

EE_TFG LAMINATIONS

Some insight into the Lamination costs (small prototype quantity) and requirements (including heat treatment and environment anneal):

Ref: TFG_Z04 [EE_TFG]

COST (small quantity - for Engineering design and development):

| P.O. Number | Terms | Via | F.O.B. |
|--|--|------------|------------|
| ██████████ | Credit Card | | |
| Quantity | Description | Price Each | Amount |
| 20 | TFG_Z04 Lamination, .014" Carp 49 to be supplied by ██████████ Units are in .594" bonded stacks. Bond with EB-548. Shipping: 7 weeks from receipt of order. Standard Carpenter Tech. annealing is included. Best stack height tolerance: +/- 1 lamination. Best stack tolerance: +/- .003" | 232.00 | 4,640.00 |
| 20 | TFG_Z04 Lamination, 29 ga M19 C5 to be supplied by ██████████ Units are in .594" bonded stacks. Bond with EB-548. Shipping: 3 weeks from receipt of order. Best stack height tolerance: +/- 1 lamination. Best stack tolerance: +/- .003" | 149.00 | 2,980.00 |
| <p>THE ORDER AND THE TERMS AND CONDITIONS SHALL BE SUBJECT TO, CONSTRUED UNDER AND ENFORCED ACCORDING TO THE LAWS OF THE STATE OF ILLINOIS. ANY ACTION IN REGARD TO OR ARISING OUT OF THE ORDER OR THE TERMS AND CONDITIONS SHALL BE INSTITUTED AND LITIGATED IN THE 18TH JUDICIAL CIRCUIT, DUPAGE COUNTY, ILLINOIS. IN ACCORDANCE HEREWITH, BUYER SUBMITS TO THE JURISDICTION AND VENUE OF THE COURTS WITHIN THE COUNTY OF DUPAGE, STATE OF ILLINOIS. BUYER WAIVES THE RIGHT TO A JURY TRIAL IN ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF THE ORDER OR THE TERMS AND CONDITIONS BUYER AGREES POLARIS SHALL BE ENTITLED TO RECOVER ALL COSTS INCURRED IN COLLECTING AMOUNTS DUE FROM BUYER FOR THIS ORDER, INCLUDING REASONABLE ATTORNEY FEES AND COURT COSTS.</p> | | | |
| Total | | | \$7,620.00 |
| Payments/Credits | | | \$0.00 |
| Balance Due | | | \$7,620.00 |

Lamination Annealing:

Unannealed [page 2 of 5] (rotor grade) {Capr-49}:

| CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE | CARPENTER NO./WERKS-NR./N° DE REFERENCE INTERNE | DATE/DATUM/DATE | WEIGHT/GEWICHT/POIDS | | |
|---|---|-----------------|----------------------|----------|----------|
| REFER TO PAGE 1 | L30506 | SEE PG 1 | SEE PG 1 | | |
| HEAT NUMBER / SCHMELZE-NR. / N° DE COULÉE: 221647 | | | | | |
| PRODUCT DESCRIPTION: CARPENTER HIGH PERM "49" ELEC ALLOY COLD FINISH UNANNEALED ROTOR GRADE | | | | | |
| SPECIFICATION: MIL-N-14411C COMPOSITION 3 (11/23/77) AMS 7719 REAFFIRMED REV E (05/ /19) ASTM-A753-08 ALLOY 2 GRADE 2 REAPPROVED 2013 MOOG COMPONENTS E.S. 749 UNS K94840 REV D (01/25/11) EXCPT LTR (06/01/17) PENDING | | | | | |
| SIZE 12.50000 X 0.014000 IN. (317.50 X 0.36 MM) FLT STP | | | | | |
| HEAT CHEMISTRY (WT%): (TEST METHOD IS SHOWN IN PARENTHESIS) | | | | | |
| C (COM) | MN (XRF) | SI (XRF) | P (XRF) | S (COM) | CR (XRF) |
| 0.025 | 0.28 | 0.26 | 0.003 | 0.001 | 0.03 |
| NI (XRF) | MO (XRF) | CU (XRF) | CO (XRF) | FE (XRF) | |
| 47.6 | 0.01 | 0.04 | 0.01 | 51.70 | |
| THIS HEAT MELTED BY THE VIM PROCESS | | | | | |
| HARDNESS AS SHIPPED 22HRC (248HV) 500 GRAM LOAD *-->TESTED AT READING | | | | | |
| CAPABILITY A.C. MAGNETIC TEST REPORT DRY HYDROGEN ANNEAL 1177C/ 4.00 HOURS/ 83C PER HR COOL BAKE 0C/ 0.00 HOURS/ 00E MAGNETIC STRENGTH EI SINE CURRENT/RING PERM X 1000 | | | | | |
| FREQ COIL | B GAUSS | B GAUSS | B GAUSS | B GAUSS | B GAUSS |
| 60 | B40 | B200 | B2000 | B4000 | B8000 |
| | (TESLA) | (TESLA) | (TESLA) | (TESLA) | (TESLA) |
| | (0.004) | (0.020) | (0.200) | (0.400) | (0.800) |
| | 11.40 | 18.30 | 34.70 | 43.80 | 48.40 |
| | *-->TESTED AT READING | | | | |
| CAPABILITY A.C. MAGNETIC TEST REPORT DRY HYDROGEN ANNEAL 1177C/ 4.00 HOURS/ 83C PER HR COOL WATT METER/RING CORE LOSS (WATTS/LBS.) | | | | | |
| FREQ COIL | B10000 | | | | |
| 60 | 0.157 | | | | |
| | *-->TESTED AT READING | | | | |
| CONTINUED ON NEXT PAGE | | | | | |
| <small>This certification is made to the customer printed on this form. Carpenter neither makes, nor assumes responsibility for the use, representation or certification to other parties. Die vorliegende Zertifizierung ist nur für den in diesem Formular genannten Kunden gültig. Carpenter übernimmt gegenüber Dritten keinerlei Haftung für die Verwendung dieses oder anderer Zertifikate. Ce certificat est uniquement valable pour le client dont le nom est imprimé sur ce formulaire. Carpenter n'assume pas de responsabilité pour une certification vis-à-vis d'une tierce personne.</small> | | | | | |

FORM 12-566

Magnetic Test Report [Annealed page 3 of 5] {Carp-49}:

| CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE | CARPENTER NO./MÈRES-NR./N° DE REFERENCE INTERNE | DATE/OATM/DATE | WEIGHT/GEWICHT/POIDS |
|---|---|----------------|----------------------|
| REFER TO PAGE 1 | L30506 | SEE PG 1 | SEE PG 1 |
| <p>HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE: 221647 CAPABILITY D.C. MAGNETIC TEST REPORT DRY HYDROGEN ANNEAL 1177C/ 4.00 HOURS/ 83C PER HR COOL H OERSTED (A/M) B GAUSS (TESLA) PERM ----- 0.005270 (0.419373) 100 (0.0100) 19000 100.000000 (7957.747000) 15800 (1.5800)</p> <p>MAX PERM = 208000 *-->TESTED AT READING</p> | | | |

| CUSTOMER ORDER NO./BESTELL-NR./N° DE COMMANDE | CARPENTER NO./WERKS-NR./N° DE REFERENCE INTERNE | DATE/DATUM/DATE | WEIGHT/GEWICHT/POIDS |
|---|---|-----------------|----------------------|
| REFER TO PAGE 1 | L30506 | SEE PG 1 | SEE PG 1 |

HEAT NUMBER /SCHMELZE-NR./N° DE COULEE: 221647
ADDRESS OF TESTING LOCATIONS:
READING - 101 WEST BERN ST, READING, PA 19601

MATERIAL HAS BEEN MELTED AND MANUFACTURED IN THE USA WHICH IS A QUALIFYING COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND 252.225-7009.

