

JK™ 554
Tribaloy® T-400 Intermetallic Powder

Technical Note

DATE : 8/20/2001

SUPERSEDES : 9/06/88

NO : C-003

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DESCRIPTION

JK554, Tribaloy® T-400 powder meets the requirements of General Electric Aircraft Engines Material Specification B50TF155 CLA, and EMS 56712. Coatings made from this powder exhibit outstanding resistance to wear and galling, has good corrosion resistance and particularly suited where lack of lubrication is a problem, such as fretting wear. Tribaloy 400 coatings have good wear properties in sliding wear, and exceptional performance in cavitation prone applications. Parameter Set A appears to produce coatings that are high in oxide content. Parameter Set B produces a denser, low oxide containing coating which typically appear to meet G.E. Coating Specification F50TF83. The coatings produced, if properly applied, may meet G.E. Coating Specification F50TF83. The parameters listed in this technical note are to be used for guidance.

APPROXIMATE COMPOSITION, Wt. %

MESH SIZE

Carbon	< .08	325/D
Cobalt	Balance	
Chromium	8.5	
Iron + Nickel	< 3.0	
Molybdenum	28.5	
Silicon	2.6	

APPLICATIONS

Applications for JK554 are:

Restoration of aircraft engine and land based turbine components, alternative to chromium plating, furnace shafts, furnace blowers, thermocouple tubes, hydropower guides, weirs and turbine blades, and various pump components.

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COATING CHARACTERISTICS

Approximate properties of JK554 coatings produced by Jet Kote® thermal spray units are as follow.

	<u>SET A</u>	<u>SET B</u>
Bond Strength, KPSI (per ASTM 633)	7.5-9	9-10.3
Microhardness, DPH [300g]	605-694	584-674
Macrohardness, 15N (Rc Conversion)	86-88 (50-55)	87-91 (53-61)
Est. Porosity, As-Sprayed	<2%	<1%
Unmelted Particles, Per Field of View at 200x	NA	<3
Maximum Coating Thickness, Inches As-Sprayed, Flat or Irregular Shapes	.020	.020+ (Unknown)
Maximum Coating Thickness, Inches As-Sprayed, Cylindrical Shapes	.020+ (Unknown)	.020+ (Unknown)
Est. Maximum Service Temperature, °F	800	1400
Est. Deposit Efficiency, %	55	55
Est. Coverage, Lb/Ft ² / .010"	.7	.7
Est. Surface Finish, Microinch AA	230-400	Unknown
Abrasive Wear Resistance, MM ³ Loss Per ASTM G65-80	13.8	Unknown
Oxide Level, Visual	Significant	Low
Est. Thermal Expansion Coefficient Microinches/Inch/°F , 72-1800 °F	Unknown	Unknown

The above data in no way constitutes a specification, but does represent coating properties obtained by Stellite Coating's personnel when using the parameters described. Parameters and other technical information in this document are for guidance only.

FINISHING

GRINDING OPTION #1 :

Wheel Type : 100-240 Mesh Resinoid Bonded Diamond Wheel of
L, P or R Hardness and Concentration of 50
Cross-Feed/Pass : .035" - .050"
Part Surface Speed : 40-50 Feet Per Minute
In-feed/Pass : .0005"

GRINDING OPTION #2 :

Use all of the above but substitute a wheel with 100 mesh, nickel-clad diamonds in a resinoid bonded matrix, and hardness of R. Large surfaces may require a softer wheel.

GRINDING OPTION #3 :

Wheel Type : 220 SiC Vitrified Bonded with H hardness
Cross-Feed/Pass : .035" - .075"
Part Surface Speed : 40-65 Feet Per Minute
In-feed/Pass : .0005"-.001"

NOTES :

1. **IMPORTANT!** Dressing the wheel to periodically will relieve matrix and expose sharp cutting surface of the diamonds should insure proper grinding.
2. Irreversible damage to the coating can occur when the grinding wheel specifications and/or the grinding technique is incorrect.
3. Coolant must be flooded onto the part and grinding wheel during grinding.

Recommended Lapping

1. Lapping is best done following a 6-14 microinch AA diamond ground finish of the coating.
2. Diamond paste or slurry is recommended as lapping media. Do not lap coatings dry. Use a lubricant as recommended for the particular media used in each step. Remove debris, wash and dry the coating surface prior to proceeding to the next grain size. Avoid contamination of the lapping surfaces by cleaning prior to application of fresh media.
3. Recommended grain size progression after grinding:

<u>Lapping Compound</u>	<u>Est. Finish, Microinch AA</u>
15 Micron	6-10
9 Micron	2-8
4. Super-finishing is possible only if the coating does not have cracks or pull-out caused by improper coating or finishing techniques.

