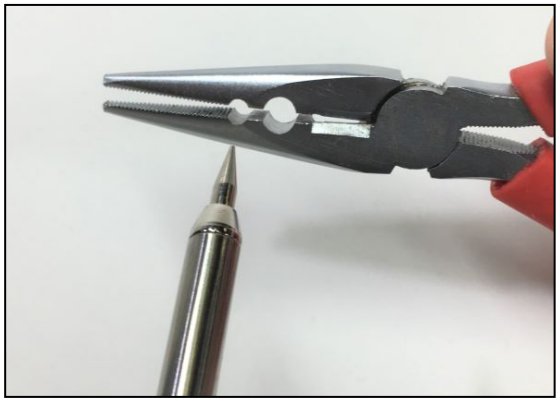
Power Cord	**BNC Connection Cold Circuit**			**Hard Wired Hot Circuit**
Always Use	Choose 1 of 3 contacts			Always Use
Power	The Alligator Clamp	The Wand	The Block (use with 6’ extension cable)	Hot Probe
				
Plug into 120V Power outlet	To “bite” test metal	To make brief contact with test metal	Set test metal on top of copper block	The Hot and the cold make contact with test metal at the same time.

HOT PROBE TIPS



A variety of tip configurations are available. The TEAS is furnished with a Blunt shaped tip. Other available shapes are Conical (included), Spherical and Dolphin Nose. Different shapes aid in repeatable metal contact at a perpendicular or tangent angles. Custom shaped tips can be fabricated to your specifications. Give us a call to learn more.

Replace probe tips when the tip is marred, misshaped, or no longer providing stable readings. Confirm that the tip is completely screwed tightly into the probe shaft. Loose tips could give poor readings. Use of a handheld crimping tool is recommended for proper torque without scratching tip. Do not tamper with machine screws on the probe shaft. Remove Alloy Sorter from power when changing tips.



Tip Removal

1. Remove power from the TE-3000 by unplugging.
2. Allow equipment to cool.
3. Hold pliers (Koslow Part No. TE-3000-F) in a horizontal position.
4. Insert the old probe's tip into the jaw of the pliers.
5. Twist probe handle counter-clockwise until the tip can fall out.
6. Discard old tip. See the demo video on YouTube.

New Tip Insertion

1. Insert a new tip by hand. Twist clockwise. Be careful not to damage the threads. The new tip should be inserted about halfway by hand. A very small drop of dielectric silicone can be used to lubricate the screw threads.
2. Hold pliers in a horizontal position. (Koslow Part No. TE-3000-F)
3. Hold TE probe (in other hand) vertically, with the tip up and the cord down.
4. Align the tip into the jaw of the pliers. Gently squeeze the probe tip. Do not crush the probe tip.
5. Rotate the handle part of the probe only. Do not rotate the pliers. The pliers should remain perpendicular to the probe.
6. The tip should be installed firmly. Small scratches on the tip will not inhibit performance.

PARTS REORDER INFORMATION

Parts	Part No.
Metal Standards Collection a 24 piece alloy sample kit	**1900**
Replacement Spherical Shape Tip (for angular contact testing) (standard)	**TE-3000 TS**
Replacement Blunt Shape Tip (for perpendicular point of contact testing)	**TE-3000 TB**
Replacement Conical Probe Tips	**TE-3000 TC**
Annual Certificate of Calibration	**TE-3000 C**
Self-adhesive Probe Holster	**TE-3000 H**
TE-Tool Supply Kit: Contains two of each Assorted Tips, Installation Pliers, Signal Jack Leads, Probe Holster, and abrasive Sheet, neatly packed in a hard kit case for convenient storage.	**TE-3000 Z**

For current prices and availability, call (201) 541-9100. http://www.koslow.com/te-3000-accessories.html

