TECHNICAL BULLETIN: Volume 1, Number 5
Measuring Best Practices for SFIA Code Compliance Certification Program

STEEL FRAMING INDUSTRY ASSOCIATION

April 15, 2025

SUMMARY:

This technical bulletin is designed primarily to support new manufacturers participating in the SFIA Code Compliance Certification Program, helping them understand how to measure steel framing elements accurately and consistently. At the same time, it serves as a valuable reference for experienced manufacturers and inspectors, promoting alignment across the industry so everyone is measuring the same way.

Additional Resources:

- Volume 4, Number 2 – Steel Coil Procurement: Ordering Sheet Steel for Cold-Formed Framing - February 2025.
- SFIA video: SFIA Verification of Product Dimensions and Other Physical Characteristics 2020

Together, these tools support consistent, code-compliant measurements for steel framing, ensuring all members—especially newer ones—are aligned in their practices and inspectors are evaluating materials using the same methods.

Disclaimer: These standards and practices are for educational purposes only and are not a mandate. These standards and practices may vary depending on geographic region, type of work and member preference.

Tolerance and Thickness Tables from the SFIA Code Compliance Certification Program

Table A5-1
Manufacturing Tolerances for Structural Members

Dimension[1]	Item Checked	Studs, In. (mm)	Tracks, In. (mm)
A	Length	+3/32 (2.38) -3/32 (2.38)	+1/2 (12.7) -1/4 (6.35)
B[2]	Web Depth	+1/32 (0.79) -1/32 (0.79)	+1/32 (0.79) +1/8 (3.18)
C	Flare Overbend	+1/16 (1.59) -1/16 (1.59)	+0 (0) -3/32 (2.38)
D	Hole Center Width	+1/16 (1.59) -1/16 (1.59)	NA NA
E	Hole Center Length	+1/4 (6.35) -1/4 (6.35)	NA NA
F	Crown	+1/16 (1.59) -1/16 (1.59)	+1/16 (1.59) -1/16 (1.59)
G[3]	Camber	1/8 per 10 ft (3.13 per 3 m)	1/32 per ft (2.60 per m) 1/2 max (12.7)
H[3]	Bow	1/8 per 10 ft (3.13 per 3 m)	1/32 per ft (2.60 per m) 1/2 max (12.7)
I	Twist	1/32 per ft (2.60 per m) 1/2 max (12.7)	1/32 per ft (2.60 per m) 1/2 max (12.7)
J	Flange Width	+1/8 (3.18) -1/16 (1.59)	+1/4 (6.35) -1/16 (1.59)
K	Stiffening Lip Length	+1/8 (3.18) -1/32 (0.79)	NA

[1] All measurements are taken not less than 1 ft (305 mm) from the end.

[2] Outside dimension for *stud*, inside for *track*.

[3] 1/8 inch per 10 feet represents L/960 maximum for overall camber and bow. Thus, a 20-foot-long member has 1/4 inch permissible maximum; a 5-foot-long member has 1/16 inch permissible maximum.

Table A6-1
Manufacturing Tolerances for Nonstructural Members

Dimension[1]	Item Checked	Studs, In. (mm)	Tracks, In. (mm)
A	Length	+1/8 (3.18)	+1 (25.40)
		-1/4 (6.35)	-1/4 (6.35)
B[2]	Web Depth	+1/32 (0.79)	+1/8 (3.18)
		-1/32 (0.79)	-0 (0)
C	Flare	+1/16 (1.59)	+0 (0)
	Overbend	-1/16 (1.59)	-3/16 (4.76)
D	Hole Center Width	+1/8 (3.18)	NA
		-1/8 (3.18)	NA
E	Hole Center Length	+1/4 (6.35)	NA
		-1/4 (6.35)	NA
F	Crown	+1/8 (3.18)	+1/8 (3.18)
		-1/8 (3.18)	-1/8 (3.18)
G[3]	Camber	1/32 per ft (2.60 per m)	1/32 per ft (2.60 per m)
		1/2 max (12.7)	1/2 max (12.7)
H[3]	Bow	1/32 per ft (2.60 per m)	1/32 per ft (2.60 per m)
		1/2 max (12.7)	1/2 max (12.7)
I	Twist	1/32 per ft (2.60 per m)	1/32 per ft (2.60 per m)
		1/2 max (12.7)	1/2 max (12.7)
J	Flange Width	+1/8 (3.18)	+1/2 (12.7)
		-1/16 (1.59)	-1/16 (1.59)
K	Stiffening Lip Length	+1/8 (3.18)	NA
		-1/32 (0.79)	

