



JFE

# RAIL



JFE Steel Corporation



# C O N T E N T S





# RAIL

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# Introduction



**You will find detailed information on JFE's railroad rails in this catalog, including technical and dimensional data. This information should help you select the rails best suited to your specific needs. JFE Rails are produced in the shape mill at our West Japan Works. Their high quality reflects the superior manufacturing processes and quality control systems that we have developed during more than a hundred years of steelmaking.**

**The rails' super-clean materials are produced with a combination of desulfurizing, degassing and continuous casting processes for improving**

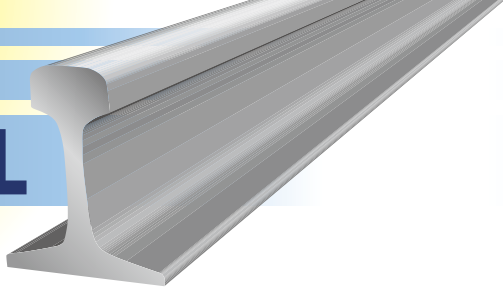


**contact fatigue properties. And their quality is assured by the rigorous controls of UST, ECT and other systems.**

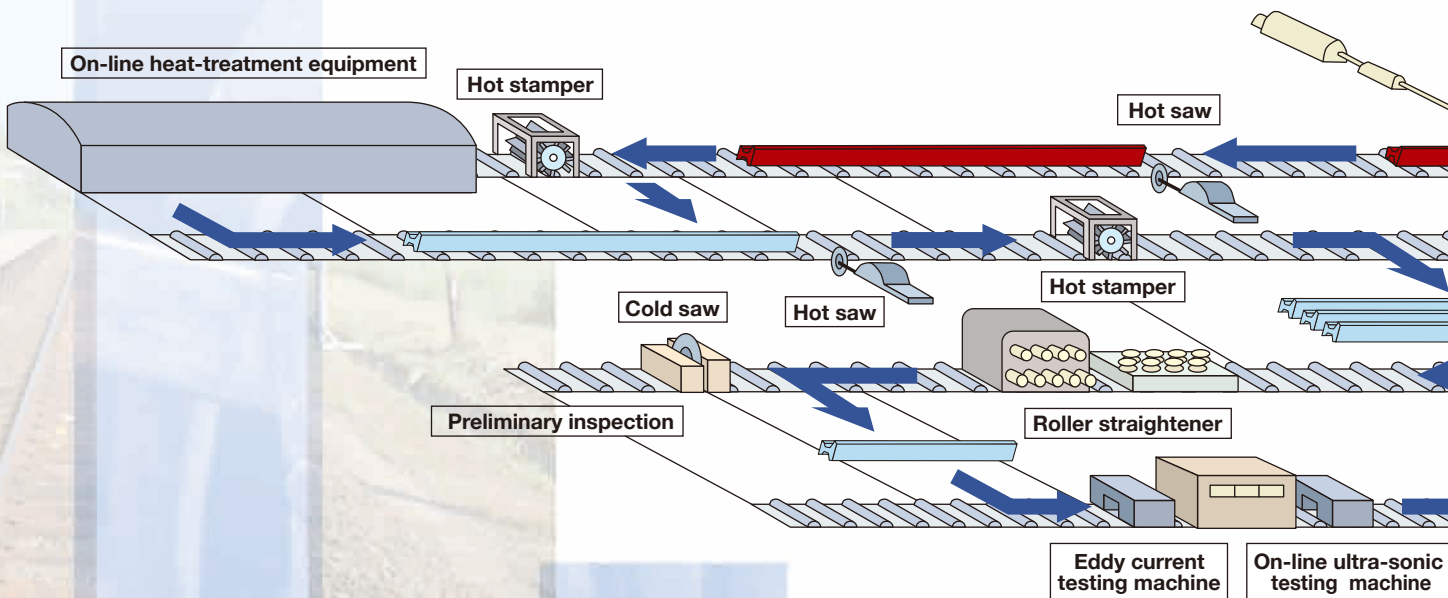
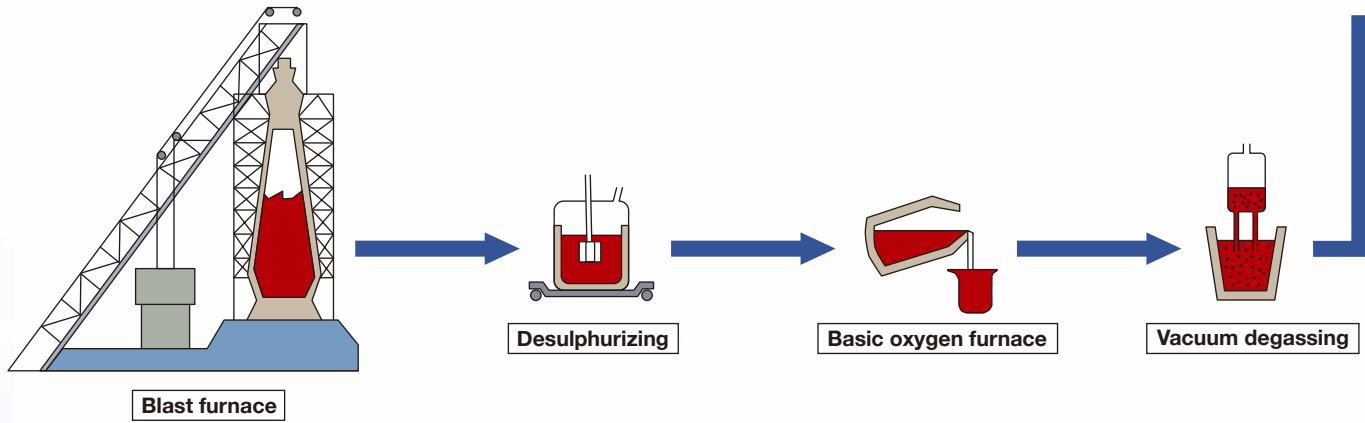
**Along with the super-clean standard carbon rails, our head-hardened rails, JFE-SP and JFE-THH, which are produced by our advanced on-line heat treatment technologies, enjoy favorable reception from worldwide heavy-haul customers.**

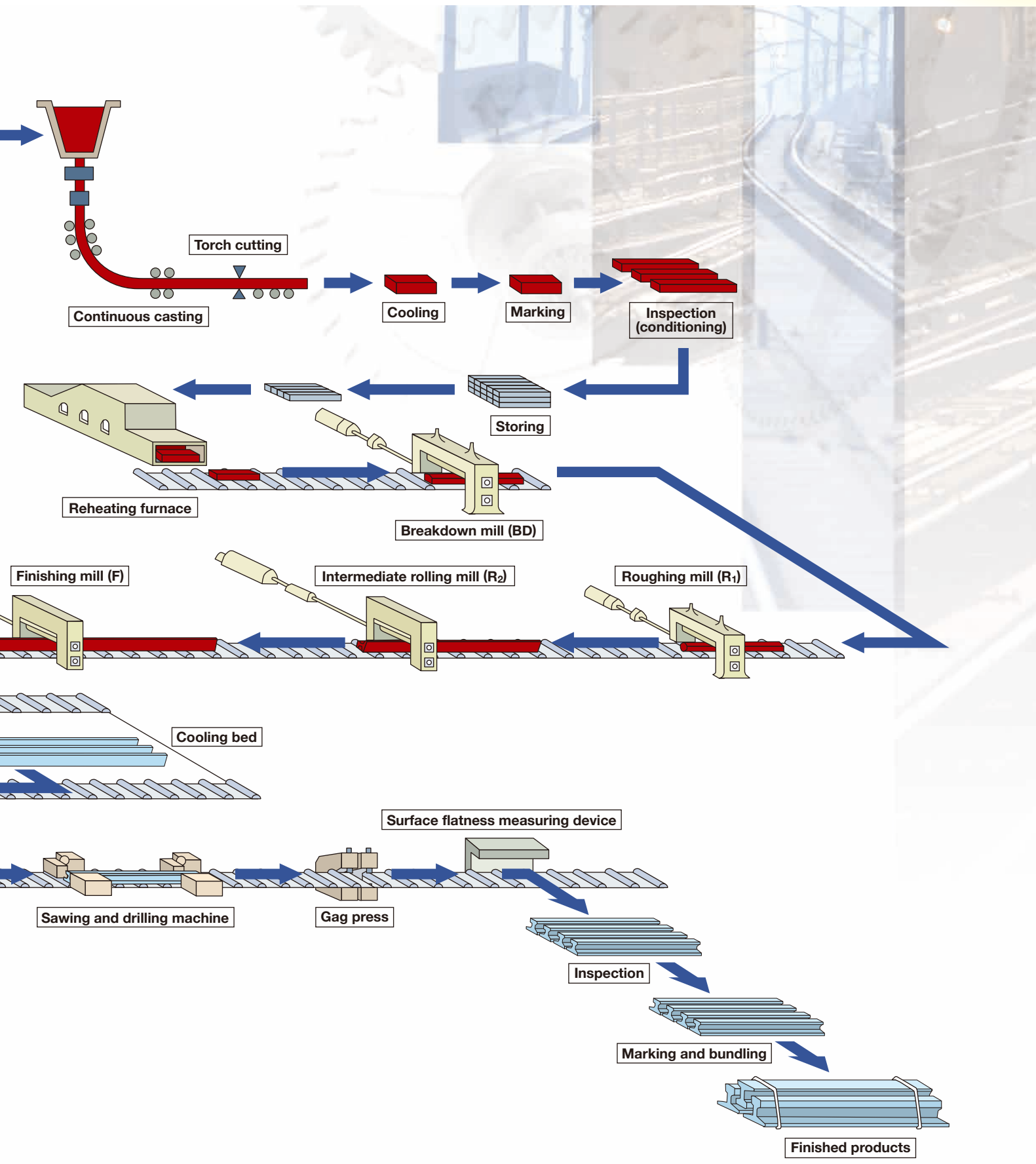
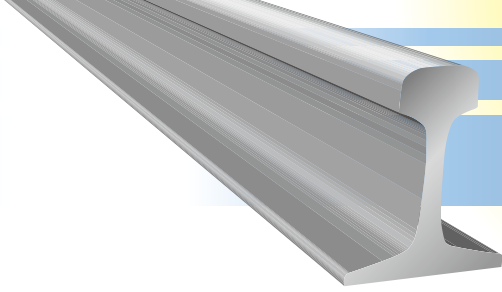
**JFE rail manufacturing meets the specifications of JIS, AREMA, EN, UIC, AS, IRS and other internationally recognized standards.**

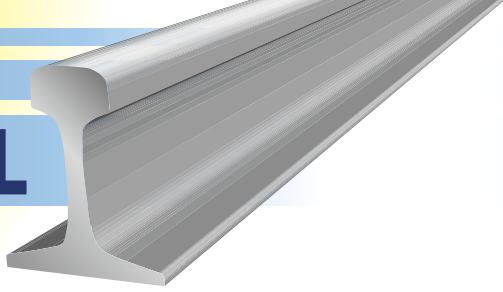
**We hope this information is helpful, and we look forward to serving you.**