*ALLOY IDENTIFICATION CHART – ALPHABETICAL LISTING

ALLOY	TE	Chrome	Nickel	Moly	Copper	Vanadium	Tung.	Cobalt	Carbon	Iron	Other
0-1	95	0.5					0.5		0.9	98	
1 ¼ CR	84	1.25		0.25						99	
1117	95								0.14	100	
1141	130								0.4	100	
17-4 PH	72	16	4		4					76	
200 SS	-3	18	5						0.15	77	
300 SS	4	18	8							74	
316 SS	4	18	8	205						72	
329 SS	55	27	5	1.5					0.1	66	
430 SS	128	17	0	0							
4140	110	1		0.15					0.4	98	
4340	60	0.8	1.85	0.25					0.4	97	
440C	140	17								83	
52100 Lescalloy	95	1.5							1	96.8	Mn 0.35
904L	9	27	5	1.5					0.1	66	Alum.
A-2	120	5		1					1	93	
A-286	3	15	26	1.25						55	Ti,CB
A-36	94										
AL BRONZE	16				90					3	7 Alum.
ALLOY 20 CB3	20	20	34	2.5	3.5					40	
ALLOY 52	-410		51						0.4	49	
ALUMEL	-184		95								
ALUMINUM	10									0	100 Tl,CB
BE CU	5				98					0	2 Beryl
BE CU, LEAD.	18				98					0	2 Beryl.
BE/CU	32				98					0	2 Beryl.
BRASS 60:40	24				60					0	40 Zinc
BRASS 70%CU	29				70					0	30 Zinc
BRASS 90:10	27				90					0	10 Zinc
CADMIUM	75									0	100 Cadm.
CARBON 1018	115								0.2	100	
CARBON 1020	94										
CARBON 1050	95								0.5	99	0.7 Mang.
CAST IRON	-48									94	
COLD ROLLED	90									100	
COLD ROLLED	120										
CONSTANTAN	-465		46		54						
COPPER ETP	37				99					1	
CORTEN B	82									100	
CU/NI 90:10	-150		10		90					-96	2,2 AL,MN
D-2	125	12		1		1			1.5	85	
GOLD, 14K	22										60 Gold
GOLD, 24K	45									0	100 Gold
H-11	118	5		1.5			0.4			93	
HASTE C-276	60	15	60	16			4			5	
HASTELLOY 22	55	22	56	13			3	2.5		4	
HASTELLOY B	135	1	64	28				2.5		5	
HASTELLOY X	37	22	50	9			0.6			18	
HAYNES 25	45	20	10				15	52		3	
HOT ROLLED	135										
INCOLOY 825	32	21	42	3	2.25				0.03	32	
INCOLOY 825	24	21	42	3	2.25				0.03	32	
INCONEL 600	125	15	76							9	
INCONEL 625	60	22	61	9						4	3.65 Columb
INCONEL 718	50	19	52	3						21	5 Columb.
KOVAR	-375		29					17	0.15	54	Mang.
LEAD	10										100 Lead
M-2	125	4		5		2	16		0.85	72	
M-2	140	4		5		2	6				

ALLOY	TE	Chrome	Nickel	Moly	Copper	Vanadium	Tung.	Cobalt	Carbon	Iron	Other
M-50	130	4		4		1				91	
M-7	140	4		8.75		2	1.75			84	
MONEL 400	-225		66.5		31.5					2	3.73
MONEL 500	-275		66.5		29.5				0.13	0	0.2 Alum.
NAVAL BRASS	23				60					0	40 Zinc
NICKEL	-185		99.5							1	
NIOBIUM	14										
PHOS. BRONZE	23				95					0	5 Tin
SILVER/CU	45				10					0	90 Silver
TANTALUM	-3										
TI CP	110									0	100 Titan.
TI 6AL. –4V	-46					4				96	6 Alum.
TIN	10									0	100 Tin
TI-PD	127									2	98 Titan.
TITANIUM/AL	-50										96 Titan.
TUNGSTEN	35						100				
ZINC	56									0	100 Zinc
ZIRCONIUM702	96										100 Zircon.
ZIRCONIUM705	89										2.5Niob.