[1] All measurements are taken not less than 1 ft (305 mm) from the end.

[2] Outside dimension for *stud*, inside for *track*.

Table 1 – Thickness for Standard Structural Members

Designation Thickness	Minimum Base Steel Thickness		Design Thickness	
	(Inch)	(mm)	(Inch)	(mm)
33	0.0329	0.836	0.0346	0.874
43	0.0428	1.087	0.0451	1.146
54	0.0538	1.367	0.0566	1.435
68	0.0677	1.720	0.0713	1.811
97	0.0966	2.454	0.1017	2.583
118	0.1180	2.997	0.1242	3.155

Note: For the purposes of measuring, minimum base steel thickness is what needs to be measured. Design thickness is for reference only.

Table 2 – Thickness for Standard Nonstructural Members

Designation Thickness	Minimum Base Steel Thickness		Design Thickness	
	(Inch)	(mm)	(Inch)	(mm)
18	0.0179	0.455	0.0188	0.478
27	0.0269	0.683	0.0283	0.719
30	0.0296	0.752	0.0312	0.792
33	0.0329	0.836	0.0346	0.874

Note: For the purposes of measuring, minimum base steel thickness is what needs to be measured. Design thickness is for reference only.

What Needs To Be Measured?

Minimum thickness has no tolerance: it is a code requirement that the uncoated steel thickness be greater than or equal to the minimum shown in Table 1 and Table 2 on the previous page. Many manufacturers rely on testing done at the steel mill and recorded on their Mill Certs to confirm minimum thickness. A Mill Cert is the best way to ensure the base materials meet code and certification requirements. Listed below are some other methods to confirm minimum thickness if a Mill Cert is not available or if further verification is required.

When measuring framing in the shop or lab, the coatings must be removed for accurate base steel thickness measurement. For zinc coatings, this can be done by dipping samples in hydrochloric acid until the zinc is removed (bubbling of the acid stops). Then the bare steel may be measured using a calibrated micrometer, in accordance with *ASTM A1073, Standard Practice for Using Hand Micrometers to Measure the Thickness of Nonmetallic and Metallic-Coated Steel Sheet*. Other tools such as tape measures or calipers are typically not accurate enough for steel framing thickness measurement.

If it becomes necessary to measure thickness in the field, it is best to find an area of the framing that is flat, clean, free of oil or debris, and slightly away from a cut or punched edge, since deformation from the punch or shear that created the edge may make the material appear thicker. Unfortunately, it is difficult to safely remove coatings in the field before measurement. Coating thickness can be approximated from the equations in Section 8.1.3 of ASTM A653, where 1.00 oz/ft^2 of coating weight = 1.68 mils coating thickness. Using this equation, the table below shows approximate additional thickness of the coating. These values should be subtracted from field-measured micrometer readings to get a rough approximation of the bare steel thickness.

If the micrometer reading is below the minimum bare steel thickness, the material should be rejected: it will not meet code requirements. If the micrometer reading is greater than the minimum bare steel thickness but is below the minimum when subtracting the estimated coating thickness, samples should be taken to the lab for a more accurate thickness measurement.

