

Invoice No.	880879
Bill of Lading	324321
Customer No.	5988
Customer P.O.	3575-0017

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-04-23
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S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	° F	ft• lbf		Loc																
					MPa	MPa	%	° C	J																		
1	W30X261.0 46 ft 0 in W760X389 (14.02 m)	2	485784	0.78 0.77	56 55 385 381	72 72 496 496	27 28	70 21	94 127	94 128	91 124	Cor	.07	1.32	.010	.024	.27	.27	.10	.11	.03	.04	.002	.35	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

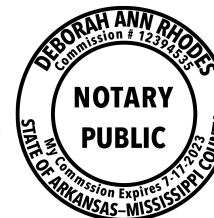
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-04-23

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-04
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
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325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact							C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft•lbf		Loc																		
									MPa	MPa		%	° C	J															
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	485240	0.78 0.79	55 56 378 388	71 71 488 489	32 31							.05	1.51	.015	.023	.33	.28	.12	.11	.04	.07	.004	.37	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30							.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31							.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30							.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04
My commission expires on 07/17/2023



Invoice No.	883774
Bill of Lading	326316
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-07

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SCHUFF STEEL
BOX 19048
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USA

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HARDY UT 84042
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}	
					KSI	KSI	%	° F	ft• lbf	Loc																	
					MPa	MPa	%	° C	J																		
1	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	485233	0.78 0.81	56 57 383 392	71 70 490 482	34 32						.05	1.44	.014	.018	.27	.25	.11	.12	.03	.07	.003	.35	.01	.16	
2	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486556	0.77 0.78	55 55 379 377	71 70 490 482	30 32						.06	1.46	.016	.022	.31	.29	.12	.11	.04	.06	.003	.37	.01	.17	
3	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486558	0.79 0.77	55 54 381 370	70 69 480 478	31 33						.05	1.48	.019	.025	.25	.26	.13	.17	.04	.06	.003	.38	.01	.17	
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30						.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)*2

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The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

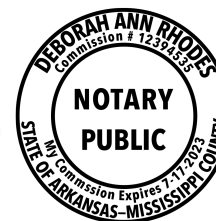
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Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-07
My commission expires on 07/17/2023



Invoice No.	883142
Bill of Lading	325786
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
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Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30						.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30						.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18		
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	4	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30						.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883774
Bill of Lading	326316
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-07

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}	
					KSI	KSI	%	° F	ft• lbf		Loc																	
					MPa	MPa	%	° C	J																			
1	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	485233	0.78 0.81	56 57 383 392	71 70 490 482	34 32							.05	1.44	.014	.018	.27	.25	.11	.12	.03	.07	.003	.35	.01	.16	
2	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486556	0.77 0.78	55 55 379 377	71 70 490 482	30 32							.06	1.46	.016	.022	.31	.29	.12	.11	.04	.06	.003	.37	.01	.17	
3	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486558	0.79 0.77	55 54 381 370	70 69 480 478	31 33							.05	1.48	.019	.025	.25	.26	.13	.17	.04	.06	.003	.38	.01	.17	
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	2	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30							.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

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The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

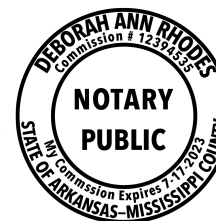
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Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-07
My commission expires on 07/17/2023



Invoice No.	883143
Bill of Lading	325787
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	890076
Bill of Lading	330689
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
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All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-06-06
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp		Impact Energy		Loc																
					MPa	MPa	%	° F		ft• lbf																		
1	W14X342.0 47 ft 8 in W360X509 (14.53 m)	2	486599	0.78 0.76	56 55 389 376	73 72 500 493	30 30																					
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30																					
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32																					
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31																					

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.


Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-06-06
My commission expires on 07/17/2023



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-04
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties							Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	CI
					KSI	KSI	%	Temp	Impact Energy	Loc															
					MPa	MPa	%	° F	ft• lbf																
								° C	J																
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	485240	0.78 0.79	55 56 378 388	71 71 488 489	32 31				.05	1.51	.015	.023	.33	.28	.12	.11	.04	.07	.004	.37	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30				.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31				.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30				.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04
My commission expires on 07/17/2023



Invoice No.	883146
Bill of Lading	325790
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883143
Bill of Lading	325787
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	890076
Bill of Lading	330689
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-06-06
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy		Loc																	
					MPa	MPa	%	° F	ft• lbf																			
1	W14X342.0 47 ft 8 in W360X509 (14.53 m)	2	486599	0.78 0.76	56 55 389 376	73 72 500 493	30 30							.06	1.46	.014	.024	.31	.30	.12	.16	.05	.07	.002	.38	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30							.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32							.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31							.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-06-06
My commission expires on 07/17/2023



Invoice No.	883146
Bill of Lading	325790
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883145
Bill of Lading	325789
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30						.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

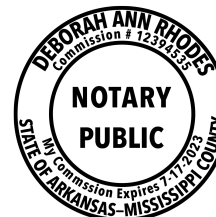
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883144
Bill of Lading	325788
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
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Date 2018-05-03

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	5	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883143
Bill of Lading	325787
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-04

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties							Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy	Loc															
					MPa	MPa	%	° F	ft• lbf																
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	485240	0.78 0.79	55 56 378 388	71 71 488 489	32 31				.05	1.51	.015	.023	.33	.28	.12	.11	.04	.07	.004	.37	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30				.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31				.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30				.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04
My commission expires on 07/17/2023



Invoice No.	883146
Bill of Lading	325790
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883144
Bill of Lading	325788
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	5	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

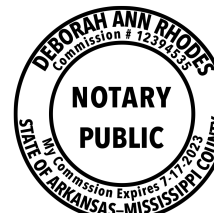
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883143
Bill of Lading	325787
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-03
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S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft•lbf		Loc																	
					MPa	MPa	%	° C	J																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30							.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32							.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31							.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31							.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

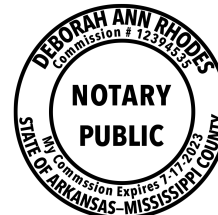
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	890076
Bill of Lading	330689
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-06-06
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S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy		Loc																	
					MPa	MPa	%	° F	ft• lbf																			
1	W14X342.0 47 ft 8 in W360X509 (14.53 m)	2	486599	0.78 0.76	56 55 389 376	73 72 500 493	30 30							.06	1.46	.014	.024	.31	.30	.12	.16	.05	.07	.002	.38	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30							.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32							.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31							.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

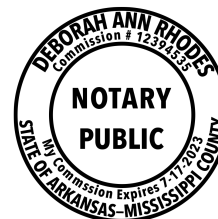
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.


Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-06-06
My commission expires on 07/17/2023



Invoice No.	883146
Bill of Lading	325790
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

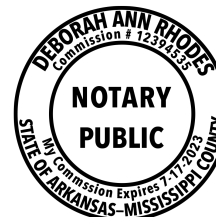
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dany Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883144
Bill of Lading	325788
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																
					KSI	KSI	%	° F	ft• lbf																		
MPa	MPa	%	° C	J																							
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	5	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31						.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B (B = \text{Approx. } .0005)$

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

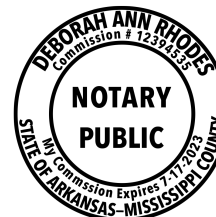
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	882860
Bill of Lading	325608
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-02
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties							Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	CI
					KSI	KSI	%	Temp	Impact Energy	Loc															
					MPa	MPa	%	° F	ft• lbf																
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30				.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30				.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31				.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-04

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	485240	0.78 0.79	55 56 378 388	71 71 488 489	32 31						.05	1.51	.015	.023	.33	.28	.12	.11	.04	.07	.004	.37	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486564	0.76 0.76	53 54 367 376	70 71 482 493	32 30						.05	1.50	.017	.022	.29	.32	.12	.13	.04	.06	.004	.38	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31						.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04
My commission expires on 07/17/2023



Invoice No.	883146
Bill of Lading	325790
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-03

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	° F	ft• lbf	Loc																	
					MPa	MPa	%	° C	J																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

