

From L.C.C.

PENNSYLVANIA RAILROAD

LINES EAST AND WEST OF PITTSBURGH

ISSUED ALTOONA, PA.
JUNE 1, 1916.

No. 109-F

CLASSIFICATION AND DESCRIPTION OF LOCOMOTIVES

(SUPERSEDING CLASSIFICATION AND DESCRIPTION No. 109-E, DATED JUNE 1, 1912)

In this classification, locomotives are grouped into typical classes according to the number of wheels used under them, irrespective of the service for which they are intended, using a primary letter to designate the type. Successive designs of a type are designated by numbers following the primary letter, and small suffix letters are used to indicate modifications of any particular class of locomotive.

Class A.—Locomotives with two pairs of drivers
and no truck.



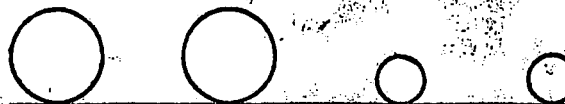
Class B.—Locomotives with three pairs of drivers
and no truck.



Class C.—Locomotives with four pairs of drivers
and no truck.



Class D.—Locomotives with two pairs of drivers
and four wheel truck.



Class E.—Locomotives with two pairs of drivers,
four wheel truck and trailing wheels.



Class F.—Locomotives with three pairs of drivers
and two wheel truck.



Class G.—Locomotives with three pairs of drivers
and four wheel truck.



Class H.—Locomotives with four pairs of drivers
and two wheel truck.



Class J.—Locomotives with three pairs of drivers,
two wheel truck and trailing wheels.



Class K.—Locomotives with three pairs of drivers,
four wheel truck and trailing wheels.



Class L.—Locomotives with four pairs of drivers, two wheel truck and trailing wheels.



Class CC.—Articulated locomotive with eight pairs of drivers and no truck.



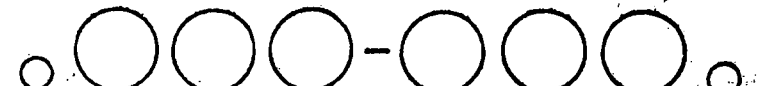
Class HH.—Articulated locomotive with eight pairs of drivers and two two-wheel trucks.



Class DD.—Articulated locomotive with four pairs of drivers and two four-wheel trucks.



Class FF.—Articulated locomotive with six pairs of drivers and two two-wheel trucks.



Under these general types the different classes of locomotives are classified as follows:

- Class A 1, formerly class Q, 44" drivers.
- Class A 2, formerly class Q, 50" drivers, with tender.
- Class A 2 a, formerly class Q, 50" drivers, without tender.
- Class A 3, formerly class U.
- Class A 3 a.
- Class A 4.
- Class A 5 s.
- *Class A 29, formerly class Pg. (Now out of existence.)
- *Class A 30, (Now out of existence.)
- Class B 1, formerly class F. (Now out of existence.)
- Class B 2, formerly class H. (Now out of existence.)
- Class B 3, formerly class M, old type with tender.
- Class B 3 a, formerly class M, old type without tender. (Now out of existence.)
- Class B 4, formerly class M, type of 1891.
- Class B 4 a, formerly class M, type of 1893.
- Class B 4 b, formerly B 4 with saddle tank applied.
- Class B 5, formerly class I, converted into six-wheel shifting engines.
- *Class B 5 a, formerly class H 2a, converted into six wheel shifting engines.
- *Class B 6.
- *Class B 6 s.
- Class B 6 a.
- Class B 6 s a.
- Class B 6 s b.
- Class B 7, formerly class H 3, converted into six wheel shifting engines. (Now out of existence.)
- Class B 7 a, formerly class H 3 a, converted into six-wheel shifting engines. (Now out of existence.)
- Class B 8.
- *Class B 29.
- *Class B 30, acquired with C. S. & H. (Now out of existence.)
- *Class B 31, acquired with C. S. & H. (Now out of existence.)
- *Class B 32, acquired with C. S. & H. (Now out of existence.)
- *Class B 33, acquired with C. L. & N. (Now out of existence.)
- *Class B 35, (Now out of existence.)
- *Class C 29, formerly class H 1, H2 or H2 a, converted into eight-wheel shifting engines.
- *Class C 30.
- *Class C 31.
- Class Geared Electric No. 10001.
- Class Geared Electric No. 10002.
- Class D 1, formerly class A bit. (Now out of existence.)
- Class D 2, formerly class B. (Now out of existence.)
- Class D 2 a, formerly class BA. (Now out of existence.)
- Class D 3, formerly class C bit. (Now out of existence.)
- Class D 4, formerly class C anth. (Now out of existence.)
- Class D 4 a, formerly class CA anth. (Now out of existence.)
- Class D 5, formerly class G. (Now out of existence.)
- Class D 6, formerly class K, 78" drivers. (Now out of existence.)
- Class D 6 a, formerly class K, 72" drivers. (Now out of existence.)
- Class D 6 b, formerly class K, 72" drivers. (68" drivers substituted for 72" drivers.) (Now out of existence.)
- Class D 7, formerly class A anth., 68" drivers. (Now out of existence.)

Class D 7 a, formerly class A anth., 62" drivers. (Now out of existence.)
 Class D 8, formerly class N. (Now out of existence.)
 Class D 8 a, formerly class O, 130 lbs.
 Class D 9, formerly class O, 160 lbs., 54" boiler, 62" drivers. (Now out of existence.)
 Class D 9 a, formerly class O, 160 lbs., 54" boiler, 68" drivers.
 Class D 10, formerly class O, 160 lbs., 57" boiler, 62" drivers.
 Class D 10 a, formerly class O, 160 lbs., 57" boiler, 68" drivers.
 Class D 11, formerly class P, 140 lbs., 62" drivers. (Now out of existence.)
 Class D 11 a, formerly class P, 140 lbs., 68" drivers. (Now out of existence.)
 Class D 12, formerly class P, 160 lbs., 54" boiler, 62" drivers. (Now out of existence.)
 Class D 12 a, formerly class P, 160 lbs., 54" boiler, 68" drivers. (Now out of existence.)
 Class D 13, formerly class P, 160 lbs., 57" boiler, 62" drivers, type of 1892. (Now out of existence.)
 Class D 13 a, formerly class P, 160 lbs., 57" boiler, 68" drivers, type of 1892.
 Class D 13 b, formerly class P, 160 lbs., 57" boiler, 62" drivers, type of 1893. (Now out of existence.)
 Class D 13 c, formerly class P, 160 lbs., 57" boiler, 68" drivers, type of 1893.
 Class D 14, formerly class P, 175 lbs., 78" drivers. (Now out of existence.)
 Class D 14 a, formerly class P, 175 lbs., 80" drivers. (Now out of existence.)
 Class D 14 b, formerly class P, 175 lbs., 80" drivers. (68" drivers substituted for 80" drivers.)
 Class D 14 c, formerly class P, 175 lbs., 78" drivers. (68" drivers substituted for 78" drivers.) (Now out of existence.)
 Class D 15, formerly class T compound. (Now out of existence.)
 Class D 16, formerly class L, 68" drivers.
 Class D 16 a, formerly class L, 80" drivers.
 Class D 16 b.
 Class D 16 s b.
 Class D 16 c. (Now out of existence.)
 Class D 16 d.
 Class D 16 s d.
 *Class D 29, formerly class Pa.
 *Class D 30, acquired with C. S. & H. (Now out of existence.)
 *Class D 31, acquired with C. S. & H. (Now out of existence.)
 *Class D 33, acquired with C. & M. (Now out of existence.)
 *Class D 34, acquired with C. & M. (Now out of existence.)
 *Class D 35, acquired with C. & M. (Now out of existence.)
 *Class D 36, acquired with C. & M. (Now out of existence.)
 *Class D 37, acquired with C. L. & N. (Now out of existence.)
 *Class D 38, acquired with C. L. & N. (Now out of existence.)
 *Class D 61, acquired with C. A. & C.

 Class E 1, (Now out of existence.)
 Class E 1 a.
 Class E 2.
 Class E 2 a.
 *Class E 2 b.
 *Class E 2 c.
 Class E 2 d.
 Class E 2 s d.
 Class E 3.
 Class E 3 a.
 Class E 3 d.
 Class E 3 s d.
 Class E 4. (None of this class has been built.)
 Class E 4 s. (None of this class has been built.)
 Class E 5.
 Class E 5 s.
 Class E 6. (Now out of existence.)
 Class E 6 s. (Loco. with 22" cylinders now out of existence.)
 Class E 6 s.
 Class E 6 s a. (Now out of existence.)
 *Class E 7 s.
 *Class E 7 s a.
 Class E 28, Baldwin four-cylinder compound.
 Class E 29, American Loco. Co. four-cylinder compound.
 Class DeGlehn, four cylinder compound. (Now out of existence.)

 Class F 1, formerly known as mogul simple.
 Class F 1 a.
 Class F 2, formerly known as mogul compound. (Now out of existence.)
 Class F 3.
 Class F 3 a. (None of this class has been built.)
 Class F 3 b.
 Class F 3 c.
 *Class F 31, acquired with C. & M. (Now out of existence.)

 Class G 1, formerly class D. (Now out of existence.)
 Class G 1 a, formerly class DE. (Now out of existence.)
 Class G 2, formerly class E. (Now out of existence.)
 *Class G 3, formerly class X, 68" drivers.
 *Class G 3 a, formerly class X, 62" drivers. (Now out of existence.)
 Class G 4.
 Class G 4 s.
 *Class G 4 a.
 *Class G 4 b.

Class G 30, acquired with C. S. & H. (Now out of existence.)
 Class G 31, acquired with C. S. & H. (Now out of existence.)
 Class G 32, acquired with C. & M. (Now out of existence.)
 Class G 33, acquired with C. & M. (Now out of existence.)

Class H 1, formerly class I.
 *Class H 2, formerly class S.
 *Class H 2 a, formerly class S, crownbar.
 Class H 3, formerly class R, built prior to December, 1889.
 Class H 3 a, formerly class R, built after December, 1889.
 Class H 3 b, formerly class R, type of 1893.
 *Class H 3 c.
 Class H 3 d, (None of this class has been built.)
 Class H 3 e.
 Class H 3 f, (None of this class has been built.)
 *Class H 4.
 Class H 5.
 Class H 6.
 Class H 6 a.
 Class H 6 b.
 Class H 6 s b.
 Class H 7, (None of this class has been built.)
 Class H 8.
 Class H 8 s.
 *Class H 8 a.
 *Class H 8 s a.
 Class H 8 b.
 Class H 8 s b.
 *Class H 8 c.
 *Class H 8 s c.
 Class H 9 s.
 *Class H 9 s a.
 *Class H 10 s.
 Class H 28, American Loco. Co., simple.
 *Class H 30, acquired with C. & M. (Now out of existence.)
 *Class H 31, (Now out of existence.)
 *Class H 61, acquired with C. A. & C.
 *Class H 61 a, acquired with C. A. & C.

Class J 28, American Loco. Co., simple prairie type.

Class K 1, (None of this class has been built.)
 Class K 1 a, (None of this class has been built.)
 Class K 2.
 Class K 2 s.
 Class K 2 a, (Now out of existence.)
 Class K 2 s a.
 Class K 2 b, (Now out of existence.)
 Class K 2 s b.
 *Class K 3 s.
 Class K 4 s.
 *Class K 5 s, None of this class has been built.
 *Class K 28, American Loco Co., simple Pacific type.
 Class K 29 s, American Loco Co., simple Pacific type.

Class L 1 s.

Class CC 1 s, Baldwin Mallet Compound.

Class DD 1, Electric.
 Eng. Nos. 3998 and 3999 (DD 1), Electric.
 Class FF 1, Electric.

Class HH 1 s, American Loco. Co., Mallet Simple.

None of the classes marked thus * have been built for Lines East of Pittsburgh.

The use of the letter "s" after the numeral in a classification, indicates that fire tube superheaters are used.

For locomotives equipped with superheaters, the heating surface of the small superheater tubes as given by the lower figures of item No. 28, is 50 per cent. greater than the actual area. These figures are used in obtaining items Nos. 30, 45 and 46.

J. T. WALLIS,

General Superintendent Motive Power,
 Penna. Railroad Lines East of Pittsburgh.

D. F. CRAWFORD,

General Superintendent Motive Power,
 Penna. Railroad Lines West of Pittsburgh.

KW TRAILER TRUCK

INVENTORS

WM F. Kiesel

Chas T. Westlake

STEAM LOCOMOTIVES.

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CLASSIFICATION.	A 1	A 2	A 2 a	A 3	A 3 a	A 4	A 5 s	
No. of Pairs of Driving Wheels,	2	2	2	2	2	2	2	1
Diam. of Driving Wheels,	44"	50"	50"	50"	50"	50"	50"	2
Size of Driving Axle Journals,	7½"D x 7½"L	7½"D x 7½"L	7½"D x 7½"L	8"D x 7½"L	8"D x 7½"L	8½"D x 12"L	8½"D x 12"L	3
Length of Driving Wheel Base,	7' 0"	7' 0"	7' 0"	7' 0"	7' 0"	7' 0"	7' 3"	4
Total Wheel Base of Engine,	7' 0"	7' 0"	7' 0"	7' 0"	7' 0"	7' 0"	7' 3"	5
Total Wheel Base of Eng. & Tender,	No Tender.	81' 7½"	No Tender.	87' 4"	No Tender.	42' 11½"	48' 7½"	6
No. of Wheels in Engine Truck,								7
Diam. of Wheels in Engine Truck,								8
Size of Engine Truck Axle Journals,								9
Diameter of Trailing Wheels,								10
Size of Trailing Axle Journals,								11
Spread of Cylinders,	81"	81"	81"	84"	84"	86"	86"	12
Size of Cylinders,	15" x 22"	15" x 24"	15" x 24"	17" x 24"	17" x 24"	19½" x 24"	20" x 24"	13
Steam Ports,	1" x 12"	1" x 12"	1" x 12"	1½" x 15½"	1½" x 15½"	1½" x 15½"	2½" wide.	14
Exhaust Ports,	2" x 12"	2" x 12"	2" x 12"	2½" x 15½"	2½" x 15½"	2½" x 15½"		15
Travel of Valve,	4"	4"	4"	5½"	5½"	5"	5"	16
Lap of Valve,	½"	½"	½"	½"	½"	½"	½"	17
Type of Valve,	D	D	D	D	D	D	8" Piston.	18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n.	Wals'l't	19
Type of Boiler,	Straight with Radii Stays.	Straight with Radii Stays.	Straight with Radii Stays.	Belpaire	Belpaire.	Belpaire. Wide Fire Box.	Belpaire Wide Fire Box	20
Min. Internal Diam. Boiler,	42½"	42½"	42½"	51½"	51½"	60"	60"	21
Number of Tubes,	97	97	97	144	144	247	136, 18, 72	22
Outside Diam. of Tubes,	2"	2"	2"	2"	2"	2"	2", 5½", 1½"	23
Length of Tubes bet. Tube Sheets,	125½"	120½"	120½"	128½"	128½"	108½"	106½"	24
Fire Area through Tubes, sq. ft.,	1.62	1.62	1.62	2.40	2.40	4.12	3.71	25
Size of Fire Box, inside,	34½" x 50½"	34½" x 50½"	34½" x 50½"	34½" x 50½"	34½" x 50½"	66" x 60"	80" x 60"	26
Fire Grate Area, sq. ft.,	12.26	12.25	12.25	14.25	14.25	27.50	38.33	27
Ext. Heating Surface of Tubes, sq. ft.,	531	549	549	809	800	1148	862	28
Heating Surface of Fire Box, sq. ft.,	63	53	53	90	90	97	130	29
Total Heating Surface of Boiler, sq. ft.,	594	602	602	899	899	1245	1320	30
Steam Pressure per square inch, lbs.,	125	125	125	100	160	185	185	31
No. of Wheels under Tender,		8		8		8	8	32
Diam. of Wheels under Tender,		30"		33"		33"	33"	33
Size of Tender Truck Axle Journals,		4½" x 8"		4½" x 8"		5½" x 10"	5½" x 10"	34
Wt. of Engine Empty, lbs.,	52200	60000	58530	72500		105500		35
Wt. on Truck in Working Order, lbs.,								36
Wt. on 1st Pair of Drivers, lbs.,	33400	35000	32400	37100	45000	60000		37
Wt. on 2d Pair of Drivers, lbs.,	30100	37000	37600	45200	53000	56500		38
Wt. on 2d Pair of Drivers, lbs.,								39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,								41
Wt. of Engine in Work'g Order, lbs.,	63500	72000	70000	82300	98000	116500		42
Total Wt. on Drivers, lbs.,	63500	72000	70000	82300	98000	116500		43
Wt. of Tender Loaded, lbs.,		59700		71000		122000	122000	44
Ratio of Heat'g Surf. to Grate Surface,	48.36	49.14	49.14	63.09	63.09	45.27	34.44	45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	8.41	10.38	10.38	8.99	8.99	11.78	9.15	46
Heat. Surf. + Wt. one Cyl'd Steam,	838.97	779.79	779.79	735.07	735.07	757.91		47
Grate Area + Wt. one Cyl'd Steam,	17.32	15.87	15.87	11.66	11.66	16.74		48
Tractive Power per lb. of M.E. Press.,	112.50	108.00	108.00	138.72	138.72	164.28	192.00	49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	11953	11475	11475	18866	18866	25833	30192	50
Ratio Wt. on Drivers to Tract. Pow.,	5.31	6.27	6.10	4.36	5.10	4.51		51
Height of Deck Plate,	43½"	43½"	43½"	51"	51"	66½"	66½"	52

STEAM LOCOMOTIVES.

CLASSIFICATION.		L W A 20	L W A 30						
1	No. of Pairs of Driving Wheels,	2	2						1
2	Diam. of Driving Wheels,	48"	50"						2
3	Size of Driving Axle Journals,	6" D x 7 1/4" L	6" D x 7 1/4" L						3
4	Length of Driving Wheel Base,	7' 0"	6' 10"						4
5	Total Wheel Base of Engine,	7' 0"	6' 10"						5
6	Total Wheel Base of Eng. & Tender,	33' 9 1/2"	No Tender.						6
7	No. of Wheels in Engine Truck,								7
8	Diam. of Wheels in Engine Truck,								8
9	Size of Engine Truck Axle Journals,								9
10	Diameter of Trailing Wheels,								10
11	Size of Trailing Axle Journals,								11
12	Spread of Cylinders,	79 1/2"	80"						12
13	Size of Cylinders,	15" x 22"	15" x 22"						13
14	Steam Ports,	1 1/2" x 13"	1 1/2" x 13 1/4"						14
15	Exhaust Ports,	2 1/2" x 13"	2 1/2" x 13 1/4"						15
16	Travel of Valve,	4 1/2"	5"						16
17	Lap of Valve,	1"	1"						17
18	Type of Valve,		D						18
19	Type of Valve Gear,		Steph'n						19
20	Type of Boiler,	Wagon Top.	Wagon Top.						20
21	Min. Internal Diam. Boiler,	43 1/2"	42 1/2"						21
22	Number of Tubes,	91	92						22
23	Outside Diam. of Tubes,	2 1/2"	2"						23
24	Length of Tubes bet. Tube Sheets,	128"	128"						24
25	Fire Area through Tubes, sq. ft.,	1.98	1.54						25
26	Size of Fire Box, inside,	46" x 33 1/2"	34 1/2" x 45"						26
27	Fire Grate Area, sq. ft.,	10.82	10.70						27
28	Ext. Heating Surface of Tubes, sq. ft.,	563	506						28
29	Heating Surface of Fire Box, sq. ft.,	58	63						29
30	Total Heating Surface of Boiler, sq. ft.,	621	569						30
31	Steam Pressure per square inch, lbs.,	125	120						31
32	No. of Wheels under Tender,	8							32
33	Diam. of Wheels under Tender,	30"							33
34	Size of Tender Truck Axle Journals,	3 1/2" x 6"							34
35	Wt. of Engine Empty, lbs.,	46120	55400						35
36	Wt. on Truck in Working Order, lbs.,								36
37	Wt. on 1st Pair of Drivers, lbs.,	24105	28050						37
38	Wt. on 2d Pair of Drivers, lbs.,	27795	36250						38
39	Wt. on 3d Pair of Drivers, lbs.,								39
40	Wt. on 4th Pair of Drivers, lbs.,								40
41	Wt. on Trailing Wheels, lbs.,								41
42	Wt. of Engine in Work'g Order, lbs.,	51900	65200						42
43	Total Wt. on Drivers, lbs.,	51900	65200						43
44	Wt. of Tender Loaded, lbs.,	38300							44
45	Ratio of Heat'g Surf. to Grate Surface,	57.39	53.2						45
46	Ratio of Ext'l Flue Heating Surface } to Fire Box Heating Surface, }	0.70	8.03						46
47	Heat. Surf. + Wt. one Cyl'd Steam,	877.11	831.4						47
48	Grate Area + Wt. one Cyl'd Steam,	15.28	15.63						48
49	Tractive Power per lb. of M.E. Press.,	103.12	99.00						49
50	Tractive Power with M. E. Pressure } equal to 85% of Boiler Pressure, }	10957	10098						50
51	Ratio Wt. on Drivers to Tract. Pow.,	4.73	6.46						51
52	Height of Deck Plate,								52

STEAM LOCOMOTIVES.