## Manufacturing Process



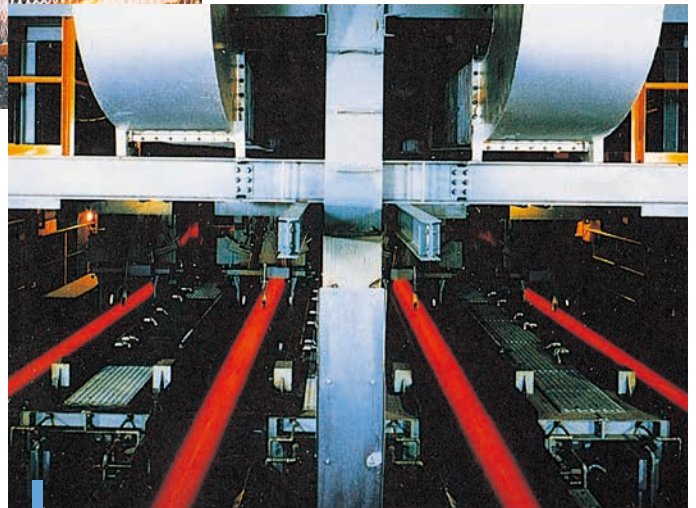
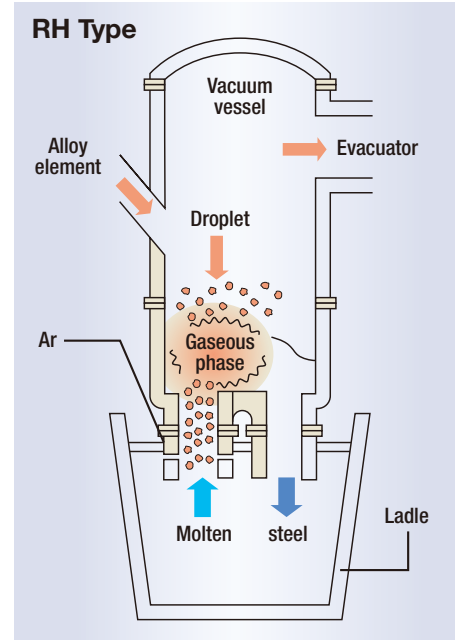




## Manufacturing Process and Quality Control

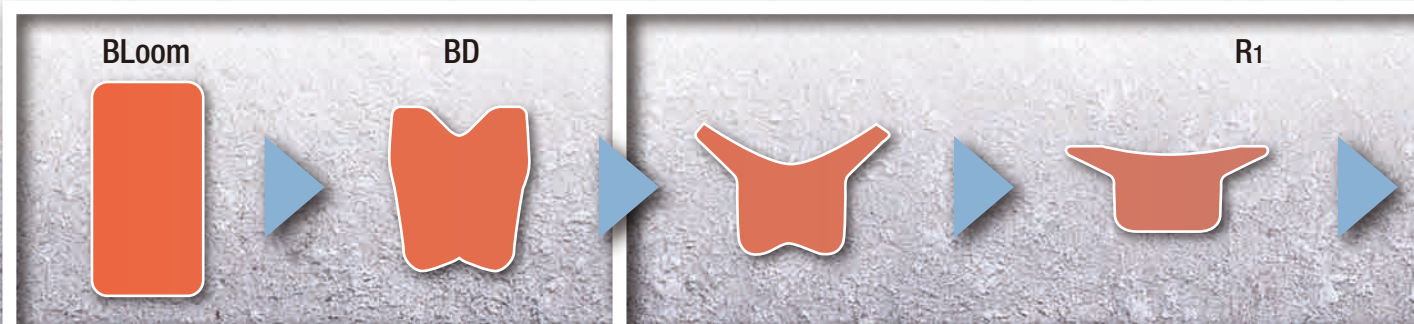


Vacuum degassing

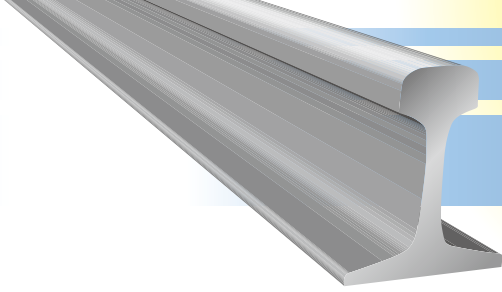


Continuous casting bloom

### Forming sequence





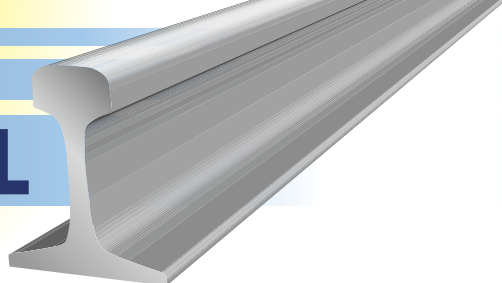


Rail rolling



Online heat-treatment equipment



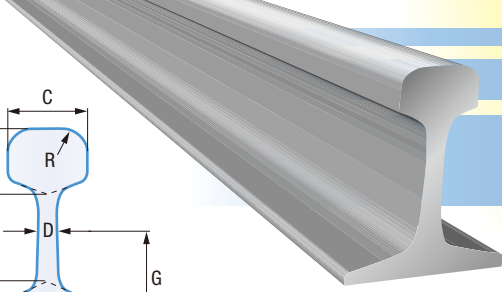
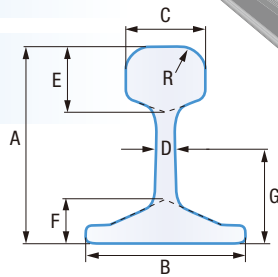


## Standard Dimensions and Weights

Specifications	Profile	Dimensions											
		A		B		C		D		E		F	
		mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	
AREMA 2015 Chapter 4 RAIL	115lbs	115RE	(168.28)	6-5/8	(139.70)	5-1/2	(69.06)	2-23/32	(15.88)	5/8	(42.86)	1-11/16	(28.58)
		115-10											
	136lbs	136RE	(185.74)	7-5/16	(152.40)	6	(74.61)	2-15/16	(17.46)	11/16	(49.21)	1-15/16	(30.16)
136-10													
	141lbs	141RE	(188.91)	7-7/16	(152.40)	6	(77.79)	3-1/16	(17.46)	11/16	(54.77)	2-5/32	(30.16)
EN13674-1:2011	54kg	54E1	159.00		140.00		70.00		16.00		49.40		30.20
	60kg	60E1 60E2	172.00		150.00		72.00		16.50		51.00		31.50
UIC860-0	54kg	UIC54	159.00		140.00		70.00		16.00		49.40		30.20
	60kg	UIC60	172.00		150.00		72.00		16.50		51.00		31.50
AS1085.1-2002	60kg	AS60	170.00		146.00		70.00		16.50		49.00		28.00
	68kg	AS68	185.70		152.40		74.60		17.50		49.20		30.20
JIS E 1101-2001 JIS E 1120-2007	37kg	37A	122.24		122.24		62.71		13.49		36.12		21.43
	40kg	40N	140.00		122.00		64.00		14.00		41.00		25.50
	50kg	50N	153.00		127.00		65.00		15.00		49.00		30.00
	60kg	60	174.00		145.00		65.00		16.50		49.00		30.10

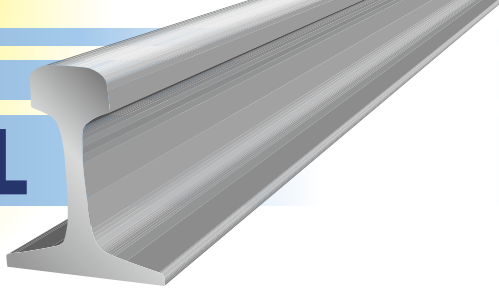
## Chemical composition and mechanical properties

Standards	Type of Rail		C	Si	Mn	P
			%	%	%	%
AREMA 2016 Chapter 4 RAIL	High Strength	(Carbon)	0.74-0.86	0.10-0.60	0.75-1.25	0.020 max.
		(Low Alloy)	0.72-0.82	0.10-1.00	0.70-1.25	0.020 max.
	Inter- mediate	(Carbon)	0.74-0.86	0.10-0.60	0.75-1.25	0.020 max.
		(Low Alloy)	0.72-0.82	0.10-1.00	0.70-1.25	0.020 max.
	Standard	(Carbon)	0.74-0.86	0.10-0.60	0.75-1.25	0.020 max.
		(Low Alloy)	0.72-0.82	0.10-0.50	0.80-1.10	0.020 max.
EN13674-1:2011	R350HT		0.72-0.80	0.15-0.58	0.70-1.20	0.020 max.
	R260		0.62-0.80	0.15-0.58	0.70-1.20	0.025 max.
UIC860-0	Grade1100		0.60-0.82	0.30-0.90	0.80-1.30	0.03 max.
	Grade900A		0.60-0.80	0.10-0.50	0.80-1.30	0.04 max.
AS1085.1-2002	Head-Hardened		0.65-0.82	0.15-0.58	0.70-1.25	0.025 max.
	Standard					
IRS-T-12-2009	1080 HH		0.60-0.80	0.10-0.50	0.80-1.30	0.030 max.
	880		0.60-0.80	0.10-0.50	0.80-1.30	0.030 max.
JIS E 1120-2007	HH370		0.72-0.82	0.10-0.65	0.80-1.20	0.030 max.
	HH340		0.72-0.82	0.10-0.55	0.70-1.10	0.030 max.
JIS E 1101-2001	Standard (40N,50N,60)		0.63-0.75	0.15-0.30	0.70-1.10	0.030 max.
	Standard (37A)		0.55-0.70	0.15-0.35	0.60-0.90	0.045 max.