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Doug Lennell

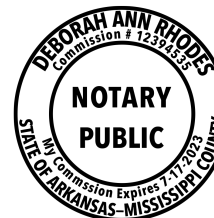
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	883145
Bill of Lading	325789
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-03

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SCHUFF STEEL
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USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
				MPa	MPa	%	° C	J																				
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30						.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B (B = \text{Approx. } .0005)$

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

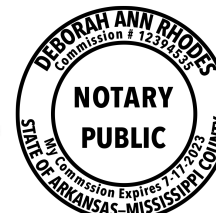
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883144
Bill of Lading	325788
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

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BOX 19048
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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																	
					MPa	MPa	%	° C	J																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32							.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486568	0.76 0.76	54 53 372 367	71 70 487 485	32 31							.06	1.46	.016	.023	.29	.33	.12	.14	.04	.07	.003	.38	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	5	486570	0.77 0.77	55 56 377 389	71 73 492 506	31 31							.06	1.48	.014	.012	.31	.31	.14	.15	.05	.06	.002	.39	.01	.18	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30							.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

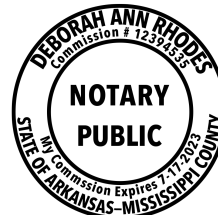
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-02

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties							Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	CI
					KSI	KSI	%	Temp	Impact Energy	Loc															
					MPa	MPa	%	° F	ft• lbf																
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31				.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30				.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31				.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-04

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy		Loc																	
					MPa	MPa	%	° F	ft• lbf																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31																					
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486728	0.78 0.81	57 58 392 402	73 72 504 498	32 31																					

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

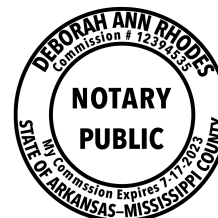
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	883145
Bill of Lading	325789
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C _{eq}
								Temp	Impact Energy		Loc																	
								° F	ft• lbf																			
					KSI	KSI	%	° C	J																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32						.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30						.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B (B = \text{Approx. } .0005)$

Corrosion Index = $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE = $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

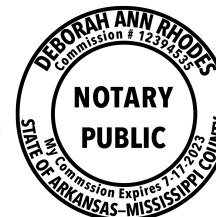
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883142
Bill of Lading	325786
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-03
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S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact							C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf			Loc																	
									MPa	MPa	%		° C	J															
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31							.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30							.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30							.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18		
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	4	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30							.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

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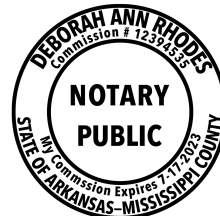
Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	882860
Bill of Lading	325608
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-02

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy	Loc																	
					MPa	MPa	%	° F	ft• lbf																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30						.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30						.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31						.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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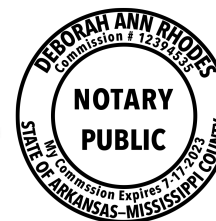
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	883145
Bill of Lading	325789
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-03

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
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SCHUFF STEEL - SALT LAKE CITY
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																	
					MPa	MPa	%	° C	J																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486566	0.76 0.79	55 57 378 392	72 72 498 495	31 32							.05	1.47	.019	.016	.29	.30	.12	.18	.05	.07	.003	.39	.01	.17	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30							.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31							.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
4	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30							.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

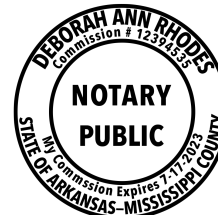
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Doug Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	883142
Bill of Lading	325786
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
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Date 2018-05-03

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F		ft• lbf		Loc																
					MPa	MPa	%	° C		J																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31							.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30							.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30							.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	4	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30							.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

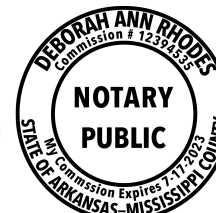
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-02

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy	Loc																	
					MPa	MPa	%	° F	ft• lbf																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30						.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31						.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	883142
Bill of Lading	325786
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-03
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S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

S
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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact							C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf			Loc																	
									MPa	MPa	%		° C	J															
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31							.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18		
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30							.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17		
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30							.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18		
4	W14X426.0 47 ft 4 in W360X634 (14.43 m)	4	486560	0.80 0.77	57 55 391 378	71 71 491 489	32 30							.05	1.45	.016	.021	.30	.31	.13	.14	.04	.06	.002	.37	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

