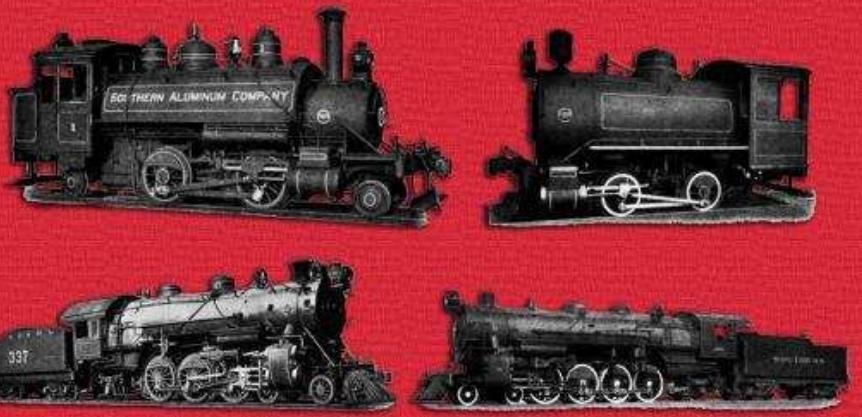
BALDWIN LOCOMOTIVE WORKS

Manufacturers of Locomotive Engines

Philadelphia, Pennsylvania



Catalogue of Locomotives • 1881

CATALOGUE OF LOCOMOTIVES

The Baldwin Locomotive Works

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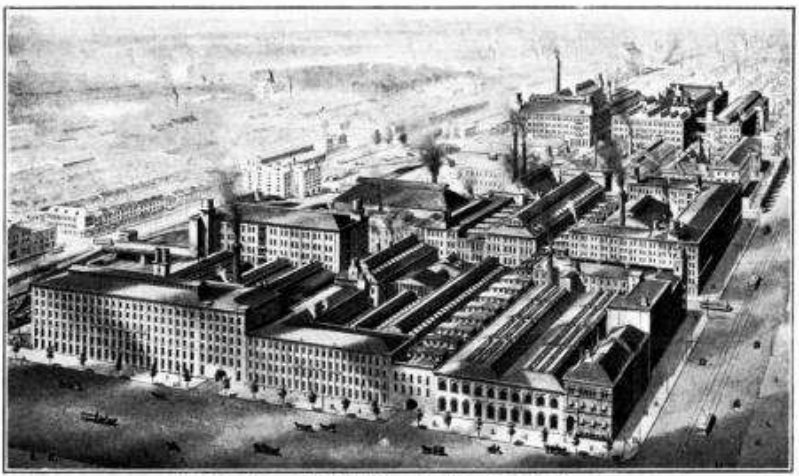


Birdseye View of The Baldwin Locomotive Works—Philadelphia Plant

The Baldwin Locomotive Works

THE following pages illustrate various types of locomotives, of both broad and narrow gauges, adapted for logging, plantation, contractors', industrial and general road service. The principal dimensions which are given in each instance are intended as a guide in determining the type and class of locomotive, but modifications can be made in any of the designs shown, in order to meet the special requirements of the purchaser.

The locomotives herewith presented are adapted to the consumption of wood, coke, or bituminous coal as fuel. With the addition of the necessary appliances any can be adapted to burn petroleum.

By the system of manufacture employed, all important parts are accurately made to gauges and templets; they are, therefore, interchangeable throughout any number of locomotives of the same class. This system permits of any parts needed for repairs being supplied either with the locomotive or whenever subsequently required. Such parts are made to the same gauges and templets as are originally used in the construction of the locomotive, and in this manner the expense of repairs is reduced to a minimum, and the maintenance of locomotive power is attended with the least possible inconvenience and delay. It is only necessary to give the construction number of the locomotive, which is found on the builder's number plate, ordinarily attached to the sides of the smokebox, and name the particular detail which is required. It can then be furnished from the Works at the shortest notice, guaranteed to fit in place.

Class Designation

The designation of the different classes of locomotives, as used by The Baldwin Locomotive Works, embodies the combination of certain figures with one of the letters, A, B, C, D, E, or F, to indicate both the number and kind of wheels and size of cylinders. The method of designating the number of driving wheels by letter was first used in 1842, and has been continued without change since that time; thus, a locomotive having one pair of driving wheels is classed B; that with two pairs, C; that with three pairs, D; that with four pairs, E; and that with five pairs, F. The letter A is used for a special class of high-speed locomotives, with a single pair of driving wheels, and for a rack-rail locomotive with a single pinion. A figure (4, 6, 8, 10, 12, etc.) is used as an initial figure to indicate the total number of wheels under the locomotive. A figure or figures following the initial figure indicates the diameter of the cylinders, and the figure or figures following the class designation represents the consecutive class number of the locomotive on which it appears. Thus, 8-26-C 500 indicates a locomotive with eight wheels in all, having cylinders sixteen inches in diameter, with two pairs of driving wheels, and the five hundredth locomotive of its class.

The number representing the cylinder diameter is an arbitrary figure, originally intended to represent the weight of the locomotive in tons; but in present practice it has no such reference— forty representing a twenty-three inch cylinder, thirty-eight a twenty-two inch cylinder, thirty-six a twenty-one inch cylinder, and so on. The size of the cylinder may be found by dividing this number by two and adding three to the quotient, or the figures for cylinder in the class designation may be obtained by subtracting three from the number indicating the diameter of the cylinder in inches and multiplying the remainder by two.

The same rule is carried out in the classification of compound locomotives. In this case, however, a number is given to indicate the diameter of each cylinder, that indicating the high-pressure being written over the low-pressure. Thus, 10-$\frac{26}{40}$-D 100 indicates a compound

locomotive, with ten wheels in all, having high-pressure cylinders fourteen inches in diameter and low-pressure cylinders twenty-four inches in diameter, with three pairs of driving wheels, and the one hundredth locomotive of its class.

As a further illustration the figures indicating the diameter of the cylinders are as follows:

8 indicates cylinders 7 inches in diameter.

10½ indicates cylinders 8 inches in diameter.

11 indicates cylinders 9 inches in diameter with stroke not exceeding 14 inches.

12 indicates cylinders 9 inches in diameter with stroke exceeding 14 inches.

14 indicates cyls. 10″ dia.
16 indicates cyls. 11″ dia.
18 indicates cyls. 12″ dia.
20 indicates cyls. 13″ dia.
22 indicates cyls. 14″ dia.
24 indicates cyls. 15″ dia.
26 indicates cyls. 16″ dia.
28 indicates cyls. 17″ dia.
30 indicates cyls. 18″ dia.
32 indicates cyls. 19″ dia.
34 indicates cyls. 20″ dia.
36 indicates cyls. 21″ dia.
38 indicates cyls. 22″ dia.
40 indicates cyls. 23″ dia.
42 indicates cyls. 24″ dia.
44 indicates cyls. 25″ dia.
46 indicates cyls. 26″ dia.
48 indicates cyls. 27″ dia.
50 indicates cyls. 28″ dia.
60 indicates cyls. 33″ dia.
70 indicates cyls. 38″ dia.
80 indicates cyls. 43″ dia.

The addition of the fraction ¼ to any class indicates that there is a truck placed at each end of the locomotive. The addition of the fraction ⅛ to any class indicates that there is no front truck, but that a rear truck is placed back of the firebox.

From the above system of classification, and omitting the figures indicating the cylinder diameter for particular sizes, the following type designations are deduced. The diagrams show the location of cylinders and arrangement of wheels.

4-C Tank— Two pairs of coupled wheels, with saddle or side tanks, no trucks.

4-C Tender— TENDER Two pairs of coupled wheels and separate tender, no trucks.

6-C Tank— Two pairs of coupled wheels, and two-wheeled front truck, with saddle or side tanks.

6-C Tender—  Two pairs of coupled wheels, and two-wheeled front truck, and separate tender.

6½-C Tank—  Two pairs of coupled wheels and two-wheeled rear truck, with saddle, side, or rear tanks.

8-C Tender— American type—Two pairs of coupled wheels, four-wheeled front truck, and separate tender.

8¼-C Tank—  Two pairs of coupled wheels, with two-wheeled front and two-wheeled rear truck, with saddle or side tanks.

8½-C Tank—  Forney Type—Two pairs of coupled wheels, with four-wheeled rear truck, tank at rear.

8-CC Tank— Mallet Articulated type—Two pairs of coupled wheels in each group, no trucks, saddle or side tanks.

10¼-C Tank—  Two pairs of coupled wheels, two-wheeled front truck, and a four-wheeled rear truck, tank at rear.

10¼-C Tender—  Atlantic type—Two pairs of coupled wheels, four-wheeled front truck and two-wheeled rear truck, and separate tender.

12¼-CC Tender—  Mallet articulated type—Two pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, and separate tender.

6-D Tank—  Three pairs of coupled wheels, with saddle or side tanks, no trucks.

6-D Tender—  Three pairs of coupled wheels, and separate tender, no trucks.

8-D Tender—  Mogul type—Three pairs of coupled wheels, two-wheeled front truck, and separate tender.

8½-D Tank—  Three pairs of coupled wheels and two-wheeled rear truck, with saddle, side, or rear tanks.

10-D Tender— Ten-wheeled type—Three pairs of coupled wheels, four-wheeled front truck, and separate tender.

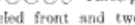
10¼-D Tank— Three pairs of coupled wheels, two-wheeled front and two-wheeled rear truck, with saddle or side tanks.