					Sectional Area		Weight		Moment of Inertia		Section Modulus				
		G		R		S		W		Ix		Head Zx		Base Zx	
in.	mm	in.	mm	in.	cm <sup>2</sup>	in. <sup>2</sup>	kg/m	lbs/yd	cm <sup>4</sup>	in. <sup>4</sup>	cm <sup>3</sup>	in. <sup>3</sup>	cm <sup>3</sup>	in. <sup>3</sup>	
1-1/8	(82.55)	3-1/4	(203.2)	8	(72.37)	11.22	56.9	114.38	2726	65.5	295	18.0	359	21.9	
			(254.0)	10											
1-3/16	(98.43)	3-7/8	(203.2)	8	(85.98)	13.33	67.36	135.88	3921	94.2	388	23.7	462	28.2	
			(254.0)	10											
1-3/16	(98.43)	3-7/8	(203.2)	8	(89.01)	13.80	69.79	140.70	4181	100.4	414	25.2	475	29.0	
	75.13		300		69.77		54.77		2338		279		311		
	80.92		300		76.70		60.21		3038		334		376		
	80.67		200		76.48		60.03		3022		331		375		
	76.20		300		69.34		54.43		2346		279		313		
	80.95		300		76.86		60.34		3055		336		377		
	80.00		190		77.25		60.6		2930		322		369		
	98.40		254		86.02		67.5		3940		392		464		
	53.78		304.8		47.30		37.20		952		149		163		
	70.00		300		52.00		40.90		1378		186		197		
	76.00		300		64.20		50.40		1960		242		274		
	77.50		600		77.50		60.80		3090		321		397		

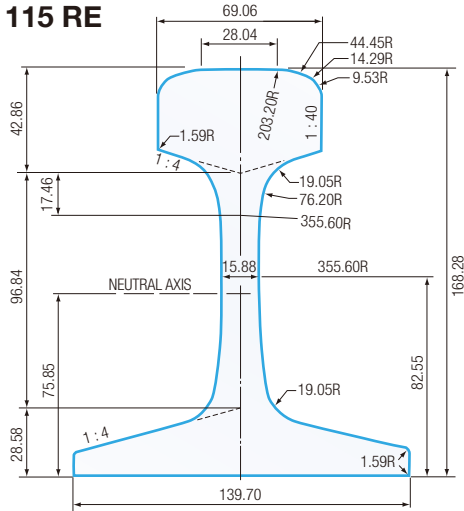
	S	Yield Strength	Tensile Strength	Elongation	Test Piece	Brinell Hardness
	%	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	mm	HBW
0.020 max.	0.020 max.	828 min.	1,179 min.	10 min.	Diam.=12.7 GL=50.8	370 min.
0.020 max.						
0.020 max.	724 min.	1,069 min.	10 min.			
0.020 max.	552 min.	1,014 min.	8.0 min.			
0.020 max.	0.020 max.	511 min.	983 min.	10 min.	Diam.=10 GL=50	310 min.
0.020 max.						
0.025 max.	-	1,175 min.	9 min.			
0.025 max.	-	880 min.	10 min.			
0.03 max.	-	1,080 min.	9 min.	Diam.=10	-	
0.04 max.	-	880-1,030	10 min.	GL=50		
0.025 max.	780 min.	1,130 min.	9 min.	Diam.=10	340 min.	
	420 min.	880 min.	8 min.	GL=50		
0.030 max.	460 min.	1,080 min.	10.0 min.	Diam.=6 GL=21	340-390	
0.030 max.	460 min.	880 min.	10.0 min.	Diam.=10 GL=50	260 min.	
0.020 max.	-	1,130 min.	8 min.	Diam.=14 GL=50	331-388	
0.020 max.	-	1,080 min.	8 min.		321-375	
0.025 max.	-	800 min.	10 min.		235 min.	
0.050 max.	-	690 min.	9 min.		-	



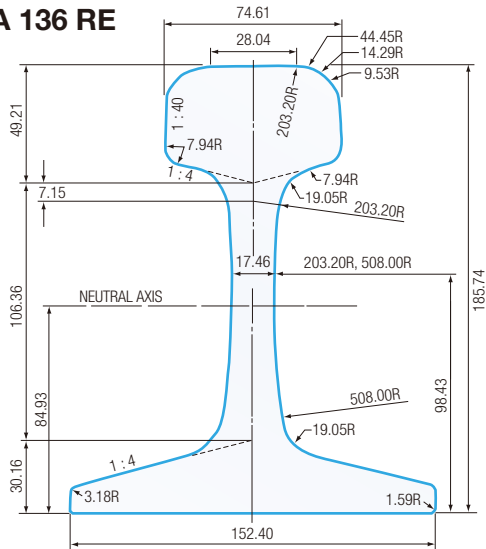
## Sections

### AREMA (American Railway Engineering and Maintenance-of-Way Association)

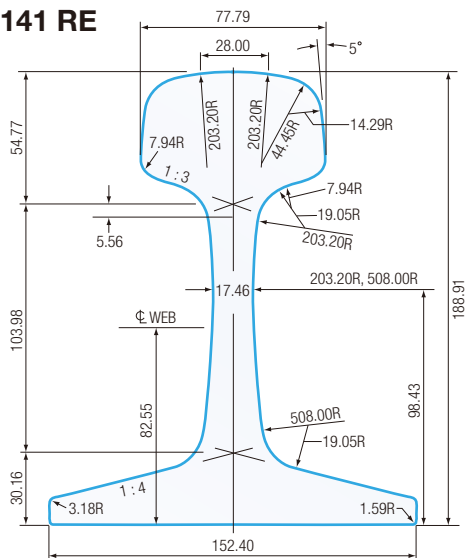
#### AREMA 115 RE



#### AREMA 136 RE

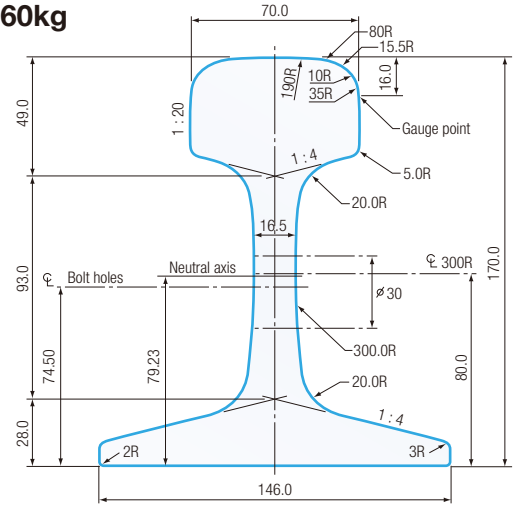


#### AREMA 141 RE

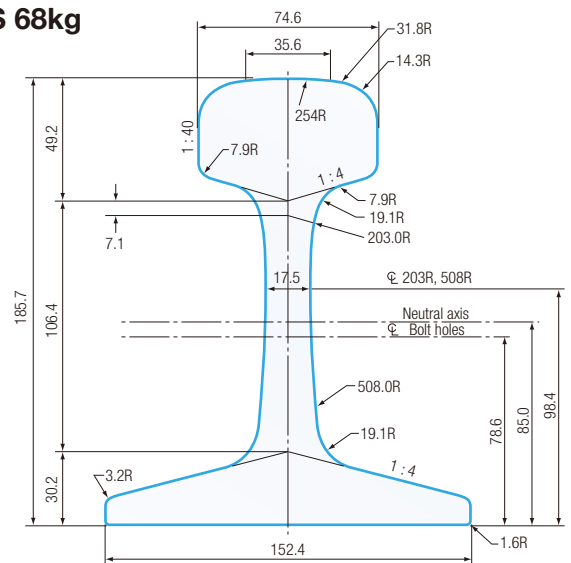


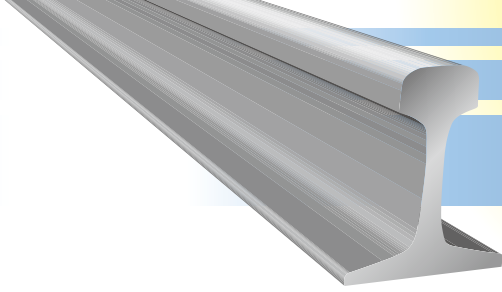
### AS (Australian Standard)

#### AS 60kg



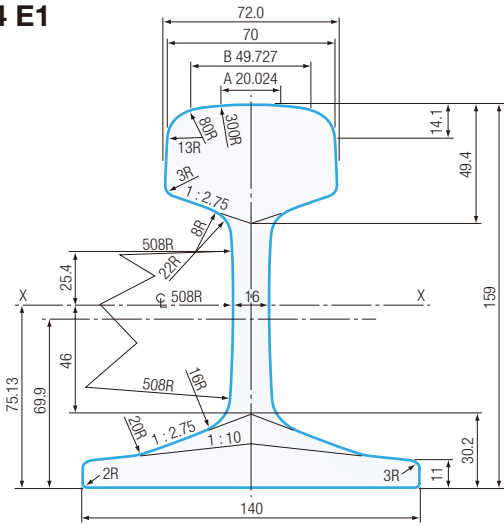
#### AS 68kg



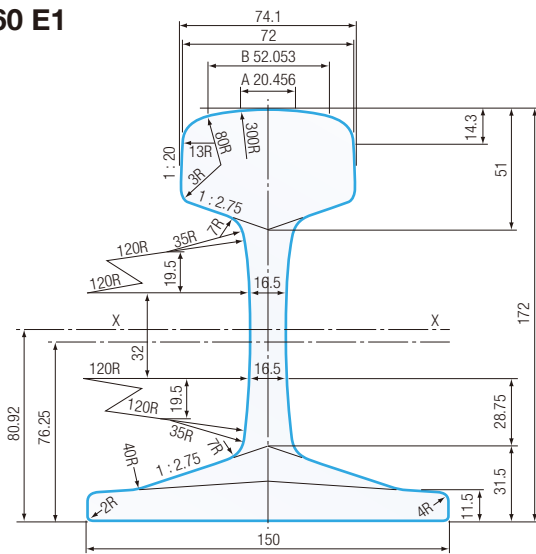


**EN (European Norm)**

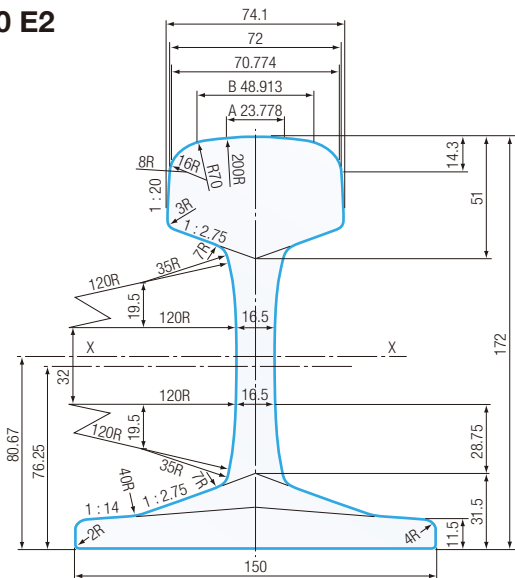
**EN 54 E1**



**EN 60 E1**

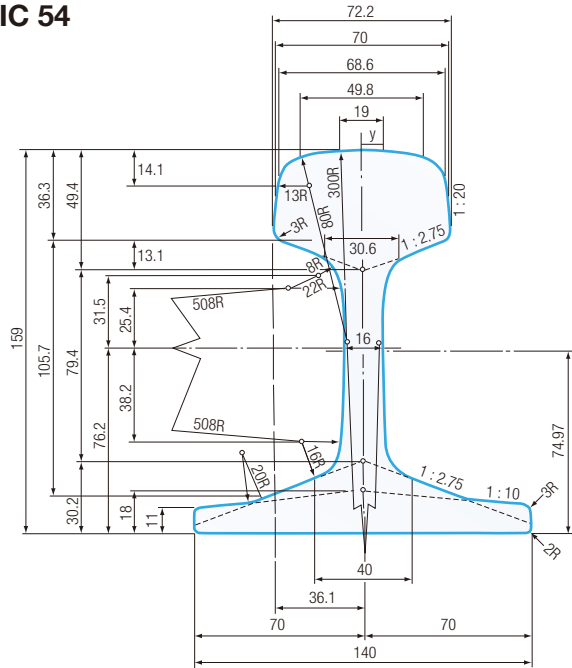


**EN 60 E2**



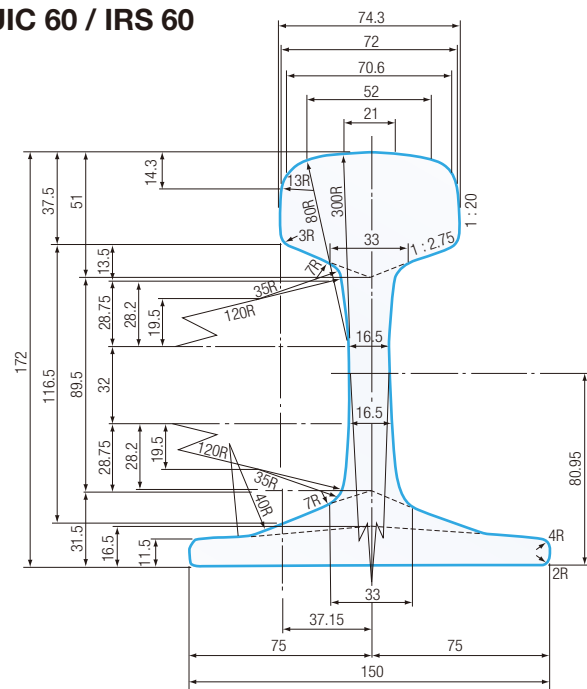
**UIC (International Union of Railway)**