Table 1: estimated galvanized coating thickness, based on ASTM A653 section 8.1.3

	G40	G60	G90
Estimated coating thickness (mils, or 0.001 inches)	0.67	1.01	1.51

Note: Total both sides

Measuring Equipment: What's Needed and When It Should be Verified and Calibrated

Note: While this Technical Bulletin is a "Best Practices", much of the information contained in this section was copied from the SFIA Code Compliance Certification Program (CCCP) and the example Quality Control Manual. While "Best Practices" implies a recommendation, many of the requirements listed below are in fact mandatory for the CCCP.

1. Measuring devices are listed in the table below. Each device requires a unique identification number allowing traceability to its calibration records. The Master Log is maintained by the Quality Manager/Responsible Manager.
   - Measuring devices shall be of a sensitivity as to accurately take measurements within the tolerances prescribed in the SFIA Code Compliance Certification Program.
   - Calibration of devices shall be performed at a frequency not to exceed one year and be traceable to national standards.
     Note: Tape measures used for quality checks are verified internally utilizing a standard device traceable to national standards.

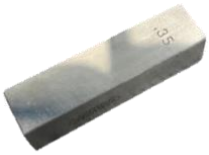
  - Standards used for internal verification of equipment (steel rule, gauge blocks, etc.) are calibrated at a frequency not to exceed three years.
- All testing and measurement devices shall have a calibration label indicating the date of last calibration and the next due date.
- An example of the Equipment Calibration Log is included in Appendix A. The calibration information and Equipment Calibration Log for each location is maintained in the Quality Manager/Responsible Manager's office.
- In addition to calibration by an outside accredited calibration lab at the frequencies noted above, internal verification of equipment is performed on tape measures, calipers and micrometer at the following frequencies:
  - Tape measures – prior to each shift
  - Calipers and Micrometers – every 3 months
    Note: We recommend using the equipment and tools that the Administrator uses during an inspection such as a tape measure for larger measurements and a caliper or micrometer for all other measurements.
- Records for the internal verification of equipment, Appendix B are maintained by the Quality Manager/Responsible Manager.

2. Ideally tools should be certified by an ISO 17025 certified third-party lab.
   - At a minimum, calibrations should be NIST traceable.

3. What is the difference between certification and verification of calibration?
   - Verifications are performed by the manufacturer's employees/staff to ensure equipment is still within tolerance.
   - Calibrations are performed by an accredited calibration laboratory who provide calibration certificates for the individual devices that are calibrated to national standards (NIST).

4. Frequency of certification and verification is laid out in the table below.
   Note: Not all of these tools are required to be used but clear records need to be kept as per the requirements and processes outlined in each manufacturer's quality control manual. "Staff" refers to the responsible personnel at the manufacturing facility or site location.

Device		Purpose	Verification[1]	Calibration
Tape measure		Typically used for measuring length or larger areas that don't need a more accurate measurement.	Performed by staff prior to each shift.	Typically not calibrated. If the tape measure is damaged and cannot be brought back into tolerance, it is to be replaced with a new one.
Caliper		Typically used for areas that need a more accurate measurement such as web width, flange width, return lips, cut outs, etc.	Performed by staff every 3 months.	Performed by an accredited calibration lab annually.

Device		Purpose	Verification[1]	Calibration
Micrometer		Typically used for areas that need a more accurate measurement such as web width, flange width, return lips, cut outs, etc.	Performed by staff every 3 months.	Performed by an accredited calibration lab annually.
Coating tester		Used to ensure that coatings meet industry standards. Note: This tool can be considered optional. Many manufacturers rely on their Mill Certs to verify coating thickness.	Performed by staff every 3 months.	A new device is purchased when the existing one is out of order.
Feeler Gauge		Used to check the width of small gaps between objects placed very close together.	Leaf thickness is checked using a calibrated micrometer every 6 months.	Performed by an accredited calibration lab annually.
Square		Used for internal verification of equipment to ensure they are accurate.	NA	Performed by an accredited calibration lab required at a frequency not to exceed 3 years.
Gauge Blocks		Used for internal verification of equipment to ensure they are accurate.	NA	Performed by an accredited calibration lab required at a frequency not to exceed 3 years.
Straight Edge or Steel Rule		Used for internal verification of equipment to ensure they are accurate.	NA	Performed by an accredited calibration lab required at a frequency not to exceed 3 years.