UNLESS OTHERWISE STATED, THE TEST WERE PERFORMED TO THE LATEST REVISION OF THE STANDARDS LISTED BELOW: 1) BEND TEST - ASTM E290, 2) CHARPY IMPACT - ASTM E23, 3) COEFFICIENT OF LINEAR THERMAL EXPANSION - ASTM E228, 4) FRACTURE TOUGHNESS - ASTM E399, 5) BRINELL HARDNESS - ASTM E10, 6) ROCKWELL HARDNESS-ASTM E18, 7) MICRO VICKERS HARDNESS-ASTM E92, 8) KNOOP HARDNESS-ASTM E92, 9) MACRO VICKERS HARDNESS-ASTM E92, 10) STRESS RUPTURE/ CREEP RUPTURE-ASTM E139, 11) STRESS RUPTURE (COMBINATION)-ASTM E292, 12) ROOM TEMPERATURE TENSILE-ASTM E8, 13) ELEVATED ROOM TEMPERATURE TENSILE-ASTM E21, 14) DECARBURIZATION-ASTM E1077, 15) DELTA FERRITE AMS 2315, 16) GRAIN SIZE-ASTM E112, 17) INCLUSION CONTENT/MICROCLEANLINESS-ASTM E45, 18) INTERGRANULAR ATTACH - ASTM A262, 19) INTERGRANULAR CORROSION-ASTM A262, 20) MACRO ETCH&TESTING - ASTM A604/E381, 21) FITTING CORROSION - ASTM A923, 22) CREVICE CORROSION-ASTM G48, 23) HARDNESS CONVERSIONS - ASTM E140, 24) XRF-ASTM E572/E1085/E2465, 25) OBS - ASTM E415/E1086, 26) COM - ASTM E1019, 27) FUS - ASTM E1019, 28) MS - CARPENTER METHODS 206.8500/206.8530
THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 37 DATED 07/31/2019.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED TO ISO 9001, AS9100, AND AS9120. THIS CERTIFICATION OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

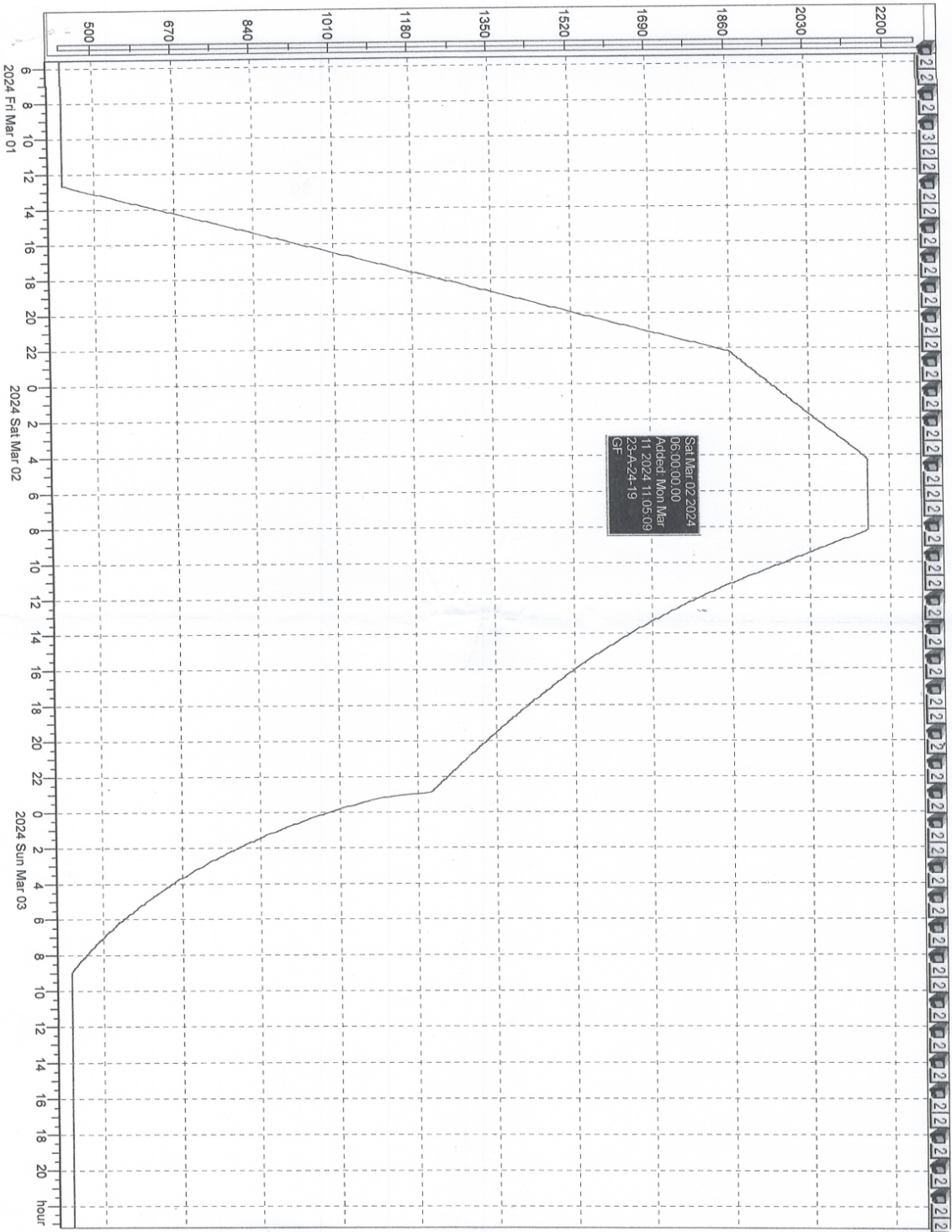
THE ABSENCE OF A REPORTED TEST TEMPERATURE INDICATES THAT THE TEST WAS COMPLETED AT ROOM TEMPERATURE.