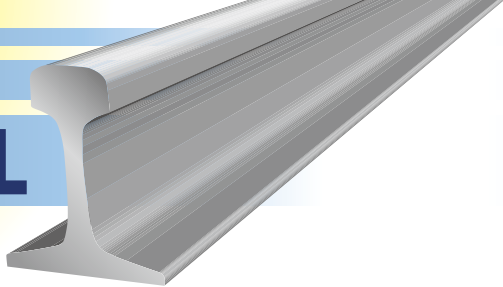
**UIC 54**



**UIC (International Union of Railway)  
IRS (Indian Railway Standard)**

**UIC 60 / IRS 60**

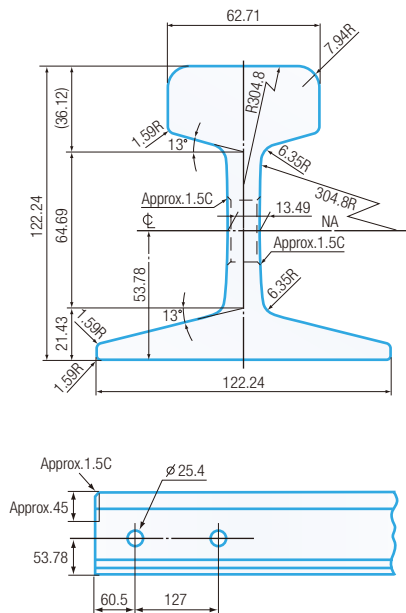




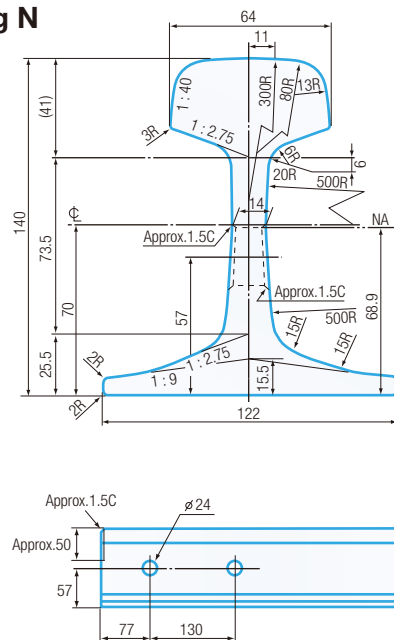
## Sections

### JIS (Japanese Industrial Standards)

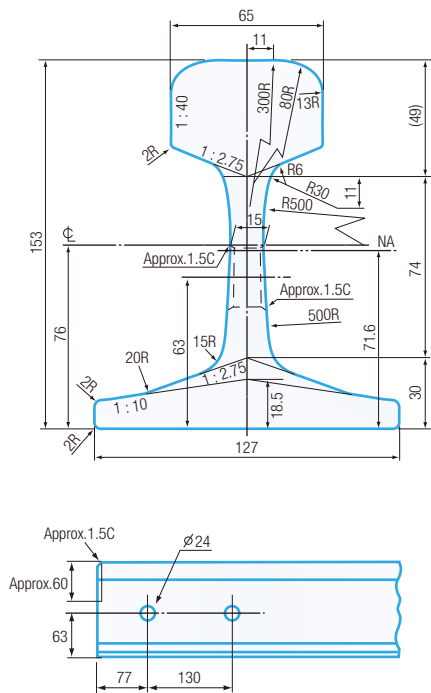
#### JIS 37kg



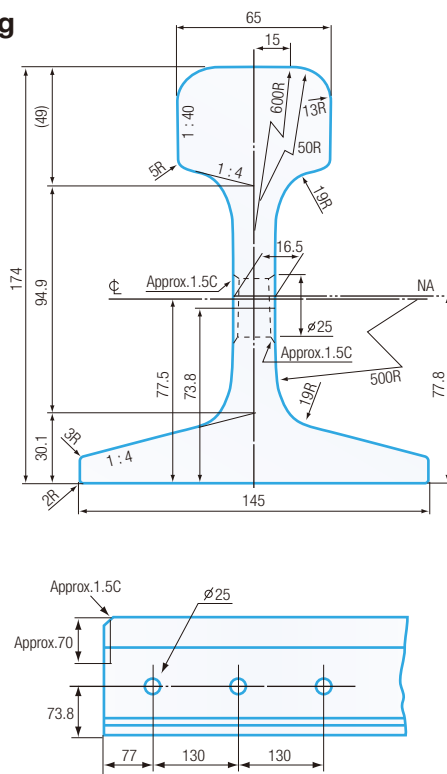
#### JIS 40kg N

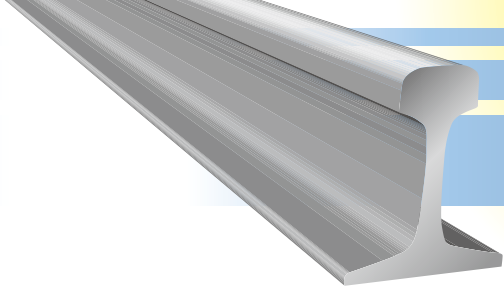


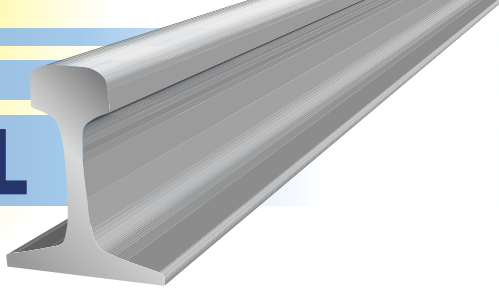
#### JIS 50kg N



#### JIS 60kg







## Head Hardened Rails

(JFE-SP4, SP3, SP2, SPA, THH370N, THH370A, THH370, THH340 and IH)

Designed for heavy haul railways and passenger railways, JFE head hardened rails have been developed by super clean steel making, optimal chemical composition and our advanced on-line heat treatment technologies that deliver still higher economics.

### Features

#### **1 Uniform, thicker head hardened layer.**

Our advanced on-line heat-treatment technologies make the head-hardened region of JFE head hardened rails.

#### **2 Outstanding wear-resistance.**

Optimal alloy designing and advanced heat-treatment technologies bring about the outstanding wear-resistance of JFE head hardened rails.

#### **3 Excellent weld-ability.**

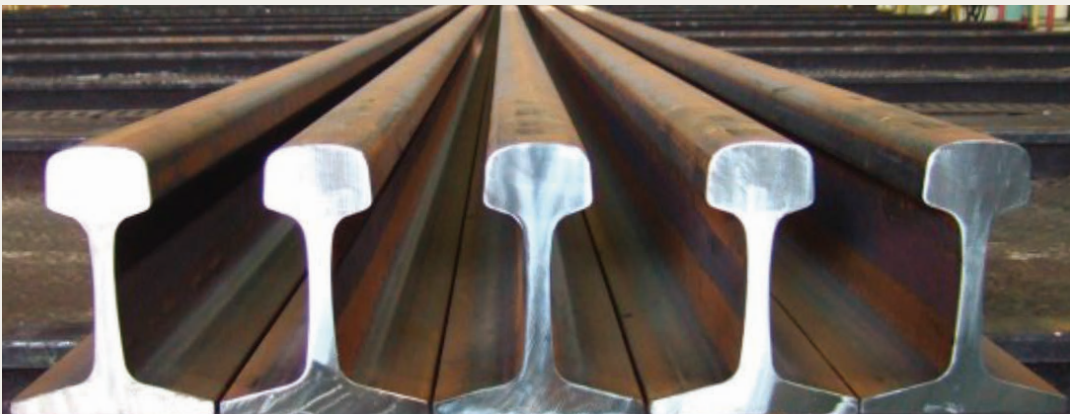
JFE head hardened rails have excellent weld-ability in flash-butt and thermite welding.

#### **4 Consistent quality.**

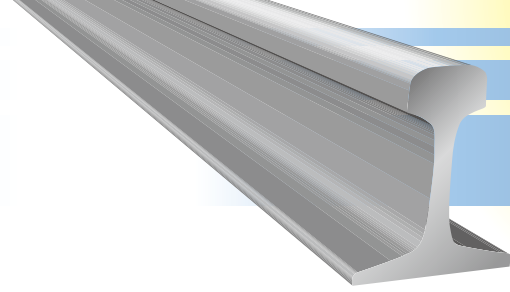
JFE head hardened rails offer consistent quality accomplished by our super-clean steelmaking technology, advanced on-line heat-treatment technique and rigorous inspection systems.

#### **5 Extremely economy.**

The excellent resistance to wear and rolling contact fatigue damage of JFE head hardened rails will greatly contribute to reduce the cost of maintenance and replace.