1 If any measuring tool or device is accidentally dropped or bumped by something that could cause an inaccurate reading, it should be verified for accuracy immediately.

How to Measure Each Member Element

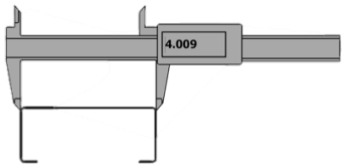
Length:

Member Length is the end-to-end measurement of the member using a tape measure. The tape measure should be hooked to the center of the web at one end of the member then extended the full length of the member. Ensure that the tape measure blade remains flat across the full linear distance of the member. Take the tape measure reading at the opposite edge of the member reading the tape to the smallest graduated increment. Record this value as the Length.

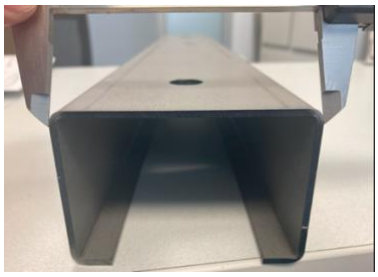
Helpful hint: Embed a tape measure into your run-off table to create a gauge block for length.

Web Depth:

Web Depths of C-Shaped members should be measured at a minimum of three points along the length of the member. Measurement points should be 12" from each end of the member and at the mid-point of each member.



Using calipers measure across the closed side of the web from tangent point to tangent point of the flanges. Record the average of the three measurements as the Web Depth.



Note: Web measurements at punchouts should be avoided!

Web Depths of Track members should be measured at a minimum of three points along the length of the member. Measurement points should be 12" from each end of the member and at the mid-point of each member.

Using calipers capable of clearing the flange length of the track, measure across the inside of the closed side of the web from tangent-point-to-tangent-point of the flanges. Record the average of the three measurements as the Web Depth.

Alternative Method: Web Depths of Track members should be measured at a minimum of three points along the length of the member. Measurement points should be 12" from each end of the member and at the mid-point of each member. Using calipers measure across the closed side of the web from tangent-point-to-tangent-point of the flanges. Calculate the average of the three measurements.

Using a micrometer measure the material thickness. Times the material thickness reading by two and subtract this value from the average of three measurements. Record this value as the Web Depth.

Alternative Method Formula: Material Thickness x2 – Average (Outside) Web Depth = Track Web Depth

Flare/Overbend

Flare/Overbend should be evaluated at a minimum of three points on each flange along the length of the member. Evaluation points should be 12" from each end of the member and at the mid-point of each member. Using a square, place the square across the web and flange of the member. Evaluate the gap between the square and flange at the web (flare) and open end (overbend). Measure the largest gap using calipers or a feeler gauge. Record this value as the Flare/Overbend.

A protractor set at 90 degrees for larger sizes can be used however, a square is preferable. Though there is a tolerance, it is preferable to reset the machine to achieve a 90 degree.

Note: Track is not permitted to have flare.

Hole Center Width (location of the hole centered between flanges)

Hole Center Width should be measured on a minimum of two punchouts on the member being inspected. Using calipers, measure the distance between the edge of the punchout to the flange. Repeat this process on the other side of the punchout. Subtract the smaller of the two measurements from the larger measurement and divide by two to determine hole centering. Record this value as the Hole Center Width.

Drive Side

Operator Side

Formula: Larger Distance – Smaller Distance ÷ 2 = Hole Center Width

Hole Center Length (location of the hole along the length of the member)

Hole Center Length should be measured using a tape measure by measuring from the edge of one punchout to the same edge of the next punchout. Record this value as the Hole Center Length.

