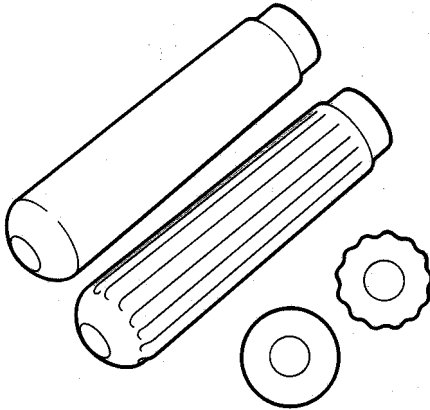




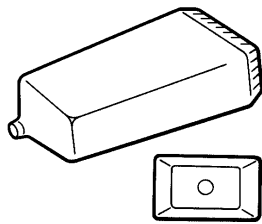
All molds are available at either EQS or ENS unless noted with (Q) currently EQS or (N) currently ENS only, mold locations modified as needed



ROUND MOLDS

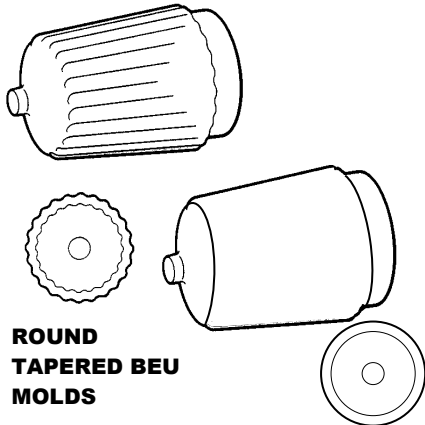
Ingot Name	Ingot(s) Per Heat	Mold Size (in.)	Mean Diameter (in.)	Mean Area (sq. in.)	***Gross Weight*** Length (in.) Weight (lbs.)	***Net Weight*** Length (in.) Weight (lbs.)
10*(Q)	4-12	10x185	10	83	182 3,900	171 3,700
13	12-(15)	13x185	12.75	138	182 6,400	171 6,000
16L	7-(8)	16x197	16.25	214	194 10,800	180 10,120
18	7-(8)	18x185	17.75	251	182 12,300	171 11,300
20L	5-(6)	21x197	21	322	194 16,500	180 15,500
24	4	24x175	24	471	173 21,200	158 19,500
24L	4	24x197	24	471	196 24,100	181 22,400
27L	3-(4)	27.5x165	26.5	583	163 24,750	149 22,250
29 (Q)	3	29x190	28.25	630	186 30,500	169 28,250
31S(Q)	4	31x110	31	755	108 21,000	94 19,000
31L	3	31x158	30.75	755	156 30,700	140 28,000
31XL	3	31x175	30.75	755	172 33,500	156 30,750
33L (Q)	3	33x145	32	895	143 32,200	127 29,000
36R	2	36x160	36	1,010	160 41,000	94 36,900
36N	2	36x185	36	1,010	185 50,000	170 45,000
37R	2	37x190	37	1075	187 50,300	164 45,700
39S	3	39x110	39	1,195	108 32,250	91 27,750
39	2	39x138	38.5	1,195	137 42,100	118 38,000
39L	2	39.5x156	39	1,195	154 46,000	135 41,900
39M	2	39x172	39	1,195	170 51,000	151 46,000
47L	2	47x120	46	1,791	108 48,900	90 40,750
50	2	51x116	49.5	1,912	105 49,400	92 42,500
60X (Q)	1	60x140	60.1	2,860	137 98,000	120 85,000
60E (Q)	1	60x150	60.1	2,860	142 103,000	125 90,000

*Partial heats only for 10" split with 13" or 16". () Indicate standard heat lot quantity. All molds range from a slightly BEU to BED. Diameters are approximate. Ingot weights and lengths are variable. EQS sales can provide details.