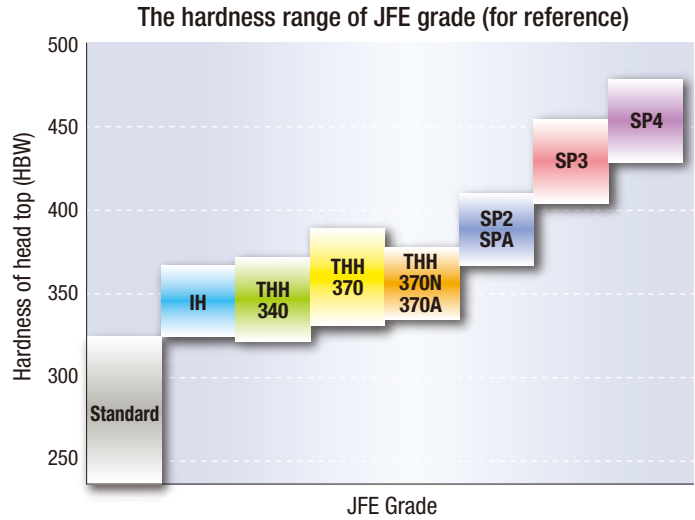




# Quality

## 1. Hardness (for reference)

JFE Grade		Hardness* of head top (HBW) * an approximate average
THH340	JIS E 1120	345
THH370		355
IH		340
THH370N		370
THH370A		370
SP2		390
SPA		390
SP3		430
SP4		450

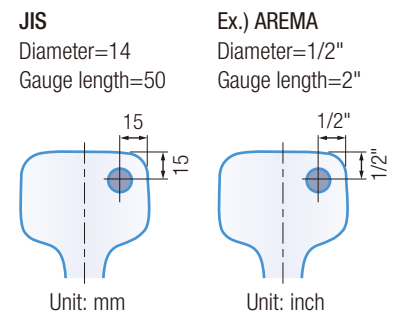


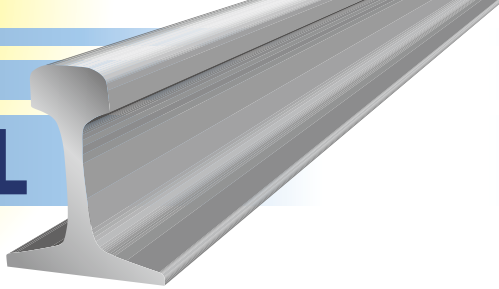
## 2. Chemical composition (for reference)

JFE Grade		C	Si	Mn	P	S	Cr	Others
THH340	JIS E 1120	0.79	0.25	0.76	0.030max.	0.020max.	0.08	V:0.03max.
THH370		0.79	0.17	0.99	0.030max.	0.020max.	0.16	V:0.03max.
IH		0.81	0.30	1.04	0.020max.	0.020max.	0.20	-
THH370N		0.78	0.30	1.20	0.020max.	0.020max.	0.22	-
THH370A		0.77	0.56	0.84	0.020max.	0.020max.	0.44	-
SP2		0.83	0.55	1.17	0.020max.	0.020max.	0.24	add.
SPA		0.83	0.78	0.63	0.020max.	0.020max.	0.44	add.
SP3		0.83	0.55	0.53	0.020max.	0.020max.	add.	add.
SP4		0.83	add.	add.	0.020max.	0.020max.	add.	add.

## 3. Tensile properties (for reference)

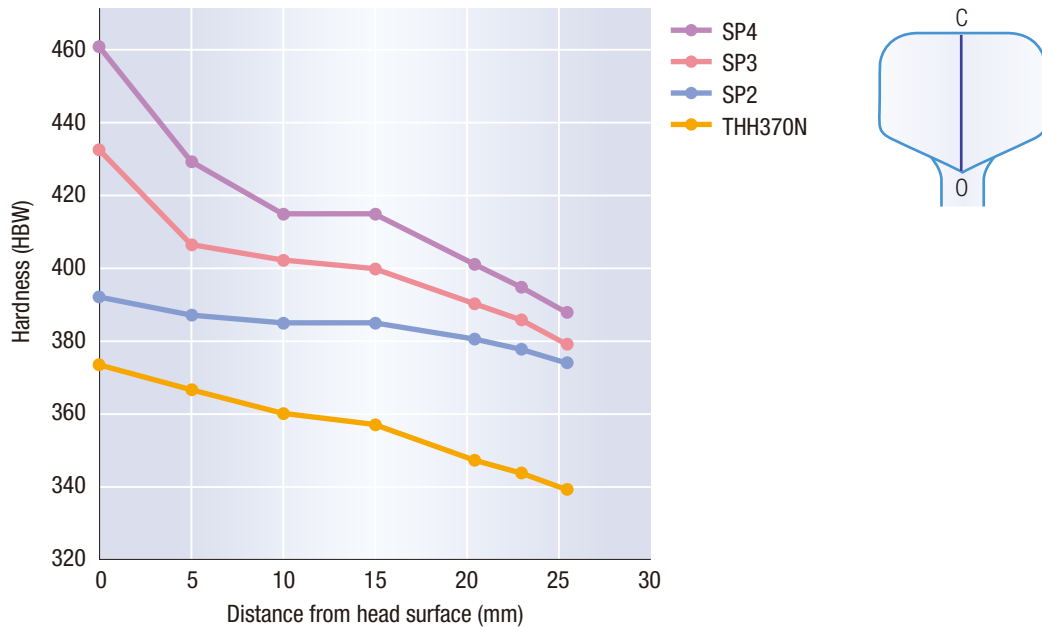
JFE Grade		0.2% Yield Strength N/mm <sup>2</sup> (ksi)	Tensile Strength N/mm <sup>2</sup> (ksi)	Elongation %
THH340	JIS E 1120	-	1,228 (178)	13.1
THH370		-	1,240 (180)	12.8
IH		717 (104)	1,171 (170)	13.6
THH370N		853 (124)	1,285 (186)	12.4
THH370A		880 (128)	1,310 (191)	13.3
SP2		916 (133)	1,366 (198)	12.8
SPA		900 (130)	1,360 (197)	13.4
SP3		967 (140)	1,413 (205)	13.0
SP4		1,002 (145)	1,457 (211)	13.3





## Typical data of JFE rails

### 1. Hardness of rail head cross section (for reference)

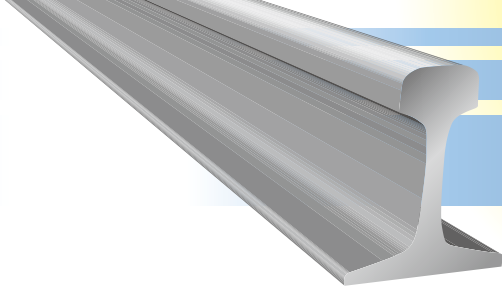


### 2. JFE grade and international standards

The chart of rough correlation of mechanical property between JFE rail grade and major grade of general standard. Though this chart is rough correlation of mechanical property, please use for reference of rail grade.

Please contact us for the confirmation of the detailed conformability.

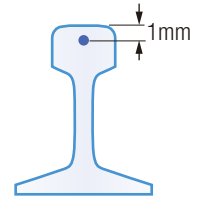
JFE Grade		JIS E 1101, E 1120	EN 13674-1	UIC 860-0	IRS T-12	AREMA Chapter4	AS 1085.1
Standard		Standard	R260	Gr900A	880	Standard	Standard
THH340	JIS E 1120	HH340	R350HT	Gr1100	1080Cr		
THH370		HH370			1080HH		
IH			R320Cr			Intermediate strength	
THH370N			R350HT		High strength	Head hardened	
THH370A			R350LHT				
SP2		-	R370HT				
SPA			R370CrHT				
SP3			R400HT	-			
SP4							



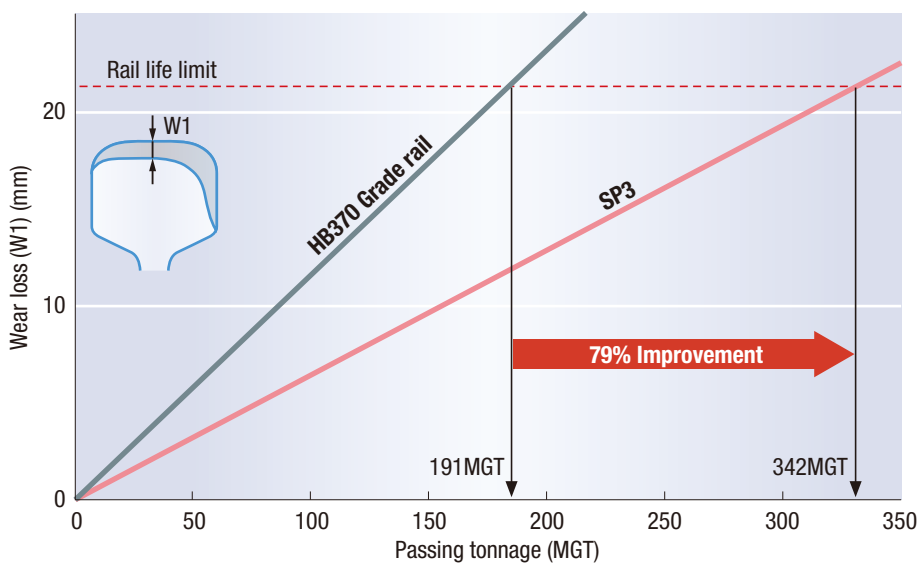
### 3. Properties of head-hardened layers Microstructure (for reference)

Grade	Magnification	
	Optical micrographs (x 200)	SEM image (x 15,000)
● Standard		
● THH 370N		
● SP3		

Measurement point of microstructure

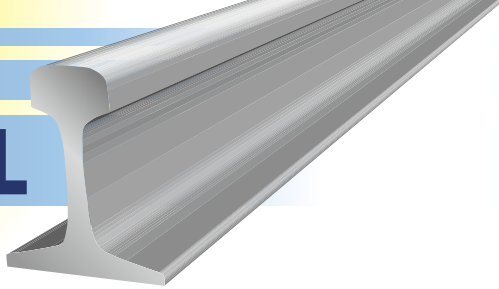


### 4. Rail life comparison in the actual track (for reference)



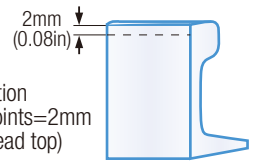
The condition of the curve

- Low Rail
- Curvature : R240 m
- Some lubrication and periodical grinding were conducted.