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This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-03
My commission expires on 07/17/2023



Invoice No.	882860
Bill of Lading	325608
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-02
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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																	
					MPa	MPa	%	° C	J																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486572	0.76 0.78	54 57 375 393	72 73 494 501	32 30							.06	1.46	.013	.011	.29	.31	.12	.12	.04	.06	.003	.38	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486575	0.77 0.75	55 54 377 369	71 71 486 492	33 30							.06	1.49	.011	.017	.26	.29	.11	.10	.04	.07	.002	.37	.01	.17	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31							.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-02

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties							Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	CI
					KSI	KSI	%	Temp	Impact Energy	Loc															
					MPa	MPa	%	° F	ft• lbf																
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31				.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30				.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31				.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

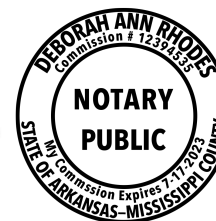
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	883368
Bill of Lading	325966
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-05-04
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties										Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy	Loc																		
					MPa	MPa	%	° F	ft• lbf																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31																					
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	1	486728	0.78 0.81	57 58 392 402	73 72 504 498	32 31																					

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

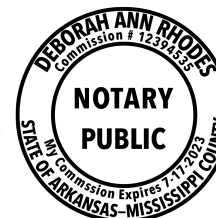
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-04
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-02

SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
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USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy	Loc																	
					MPa	MPa	%	° F	ft• lbf																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30						.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31						.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$Pcm = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

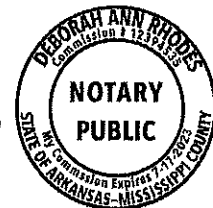
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I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lannell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-02

SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	CI
					KSI	KSI	%	Temp	Impact Energy		Loc																
					MPa	MPa	%	° F	ft• lbf																		
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31						.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30						.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31						.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$Pcm = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lannell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	882861
Bill of Lading	325609
Customer No.	5988
Customer P.O.	3575-0043

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-02

SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

SCHUFF STEEL - SALT LAKE CITY
C/O UP RR HARDY SPUR
325 S GENEVA RDD
HARDY UT 84042
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50 (345)
ASTM A709/A709M-15 GR50S (345S)
CSA G40.21-13 50WM (345WM)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy	Loc																		
					MPa	MPa	%	° F	ft• lbf																			
1	W14X398.0 47 ft 4 in W360X592 (14.43 m)	3	486574	0.76 0.77	55 57 381 393	73 74 504 513	31 31							.06	1.49	.013	.016	.31	.29	.12	.15	.05	.07	.002	.39	.01	.18	
2	W14X398.0 47 ft 4 in W360X592 (14.43 m)	4	486577	0.77 0.77	56 56 384 384	72 72 496 497	30 30							.06	1.50	.013	.011	.32	.29	.11	.12	.04	.06	.003	.38	.01	.18	
3	W14X398.0 47 ft 4 in W360X592 (14.43 m)	2	486579	0.78 0.76	55 54 378 374	71 71 486 490	31 31							.06	1.47	.011	.015	.30	.30	.13	.11	.04	.07	.003	.37	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$Pcm = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2008 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lannell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-02
My commission expires on 07/17/2023



Invoice No.	898220
Bill of Lading	336522
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-07-13
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
								Temp	Impact Energy			Loc																
KSI	KSI	%	° F	ft• lbf																								
MPa	MPa	%	° C	J																								
1	W40X297.0 49 ft 0 in W1000X443 (14.94 m)	1	478448	0.79 0.82	59 59 405 408	74 72 511 499	28 28	70 21	103 140	256 347	192 260	Cor	.07	1.35	.016	.019	.25	.33	.12	.17	.04	.05	.001	.38	.01	.18		
2	W40X297.0 49 ft 0 in W1000X443 (14.94 m)	1	488203	0.79 0.75	57 52 391 362	71 70 493 481	29 28	70 21	230 312	216 293	227 308	Cor	.07	1.20	.013	.028	.23	.28	.11	.11	.03	.02	.020	.33	.01	.16		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-07-13