	CLASSIFICATION.	B 1	B 2	B 3	B 3 a	B 4	B 4 a	B 4 b	7
1	No. of Pairs of Driving Wheels,	3	3	3	3	3	3	3	1
2	Diam. of Driving Wheels,	44"	44"	50"	50"	50"	50"	50"	2
3	Size of Driving Axle Journals,	6½"D x 7½"L	6½"D x 7½"L	7½"D x 7½"L	7½"D x 7½"L	8"D x 7½"L	8"D x 7½"L	8"D x 7½"L	3
4	Length of Driving Wheel Base,	9' 9"	9' 10"	10' 8"	10' 8"	10' 7"	10' 7"	10' 7"	4
5	Total Wheel Base of Engine,	9' 9"	9' 10"	10' 8"	10' 8"	10' 7"	10' 7"	10' 7"	5
6	Total Wheel Base of Eng. & Tender,	No Tender.	34' 11½"	38' 5½"	No Tender.	41' 0½"	41' 6½"	No Tender.	6
7	No. of Wheels in Engine Truck,								7
8	Diam. of Wheels in Engine Truck,								8
9	Size of Engine Truck Axle Journals,								9
10	Diameter of Trailing Wheels,								10
11	Size of Trailing Axle Journals,								11
12	Spread of Cylinders,	81"	81"	84"	84"	84"	84"	84"	12
13	Size of Cylinders,	15" x 18"	15" x 22"	10" x 24"	10" x 24"	10" x 24"	10" x 24"	10" x 24"	13
14	Steam Ports,	1" x 12"	1" x 12"	1½" x 15½"	1½" x 15½"	1½" x 15½"	1½" x 15½"	1½" x 15½"	14
15	Exhaust Ports,	2" x 12"	2" x 12"	2½" x 15½"	2½" x 15½"	2½" x 15½"	2½" x 15½"	2½" x 15½"	15
16	Travel of Valve,	4"	4"	5"	5"	5"	5"	5"	16
17	Lap of Valve,	½"	½"	½"	½"	½"	½"	½"	17
18	Type of Valve,	D	D	D	D	D	D	D	18
19	Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	19
20	Type of Boiler,	Straight with Crown Bars.	Straight with Crown Bars.	Altoona.	Altoona.	Belpaire.	Belpaire.	Belpaire.	20
21	Min. Internal Diam. Boiler,	42½"	44½"	51½"	51½"	57"	57"	57"	21
22	Number of Tubes,	89	91	119	119	128	128	128	22
23	Outside Diam. of Tubes,	2½"	2½"	2½"	2½"	2½"	2½"	2½"	23
24	Length of Tubes bet. Tube Sheets,	149½"	156½"	160½"	169½"	177"	177½"	177"	24
25	Fire Area through Tubes, sq. ft.,	1.94	2.51	3.20	3.20	3.53	3.53	3.53	25
26	Size of Fire Box, inside,	35" x 44½"	35" x 54½"	34½" x 62½"	34½" x 62½"	34½" x 62½"	34½" x 74½"	34½" x 62½"	26
27	Fire Grate Area, sq. ft.,	10.76	13.25	15.00	15.00	14.04	17.82	14.04	27
28	Ext. Heating Surface of Tubes, sq. ft.,	651	777	1103	1103	1236	1236	1236	28
29	Heating Surface of Fire Box, sq. ft.,	62	79	93	93	98	117	98	29
30	Total Heating Surface of Boiler, sq. ft.,	713	856	1196	1196	1334	1353	1334	30
31	Steam Pressure per square inch, lbs.,	125	125	125	125	188	188	188	31
32	No. of Wheels under Tender,		8	8		8	8		32
33	Diam. of Wheels under Tender,		30"	33"		33"	33"		33
34	Size of Tender Truck Axle Journals,		3½" x 7"	4½" x 8"		4½" x 8"	4½" x 8"		34
35	Wt. of Engine Empty, lbs.,	58500	57350	77000		94600	97000	101950	35
36	Wt. on Truck in Working Order, lbs.,								36
37	Wt. on 1st Pair of Drivers, lbs.,	19500	19700	33500		33750	35300	33800	37
38	Wt. on 2d Pair of Drivers, lbs.,	26070	22270	29200		38800	36900	44875	38
39	Wt. on 3d Pair of Drivers, lbs.,	25730	22730	29000		35550	35300	43425	39
40	Wt. on 4th Pair of Drivers, lbs.,								40
41	Wt. on Trailing Wheels, lbs.,								41
42	Wt. of Engine in Work'g Order, lbs.,	71300	64700	91700		108100	107500	122100	42
43	Total Wt. on Drivers, lbs.,	71300	64700	91700		108100	107500	122100	43
44	Wt. of Tender Loaded, lbs.,		44800	64550		71000	74000		44
45	Ratio of Heat'g Surf. to Grate Surface,	66.26	64.80	70.7	70.7	89.20	75.92	80.20	45
46	Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	10.50	9.82	11.86	11.86	12.61	10.56	12.61	46
47	Heat. Surf. + Wt. one Cyl'd Steam,	1231.43	1200.04	965.09	965.00	873.32	885.75	873.32	47
48	Grate Area + Wt. one Cyl'd Steam,	18.58	18.71	13.10	12.10	0.78	11.66	0.78	48
49	Tractive Power per lb. of M. E. Press.,	92.05	112.50	173.28	173.28	173.28	173.28	173.28	49
50	Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	9780	11053	18411	18411	23566 22093	23566 22093	23566 22093	50
51	Ratio Wt. on Drivers to Tract. Pow.,	7.29	5.42	4.98		4.88	4.88	5.11	51
52	Height of Deck Plate,			45½"		51"	51"		52

STEAM LOCOMOTIVES.

CLASSIFICATION.	B 5	LW B 5a	LW B 6	B 6a	B 6a	B 6sa	B 6sb	
No. of Pairs of Driving Wheels,	3	3	3	3	3	3	3	1
Diam. of Driving Wheels,	50"	50"	50"	50"	50"	50"	50"	2
Size of Driving Axle Journals,	6 1/2" D x 7 3/4" L	7" D x 7 1/4" L	7 1/2" D x 12" L	7 1/2" D x 12" L	7 1/2" D x 12" L	7 1/2" D x 12" L	7 1/2" D x 12" L	3
Length of Driving Wheel Base,	9' 0"	13' 8"	11' 6"	11' 6"	11' 6"	11' 6"	11' 6"	4
Total Wheel Base of Engine,	9' 0"	13' 8"	11' 0"	11' 6"	11' 6"	11' 6"	11' 6"	5
Total Wheel Base of Eng. & Tender,	39' 9 1/2"		48' 3 1/2"	48' 5 1/2"	48' 9 1/2"	49' 2 1/2"	49' 2 1/2"	6
No. of Wheels in Engine Truck,								7
Diam. of Wheels in Engine Truck,								8
Size of Engine Truck Axle Journals,								9
Diameter of Trailing Wheels,								10
Size of Trailing Axle Journals,								11
Spread of Cylinders,	84"	84"	80"	80"	80"	86"	86"	12
Size of Cylinders,	20" x 24"	20" x 24"	22" x 24"	22" x 24"	22" x 24"	22" x 24"	22" x 24"	13
Steam Ports,	1 1/4" x 17 1/4"	1 1/4" x 17 1/4"	2" wide.	2" wide.	2" wide.	2" wide.	2" wide.	14
Exhaust Ports,	2 1/4" x 17 1/4"	2 1/4" x 17 1/4"						15
Travel of Valve,	5"	5"	5"	5"	5"	5"	5"	16
Lap of Valve,	1"	1"	1"	1"	1"	1"	1"	17
Type of Valve,	D	D	10" Piston	10" Piston	10" Piston	10" Piston	10" Piston	18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Wals'h't.	Wals'h't	Wals'h't	19
Type of Boiler,	Altoona.	Crown Bar.	Belpaire, Sloping Top.	Belpaire, Sloping Top.	Radial Stay, Wide Fire Box.	Radial Stay, Wide Fire Box.	Belpaire, Wide Fire Box.	20
Min. Internal Diam. Boiler,	53 1/2"	56 1/2"	67 1/2"	67 1/2"	67 1/2"	67 1/2"	67 1/2"	21
Number of Tubes,	138	157	323	180, 26, 104	360	194, 26, 104.	194, 26, 104.	22
Outside Diam. of Tubes,	2 1/2"	2 1/2"	2"	2", 5 1/2", 1 1/2"	2"	2", 5 1/2", 1 1/2"	2", 5 1/2", 1 1/2"	23
Length of Tubes bet. Tube Sheets,	153 1/2"	158 1/2"	166 1/2"	166 1/2"	148"	148"	148"	24
Fire Area through Tubes, sq. ft.,	3.81	3.4	5.39	5.48	6.01	5.32	5.32	25
Size of Fire Box, inside,	34 1/2" x 96"	34 1/2" x 95 1/4"	68" x 90"	68" x 90"	80" x 111"	80" x 111"	79 1/2" x 111"	26
Fire Grate Area, sq. ft.,	23.00	22.87	41.25	41.25	61.67	61.67	61.57	27
Ext. Heating Surface of Tubes, sq. ft.,	1159	1222	2343	1824	2325	1714	1714	28
Heating Surface of Fire Box, sq. ft.,	101	119	152	152	168.0	190	195	29
Total Heating Surface of Boiler, sq. ft.,	1260	1341	2495	2783	2493	2505	2600	30
Steam Pressure per square inch, lbs.,	11 1/2	11 1/2	205	205	205	205	205	31
No. of Wheels under Tender,	8	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	33"	33"	33"	33"	36"	36"	36"	33
Size of Tender Truck Axle Journals,	3 1/2" x 7"	4 1/2" x 8"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	34
Wt. of Engine Empty, lbs.,	81300		140000		150600		101600	35
Wt. on Truck in Working Order, lbs.,								36
Wt. on 1st Pair of Drivers, lbs.,	29500	32250	60000	66000	61400	62700	61400	37
Wt. on 2d Pair of Drivers, lbs.,	20800	35250	59500	56000	56300	59400	62200	38
Wt. on 3d Pair of Drivers, lbs.,	31700	32250	50500	52000	56300	55250	56700	39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,								41
Wt. of Engine in Work'g Order, lbs.,	91000	99750	170000	174000	174000	177350	180300	42
Total Wt. on Drivers, lbs.,	91000	99750	170000	174000	174000	177350	180300	43
Wt. of Tender Loaded, lbs.,	64550	84050	108000	108000	144000	128000	128000	44
Ratio of Heat'g Surf. to Grate Surface,	54.78	58.64	60.48	67.48	40.42	42.08	42.22	45
Ratio of Ext'l Flue Heating Surface } to Fire Box Heating Surface, }	11.48	10.27	15.41	17.30	13.83	12.66	12.33	46
Heat. Surf. + Wt. one Cyl'd Steam,	917.61	887.48	973.98		973.2			47
Grate Area + Wt. one Cyl'd Steam,	16.75	15.13	16.11		24.07			48
Tractive Power per lb. of M. E. Press.,	192.00	192.00	207.43	207.43	207.43	207.43	207.43	49
Tractive Power with M. E. Pressure } equal to 85% of Boiler Pressure, }	20400 18768	21216 22843	36144	36144	36144	36144	36144	50
Ratio Wt. on Drivers to Tract. Pow.,	4.48 4.88	4.68 4.87	4.70	4.81	4.81	4.90	4.90	51
Height of Deck Plate,	51 1/2"	51 1/2"	66 1/2"	66 1/2"	66 1/2"	66 1/2"	66 1/2"	52

STEAM LOCOMOTIVES.

9

LOCATION.	B 7	B 7a	B 8	LW B 29	LW B 30	LW B 31	LW B 32	
1 Driving Wheels,	3	3	3	3	3	3	3	1
2 Diameter of Driving Wheels,	50"	50"	56"	51"	50"	50"	50"	2
3 Size of Driving Axle Journals,	8" D x 3 3/4" L	8" D x 8 3/4" L	10 1/2" D x 12" L	9" D x 10" L	7" D x 8" L	7 1/2" D x 9" L	7" D x 8" L	3
4 Length of Driving Wheel Base,	9' 3"	9' 3"	11' 6"	11' 6"	10' 6"	10' 6"	10' 6"	4
5 Total Wheel Base of Engine,	9' 3"	9' 3"	11' 6"	11' 6"	10' 6"	10' 6"	10' 6"	5
6 Total Wheel Base of Eng. & Tender,	41' 10"	41' 10"	47' 2 1/2"	40' 0 1/2"	34' 3 1/2"	36' 1 1/2"	38' 1"	6
7 No. of Wheels in Engine Truck,								7
8 Diam. of Wheels in Engine Truck,								8
9 Size of Engine Truck Axle Journals,								9
10 Diameter of Trailing Wheels,								10
11 Size of Trailing Axle Journals,								11
12 Spread of Cylinders,	36"	36"	36"	36"	38"	34 1/2"	34 1/2"	12
13 Size of Cylinders,	20" x 24"	20" x 24"	20" x 24"	19" x 26"	17" x 24"	18" x 24"	18" x 24"	13
14 Steam Ports,	1 1/4" x 17 1/4"	1 1/4" x 17 1/4"	1 1/4" x 15 1/2"	1 1/4" x 18"	1 1/4" x 16"	1 1/4" x 17"	1 1/4" x 16"	14
15 Exhaust Ports,	2 1/2" x 17 1/4"	2 1/2" x 17 1/4"	2 1/2" x 15 1/2"	2 1/2" x 18"	2 1/2" x 16"	2 1/2" x 17"	2 1/2" x 16"	15
16 Travel of Valve,	5"	5"	5"	5 1/2"	5 1/2"	5"	5 1/2"	16
17 Lap of Valve,	1"	1"	1"	1"	1"	1 1/8"	1"	17
18 Type of Valve,	D	D	D	D				18
19 Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n				19
20 Type of Boiler,	Belpaire.	Belpaire.	Belpaire Sloping Top.	Straight.	Straight.	Straight.	Straight.	20
21 Min. Internal Diam. Boiler,	50"	60"	60"	65"	49 1/2"	55"	52"	21
22 Number of Tubes,	183	174	247	280	148	160	184	22
23 Outside Diam. of Tubes,	2 1/2"	2 1/2"	2"	2"	2"	2 1/4"	2"	23
24 Length of Tubes bet. Tube Sheets,	156 1/2"	159"	163 1/2"	181"	120"	165"	133 1/2"	24
25 Fire Area through Tubes, sq. ft.,	5.05	3.79	4.13	4.68	2.47	3.49	3.07	25
26 Size of Fire Box, inside,	42" x 107"	42" x 108"	66" x 69"	42" x 108 1/2"	34 1/2" x 78 1/2"	33 1/2" x 60"	34 1/2" x 89 1/2"	26
27 Fire Grate Area, sq. ft.,	31.20	31.50	31.62	31.54	18.66	13.95	21.41	27
28 Ext. Heating Surface of Tubes, sq. ft.,	1564	1353	1762	1600	775	1296	1072	28
29 Heating Surface of Fire Box, sq. ft.,	167	140	106	155	94	94	119	29
30 Total Heating Surface of Boiler, sq. ft.,	1731	1493	1868	1755	869	1390	1191	30
31 Steam Pressure per square inch, lbs.,	140	150	195	180	140	150	140	31
32 No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33 Diam. of Wheels under Tender,	33"	33"	36"	33"	33"	33"	33"	33
34 Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	5 1/2" x 10"	5" x 9"	3 1/2" x 7"	3 1/2" x 7"	3 1/2" x 7"	34
35 Wt. of Engine Empty, lbs.,		108900	128100	117000		83900	69620	35
36 Wt. on Truck in Working Order, lbs.,								36
37 Wt. on 1st Pair of Drivers, lbs.,		37500	48100	42500	30000	33700	28050	37
38 Wt. on 2d Pair of Drivers, lbs.,		35100	47100	47600	27000	30450	27810	38
39 Wt. on 3d Pair of Drivers, lbs.,		50000	48250	45000	27000	30450	21780	39
40 Wt. on 4th Pair of Drivers, lbs.,								40
41 Wt. on Trailing Wheels, lbs.,								41
42 Wt. of Engine in Work'g Order, lbs.,		122600	143450	135000	84000	94600	77620	42
43 Total Wt. on Drivers, lbs.,		122600	143450	135000	84000	94600	77620	43
44 Wt. of Tender Loaded, lbs.,	80000	80000	122000	91050			48000	44
45 Ratio of Heat'g Surf. to Grate Surface,	55.48	47.55	59.07	55.84	46.57	99.64	55.63	45
46 Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface, }	9.36	9.70	16.62	10.32	3.22	13.85	9.02	46
47 Heat. Surf. + Wt. one Cyl'd Steam,	1145.6	935.21	882.34	957.6	796.51	1071.3	973.1	47
48 Grate Area + Wt. one Cyl'd Steam,	20.65	19.66	14.93	17.21	17.10	10.75	17.49	48
49 Tractive Power per lb. of M. E. Press.,	192.00	192.00	171.43	184.04	138.72	155.52	155.52	49
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure, }	22848	24480	29871 28414	28158	16508	19829	18507	50
51 Ratio Wt. on Drivers to Tract. Pow.,		5.00	4.89	4.79	5.09	4.77	4.19	51
52 Height of Deck Plate,	51"		66 1/2"					52

STEAM LO				
DESCRIPTION	C 29	C 30	C 31	
No. of Driving Wheels,	4		4	
Driving Wheels,	50"	50"	46"	
No. of Driving Axle Journals,		8" x 8 1/2"	8" x 8 1/2"	
Length of Driving Wheel Base,	13' 8"	13' 8"	13' 6"	
Total Wheel Base of Engine,	13' 8"	48' 3"	13' 6"	
Total Wheel Base of Eng. & Tender,		No Tender	No Tender	
No. of Wheels in Engine Truck,				
Diam. of Wheel in Engine Truck,				
Size of Engine Truck Axle Journals,				
Diameter of Trailing Wheels,				
Size of Trailing Axle Journals,				
Spread of Cylinders,	84"	88"	84"	
Size of Cylinders,	20" x 24"	22" x 23"	20" x 24"	
Steam Ports,	11" x 17 1/2"	11" x 18"	11" x 16"	
Exhaust Ports,	2 1/2" x 17 1/2"	2 1/2" x 18"	2 1/2" x 16"	
Valve Valve,	5"	5"	5"	
Lap of Valve,	1"	1"	1"	
Type of Valve,	D	D	D	
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	
Type of Boiler,		Belpaire	Wagon Top	
Min. Internal Diam. Boiler,		60 1/2"	59 1/2"	
Number of Tubes,		220	248	
Outside Diam. of Tubes,		2"	2"	
Length of Tubes bet. Tube Sheets,		160 3/4"	157 1/4"	
Fire Area through Tubes, sq. ft.,		3.87	4.06	
Size of Fire Box, inside,		42 1/2" x 93 1/2"	33" x 107 1/2"	
Grate Area, sq. ft.,		27.27	24.56	
Ext. Heating Sur. of Tubes, sq. ft.,		1542	1669	
Heating Surface of Fire Box, sq. ft.,		141	137.8	
Total Heating Sur. of Boiler, sq. ft.,		1683	1807	
Steam Pressure in Cylinders, lbs.,		150	140	
No. of Wheels on Tender,	8			
Diam. of Wheel on Tender,	38"			
Size of Tender Axle Journals,				
Wt. of Engine only, lbs.,		118977		
Wt. on Truck in Working Order, lbs.,				
Wt. on 1st Pair of Drivers, lbs.,		36000		
Wt. on 2d Pair of Drivers, lbs.,		38800		
Wt. on 3d Pair of Drivers, lbs.,		41700		
Wt. on 4th Pair of Drivers, lbs.,		37800		
Wt. on Trailing Wheels, lbs.,				
Wt. of Engine in Work'g Order, lbs.,		154300		
Wt. on Drivers, lbs.,		154300	117000	
Wt. on Tender loaded, lbs.,				
No. of Heat'g Surf. to Grate Surface,		61.72	72.39	
Ratio of Ext'l Flue Heating Surface } to Fire Box Heating Surface, }		10.90	12.11	
Heat. Surf. + Wt. one Cyl'd Steam,		7.3.7	1195.87	
Grate Area + Wt. one Cyl'd Steam,		12.05	16.52	
Tractive Power in lbs. of M.E.,		271.04	208.60	
Tractive Power in M. E. Pressure at 85% Boiler Pressure,		34558	24834	
Wt. on Drivers to Tract. Pow.,		4.46		
Area of Deck Plate,				
WT. ONE CYL'D STEAM		2.26	1.52	