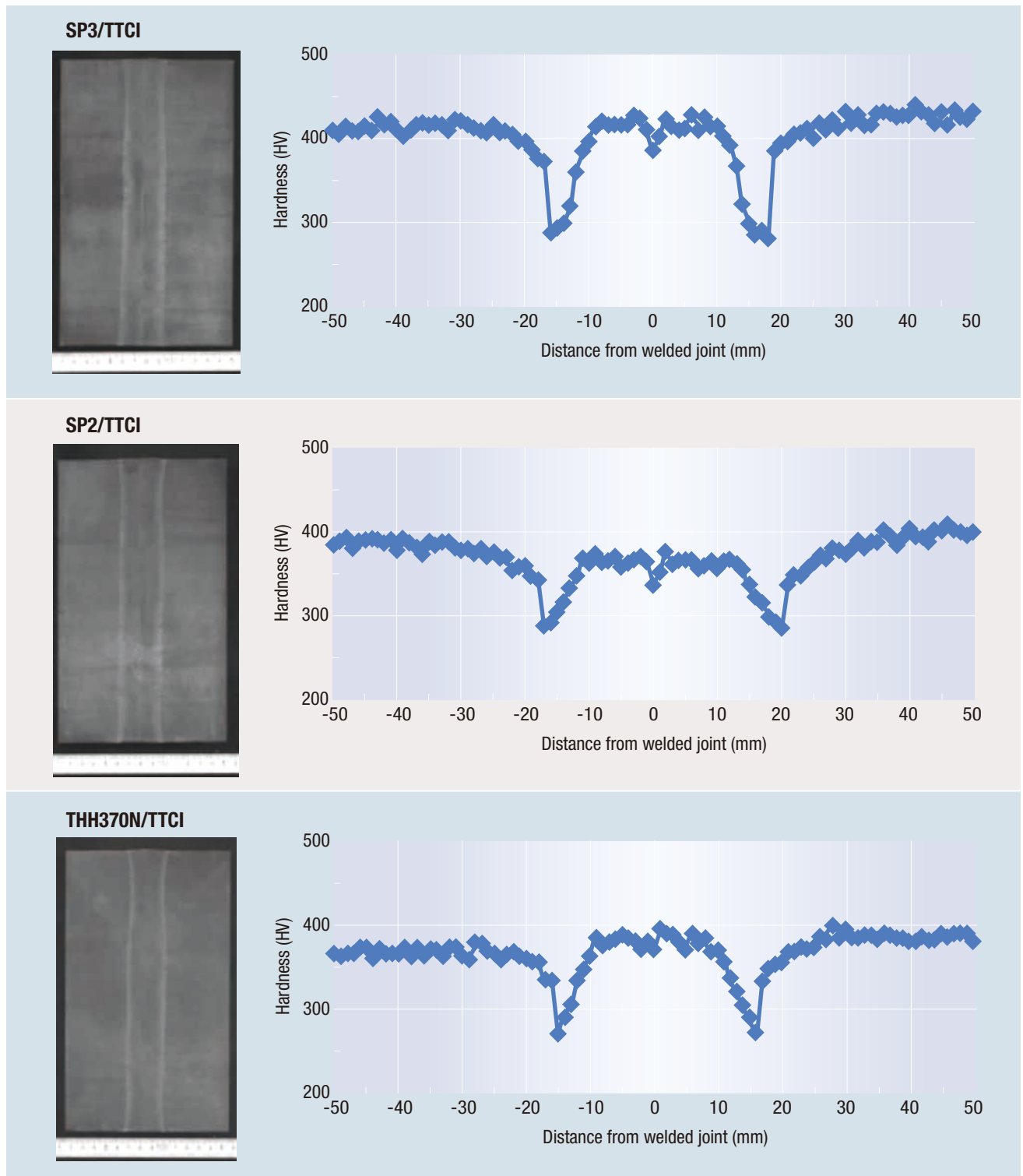


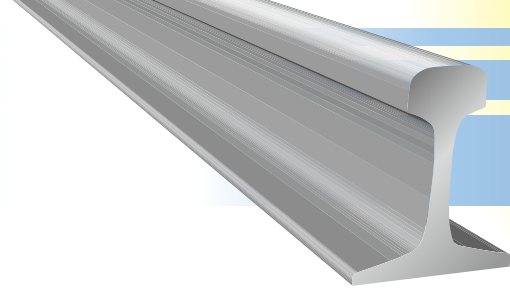
## Typical data of JFE rails

### 5. Hardness distribution in flash-butt welded joints (for reference)



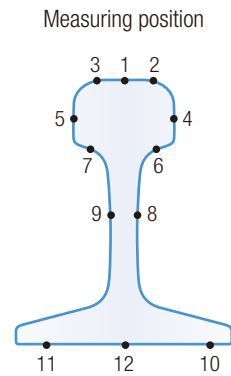
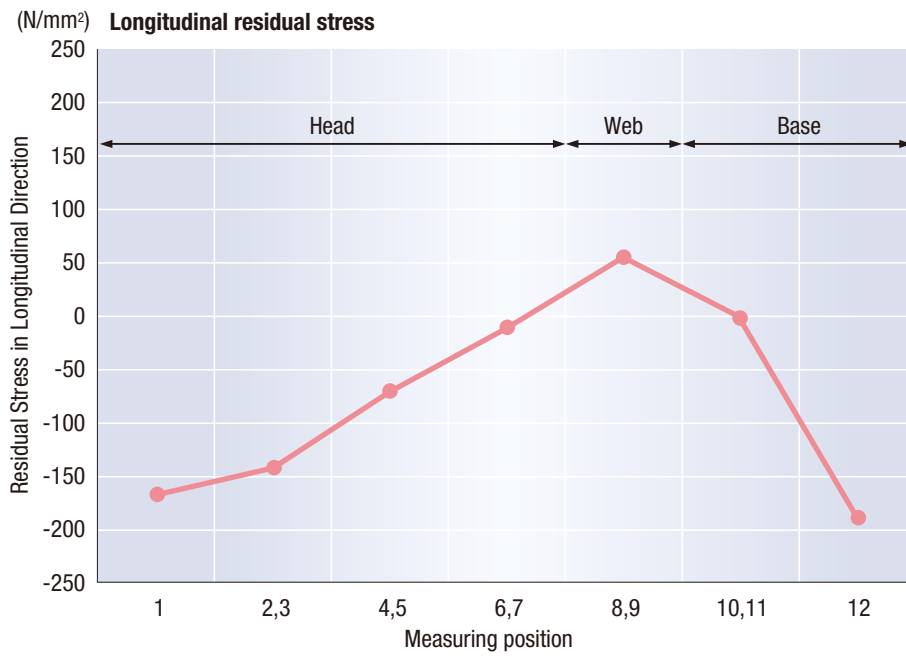
Hardness distribution  
(Measurement points=2mm  
from surface of head top)

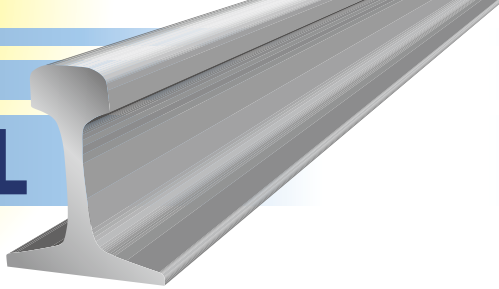




## 6. Residual stress (for reference)

Test method : Contact strain gauge method



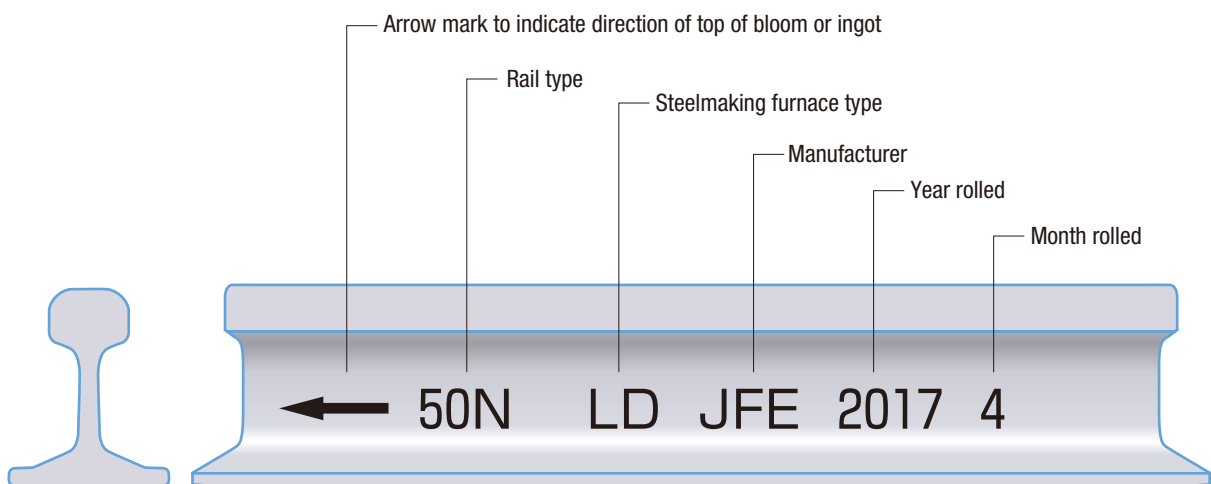


## Marking (Branding and Stamping)

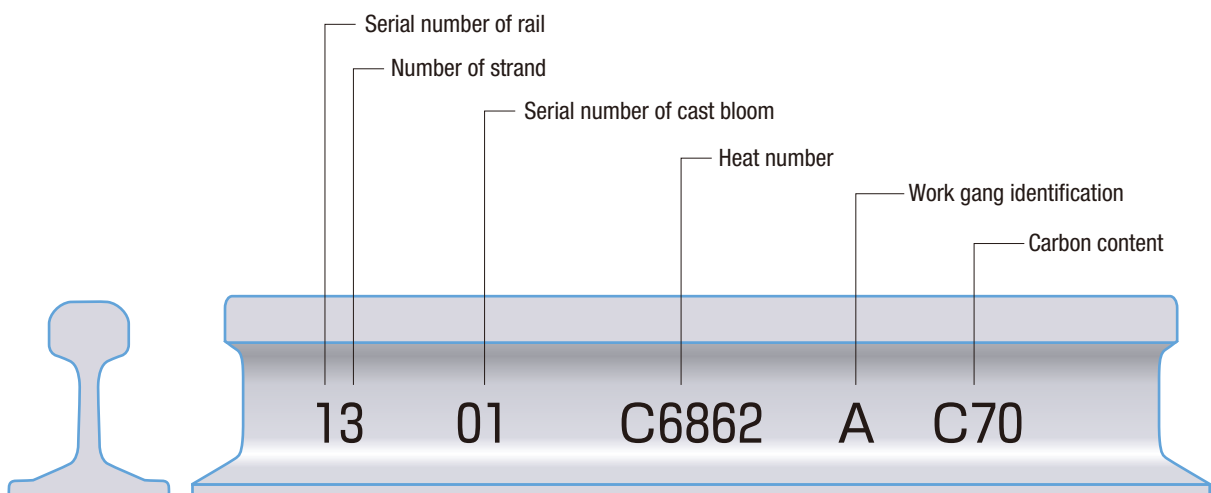
To identify case histories of manufacture, letters and numerical figures are shown in relief and hot-stamped on the web, as shown below.