10½-D Tender—  Prairie type —Three pairs of coupled wheels, two-wheeled front and two-wheeled rear truck, and separate tender.

12¼-D Tank—  Three pairs of coupled wheels, four-wheeled front and two-wheeled rear truck, with saddle or side tanks.

12½-D Tender— Pacific type —Three pairs of coupled wheels, four-wheeled front and two-wheeled rear truck, and separate tender.

14¼-D Tank—  Three pairs of coupled wheels, four-wheeled front and four-wheeled rear truck, with saddle or side tanks.

12-DD Tender—  Mallet articulated type—Three pairs of coupled wheels in each group, no trucks, and separate tender.

14-DD Tender— Mallet articulated type—Three pairs of coupled wheels in each group, two-wheeled front truck, and separate tender.

16¼DD Tank—  Mallet articulated type—Three pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, and saddle or side tanks.

16¼-DD Tender— Mallet articulated type—Three pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, and separate tender.

8-E Tank—  Four pairs of coupled wheels with saddle or side tanks, no trucks.

8-E Tender—  Four pairs of coupled wheels and separate tender, no trucks.

10-E Tender—  Consolidation type—Four pairs of coupled wheels, two-wheeled front truck, and separate tender.

12-E Tender—  Four pairs of coupled wheels, four-wheeled front truck, and separate tender.

12¼-E Tank— Four pairs of coupled wheels, two-wheeled front and two-wheeled rear truck, with saddle or side tanks.

12¼-E Tender—  Mikado type—Four pairs of coupled wheels, two-wheeled front and two-wheeled rear truck, and separate tender.

14¼-E Tender—  Mountain type—Four pairs of coupled wheels, four-wheeled front and two-wheeled rear truck, and separate tender.

16-EE Tender—  Mallet articulated type—Four pairs of coupled wheels in each group, and separate tender.

18-EE Tender— Mallet articulated type—Four pairs of coupled wheels in each group, two-wheeled front truck, and separate tender.

20¼-EE Tender—  Mallet articulated type—Four pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, and separate tender.

28¼-EEE— Triple articulated type—Four pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, with tank over rear group of wheels. Has also been built with four-wheeled rear truck, class 30¼-EEE.

10-F Tank— Five pairs of coupled wheels, with saddle or side tanks, no trucks.

12-F Tender—  Decapod type—Five pairs of coupled wheels, two-wheeled front truck, and separate tender.

14¼-F Tender—  Santa Fe type—Five pairs of coupled wheels, two-wheeled front and two-wheeled rear truck, and separate tender.

24¼-FF Tender—  Mallet articulated type—Five pairs of coupled wheels in each group, two-wheeled front and two-wheeled rear truck, and separate tender.

Tractive Force and Hauling Capacity

The hauling capacity of a locomotive is determined by the relation between the tractive force developed and the resistance of the train, and both of these factors are dependent on the speed.

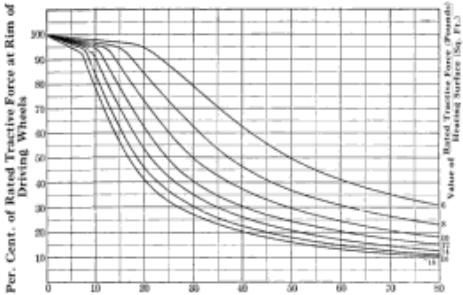
At starting speeds a locomotive will usually develop, at the rim of the driving wheels, the rated tractive force, which is calculated from the dimensions of the engine by the formula:

$$T=\frac{0.85P\times C^2\times S}{D}$$

where T=the rated tractive force at rim of driving wheels in pounds.
P=the boiler pressure in pounds per square inch.
C=diameter of cylinders in inches.
S=stroke in inches.
D=driving wheel diameter in inches.

As the speed is increased the available tractive force falls off slowly until a point is reached at which the boiler can no longer supply the steam required by the cylinders at full stroke. To attain higher speeds the cut-off must be shortened, after which the available tractive force falls more rapidly. It is evident that, under these circumstances, the tractive force that a locomotive can develop is dependent not only on the cylinder and driving wheel dimensions, but also on the steaming capacity of the boiler. For practical purposes this may be taken as directly proportional to the total heating surface. Then, as is shown by the curves on page 12, the available tractive force at any speed will depend on the relation between the rated tractive force and the total heating surface. Each curve corresponds to a different value of this relation. The vertical scale measures the available tractive force as a percentage of the rated tractive force, while on the horizontal scale the speed is measured in miles per hour. The curves assume that at the high speeds one horse-power can be developed at the tread of the driving wheels for every two and one-half square feet of heating surface, and they allow for a lower efficiency at slow speeds.

In assuming as above that the steaming capacity is directly proportional to the total heating surface, it is essential that the ratio of grate area to heating surface be properly suited to the quality of the fuel. It is also assumed that sufficient fuel can be fired to enable the



Relation between Tractive Force at Rim of Driving Wheels, and Speed in Miles per Hour

steam production to be pushed to the limit set by the heating surface.

As an example of the use of the curves, suppose it is desired to find the available tractive force at a speed of forty miles per hour, for a locomotive having the following dimensions:

Cylinders, 22" x 28".
Driving wheels, 69" diameter.
Steam pressure, 200 pounds.
Heating surface, 4150 square feet

From the formula on page 11, it is found that the rated tractive force of this locomotive is 33,400 pounds. The ratio of rated tractive force to heating surface is therefore $\frac{33,400}{4150}$=8.0. Referring to the curve herewith, it is seen that the vertical line representing 40 miles per hour intersects the curve marked 8, on a horizontal line representing 47 per cent. Hence, the tractive force developed by this locomotive at a speed of 40 miles per hour, will be 33,400 × .47=15,700 pounds.

In order that a locomotive may employ all of its rated tractive force in hauling a train, it is desirable that the weight on driving wheels be at least 4 times the rated force; or, in other words, not more than 25 per cent. of the adhesion weight can be utilized as tractive force.

In the case of locomotives equipped with compound cylinders or superheaters, the proportion of the rated tractive force developed at any speed will be from 10 to 20 per cent. higher than that shown by the curves.

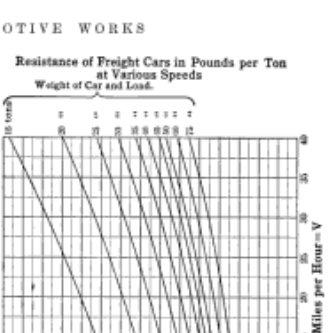
Relation of Rated Tractive Force to Heating Surface

Average values of the quotient obtained by dividing the rated tractive force in pounds by the total heating surface in square feet, for different classes of engines, are given below:

Atlantic	(4-4-2) type,	8
Pacific	(4-6-2) type,	9
American	(4-4-0) type,	10
Mikado	(2-8-2) type,	10
Ten-wheeled	(4-6-0) type,	11
Consolidation	(2-8-0) type,	14
Switching Locomotives,		16

Train Resistance

The chart herewith represents the resistance, in pounds per ton, for freight cars of different weights, at speeds varying from 5 to 40 miles per hour, on straight level track. These curves are based on the results of experiments conducted by Prof. Edward C. Schmidt, on the Illinois Central Railroad. Recent tests show that



the resistance of light cars is greater, in pounds per ton, than that of heavy cars. Thus, a car weighing 75 tons is seen, from the table, to have a resistance of 5 pounds per ton at a speed of 35 miles per hour, while a car weighing only 20 tons has a resistance of 11.1 pounds per ton at the same speed.

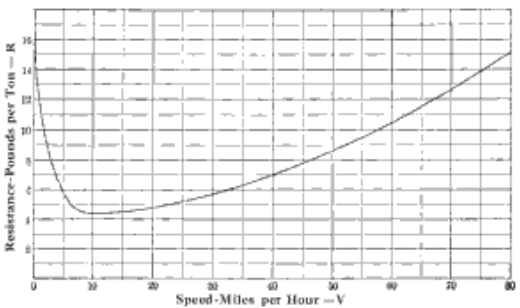
A formula which gives results approximately agreeing with the curves, is as follows:

$$R = 1.8\ T + 100\ N$$

where R = total resistance of train in pounds, exclusive of engine and tender.
T = weight of train in tons, exclusive of engine and tender.
N = number of cars in train.

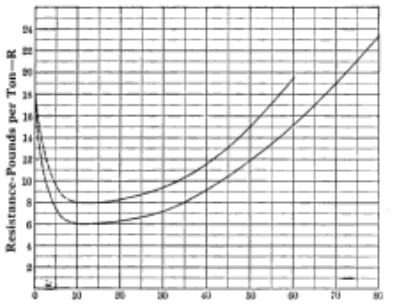
This formula is worked out for a speed of 5 miles per hour. For higher speeds, add 2 per cent. for each mile per hour above 5. The formula should not be used for speeds exceeding 30 miles per hour.

The resistance of passenger cars in pounds per ton on straight, level track, is represented by the diagram herewith. The curve here shown is based on the results of recent experiments with modern rolling stock, and



Resistance of Passenger Cars in Pounds per Ton at Various Speeds

This Curve is based on the Formula $R = 4.3 + 0.0017\ V^2$, and should be used for Cars weighing 45 Tons and upwards. For lighter Cars, use Curves for Freight Cars of Corresponding Weights.