Hole is -1/4"

Crown

Crown should be evaluated on the web along the length of the member except for 12" from each end of the member. Using a straight edge or square, place the straight edge or square across the web of the member. Run the straight edge or square along the length of the member evaluating the gap between the straight edge and the web. Measure the largest visible gap using calipers or a feeler gauge. Record this value as the Crown.

Camber

Camber should be evaluated by aligning two members with their flanges side-by-side and observing the gap between the two members. The members should be flipped in multiple orientations flange-to-flange until the largest gap is observed. Using calipers or a feeler gauge, measure the largest gap and divide this measurement by 2. Record this value as the Camber.

Formula: Largest Gap ÷ 2

Bow

Bow should be evaluated by aligning two members web-to-web and evaluating the gap between the webs of the members. Using calipers or a feeler gauge, measure the largest gap and divide this measurement by 2. Record this value as the Bow.

Formula: Largest Gap ÷ 2

Twist

Twist should be evaluated by aligning two members web-to-web and evaluating the gap at the four corners between the members. Using calipers or a feeler gauge, measure the largest and smallest gaps at the corners. Subtract the smallest gap measurement from the largest gap measurement and divide this value by 2. Record this value as the Twist.

Formula: Largest Gap – Smallest Gap ÷ 2

Flange Width

Flange Width should be measured at a minimum of three points on each flange along the length of the member. Evaluation points should be 12" from each end of the member and at the mid-point of each member.

Using calipers, measure the flange width from the web to the return lip. Record the minimum and maximum measurements as the Flange Width.

Drive Side Leg

Operator Side Leg

Stiffening Lip Length

Stiffening Lip Length should be measured at a minimum of three points on each flange along the length of the member. Evaluation points should be 12" from each end of the member and at the mid-point of each member.

Using calipers, measure the distance from the flange to the end of the stiffening lip. Record the minimum and maximum measurements as the Stiffening Lip Length.

Drive Side Return

Operator Side Return

Table from SFIA Technical Guide for Cold-Formed Steel Framing Products

Section	Flange Width	Design Stiffening Lip Length (in)
S125	1-1/4"	0.188
S137	1-3/8"	0.375
S162	1-5/8"	0.500
S200	2"	0.625
S250	2-1/2"	0.625
S300	3"	0.625
S350	3-1/2"	1.000

Mill Certs

While each company's Mill Cert can look a little different, there are some key pieces of information that should be included on all of them. Consult the examples given below for a structural and nonstructural Mill Cert and ensure that those you receive include this information.

All Mill Certs should include the following:

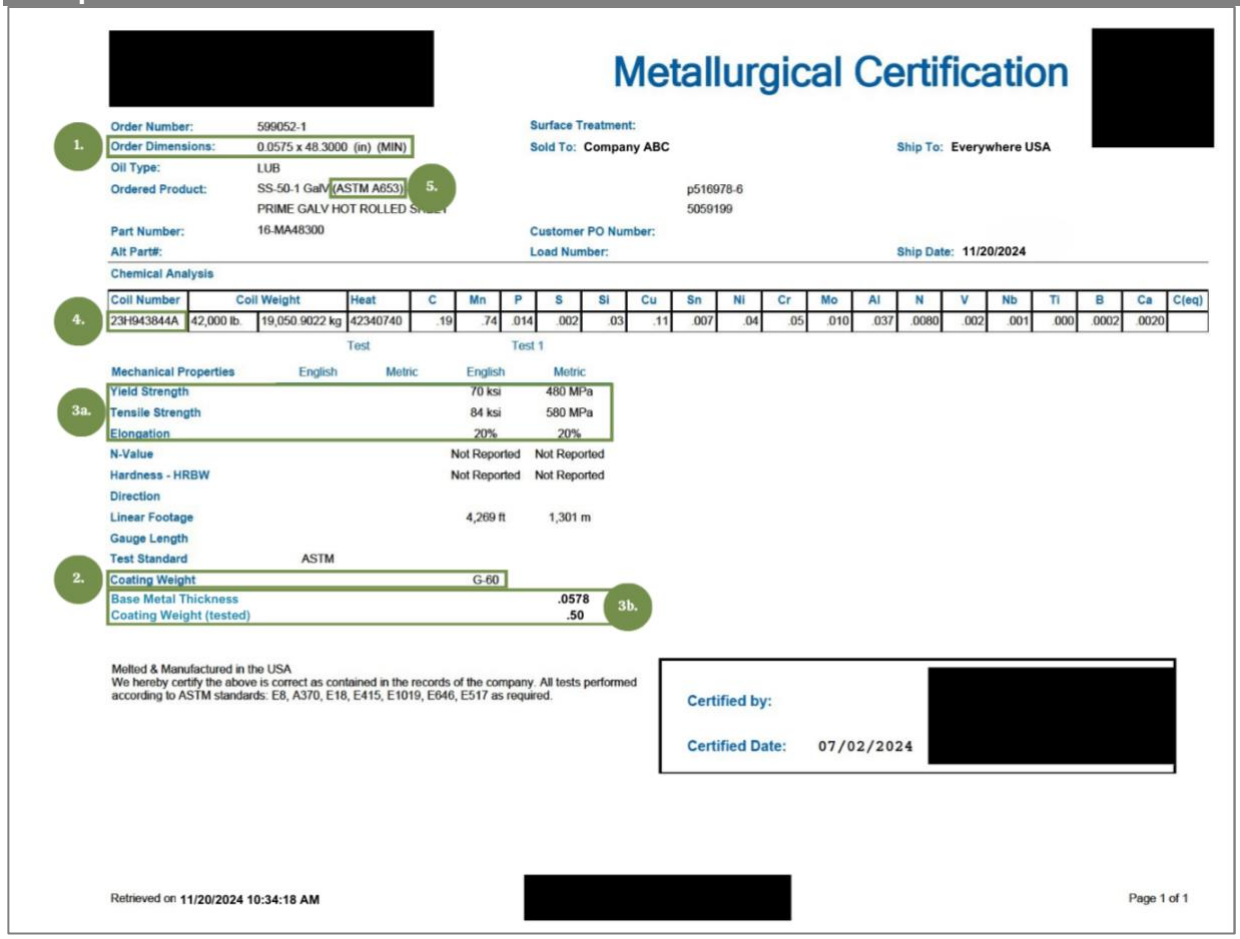
1. The ordered product including base metal thickness
2. The specified coating weight

Test results for:

- 3a. Yield strength, tensile strength and elongation
- 3b. Base metal thickness and coating thicknesses confirmed through testing

4. Traceability including coil number
5. Appropriate ASTM standard (usually ASTM A1003 or ASTM A653)

Example Mill Cert for Structural Products



[redacted]

Metallurgical Certification

[redacted]

1. Order Number: 599052-1
   Order Dimensions: 0.0575 x 48.3000 (in) (MIN)
   Oil Type: LUB
   Ordered Product: SS-50-1 GalV (ASTM A653) 5.
   PRIME GALV HOT ROLLED SHEET
   Part Number: 16-MA48300
   Alt Part#:
   Surface Treatment:
   Sold To: Company ABC
   Ship To: Everywhere USA
   p516978-6
   5059199
   Customer PO Number:
   Load Number:
   Ship Date: 11/20/2024

Chemical Analysis

4.