**SMOOTH SIDED
SQUARE & RECTANGULAR
TAPERED BEU MOLDS**

Ingot Name	Ingot(s) Per Heat	Mold Size (in.)	Top Dimension (in.)	Bottom Dimension (in.)	Mean Area (sq. in.)	***Gross Weight*** Length (in.) Weight (lbs.)	***Net Weight*** Length (in.) Weight (lbs.)
12x39	6	12x39x130	12x39	10.5x38	434	122 13,400	104 11,300
12x52	5-(6)	12x52x114	12x54	10.5x52	568	110 16,000	95 13,400
20S	7-(14)	20x20x82	21x21	18x18	379	82 7,100	70 6,000
22x57	3	22x57x107	22x57	21x56	1215	98 28,000	80 24,000
25x27	6-(7)	25x27x95	25x27	24x18	511	81 11,900	65 10,250
28x36	5-(6)	28x36x85	28x36	22x32	856	71 15,900	61 13,500
30SN (N)	6-(7)	30x30x78	30.25x30.25	23.75x23.75	739	78 13,500	68 11,500
34S (N)	4-(5)	34x34x82	34x34	27.5x 27.5	956	79 20,000	68 17,200
34x47	3	34x47x71	34x46.5	24.25x38.5	1,284	69 24,200	59 20,150
34x47L	3	34x47x91	34.5x47	24.25x38.5	1,321	80 28,300	69 24,250
36S (N)	4-(5)	36x36x79	36x36	29.7x29.7	865	86 22,750	74 19,500
40x53L	2	40x53x104	40.25x52	33x44.25	1,805	100 44,500	88 37,000
40x53X	2	40x53x112	40.25x52	33x44.25	1,831	108 48,800	96 41,000
60x79AB(Q)	1	60x79x92	58.2x76.5	51.8x72	4,189	81 103,000	73 79,000



**ROUND
TAPERED BEU
MOLDS**

Ingot Name	Ingot(s) Per Heat	Mold Size (in.)	Top Dimension (in.)	Bottom Dimension (in.)	Mean Area (sq. in.)	***Gross Weight*** Length (in.) Weight (lbs.)	***Net Weight*** Length (in.) Weight (lbs.)
30	5(6)(7)	30x114	29.75	23.25	501	107 14,200	92 12,300
30L*	5	30x127	29.75	23.25	523	115 17,300	100 15,200
40R(N)	3	40x125	40.5	32	963	126 33,200	109 27,700
43	3	43x104	42.75	32.50	1,037	104 28,000	84 23,800
49 (Q)	2	48x124	48	38	1,202	121 40,750	97 34,000
49L*(Q)	2	48x149	48	38	1,331	138 50,150	119 42,500
58	2	58x103	56.25	46.5	1,897	95 48,900	78 39,500
60L*(Q)	1	60x128	58.5	46.25	2,034	147 84,000	120 68,000
63S**	2	63x66	63.75	53.25	2,671	80 56,800	61 43,000
63*	1	63x86	63.75	53.25	2,744	105 73,000	84 58,000
63L*	1	63x121	63.75	53.25	2,656	124 86,000	97 71,000
69*	1	69x104	68	57.75	2,952	126 101,300	101 79,000

Weights may be variable.
*Superimposed hot tops
**Additional charge due to reduced refractory life on big ladle.
Heat weights are limited to 100,000 lb. max.; 72,000 lb. min.
All weights, lengths, and dimensions given are typical values.
Lengths are measured to bottom corner of ingot.

All molds are BEU for optimal cleanliness and center soundness.
Hot tops are variable on cylindrical ingots for weight and size flexibility.
Different ingot sizes may be combined for the production of 1 heat of steel.
Hot shipment of steel is available to delivery within a 200 mi. radius of the mill where permits allowed.
Ingot saw cutting to 60" and torch cutting thru 102" are available.
Cropped refers to top removal only.



Product Capability Data

All carbon and alloy steel produced at **EQS** and **ENS** Electric Furnace melted, ladle refined and vacuum degassed. Low carbon stainless steel at ENS is Electric Furnace melted, ladle refined and refined using vacuum oxygen decarburization. EQS and ENS bottom pour all ingots into either cylindrical or tapered big end up molds. All ingots receive a specific thermal cycle following removal from ingot molds resulting in an ingot surface hardness < 286 BHN and reduced ingot residual stresses.