*ALLOY SEPARATIONS CHART

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LIMITATIONS

Thermoelectric response is inherently a comparison method of identification because individual elements cannot be quantitatively determined. Some alloys differ only slightly in one or two elements and the change in voltage on the tester is too slight to produce a different reading. Some alloys have elements in them which may offset one another to produce nearly identical readings overall. Alloys of identical chemical makeup but with different physical hardness structure usually have different readings.

Additionally, the thermoelectric response procedure cannot differentiate between Stainless Steel 316 and 304. **The Spotter 316** can do the job. For more information, check out https://www.koslow.com/select_metal_test_kit.

*ALLOY IDENTIFICATION CHART – NUMERICAL LISTING

ALLOY	TE	Chrome	Nickel	Moly	Copper	Vanadium	Tung.	Cobalt	Carbon	Iron	Other
CONSTANTAN	-465		46		54						
ALLOY 52	-410		51						0.4	49	
KOVAR	-375		29					17	0.15	54	Mang.
MONEL 500	-275		66.5		29.5				0.13	0	0.2 Alum.
MONEL 400	-225		66.5		31.5					2	3.73
NICKEL	-185		99.5							1	
ALUMEL	-184		95								
CU/NI 90:10	-150		10		90					-96	2,2 AL,MN
TITANIUM/AL	-50										96 Titan.
CAST IRON	-48									94	
TI GAL. –4V	-46					4				96	6 Alum.
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904L	9	27	5	1.5					0.1	66	Alum.
ALUMINUM	10									0	100 TI,CB
TIN	10									0	100 Tin
LEAD	10										100 Lead
NIOBIUM	14										
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PHOS. BRONZE	23				95					0	5 Tin
NAVAL BRASS	23				60					0	40 Zinc
INCOLOY 825	24	21	42	3	2.25				0.03	32	
BRASS 60:40	24				60					0	40 Zinc
BRASS 90:10	27				90					0	10 Zinc
BRASS 70%CU	29				70					0	30 Zinc
INCOLOY 825	32	21	42	3	2.25				0.03	32	
BE/CU	32				98					0	2 Beryl.
TUNGSTEN	35						100				
HASTELLOY X	37	22	50	9			0.6			18	
COPPER ETP	37				99					1	
GOLD, 24K	45									0	100 Gold
SILVER/CU	45				10					0	90 Silver
HAYNES 25	45	20	10				15	52		3	
INCONEL 718	50	19	52	3						21	5 Columb.
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COLD ROLLED	90									100	
A-36	94										
CARBON 1020	94										
CARBON 1050	95								0.5	99	0.7 Mang.
0-1	95	0.5					0.5		0.9	98	
1117	95								0.14	100	
52100 Lescalloy	95	1.5							1	96.8	Mn 0.35
ZIRCONIUM702	96										100 Zircon.

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4140	110	1		0.15					0.4	98	
TI CP	110									0	100 Titan.
CARBON 1018	115								0.2	100	
H-11	118	5		1.5			0.4			93	
COLD ROLLED	120										
A-2	120	5		1					1	93	
INCONEL 600	125	15	76							9	
M-2	125	4		5		2	16		0.85	72	
D-2	125	12		1		1			1.5	85	
TI-PD	127									2	98 Titan.
430 SS	128	17	0	0							
1141	130								0.4	100	
M-50	130	4		4		1				91	
HOT ROLLED	135										
HASTELLOY B	135	1	64	28				2.5		5	
M-2	140	4		5		2	6				
440C	140	17								83	
M-7	140	4		8.75		2	1.75			84	

ALLOY SEPARATIONS CHART

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Additionally, the thermoelectric response procedure cannot differentiate between Stainless Steel 316 and 304. **The Spotter 316** can do the job. For more information, check out https://www.koslow.com/select_metal_test_kit.