Coil Number	Coil Weight		Heat	C	Mn	P	S	Si	Cu	Sn	Ni	Cr	Mo	Al	N	V	Nb	Ti	B	Ca	C(eq)
23H943844A	42,000 lb.	19,050.9022 kg	42340740	.19	.74	.014	.002	.03	.11	.007	.04	.05	.010	.037	.0080	.002	.001	.000	.0002	.0020	
			Test				Test 1														

Mechanical Properties	English	Metric	English	Metric
3a. Yield Strength			70 ksi	480 MPa
Tensile Strength			84 ksi	580 MPa
Elongation			20%	20%
N-Value			Not Reported	Not Reported
Hardness - HRBW			Not Reported	Not Reported
Direction				
Linear Footage			4,269 ft	1,301 m
Gauge Length				
Test Standard	ASTM			
2. Coating Weight			G-60	
Base Metal Thickness				.0578
Coating Weight (tested)				.50 3b.

Melted & Manufactured in the USA
We hereby certify the above is correct as contained in the records of the company. All tests performed according to ASTM standards: E8, A370, E18, E415, E1019, E646, E517 as required.

Certified by: [redacted]

Certified Date: 07/02/2024

Retrieved on 11/20/2024 10:34:18 AM [redacted]

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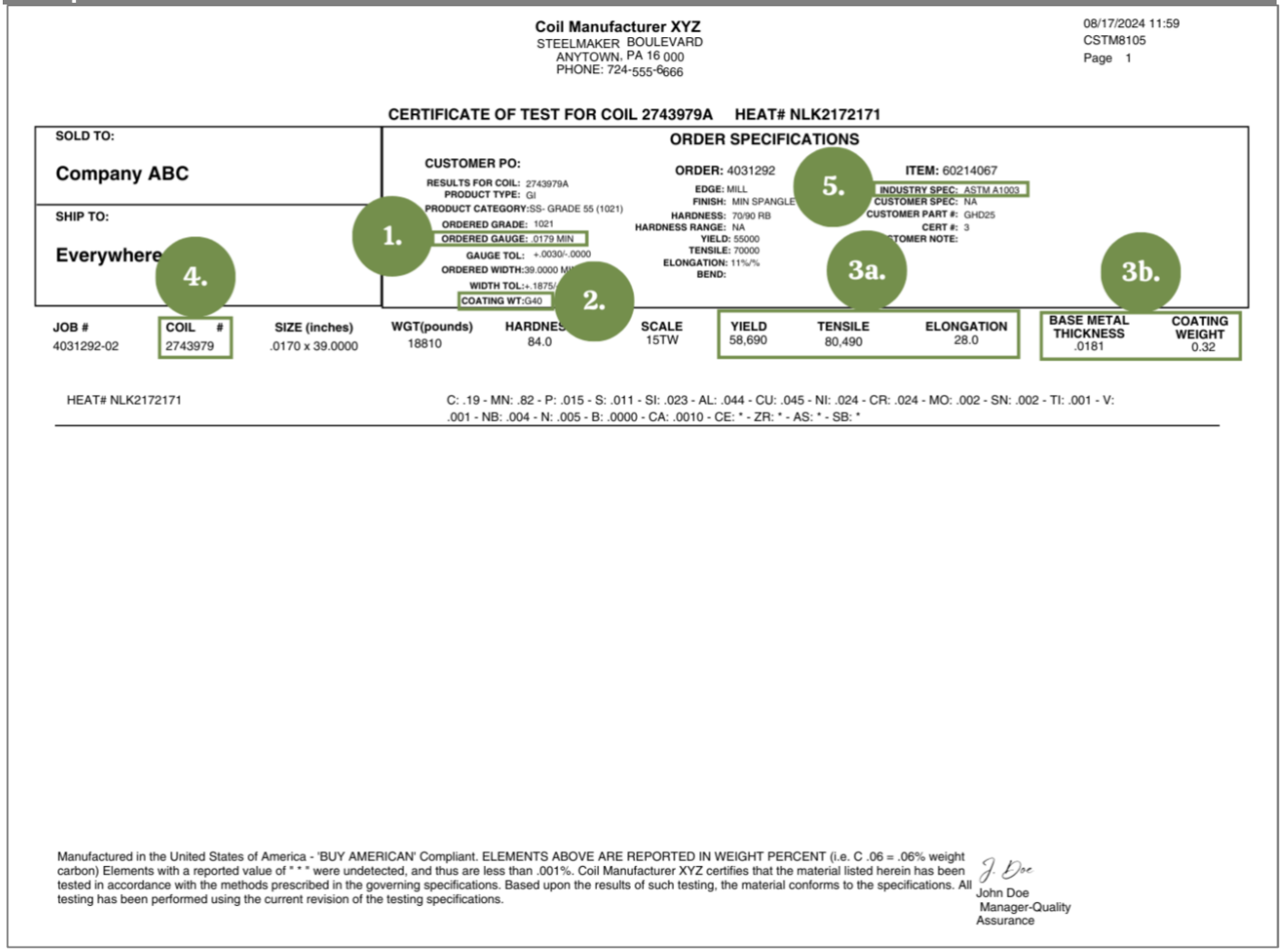
Example Mill Cert for Nonstructural Products