	D1	D2	D2a	D3	D4	D4a	D5
1. No. of Driving Wheels,	2	2	2	2	2	2	2
2. Diam. of Driving Wheels,	68"	62"	68"	62"	62"	68"	56"
3. Size of Driving Axle Journals,	7" x 7 1/2"	7" x 7 1/2"	7" x 7 1/2"	7" x 7 1/2"	7" x 7 1/2"	7" x 7 1/2"	6 1/2" x 7 1/2"
4. Length of Driving Wheel Base,	8' 0"	8' 0"	8' 0"	8' 6"	8' 0"	8' 6"	7' 0"
5. Total Wheel Base of Engine,	50' 5 1/2"	22' 5 1/2"	22' 5 1/2"	22' 5 1/2"	22' 5 1/2"	22' 5 1/2"	19' 0 1/2"
6. Total Wheel Base of Eng. & Tender,	44' 6 1/2"	44' 6 1/2"	44' 6 1/2"	44' 6 1/2"	40' 10 1/2"	46' 10 1/2"	40' 6 1/2"
7. No. of Wheels in Engine Truck,	4	4	4	4	4	4	4
8. Diam. of Wheels in Engine Truck,	30"	28"	30"	28"	28"	30"	26"
9. Size of Engine Truck Axle Journals,	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"
10. Diameter of Trailing Wheels,							
11. Size of Trailing Axle Journals,							
12. Spread of Cylinders,	81"	41"	51"	81"	41"	81"	81"
13. Size of Cylinders,	17" x 24"	15" x 24"	8" x 24"	17" x 24"	17" x 24"	17" x 24"	15" x 22"
14. Inlet Ports,	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"
15. Exhaust Ports,	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"
16. Travel of Valve,	5"	5"	5"	5"	5"	5"	4"
17. Valve,	3"	3"	4"	3"	3"	3"	3"
18. Valve,	D	D	D	D	D	D	D
19. Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n
20. Type of Boiler,	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars
21. Min. Intern. Diam. of Boiler,	48 1/2"	48 1/2"	48 1/2"	48 1/2"	48 1/2"	48 1/2"	44 5/8"
22. Number of Tubes,	142	155	155	155	153	153	153
23. Outside Diam. of Tubes,	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
24. Length of Tubes bet. Tube Sheets,	131 1/2"	127 1/2"	127 1/2"	127 1/2"	125 1/2"	125 1/2"	115"
25. Fire Area through Tubes, sq. ft.,	3.09	3.38	3.38	3.38	3.06	3.06	2.17
26. Size of Fire Box, in. sq.,	35" x 66 1/2"	35" x 72 1/2"	35" x 72 1/2"	35" x 72 1/2"	34 1/2" x 110 1/2"	34 1/2" x 110 1/2"	35" x 54 1/2"
27. Fire Grate Area, sq. ft.,	16.19	17.65	17.65	17.65	28.72	28.72	13.36
28. Ext. Heating Surface of Tubes, sq. ft.,	917	965	965	968	1002	1002	652
29. Heating Surface of Fire Box, sq. ft.,	132	115	115	115	156	156	69
30. Total Heating Surface of Boiler, sq. ft.,	1049	1083	1083	1083	1158	1158	721
31. Steam Pressure per square inch, lbs.,	125	125	125	125	125	125	125
32. No. of Wheels under Tender,	8	8	8	8	8	8	8
33. Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	33"
34. Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	3 1/2" x 7 1/2"
35. Wt. of Engine Empty, lbs.,	60000	72300	73900	70200	72000	73000	59200
36. Wt. of Engine in Working Order, lbs.,	29850	28000	28450	28350	25600	26340	24500
37. Wt. of Pair of Drivers, lbs.,	24680	27300	28200	26880	29100	28470	20500
38. Wt. of Pair of Drivers, lbs.,	23170	25200	25420	24070	27040	27110	20200
39. Wt. of Pair of Drivers, lbs.,							
40. Wt. of Pair of Drivers, lbs.,							
41. Wt. on Trailing Wheels, lbs.,							
42. Wt. of Engine in Working Order, lbs.,	77700	80500	82200	79100	81300	82000	65200
43. Total Wt. on Drivers, lbs.,	47850	52500	53750	50950	56200	55520	40700
44. Wt. of Tender Loaded, lbs.,	60000	60000	60000	60000	60000	60000	40800
45. Ratio of Heat'g Surf. to Grate Surface,	64.79	61.30	61.30	61.30	40.32	40.32	54.17
46. Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	6.96	3.42	3.42	3.42	6.42	6.42	9.44
47. Heat. Surf. + Wt. one Cyl'd Steam,	1057.3	973.71	973.71	1091.63	1167.34	1167.34	1018.36
48. Grate Area + Wt. one Cyl'd Steam,	16.22	15.87	15.87	17.79	28.95	28.95	18.79
49. Tractive Power per lb. of M.E. Press.,	102.00	125.42	114.35	111.87	111.87	102.00	88.39
50. Tractive Power with M. E. Pressure equal to 85 % of Boiler Pressure,	10837	13325	12100	11886	11886	10837	9392
51. Ratio Wt. on Drivers to Tract. Pow.,	4.41	3.94	4.42	4.28	4.73	5.12	4.33
52. Height of Deck Plate,		52 1/2"	52 1/2"	49 1/2"	47 1/2"		

LOCOMOTIVES.

CLASSIFICATION.	D 6	D 6 a	D 7	D 7 a	D 8	D 8 a
No. of Driving Wheels,	2	2	2	2	2	2
Trailing Wheels,	78"	72"	68"	68"	62"	62"
Driving Axle Journals,	8"b x 10 1/2"	8"b x 10 1/2"	8"b x 10 1/2"	8"b x 10 1/2"	8"b x 7 1/2"	8"b x 7 1/2"
Driving Wheel Base,	7' 9"	7' 9"	7' 9"	7' 9"	7' 9"	8' 6"
Wheel Base of Engine,	22' 8"	22' 8"	22' 8"	22' 8"	23' 8"	23' 5 1/2"
Wheel Base of Eng. & Tender,	47' 10"	47' 10"	47' 0"	47' 10"	45' 11"	45' 11 1/2"
Wheels in the Truck,	4	4	4	4	4	4
Trailing Wheels of Engine Truck,	33"	33"	33"	33"	33"	33"
Size of Engine Truck Axle Journals,	5 1/2" x 9"	5 1/2" x 9"	5 1/2" x 9"	5 1/2" x 9"	5 1/2" x 10"	5 1/2" x 10"
Diameter of Trailing Wheels,						
Size of Trailing Axle Journals,						
Spread of Cylinders,	77"	77"	77"	77"	77"	77"
Size of Cylinders,	18" x 24"	18" x 24"	18" x 24"	17" x 24"	17" x 24"	18" x 24"
Steam Ports,	1 1/2" x 16 1/2"	1 1/2" x 16 1/2"	1 1/2" x 16 1/2"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 17 1/2"
Exhaust Ports,	3 1/2" x 16 1/2"	3 1/2" x 16 1/2"	3 1/2" x 16 1/2"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 17 1/2"
Travel of Valve,	5 1/2"	5 1/2"	5 1/2"	8"	5"	5"
Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Type of Valve,	D	D	D	D	D	D
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n
Type of Boiler,	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars	Wagon Top Crown Bars
Min. Internal Diam. Boiler,	40 1/2"	40 1/2"	40 1/2"	49 1/2"	49 1/2"	53 1/2"
Num. of Tubes,	201	201	201	201	193	193
Di. of Tubes,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"
Le. of Tubes bet. Tube Sheets,	130 1/2"	130 1/2"	130 1/2"	136 1/2"	136 1/2"	131 1/2"
Fire Area through Tubes, sq. ft.,	2.80	2.89	2.80	2.89	2.89	4.21
Size of Fire Box, inside,	41 1/2" x 119 1/2"	41 1/2" x 119 1/2"	41 1/2" x 119 1/2"	41 1/2" x 119 1/2"	41 1/2" x 119 1/2"	35" x 71"
Fire Grate Area, sq. ft.,	34.75	34.75	34.75	34.75	34.75	17.65
Ext. Heating Surface of Tubes, sq. ft.,	1075	1075	1075	1125	1125	1250
Heating Surface of Fire Box, sq. ft.,	155	155	155	155	155	142
Total Heating Surface of Boiler, sq. ft.,	1230	1230	1230	1280	1280	1392
Steam Pressure per square inch, lbs.,	140	140	140	140	140	130
No. of Wheels under Tender,	8	8	8	8	8	8
Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"
Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"
Wt. of Engine Empty, lbs.,	87800	87800	87800	84100	88250	81700
Wt. of Truck in Working Order, lbs.,	31800	31800	31800	29500	31150	33000
Wt. of 1st Pair of Drivers, lbs.,	32000	32000	32000	33100	32500	30600
Wt. of 2d Pair of Drivers, lbs.,	32000	32000	32000	30900	32500	28000
Wt. on 3d Pair of Drivers, lbs.,						
Wt. on 4th Pair of Drivers, lbs.,						
Wt. on Trailing Wheels, lbs.,						
Wt. of Engine in Work'g Order, lbs.,	96700	96700	96700	93500	90300	91200
Total Wt. on Drivers, lbs.,	64900	64900	64900	64000	65180	57700
Wt. of Tender Load, lbs.,	60000	60000	60000	60000	60000	60000
Ratio of Heat'g Surf. to Grate Surface,	35.39	35.39	35.39	36.83	36.83	78.87
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	6.94	6.94	6.94	7.26	7.26	8.80
Heat. Surf. + Wt. one Cyl'd Steam,	1004.96	1004.96	1004.96	1172.16	1172.16	1210.75
Grate Area + Wt. one Cyl'd Steam,	28.39	28.39	28.39	31.82	31.82	15.36
Tractive Power per sq. in. M.E. Press.,	99.69	108.00	114.35	102.00	111.87	125.42
Tractive Power with 200 lbs. Pressure equal to 55% of Bo. r Pressure,	11863	12852	13608	12138	13333	13888
Ratio Wt. on Drivers to Tract. Pow.,	5.47	5.05	4.77	5.27	4.89	4.67
Height of Deck Plate,	60"	54"		48 1/2"	51 1/2"	51 1/2"

STEAM LOCOMOTIVES.

	D 9	D 9 a	D 10	D 10 a	D 11	D 11 a	D 12	
1. No. of Driving Wheels,	2	2	2	2	2	2	2	1
2. Diam. of Driving Wheels,	62"	63"	62"	68"	62"	68"	62"	2
3. Size of Driving Axle Journals,	8"D x 7 1/4"	8"D x 7 1/4"	8"D x 7 1/4"	8"D x 7 1/4"	8"D x 10 1/4"	8"D x 10 1/4"	8"D x 10 1/4"	3
4. Length of Driving Wheel Base,	8' 6"	8' 6"	8' 6"	8' 6"	7' 9"	7' 9"	7' 9"	4
5. Total Wheel Base of Engine,	23' 5 1/2"	23' 5 1/2"	23' 5 1/2"	23' 5 1/2"	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	5
6. Total Wheel Base of Eng. & Tender,	47' 4 1/2"	47' 4 1/2"	47' 4 1/2"	47' 4 1/2"	47' 10"	47' 10"	47' 7 1/2"	6
7. No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
8. Diam. of Wheels in Engine Truck,	33"	33"	33"	33"	33"	33"	33"	8
9. Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
10. Diameter of Trailing Wheels,								10
11. Size of Trailing Axle Journals,								11
12. Spread of Cylinders,	77"	77"	77"	77"	77"	77"	77"	12
13. Size of Cylinders,	18" x 24"	18" x 24"	18" x 24"	18" x 24"	18 1/2" x 24"	18 1/2" x 24"	18 1/2" x 24"	13
14. Steam Ports,	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	14
15. Exhaust Ports,	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	15
16. Travel of Valve,	5"	5"	5"	5"	5"	5"	5"	16
17. Lap of Valve,	3"	3"	4"	4"	4"	4"	4"	17
18. Type of Valve,	D	D	D	D	D	D	D	18
19. Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	19
20. Type of Boiler,	Belpaire.	Belpaire.	Belpaire.	Belpaire.	Wagon Top. Crown Bars.	Wagon Top. Crown Bars.	Belpaire. Kaiser Top.	20
21. Min. Internal Diam. Boiler,	53 1/2"	53 1/2"	56 1/2"	56 1/2"	53 1/2"	53 1/2"	53 1/2"	21
22. Number of Tubes,	195	195	196	196	240	240	210	22
23. Outside Diam. of Tubes,	2"	2"	2"	2"	2"	2"	2"	23
24. Length of Tubes bet. Tube Sheets,	136"	136"	136"	136"	130 1/2"	130 1/2"	130"	24
25. Fire Area through Tubes, sq. ft.,	3.26	3.26	3.27	3.27	4.01	4.01	3.51	25
26. Size of Fire Box, inside,	35 1/2" x 72 1/2"	35 1/2" x 72 1/2"	34 1/2" x 72 1/2"	34 1/2" x 72 1/2"	41 1/2" x 119 1/2"	41 1/2" x 119 1/2"	40" x 119 1/2"	26
27. Fire Grate Area, sq. ft.,	17.05	17.05	17.34	17.34	34.75	34.75	33.26	27
28. Ext. Heating Surface of Tubes, sq. ft.,	1157	1157	1163	1163	1366	1366	1245	28
29. Heating Surface of Fire Box, sq. ft.,	128	128	133	133	164	164	138	29
30. Total Heating Surface of Boiler, sq. ft.,	1285	1285	1296	1296	1530	1530	1383	30
31. Steam Pressure, per square inch, lbs.,	160	160	160	160	140	140	160	31
32. No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33. Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	33"	33
34. Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	34
35. Wt. of Engine Empty, lbs.,	87350	88950	91750	93050	97900	90100	94850	35
36. Wt. on Truck in Working Order, lbs.,	36900	37000	39000	36600	34300	32800	33150	36
37. Wt. on 1st Pair of Drivers, lbs.,	31100	33000	33000	33600	33200	34700	35900	37
38. Wt. on 2d Pair of Drivers, lbs.,	28700	33000	33000	33300	36200	33100	36250	38
39. Wt. on 3d Pair of Drivers, lbs.,								39
40. Wt. on 4th Pair of Drivers, lbs.,								40
41. Wt. on Trailing Wheels, lbs.,								41
42. Wt. of Engine in Work'g Order, lbs.,	96700	103000	105000	103500	108700	100600	105300	42
43. Total Wt. on Drivers, lbs.,	59800	63000	66000	66900	74400	67800	72150	43
44. Wt. of Tender Loaded, lbs.,	80000	102200	102200	102200	60000	60000	70000	44
45. Ratio of Heat'g Surf. to Grate Surface,	72.80	72.80	74.72	74.72	44.03	44.03	41.61	45
46. Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	9.04	9.04	8.74	8.74	8.33	8.33	9.03	46
47. Heat. Surf. ÷ Wt. one Cyl'd Steam,	937.22	937.22	945.32	945.32	1183.43	1183.43	955.7	47
48. Grate Area ÷ Wt. one Cyl'd Steam,	12.87	12.87	12.65	12.65	26.87	26.87	22.96	48
49. Tractive Power per lb. of M.E. Press.,	125.42	114.35	125.2	114.35	132.48	120.79	132.48	49
50. Tractive Power with M.E. Pressure equal to 85% of Boiler Pressure,	17057	15552	17057	15552	15766	14374	18017	50
51. Ratio Wt. on Drivers to Tract. Pow.,	3.50	4.24	3.87	4.30	4.72	4.71	4.00	51
52. Height of Deck Plate,			50"	51 1/2"		54 1/2"		52

CLASSIFICATION.	D 12 a	D 13	D 13 a	D 13 b	D 13 c	D 14	D 14 a	
No. of Driving Wheels,	2	2	2	2	2	2	2	1
Size of Driving Wheels,	68"	62"	68"	62"	68"	78"	80	2
Size of Driving Axle Journals,	8" d x 10 1/2"	8" d x 10 1/2"	8" d x 10 1/2"	8 3/4" d x 10 1/2"	8 1/2" d x 10 1/2"	8 1/2" d x 10 1/2"	8 1/2" d x 10 1/2"	3
Size of Driving Wheel Base,	7' 9"	7' 9"	7' 9"	7' 9"	7' 9"	7' 9"	7' 9"	4
Total Wheel Base of Engine,	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	22' 8 1/2"	5
Total Wheel Base of Eng. & Tender,	48' 7 1/2"	48' 7 1/2"	48' 7 1/2"	48' 7 1/2"	48' 7 1/2"	48' 7 1/2"	40' 3 1/2"	6
No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
Diam. of Wheels in Engine Truck,	33"	33"	33"	33"	33"	36"	36"	3
Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
Diameter of Trailing Wheels,								10
Size of Trailing Axle Journal,								11
Spread of Cylinders,	77"	77"	77"	77"	77"	77"	77"	12
Size of Cylinders,	18 1/2" x 24"	18 1/2" x 24"	18 1/2" x 24"	18 1/2" x 24"	18 1/2" x 24"	18 1/2" x 24"	19" x 24"	13
Steam Ports,	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 20"	14
Exhaust Ports,	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	3" x 17 1/2"	3" x 20"	15
Travel of Valve,	5"	5"	5"	5"	5"	5 1/2"	6"	18
Lap of Valve,	1"	1"	1"	1"	1"	1"	1 1/2"	17
Type of Valve,	D	D	D	D	D	D	D	18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	19
Type of Boiler,	Belpaire Raised Top.	Belpaire.	Belpaire.	Belpaire.	Belpaire.	Belpaire.	Belpaire.	20
Min. Internal Diam. Boiler,	53 1/2"	56 1/2"	56 1/2"	56 1/2"	56 1/2"	56 1/2"	57"	21
Number of Tubes,	210	258	258	258	258	254	258	22
Outside Diam. of Tubes,	2 1/2"	1 1/2"	1 1/2"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	23
Length of Tubes, bet. Tube Sheets,	136"	135 1/2"	135 1/2"	135 1/2"	135 1/2"	136"	136"	24
Fire Area through Tubes, sq. ft.,	3.5	3.72	3.72	3.72	3.72	3.72	3.72	25
Size of Fire Box, inside,	40" x 110"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	26
Fire Grate Area, sq. ft.,	33.26	33.23	33.23	33.23	33.23	33.26	33.26	27
Ext. Heating Surface of Tubes, sq. ft.,	1246	1434	1434	1434	1434	1435	1435	28
Heating Surface of Fire Box, sq. ft.,	138	137	137	137	137	148	148	29
Total Heating Surface of Boiler, sq. ft.,	1384	1571	1571	1571	1571	1583	1583	30
Steam Pressure per square inch, lbs.,	160	175	175	175	175	175	175	31
No. of Wheels under Tender,	8	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	36"	33
Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	34
Wt. of Engine Empty, lbs.,	96100	99600	100900	100200	102400	111300	114500	35
Wt. on Truck in Working Order, lbs.,	33150	35000	35000	35800	35000	40000	39750	36
Wt. on 1st Pair of Drivers, lbs.,	36500	37700	38950	38700	42500	42000	43500	37
Wt. on 2d Pair of Drivers, lbs.,	36850	37000	38250	38200	37000	40600	43800	38
Wt. on 3d Pair of Drivers, lbs.,								39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,								41
Wt. of Engine in Work'g Order, lbs.,	106500	109700	112200	112700	114500	122600	127050	42
Total Wt. on Drivers, lbs.,	73350	74700	77200	76900	79500	82600	87300	43
Wt. of Tender Loaded, lbs.,	70000	70000	77000	70000	77000	70000	70000	44
Ratio of Heat'g Surf. to Grate Surface,	41.61	47.23	47.28	47.28	47.28	47.59	47.59	45
Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface, }	9.03	10.47	10.47	10.47	10.47	9.69	9.69	46
Heat. Surf. ÷ Wt. one Cyl'd Steam,	955.7	1004.15	1084.94	1004.15	1004.15	1011.73	959.17	47
Grate Area ÷ Wt. one Cyl'd Steam,	22.96	21.24	22.94	21.24	21.24	21.25	20.15	48
Tractive Power per lb. of M.E. Press.,	120.79	132.48	120.79	132.48	120.79	105.31	108.00	49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure, }	16428	19707	16428 15915	19707	17968 16423	15665	16110	50
Ratio Wt. on Drivers to Tract. Pow.,	4.46	3.79	4.76 4.45	3.90	4.43 4.31	5.27	5.42	51
Height of Deck Plate,			53 1/2"		53 1/2"	53 1/2"		52

STEAM LOCOMOTIVES.

DESCRIPTION.	D 14 b	D 14 c	D 15	D 16	D 16 a	D 16 b	D 16 s b
No. of Driving Wheels	2	2	2	2	2	2	2
Diam. of Driving Wheels	68"	68"	84"	68"	80"	68"	68"
Size of Engine Axle Journals	8 1/2" x 10 1/2"	8 1/2" x 10 1/2"	8 1/2" x 12 1/2"	8 1/2" x 12 1/2"	8 1/2" x 12 1/2"	9 1/2" x 12 1/2"	9 1/2" x 12 1/2"
Length of Driving Wheel Base	7' 9"	7' 9"	8' 0"	7' 8"	7' 9"	7' 9"	7' 9"
Total Wheel Base of Engine	22' 9 1/2"	22' 8 1/2"	23' 11"	22' 9 1/2"	22' 9 1/2"	22' 9 1/2"	22' 9 1/2"
Total Wheel Base of Eng. & Tender	49' 3 1/2"	48' 7 1/2"	48' 1"	50' 3 1/2"	50' 3 1/2"	55' 0 1/2"	55' 0 1/2"
No. of Wheels in Engine Truck	4	4	4	4	4	4	4
Diam. of Wheels in Engine Truck	30"	30"	42"	33"	30"	33"	30"
Size of Engine Truck Axle Journals	5 1/2" x 10"	5 1/2" x 10"	6" x 12"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"
Diameter of Trailing Wheels							
Size of Trailing Axle Journals							
Spread of Cylinders	77"	77"	79"	78"	78"	78"	73"
Size of Cylinders	19 1/2" x 24"	18 1/2" x 24"	19 1/2" x 26"	18 1/2" x 26"	18 1/2" x 26"	18 1/2" x 26"	20 1/2" x 26"
Steam Ports	1 1/2" x 20"	1 1/2" x 17 1/2"	2 1/2" x 29"	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 20"	1 1/2" & 1 1/4"
Exhaust Ports	3" x 20"	3" x 17 1/2"	5 1/2" x 29"	3" x 20"	3" x 20"	3" x 20"	3" x 20"
Travel of Valve	6"	5 1/2"	7"	6"	6"	6"	6"
Lap of Valve	1 1/4"	1"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"
Type of Valve	D	D	Piston	D	D	D	8" Piston
Type of Valve Gear	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n
Type of Boiler	Belpaire	Belpaire	Belpaire	Belpaire	Belpaire	Belpaire Sloping Top	Belpaire Sloping Top
Min. Internal Diam. Boiler	57"	50 1/2"	59 1/2"	58 1/2"	58 1/2"	58 1/2"	58 1/2"
Number of Tubes	258	238	289	310	310	310	159, 21, 84
Outside Diam. of Tubes	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2", 5/8", 1 1/4"
Length of Tubes bet. Tube Sheets	136"	136"	140 1/2"	136 1/2"	136 1/2"	136 1/2"	135 1/2"
Fire Area through Tubes, sq. ft.	3.72	3.72	4.16	4.46	4.46	4.46	3.07
Size of Fire Box, inside	40" x 119 1/2"	40" x 119 1/2"	40" x 108"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"
Fire Grate Area, sq. ft.	33.26	33.26	30.00	33.22	33.22	33.22	33.22
Ext. Heating Surface of Tubes, sq. ft.	1435	1435	1661	1734	1734	1734	1226
Heating Surface of Fire Box, sq. ft.	148	148	163	171	171	166	181
Total Heating Surface of Boiler, sq. ft.	1583	1583	1824	1905	1905	1900	1897
Steam Pressure per square inch, lbs.	175	175	205	185	185	185	175
No. of Wheels under Tender	8	8	6	8	8	8	8
Diam. of Wheels under Tender	33"	33"	42"	36"	36"	36"	36"
Size of Tender Truck Axle Journals	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 9"	4 1/2" x 8"	4 1/2" x 8"	5 1/2" x 10"	5 1/2" x 10"
Wt. of Engine Empty, lbs.	114500		130000	120900	120200	121800	
Wt. on Truck in Working Order, lbs.	39750		50300	41700	41400	40900	42600
Wt. on 1st Pair of Drivers, lbs.	43500		48500	48300	48400	50300	51800
Wt. on 2d Pair of Drivers, lbs.	43800		46700	45300	44700	46700	46700
Wt. on 3d Pair of Drivers, lbs.							
Wt. on 4th Pair of Drivers, lbs.							
Wt. on Trailing Wheels, lbs.							
Wt. of Engine in Work'g Order, lbs.	127050		145500	135300	134500	138000	141100
Total Wt. on Drivers, lbs.	87300		95200	93600	93100	97100	98500
Wt. of Tender Loaded, lbs.	77000	70000	70000	75000	75000	124000	134000
Ratio of Heat'g Surf. to Grate Surface	47.59	47.59	60.80	57.34	57.34	57.19	57.10
Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface	9.69	9.69	10.2	10.14	10.14	10.44	9.48
Heat. Surf. + Wt. one Cy'd Steam	959.17	1011.73		1070.64	1070.64	1067.68	
Grate Area + Wt. one Cy'd Steam	20.15	21.25		18.67	18.67	18.67	
Tractive Power per lb. of M.E. Press.	127.41	120.79		130.86	111.23	130.36	160.68
Tractive Power with M. E. Pressure equal to 65% of Boiler Pressure	18952	17968	20800	20578	17491	20578	23002
Ratio Wt. on Drivers to Tract. Pow.	4.61		4.31	4.51	5.33	4.72	4.12
Height of Deck Plate	40 1/2"	62 1/2"		55 1/2"	55 1/2"	55 1/2"	55 1/2"

STEAM LOCOMOTIVES.