Resistance of Locomotives and Tenders, in Pounds per Ton, at Various Speeds

Lower Line applies to heavy standard gauge Locomotives and Tenders, and is based on Formula R = 4.3 + 0.0030 V². Upper Line applies to narrow gauge and light standard gauge Locomotives and Tenders, and is based on Formula R = 5.0 + 0.0040 V².

is applicable to cars weighing 45 tons and upward. For lighter cars use the diagram on page 13, selecting the line which applies to the particular weight of cars in question.

The diagram herewith, represents the resistance of the locomotive and tender in pounds per ton. Two lines are shown, the lower one being applicable to heavy standard gauge engines, and the upper one to narrow gauge and light standard gauge engines. These curves generally follow that for passenger cars, plus an amount sufficient to cover the head end resistances.

The resistance due to grades is discussed on pages 19 and 20.

Superheating

The temperature to which it is necessary to raise water before it can be evaporated into steam, depends upon the pressure. For every given pressure there is, therefore, a corresponding minimum temperature at which steam can exist. Steam existing at this temperature is said to be saturated, and any reduction in temperature will cause some of the steam to be condensed as

water. If the temperature is above that of saturation the steam is said to be superheated. A device employed for the purpose of raising the temperature of steam above that of saturation, is called a superheater.

The temperature of the cylinder walls of a locomotive is constantly changing, owing to the variation in the steam temperature due to expansion. As a result there is considerable condensation of steam, causing a loss in efficiency. The object in using superheated steam is to reduce this loss, by raising the steam temperature to such a point that condensation is, to a large extent, avoided. Furthermore since the volume per pound of superheated steam is greater than that of saturated steam at the same pressure, there is a gain in efficiency, because each pound of water evaporated forms a larger volume of steam, and therefore fewer pounds of steam are required to fill the cylinders.

The type of superheater generally used in locomotive work is known as the firetube. It is designed to give from 150 to 200 degrees of superheat, and in some cases even higher temperatures are attained. The superheater pipes are placed in a number of large tubes, which are about five and one-half inches in diameter. These tubes, like the small boiler tubes, convey the products of combustion from the firebox to the smokebox. A double loop of superheater pipes is usually placed in each large tube, and the pipes extend from the headers in the smokebox, to within a short distance of the firebox. The hot gases passing through the large tubes, both heat the water and superheat the steam. A damper is usually placed in the smokebox to cut off the draft through the large tubes when the throttle is closed. This is for the purpose of preventing the burning out of the superheater pipes when no steam is passing through them. The nature of the service to be performed, size and type of locomotive, and various other factors, must be considered when applying superheaters.

The locomotives described in the tables in this catalogue can be designed to use superheated steam, provided operating conditions are favorable. The superheater is of special value in heavy locomotives, which must develop high horse-power for sustained periods of time.

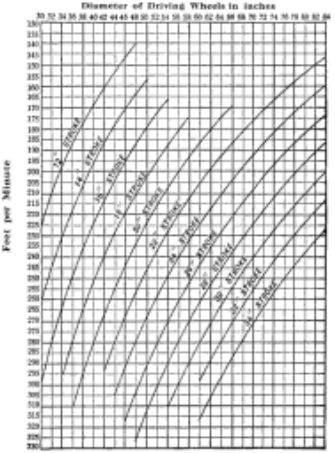
Piston Speed

The figures at the top of the chart herewith, represent the diameter of the driving wheels in inches, and those at the left hand side indicate the piston speed in feet per minute. The several curves in the body of the chart represent different strokes of piston.

Follow the perpendicular line from the number representing the diameter of wheel selected until it intersects the curve representing the desired stroke; then follow the horizontal line from the point of intersection to the left hand margin, and the figure here given will denote the piston speed.

It will be noted that the calculations are based on an engine speed of ten miles per hour. Greater speed will be determined by multiplying the results by the proper factor indicated by the speed required. In locomotive practice the maximum piston speed should not exceed 1600 feet per minute. The economical speed may be placed at about 1100 feet per minute.

Piston Speeds in feet per Minute at Engine Speed of Ten Miles per Hour



Revolutions of Wheels per Minute and per Second at Various Speeds

WHEELS			For Rev. per Minute Multiply miles per Hour by	For Rev. per Second Multiply miles per Hour by
Diameter in Inches	Circumference in Feet	Revolutions per Mile		
18	4.712	1119.76	18.66	.3110
20	5.236	1008.4	16.81	.2801
22	5.760	916.8	15.28	.2547
24	6.283	838.4	13.97	.2329
26	6.81	775.3	12.92	.2154
28	7.30	720.3	12.00	.2000
30	7.85	672.6	11.21	.1868
32	8.377	630.3	10.50	.1751
33	8.64	611.1	10.18	.1696
34	8.901	593.2	9.89	.1648
36	9.42	560.5	9.34	.1556
37	9.686	545.1	9.09	.1514
38	9.95	530.6	8.84	.1440
40	10.47	504.2	8.40	.1401
42	11.00	480.0	8.00	.1363
44	11.52	458.3	7.64	.1273
46	12.04	438.5	7.31	.1218
48	12.57	420.0	7.00	.1166
50	13.00	403.4	6.72	.1120
52	13.61	387.9	6.46	.1073
54	14.14	373.4	6.22	.1033
56	14.66	360.2	6.00	.1000
58	15.18	347.8	5.79	.0965
60	15.71	336.1	5.60	.0933
62	16.23	325.3	5.42	.0901
64	16.75	315.2	5.25	.0875
66	17.28	305.5	5.09	.0848
68	17.80	296.6	4.94	.0823
70	18.36	288.1	4.80	.0798
72	18.85	280.1	4.67	.0778
78	20.42	258.6	4.31	.0718
84	21.99	240.1	4.00	.0666
90	23.56	224.1	3.73	.0622
96	25.16	210.1	3.50	.0586

Horse-Power

The term horse-power was first established by James Watt, who ascertained that a strong London draught horse was capable of doing work for a short interval of time equivalent to lifting 33,000 pounds through a height of one foot in one minute.

This value was used by Watt in expressing the power of his engines, and has since been universally adopted in mechanics. The unit of work is the foot-pound, which is the amount of work required to lift a weight of one pound through a space of one foot.

Horse-power is the measure of the rate at which work is performed, and is equal to 33,000 pounds lifted one foot in one minute, or one pound lifted 33,000 feet in one minute, or one pound lifted 550 feet in one second; therefore, one horse-power equals 550 foot-pounds per second.

The general formula for ascertaining the horse-power of a locomotive is as follows:

$$\frac{P \times L \times A \times N}{33{,}000} = \text{H.P.},$$ in which

P=mean effective pressure in pounds per square inch.
L=length of stroke in feet.
A=area of the piston in square inches.
N=number of strokes (four times the number of revolutions) per minute.
H. P.=indicated horse-power.

By cancellation and substituting the diameter of the driving wheels, the formula may be reduced to the following:

$$\frac{C^2 \times S \times P \times (M.P.H.)}{D \times 375} = \text{H.P.},$$ in which

C=diameter of cylinder in inches.
P=mean effective pressure at given speed.
S=length of stroke in inches.
M. P. H.=miles per hour.
D=diameter of driving wheels in inches.
H. P.=horse-power.

The tractive force of a locomotive, multiplied by the speed in miles per hour, divided by 375, gives horse-power.

Grades

When a train is hauled up a grade, the resistance due to friction is increased by that due to lifting the train against gravity. One mile equals 5280 feet; hence a ton of 2000 pounds raised one foot in one mile, represents a resistance of $\frac{2000}{5280}$, or .3788 pounds. Therefore, when the grade is expressed in feet per mile, the number of feet multiplied by .3788 gives the resistance in pounds per ton of 2000 pounds. When the grade is expressed in feet per hundred or per cent., the per cent. of grade multiplied by twenty gives the resistance in pounds per ton of 2000 pounds.

The resistance due to friction must, of course, be added to that due to the grade, in order to find the total resistance of the train.

The accurate method of determining a grade is by means of surveyor's instruments, but if these are not available the following method will suffice, unless the inclination is very moderate. A straight edge, 100 inches long, with one end resting on the rail, is leveled by means

of a spirit level; and the vertical distance between the other end of the straight edge and the rail is mensured. This distance expressed in inches, equals the grade in per cent.; and when the inclination is at all steep the result so obtained is fairly accurate.

Curves

In the United States it is customary to express curvature in degrees noted by twice the deflection from the tangent measured at stations 100 feet apart. In other words, the number of degrees of central angle subtended by a chord of 100 feet represents the "degree curve." One degree of curvature is equal to a radius of 5730 feet. Therefore, the number of degrees divided into 5730 gives the radius in feet, or, per contra, the number of feet radius divided into 5730 gives the number of degrees. This assumes that the 100 feet are measured on the arc instead of the chord, but the error is so slight on curves commonly used that it may be ignored for ordinary calculation.

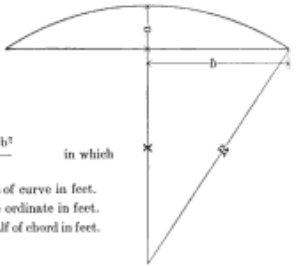
In Great Britain it is common to define a curve as so many chains (sixty-six feet) radius. Thus the radius of a one degree curve expressed in chains would be $\frac{5730}{66}$=86.81; therefore, 86.81 divided by the degrees equals the radius in chains; or 86.81 divided by the radius in chains equals the degrees.