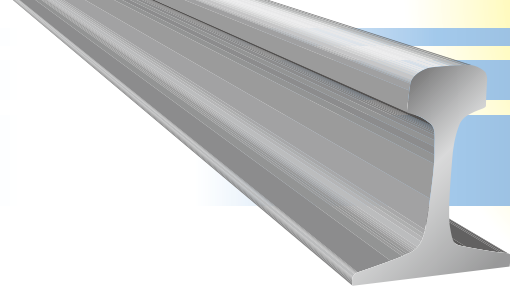
### Japanese Industrial Standard

#### 1 Rolled letters (Branding)



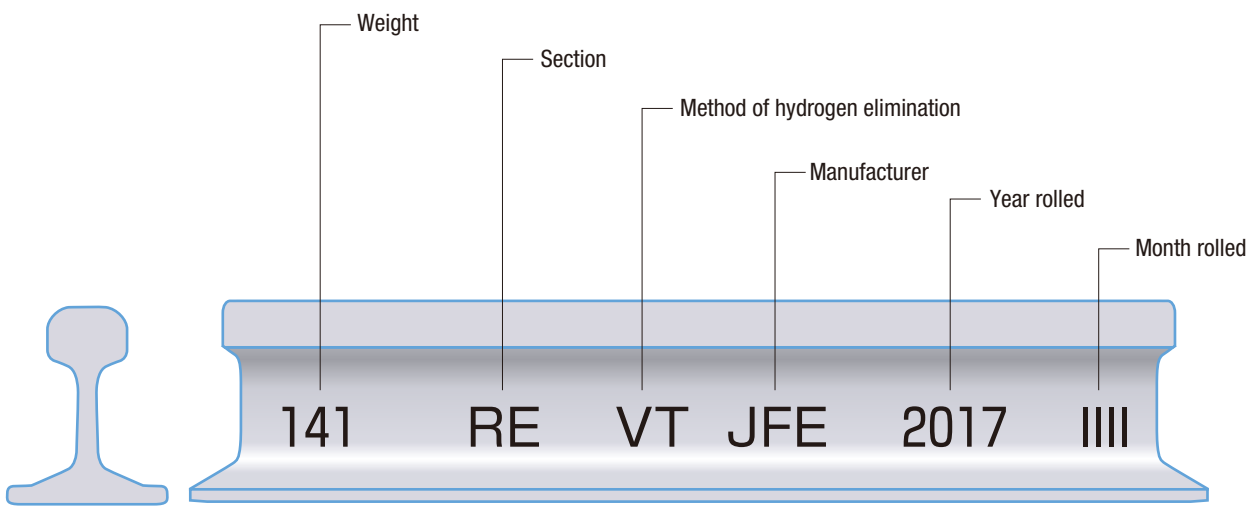
#### 2 Hot-stamped letters (Stamping)



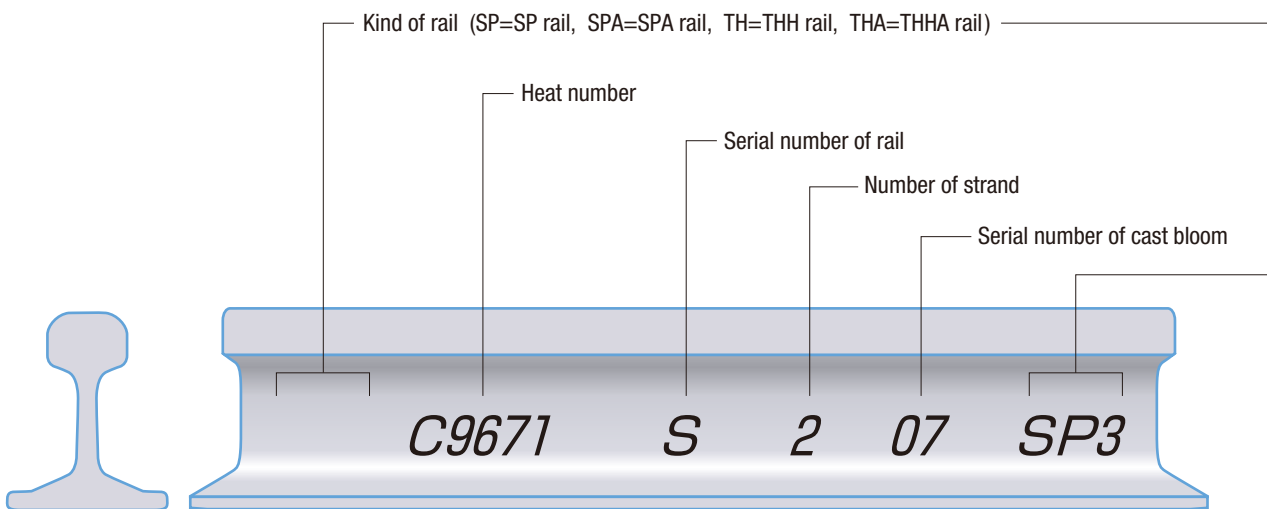


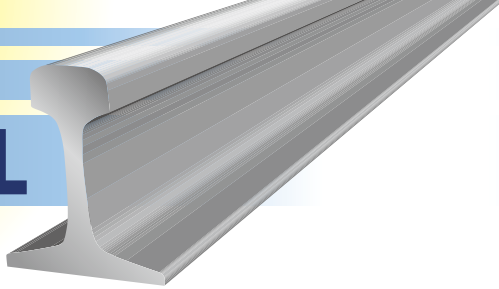
## American Railway Engineering and Maintenance-of-Way Association

### 1 Rolled letters (Branding)



### 2 Hot-stamped letters (Stamping)





## Conversion factors and tables

### Force Conversion Factors

N	kgf	kip	tonf
1	0.101972	$0.224809 \times 10^{-3}$	$0.101972 \times 10^{-3}$
9.80665	1	$2.20462 \times 10^{-3}$	$10^{-3}$
4448.22	453.592	1	0.453592
9806.65	$10^3$	2.20462	1

kip=1000 lbf

### Stress & Pressure Conversion Factors

MPa (N/mm <sup>2</sup> )	kgf/mm <sup>2</sup>	ksi
1	0.101972	$1.45038 \times 10^{-7}$
9.80665	1	1.42233
6.89475	0.703069	1

kip/in<sup>2</sup>= ksi=1000 psi    psi=lbf/in<sup>2</sup>

### Energy Conversion Factors

J	kgf·m	ft·lbf
1	0.101972	0.737562
9.80665	1	7.23301
1.35582	0.138255	1

### Curve Conversion Table

Degree of Curve	Radius of Curve
0° 30'	3492.8
0° 35'	3000
0° 52'	2000
1° 00'	1746.4
1° 10'	1500
1° 30'	1164.3
1° 44'	1000
2° 00'	873.2
2° 11'	800
2° 30'	698.6
2° 55'	600
3° 00'	582.2
3° 30'	500
3° 30'	499.0
4° 00'	436.7
4° 22'	400
4° 30'	388.2
5° 00'	349.4
5° 30'	317.6
5° 50'	300
6° 00'	291.2
7° 00'	249.7
8° 00'	218.5
8° 44'	200
9° 00'	194.2
10° 00'	174.9
11° 00'	159.0
12° 00'	145.8

### Hardness Conversion Table

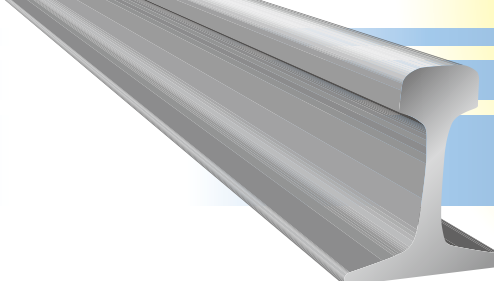
HV	HBW	HRC	HS	TS N/mm <sup>2</sup> (kgf/mm <sup>2</sup> )
530	497	51.1	-	1825 (186)
520	488	50.5	67	1795 (183)
510	479	49.8	-	1750 (179)
500	471	49.1	66	1705 (174)
490	460	48.4	-	1660 (169)
480	452	47.7	64	1620 (165)
470	442	46.9	-	1570 (160)
460	433	46.1	62	1530 (156)
450	425	45.3	-	1500 (153)
440	415	44.5	59	1461 (149)
430	405	43.6	-	1412 (144)
420	397	42.7	57	1373 (140)
410	388	41.8	-	1334 (136)
400	379	40.8	55	1285 (131)
390	369	39.8	-	1245 (127)
380	360	38.8	52	1206 (123)
370	350	37.7	-	1177 (120)
360	341	36.6	50	1128 (115)
350	331	35.5	-	1098 (112)
340	322	34.4	47	1069 (109)
330	313	33.3	-	1030 (105)
320	303	32.2	45	1010 (103)
310	294	31.0	-	981 (100)
300	284	29.8	42	951 (97)
295	280	29.2	-	941 (96)
290	275	28.5	41	922 (92)
285	270	27.8	-	902 (92)
280	265	27.1	40	892 (91)
275	261	26.4	-	873 (89)
270	256	25.6	38	853 (87)
265	252	24.8	-	843 (86)
260	247	24.0	37	824 (84)
255	243	23.1	-	804 (82)
250	238	22.2	36	794 (81)
245	233	21.3	-	775 (79)
240	228	20.3	34	765 (78)

HV Vickers Hardness Load 50kgf  
 HBW Brinell Hardness 10mm Ball Load 3000kgf  
 HRC Rockwell Hardness C-Scale Load 150kgf  
 HS Shore Hardness diamond cone

$$R = \frac{1746.38}{D} \text{ (Degree)} \quad D = 2 \sin^{-1} \frac{50}{R \text{ (ft)}}$$

$$= 2 \sin^{-1} \frac{15.24}{R \text{ (m)}}$$





### Temperature Conversion Table

Celsius (°C) to Fahrenheit (°F)

°C	-0	-2	-4	-6	-8	°C
-60	-76.0	-79.6	-83.2	-86.8	-90.4	-60
-50	-58.0	-61.6	-65.2	-68.8	-72.4	-50
-40	-40.0	-43.6	-47.2	-50.8	-54.4	-40
-30	-22.0	-25.6	-29.2	-32.8	-36.4	-30
-20	-4.0	-7.6	-11.2	-14.8	-18.4	-20
-10	14.0	10.4	6.8	3.2	-0.4	-10
-0	32.0	28.4	24.8	21.2	17.6	-0
°C	0	2	4	6	8	°C
0	32.0	35.6	39.2	42.8	46.4	0
10	50.0	53.6	57.2	60.8	64.4	10
20	68.0	71.6	75.2	78.8	82.4	20
30	86.0	89.6	93.2	96.8	100.4	30
40	104.0	107.6	111.2	114.8	118.4	40
50	122.0	125.6	129.2	132.8	136.4	50
60	140.0	143.6	147.2	150.8	154.4	60
70	158.0	161.6	165.2	168.8	172.4	70
80	176.0	179.6	183.2	186.8	190.4	80
90	194.0	197.6	201.2	204.8	208.4	90
100	212.0	215.6	219.2	222.8	226.4	100
°C	10	20	40	60	80	°C
0	32	68	104	140	176	0
100	212	248	284	320	356	100
200	392	428	464	500	536	200
300	572	608	644	680	716	300
400	752	788	824	860	896	400
500	932	968	1004	1040	1076	500
600	1112	1148	1184	1220	1256	600
700	1292	1328	1364	1400	1436	700
800	1472	1508	1544	1580	1616	800
900	1652	1688	1724	1760	1796	900
1000	1832	1868	1904	1940	1976	1000
1100	2012	2048	2084	2120	2156	1100
1200	2192	2228	2264	2300	2336	1200
1300	2372	2408	2444	2480	2516	1300
1400	2552	2588	2624	2660	2696	1400
1500	2732	2768	2804	2840	2876	1500
1600	2912	2948	2984	3020	3056	1600
1700	3092	3128	3164	3200	3236	1700
1800	3272	3308	3344	3380	3416	1800
1900	3452	3488	3524	3560	3596	1900
2000	3632	3668	3704	3740	3776	2000