Jet Kote® SET A OPERATING PARAMETERS ⁽¹⁾

Fuel Gas	Propylene (C ₃ H ₆)
Powder Carrier Type	Argon (Ar)
Nozzle	5/16 x 6
Injector	#50

<u>Console Type</u>	<u>JKII</u>	<u>JKII NOVA</u>	<u>JKIIA</u>
<u>Manifold Pressures, PSI</u>	(2) (7)	(8)	(3)
Oxygen	120	120	100
Main Fuel Gas	80	80	80
Carrier Gas	85	80	85
Hydrogen (Pilot)	25		100
<u>Console Pressures, PSI</u>			
Oxygen	75-85	80-90	80-86
Main Fuel	60-68	63-67	62-75
Carrier	48-50	48-50	48-50
<u>Console Flows (4)</u>			
Oxygen	980-1020	980-1020	990-1020
Main Fuel	56-60%	115-120	137
Carrier	30-35	57	57
<u>Console Settings</u>			
Oxygen			55.0-56.7
Main Fuel			45.7
Carrier			40.7
<u>Cooling Water (5)</u>			
°F IN	80-90	80-90	80-90
°F OUT	115-120	115-120	115-120
<u>Powder feed Settings</u>			
RPM (Approximate)	2.0	2.0	2.0
Feed Rate (6), grams/Min.	40-45	40-45	40-45
<u>Spray Distance, Inches</u>	6-7	6-7	6-7

NOTES:

- Pressures shown are running pressures with powder feeding.
- Manifold pressures for JKII system are critical, manifold regulators must be located at factory supplied hose ends.
- Manifold pressure too low will not allow enough flow. If it is too high the controller will pulse upon start up.
- JKII system does not correct flow due to change in gas temperature or pressures at the meters, JKIIA system compensates and flow is displayed as true Standard Cubic Feet per Hour (SCFH):
T = 0°C, P = 14.7 PSIA
- A heat exchanger to control the water inlet temperature to the gun is recommended. Adjust water flow to achieve outlet temperature. Water temperatures may affect coating quality and torch performance.
- Powder feed rate must be checked with powder flowing through lit gun. Powder Feed Rate (PFR) = (Powder Weight (g) Initial - Powder Weight Final (g) / Powder Feed Time (min.)) Powder feed time must be greater than 2 min. PFR is linear to RPM of the feeder. To achieve required PFR, change RPM as follows:
RPM (NEW) = (PFR (Required) X RPM (Original)) / PFR (Calculated)
- JKII flowmeter requires change for specific gas use: H₂ - Part #972915 C₃H₆ - Part #972763
- Maximum Console Inlet gases pressure is 180 PSI.

Jet Kote® SET B OPERATING PARAMETERS (1)

Fuel Gas	Hydrogen (H ₂)
Powder Carrier Type	Argon (Ar)
Nozzle	1/4 x 9
Injector	#40

<u>Console Type</u>	<u>JKII</u>	<u>JKII NOVA</u>	<u>JKIIA</u>
<u>Manifold Pressures, PSI</u>	(2) (7)	(8)	(3)
Oxygen	120	120	100
Main Fuel Gas	120	120	80
Carrier Gas	85	80	85
Hydrogen (Pilot)	25		100
<u>Console Pressures, PSI</u>			
Oxygen	59	~56-61	57
Main Fuel	81	~77-82	78
Carrier	48-51	48-51	48-51
<u>Console Flows (4)</u>			
Oxygen	475-500	480	480
Main Fuel	1325	1300	1300
Carrier	28-30	58	58
<u>Console Settings</u>			
Oxygen			26.7
Main Fuel			72.2
Carrier			41.4
<u>Cooling Water (5)</u>			
°F IN	85-95	85-95	85-95
°F OUT	115-120	115-120	115-120
<u>Powder feed Settings</u>			
RPM (Approximate)	.8-1.0	.8-1.0	.8-1.0
Feed Rate (6), grams/Min. 15-20	15-20		15-20
<u>Spray Distance, Inches</u>	5.5-6.5	5.5-6.5	5.5-6.5

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