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	886413
Bill of Lading	327940
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-18

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																
					MPa	MPa	%	° C	J																		
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	170 230	155 210	145 197	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18	
3	W44X230.0 55 ft 0 in W1100X343 (16.76 m)	2	487754	0.79 0.82	56 58 389 398	72 70 495 484	29 28	70 21	120 163	133 180	134 182	Fla	.07	1.20	.014	.021	.19	.29	.11	.13	.03	.02	.019	.33	.01	.16	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

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Dary Lennell

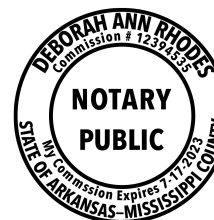
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-18

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	888099
Bill of Lading	329434
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-28

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy		Loc																	
				KSI	KSI	%	° F	ft• lbf																				
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	100 136	110 149	127 172	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21	141 191	214 290	139 188	Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	191 259 164 222	200 271 92 125	121 164 190 258	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	488223	0.74 0.73	55 55 378 376	74 75 513 514	27 26	70 21	140 190	112 152	108 146	Cor	.07	1.35	.014	.020	.26	.25	.10	.12	.04	.06	.001	.36	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

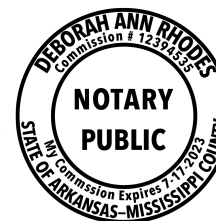
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-28
My commission expires on 07/17/2023



Invoice No.	886413
Bill of Lading	327940
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-18

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft•lbf			Loc															
									MPa	MPa	%																
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	170 230	155 210	145 197	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18	
3	W44X230.0 55 ft 0 in W1100X343 (16.76 m)	2	487754	0.79 0.82	56 58 389 398	72 70 495 484	29 28	70 21	120 163	133 180	134 182	Fla	.07	1.20	.014	.021	.19	.29	.11	.13	.03	.02	.019	.33	.01	.16	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

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Dary Lennell

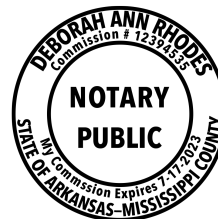
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-18

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	887044
Bill of Lading	328423
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-22

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BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy		Loc																	
					KSI	KSI	%	° F	ft•lbf																			
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	4	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21 70 21	194 263 182 247 106 144	150 203 112 152 66 90	132 179 222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	190 258 145 197	232 315 147 199	227 308 211 286	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487602	0.76 0.78	56 57 385 393	74 73 508 503	28 27	70 21	43 59	75 102	228 309	Cor	.07	1.35	.013	.025	.24	.30	.10	.09	.03	.05	.002	.35	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV₂) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

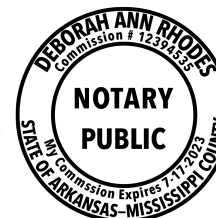
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-22
My commission expires on 07/17/2023



Invoice No.	887266
Bill of Lading	328596
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-23

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact																			
					KSI	KSI	%	Temp	Impact Energy		Loc																
								° F	ft• lbf																		
					MPa	MPa	%	° C	J			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487593	0.74 0.74	55 55 376 378	73 74 505 508	27 28	70 21	55 75	77 105	62 84	Cor	.08	1.39	.013	.023	.21	.32	.13	.10	.04	.05	.002	.38	.01	.19	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21	182 247 106 144	112 152 66 90	222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17	
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	145 197 191 259	147 199 200 271	211 286 121 164	Cor Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18	
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	488226	0.75 0.75	57 57 390 393	76 76 523 524	27 25	70 21	81 110	119 161	88 120	Cor	.08	1.36	.012	.021	.24	.29	.12	.13	.04	.05	.001	.38	.01	.19	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx. .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

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I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

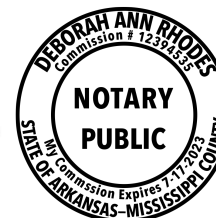
Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-23

My commission expires on 07/17/2023



Invoice No.	887044
Bill of Lading	328423
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-22