17

DESCRIPTION.	D 16 c	D 16 d	D 16 s d	D 20	D 30	D 31	D 33	
1 No. of Pairs of Driving Wheels,	2	2	2	2	2	2	2	1
2 Diam. of Driving Wheels,	80"	80"	80"	82"	82"	82"	82"	2
3 Size of Driving Axle Journals,	8 1/2" x 12 1/2"	8 1/2" x 12 1/2"	9 1/2" x 12 1/2"	10 1/2" x 12 1/2"	11 1/2" x 12 1/2"	11 1/2" x 12 1/2"	11 1/2" x 12 1/2"	3
4 Length of Driving Wheel Base,	7' 9"	7' 9"	7' 9"	8' 9"	9' 0"	9' 0"	9' 6"	4
5 Total Wheel Base of Engine,	22' 0 1/2"	22' 9 1/2"	22' 9 1/2"	24' 3 1/2"	22' 11"	23' 0"	23' 1 1/2"	5
6 Total Wheel Base of Eng. & Tender,	50' 3 1/2"	53' 0 1/2"	51' 0 1/2"	43' 3 1/2"	44' 2"	47' 7"	48' 2"	6
7 No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
8 Diam. of Wheels in Engine Truck,	36"	36"	36"	30"	28"	30"	28"	8
9 Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	4 1/2" x 8"	5" x 8"	5" x 10"	5" x 10"	9
10 Diameter of Trailing Wheels,								10
11 Size of Trailing Axle Journal,								11
12 Spread of Cylinders,	78"	78"	78"	74"	70"	84"	76"	12
13 Size of Cylinders,	18 1/2" x 26"	18 1/2" x 26"	20 1/2" x 26"	17" x 24"	18" x 24"	18" x 24"	18" x 24"	13
14 Steam Ports,	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 15"	1 1/2" x 10"	1 1/2" x 16"	1 1/2" x 16"	14
15 Exhaust Ports,	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 20"	2 1/2" x 15"	2 1/2" x 10"	2 1/2" x 16"	2 1/2" x 16"	15
16 Travel of Valve,	6"	6"	6"	5 1/2"	5 1/2"	5 1/2"	5"	16
17 Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1"	1"	1"	1"	17
18 Type of Valve,	D	D	8" Piston					18
19 Type of Valve Gear,	Steph'n	Steph'n	Steph'n					19
20 Type of Boiler,	Belpaire Sloping Top	Belpaire Sloping Top	Belpaire Sloping Top	Wagon Top	Wagon Top	Wagon Top	Belpaire	20
21 Min. Internal Diam. Boiler,	58 1/2"	58 1/2"	58 1/2"	52"	53"	54"	56"	21
22 Number of Tubes,	310	310	155, 21, 84	162	212	230	227	22
23 Outside Diam. of Tubes,	1 1/2"	1 1/2"	1 1/2", 5 1/2", 1 1/2"	2"	2"	2"	2"	23
24 Length of Tubes bet. Tube Sheets,	136 1/2"	136 1/2"	135 1/2"	131"	131"	130 1/2"	130"	24
25 Fire Area through Tubes, sq. ft.,	4.40	4.40	3.97	2.71	3.54	3.85	3.79	25
26 Size of Fire Box inside,	40" x 119 1/2"	40" x 119 1/2"	40" x 119 1/2"	35 1/2" x 72"	34 1/2" x 78 1/2"	34 1/2" x 71 1/2"	34 1/2" x 71 1/2"	26
27 Fire Box Area, sq. ft.,	33.22	33.22	33.22	17.88	19.87	16.98	16.18	27
28 Heating Surface of Tubes, sq. ft.,	1734	1734	1226	926	1211	1309	1287	28
29 Heating Surface of Fire Box, sq. ft.,	166	166	181	115	142	129	124	29
30 Total Heating Surface of Boiler, sq. ft.,	1900	1900	1897	1041	1353	1438	1411	30
31 Steam Pressure per square inch, lb.,	17 1/2	17 1/2	17 1/2	125	160	140	140	31
32 No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33 Diam. of Wheels under Tender,	36"	36"	36"	33"	33"	33"	33"	33
34 Size of Tender Truck Axle Journals,	4 1/2" x 8"	5 1/2" x 10"	5 1/2" x 10"	3 1/2" x 7"	3 1/2" x 7"	3 1/2" x 7"	3 1/2" x 7"	34
35 Wt. of Engine Empty, lbs.,	121800	121900		70800		70940	86386	35
36 Wt. on Truck in Working Order, lbs.,	49800	40000		29000	33000	34100	36100	36
37 Wt. on 1st Pair of Drivers, lbs.,	48100	50000		36000	32500	29270	30610	37
38 Wt. on 2nd Pair of Drivers, lbs.,	46800	48000		27000	32500	27770	27800	38
39 Wt. on 3rd Pair of Drivers, lbs.,								39
40 Wt. on 4th Pair of Drivers, lbs.,								40
41 Wt. on Trailing Wheels, lbs.,								41
42 Wt. of Engine in Work'g Order, lbs.,	138700	138000		92000	98000	91140		42
43 Total Wt. on Drivers, lbs.,	94900	98000		63000	65000	67040		43
44 Wt. of Tender Loaded, lbs.,	75000	134000	134000	63150		68000		44
45 Ratio of Heat'g Sur. to Grate Surface,	57.19	57.19	57.10	58.22	72.47	84.67		45
46 Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface, }	10.44	10.44	9.48	8.05	8.52	10.15		46
47 Heat. Surf. + Wt. one Cyl'd Steam,	1067.68	1067.68		1049.39	986.9	1174.9	1152.81	47
48 Grate Area + Wt. one Cyl'd Steam,	18.67	18.67		13.02	13.62	13.87	13.19	48
49 Tractive Power per lb. of M.E. Press.,	111.23	111.23	136.58	111.67	125.42	125.42	125.42	49
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure, }	17491	17491	20316	11886	17058	14925	14925	50
51 Ratio Wt. on Drivers to Tract. Pow.,	5.44	5.60		5.80	3.81	3.82	3.80	51
52 Height of Deck Plate,	55 1/2"	55 1/2"	55 1/2"					52

STEAM LOCOMOTIVES.

CLASSIFICATION.	D 34	D 35	D 36	D 37	D 38	D 61	
No. of Driving Wheels,	2	2	2	2	2	2	1
No. of Trailing Wheels,	62"	55"	50"	60"	62"	65"	2
Size of Driving Axle Journals,	7" D x 8" L	7" D x 8" L	7" D x 8" L	7" D x 8" L	8" D x 9" L	8" D x 8 1/2" L	2
Length of Driving Wheel Base,	8' 3 1/2"	8' 2 1/2"	8' 3 1/2"	8' 3"	9' 1"	8' 9"	4
Total Wheel Base of Engine,	22' 3"	22' 3"	22' 4 1/2"	22' 2"	23' 4"	22' 10 1/2"	5
Total Wheel Base of Eng. & Tender,	43' 6"	43' 0"	43' 6 1/2"	45' 5"	46' 8"	46' 10"	6
No. of Wheels in Engine Truck,	4	4	4	4	4	4	7
Diam. of Wheels in Engine Truck,	28"	28"	28"	28"	30"	30"	8
Size of Engine Truck Axle Journals,	5" x 8"	5" x 8"	5" x 8"	4 1/2" x 7 1/2"	5" x 10"	5 1/2" x 10"	9
Diameter of Trailing Wheels,							10
Size of Trailing Axle Journals,							11
Spread of Cylinders,	74"	74"	74 1/2"	74"	79"	83 1/2"	12
Size of Cylinders,	17" x 24"	17" x 24"	17" x 24"	17" x 24"	18" x 24"	18" x 24"	13
Steam Ports,	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 14 1/2"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	14
Exhaust Ports,	2 1/2" x 16"	2 1/2" x 16"	3" x 14 1/2"	2 1/2" x 16"	2 1/2" x 16"	2 1/2" x 16"	15
Travel of Valve,	5 1/2"	5 1/2"	5"	5 1/2"	5"	5 1/2"	16
Lap of Valve,	3"	3"	3"	3"	3"	3"	17
Type of Valve,							18
Type of Valve Gear,							19
Type of Boiler,	Wagon Top.	Wagon Top.	Wagon Top. Crown Bar.	Wagon Top.		Wagon Top	20
Min. Internal Diam. Boiler,	49 1/2"	49 1/2"	50"	51"	55"	55"	21
Number of Tubes,	180	180	173	188	222	250	22
Outside Diam. of Tubes,	2"	2"	2 1/4"	2"	2"	2"	23
Length of Tubes bet. Tube Sheets,	130 1/2"	130 1/2"	132"	130"	131"	129 1/2"	24
Fire Area through Tubes, sq. ft.,	3.00	3.00	3.77	3.14	3.71	4.1	25
Size of Fire Box, inside,	39 1/2" x 68"	39 1/2" x 68"	33 1/2" x 66 1/2"	69 1/4" x 34 1/2"	34 1/2" x 76"	34 1/2" x 73 1/2"	26
Fire Grate Area, sq. ft.,	18.05	18.05	15.47	10.56	13.12	17	27
Ext. Heating Surface of Tubes, sq. ft.,	1024	1024	1121	1066	1268	1416	28
Heating Surface of Fire Box, sq. ft.,	121	121	122	116	125.0	138	29
Total Heating Surface of Boiler, sq. ft.,	1145	1145	1243	1182	1393	1554	30
Steam Pressure per square inch, lbs.,	180	185	180	150	160	160	31
No. of Wheels under Tender,	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	33
Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	3 1/2" x 7"	4 1/2" x 8"	3 1/2" x 7"	34
Wt. of Engine Empty, lbs.,	76300	76300		80000	92000	98510	35
Wt. on Truck in Working Order, lbs.,	30450	30450	30400	23600	38450	40000	36
Wt. on 1st Pair of Drivers, lbs.,	25850	25250	25100	25800	33220	32500	37
Wt. on 2d Pair of Drivers, lbs.,	27500	26900	27700	27500	32600	32500	38
Wt. on 3d Pair of Drivers, lbs.,							39
Wt. on 4th Pair of Drivers, lbs.,							40
Wt. on Trailing Wheels, lbs.,							41
Wt. of Engine in Work'g Order, lbs.,	83800	82000	83200	86900	104270	105000	42
Total Wt. on Drivers, lbs.,	53350	52150	52800	53300	63820	65000	43
Wt. of Tender Loaded, lbs.,	61650	61650		68000	62750		44
Ratio of Heat'g Surf. to Grate Surface,	61.39	61.39	80.35	71.38	76.87	91.41	45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	8.46	8.46	9.18	9.19	10.14	10.26	46
Heat. Surf. - Wt. one Cyl'd Steam	1116.52	1087.29	1212.68	1021.61	1016.1	1133.5	47
Grate Area - Wt. one Cyl'd Steam,	13.18	17.63	15.09	14.31	13.22	12.40	48
Tractive Power per lb. of M.E. Press.,	111.87	126.11	138.72	115.60	125.42	114.35	49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	12362	14471	15320	14739	17057	15552	50
Ratio Wt. on Drivers to Tract. Pow.,	4.31	3.60	3.44	3.61	3.86	4.17	51
Height of Deck Plate,							52

STEAM LOCOMOTIVES.

DESCRIPTION.	E 1	E 1 a	E 2	E 2 a	E 2 b	E 2 c	E 2 d	
No. of Pairs of Driving Wheels,	2	2	2	2	2	2	2	1
Diam. of Driving Wheels,	80"	80"	80"	80"	80"	80"	80"	2
Size of Driving Axle Journals,	2 1/2" D x 13" L	2 1/2" D x 13" L	2 1/2" D x 13" L	2 1/2" D x 13" L	2 1/2" D x 13" L	2 1/2" D x 13" L	2 1/2" D x 13" L	3
Length of Driving Wheel Base,	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	4
Total Wheel Base of Engine,	26' 6 1/2"	30' 0 1/2"	30' 0 1/2"	30' 0 1/2"	30' 0 1/2"	30' 0 1/2"	30' 0 1/2"	5
Total Wheel Base of Eng. & Tender,	50' 5"	53' 0 1/2"	60' 6 1/2"	60' 6 1/2"	60' 2 1/2"	60' 2 1/2"	60' 6 1/2"	6
No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
Diam. of Wheels in Engine Truck,	36"	36"	36"	36"	36"	36"	36"	8
Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
Diameter of Trailing Wheels,	50"	50"	50"	50"	50"	50"	50"	10
Size of Trailing Axle Journals,	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	11
Spread of Cylinders,	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	12
Size of Cylinders,	20 1/2" x 20"	20 1/2" x 26"	20 1/2" x 26"	20 1/2" x 26"	20 1/2" x 26"	20 1/2" x 26"	20 1/2" x 26"	13
Steam Ports,	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 20"	1 1/2" x 20"	1 1/2" wide.	1 1/2" x 20"	2" & 1 1/2"	14
Exhaust Ports,	3" x 20"	3" x 20"	3" x 20"	3" x 20"	2 1/2" wide.	3" x 20"		15
Travel of Valve,	7"	7"	7"	7"	7"	7"	7"	16
Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	17
Type of Valve,	D	D	D	D	12" Piston.	D	12" Piston.	18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Wals'h't	19
Type of Boiler,	Belaire, Wide Fire Box.	Railroad, Wide Fire Box.	Railroad, Wide Fire Box.	Railroad, Wide Fire Box.	Belaire, Wide Fire Box.	Belaire, Wide Fire Box.	Railroad, Wide Fire Box.	20
Min. Internal Diam. Boiler,	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	21
Number of Tubes,	358	290	315	315	315	315	315	22
Outside Diam. of Tubes,	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	23
Length of Tubes bet. Tube Sheets,	156"	180"	180"	180"	180"	180"	180"	24
Fire Area through Tubes, sq. ft.,	4.33	4.84	5.26	5.26	5.26	5.26	5.26	25
Size of Fire Box, inside,	102" x 96"	66" x 111"	72" x 111"	72" x 111"	72" x 111"	72" x 111"	72" x 111"	26
Fire Grate Area, sq. ft.,	68.00	50.87	55.55	55.55	55.55	55.55	55.55	27
Ext. Heating Surface of Tubes, sq. ft.,	2102	2277	2474	2474	2474	2474	2474	28
Heating Surface of Fire Box, sq. ft.,	218	152	166	166	166	166	166	29
Total Heating Surface of Boiler, sq. ft.,	2320	2429	2640	2640	2640	2640	2640	30
Steam Pressure, per square inch, lbs.,	185	185	205	205	205	205	205	31
No. of Wheels under Tender,	0	6	8	8	8	8	8	32
Diam. of Wheels under Tender,	42"	42"	36"	36"	36"	36"	36"	33
Size of Tender Truck Axle Journals,	5" x 9"	5" x 9"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	34
Wt. of Engine Empty, lbs.,	154700	150500	157000	162000	163100	163100	171500	35
Wt. on Truck in Working Order, lbs.,	38125	36335	32000	32000	32000	32000	31000	36
Wt. on 1st Pair of Drivers, lbs.,	50250	49500	60000	60000	60000	60000	61300	37
Wt. on 2d Pair of Drivers, lbs.,	51300	51105	62000	63000	63000	62000	62600	38
Wt. on 3d Pair of Drivers, lbs.,								39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,	33775	32320	31500	32000	32000	31000	32600	41
Wt. of Engine in Work'g Order, lbs.,	173450	160350	185500	187000	187000	185000	190500	42
Total Wt. on Drivers, lbs.,	101550	100695	122000	124000	123000	122000	123900	43
Wt. of Tender Loaded, lbs.,	90000	134000	134000	134000	154050	154050	134000	44
Ratio of Heat'g Surf. to Grate Surface,	34.12	47.75	47.52	47.52	47.52	47.52	47.52	45
Ratio of Expt'l Flue Heating Surface to Fire Box Heating Surface,	9.64	14.98	14.90	14.90	14.90	14.90	14.90	46
Heat. Surf. + Wt. one Cyl'd Steam,	1061.72	1111.61	1095.62	1095.62	1095.62	1095.62	1095.62	47
Grate Area + Wt. one Cyl'd Steam,	31.11	23.28	23.05	23.05	23.05	23.05	23.05	48
Tractive Power per lb. of M.E. Press.,	130.58	136.58	136.58	136.58	136.58	136.58	136.58	49
Tractive Power with M. E. Pressure equal to 55 % of Boiler Pressure,	21477	21477	23799	23799	23799	23799	23799	50
Ratio Wt. on Drivers to Tract. Pow.,	4.72	4.68	5.17	5.17	5.17	5.12	5.20	51
Height of Deck Plate,		58 1/2"	58 1/2"	58 1/2"			58 1/2"	52

STEAM LOCOMOTIVES.

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DESCRIPTION.	E 2 s d	E 3	E 3 a	E 3 d	E 3 s d	E 4	E 4 s	
No. of Pairs of Driving Wheels,	2	2	2	2	2	2	2	1
Diam. of Driving Wheels,	80"	80"	80"	80"	80"	80"	80"	2
Size of Driving Axle Journals,	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	3
Length of Driving Wheel Base,	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	4
Total Wheel Base of Engine,	30' 9 1/2"	30' 9 1/2"	30' 9 1/2"	30' 9 1/2"	30' 9 1/2"	29' 7 1/2"	29' 7 1/2"	5
Total Wheel Base of Eng. & Tender,	60' 6 1/2"	60' 6 1/2"	60' 6 1/2"	60' 6 1/2"	60' 6 1/2"	63' 6 1/2"	63' 6 1/2"	6
No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
Diam. of Wheels in Engine Truck,	36"	36"	36"	36"	36"	36"	36"	8
Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
Diameter of Trailing Wheels,	50"	50"	50"	50"	50"	50"	50"	10
Size of Trailing Axle Journals,	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	6 1/2" x 12"	6 1/2" x 12"	11
Spread of Cylinders,	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	12
Size of Cylinders,	20 1/2" x 26"	22" x 26"	22" x 26"	22" x 26"	22" x 26"	20 1/2" x 26"	20 1/2" x 26"	13
Steam Ports,	2" & 1 1/2"	1 1/2" x 20"	1 1/2" x 20"	2" & 1 1/2"	2" & 1 1/2"	2" & 1 1/2"	2" & 1 1/2"	14
Exhaust Ports,		3" x 20"	3" x 20"					15
Travel of Valve,	7"	7"	7"	7"	7"	7"	7"	16
Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	17
Type of Valve,	12" Piston.	D	D	12" Piston.	12" Piston.	12" Piston.	12" Piston.	18
Type of Valve Gear,	Wals'h't	Steph'n	Steph'n	Wals'h't	Wals'h't	Wals'h't	Wals'h't	19
Type of Boiler,	Belpaire Wide Fire Box	Belpaire Wide Fire Box	Belpaire Wide Fire Box	Belpaire Wide Fire Box	Belpaire Wide Fire Box	Belpaire Wide Fire Box	Belpaire Wide Fire Box	20
Mth. Internal Diam. Boiler,	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	65 1/2"	21
Number of Tubes,	170, 24, 96,	315	315	315	170, 24, 96	315	170, 24, 96,	22
Outside Diam. of Tubes,	2", 5 1/2", 1 1/2"	2"	2"	2"	2", 5 1/2", 1 1/2"	2"	2", 5 1/2", 1 1/2"	23
Length of Tubes bet. Tube Sheets,	180"	180"	180"	180"	180"	180"	180"	24
Fire Area through Tubes, sq. ft.,	4.76	5.26	5.26	5.26	4.76	5.26	4.76	25
Size of Fire Box, inside,	72" x 111"	72" x 111"	72" x 111"	72" x 111"	72" x 111"	72" x 111"	72" x 111"	26
Fire Grate Area, sq. ft.,	55.55	55.55	55.55	55.55	55.55	55.55	55.55	27
Ext. Heating Surface of Tubes, sq. ft.,	1854	2474	2474	2474	1854	2474	1854	28
Heating Surface of Fire Box, sq. ft.,	166	166	166	166	166	166	166	29
Total Heating Surface of Boiler, sq. ft.,	2806	2640	2640	2640	2806	2640	2806	30
Steam Pressure per square inch, lbs.,	205	205	205	205	205	205	205	31
No. of Wheels under Tender,	8	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	36"	36"	36"	36"	36"	36"	36"	33
Size of Tender Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	34
Wt. of Engine Empty, lbs.,	172900	163200	171100	170400	175400			35
Wt. on Truck in Working Order, lbs.,	34000	34500	35500	34000	35500			36
Wt. on 1st Pair of Drivers, lbs.,	62300	57700	56700	60600	62700			37
Wt. on 2d Pair of Drivers, lbs.,	63300	57600	61700	62300	64500			38
Wt. on 3d Pair of Drivers, lbs.,								39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,	33400	33700	36700	33500	33900			41
Wt. of Engine in Work'g Order, lbs.,	192200	183500	190600	190400	196600			42
Total Wt. on Drivers, lbs.,	125800	115300	118400	122900	127200			43
Wt. of Tender Loaded, lbs.,	134000	134000	134000	134000	134000			44
Ratio of Heat'g Surf. to Grate Surface,	50.51	47.52	47.52	47.52	50.51			45
Ratio of Ext'l Flue Heating Surface } to Fire Box Heating Surface,	15.90	14.90	14.90	14.90	15.90			46
Heat. Surf. + Wt. one Cyl'd Steam,		951.31	951.31	951.31		1095.62		47
Grate Area + Wt. one Cyl'd Steam,		20.02	20.02	20.02		23.05		48
Tractive Power per lb. of M. E. Press.,	136.58	157.30	157.30	157.30	157.30	136.58	136.58	49
Tractive Power with M. E. Pressure } equal to 55% of Boiler Pressure,	23769	27409 26072	27409 26072	27409 26072	27409 26072	23799	23799	50
Ratio Wt. on Drivers to Tract. Pow.,	5.20	4.34	4.31	4.44	4.44			51
Height of Deck Plate,	58 1/2"	58 1/2"	58 1/2"	58 1/2"	58 1/2"	58 1/2"	58 1/2"	52

STEAM LOCOMOTIVES.