TROUBLESHOOTING

Symptom	Cause	Remedy
Difficult to reassemble unscrewed and opened probe.	Only to be serviced by Koslow service technicians.	Do not open the probe screws.
Display reads 0000 even when making contact with test metal.	Open circuit or no reading.	Test metal should be free of paint, grease and other non-conductive coatings. Check Cold Contacts.
Testing the same area multiple times, and the reading changed from passive to non-passive.	Do not perform multiple tests in the exact same test spot.	Allow to cool to ambient temp before testing a second time.
The Tip appears discolored.	The hot tip may change from a normal copper color to others from temp changes.	Wipe the tip with gentle abrasive.
The number 1 is on the display and does not change.	Damage to internal components.	Contact Koslow for calibration and repair.
Very small parts and wire are difficult to test.	It is necessary to contact wire at two points.	Place small parts such as small fasteners or wire on a clean conductive block for testing.
Cannot test all areas of a tank.	It can be difficult to reach high or deep into equipment.	Accessory available. The extension handle is up to 4 feet long. (Part No. TE -KFG)
Cannot get a 60 (±5) with the standard Alloy C-276.	The TEAS readings are too high or too low.	• Is the tip of the probe tightly installed? Use the pliers to make sure the hot probe tip is tight. • Are metal tips and parts clean? • Are you working close to a fan, vent, or air movement? • Are you working close to a large machine that can be causing electromagnetic interference?
Readings are climbing or falling over time.	The Hot Probe is to only make contact with the test metal for one or two seconds.	• Press the hot tip to the metal with light downward pressure (about 70 psi). • Wait for 5 seconds interval between tests.

koslow
SCIENTIFIC TESTING INSTRUMENTS
172 Walkers Lane, Englewood, NJ, 07631 USA
Tel 201.541.9100 • Fax 201.541.9330 • Email sales@koslow.com
K O S L O W . C O M

SCHEDULED CALIBRATION LOG

DUE DATE	DATE CALIBRATION PERFORMED	NOTES	INITIALS

The above log is to properly maintain and service your Alloy Sorter. It is imperative to keep current with your calibration schedule.

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K O S L O W . C O M

Instructions for Returning a Koslow Instrument for Factory Calibration

We appreciate your confidence in Koslow test kits. We recommend an annual factory calibration.

You provide:

1. Pack your kit, with all its parts, in a well-cushioned and corrugated carton.
2. Include the Daily Qualification Standard (one inch square metal sheet).
3. Include your contact information with the shipment: Name, Phone and Email.
4. Include a note with comments to our technicians. We appreciate any technical observations that may help our technicians service your equipment.
5. Don't send a payment or purchase order yet! Call for the base price for calibration. A service technician will need to first review the instrument's condition before a final price can be established. Return shipping methods must also be estimated and added.
6. Our expectation is to service equipment that is reasonably used. For the safety of our personnel, please clean unsanitary equipment prior to submission. If objectionable surface materials are found, the kit may be removed from our labs and shipped back to owner without work performed.
7. Ship your kit complete to the address below. Include Return Authorization Number for the outside of the shipping carton: RMA 1113-68.

Koslow Scientific Company
Attn: Calibration Dept. RMA 1113-68
172 Walkers Lane
Englewood, NJ 07631

We will provide the following:

1. A factory *Certificate of Calibration.* This includes: electronics verification traceable to N.I.S.T. standards, "As Found" before data and "As Left" after data.
2. A maintenance checklist to keep the consumables fresh for another whole year, with the suggested option to remedy missing or damaged parts.
3. In the course of calibration, if a repair is necessary for the completion of the calibration, we will add cost to the formal quotation.
4. You will be notified by email with a formal quotation within three business days.
5. Equipment abandoned at our location for longer than 60 days will be disposed of.
6. We thank you for the opportunity to serve you.

https://www.koslow.com/metal-alloy-id/thermoelectric-alloy-sorter-te-3000-hd.html