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BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl	
					KSI	KSI	%	Temp	Impact Energy		Loc																	
					KSI	KSI	%	° F	ft•lbf																			
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	4	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21 70 21	194 263 182 247 106 144	150 203 112 152 66 90	132 179 222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	190 258 145 197	232 315 147 199	227 308 211 286	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487602	0.76 0.78	56 57 385 393	74 73 508 503	28 27	70 21	43 59	75 102	228 309	Cor	.07	1.35	.013	.025	.24	.30	.10	.09	.03	.05	.002	.35	.01	.17		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

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CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

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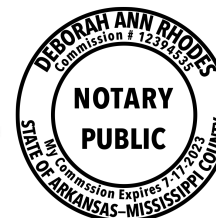
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Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-22
My commission expires on 07/17/2023



Invoice No.	888099
Bill of Lading	329434
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-28

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																
					MPa	MPa	%	° C	J																		
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	100 136	110 149	127 172	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21	141 191	214 290	139 188	Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17	
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21	191 259 164 222	200 271 92 125	121 164 190 258	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18	
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	488223	0.74 0.73	55 55 378 376	74 75 513 514	27 26	70 21	140 190	112 152	108 146	Cor	.07	1.35	.014	.020	.26	.25	.10	.12	.04	.06	.001	.36	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-28
My commission expires on 07/17/2023



Invoice No.	887266
Bill of Lading	328596
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-23

S
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
								Temp	Impact Energy			Loc																
									° F	ft• lbf			° C															
				KSI	KSI	%	° F	ft• lbf																				
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487593	0.74 0.74	55 55 376 378	73 74 505 508	27 28	70 21	55 75	77 105	62 84	Cor	.08	1.39	.013	.023	.21	.32	.13	.10	.04	.05	.002	.38	.01	.19		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21 70 21	182 247 106 144 141 191	112 152 66 90 214 290	222 301 116 157 139 188	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21 70 21	145 197 191 259 190 258	147 199 200 271 232 315	211 286 121 164 227 308	Cor Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	488226	0.75 0.75	57 57 390 393	76 76 523 524	27 25	70 21	81 110	119 161	88 120	Cor	.08	1.36	.012	.021	.24	.29	.12	.13	.04	.05	.001	.38	.01	.19		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx. .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

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Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-23

My commission expires on 07/17/2023



Invoice No.	887044
Bill of Lading	328423
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-22

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BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy		Loc																
					MPa	MPa	%	° F	ft• lbf																		
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	4	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21 70 21	194 263 182 247 106 144	150 203 112 152 66 90	132 179 222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17	
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	190 258 145 197	232 315 147 199	227 308 211 286	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18	
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487602	0.76 0.78	56 57 385 393	74 73 508 503	28 27	70 21	43 59	75 102	228 309	Cor	.07	1.35	.013	.025	.24	.30	.10	.09	.03	.05	.002	.35	.01	.17	

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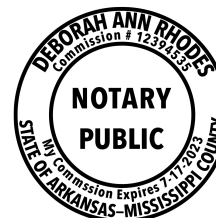
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Bill of Lading	329434
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-28

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties																
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	C
								Temp	Impact Energy			Loc																
								° F	ft• lbf																			
					KSI	KSI	%	° C	J																			
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	100 136	110 149	127 172	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21	141 191	214 290	139 188	Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	191 259 164 222	200 271 92 125	121 164 190 258	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	488223	0.74 0.73	55 55 378 376	74 75 513 514	27 26	70 21	140 190	112 152	108 146	Cor	.07	1.35	.014	.020	.26	.25	.10	.12	.04	.06	.001	.36	.01	.18		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

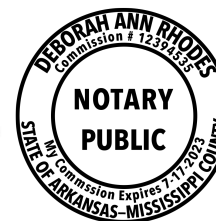
This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-28
My commission expires on 07/17/2023



Invoice No.	887266
Bill of Lading	328596
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-23