CLASSIFICATION.	E 5	E 5s	E 6	E 6s Built Prior to 6-1-13	E 6s Built After 6-1-13	E 6sa	E 7	1
No. of Pairs of Driving Wheels,	2	2	2	2	2	2	2	1
Diam. of Driving Wheels,	80"	80"	80"	80"	80"	80"	80"	2
Size of Driving Axle Journals,	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	9 1/2" x 13 1/2"	3
Length of Driving Wheel Base,	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	7' 5"	4
Total Wheel Base of Engine,	20' 7 1/2"	20' 7 1/2"	20' 7 1/2"	20' 7 1/2"	20' 7 1/2"	20' 7 1/2"	30' 9 1/2"	5
Total Wheel Base of Eng. & Tender,	63' 6 1/2"	63' 6 1/2"	63' 8"	63' 10 1/2"	63' 10 1/2"	63' 8"	60' 1 1/2"	6
No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
Diam. of Wheels in Engine Truck,	30"	36"	36"	36"	36"	36"	36"	8
Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	5 1/2" x 10"	9
Diameter of Trailing Wheels,	50"	50"	50"	50"	50"	50"	50"	10
Size of Trailing Axle Journals,	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	7" x 11 1/2"	11
Spread of Cylinders,	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	85 1/2"	12
Size of Cylinders,	22" x 26"	22" x 26"	22" x 26"	22" x 26"	22 1/2" x 26"	22" x 26"	22" x 26"	13
Steam Ports,	2" & 1 1/2"	2" & 1 1/2"	2 1/2" wide.	2 1/2" & 2 1/2"	2 1/2" & 2 1/2"	1 1/2" wide.		14
Exhaust Ports,						2 1/2" wide.		15
Travel of Valve,	7"	7"	7"	7"	7"		7"	16
Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"		1 1/2"	17
Type of Valve,	12" Piston.	12" Piston.	14" Piston.	14" Piston.	12" Piston.	10 1/2" Rotary		18
Type of Valve Gear,	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Young-Man-Averill	St-pl'n	19
Type of Boiler,	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	20
Min. Internal Diam. Boiler,	65 1/2"	65 1/2"	70 1/2"	70 1/2"	70 1/2"	70 1/2"	65 1/2"	21
Number of Tubes,	315	170, 24, 96	400	242, 30, 144	242, 30, 144	242, 30, 144	170, 24, 96	22
Outside Diam. of Tubes,	2"	2", 5 1/2", 1 1/2"	2"	2", 5 1/2", 1 1/2"	2", 5 1/2", 1 1/2"	2", 5 1/2", 1 1/2"	2", 5 1/2", 1 1/2"	23
Length of Tubes bet. Tube Sheets,	180"	180"	167 1/2"	164 1/2"	180"	164 1/2"	180"	24
Fire Area through Tubes, sq. ft.,	5.26	4.76	7.68	6.92	6.92	6.80		25
Size of Fire Box, inside,	72" x 111"	72" x 111"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 111"	26
Fire Grate Area, sq. ft.,	55.55	55.55	55.13	55.13	55.13	55.13	55.55	27
Ext. Heating Surface of Tubes, sq. ft.,	2474	1854	2364	2445	2477	2443	1854	28
Heating Surface of Fire Box, sq. ft.,	166	166	218	218	218	218	166	29
Total Heating Surface of Boiler, sq. ft.,	2640	2806	3582	3647	4001	3831	2794	30
Steam Pressure, per square inch, lbs.,	205	205	205	205	205	205	205	31
No. of Wheels under Tender,	8	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	36"	36"	36"	36"	36"	36"	36"	33
Size of Tender Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	34
Wt. of Engine Empty, lbs.,		188800						35
Wt. on Truck in Working Order, lbs.,	32000	39300	51300	54000*	55200		35000	36
Wt. on 1st Pair of Drivers, lbs.,	62000	61500	64500	65000*	68000		57000	37
Wt. on 2d Pair of Drivers, lbs.,	65000	67400	68800	66000*	68000		64000	38
Wt. on 3d Pair of Drivers, lbs.,								39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,	41000	40500	46900	51000*	52400		35000	41
Wt. of Engine in Work'g Order, lbs.,	200000	205700	231500	230000*	243600		191600	42
Total Wt. on Drivers, lbs.,	127000	128900	133300	131000*	136000		121000	43
Wt. of Tender Loaded, lbs.,	154050	159000	158000	159000	150000	158000	164050	44
Ratio of Heat'g Surf. to Grate Surface,	47.52	50.51	64.97	66.15	74.20	65.86	50.29	45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	14.90	15.90	15.43	15.73	17.77	15.66	11.00	46
Heat. Surf. ÷ Wt. one Cyl'd Steam,	951.31		1290.75					47
Grate Area ÷ Wt. one Cyl'd Steam,	20.02		19.37					48
Tractive Power per lb. of M.E. Press.,	157.30	157.30	157.30	157.30	170.43	157.30	164.53	49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	27409	27409	27409	27409 29058	31275	27409	28670	50
Ratio Wt. on Drivers to Tract. Pow.,	4.63	4.70	4.86	4.37*	4.34		4.22	51
Height of Deck Plate,	58 1/2"	58 1/2"	66 1/2"	66 1/2"	66 1/2"	66 1/2"		52

* For 23" Cylinders.

STEAM LOCOMOTIVES.

23

CLASSIFICATION.	E 7 s a	E 28	E 29	De Glehn 2-5/2			
No. of Pairs of Driving Wheels,	2	2	2	2			1
Num. of Driving Wheels,	80"	80"	80"	80 1/2"			2
Size of Driving Axle Journals,	9 1/2" D x 13" L	11" D x 13" L	10 1/2" D x 12" L	8 1/2" D x 9 1/2" L			3
Length of Driving Wheel Base,	7' 5"	7' 5"	7' 5"	7' 0 1/2"			4
Total Wheel Base of Engine,	30' 0 1/2"	33' 8"	31' 11"	28' 0 1/2"			5
Total Wheel Base of Eng. & Tender,	60' 1 1/2"	63' 4 1/2"	61' 4 1/2"	59' 5"			6
No. of Wheels in Engine Truck,	4	4	4	4			7
Diam. of Wheels in Engine Truck,	36"	36"	36"	37 1/2"			8
Size of Engine Truck Axle Journals,	5 1/2" x 10"		6 1/2" x 12"	5 1/2" x 9 1/2"			9
Diameter of Trailing Wheels,	50"	50"	50"	60 1/2"			10
Size of Trailing Axle Journal,	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"	7" x 11 1/2"			11
Spread of Cylinders,	85 1/2"	85 1/2"	85 1/2"	84 1/2"			12
Size of Cylinders,	22 1/2" x 26"	1 1/2" x 26"	1 1/2" x 26"	1 1/2" x 25 1/2"			13
Steam Ports,		1 1/2" wide.					14
Exhaust Ports,							15
Travel of Valve,	7"		6"	5 1/2"			16
Lap of Valve,	1 1/2"		1"				17
Type of Valve,		15" Piston.	14" Piston.	D and Piston			18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Wals'h't			19
Type of Boiler,	Radial Stay Wide Fire Box	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Narrow Fire Box.			20
Min. Internal Diam. Boiler,	65 1/2"	65 1/2"	65 1/2"	58 1/2"			21
Number of Tubes,	170, 24, 96	261	315	139			22
Outside Diam. of Tubes,	2", 5 1/2", 1 1/2"	2"	2"	2 1/2"			23
Length of Tubes, excl. Tube Sheets,	180"	211"	195"	173 1/2"			24
Fire Area through Tubes, sq. ft.,		5.69	5.26	4.74			25
Size of Fire Box, inside,	72" x 111"	72" x 111"	72" x 111"	39 3/4" x 119 1/2"			26
Fire Grate Area, sq. ft.,	55.55	55.55	55.55	33.38			27
Ext. Heating Surface of Tubes, sq. ft.,	1812	2703	2680	2402			28
Heating Surface of Fire Box, sq. ft.,	166	166.0	166.0	174			29
Total Heating Surface of Boiler, sq. ft.,	2794	2869	2846	2576			30
Steam Pressure per square inch, lbs.,	205	205	205	227.5			31
No. of Wheels under Tender,	8	8	8	8			32
Diam. of Wheels under Tender,	36"	36"	36"	36"			33
Size of Tender Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"			34
Wt. of Engine Empty, lbs.,				147400			35
Wt. on Truck in Working Order, lbs.,	35000	38500	38000	41250			36
Wt. on 1st Pair of Drivers, lbs.,	57000	62000	60000	44550			37
Wt. on 2d Pair of Drivers, lbs.,	63000	65000	63000	43300			38
Wt. on 3d Pair of Drivers, lbs.,							39
Wt. on 4th Pair of Drivers, lbs.,							40
Wt. on Trailing Wheels, lbs.,	34500	38500	38000	34900			41
Wt. of Engine in Work'g Order, lbs.,	139500	204000	199000	164000			42
Total Wt. on Drivers, lbs.,	120000	127000	122000	87850			43
Wt. of Tender Loaded, lbs.,	145150	154050	154050	132500			44
Ratio of Heat'g Surf. to Grate Surface,	50.29	51.65	51.23	77.17			45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	11.09	16.28	16.14	13.80			46
Heat. Surf. + Wt. one Cyl'd Steam,							47
Grate Area + Wt. one Cyl'd Steam,							48
Tractive Power per lb. of M.E. Press.,	164.53						49
Tractive Power with M. E. Pressure equal to 85 % of Boiler Pressure,	28670	23500	23500	19558			50
Ratio Wt. on Drivers to Tract. Pow.,	4.19	5.09	4.98	4.40			51
Height of Deck Plate,							52

STEAM LOCOMOTIVES.

CLASSIFICATION.	F 1	F 1 a	F 2	F 3	F 3 a	F 3 b	F 3 c	
No. of Pairs of Driving Wheels,	3	3	3	3	3	3	3	1
Diam. of Driving Wheels,	62"	62"	62"	62"	63"	62"	62"	2
Size of Driving Axle Journals,	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	$\frac{11}{16}$ " ϕ x 12"L	3
Length of Driving Wheel Base,	14' 6"	14' 6"	14' 6"	14' 9"	14' 9"	14' 9"	14' 9"	4
Total Wheel Base of Engine,	23' 4"	23' 4"	23' 4"	23' 10"	23' 10"	23' 10"	23' 10"	5
Total Wheel Base of Eng. & Tender,	51' 11"	51' 11"	51' 11"	54' 5 1/2"	54' 5 1/2"	54' 5 1/2"	55' 10 1/2"	6
No. of Wheels in Engine Truck,	2	2	2	2	2	2	2	7
Diam. of Wheels in Engine Truck,	33"	33"	33"	33"	33"	33"	33"	8
Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
Diameter of Trailing Wheels,								10
Size of Trailing Axle Journals,								11
Spread of Cylinders,	86"	86"	86"	86"	80"	86"	86"	12
Size of Cylinders,	20" x 28"	20" x 28"	$\frac{11}{16}$ " ϕ x 28" H. P. 20" x 28" L. P. 20" x 28"	20" x 28"	20" x 28"	20" x 28"	20" x 28"	13
Steam Ports,	1 1/2" x 18"	1 1/2" x 18"	$\frac{11}{16}$ " ϕ x 18" H. P. 1 1/2" x 18" L. P. 1 1/2" x 18"	1 1/2" x 18"	1 1/2" x 18"	1 1/2" x 18"	1 1/2" x 18"	14
Exhaust Ports,	3" x 18"	3" x 18"	$\frac{11}{16}$ " ϕ x 18" H. P. 3" x 18" L. P. 3" x 18"	3" x 18"	3" x 18"	3" x 18"	3" x 18"	15
Travel of Valve,	6"	6"	$\frac{11}{16}$ " ϕ x 6" H. P. 6" L. P. 6"	6"	6"	6"	6"	16
Lap of Valve,	1"	1"	$\frac{11}{16}$ " ϕ x 1" H. P. 1" L. P. 1"	1"	1"	1"	1"	17
Type of Valve,	D	D	D	D	D	D	D	18
Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	19
Type of Boiler,	Belpaire.	Belpaire. Sloping Top.	Belpaire.	Radial Stay. Sloping Top.	Radial Stay. Sloping Top.	Radial Stay. Wide Fire Box.	Belpaire. Wide Fire Box.	20
Min. Internal Diam. Boiler,	60 3/4"	60 3/4"	60 3/4"	67 1/4"	67 1/4"	67 1/4"	67 1/4"	21
Number of Tubes,	270	283	270	356	350	364	364	22
Outside Diam. of Tubes,	2"	2"	2"	2"	2"	2"	2"	23
Length of Tubes bet. Tube Sheets,	140 1/2"	140 1/2"	140 1/2"	145 1/2"	145 1/2"	145 1/2"	145 1/2"	24
Fire Area through Tubes, sq. ft.,	4.66	4.73	4.66	5.95	5.95	6.08	6.08	25
Size of Fire Box, inside,	40" x 108"	40" x 108"	40" x 108"	39 1/2" x 111 1/4"	39 1/2" x 111 1/4"	66" x 102 7/8"	66" x 102 7/8"	26
Fire Grate Area, sq. ft.,	30.00	30.13	30.00	30.79	30.79	47.07	47.07	27
Ext. Heating Surface of Tubes, sq. ft.,	1712	1737	1712	2264	2264	2315	2315	28
Heating Surface of Fire Box, sq. ft.,	153	147	153	167	167	154	154	29
Total Heating Surface of Boiler, sq. ft.,	1865	1884	1865	2431	2431	2469	2469	30
Steam Pressure per square inch, lbs.,	185	185	205	205	205	205	205	31
No. of Wheels under Tender,	8	8	8	8	8	8	8	32
Diam. of Wheels under Tender,	36"	36"	36"	33"	33"	33"	30"	33
Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	5" x 9"	5" x 9"	5" x 9"	5 1/2" x 10"	34
Wt. of Engine Empty, lbs.,	130400	131900	140800	145250		146300	147000	35
Wt. on Truck in Working Order, lbs.,	18000	18000	22400	20950		22200	23000	36
Wt. on 1st Pair of Drivers, lbs.,	40500	40500	42500	48700		49050	49000	37
Wt. on 2d Pair of Drivers, lbs.,	44500	45000	46100	48350		47450	48200	38
Wt. on 3d Pair of Drivers, lbs.,	41500	41500	45600	45000		43300	45700	39
Wt. on 4th Pair of Drivers, lbs.,								40
Wt. on Trailing Wheels, lbs.,								41
Wt. of Engine in Work'g Order, lbs.,	144500	145000	156600	163000		162500	165900	42
Total Wt. on Drivers, lbs.,	126500	127000	134200	142050		140300	142900	43
Wt. of Tender Loaded, lbs.,	75000	96000	80000	113000		112000	117000	44
Ratio of Heat'g Surf. to Grate Surface,	62.17	62.52	62.17	78.95		78.95	52.45	45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	11.19	11.81	11.19	13.55		13.55	15.03	46
Heat. Surf. + Wt. one Cyl'd Steam	822.65	841.13		984.24		984.24	999.62	47
Grate Area + Wt. one Cyl'd Steam,	13.39	13.45		12.47		12.47	19.06	48
Tractive Power per lb. of M. E. Press.,	180.65	180.65	180.65	180.05		164.71	180.65	49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	28406	28406	31478	31477		26700	31477	50
Ratio Wt. on Drivers to Tract. Pow.,	4.45	4.45	4.26	4.51		4.45	4.54	51
Height of Deck Plate,	55 1/2"	55 1/2"		58 3/4"		66 3/4"	66 3/4"	52

STEAM LOCOMOTIVES.

CLASSIFICATION.	G 1	G 1 a	G 2	G 3	G 3 a	G 4	G 4 a	
1. No. of Driving Wheels,	3	3	3	3	3	3	3	
2. Diam. of Driving Wheels,	56"	50"	50"	68"	62"	72"	72"	
3. Size of Driving Axle Journals,	6 1/2" D x 7 1/2" L	6 1/2" D x 7 1/2" L	6 1/2" D x 7 1/2" L	8" D x 9" L	8" D x 9" L	8 1/2" D x 13" L	8 1/2" D x 13" L	
4. Length of Driving Wheel Base,	12' 5"	12' 5"	12' 8"	11' 10"	11' 10"	13' 10"	13' 10"	
5. Total Wheel Base of Engine,	23' 8"	23' 8"	23' 8"	23' 0 1/2"	23' 0 1/2"	25' 5"	25' 5"	
6. Total Wheel Base of Eng. & Tender,	45' 4 1/2"	45' 4 1/2"	45' 4 1/2"	51' 1 1/2"	51' 1 1/2"	57' 10"	57' 10"	
7. No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	
8. Diam. of Wheels in Engine Truck,	28"	26"	26"	33"	30"	26"	30"	
9. Size of Engine Truck Axle Journals,	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	
10. Diameter of Trailing Wheels,								
11. Size of Trailing Axle Journals,								
12. Spread of Cylinders,	81"	81"	81"	88"	88"	90"	90"	
13. Size of Cylinders,	18" x 22"	18" x 22"	18" x 22"	10" x 24"	10" x 24"	20" x 26" 22" x 28"	23" x 28"	
14. Steam Ports,	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 16"	1 1/2" x 23"	1 1/2" x 28"	1 1/2" x 20"	2 1/2" x 2 1/2"	
15. Exhaust Ports,	2 1/2" x 16"	2 1/2" x 18"	2 1/2" x 16"	2 1/2" x 23"	2 1/2" x 23"	3" x 20"		
16. Travel of Valve,	5"	5"	5"	5 1/2"	5 1/2"	6"	7"	
17. Lap of Valve,	1"	1"	1"	1 1/2"	1 1/2"	1"	1 1/2"	
18. Type of Valve,	D	D	D	D	D	D	12" Platon	
19. Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Allan	Allan	Steph'n	Wals'ly	
20. Type of Boiler,	Wagon Top, Grown Bars.	Wagon Top, Grown Bars.	Wagon Top, Grown Bars.	Belpaire.	Belpaire.	Radial Stay.	Radial Stay.	
21. Min. Internal Diam. Boiler,	48 1/2"	48 1/2"	48 1/2"	59 1/2"	50 1/2"	67"	67"	
22. Number of Tubes,	119	119	123	241	241	356	193, 26, 104	
23. Outside Diam. of Tubes,	2 1/2"	2 1/2"	2 1/2"	2"	2"	2"	2", 5 1/2", 1 1/2"	
24. Length of Tubes bet. Tube Sheets,	152 1/2"	152 1/2"	146 1/2"	167"	167"	170 1/2"	170 1/2"	
25. Fire Area through Tubes, sq. ft.,	3.29	3.29	3.39	4.03	4.03	5.95	5.30	
26. Size of Fire Box, inside,	35" x 50 1/2"	35" x 50 1/2"	35" x 67 1/2"	41 1/2" x 107 1/2"	41 1/2" x 107 1/2"	39 1/2" x 111 1/2"	30 1/2" x 111 1/2"	
27. Fire Grate Area, sq. ft.,	14.54	14.54	16.34	31.35	31.35	30.78	30.78	
28. Ext. Heating Surface of Tubes, sq. ft.,	991	991	985	1755	1755	2654	1973	
29. Heating Surface of Fire Box, sq. ft.,	96	96	111	146	146	162	175	
30. Total Heating Surface of Boiler, sq. ft.,	1087	1087	1096	1901	1901	2816	2050	
31. Steam Pressure per square inch, lbs.,	125	125	125	180	180	225	205	
32. No. of Wheels under Tender,	8	8	8	8	8	8	8	
33. Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	36"	36"	
34. Size of Tender Truck Axle Journals,	3 1/2" x 7"	3 1/2" x 7"	3 1/2" x 7"	4 1/2" x 8"	4 1/2" x 8"	5 1/2" x 10"	5 1/2" x 10"	
35. Wt. of Engine Empty, lbs.,	74800	73180	75800	127150	125200	106400	177500	
36. Wt. on Truck in Working Order, lbs.,	25100	24880	22700	30500	23300	43800	47200	
37. Wt. on 1st Pair of Drivers, lbs.,	18600	17570	19700	37000	34050	46500	55900	
38. Wt. on 2d Pair of Drivers, lbs.,	20800	20570	23300	41000	37800	48500	50600	
39. Wt. on 3d Pair of Drivers, lbs.,	19000	19570	19100	38000	38300	45500	43400	
40. Wt. on 4th Pair of Drivers, lbs.,								
41. Wt. on Trailing Wheels, lbs.,								
42. Wt. of Engine in Work'g Order, lbs.,	83500	82590	84500	146500	136050	184300	197100	
43. Total Wt. on Drivers, lbs.,	58400	57710	62100	116000	110750	140500	149200	
44. Wt. of Tender Loaded, lbs.,	60000	60000	60000	122000	78000	147000	147000	
45. Ratio of Heat'g Surf. to Grate Surface,	75.76	75.76	67.07	60.63	60.63	91.48	96.18	
46. Ratio of Ext'l Flue Heating Surface } to Fire Box Heating Surface, }	10.32	10.32	8.87	12.02	12.02	16.38	15.91	
47. Heat. Surf. + Wt. one Cyl'd Steam	1066.73	1066.73	1074.98	1123.7	1123.7	1040.68		
48. Grate Area + Wt. one Cyl'd Steam,	14.27	14.27	16.04	18.53	24.53	11.47		
49. Tractive Power per lb. of M. E. Press.,	127.29	142.56	142.56	127.41	130.74	135.56 168.32	205.72	
50. Tractive Power with M. E. Pressure } equal to 85% of Boiler Pressure, }	13524	15147	15147	10494	21351	20750 32798	35847	
51. Ratio Wt. on Drivers to Tract. Pow.,	4.31	3.81	4.10	5.95	5.17	4.38	4.16	
52. Height of Deck Plate,						58 1/2"	58 1/2"	

STEAM LOCOMOTIVES.