CONTINUED ON NEXT PAGE

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FORM 17-2-24-6

Carp49 Anneal Curve:



Carp49 Measurement:

PART# TFG_Z04_Lamination
MATERIAL TYPE: .014 Carp49

ALL DIMENSIONS ARE IN MILLIMETERS

| | STACK HEIGHT | DISTANCE | DISTANCE | DISTANCE | DISTANCE |
|-----|--------------|-------------|-------------|-------------|-------------|
| | 15.10 ±.35 | 45.00 ±.076 | 45.00 ±.076 | 30.00 ±.076 | 15.00 ±.076 |
| #1 | 15.21 | 45.00 | 45.00 | 30.01 | 15.03 |
| #2 | 15.24 | 45.01 | 45.01 | 30.03 | 15.04 |
| #3 | 15.17 | 45.00 | 45.00 | 30.02 | 15.03 |
| #4 | 15.22 | 45.02 | 45.03 | 30.01 | 15.02 |
| #5 | 15.19 | 45.03 | 45.02 | 30.02 | 15.02 |
| #6 | 15.13 | 45.00 | 45.01 | 30.02 | 15.03 |
| #7 | 15.24 | 45.02 | 45.03 | 30.01 | 15.03 |
| #8 | 15.02 | 45.01 | 45.02 | 30.02 | 15.02 |
| #9 | 15.13 | 45.00 | 45.00 | 30.01 | 15.04 |
| #10 | 15.23 | 45.03 | 45.01 | 30.01 | 15.03 |
| #11 | 15.15 | 45.02 | 45.00 | 30.03 | 15.04 |
| #12 | 15.20 | 45.01 | 45.02 | 30.01 | 15.03 |
| #13 | 15.26 | 45.02 | 45.01 | 30.02 | 15.02 |
| #14 | 15.27 | 45.00 | 45.01 | 30.03 | 15.04 |
| #15 | 15.26 | 45.01 | 45.03 | 30.01 | 15.03 |
| #16 | 15.29 | 45.03 | 45.02 | 30.03 | 15.02 |
| #17 | 15.27 | 45.02 | 45.00 | 30.02 | 15.04 |
| #18 | 15.27 | 45.01 | 45.01 | 30.02 | 15.02 |
| #19 | 15.19 | 45.02 | 45.03 | 30.01 | 15.02 |
| #20 | 15.28 | 45.00 | 45.00 | 30.03 | 15.03 |

MEASUREMENT TOOL: CALIPER

INSPECTED BY: DUY LE

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M19 Electrical Steel (composition and core loss):

Service Performed: Laser Cutting and Bonding

Part Number: TFG_Z04_Lamination

QTY: 20 Bonded stacks

Material Used: 29ga-M19 C5 – Lapham-Hickey Heat # 521681

Date of Mfg: February 28, 2024

PO Line: 02

Item# 1 089 ELECTRICAL STEEL
M19 C5
.0140 x 45.0000 x 96.0000" STOCK WID EDGE

Part Number: 29GA M19 C5 45 X 96

| | |
|-------------------|-------------|
| HEAT NUMBER | 521681 |
| CARBON (C) | .0028 |
| MANGANESE (MN) | .1404 |
| PHOSPHORUS (P) | .0070 |
| SULPHUR (S) | .0005 |
| SILICON (SI) | 2.5650 |
| ALUMINUM (AL) | .5720 |
| WATTS/LB CORE MAX | 1.30 - 1.34 |

Solarlab (SL)