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
								Temp	Impact Energy			Loc																
									° F	ft• lbf			° C															
				KSI	KSI	%	° F	ft• lbf																				
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487593	0.74 0.74	55 55 376 378	73 74 505 508	27 28	70 21	55 75	77 105	62 84	Cor	.08	1.39	.013	.023	.21	.32	.13	.10	.04	.05	.002	.38	.01	.19		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21	182 247 106 144	112 152 66 90	222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	145 197 191 259	147 199 200 271	211 286 121 164	Cor Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	488226	0.75 0.75	57 57 390 393	76 76 523 524	27 25	70 21	81 110	119 161	88 120	Cor	.08	1.36	.012	.021	.24	.29	.12	.13	.04	.05	.001	.38	.01	.19		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx. .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-23

My commission expires on 07/17/2023



Invoice No.	887044
Bill of Lading	328423
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-22

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PHOENIX AZ 85005
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BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy		Loc																
					MPa	MPa	%	° F	ft• lbf																		
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	483722	0.77 0.76	57 56 390 383	74 73 509 507	27 28	70 21	91 123	109 148	118 160	Cor	.07	1.39	.016	.025	.24	.29	.11	.10	.04	.05	.002	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	4	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21 70 21	194 263 182 247 106 144	150 203 112 152 66 90	132 179 222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17	
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	190 258 145 197	232 315 147 199	227 308 211 286	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18	
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487602	0.76 0.78	56 57 385 393	74 73 508 503	28 27	70 21	43 59	75 102	228 309	Cor	.07	1.35	.013	.025	.24	.30	.10	.09	.03	.05	.002	.35	.01	.17	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

Pcm= C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B(B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV₂) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

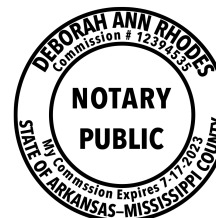
I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-22
My commission expires on 07/17/2023



Invoice No.	885515
Bill of Lading	327317
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-15

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties								Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact				C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc															
					MPa	MPa	%	° C	J																	
1	W40X297.0 49 ft 0 in W1000X443 (14.94 m)	2	488203	0.79 0.75	57 52 391 362	71 70 493 481	29 28	70 21 70 21	230 312 220 298	216 293 107 145	227 308 193 262	Cor Cor	.07	1.20	.013	.028	.23	.28	.11	.11	.03	.02	.020	.33	.01	.16

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-15
My commission expires on 07/17/2023



Invoice No.	898220
Bill of Lading	336522
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date	2018-07-13
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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	Temp	Impact Energy			Loc																
					MPa	MPa	%	° F	ft• lbf																			
1	W40X297.0 49 ft 0 in W1000X443 (14.94 m)	1	478448	0.79 0.82	59 59 405 408	74 72 511 499	28 28	70 21	103 140	256 347	192 260	Cor	.07	1.35	.016	.019	.25	.33	.12	.17	.04	.05	.001	.38	.01	.18		
2	W40X297.0 49 ft 0 in W1000X443 (14.94 m)	1	488203	0.79 0.75	57 52 391 362	71 70 493 481	29 28	70 21	230 312	216 293	227 308	Cor	.07	1.20	.013	.028	.23	.28	.11	.11	.03	.02	.020	.33	.01	.16		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= $26.01(\%Cu) + 3.88(\%Ni) + 1.2(\%Cr) + 1.49(\%Si) + 17.28(\%P) - 7.29(\%Cu)(\%Ni) - 9.10(\%Ni)(\%P) - 33.39(\%Cu)^2$

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mercury has not been used in the direct manufacturing of this material

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I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-07-13

My commission expires on 07/17/2023

Deborah Ann Rhodes



Invoice No.	888099
Bill of Lading	329434
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-28

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties														
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact					C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
					KSI	KSI	%	° F	ft• lbf		Loc																
					MPa	MPa	%	° C	J																		
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	483718	0.76 0.77	56 57 385 391	74 74 508 511	28 28	70 21	100 136	110 149	127 172	Cor	.08	1.35	.015	.017	.21	.30	.12	.11	.04	.05	.001	.37	.01	.18	
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21	141 191	214 290	139 188	Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17	
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21	191 259 164 222	200 271 92 125	121 164 190 258	Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18	
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	2	488223	0.74 0.73	55 55 378 376	74 75 513 514	27 26	70 21	140 190	112 152	108 146	Cor	.07	1.35	.014	.020	.26	.25	.10	.12	.04	.06	.001	.36	.01	.18	