In the metric system instead of the stations being 100 feet apart they are taken at twenty metres (65.61 feet). The central angle remaining the same, the radius must necessarily be less. This is represented by $\frac{65.61}{100}$ for a one degree curve, or approximately five-eighths, English measurement, which can be used as a factor for converting the English to the French system.

The resistance due to curves averages from 0.7 to 1.0 pound per ton per degree of curvature, depending upon weight of cars, condition of track, etc.

Radius of Curves

To determine the radius of any existing curve, lay off carefully on the inside rail, by any convenient means, a chord of any desired length, as shown in the accompanying diagram. Note the center height or middle ordinate of the chord (a) in feet or fraction of a foot. The formula is as follows:

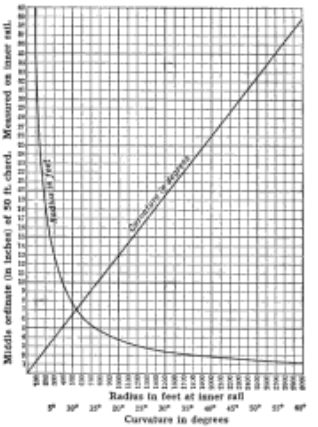


$$R = \frac{a + b^2}{2a}$$ in which

R—radius of curve in feet.
a middle ordinate in feet.
b—one-half of chord in feet.

A simple method for approximately measuring the degree of curvature is as follows: Let the chord equal two rail lengths, then half the chord, or measurement b, will be approximately thirty feet, and the height of the middle ordinate a in inches will nearly equal the curvature in degrees.

The diagram herewith, gives the radius in feet, and the curvature in degrees, for ordinates from one to forty inches measured on a chord of fifty feet in length.



Relation of Middle Ordinate to Radius of Curve

Radii of Curves at Switches

The following table, compiled from the Manual of the American Railway Engineering Association (1915), gives the radii of curvature at point switches using different frogs. In each case the switch is supposed to lead from a tangent, and the radius is measured to the center of the track:

FROG NUMBER	RADIUS IN FEET	
	THEORETICAL	PRACTICAL
4	112.26	110.69
5	183.22	174.34
6	273.95	265.39
7	364.88	362.08
8	488.71	487.48
9	616.27	605.18
9½	699.97	695.45
10	790.25	790.25
11	940.21	922.65
12	1136.34	1098.73
15	1744.45	1743.80
16	2005.98	1993.24
18	2587.66	2546.31
20	3262.98	3257.26
24	4052.77	4886.16

The theoretical radii are mathematically computed. In order, however, to reduce rail cutting and rail waste, it is usually desirable to use the "practical" instead of "theoretical" radius; as the straight lead rail is then of a length to permit the eventual utilization of both pieces into which a rail is cut.

Gauge of Track

The measurement for track gauge is understood to represent the distance between the inside edges of the heads of the rails, as shown in the accompanying sketch,

and the distance over the flanges represents the gauge less the required amount of play or clearance between the flange of the wheel and the rail.

When deciding the gauge for a contemplated road, the following suggestions will be found useful:

If the line is to connect with any standard gauge road, the track should correspond and be of the standard broad gauge, which is four feet eight and one-half inches.

If such connection is unlikely and narrow gauge is considered preferable, the standard narrow gauge should be adopted, which is three feet.

The advantage of adopting one of these standard gauges, is that, should it be desirable at any time to sell the equipment, a ready market can be found.

For logging railroads the standard gauge of four feet eight and one-half inches is generally preferable, as the cars can then have long bolsters and be heavily loaded without piling the logs too high.

While some roads use the same gauge in curves as on tangents, it is desirable in order to insure easy riding and reduce wear, to widen the gauge in the curves. It is stated in "Trautwine's Engineer's Pocket Book," that the gauge is usually widened by from one-thirty-second inch to one-eighth inch for each degree of curvature, the maximum amount seldom exceeding one inch.

Rails

The number of driving wheels required is determined by the weight which they must necessarily carry and the strength of the rail or permanent way. As an approximate calculation it may be assumed that steel rails, properly supported by crossties, can sustain, as a maximum, a weight per wheel of 225 to 300 pounds for each pound per yard of rail. It is, therefore, easy to ascertain the load which any given rail section will support.

Example. With a rail section of forty pounds per yard the maximum weight for each wheel will be $40 \times 300 = 12{,}000$ pounds. This with a locomotive having two pairs of driving wheels will equal an available weight on driving wheels of 48,000 pounds, or with three pairs of driving wheels, of 72,000 pounds.

To ascertain the weight of rails per mile of single track to be laid of any given section, the following formula may be used:

$$\frac{\text{Weight per yard of rail} \times 11}{7} = \text{Tons of 2240 pounds}$$

Example. For a road equipped with 40-pound rails the number of tons required per mile will be:

$$\frac{40 \times 11}{7} = 62.8 \text{ tons per mile}$$

The following table is deduced from the above formula:

Amount in Tons of Rails of Various Weights

To Lay One Mile of Track

Weight per Yard	Tons per Mile	Weight per Yard	Tons per Mile
8 pounds	12.57	65 pounds	102.14
9 "	14.14	66 "	103.71
10 "	15.71	67 "	105.28
12 "	18.85	68 "	106.85
14 "	22.	70 "	110.
16 "	25.14	71 "	111.57
20 "	31.43	72 "	113.14
25 "	39.28	73 "	114.71
30 "	47.14	75 "	117.85
35 "	55.	78 "	122.57
40 "	62.85	80 "	125.71
45 "	70.71	82 "	128.83
48 "	75.44	85 "	133.57
50 "	78.57	88 "	138.28
52 "	81.71	90 "	141.43
56 "	88.	92 "	144.57
57 "	89.57	95 "	149.28
60 "	94.28	98 "	154.
61 "	95.85	100 "	157.14
63 "	99.	125 "	196.43

Spikes

The following table, giving data referring to railroad spikes, is taken from the hand book of the Cambria Steel Company, Johnstown, Penna.

Size Measured Under Head Inches	Average Number per Keg of 200 pounds	Quantity of Spikes per Mile of Single Track. Ties 2 feet C. to C. 4 Spikes per Tie		Rail Used Weight per Yd Pounds
		Pounds	Kegs	
5½x9/16	300	7040	35 1/5	75 to 100
5½x5/8	375	5870	29 1/4	45 " 75
5 x5/8	400	5170	26	40 " 56
5 x½	450	4960	23½	35 " 40
4½x½	530	3960	20	30 " 35
4 x½	600	3520	17½	25 " 35
4½x7/16	680	3140	15⅞	20 " 30
4 x7/16	720	2980	14⅞	20 " 30
3½x7/16	900	2850	11	16 " 25
4 x⅜	1000	2090	10½	16 " 25
3½x⅜	1190	1780	9	16 " 20
3 x⅜	1240	1710	8½	16 " 20
2½x⅜	1342	1575	7⅞	8 " 16

Number of Splice Bars and Splice Bar Bolts Required per Mile of Single Track

Length of Rails Feet	No. of Single Splice Bars.	No. of Bolts & Nuts for Each Joint	Length of Rails Feet	No. of Single Splice Bars	No. of Bolts & Nuts for Each Joint
20	1056	2112	28	752	1504
24	880	1760	30	704	1408
26	812	1624	33	640	1280

Crossties

A crosstie 9 x 7 inches and 8½ feet in length contains 3.719 cubic feet. If placed two feet apart, from center to center, it will take 2640 per mile. If placed 2½ feet, 2112; and if placed 3 feet, 1760 per mile will be required.

Fuel Consumption

Assuming that one-half stroke cut-off represents the average work of the cylinders for a given run, the water consumption will be about twenty-five pounds or three gallons per horse-power per hour, and the consumption of coal about one pound per gallon of water or three pounds per horse-power. (For horse-power see page 18.)

Wood as Fuel

On logging railroads wood is frequently used as fuel for locomotives.

The following data regarding the heating value and composition of various woods has been selected from "Kent's Mechanical Engineer's Pocket Book."

HEATING VALUE OF WOOD—The weight of one cord of wood (thoroughly air dried) is about as follows:

Hickory or Hard Maple	4500	pounds	equal to	1800	pounds	coal
White Oak	3850	"	" "	1540	"	"
Beech, Red and Black Oak	3250	"	" "	1300	"	"
Poplar, Chestnut and Elm	2350	"	" "	940	"	"
The Average Pine	2000	"	" "	800	"	"

From the above it is safe to assume that two and one-quarter pounds of average dry wood are equal to one pound of the average quality of soft coal, and that the fuel value of the same weight of different woods is very nearly the same—that is a pound of hickory is worth no more for fuel than a pound of pine, assuming both to be dry. It is important that the wood be dry, as each ten per cent. of water or moisture in wood will detract about twelve per cent. from its value as fuel.