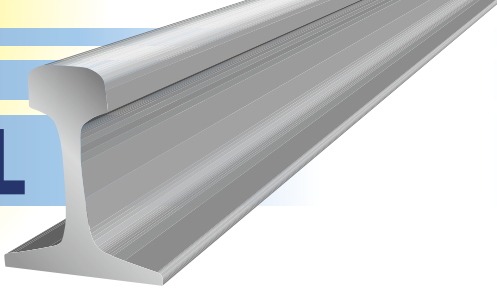
$$F = 32 + \frac{9}{5}C$$

$$C = \frac{5}{9}(F-32)$$

### Temperature Conversion Table

Fahrenheit (°F) to Celsius (°C)

°F	-0	-2	-4	-6	-8	°F
-80	-62.2	-63.3	-64.4	-65.6	-66.7	-80
-70	-56.7	-57.8	-58.9	-60.0	-61.1	-70
-60	-51.1	-52.2	-53.3	-54.4	-55.6	-60
-50	-45.6	-46.7	-47.8	-48.9	-50.0	-50
-40	-40.0	-41.1	-42.2	-43.3	-44.4	-40
-30	-34.4	-35.6	-36.7	-37.8	-38.9	-30
-20	-28.9	-30.0	-31.1	-32.2	-33.3	-20
-10	-23.3	-24.4	-25.6	-26.7	-27.8	-10
-0	-17.8	-18.9	-20.0	-21.1	-22.2	-0
°F	0	2	4	6	8	°F
0	-17.8	-16.7	-15.6	-14.4	-13.3	0
10	-12.2	-11.1	-10.0	-8.9	-7.8	10
20	-6.7	-5.6	-4.4	-3.3	-2.2	20
30	-1.1	0	1.1	2.2	3.3	30
40	4.4	5.6	6.7	7.8	8.9	40
50	10.0	11.1	12.2	13.3	14.4	50
60	15.6	16.7	17.8	18.9	20.0	60
70	21.1	22.2	23.3	24.4	25.6	70
80	26.7	27.8	28.9	30.0	31.1	80
90	32.2	33.3	34.4	35.6	36.7	90
100	37.8	38.9	40.0	41.1	42.2	100
110	43.3	44.4	45.6	46.7	47.8	110
120	48.9	50.0	51.1	52.2	53.3	120
130	54.4	55.6	56.7	57.8	58.9	130
140	60.0	61.1	62.2	63.3	64.4	140
150	65.6	66.7	67.8	68.9	70.0	150
160	71.1	72.2	73.3	74.4	75.6	160
170	76.7	77.8	78.9	80.0	81.1	170
180	82.2	83.3	84.4	85.6	86.7	180
190	87.8	88.9	90.0	91.1	92.2	190
200	93.3	94.4	95.6	96.7	97.8	200
210	98.9	100.0	101.1	102.2	103.3	210
220	104.4	105.6	106.7	107.8	108.9	220
°F	10	20	40	60	80	°F
0	-17.8	-6.7	4.4	15.6	26.7	0
100	37.8	48.9	60.0	71.1	82.2	100
200	93.3	104.4	115.6	126.7	137.8	200
300	148.9	160.0	171.1	182.2	193.3	300
400	204.4	215.6	226.7	237.8	248.9	400
500	260.0	271.1	282.2	293.3	304.4	500
600	315.6	326.7	337.8	348.9	360.0	600
700	371.1	382.2	393.3	404.4	415.6	700
800	426.7	437.8	448.9	460.0	471.1	800
900	482.2	493.3	504.4	515.6	526.7	900
1000	537.8	548.9	560.0	571.1	582.2	1000
1100	593.3	604.4	615.6	626.7	637.8	1100
1200	648.9	660.0	671.1	682.2	693.3	1200
1300	704.4	715.6	726.7	737.8	748.9	1300
1400	760.0	771.1	782.2	793.3	804.4	1400
1500	815.6	826.7	837.8	848.9	860.0	1500
1600	871.1	882.2	893.3	904.4	915.6	1600
1700	926.7	937.8	948.9	960.0	971.1	1700
1800	982.2	993.3	1004.4	1015.6	1026.7	1800
1900	1037.8	1048.9	1060.0	1071.1	1082.2	1900
2000	1093.3	1104.4	1115.6	1126.7	1137.8	2000
2100	1148.9	1160.0	1171.1	1182.2	1193.3	2100
2200	1204.4	1215.6	1226.7	1237.8	1248.9	2200
2300	1260.0	1271.1	1282.2	1293.3	1304.4	2300
2400	1315.6	1326.7	1337.8	1348.9	1360.0	2400
2500	1371.1	1382.2	1393.3	1404.4	1415.6	2500
2600	1426.7	1437.8	1448.9	1460.0	1471.1	2600
2700	1482.2	1493.3	1504.4	1515.6	1526.7	2700
2800	1537.8	1548.9	1560.0	1571.1	1582.2	2800
2900	1593.3	1604.4	1615.6	1626.7	1637.8	2900



## Information to be included with order and inquiries

Orders and inquiries should be accompanied by the following information, and by any other information that can be useful in meeting the customers requirements.

1. Dimension and Weight
2. Grade
3. Specification or Standard
4. Length and Quantity
5. Drilling
6. Marking and Bundling
7. Delivery Date





**JFE Steel Corporation**<http://www.jfe-steel.co.jp/en/>**HEAD OFFICE**

Hibiya Kokusai Building, 2-3 Uchisaiwaicho 2-chome, Chiyodaku, Tokyo 100-0011, Japan Phone: (81)3-3597-3111 Fax: (81)3-3597-4860

**ASIA PACIFIC****SEOUL**JFE Steel Korea Corporation  
16th Floor, 41, Chunggyecheon-ro, Jongno-gu, Seoul,  
03188, Korea  
(Youngpung Building, Seorin-dong)  
Phone: (82)2-399-6337 Fax: (82)2-399-6347**BEIJING**JFE Steel Corporation Beijing  
1009 Beijing Fortune Building No.5, Dongsanhuan  
North Road, Chaoyang District, Beijing, 100004,  
P.R.China  
Phone: (86)10-6590-9051 Fax: (86)10-6590-9056**SHANGHAI**JFE Consulting (Shanghai) Co., Ltd.  
Room 801, Building A, Far East International Plaza,  
319 Xianxia Road, Shanghai 200051, P.R.China  
Phone: (86)21-6235-1345 Fax: (86)21-6235-1346**GUANGZHOU**JFE Consulting (Guangzhou) Co., Ltd.  
Room 3901 Citic Plaza, 233 Tian He North Road,  
Guangzhou, 510613, P.R.China  
Phone: (86)20-3891-2467 Fax: (86)20-3891-2469**MANILA**JFE Steel Corporation, Manila Office  
23rd Floor 6788 Ayala Avenue, Oledan Square,  
Makati City, Metro Manila, Philippines  
Phone: (63)2-886-7432 Fax: (63)2-886-7315**HO CHI MINH CITY**JFE Steel Vietnam Co., Ltd.  
Unit 1704, 17th Floor, MPLaza, 39 Le Duan Street,  
Dist 1, HCMC, Vietnam  
Phone: (84)28-3825-8576 Fax: (84)28-3825-8562**HANOI**JFE Steel Vietnam Co., Ltd., Hanoi Branch  
Unit 1501, 15th Floor, Cornerstone Building, 16 Phan  
Chu Trinh Street, Hoan Kiem Dist., Hanoi, Vietnam  
Phone: (84)24-3855-2266 Fax: (84)24-3533-1166**BANGKOK**JFE Steel (Thailand) Ltd.  
22nd Floor, Abdulrahim Place 990, Rama IV Road,  
Silom, Bangrak, Bangkok 10500, Thailand  
Phone: (66)2-636-1886 Fax: (66)2-636-1891**SINGAPORE**JFE Steel Asia Pte. Ltd.  
16 Raffles Quay, No.15-03, Hong Leong Building,  
048581, Singapore  
Phone: (65)6220-1174 Fax: (65)6224-8357**JAKARTA**JFE Steel Corporation, Jakarta Office  
6th Floor Summitmas II, JL Jendral Sudirman Kav.  
61-62, Jakarta 12190, Indonesia  
Phone: (62)21-522-6405 Fax: (62)21-522-6408**NEW DELHI**JFE Steel India Private Limited  
806, 8th Floor, Tower-B, Unitech Signature Towers,  
South City-I, NH-8, Gurgaon-122001, Haryana, India  
Phone: (91)124-426-4981 Fax: (91)124-426-4982**MUMBAI**JFE Steel India Private Limited, Mumbai Office  
603-604, A Wing, 215 Atrium Building, Andheri-Kurla  
Road, Andheri (East), Mumbai-400093, Maharashtra,  
India  
Phone: (91)22-3076-2760 Fax: (91)22-3076-2764**CHENNAI**JFE Steel India Private Limited, Chennai Office  
No.86, Ground Floor, Polyhose Towers(SPIC Annexe),  
Mount Road, Guindy, Chennai-600032, Tamil Nadu,  
India  
Phone: (91)44-2230-0285 Fax: (91)44-2230-0287**BRISBANE**JFE Steel Australia Resources Pty Ltd.  
Level28, 12 Creek Street, Brisbane QLD 4000  
Australia  
Phone: (61)7-3229-3855 Fax: (61)7-3229-4377**EUROPE and MIDDLE EAST****LONDON**JFE Steel Europe Limited  
15th Floor, The Broadgate Tower, 20 Primrose Street,  
London EC2A 2EW, U.K.  
Phone: (44)20-7426-0166 Fax: (44)20-7247-0168**DUBAI**JFE Steel Corporation, Dubai Office  
P.O.Box 261791 LOB19-1208, Jebel Ali Free Zone  
Dubai, U.A.E.  
Phone: (971)4-884-1833 Fax: (971)4-884-1472**NORTH, CENTRAL and SOUTH AMERICA****NEW YORK**JFE Steel America, Inc.  
600 Third Avenue, 12th Floor, New York, NY 10016,  
U.S.A.  
Phone: (1)212-310-9320 Fax: (1)212-308-9292**HOUSTON**JFE Steel America, Inc., Houston Office  
750 Town & Country Blvd., Suite 705 Houston,  
Texas 77024, U.S.A.  
Phone: (1)713-532-0052 Fax: (1)713-532-0062**MEXICO CITY**JFE Steel America, Inc., Mexico Office  
Ruben Dario #281, 1404 Col. Bosque de  
Chapultepec, C.P. 11580, Mexico, D.F. Mexico  
Phone: (52)55-5985-0097 Fax: (52)55-5985-0099**RIO DE JANEIRO**JFE Steel do Brasil LTDA  
Praia de Botafogo, 228 Setor B, Salas 508 & 509,  
Botafogo, CEP 22250-040, Rio de Janeiro-RJ, Brazil  
Phone: (55)21-2553-1132 Fax: (55)21-2553-3430**Notice**

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