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LOCATION.	LW G 4 a	LW G 4 b	LW G 30	LW G 31	LW G 32	LW G 33	
1 No. of Pairs of Driving Wheels,	3	3	3	3	3	3	1
2 Diam. of Driving Wheels,	62"	62"	56"	56"	54"	54"	2
3 Size of Driving Axle Journals,	$\frac{9}{16}$ " ϕ x 13"	$\frac{9}{16}$ " ϕ x 13"	$7\frac{1}{2}$ " ϕ x 8"	$8'$ " ϕ x $8\frac{1}{2}$ "	$7\frac{1}{2}$ " ϕ x 8"	$7\frac{1}{2}$ " ϕ x 9"	3
4 Length of Driving Wheel Base,	13' 10"	13' 10"	14' 0"	14' 0"	14' 0"	14' 1"	4
5 Total Wheel Base of Engine,	25' 5"	25' 5"	24' 5"	25' 0"	24' 0"	24' 7"	5
6 Total Wheel Base of Eng. & Tender,	56' 1"	56' 1"	46' 0"	48' 0"	47' 11"	47' 0"	6
7 No. of Wheels in Engine Truck,	4	4	4	4	4	4	7
8 Diam. of Wheels in Engine Truck,	30"	30"	28"	28"	28"	28"	8
9 Size of Engine Truck Axle Journals,	$5\frac{1}{2}$ " x 10"	$5\frac{1}{2}$ " x 10"	5" x 10"	5" x 10"	5" x 10"	5" x 10"	9
10 Diameter of Trailing Wheels,							10
11 Size of Trailing Axle Journals,							11
12 Spread of Cylinders,	90"	90"	84"	85"	84"	87"	12
13 Size of Cylinders,	20" x 28"	20" x 23"	18" x 24"	19" x 24"	19" x 24"	19" x 24"	13
14 Steam Ports,	11" x 20"	11" x 23"	11" x 17"	11" x 16"	11" x 16"	11" x 18"	14
15 Exhaust Ports,	3" x 20"	3" x 20"	21" x 17"	3" x 16"	21" x 16"	21" x 19"	15
16 Travel of Valve,	6"	6"	5"	5"	5"	5"	16
17 Lap of Valve,	1"	1"	1"	1"	1"	1"	17
18 Type of Valve,	D	D	D	D			18
19 Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n			19
20 Type of Boiler,	Radial Stay.	Belpaire Wide Fire Box.	Belpaire.	Wagon Top.	Belpaire.	Belpaire.	20
21 Min. Internal Diam. Boiler,	67"	67"	57"	60"	59"	60"	21
22 Number of Tubes,	356	350	229	256	229	237	22
23 Outside Diam. of Tubes,	2"	2"	2"	2"	2"	2"	23
24 Length of Tubes bet. Tube Sheets,	170"	170"	151"	150"	150"	150"	24
25 Fire Area through Tubes, sq. ft.,	5.95	5.95	3.83	4.28	3.83	3.90	25
26 Size of Fire Box, inside,	$39\frac{1}{2}$ " x 111"	66" x 100"	$33\frac{1}{2}$ " x 73"	$34\frac{1}{2}$ " x 87"	$40\frac{1}{2}$ " x 71"	41" x 74"	26
27 Fire Grate Area, sq. ft.,	30.78	45.83	17.17	18.72	19.96	21.14	27
28 Ext. Heating Surface of Tubes, sq. ft.,	2654	2653	1509	1675	1503	1555	28
29 Heating Surface of Fire Box, sq. ft.,	162	137	120	110	138	138	29
30 Total Heating Surface of Boiler, sq. ft.,	2816	2790	1629	1785	1641	1693	30
31 Steam Pressure per square inch, lbs.,	225	225	150	150	160	160	31
32 No. of Wheels under Tender,	8	8	8	8	8	8	32
33 Diam. of Wheels under Tender,	33"	34"	33"	33"	33"	33"	33
34 Size of Tender Truck Axle Journals,	$5\frac{1}{2}$ " x 10"	$5\frac{1}{2}$ " x 10"	$4\frac{1}{2}$ " x 8"	$4\frac{1}{2}$ " x 8"	$4\frac{1}{2}$ " x 8"	$4\frac{1}{2}$ " x 8"	34
35 Wt. of Engine Empty, lbs.,	163000	166800			101300	100000	35
36 Wt. on Truck in Working Order, lbs.,	41000		24000	31700	38000	32400	36
37 Wt. on 1st Pair of Drivers, lbs.,	48000			26790	23720	30850	37
38 Wt. on 2d Pair of Drivers, lbs.,	49000		76000	26910	28930	30440	38
39 Wt. on 3d Pair of Drivers, lbs.,	45000			26120	25500	23040	39
40 Wt. on 4th Pair of Drivers, lbs.,							40
41 Wt. on Trailing Wheels, lbs.,							41
42 Wt. of Engine in Work'g Order, lbs.,	183000	146050	100000	111520	111150	117730	42
43 Total Wt. on Drivers, lbs.,	142000		76000	79820	78150	84330	43
44 Wt. of Tender Loaded, lbs.,	122000			72000	76400	67200	44
45 Ratio of Heat'g Surf. to Grate Surface,	91.48	60.90	94.87	95.35	82.21	80.08	45
46 Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface,	16.38	19.35	12.57	15.23	10.88	11.27	46
47 Heat. Surf. + Wt. one Cyl'd Steam,	1049.67	1039.89	1255.54	1234.77	1196.97	1108.33	47
48 Grate Area + Wt. one Cyl'd Steam,	11.47	17.08	13.23	12.95	14.56	13.84	48
49 Tractive Power per lb. of M. E. Press.,	180.65	180.65	138.86	154.71	144.00	160.44	49
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	34548	34548	17704	19720	19584	21820	50
51 Ratio Wt. on Drivers to Tract. Pow.,	4.11		4.29	4.04	3.99	3.86	51
52 Height of Deck Plate,	58"	58"					52

STEAM LOCOMOTIVES.

CLASSIFICATION	H 1	H 2	H 2 a	H 3	H 3 a	H 3 b	H 3 c
No. of Pairs of Driving Wheels,	4	4	4	4	4	4	4
Diam. of Driving Wheels,	50"	50"	50"	50"	50"	50"	50"
Size of Driving Axle Journals,	7" D x 7 1/2" L	7" D x 7 1/2" L	7" D x 7 1/2" L	8" D x 8 1/2" L	8" D x 8 1/2" L	8" D x 8 1/2" L	8 1/2" D x 10 1/2" L
Length of Driving Wheel Base,	13' 8"	13' 8"	13' 8"	13' 10"	13' 10"	13' 10"	13' 10"
Total Wheel Base of Engine,	21' 6"	21' 6"	21' 6"	21' 9"	21' 9"	21' 9"	21' 9"
Total Wheel Base of Eng. & Tender,	48' 4 1/2"	47' 8 1/2"	47' 8 1/2"	49' 9"	49' 9"	49' 9"	49' 9"
No. of Wheels in Engine Truck,	2	2	2	2	2	2	2
Diam. of Wheels in Engine Truck,	28"	28"	28"	28"	28"	28"	28"
Size of Engine Truck Axle Journals,	5" x 7 1/2"	4 1/2" x 7 1/2"	4 1/2" x 7 1/2"	5 1/2" x 8 1/2"	5 1/2" x 8 1/2"	5 1/2" x 8 1/2"	5 1/2" x 8 1/2"
Diameter of Trailing Wheels,							
Size of Trailing Axle Journals,							
Spread of Cylinders,	84"	84"	84"	86"	86"	86"	88"
Size of Cylinders,	20" x 24"	20" x 24"	20" x 24"	20" x 24"	20" x 24"	20" x 24"	20" x 28"
Steam Ports,	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 17 1/2"	1 1/2" x 21"
Exhaust Ports,	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	2 1/2" x 17 1/2"	3" x 21"
Travel of Valve,	5"	5"	5"	5"	5"	5"	5"
Lap of Valve,	3"	3"	3"	3"	3"	3"	1"
Type of Valve,	D	D		D	D	D	D
Type of Valve Gear,	Steph'n	Steph'n		Steph'n	Steph'n	Steph'n	Steph'n
Type of Boiler,	Altoona.	Beltpaire.	Crown Bar.	Beltpaire.	Beltpaire.	Beltpaire.	Beltpaire.
Mdn. Internal Diam. Boiler,	53 1/2"	57"	56 1/2"	59"	60"	60"	60"
Number of Tubes,	138	147	157	163	174	174	174
Outside Diam. of Tubes,	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Length of Tubes bet. Tube Sheets,	158 1/2"	158 1/2"	158 1/2"	150 1/2"	150"	150"	150"
Fire Area through Tubes, sq. ft.,	3.81	3.21	3.43	5.05	3.83	3.83	3.83
Size of Fire Box, inside,	34 1/2" x 96"	34 1/2" x 95 1/2"	34 1/2" x 95 1/2"	42" x 107"	42" x 108"	42" x 108"	42" x 108"
Fire Grate Area, sq. ft.,	23.00	22.77	22.87	31.20	31.50	31.50	31.50
Ext. Heating Surface of Tubes, sq. ft.,	1158	1145	1222	1565	1358	1358	1358
Heating Surface of Fire Box, sq. ft.,	101	120	119	167	140	140	140
Total Heating Surface of Boiler, sq. ft.,	1259	1265	1341	1732	1498	1498	1498
Steam Pressure, per square inch, lbs.,	125	140	140	140	140	140	140
No. of Wheels under Tender,	8	8	8	8	8	8	8
Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	33"
Size of Tender Truck Axle Journals,	3 1/2" x 7"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"
Wt. of Engine Empty, lbs.,	85200	94550	94200	102000	110000	116100	116000
Wt. on Truck in Working Order, lbs.,		11000	11000	14030	15000	12000	13500
Wt. on 1st Pair of Drivers, lbs.,		23000	23000	24220	21500	20000	23000
Wt. on 2d Pair of Drivers, lbs.,		26000	23000	28870	29000	33000	31000
Wt. on 3d Pair of Drivers, lbs.,		28000	27000	26750	32000	37000	34000
Wt. on 4th Pair of Drivers, lbs.,		23000	22000	25750	29000	25000	30000
Wt. on Trailing Wheels, lbs.,							
Wt. of Engine in Work'g Order, lbs.,		111000	106000	114620	126500	127000	131500
Total Wt. on Drivers, lbs.,		100000	95000	100590	111500	115000	118000
Wt. of Tender Loaded, lbs.,	64550	84050	84050	75000	102200	102200	102200
Ratio of Heat'g Surf. to Grate Surface,	54.74	55.56	58.64	55.49	47.56	47.56	47.56
Ratio of Ex'tl Flue Heating Surface to Fire Box Heating Surface,	11.46	9.54	10.27	9.37	9.70	9.70	9.70
Heat. Surf. + Wt. one Cyl'd Steam,	916.88	837.18	844.77	1146.24	935.21	935.21	840.75
Grate Area + Wt. one Cyl'd Steam,	16.75	15.06	15.12	20.65	19.66	19.66	17.85
Tractive Power per lb. of M. E. Press.,	192.00	192.00	192.00	192.00	192.00	192.00	224.00
Tractive Power with M. E. Pressure equal to 85 % of Boiler Pressure,	20400	22848	21216	22848	22848	24480	25656
Ratio Wt. on Drivers to Tract. Pow.,		4.37	4.48	4.48	4.55	4.64	4.43
Height of Deck Plate,	49 1/2"		4.15	51"	51"	51"	51"

STEAM LOCOMOTIVES.

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CLASSIFICATION.	H 3 d	H 3 e	H 3 f	H 4	H 5	H 6	H 6 a	
1. No. of Driving Wheels,	4	4	4	4	4	4	4	1
2. Diam. of Driving Wheels,	50"	50"	50"	50"	56"	56"	56"	2
3. Size of Driving Axle Journals,	8"D x 8 1/2"L	8"D x 8 1/2"L	8"D x 8 1/2"L	8 1/2"D x 10"L	9"D x 13 1/2"L	9"D x 13 1/2"L	9"D x 13 1/2"L	3
4. Length of Driving Wheel Base,	13' 10"	13' 10"	13' 10"	16' 11"	17' 6"	16' 6 1/2"	16' 6 1/2"	4
5. Total Wheel Base of Engine,	21' 9"	21' 9"	21' 0"	25' 5"	25' 11 1/2"	24' 9"	24' 9"	5
6. Total Wheel Base of Eng. & Tender,	48' 10"	49' 9"	49' 9"	53' 1 1/2"	57' 3"	56' 8 1/2"	58' 1 1/2"	6
7. No. of Wheels in Engine Truck,	2	2	2	2	2	3	2	7
8. Diam. of Wheels in Engine Truck,	28"	28"	28"	30"	30"	30"	30"	8
9. Size of Engine Truck Axle Journals,	5 1/2" x 8 1/2"	5 1/2" x 8 1/2"	5 1/2" x 8 1/2"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	9
10. Diameter of Trailing Wheels,								10
11. Size of Trailing Axle Journal,								11
12. Spread of Cylinders,	86"	80"	86"	88"	90"	88"	88"	12
13. Size of Cylinders,	20" x 24"	20" x 24"	20" x 24"	22" x 23"	23 1/2" x 28"	22" x 28"	22" x 28"	13
14. Steam Ports,	1 1/2" x 17"	1 1/2" x 17"	1 1/2" x 17"	1 1/2" x 21"	1 1/2" x 21"	1 1/2" x 21"	1 1/2" x 21"	14
15. Exhaust Ports,	2 1/2" x 17"	2 1/2" x 17"	2 1/2" x 17"	3" x 21"	3" x 21"	3" x 21"	3" x 21"	15
16. Travel of Valve,	5"	5"	5"	6"	8"	6"	6"	16
17. Lap of Valve,	3"	3"	3"	1"	1"	1"	1"	17
18. Type of Valve,	D	D	D	D	D	D	D	18
19. Type of Valve Gear,	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	Steph'n	19
20. Type of Boiler,	Altoona	Altoona	Altoona	Belpaire	Belpaire, Sloping Top.	Belpaire, Sloping Top.	Belpaire, White Fire Box.	20
21. Min. Internal Diam. Boiler,	59"	59"	59"	63"	69 1/2"	60 1/2"	60 1/2"	21
22. Number of Tubes,	183	183	183	216	369	369	373	22
23. Outside Diam. of Tubes,	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	23
24. Length of Tubes, bet. Tube Sheets,	156 1/2"	156 1/2"	156 1/2"	168"	168"	163 1/2"	164 1/2"	24
25. Fire Area through Tubes, sq. ft.,	5.05	5.05	5.05	5.78	6.16	6.16	6.23	25
26. Size of Fire Box, inside,	42" x 107"	42" x 107"	42" x 107"	40" x 106"	40" x 120"	40" x 120"	66" x 107"	26
27. Fire Grate Area, sq. ft.,	31.20	31.20	31.20	29.45	33.33	33.33	49.04	27
28. Ext. Heating Surface of Tubes, sq. ft.,	1565	1565	1565	2216	2705	2632	2677	28
29. Heating Surface of Fire Box, sq. ft.,	149	149	149	154	197	180	167	29
30. Total Heating Surface of Boiler, sq. ft.,	1714	1714	1714	2470	2902	2812	2844	30
31. Steam Pressure per square inch, lbs.,	140	140	140	205	185	190	200	31
32. No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33. Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	33"	33"	33
34. Size of Tender Truck Axle Journals,	4 1/2" x 8"	4 1/2" x 8"	4 1/2" x 8"	5" x 9"	5" x 9"	5" x 9"	5 1/2" x 10"	34
35. Wt. of Engine Empty, lbs.,				154950	173100	162900	171600	35
36. Wt. on Truck in Working Order, lbs.,				18000	20800	20100	18800	36
37. Wt. on 1st Pair of Drivers, lbs.,				36000	41800	43800	43000	37
38. Wt. on 2d Pair of Drivers, lbs.,				42000	43000	40200	44000	38
39. Wt. on 3d Pair of Drivers, lbs.,				45000	45600	41500	46000	39
40. Wt. on 4th Pair of Drivers, lbs.,				38000	45500	40000	42700	40
41. Wt. on Trailing Wheels, lbs.,								41
42. Wt. of Engine in Work'g Order, lbs.,				179000	196500	186500	194500	42
43. Total Wt. on Drivers, lbs.,				161000	175700	166400	176700	43
44. Wt. of Tender Loaded, lbs.,	80000	80000	80000	122000	118000	113000	147000	44
45. Ratio of Heat'g Surf. to Grate Surface,	54.92	54.94	54.94	83.87	87.01	84.37	57.99	45
46. Ratio of Ext'l Fire Heating Surface } to Fire Box Heating Surface, }	10.50	10.50	10.50	15.04	13.73	14.62	18.03	46
47. Heat. Surf. + Wt. one Cyl'd Steam,	1134.33	1134.33	1134.33	824.9	934.43	940.9	951.62	47
48. Grate Area + Wt. one Cyl'd Steam,	20.65	20.65	20.65	9.86	10.77	11.15	16.41	48
49. Tractive Power per lb. of M.E. Press.,	192.00	192.00	192.00	242.00	276.13	242.00	242.00	49
50. Tractive Power with M. E. Pressure } equal to 85% of Boiler Pressure, }	22848	22848	22848	42168	48431	42168	42168	50
51. Ratio Wt. on Drivers to Tract. Pow.,				3.82	4.04	3.94	4.17	51
52. Height of Deck Plate,	51"	51"	51"	51"	51"	51"	60 1/2"	52

STEAM LOCOMOTIVES.