The following table gives the composition of several kinds of wood:

Wood	Carbon Per Cent.	Hydrogen Per Cent.	Oxygen Per Cent.	Nitrogen Per Cent.	Ash Per Cent.
Beech	49.36	6.01	42.69	0.91	1.06
Oak	49.64	5.92	41.16	1.20	1.97
Birch	50.20	6.20	41.62	1.15	0.81
Poplar	49.37	6.21	41.69	0.36	1.86
Willow	49.90	5.96	39.56	0.96	3.37
Average Per Cent.	49.70	6.06	41.30	1.05	1.80

Smoke Stacks

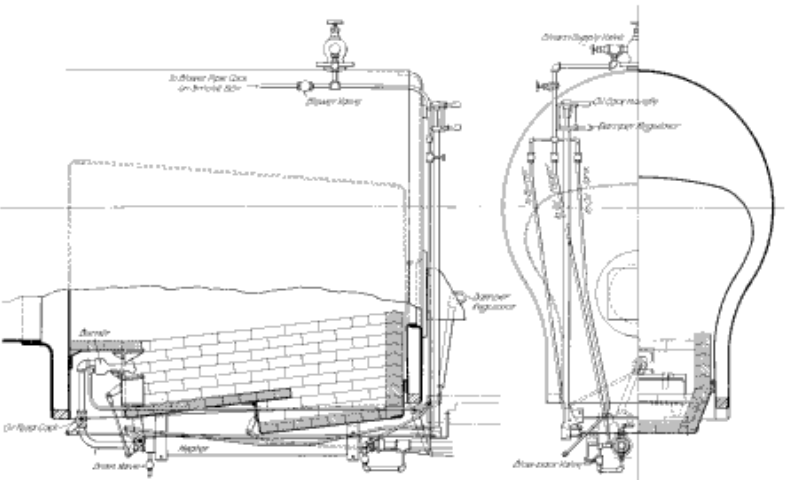
The Radley and Hunter stack has been extensively used on wood burning locomotives, and has proved to be a most efficient spark arrester. This stack is provided with a straight inside pipe, over which is placed a cast iron cone having volute flanges on its under side. The outside casing of the stack is balloon shaped. It has a diameter at the bottom 5 to 8 inches greater than the inside pipe, with a maximum diameter approximately four times that of the inside pipe. The sparks are given a rotary motion when they strike the cone, and are broken up and extinguished. Such refuse as does not escape to the atmosphere, falls to the bottom of the outside casing, and is removed through a cleaning hole. As a further precaution, netting is provided, through which the products of combustion must pass before escaping from the stack.

In some instances wood burning locomotives are fitted with a straight open stack. An extended smokebox, equipped with fine netting and deflecting plates, should then be used.

Oil Fuel for Locomotives

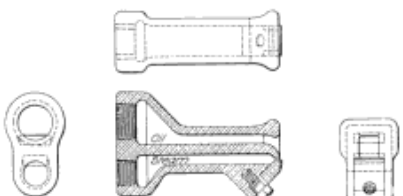
The development, during the past twenty years, of oil fields in this country as well as abroad, has greatly increased the available supply of petroleum for fuel purposes, and has in some districts, resulted in the extensive introduction of oil burning locomotives. Petroleum possesses certain advantages which render its use desirable where it can be obtained at less cost than other forms of fuel. One pound of oil possesses nearly as much heating power as two pounds of coal, and probably as much as four pounds of wood, and the ease with which the fuel may be handled and the fire regulated to suit conditions of working, results in considerable economy where an abundant supply is available.

A convenient arrangement of apparatus, which has been extensively used for burning fuel oil, is shown in the accompanying illustrations. The burner is located in the front of the firebox, and dampers for the admission of air are placed beneath it and at mid-length in the firepan. It is essential to have an arrangement that



Arrangement of Oil Burning Equipment as Used by The Baldwin Locomotive Works

will break up and atomize the oil, as without these conditions the combustion will not be complete, and smoke and loss of economy will result. The burner is rectangular in cross section with two separated ports or chambers (one above the other) running its entire length. Into the upper of these ports the oil is fed through suitable pipes. Steam is admitted to the lower part of the burner through a pipe connected to the boiler, and as the oil flows out it is met by the jet of steam which atomizes it and sprays it into the fire box. The flow of oil is regulated by a plug cock in the feed pipe, provided with an operating handle placed within easy reach of the fireman. The arrangement of the fire bricks and firepan is clearly shown in the sections through the firebox. A proper regulation of the quantity of air admitted through the dampers is of importance, in order to secure perfect combustion, and the dampers are arranged to close air tight and have substantial rigging to operate them. The fire door is also air tight and is provided with a peep hole for observing the condition of the fire. But little change is necessary in the construction of the tender, the oil tank being placed in the fuel space. Means are provided for discharging steam into the oil tank, in order to keep the fuel sufficiently liquid to flow readily; and an auxiliary heater is usually placed in the pipe line leading to the burner.



Oil Burner

The best adjustment of the diaphragm plates in the smokebox, and of the regulating plate for the steam jet in the burner, is found by experiment, and further change of these parts need not be made except for cleaning or repairs. If the apparatus is in wood working condition, engines after standing all night with stack covered, and

dampers closed, will have sufficient steam pressure in the morning to spray the oil jet properly so that the burner can be lighted.

Qualities of Coal

In designing locomotives for burning a particular quality of coal, the question is likely to arise as to what is anthracite or what is bituminous. The division between the different grades is largely empirical. That given by Kent has been adopted as generally satisfactory and is as follows:

ANTHRACITE—all coal with less than 7.5 per cent. volatile matter in combustible.

SEMI-ANTHRACITE—all coal with 7.5 per cent. to 12.5 per cent. volatile matter in combustible.

SEMI-BITUMINOUS—all coal with 12.5 per cent. to 25 per cent. volatile matter in combustible.

BITUMINOUS—all coal with 25 per cent. to 50 per cent. volatile matter in combustible.

LIGNITE—all coal with more than 50 per cent. volatile matter in combustible.

When coal is of a doubtful quality a sample can be forwarded for analysis and specifications will be furnished for locomotives guaranteed to meet requirements and burn the coal to advantage if practicable.

Logging Service

For logging service the standard gauge of four feet eight and one-half inches is generally preferable. It is found economical to use steam power even where the output is comparatively small and the distance covered is short. It is estimated that under ordinary conditions the total cost of hauling by steam power including interest and depreciation is from 30 to 60 cents per 1000 feet of lumber cut.

Plantation Service

Locomotives used in plantation service are usually narrow gauge. Sugar cane and other products are handled by steam power in a large number of plantations in the United States, West Indies, Mexico, Central and South America, Hawaii and the Philippines.

Industrial Service

For use in steel and blast furnaces and other manufacturing establishments locomotives have become indispensable. They can be operated if necessary for twenty-four hours per day without serious inconvenience, and by their use the work is accomplished in a more economical manner than by any other form of power. For shifting cars from main lines to factory yards, where power belonging to the railroad company is not always available, it is often found more economical to install locomotives to prevent unavoidable delays.

Contractors' Service

In moving material for railroad or other excavations, locomotives can be adapted to run on light, temporary track which is easily shifted, and thus do the work at a cost far below that which would be incurred if animal power were used. Besides this, a great saving of time is made, which in work of this description is generally of the utmost importance.

Coke Ovens

For feeding coke ovens the steam locomotive furnishes the most economical and satisfactory power.

Mine Service

It is frequently more convenient with the output of the mine, either coal or ore, to make delivery in mine cars at the point of shipment without breaking bulk. To do this locomotives are required of a gauge corresponding to that of the mine car.

In some instances these locomotives are required to run in, as well as about, the mine; in which case they must be adapted for use underground and conform in height and width to the dimensions of the gallery in which they are to operate.

Cable Codes

The cable address is "Baldwin Philadelphia." Each of the following tables has a code word in the line opposite the class numbers, the use of which indicates that a locomotive of the class and general dimensions shown

on the line referred to is required. The following codes are used: Lieber's; A1; A-B-C, fourth and fifth editions; Western Union; Vanguard; Commercial Code (Atlantic Cable Code), and The Baldwin Locomotive Works Private Code.

Tables

The following tables contain the leading dimensions, with hauling capacities on grades up to five per cent., of the principal classes of locomotives built by The Baldwin Locomotive Works. The frictional resistance, in each case, is assumed to be eight pounds per ton of 2000 pounds. This is a conservative figure, adopted because locomotives are frequently required to operate on uneven tracks, hauling cars which are empty or only partly loaded, and not in the best order. With loaded cars, having well lubricated journals and running over first-class tracks, the frictional resistance will be materially less than eight pounds per ton and the hauling capacity will be proportionately increased. The hauling capacity on a level, as given in the tables, is 90 per cent. of that calculated; this deduction having been made to allow for difficulties in starting the train, and for increased resistances on poorly surfaced track. In actual service, the hauling capacity is usually determined by the resistance on the maximum grade, rather than by that on the level.

In calculating the hauling capacities of locomotives having a high rated tractive force in proportion to weight on driving wheels, the effective tractive force is assumed to be equal to the weight on driving wheels divided by 4.25. Under normal track conditions, the full tonnage assigned can then be hauled without slipping the wheels.

These allowances place the tonnage ratings, as given in the tables, on a conservative basis, allowing a liberal margin for unfavorable conditions. It is difficult to establish a rating without an actual trial; but in the great majority of cases the locomotives will haul the loads assigned, and under the most favorable conditions a considerably greater tonnage can be handled. It is assumed in each case, that the locomotive is working at slow speed, with long cut-off and wide-open throttle. At higher speeds the hauling capacity will be reduced, as previously explained.