Your modifications of these and other grades can be produced to your specification.

Quality System for the manufacturing of steel forging ingots certified to the ISO 9001:2015 and AS-9100D.

CHEMISTRY:

Carbon, Alloy, & Stainless Steel, Nickel-Based, and Copper Alloys.
Tight Control provides excellent repeatability to heat treat response, dimensional control & mech. properties.

ELEMENT	AIM%	CHEMISTRY RANGE (MIN TOLERANCE)
Carbon	<0.60	+/- 0.01
	>0.60	+/- 0.02
Manganese	<1.50	+/- 0.03
	>1.50	+/- 0.05
Silicon	<0.5	+/- 0.03
	>0.5	
Chromium	<2	+/- 0.03
	2 to 6	+/- 0.05
	6 to 10	+/- 0.10
	10 to 25	+/- 0.20
	>25	+/- 0.50
Nickel	<2	+/- 0.03
	2 to 5	+/- 0.05
	5 to 25	+/- 0.20
	10 to 25	+/- 0.25
	>25	+/- 0.50
Molybdenum	<1	+/- 0.01
	1 to 5	+/- 0.03
	>5	+/- 0.10
Sulfur*	0.001% max	
Phosphorus*	0.006% max	
Hydrogen*	1.5 ppm max in mold	

*lowest values capable (may be higher for certain grades)

CLEANLINESS:

A wide variety of applications are served by Ellwood Quality Steels Co., therefore we review cleanliness requirements case by case.

For all applications:

Magnetic Particle: AMS 2301
Ultrasonic: 1/8" Flat Bottom Hole

For Big End Up ingot applications

Magnetic Particle: AMS 2304
Ultrasonic: less than 1/8" Flat Bottom Hole

For Remelted ingot applications

Magnetic Particle: AMS 2300
Ultrasonic: Less than 5/64" Flat Bottom Hole

EQS offers VAR and ESR ingots; Sizes & weights are listed:

VAR Ingot Capabilities		ESR Ingot Capabilities	
Diameter (in.)	Weight (lbs.)	Diameter (in.)	Weight (lbs.)
20	9,000	20	9,000
24	12,500	25	16,000
30	18,500	30	19,500
33	26,000	35	26,000
36	33,000	42	40,000
42	38,000	55	63,000
		59	75,000
		12x50	15,000

Typical grades produced at EQS and ENS. Additional grades available upon request.

Carbon // Plain Carbon 10xx / Re-sulfurized 11xx | Re-phosphorized 12xx / High Manganese 15xx //

Manganese // Hadfield Steels //

Alloy // Nickel-Chromium 3xxx / Molybdenum 40xx | Nickel-Molybdenum 46xx / 48xx / Molybdenum-Chromium 41xx / Chromium 5xxx / 52100 /
Nickel-Chromium-Molybdenum 43xx / 47xx / 93xx / 94xx | Silicon-Manganese 92xx | HSLA 80/100 | HY 80/100 | 300M | D6AC | Nitralloy 135M and N //

Stainless // Austenitic 303 / 304-L / 310 / 316L / 317 / 321-H / 347-H / FXM- 11 / FXM-19 / Ferritic 430 | Martensitic 403 / 410 / 410S / 416 / 420 / 422 / 431 / 440A, B, C |
Precipitation Hardening 15-5 / 17-4 | Duplex F51 / S31803 / S32205 | Super Duplex F53 / S32750 | Greek Ascology (418) | Jethete M152 | F6NM

Nickel // High Nickel Alloys: Alloy 800/H/HT: UNS N08810 / N08811 | Alloy 825: UNS N08825 //

// Nickel Based Alloys: Alloy 600: UNS N06600 // Alloy 625: UNS N06625 // Alloy 400: UNS N04400 // Alloy C276: UNS N10276 //

Copper // Copper Based Alloys: 70/30 Cu Ni: Alloy C71500 //

//Certified to industry (ASTM, AMS, Mil-S, DIN, etc.) standards or tailored to your custom specification //