CLASSIFICATION.	H 6 b	H 6 a b	H 7 ^{L W}	H 8	H 8 a	H 8 a	H 8 a	H 8 a
1 No. of Driving Wheels,	4	4	4	4	4	4	4	4
2 Diam. of Driving Wheels,	58"	58"	58"	62"	62"	62"	62"	62"
3 Size of Driving Axle Journals,	9" D x 13" L	9" D x 13" L	9" D x 13" L	9" D x 13" L	9" D x 13" L	9" D x 13" L	9" D x 13" L	9" D x 13" L
4 Length of Driving Wheel Base,	16' 3"	16' 3"	16' 6"	17' 0"	17' 0"	17' 0"	17' 0"	17' 0"
5 Total Wheel Base of Engine,	24' 9"	24' 9"	24' 11"	25' 0"	25' 9"	25' 9"	25' 9"	25' 9"
6 Total Wheel Base of Eng. & Tender,	58' 1"	58' 1"	59' 0"	59' 4"	59' 4"	59' 4"	59' 4"	59' 4"
7 No. of Wheels in Engine Truck,	2	2	2	2	2	2	2	2
8 Diam. of Wheels in Engine Truck,	30"	30"	30"	33"	33"	33"	33"	33"
9 Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"
10 Diameter of Trailing Wheels,								
11 Size of Trailing Axle Journals,								
12 Spread of Cylinders,	88"	88"	90"	90"	90"	90"	90"	90"
13 Size of Cylinders,	22" x 28"	22" x 28"	24" x 28"	24" x 28"	24" x 28"	24" x 28"	24" x 28"	24" x 28"
14 Steam Ports,	2 1/2" & 2 1/2"	2 1/2" & 2 1/2"	1 3/4" x 2 1/2"	2 1/2" wide.	2 1/2" wide.	2 1/2" wide.	2 1/2" wide.	2 1/2" wide.
15 Exhaust Ports,			3 1/2" x 2 1/2"					
16 Travel of Valve,	6"	6"	6"	6"	6"	6"	6"	6"
17 Lap of Valve,	3"	3"	1"	3"	3"	3"	3"	3"
18 Type of Valve,	12" Piston.	12" Piston.	D	12" Piston.	12" Piston.	14" Piston.	14" Piston.	14" Piston.
19 Type of Valve Gear,	Wals'h't	Wals'h't	Steph'n	Wals'h't.	Wals'h't	Wals'h't.	Wals'h't.	Wals'h't
20 Type of Boiler,	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.	Belpaire. Wide Fire Box.
21 Min. Internal Diam. Boiler,	69 1/2"	69 1/2"	76 1/2"	76 1/2"	76 1/2"	70 1/2"	76 1/2"	76 1/2"
22 Number of Tubes,	373	208, 28, 112,	508	465	265, 36, 144,	465	265, 36, 144,	465
23 Outside Diam. of Tubes,	2"	2", 5 1/2", 1 1/2"	2"	2"	2", 5 1/2", 1 1/2"	2"	2", 5 1/2", 1 1/2"	2"
24 Length of Tubes bet. Tube Sheets,	164 1/2"	164 1/2"	170"	180"	180"	180"	180"	180"
25 Fire Area through Tubes, sq. ft.,	6.23	5.71	8.49	7.77	7.30	7.77	7.04	7.04
26 Size of Fire Box, inside,	66" x 107"	66" x 107"	72" x 127"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"
27 Fire Grate Area, sq. ft.,	49.04	49.04	63.50	55.13	55.13	55.13	55.13	55.13
28 Ext. Heating Surface of Tubes, sq. ft.,	2677	2648	3768	3652	3173	3652	2841	3173
29 Heating Surface of Fire Box, sq. ft.,	167	167	198	190	190	187	187	187
30 Total Heating Surface of Boiler, sq. ft.,	2844	2815	3966	3842	4222	3839	4201	4201
31 Steam Pressure, per square inch, lbs.,	205	205	205	205	205	205	205	205
32 No. of Wheels under Tender,	8	8	8	8	8	8	8	8
33 Diam. of Wheels under Tender,	33"	33"	33"	33"	33"	36"	36"	36"
34 Size of Tender Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"
35 Wt. of Engine Empty, lbs.,	179400	185200		213180	219900			
36 Wt. on Truck in Working Order, lbs.,	22000	23000		32200	27200	24000	24000	
37 Wt. on 1st Pair of Drivers, lbs.,	45600	47000		48500	59700	52000	52000	
38 Wt. on 2d Pair of Drivers, lbs.,	44000	45100		51400	53400	53000	55500	
39 Wt. on 3d Pair of Drivers, lbs.,	46000	45400		56100	55300	54000	57000	
40 Wt. on 4th Pair of Drivers, lbs.,	43700	43400		53800	49200	52000	55000	
41 Wt. on Trailing Wheels, lbs.,								
42 Wt. of Engine in Work'g Order, lbs.,	200700	204900		242000	241800	235000	243500	
43 Total Wt. on Drivers, lbs.,	178700	180000		209800	217600	211000	219500	
44 Wt. of Tender Loaded, lbs.,	147000	147000	143000	147000	147000	161450	161450	
45 Ratio of Heat'g Surf. to Grate Surface,	57.99	61.44	62.42	69.69	76.58	69.64	76.21	
46 Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface,	16.03	17.04	10.02	19.22	21.22	19.53	21.46	
47 Heat. Surf. + Wt. one Cyl'd Steam,	951.62		1114.51	1080.21		1079.37		
48 Grate Area + Wt. one Cyl'd Steam,	16.40		17.85	15.50		15.50		
49 Tractive Power per lb. of M. E. Press.,	242.00	242.00	288.00	260.13	260.13	260.13	260.13	
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	42168 40111	42168 40111	50134	45327	45327	45327	45327	
51 Ratio Wt. on Drivers to Tract. Pow.,	4.24 4.46	4.29 4.50		4.63	4.80	4.66	4.84	
52 Height of Deck Plate,	66 1/2"	66 1/2"	66 1/2"	70 1/2"	70 1/2"	70 1/2"	70 1/2"	

CLASSIFICATION.	H 8 b	H 8 c b	H 8 c	H 8 s c	H 9 s	H 9 s a	H 10 s	
1 No. of Pairs of Driving Wheels,	4	4	4	4	4	4	4	1
2 Diam. of Driving Wheels,	62"	62"	62"	62"	62"	62"	62"	2
3 Size of Driving Axle Journals,	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	$\frac{9\frac{1}{2}}{10\frac{1}{2}} \times 13''$	3
4 Length of Driving Wheel Base,	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	17' 0 $\frac{1}{2}$ "	4
5 Total Wheel Base of Engine,	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	25' 9 $\frac{1}{2}$ "	5
6 Total Wheel Base of Eng. & Tender,	59' 4 $\frac{1}{2}$ "	62' 4 $\frac{1}{2}$ "	59' 4 $\frac{1}{2}$ "	59' 4 $\frac{1}{2}$ "	62' 5 $\frac{1}{2}$ "	62' 4 $\frac{1}{2}$ "	62' 4 $\frac{1}{2}$ "	6
7 No. of Wheels in Engine Truck,	2	2	2	2	2	2	2	7
8 Diam. of Wheels in Engine Truck,	33"	33"	33"	33"	33"	33"	33"	8
9 Size of Engine Truck Axle Journals,	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	9
10 Diameter of Trailing Wheels,								10
11 Size of Trailing Axle Journal,								11
12 Spread of Cylinders,	90"	90"	90"	90"	90"	90"	90"	12
13 Size of Cylinders,	24" x 28"	24" x 28"	24" x 28"	24" x 28"	25" x 28"	25" x 28"	26" x 28"	13
14 Steam Ports,	2 $\frac{1}{2}$ " wide.	2 $\frac{1}{2}$ " wide.	2" wide.	2" wide.	2 $\frac{1}{2}$ " wide.	2" wide.	2" wide.	14
15 Exhaust Ports,								15
16 Travel of Valve,	6"	6"	6"	6"	6"	6"	6"	16
17 Lap of Valve,	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	17
18 Type of Valve,	12" Piston.	12" Piston.	14" Piston.	14" Piston.	12" Piston.	14" Piston.	14" Piston.	18
19 Type of Valve Gear,	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Wals'h't	19
20 Type of Boiler,	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	20
21 Min. Internal Diam. Boiler,	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	76 $\frac{1}{2}$ "	21
22 Number of Tubes,	465	265, 36, 144	465	265, 36, 144	265, 36, 144	265, 36, 144	265, 36, 144	22
23 Outside Diam. of Tubes,	2"	2", 5 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "	2	2", 5 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "	2", 5 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "	2", 5 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "	2", 5 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "	23
24 Length of Tubes, bet. Tube Sheets,	180"	180"	180"	180"	180"	180"	180"	24
25 Fire Area through Tubes, sq. ft.,	7.77	7.30	7.77	7.94	7.30	7.94	7.94	25
26 Size of Fire Box, inside,	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	72" x 110 $\frac{1}{2}$ "	26
27 Fire Grate Area, sq. ft.	55.13	55.13	55.13	55.13	55.13	55.13	55.13	27
28 Ext. Heating Surface of Tubes, sq. ft.,	3652	2850	3652	2841	2850	2841	2841	28
29 Heating Surface of Fire Box, sq. ft.,	190	190	187	187	190	187	187	29
30 Total Heating Surface of Boiler, sq. ft.,	3842	4222	3830	4201	4222	4201	4201	30
31 Steam Pressure per square inch, lbs.,	205	205	205	205	205	205	205	31
32 No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33 Diam. of Wheels under Tender,	33"	33"	36"	36"	33"	36"	36"	33
34 Size of Tender Truck Axle Journals,	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	5 $\frac{1}{2}$ " x 10"	6" x 11"	5 $\frac{1}{2}$ " x 10"	6" x 11"	6" x 11"	34
35 Wt. of Engine Empty, lbs.,	216000	225500			225500			35
36 Wt. on Truck in Working Order, lbs.,	20800	27500	25000	23000	27700	23000	24500	36
37 Wt. on 1st Pair of Drivers, lbs.,	57700	61000	52000	52000	62800	52000	56000	37
38 Wt. on 2d Pair of Drivers, lbs.,	47600	55000	54000	57000	54600	57000	57000	38
39 Wt. on 3d Pair of Drivers, lbs.,	54000	59000	56000	60000	55700	60000	60000	39
40 Wt. on 4th Pair of Drivers, lbs.,	51000	50000	52500	56000	50700	56000	50000	40
41 Wt. on Trailing Wheels, lbs.,								41
42 Wt. of Engine in Work'g Order, lbs.,	240700	252500	239500	248000	251000	248000	247500	42
43 Total Wt. on Drivers, lbs.,	210900	225000	214500	225000	223300	225000	223000	43
44 Wt. of Tender Loaded, lbs.,	147000	159000	165900	167100	159000	167100	184000	44
45 Ratio of Heat'g Surf. to Grate Surface,	69.69	76.68	69.64	76.21	76.58	76.21	76.21	45
46 Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	19.22	21.22	19.53	21.46	21.22	21.46	21.46	46
47 Heat. Surf. ÷ Wt. one Cyl'd Steam,	1080.21		1079.37					47
48 Grate Area ÷ Wt. one Cyl'd Steam,	15.50		15.50					48
49 Tractive Power per lb. of M. E. Press.,	260.13	260.13	260.13	260.13	282.26	282.26	305.29	49
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	45327	45327	45327	45327	49183	49183	53197	50
51 Ratio Wt. on Drivers to Tract. Pow.,	4.65	4.97	4.73	4.97	4.54	4.58	4.18	51
52 Height of Deck Plate,	70 $\frac{1}{2}$ "	70 $\frac{1}{2}$ "	70 $\frac{1}{2}$ "	70 $\frac{1}{2}$ "	70 $\frac{1}{2}$ "			52

STEAM LOCOMOTIVES.

CLASSIFICATION.	LW 11 28	LW 11 30	LW 11 31	LW 11 61	LW 11 61 a			
No. of Pairs of Driving Wheels,	4	4	4	4	4			
Diam. of Driving Wheels,	63"	50"	46"	44"	44"			
Size of Driving Axle Journals,	10" D x 13 1/2"	7 3/4" D x 9 1/2"	8" D x 8 1/2"	7" D x 8"	7" D x 8"			
Length of Driving Wheel Base,	17' 0"	14' 0"	13' 6"	14' 0"	14' 0"			
Total Wheel Base of Engine,	26' 5"	21' 6"	21' 4"	21' 6"	21' 6"			
Total Wheel Base of Eng. & Tender,	60' 3 1/2"	49' 0"	48' 0"	48' 0"	48' 0"			
No. of Wheels in Engine Truck,	2	2	2	2	2			
Diam. of Wheels in Engine Truck,	53"	28"	28"	30"	30"			
Size of Engine Truck Axle Journals,	6" x 10"	4 1/2" x 8 1/2"	5" x 8"	5" x 8"	5" x 8"			
Diameter of Trailing Wheels,								
Size of Trailing Axle Journals,								
Spread of Cylinders,	88"	87"	84"		84"			
Size of Cylinders,	23" x 32"	19" x 24"	20" x 24"	20" x 24"	20" x 24"			
Steam Ports,	1 1/2" wide.	1 1/2" x 10"	1 1/2" x 10"	1 1/2" x 10"	1 1/2" x 10"			
Exhaust Ports,		2 1/2" x 10"	2 1/2" x 10"	2 1/2" x 10"	2 1/2" x 10"			
Travel of Valve,	6"	5"	5"	5 1/2"	5 1/2"			
Lap of Valve,	1"	3"	3"	3"	3"			
Type of Valve,	14" Piston.							
Type of Valve Gear,	Steph'n's							
Type of Boiler,	Radial Stay, Wide Fire Box.	Belpaire.	Wagon Top.	Straight Top.	Belpaire.			
Min. Internal Diam. Boiler,	80"	60 1/2"	60"	55"	55"			
Number of Tubes,	446	229	239	180	204			
Outside Diam. of Tubes,	2"	2"	2"	2 1/2"	2"			
Length of Tubes bet. Tube Sheets,	154 1/2"	160 1/2"	157 1/2"	156"	156"			
Fire Area through Tubes, sq. ft.,	7.45	3.83	3.99	3.92	3.41			
Size of Fire Box, inside,	54 1/2" x 106 1/2"	39 1/2" x 83 1/2"	33 1/2" x 107 1/2"	42 3/4" x 103 1/2"	42 3/4" x 103 1/2"			
Fire Grate Area, sq. ft.,	55.42	22.76	24.95	30.7	30.7			
Ext. Heating Surface of Tubes, sq. ft.,	3594	1602	1642	1278	1288			
Heating Surface of Fire Box, sq. ft.,	182	113	138	147	147			
Total Heating Surface of Boiler, sq. ft.,	3776	1715	1780	1525	1535			
Steam Pressure, per square inch, lbs.,	200	160	140	135	160			
No. of Wheels under Tender,	8	8	8	8	8			
Diam. of Wheels under Tender,	36"	33"	30"	33"	33"			
Size of Tender Truck Axle Journals,	5 1/2" x 10"	4 1/2" x 8"	4" x 8 1/2"	3 1/2" x 7"	3 1/2" x 7"			
Wt. of Engine Empty, lbs.,		110500		95400	110600			
Wt. on Truck in Working Order, lbs.,	20000	14840						
Wt. on 1st Pair of Drivers, lbs.,	49000	27160						
Wt. on 2d Pair of Drivers, lbs.,	50000	20000						
Wt. on 3d Pair of Drivers, lbs.,	52500	27530						
Wt. on 4th Pair of Drivers, lbs.,	50000	26880						
Wt. on Trailing Wheels, lbs.,								
Wt. of Engine in Work'g Order, lbs.,	221500	122410	113000					
Total Wt. on Drivers, lbs.,	201500	107570						
Wt. of Tender Loaded, lbs.,	157400	92510	91500					
Ratio of Heat'g Surf. to Grate Surface,	68.13	75.35	71.34	49.67	50.			
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	19.75	14.17	11.89	9.37	9.4			
Heat. Surf. + Wt. one Cyl'd Steam,	1042.52	1123.26	1173.0	1040.80	908.9			
Grate Area + Wt. one Cyl'd Steam,	15.30	14.40	16.51	20.95	18.13			
Tractive Power per lb. of M. E. Press.,	268.70	173.28	203.69	218.18	218.18			
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	45679	23563	24835	25036	29673			
Ratio Wt. on Drivers to Tract. Pow.,	4.41	4.56						
Height of Deck Plate,	66 3/4"							

STEAM LOCOMOTIVES.

33

CLASSIFICATION.	J 23			11s		
No. of Pairs of Driving Wheels,	3			5		1
Diam. of Driving Wheels,	80"			62"		2
Size of Driving Axle Journals,	10" x 12"			11" x 10"		3
Length of Driving Wheel Base,	14' 0"			22' 8"		4
Total Wheel Base of Engine,	34' 3"			32' 2"		5
Total Wheel Base of Eng. & Tender,	64' 10 1/2"			73' 0 1/2"		6
No. of Wheels in Engine Truck,	2			2		7
Diam. of Wheels in Engine Truck,	42 1/2"			33"		8
Size of Engine Truck Axle Journals,	6 1/2" x 12"			6 1/2" x 12"		9
Diameter of Trailing Wheels,	50"					10
Size of Trailing Axle Journal,	8" x 14"					11
Spread of Cylinders,	87"					12
Size of Cylinders,	21 1/2" x 23"			30" x 32"		13
Steam Ports,	1 1/2" wide.					14
Exhaust Ports,						15
Travel of Valve,	5 1/2"			6"		16
Lap of Valve,	1 1/2"			2"		17
Type of Valve,	12" Piston.			12" Piston		18
Type of Valve Gear,	Wals'h't.			Wals'h't.		19
Type of Boiler,	Radial Stay. Wide Fire Box.			Radial Stay. Wide Fire Box.		20
Min. Internal Diam. Boiler,	73"			82"		21
Number of Tubes,	322			244		22
Outside Diam. of Tubes,	2 1/2"			2 1/2" x 1 1/2"		23
Length of Tubes, bet. Tube Sheets,	232 1/2"			228"		24
Fire Area through Tubes, sq. ft.,	7.03					25
Size of Fire Box, inside,	73 1/2" x 108 1/2"			80" x 126"		26
Fire Grate Area, sq. ft.,	55.0			70		27
Ext. Heating Surface of Tubes, sq. ft.,	3076					28
Heating Surface of Fire Box, sq. ft.,	198.					29
Total Heating Surface of Boiler, sq. ft.,	3874			5909		30
Steam Pressure per square inch, lbs.,	200			250		31
No. of Wheels under Tender,	8			8		32
Diam. of Wheels under Tender,	36"			33"		33
Size of Tender Truck Axle Journals,	5 1/2" x 10"			6" x 11"		34
Wt. of Engine Empty, lbs.,	21060					35
Wt. on Truck in Working Order, lbs.,	27000			32000		36
Wt. on 1st Pair of Drivers, lbs.,	50000					37
Wt. on 2d Pair of Drivers, lbs.,	59500					38
Wt. on 3d Pair of Drivers, lbs.,	52000					39
Wt. on 4th Pair of Drivers, lbs.,						40
Wt. on Trailing Wheels, lbs.,	45000					41
Wt. of Engine in Work'g Order, lbs.,	233500			366500		42
Total Wt. on Drivers, lbs.,	161500			334500		43
Wt. of Tender Loaded, lbs.,	140050			180500		44
Ratio of Heat'g Surf. to Grate Surface,	70.44			84.4		45
Ratio of Ext'l Flue Heating Surface to Fire Box Heating Surface,	18.57					46
Heat. Surf. ÷ Wt. one Cyl'd Steam,	1398.86					47
Grate Area ÷ Wt. one Cyl'd Steam,	10.86					48
Tractive Power per lb. of M. E. Press.,	161.79					49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	27504			80640		50
Ratio Wt. on Drivers to Tract. Pow.,	5.87			4.1		51
Height of Deck Plate,	66 1/2"					52

STEAM LOCOMOTIVES.

CLASSIFICATION.

		K 1	K 1 a	K 2	K 2 s	K 2 a	K 2 sa	K 2 b	
1	No. of Pairs of Driving Wheels,	3	3	3	3	3	3	3	
2	Diam. of Driving Wheels,	80"	80"	80"	80"	80"	80"	72"	
3	Size of Driving Axle Journals,	10 1/2" x 13" L	10 1/2" x 13" L	10 1/2" x 15" L	10 1/2" x 15" L	10 1/2" x 15" L	10 1/2" x 15" L	10 1/2" x 15" L	3
4	Length of Driving Wheel Base,	14' 10"	14' 10"	13' 10"	13' 10"	13' 10"	13' 10"	13' 10"	4
5	Total Wheel Base of Engine,	31' 8"	36' 8"	35' 2 1/2"	35' 2 1/2"	35' 2 1/2"	35' 2 1/2"	35' 4 1/2"	5
6	Total Wheel Base of Eng. & Tender,	68' 2 1/2"	68' 2 1/2"	70' 3' 1/2"	70' 3' 1/2"	70' 3' 1/2"	70' 3' 1/2"	70' 5' 1/2"	6
7	No. of Wheels in Engine Truck,	4	4	4	4	4	4	4	7
8	Diam. of Wheels in Engine Truck,	36"	36"	36"	36"	36"	36"	33"	8
9	Size of Engine Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	9
10	Diameter of Trailing Wheels,	56"	56"	50"	56"	56"	56"	50"	10
11	Size of Trailing Axle Journals,	6 1/2" x 12"	6 1/2" x 12"	8" x 14"	8" x 14"	8" x 14"	8" x 14"	6 1/2" x 12"	11
12	Spread of Cylinders,	90"	90"	88"	88"	88"	88"	88"	12
13	Size of Cylinders,	26" x 26"	26" x 28"	24" x 26"	24" x 26"	24" x 26"	24" x 26"	24" x 26"	13
14	Steam Ports,	2" wide.	2" wide.	1 1/4" wide.	1 1/4" wide.	1 1/4" wide.	1 1/4" wide.	1 1/4" wide.	14
15	Exhaust Ports,								15
16	Travel of Valve,	7"	7"	7"	7"	7"	7"	7"	16
17	Lap of Valve,			1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	17
18	Type of Valve,	14" Piston.	14" Piston.	12" Piston.	12" Piston.	16" Piston.	12" Piston.	12" Piston.	18
19	Type of Valve Gear,	Wals'h't.	Wals'h't.	Wals'h't.	Wals'h't.	Wals'h't.	Wals'h't.	Wals'h't.	19
20	Type of Boiler,	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	Belpaire, Wide Fire Box.	20
21	Min. Internal Diam. Boiler,	77"	77"	78"	78"	78"	78"	78"	21
22	Number of Tubes,	348	102, 36, 144	359	202, 32, 128	350	202, 32, 128	359	22
23	Outside Diam. of Tubes,	2 1/2"	2 1/2", 5 1/2", 1 1/2"	2 1/2"	2 1/2" 5 1/2" 1 1/2"	2 1/2"	2 1/2" 5 1/2" 1 1/2"	2 1/2"	23
24	Length of Tubes bet. Tube Sheets,	232"	232"	250 1/4"	250 1/4"	250 1/4"	250 1/4"	250 1/4"	24
25	Fire Area through Tubes, sq. ft.,	7.59	6.84	7.83	6.06	7.83	6.96	7.83	25
26	Size of Fire Box, inside,	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	72" x 110 1/2"	26
27	Fire Grate Area, sq. ft.,	55.13	55.13	55.4	55.4	55.4	55.4	55.4	27
28	Ext. Heating Surface of Tubes, sq. ft.,	3903.	3127	4421	3153	4421	3153	4421	28
29	Heating Surface of Fire Box, sq. ft.,	225.	225.	208	208	208	208	208	29
30	Total Heating Surface of Boiler, sq. ft.,	4188	4113.	4629	5170	4629	5170	4629	30
31	Steam Pressure, per square inch, lbs.,	175	175	205	205	205	205	205	31
32	No. of Wheels under Tender,	8	8	8	8	8	8	8	32
33	Diam. of Wheels under Tender,	36"	36"	36"	36"	36"	36"	36"	33
34	Size of Tender Truck Axle Journals,	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	34
35	Wt. of Engine Empty, lbs.,			238500		238500		238500	35
36	Wt. on Truck in Working Order, lbs.,			42600	42500	47500	46000	47500	36
37	Wt. on 1st Pair of Drivers, lbs.,			62000	62000	55500	62000	55500	37
38	Wt. on 2d Pair of Drivers, lbs.,			64000	64000	62000	65000	62000	38
39	Wt. on 3d Pair of Drivers, lbs.,			59900	62000	61000	64000	61000	39
40	Wt. on 4th Pair of Drivers, lbs.,								40
41	Wt. on Trailing Wheels, lbs.,			50300	52500	46000	60000	46000	41
42	Wt. of Engine in Work'g Order, lbs.,			278300	283000	272000	297000	272000	42
43	Total Wt. on Drivers, lbs.,			185900	188000	178500	191000	178500	43
44	Wt. of Tender Loaded, lbs.,	148000	143000	159000	159000	158000	150000	150000	44
45	Ratio of Heat'g Surf. to Grate Surface,	75.96	74.6	83.55	93.32	83.55	93.32	83.55	45
46	Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface,	17.61	17.28	21.25	23.86	21.25	23.86	21.25	46
47	Heat. Surf. + Wt. one Cyl'd Steam,	1250.89		1401.87		1401.87		1401.87	47
48	Grate Area + Wt. one Cyl'd Steam,	16.47		16.77		16.77		16.77	48
49	Tractive Power per lb. of M.E. Press.,	219.7	219.7	187.2	187.2	187.2	187.2	208.0	49
50	Tractive Power with M. E. Pressure equal to 85 % of Boiler Pressure,	32680	32660	32620	32620	32620	32620	30244	50
51	Ratio Wt. on Drivers to Tract. Pow.,			5.70	5.76	5.47	5.85	4.92	51
52	Height of Deck Plate,			66 1/2"	66 1/2"	78"	78"	65"	52

† 67' 0 1/2" L. W. P. Weights given for Class K 2 s a include Crawford Stoker.