Locomotive Types

Four Coupled Switching

Type 0-4-0

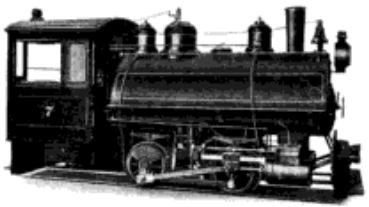
Four coupled switching locomotives have all the weight on the driving wheels, and are suitable for contractors' or industrial service, and also for light switching work in railroad yards and terminals. These engines have short wheel bases, and they can be safely operated on sharp curves and switches. The smaller classes can easily traverse curves of fifty feet radius. For short runs, or for switching service where a large fuel and water supply are not required, saddle or side tanks can be used and the fuel carried in the cab or on a rear extension of the engine frames. For longer runs, a separate tender should be employed. If desired, the tender tank is made with a sloping back, thus giving the enginemen a better view when backing up. A separate tender is also an advantage on exceptionally narrow track, as it admits of a lower center of gravity than if the tank were placed on the boiler.

In the tank-frame locomotives, as illustrated on page 34, the frames consist of steel plates, between which the water tank is placed. This construction lowers the center of gravity; an important feature where the gauge is unusually narrow. These engines are fitted with a simple design of Marshall valve gear, having all its parts outside the wheels where they are easily accessible. This style of gear has had a thorough trial on light industrial locomotives operating under the most severe service conditions.

Four Coupled Locomotives

Gauge 3 Feet or 1 Metre

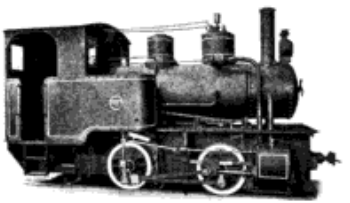
With Saddle or Side Tanks



Class 4-C

Type 0-4-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Rubber Pressure Per Inch per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tank for Water Gals. Fuel Lbs.	Load in Tons (2000 Pounds) of Cars and Lading							
									On a Grade per Mile of							
									On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Masticine	4- 4 C	5 x 10	24	150	1,320	10,000	2′ 9″	100	140	65	40	25	20	14	10	7
Masticoeum	4- 6 C	6 x 12	26	150	2,110	13,000	3′ 4″	110	230	110	65	45	35	20	15	12
Mastidim	4- 8 C	7 x 12	26	150	2,880	16,000	3′ 4″	150	315	150	90	65	50	30	20	16
Mastiff	4-10½ C	8 x 12	26	150	3,760	20,000	3′ 10″	200	410	195	120	85	65	45	30	20
Mastignao	4-11 C	9 x 14	28	150	5,160	24,000	4′ 6″	300	530	255	160	110	85	55	40	30
Mastiger	4-12 C	9 x 16	33	160	5,340	27,000	5′ 0″	350	585	280	175	125	95	65	45	35
Mastigode	4-14 C	10 x 16	33	160	6,590	32,000	5′ 0″	400	725	350	220	155	120	80	60	45
Mastigopod	4-16 C	11 x 16	33	160	7,970	38,000	5′ 6″	500	880	425	265	190	145	95	70	55
Mastigsten	4-18 C	12 x 16	33	160	9,490	44,000	5′ 6″	600	1040	505	315	225	175	115	85	65
Mastikboom	4-20 C	13 x 18	37	160	11,170	52,000	5′ 6″	700	1230	595	370	265	205	135	100	75
Mastiquait	4-22 C	14 x 18	37	160	12,970	58,000	5′ 9″	800	1430	690	430	310	240	160	115	90



Four Coupled Locomotives

Gauge 2 Feet 6 Inches

With Tanks Between Plate Frames

Class 4-C — Type 0-4-0

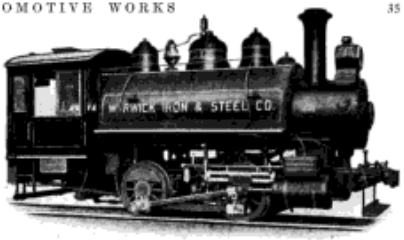
CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tank and Water Supply Gallons	Load in Tons (2000 Pounds) of Cars and Ladings							
									On a Level	On a Grade per Mile of						
										26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mastiquak	4– 6 C	6 x 10	22	160	2,230	12,000	3′ 0″	130	245	115	70	50	40	25	20	15
Mastiquale	4– 7 C	6½ x 12	23	160	3,000	15,000	3′ 4″	155	330	155	100	70	55	35	27	20
Mastiquamo	4– 8 C	7 x 12	23	160	3,480	17,500	3′ 8″	185	380	185	115	80	63	42	30	23
Mastiquand	4–10 C	8 x 12	23	160	4,550	19,500	4′ 0″	200	500	240	150	110	85	55	40	30
Mastiquapi	4–11 C	9 x 14	28	160	5,500	25,000	4′ 7″	260	605	290	185	130	100	68	50	38
Mastiquary	4–14 C	10½ x 16	32	160	7,500	29,000	5′ 3″	300	750	360	230	165	125	85	60	48
Mastiquass	4–16 C	11 x 16	32	160	8,200	34,000	5′ 11″	325	880	425	265	190	150	100	74	57
Mastiquavu	4–18 C	12 x 16	32	160	9,800	40,000	5′ 11″	350	1035	500	315	225	175	115	87	67

Four Coupled Locomotives

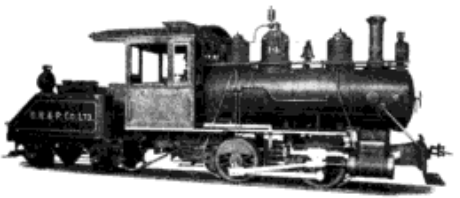
Gauge 4 Feet 8½ Inches

With Saddle or Side Tanks

Class 4-C Type 0-4-0



CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tank Water 8½ lb. to gallon	Load in Tons (2000 Pounds) of Cars and Lading							
										On a Grade per Mile of							
									On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mastique	4- 8 C	7 x 12	26	150	2,880	17,000	4' 8"	150	315	150	90	65	50	30	20	15
Mastiquons	4-10½ C	8 x 14	28	150	4,080	22,000	4' 8"	200	445	215	130	95	70	45	35	25
Mastiume	4-11 C	9 x 14	30	160	5,140	29,000	5' 0"	300	565	270	170	120	90	60	42	33
Mastixbaum	4-12 C	9 x 16	33	160	5,340	31,000	6' 0"	350	590	280	175	125	95	63	45	35
Mastixoel	4-14 C	10 x 16	33	160	6,590	36,000	6' 0"	400	720	345	215	155	115	75	55	40
Mastkeggen	4-16 C	11 x 16	33	160	7,970	42,000	6' 0"	500	875	420	260	185	145	95	70	50
Mastkeil	4-18 C	12 x 18	37	160	9,520	48,000	6' 0"	600	1050	505	315	225	175	115	85	65
Mastklamp	4-20 C	13 x 20	42	160	10,930	53,000	6' 0"	700	1200	580	360	260	200	130	95	75
Mastkorbes	4-20 C	13 x 22	44	160	11,480	56,000	6' 6"	750	1285	610	370	270	210	140	100	78
Mastkorf	4-22 C	14 x 22	44	160	13,320	63,000	7' 0"	800	1470	705	445	315	245	160	115	90
Mastkorven	4-22 C	14 x 24	44	160	14,530	67,000	7' 0"	900	1600	770	485	345	265	180	130	100
Mastkrag	4-24 C	15 x 24	44	160	16,690	75,000	7' 0"	1000	1840	890	555	400	305	205	150	115
Mastkram	4-26 C	16 x 24	44	160	18,980	88,000	7' 0"	1200	2060	1010	635	455	350	235	170	130
Mastkuehen	4-28 C	17 x 24	50	170	20,040	95,000	7' 0"	1400	2200	1060	665	475	365	245	175	135
Mastless	4-30 C	18 x 24	50	170	22,460	105,000	7' 6"	1500	2470	1195	745	535	415	275	200	155



Four Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Separate Tenders

Class 4-C

Type 0-4-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender Water Gallons $8\frac{1}{3}$ lb. to the gallon	Load in Tons (2000 Pounds) of Cars and Lading							
									On a Grade per Mile of							
									On a Level	26.4 ft. or $\frac{1}{2}$ %	52.8 ft. or 1 %	79.2 ft. or $1\frac{1}{2}$ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mastloses	4– 8 C	7 x 12	26	150	2,880	14,000	3′ 10″	500	310	145	90	60	45	30	20	15
Mastoche	4–10½ C	8 x 12	26	150	3,760	18,000	4′ 6″	600	405	190	115	80	60	40	25	20
Mastodinia	4–11 C	9 x 14	30	150	4,810	22,000	4′ 6″	650	520	245	150	105	80	50	35	25
Mastodon	4–12 C	9 x 16	33	160	5,340	24,000	5′ 0″	700	580	275	170	120	90	55	40	30
Mastoid	4–14 C	10 x 16	33	160	6,590	29,000	5′ 0″	800	715	340	210	150	110	70	50	35
Mastodeal	4–16 C	11 x 16	33	160	7,970	34,000	5′ 6″	900	870	415	255	180	140	90	60	45
Mastodeo	4–18 C	12 x 16	33	160	9,490	40,000	5′ 6″	1000	1035	495	300	215	165	105	75	55
Mastramela	4–20 C	13 x 18	37	160	11,170	47,000	6′ 0″	1200	1210	575	355	255	190	125	90	65
Mastrantos	4–22 C	14 x 18	37	160	12,970	56,000	6′ 0″	1500	1415	675	420	295	225	145	100	75