Coil Manufacturer XYZ
STEELMAKER BOULEVARD
ANYTOWN, PA 16 000
PHONE: 724-555-6666

08/17/2024 11:59
CSTM8105
Page 1

CERTIFICATE OF TEST FOR COIL 2743979A HEAT# NLK2172171

SOLD TO:
Company ABC

SHIP TO:
Everywhere

ORDER SPECIFICATIONS

CUSTOMER PO:
RESULTS FOR COIL: 2743979A
PRODUCT TYPE: GI
PRODUCT CATEGORY: SS- GRADE 55 (1021)
ORDERED GRADE: 1021
ORDERED GAUGE: .0179 MIN
GAUGE TOL: +.0030/-.0000
ORDERED WIDTH: 39.0000 MIN
WIDTH TOL: +.1875/
COATING WT: G40

ORDER: 4031292
EDGE: MILL
FINISH: MIN SPANGLE
HARDNESS: 70/90 RB
HARDNESS RANGE: NA
YIELD: 55000
TENSILE: 70000
ELONGATION: 11%/%
BEND:

ITEM: 60214067
INDUSTRY SPEC: ASTM A1003
CUSTOMER SPEC: NA
CUSTOMER PART #: GHD25
CERT #: 3
CUSTOMER NOTE:

1.
2.
3a.
3b.
4.
5.

JOB #	COIL #	SIZE (inches)	WGT(pounds)	HARDNES	SCALE	YIELD	TENSILE	ELONGATION	BASE METAL THICKNESS	COATING WEIGHT
4031292-02	2743979	.0170 x 39.0000	18810	84.0	15TW	58,690	80,490	28.0	.0181	0.32

HEAT# NLK2172171

C: .19 - MN: .82 - P: .015 - S: .011 - SI: .023 - AL: .044 - CU: .045 - NI: .024 - CR: .024 - MO: .002 - SN: .002 - TI: .001 - V: .001 - NB: .004 - N: .005 - B: .0000 - CA: .0010 - CE: * - ZR: * - AS: * - SB: *

Manufactured in the United States of America - 'BUY AMERICAN' Compliant. ELEMENTS ABOVE ARE REPORTED IN WEIGHT PERCENT (i.e. C .06 = .06% weight carbon) Elements with a reported value of " * " were undetected, and thus are less than .001%. Coil Manufacturer XYZ certifies that the material listed herein has been tested in accordance with the methods prescribed in the governing specifications. Based upon the results of such testing, the material conforms to the specifications. All testing has been performed using the current revision of the testing specifications.

J. Doe
John Doe
Manager-Quality Assurance

Appendix A: Equipment Calibration Log

Equipment	Equipment #	Calibration Date	Calibration Due Date	Calibration Date	Calibration Due Date

Appendix B: Equipment Verification Log

Equipment Checked	Equipment #	Checked by	Date	Date	Date	Date	Date