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell
Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-28
My commission expires on 07/17/2023



Invoice No.	887266
Bill of Lading	328596
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT
100% Melted and Manufactured in U.S.A
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice

Date 2018-05-23

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ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
ASTM A709/A709M-15 GR50ST (345ST)
CSA G40.21-13 50WMT (345WMT)
ASTM A6/A6M-14

Item#	Item Description	QTY	Heat#	Mechanical Properties									Chemical Properties															
				Yield to Tensile Ratio	Yield Strength	Tensile Strength	ELONG	Charpy Impact						C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Cb	CE	Sn	Pcm	Cl
								Temp	Impact Energy			Loc																
									° F	ft• lbf			° C															
				KSI	KSI	%	° F	ft• lbf																				
				MPa	MPa	%	° C	J																				
1	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	487593	0.74 0.74	55 55 376 378	73 74 505 508	27 28	70 21	55 75	77 105	62 84	Cor	.08	1.39	.013	.023	.21	.32	.13	.10	.04	.05	.002	.38	.01	.19		
2	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487597	0.75 0.76	53 55 365 376	71 71 489 493	29 28	70 21 70 21	182 247 106 144	112 152 66 90	222 301 116 157	Cor Cor Cor	.07	1.35	.017	.023	.21	.27	.10	.14	.03	.06	.003	.36	.01	.17		
3	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	3	487598	0.77 0.75	58 55 399 378	75 73 519 506	28 28	70 21 70 21	145 197 191 259	147 199 200 271	211 286 121 164	Cor Cor Cor	.07	1.35	.014	.022	.24	.32	.11	.11	.03	.05	.002	.36	.01	.18		
4	W40X431.0 49 ft 0 in W1000X642 (14.94 m)	1	488226	0.75 0.75	57 57 390 393	76 76 523 524	27 25	70 21	81 110	119 161	88 120	Cor	.08	1.36	.012	.021	.24	.29	.12	.13	.04	.05	.001	.38	.01	.19		

ELONGATION BASED ON 8.00 INCH GAUGE LENGTH

$P_{cm} = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B$ (B=Approx. .0005)

Corrosion Index= 26.01(%Cu)+3.88(%Ni)+1.2(%Cr)+1.49(%Si)+17.28(%P)-7.29(%Cu)(%Ni)-9.10(%Ni)(%P)-33.39(%Cu)^2

ISO 9001:2015 certified (Registration # 0985-07).

All mechanical testing is performed by the Quality Testing Lab, which is independent of the production departments.

The Charpy machine striker geometry used by Nucor-Yamato Steel is the 8 mm (0.315")striker (KV_g) per ASTM A370 Section 22.1.2 and ISO 148-1 Section 7.3.

CARBON EQUIVALENT CE= C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Mercury has not been used in the direct manufacturing of this material

This material was produced in accordance with the Nucor-Yamato Steel Quality Manual.

I hereby certify that the contents of this report are accurate and correct. All test results and operations performed by this material manufacturer are in compliance with the requirements of the material specifications, and when designated by the purchaser, meet the applicable specifications.

Dary Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

on 2018-05-23

My commission expires on 07/17/2023



Invoice No.	888099
Bill of Lading	329434
Customer No.	9859
Customer P.O.	3575-0051

NUCOR-YAMATO STEEL CO.
P.O. BOX 1228: BLYTHEVILLE, AR 72316

CERTIFIED MILL TEST REPORT	
100% Melted and Manufactured in U.S.A	
All Shapes produced by Nucor-Yamato Steel are cast and rolled to a fully killed and fine grain practice	
Date	2018-05-28

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SCHUFF STEEL
BOX 19048
420 S 19 AVE
PHOENIX AZ 85005
USA

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SCHUFF STEEL (FLAGSTAFF)
BNSF TRACT 9365
BELLEMONT AZ 86015
USA

ASTM A992/A992M-11 A572/A572M GR50-15
ASTM A709/A709M-15 GR50T (345T)
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Doug Lennell

Chief Metallurgist

State of Arkansas
County of Mississippi
Sworn to and subscribed before me

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My commission expires on 07/17/2023