Four Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Separate Tenders

Class 4-C Type 0-4-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Effort Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender Water Gallons U.S.	Load in Tons (2000 Pounds) of Cars and Locos. On a Grade per Mile of						
									On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.4 ft. or 4 %	264.0 ft. or 5 %
Mastreneao	4–12 C	9 x 16	33	160	5,340	27,000	5′ 0″	800	575	270	165	115	85	55	35	25
Mastrecht	4–14 C	10 x 16	33	160	6,590	32,000	5′ 6″	1000	715	340	205	145	110	70	40	35
Mastrind	4–16 C	11 x 16	33	160	7,970	36,000	6′ 0″	1200	865	410	250	175	135	85	60	40
Mastroc	4–18 C	12 x 18	37	160	9,520	44,000	6′ 0″	1400	1030	490	305	215	160	105	70	50
Mastrozzo	4–20 C	13 x 20	42	160	10,930	49,000	6′ 6″	1600	1190	565	350	245	185	120	80	60
Mastruesto	4–20 C	13 x 22	44	160	11,480	53,000	6′ 6″	1600	1250	595	365	260	195	130	90	65
Mastrucis	4–22 C	14 x 22	44	160	13,320	59,000	7′ 0″	2000	1450	690	425	300	230	145	100	75
Mastrugao	4–22 C	14 x 24	44	160	14,530	64,000	7′ 0″	2000	1580	755	465	330	250	160	115	80
Mastschnal	4–24 C	15 x 24	50	180	16,320	75,000	7′ 0″	2200	1800	855	530	375	285	180	125	90
Mastschnor	4–26 C	16 x 24	50	180	18,800	81,000	7′ 6″	2500	2055	975	605	430	325	210	145	105
Mastschrot	4–28 C	17 x 24	50	180	21,210	90,000	7′ 6″	2500	2320	1110	685	485	370	240	170	125
Mastsegel	4–30 C	18 x 24	51	190	24,020	103,000	7′ 6″	3000	2655	1260	780	555	420	275	190	140

Four Coupled with Two-Wheeled Front Truck

Type 2-4-0 

Four coupled locomotives, with two-wheeled leading trucks, are suitable for service where the runs are short and the speed moderate. Two pairs of wheels are equalized together, either the driving wheels with each other or the front pair of driving wheels with the pony truck.

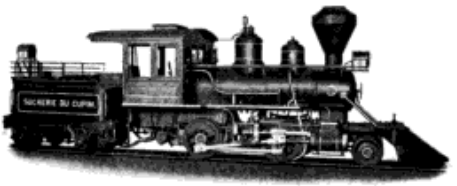
The truck has a swinging bolster and radius bar. Engines of this type readily traverse curves of short radius. A separate tender is usually provided, but if the run is short these locomotives can be designed with either saddle or side tanks.

Four Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Front Trucks
and Separate Tenders

Class 6-C Type 2-4-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water Gallons	Load in Tons (2000 Pounds) of Cars and Loading: On a Grade per Mile of: On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mastestango	6–10 C	8 x 12	30	160	3,480	17,000	21,000	5′ 0″	10′ 3″	500	375	175	105	75	55	35	20	15
Mastsueck	6–11 C	9 x 14	33	160	4,670	23,000	27,000	5′ 6″	11′ 3″	600	505	240	145	100	75	45	30	20
Maststut	6–12 C	9 x 16	33	160	5,340	25,000	30,000	5′ 6″	11′ 3″	700	580	275	165	115	85	55	35	25
Mastton	6–14 C	10 x 16	37	160	5,880	29,000	35,000	6′ 3″	12′ 4″	800	635	300	185	130	95	60	40	30
Mastonnes	6–16 C	11 x 16	37	160	7,110	33,000	38,000	6′ 0″	12′ 5″	1000	770	365	225	155	115	75	50	35
Mastuerzo	6–18 C	12 x 18	42	160	8,390	37,000	44,000	6′ 0″	12′ 11″	1200	910	430	265	185	140	90	60	40
Mastussia	6–20 C	13 x 18	42	160	9,850	44,000	53,000	6′ 6″	13′ 6″	1500	1070	505	310	215	165	100	70	50
Mastvieches	6–22 C	14 x 20	46	160	11,590	51,000	60,000	7′ 6″	15′ 2″	1800	1255	595	365	255	190	120	80	60

Four Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front Trucks
and Separate Tenders

Class 6-C — Type 2-4-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Drivers Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water 8½ ft. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 20.4 ft. or ¼ %	42.8 ft. or 1 %	74.2 ft. or 1¼ %	106.6 ft. or 2 %	138.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mastvisch	6–11 C	9 x 14	33	160	4,670	23,000	28,000	5′ 0″	10′ 8″	700	505	240	145	100	75	45	30	20
Mastwangen	6–12 C	9 x 16	33	160	5,340	25,000	31,000	6′ 0″	11′ 8½″	800	580	275	165	115	85	55	35	25
Mastwerkes	6–14 C	10 x 16	37	160	5,880	29,000	36,000	6′ 6″	12′ 5″	1000	635	300	185	130	95	60	40	30
Mastwerp	6–16 C	11 x 16	37	160	7,110	34,000	42,000	6′ 6″	13′ 0″	1200	680	360	220	155	115	70	45	33
Mastzuiger	6–18 C	12 x 18	42	160	8,390	39,000	48,000	7′ 0″	13′ 10″	1400	905	425	260	180	135	85	55	40
Mastzunge	6–20 C	13 x 20	44	160	10,430	46,000	56,000	7′ 4″	14′ 8″	1600	1130	535	325	230	170	110	75	50
Masuriorum	6–22 C	14 x 22	50	160	11,730	52,000	63,000	7′ 6″	15′ 2″	1800	1275	600	370	255	195	120	80	55
Masuvios	6–24 C	15 x 22	50	160	13,470	60,000	71,000	7′ 6″	15′ 2″	2000	1460	690	420	295	225	140	95	65
Masudi	6–26 C	16 x 22	50	160	15,320	68,000	79,000	7′ 6″	15′ 8″	2200	1670	785	485	340	255	160	110	80
Masulito	6–28 C	17 x 24	56	160	16,840	74,000	87,000	7′ 6″	15′ 8″	2500	1825	865	530	375	280	175	120	85

Four Coupled with Two-Wheeled Rear Truck

Type 0-4-2 □○○○

This type is particularly serviceable for operating short lines, where limited water and fuel capacity will answer. These locomotives have their driving wheels equalized together, the truck being center-bearing, with swinging bolster and radius bar. Having a comparatively long total wheel base and a short rigid wheel base, they are steady, and ride smoothly without plunging, curve readily, and cause little wear of track. The fuel is carried on the engine frames at the back; the water is carried either in saddle or side tanks, or in a tank back of the cab. The latter plan is better for light rails. If the tank is placed on the boiler, its weight adds to the adhesion and increases the hauling capacity, greater space is afforded the enginemen in the cab, and a larger supply of fuel may be carried. The weight is well distributed, the principal portion being carried on equalizing levers between the driving wheels, thus affording an equal distribution on these wheels. The pony truck carries the weight of the fuel or the fuel and water, as the case may be, with a part of the weight of the overhanging firebox. These locomotives are well adapted for running in either direction.

Four Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Rear Trucks
and Saddle or Side Tanks

Class $6\frac{1}{2}$-C — Type 0-4-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water 8½ lb. Gallons	Load in Tons (2000 Pounds) of Cars and Locos: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Masuola	6- $8\frac{1}{4}$ C	7 x 12	28	150	2,680	14,000	17,000	3′ 8″	9′ 0″	225	285	140	85	60	45	30	20	15
Masuriana	6-$10\frac{1}{4}$ C	8 x 12	28	160	3,650	20,000	25,000	3′ 9″	9′ 7″	300	400	190	115	80	60	40	25	20
Masurianum	6-$11\frac{1}{2}$ C	9 x 14	30	160	5,140	24,000	29,000	4′ 0″	10′ 4″	350	560	270	165	115	90	55	40	30
Masurisch	6-$12\frac{1}{2}$ C	9 x 16	33	160	5,340	26,000	32,000	4′ 6″	10′ 9″	400	585	280	170	120	95	60	45	35
Masurka	6-$14\frac{1}{2}$ C	10 x 16	33	160	6,590	31,000	37,000	4′ 6″	10′ 9″	450	720	345	215	155	115	75	55	40
Matabasi	6-$16\frac{1}{2}$ C	11 x 16	33	160	7,970	37,000	44,000	5′ 0″	11′ 6″	500	875	420	260	185	140	95	65	50
Mataborrao	6-$18\frac{1}{2}$ C	12 x 16	33	160	9,400	42,000	48,000	5′ 0″	11′ 9″	600	1040	500	310	220	170	110	80	60

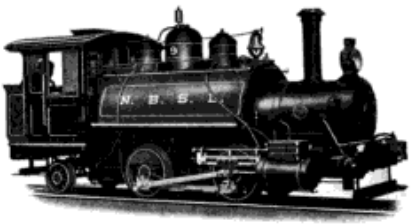
Four Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Rear Trucks
and Saddle or Side Tanks