STEAM LOCOMOTIVES.

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CLASSIFICATION.	K 2 s D	K 3 s	K 4 s	K 5 s	K 2 s	K 2 s s	
1. No. of Pairs of Driving Wheels,	3	3	3	3	3	3	1
2. Diam. of Driving Wheels,	72"	80"	80"	80"	80"	80"	2
3. Size of Driving Axle Journals,	10 1/2" x 15 1/2"	10 1/2" x 15 1/2"	11" x 15 1/2"	10 1/2" x 15 1/2"	10 1/2" x 14 1/2"	11" x 14 1/2"	3
4. Length of Driving Wheel Base,	13' 10"	13' 10"	13' 10"	13' 10"	13' 10"	13' 10"	4
5. Total Wheel Base of Engine,	35' 4 1/2"	35' 2 1/2"	34' 2"	35' 2 1/2"	35' 2 1/2"	36' 5"	5
6. Total Wheel Base of Eng. & Tender,	70' 5"	67' 0 1/2"	71' 10"	67' 0 1/2"	67' 0 1/2"	71' 5 1/2"	6
7. No. of Wheels in Engine Truck,	4	4	4	4	4	4	7
8. Diam. of Wheels in Engine Truck,	33"	36"	36"	36"	36"	36"	8
9. Size of Engine Truck Axle Journals,	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"	9
10. Diameter of Trailing Wheels,	50"	50"	50"	50"	54"	54"	10
11. Size of Trailing Axle Journal,	6 1/2" x 12"	8" x 14"	6 1/2" x 12"	8" x 14"	9" x 14"	9" x 14"	11
12. Spread of Cylinders,	88"	88"	80"	88"	88"	80"	12
13. Size of Cylinders,	24" x 26"	26" x 28"	27" x 28"	25" x 28"	24" x 26"	27" x 28"	13
14. Steam Ports,	1 1/2" wide.	1 1/2" wide.	2 1/2" & 2 1/2"	1 1/2" wide.	1 1/2" wide.	1 1/2" wide.	14
15. Exhaust Ports,							15
16. Travel of Valve,	7"	7"	7"	7"	7"	7"	16
17. Lap of Valve,	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	17
18. Type of Valve,	12" Piston.	16" Piston	12" Piston	16" Piston	16" Piston.	16" Piston.	18
19. Type of Valve Gear,	Wals'h't	Wals'h't	Wals'h't	Wals'h't	Wals'h't.	Wals'h't.	19
20. Type of Boiler,	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Belpaire Wide Fire Box.	Radial Stay Wide Fire Box.	Belpaire Wide Fire Box.	20
21. Min. Internal Diam. Boiler,	78"	78"	76 1/2"	78"	78"	80"	21
22. Number of Tubes,	202, 32, 128	202, 32, 123	236, 40, 160	202, 32, 128	343	241, 40, 160	22
23. Outside Diam. of Tubes,	21", 5 1/2", 1 1/2"	21", 5 1/2", 1 1/2"	21", 5 1/2", 1 1/2"	21", 5 1/2", 1 1/2"	21"	21", 5 1/2", 1 1/2"	23
24. Length of Tubes, bet. Tube Sheets,	250 1/2"	250 1/2"	228"	250 1/2"	252"	262 1/2"	24
25. Fire Area through Tubes, sq. ft.,	6.06	7.53	8.34	7.53	7.48	8.73	25
26. Size of Fire Box, inside,	72" x 110 1/2"	72" x 110 1/2"	80" x 126"	75" x 110 1/2"	80 1/2" x 111"	121 1/2" x 79 1/2"	26
27. Fire Grate Area, sq. ft.	55.4	65.37	70	55.37	61.86	66.95	27
28. Ext. Heating Surface of Tubes, sq. ft.,	8453 1509	8453 1509	3731 1729	8453 1509	4243	4371 1578	28
29. Heating Surface of Fire Box, sq. ft.,	208	203	315	199	205	231	29
30. Total Heating Surface of Boiler, sq. ft.,	5170	5170	5768	4615	4448	6477	30
31. Steam Pressure per square inch, lbs.,	205	205	205	205	205	200	31
32. No. of Wheels under Tender,	8	8	8	8	8	8	32
33. Diam. of Wheels under Tender,	36"	36"	36"	36"	36"	36"	33
34. Size of Tender Truck Axle Journals,	5 1/2" x 10"	6" x 11"	5 1/2" x 10"	5 1/2" x 10"	5 1/2" x 10"	6" x 11"	34
35. Wt. of Engine Empty, lbs.,	257000				240200	230600	35
36. Wt. on Truck in Working Order, lbs.,	46200	49000	53640	46000	42800	50500	36
37. Wt. on 1st Pair of Drivers, lbs.,	61200	63000	67550	62000	62100	66000	37
38. Wt. on 2d Pair of Drivers, lbs.,	65400	65000	67630	65000	64600	66800	38
39. Wt. on 3d Pair of Drivers, lbs.,	65900	65000	66850	64000	55400	66000	39
40. Wt. on 4th Pair of Drivers, lbs.,							40
41. Wt. on Trailing Wheels, lbs.,	47900	60000	53420	60000	48700	65700	41
42. Wt. of Engine in Work'g Order, lbs.,	236600	302000	308690	297000	273600	317000	42
43. Total Wt. on Drivers, lbs.,	192500	193000	201830	191000	182100	197800	43
44. Wt. of Tender Loaded, lbs.,	159000	184000	159000	167100	157400	175700	44
45. Ratio of Heat'g Surf. to Grate Surface,	93.32		82.37		71.90	96.89	45
46. Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface,	23.86		17.30		20.69	27.04	46
47. Heat. Surf. + Wt. one Cyl'd Steam,					1346.00		47
48. Grate Area + Wt. one Cyl'd Steam,					18.73		48
49. Tractive Power per lb. of M. E. Press.,	208.0	219.7	255.15	203.12	187.2	255.15	49
50. Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	36244	38243	44400	35394	32620	43375	50
51. Ratio Wt. on Drivers to Tract. Pow.,	5.31	5.04	4.54	5.40	5.58	4.56	51
52. Height of Deck Plate,	66 1/2"		66 1/2"		66 1/2"	64 1/2"	52

STEAM LOCOMOTIVES

CLASSIFICATION	1.1 s	N 1 s	N 2 s
1 Leading Wheels	4	5	5
2 Leading Wheels	62"	62"	62"
3 Size of Engine Axle Journals	11" x 15"	11" x 15"	11" x 15"
4 Length of Driving Wheel Base	17' 0 1/2"	22' - 2"	22' - 2"
5 Total Wheel Base of Engine	30' 4 1/2"	41' - 11 1/2"	41' - 11 1/2"
6 Total Wheel Base of Eng. & Tender	73' 3 1/2"	82' - 7 1/4"	82' - 7 1/4"
7 No. of Wheels in Engine Truck	2	2	2
8 Diam. of Wheels in Engine Truck	33"	33"	33"
9 Size of Engine Truck Axle Journals	6 1/2" x 12"	6 1/2" x 12"	6 1/2" x 12"
10 Diameter of Trailing Wheels	50"	36"	36"
11 Size of Trailing Axle Journals	6 1/2" x 12"	7 1/2" x 13 1/2"	7 1/2" x 13 1/2"
12 Spread of Cylinders	90"	92"	92"
13 Size of Cylinders	27" x 30"	30" x 32"	30" x 32"
14 Steam Ports	2 1/2" wide		
15 Exhaust Ports			
16 Travel of Valve	6"	8 1/2"	8 1/2"
17 Lap of Valve	1"	1 1/8"	1 1/8"
18 Type of Valve	12" Piston	14" Piston	14" Piston
19 Type of Valve Gear	Wals'h't	Wals'h't	Wals'h't
20 Type of Boiler	Belmont Wide Fire Box	Belmont Wide Fire Box	Belmont Wide Fire Box
21 Min. Internal Diam. Boiler	76 1/2"	80 1/4"	80 1/4"
22 Number of Tubes	236, 40, 160	196, 54, 216	196, 54, 216
23 Outside Diam. of Tubes	2 1/2", 5 1/4", 1 1/2"	2 1/2", 5 1/4", 1 1/2"	2 1/2", 5 1/4", 1 1/2"
24 Length of Tubes bet. Tube Sheets	228"	250 3/4"	250 3/4"
25 Fire Area through Tubes, sq. ft.	8.34		
26 Size of Fire Box, inside	80" x 128"	80" x 144"	80" x 144"
27 Fire Grate Area, sq. ft.	70	80	80
28 Ext. Heating Surface of Tubes, sq. ft.	17,311		
29 Heating Surface of Fire Box, sq. ft.	315		
30 Total Heating Surface of Boiler, sq. ft.	5766	7152	7152
31 Steam Pressure, per square inch, lbs.	205	205	205
32 No. of Wheels under Tender	8	8	8
33 Diam. of Wheels under Tender	33"	33"	33"
34 Size of Tender Truck Axle Journals	8" x 11"	6" x 11"	6" x 11"
35 Wt. of Engine Empty, lbs.			
36 Wt. on Truck in Working Order, lbs.	29600	23100	23100
37 Wt. on 1st Pair of Drivers, lbs.	56200		
38 Wt. on 2d Pair of Drivers, lbs.	57200		
39 Wt. on 3d Pair of Drivers, lbs.	62000		
40 Wt. on 4th Pair of Drivers, lbs.	64800		
41 Wt. on Trailing Wheels, lbs.	50900	61000	61000
42 Wt. of Engine in Work'g Order, lbs.	320700	235400	235400
43 Total Wt. on Drivers, lbs.	240200	351300	351300
44 Wt. of Tender Loaded, lbs.	182400	207000	207000
45 Ratio of Heat'g Surf. to Grate Surface	82.87	89.4	89.4
46 Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface	17.30		
47 Heat. Surf. + Wt. one Cyl'd Steam			
48 Grate Area + Wt. one Cyl'd Steam			
49 Tractive Power per lb. of M. E. Press.	352.74		
50 Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure	61465	80942	80942
51 Ratio Wt. on Drivers to Tract. Pow.	3.91	4.34	4.34
52 Height of Deck Plate	86 1/2"		

STEAM LOCOMOTIVES

CLASSIFICATION.	CC 1s	HH 1s.	HC 1s	CC 2s ^{LW}			
No. of Driving Wheels,	8	8	8	8			1
Diam. of Driving Wheels,	56"	56"	62"	51"			2
Size of Driving Axle Journals,	$10\frac{1}{2}" \times 13\frac{1}{2}"$	$10\frac{1}{2}" \times 12\frac{1}{2}"$	$12\frac{1}{2}" \times 16\frac{1}{2}"$	$10\frac{1}{2}" \times 14\frac{1}{2}"$			3
Length of Driving Wheel Base,	$16'0" \times 9'0" \times 16'0"$	$15'0" \times 10'10" \times 15'0"$	$17'1" \times 11'2"$	$40'1'1/2$			4
Total Wheel Base of Engine,	30'0"	57'5"	54'8 1/2	40'1 1/2			5
Total Wheel Base of Eng. & Tender,	73'10 1/2"	88'2"	97'3 3/4	78'8 1/2			6
No. of Wheels in Engine Truck,		2"	2	0			7
Diam. of Wheels in Engine Truck,		30"	33	—			8
Size of Engine Truck Axle Journals,		5 1/2" x 12"	6 1/2" x 12"	—			9
Diameter of Trailing Wheels,		30"	—	—			10
Size of Trailing Axle Journal,		5 1/2" x 12"	—	—			11
Spread of Cylinders,	84"	80"	—	—			12
Size of Cylinders,	$26\frac{1}{2}" \times 30\frac{1}{2}"$ $26" \times 30"$	27" x 23"	30 1/2 x 32	26" x 28			13
Steam Ports,		14" wide.	—	—			14
Exhaust Ports,		—	—	—			15
Travel of Valve,		0"	6	—			16
Lap of Valve,		1"	2"	—			17
Type of Valve,		14" Piston.	12" Piston	14" Piston			18
Type of Valve Gear,		Wals'h't	Wals'h't	—			19
Type of Boiler,		Round Top.	Bel'paire	CONICAL ROUND TOP			20
Min. Internal Diam. Boiler,	82 1/2"	80"	93 3/8	88 1/8			21
Number of Tubes,	250, 36, 144	282, 45, 130	37-284	209-52			22
Outside Diam. of Tubes,	2 1/2" 5 1/2"	2 1/2" 5 1/2" 1 3/4"	2 1/2" - 3 1/2"	2 1/2" 5 1/2"			23
Length of Tubes, bet. Tube Sheets,	275	206 1/2"	228"	264"			24
Fire Area through Tubes, sq. ft.,		9.85	—	—			25
Size of Fire Box, inside,	96" x 117"	144 1/2" x 96 1/2"	168 x 96	144 1/2 x 96 1/2			26
Fire Grate Area, sq. ft.	78	90.5	112	96.3			27
Ext. Heating Surface of Tubes, sq. ft.,	4810	5104	6125	4639			28
Heating Surface of Fire Box, sq. ft.,	237	304.0	531	391			29
Total Heating Surface of Boiler, sq. ft.,	6031.0	8525	6656	5030			30
Steam Pressure per square inch, lbs.,	205	160	205	225			31
No. of Wheels under Tender,	8	8	8	8			32
Diam. of Wheels under Tender,	33"	33"	33	33			33
Size of Tender Truck Axle Journals,	8" x 11"	6" x 11"	6 1/2 x 12	6 x 11			34
Wt. of Engine Empty, lbs.,		425700	—	—			35
Wt. on Truck in Working Order, lbs.,		22500	35000	—			36
Wt. on 1st Pair of Drivers, lbs.,	48000	53500	—	—			37
Wt. on 2d Pair of Drivers, lbs.,	48000	55000	—	—			38
Wt. on 3d Pair of Drivers, lbs.,	49000	56000	—	—			39
Wt. on 4th Pair of Drivers, lbs.,	48000	52000	—	—			40
Wt. on Trailing Wheels, lbs.,		22500	—	—			41
Wt. of Engine in Work'g Order, lbs.,	888000	482500	575000	458140			42
Total Wt. on Drivers, lbs.,	386000	437500	540000	458140			43
Wt. of Tender Loaded, lbs.,	186400	186400	219000	—			44
Ratio of Heat'g Surf. to Grate Surface,	88.86	88.34	—	—			45
Ratio of Ext'l Fine Heating Surface to Fire Box Heating Surface,	28.24	20.10	—	—			46
Heat. Surf. + Wt. one Cyl'd Steam,		—	—	—			47
Grate Area + Wt. one Cyl'd Steam,		—	—	—			48
Tractive Power per lb. of M. E. Press.,		729	—	—			49
Tractive Power with M. E. Pressure equal to 85% of Boiler Pressure,	91000	99144	135000	100000			50
Ratio Wt. on Drivers to Tract. Pow.,	4.00	4.41	4.0	—			51
Height of Deck Plate,		84 1/2"	—	—			52
Wt. on 5th Pair of Drivers, lbs.,	48000	52000	—	—			53
Wt. on 6th Pair of Drivers, lbs.,	48000	53000	—	—			54
Wt. on 7th Pair of Drivers, lbs.,	49000	53500	—	—			55
Wt. on 8th Pair of Drivers, lbs.,	48000	52500	—	—			56

ELECTRIC LOCOMOTIVES.

39

CLASSIFICATION.	DD 1	10001 Geared	10002 Gearless	3998-3999	FF 1	10003 D	
No. of Pairs of Driving Wheels,	4	4	4	4	6		1
Size of Driving Wheel Base,	72"	58"	56"	68"	72"	72"	2
Size of Driving Axle Journals,	10" x 13 1/2"	6" x 11 1/2"	6" x 11 1/2"	10" x 13 1/2"	11" x 15"		3
Length of Driving Wheel Base,	24' 1"	26' 1"	26' 1"	24' 1"	32' 8"		4
Total Wheel Base of Engine,	55' 11"	26' 1"	20' 1"	55' 11"	136' 11"		5
Height of Center of Gravity of Engine,		45 1/2"	42 1/2"				6
Total Height of Loco. Cab,	13' 1 1/8"	13' 4"	13' 4"	13' 1"	14' 8"		7
Total Width of Loco. Cab,	10' 8 1/2"	10' 1"	10' 1 1/2"	10' 8 1/2"	10' 11" (C)		8
Total Height of Loco.,	14' 8 1/2"	14' 6 1/2"	14' 6 1/2"	14' 8 1/2"	15' 6"		9
Method of Transmitting Power,	Through Jack Shaft	Through Gears	Through Gears & Helical Springs	Through Jack Shaft	Through Gears and Jack Shaft		10
Type of Motor,	D. C.	D. C.	D. C.	D. C.	Three Phase		11
Number of Motors,	2	4	4	2	4		12
Horse Power of Motors, Normal,	1000 each	330 each	2-330 2-200	1000 each	1000 each		13
Horse Power of Motors, Maximum,	2000 each			2000 each	1200 each		14
Voltage of Motors,	650			650	850		15
Type of Motor Control,	Electro Pneumatic	Electro Pneumatic	Electro Pneumatic	Electro Pneumatic	Electro-Pneumatic		16
No. of Main Field Poles in each Mot.	10			10	6		17
No. of Inner Poles in each Motor,	10			10			18
No. of Brush Holders in each Motor,	10			10			19
Size of Air Gap bet. Armature & Pole Piece,	1/2"			1/2"			20
Diam. of Motor Armature,	4' 8"			4' 8"			21
No. of Master Controllers per Loco.,	2	2	2	2	2		22
No. of Air Compressors, per Loco.,	2	2	2	2	2		23
Type of Air Compressors,	C-60 2-Stage			C-60 2-Stage	Vertical Compound		24
H. P. of Air Compressor Motor,	15 E. H. P.			15 E. H. P.	32		25
Voltage of Air Compressor Motor,	650			650	150		26
Current Collecting Devices,	Third Rail Shoes & Over Head Collectors	Third Rail Shoes & Over Head Collectors	Third Rail Shoes & Over Head Collectors	Third Rail Shoes & Over Head Collectors	Pantograph		27
Gear Ratio,		32 to 60			5 to 1		28
Length from Ins. to Ins. Pull Knuckle,	64' 11"	37' 10 1/2"	37' 10 1/2"	64' 11"	76' 8"		29
Length of Rigid Wheel Base,	7' 2"	8' 6"	8' 6"	7' 2"	13' 4"		30
							31
							32
							33
							34
							35
Wt. on Truck in Working Order,	57000			62000			36
Wt. on 1st Pair of Drivers, lbs.,	49750	49700	51090	52000			37
Wt. on 2nd Pair of Drivers, lbs.,	49750	40700	47950	52000			38
Wt. on 3rd Pair of Drivers, lbs.,	49750	40700	45180	52000			39
Wt. on 4th Pair of Drivers, lbs.,	49750	49700	50920	52000			40
							41
Wt. of Engine in Work'g Order, lbs.,	313000	180800	195140	832000	480000		42
Wt. on Drivers, lbs.,	109000	180800	195140	208000	396000		43
							44
							45
							46
							47
							48
							49
Tractive Power, lbs.,	66000			66000	97200		50
Ratio of Wt. on Driv's to Trac. Pow.	3.00			3.15			51
							52