Class 6½-C

Type 0-4-2



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water Kilo. Litres	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: Level	26.4 ft. or .5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matacandil	6–10½ C	8 x 14	30	160	4,060	21,000	26,000	4′ 8″	10′ 2″	300	445	210	130	90	70	45	30	20
Matacanes	6–11½ C	9 x 14	30	160	5,140	25,000	30,000	5′ 0″	10′ 0″	350	560	270	165	115	90	55	40	30
Matacantos	6–12½ C	9 x 16	33	160	5,340	27,000	33,000	5′ 0″	10′ 9″	400	585	280	170	120	95	60	45	35
Matachin	6–14½ C	10 x 16	33	160	6,590	32,000	38,000	5′ 0″	11′ 6″	450	720	345	215	155	115	75	55	40
Mataeon	6–16½ C	11 x 16	33	160	7,970	38,000	45,000	5′ 0″	11′ 9″	500	875	420	260	185	140	95	65	50
Matadeiro	6–18½ C	12 x 18	37	160	9,520	43,000	50,000	5′ 6″	12′ 6″	600	1045	500	315	225	170	115	85	65
Matadors	6–20½ C	13 x 20	42	160	10,930	50,000	57,000	6′ 6″	13′ 6″	700	1200	575	360	255	195	130	95	70
Matadouro	6–22½ C	14 x 22	44	160	13,320	59,000	66,000	7′ 0″	14′ 6″	800	1475	705	440	315	245	160	115	90
Matafloni	6–24½ C	15 x 22	44	160	15,300	68,000	76,000	7′ 0″	15′ 3″	1000	1690	810	510	365	280	185	135	100
Matafuego	6–26½ C	16 x 24	50	160	16,710	77,000	88,000	7′ 0″	16′ 0″	1200	1750	885	550	395	300	200	145	110
Matafund	6–28½ C	17 x 24	50	160	18,870	94,000	104,000	7′ 0″	17′ 6″	1200	2075	995	620	445	340	225	160	120

Four Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Rear Trucks
and Rear Tanks

Class 6½-C — Type 0-4-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Power Pounds	Weight in Working Order Pounds		Wheel Base		Capacity Tank for Water U.S. Gallons	Load in Tons (2000 Pounds) of Cars and Lading						
						On all Driving Wheels	Total	of Driving Wheels	Total		On a Level	On a Grade per Mile of					
												26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matagoso.....	6– 8½ C	7 x 12	28	150	2,680	13,000	18,000	3′ 8″	9′ 0″	225	295	140	85	60	45	30	20	15
Matahambre...	6–10½ C	8 x 12	28	160	3,650	18,000	25,000	3′ 9″	9′ 7″	300	400	190	115	80	60	40	25	20
Matahumos....	6–11½ C	9 x 14	30	160	5,140	22,000	29,000	4′ 0″	10′ 4″	350	500	270	165	115	90	55	40	30
Mataione.....	6–12½ C	9 x 16	33	160	5,340	24,000	33,000	4′ 6″	10′ 9″	400	585	280	170	120	95	60	45	35
Matajudio.....	6–14½ C	10 x 16	33	160	6,590	28,000	38,000	4′ 6″	10′ 9″	450	720	345	215	155	115	75	55	40
Matalahuva....	6–16½ C	11 x 16	33	160	7,970	34,000	44,000	5′ 0″	11′ 6″	500	875	420	260	185	140	95	65	50
Matalobos.....	6–18½ C	12 x 16	33	160	9,490	40,000	50,000	5′ 0″	12′ 3″	600	1040	500	310	220	170	110	80	60

Four Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Rear Trucks

and Rear Tanks

Class 6½-C Type 0-4-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water Gals. Fuel Coal Tons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or .5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matalones	6–10½ C	8 x 14	30	160	4,060	19,000	26,000	4′ 8″	10′ 2″	300	445	210	130	90	70	45	30	20
Matalotado	6–11¾ C	9 x 14	30	160	5,140	21,000	30,000	5′ 0″	10′ 0″	350	560	270	165	115	90	55	40	30
Matalotaje	6–12¾ C	9 x 16	33	160	5,340	25,000	34,000	5′ 0″	10′ 9″	400	585	280	170	120	95	60	45	35
Matamata	6–14½ C	10 x 16	33	160	6,590	29,000	39,000	5′ 0″	11′ 6″	450	720	345	215	155	115	75	55	40
Matamorra	6–16½ C	11 x 16	33	160	7,970	35,000	45,000	5′ 0″	11′ 9″	500	875	420	260	185	140	95	65	50
Matamouros	6–18½ C	12 x 18	37	160	9,520	41,000	51,000	5′ 6″	12′ 6″	600	1045	500	315	225	170	115	85	65
Matanza	6–20½ C	13 x 20	42	160	10,930	46,000	58,000	6′ 0″	13′ 6″	700	1190	570	355	255	195	130	95	70
Matasperros	6–22½ C	14 x 22	44	160	13,320	54,000	66,000	7′ 0″	14′ 6″	800	1395	670	420	300	230	145	110	85
Matapi	6–24½ C	15 x 22	44	160	15,300	63,000	76,000	7′ 0″	15′ 3″	1000	1630	785	490	350	270	180	130	100

American Type

Four Coupled with Four-Wheeled Front Truck

Type 4-4-0 

American type locomotives, having four coupled wheels and a four-wheeled leading truck, are suitable for passenger, freight and mixed service, where the run is of such length as to require a separate tender, or for short lines intended ultimately to be extended. The name "American" type was given for the reason that for many years locomotives of this type were used more than any other, for nearly every variety of service throughout the United States.

Four Coupled Locomotives

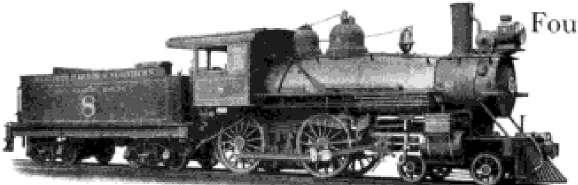
American Type

Gauge 3 Feet or 1 Metre

With Four-Wheeled Front Trucks and Separate Tenders

Class 8-C Type 4-4-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender Gallons Anthracite Coal	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: 21.4 ft. or ½ %	42.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matapollos	8-12 C	9 x 16	42	160	4,190	20,000	30,000	5′ 9″	15′ 3″	1200	445	205	120	80	60	30	20	10
Matapolvo	8-14 C	10 x 16	42	160	5,180	24,000	35,000	6′ 5″	17′ 3½″	1400	550	255	150	100	75	40	25	15
Mataran	8-16 C	11 x 16	42	160	6,280	27,000	41,000	6′ 9″	17′ 10″	1500	665	310	185	125	90	55	35	20
Mataritas	8-18 C	12 x 16	42	160	7,460	30,000	46,000	7′ 2″	18′ 3″	1600	755	350	210	145	105	65	40	25
Matarife	8-18½ C	12 x 18	44	160	8,010	32,000	50,000	7′ 10″	18′ 11″	1800	800	375	225	155	110	67	42	27
Matarrata	8-20 C	13 x 18	44	160	9,400	37,000	58,000	8′ 2″	21′ 8″	2000	925	430	260	175	130	75	45	30
Matarrubia	8-22 C	14 x 18	46	160	10,420	41,000	64,000	8′ 2″	21′ 8″	2200	1030	480	290	195	145	85	55	35
Matasanos	8-24 C	15 x 18	46	160	11,970	47,000	74,000	8′ 0″	21′ 8″	2500	1380	550	330	225	165	100	60	40



Four Coupled Locomotives

American Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Front Trucks
Fireboxes between Driving
Axles, and Separate Tenders

Class 8-C | Type 4-4-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water U.S. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or ½%	52.8 ft. or 1%	79.2 ft. or 1½%	105.6 ft. or 2%	158.4 ft. or 3%	211.2 ft. or 4%	264.0 ft. or 5%
Matasete......	8–14 C	10 x 20	50	160	5,440	24,000	38,000	5′ 6″	16′ 4″	1400	575	265	160	110	80	45	25	15
Matasen........	8–16 C	11 x 22	50	160	7,240	31,000	48,000	6′ 5″	18′ 4″	1600	775	360	215	150	110	65	40	25
Matassina.....	8–18 C	12 x 22	50	160	8,610	35,000	54,000	6′ 6″	19′ 1″	1800	890	410	245	170	125	75	45	30
Matavane.....	8–20 C	13 x 22	50	160	10,110	42,000	64,000	7′ 0″	20′ 5½″	2000	1060	495	300	205	150	90	60	35
Matavonium...	8–22 C	14 x 22	54	160	10,900	47,000	75,000	7′ 8″	21′ 3½″	2200	1170	545	330	225	165	100	65	40
Matavam.....	8–24 C	15 x 24	62	160	11,850	52,000	80,000	8′ 0″	21′ 9″	2500	1265	590	355	245	180	105	70	45
Matbeitels.....	8–26 C	16 x 24	62	170	14,320	58,000	90,000	8′ 6″	22′ 9″	2800	1465	680	410	280	210	125	80	50
Matchable.....	8–28 C	17 x 24	62	170	16,200	67,000	104,000	9′ 1″	23′ 1″	3000	1700	795	480	330	245	150	95	60
Matchless.....	8–30 C	18 x 24	66	180	18,020	73,500	115,000	9′ 1″	24′ 8½″	3500	1850	860	520	360	265	160	100	65

Four Coupled Locomotives

American Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Front Trucks
Fireboxes above Rear Driving
Axles, and Separate Tenders

Class 8-C Type 4-4-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water U.S. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or 5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matchlock	8-28 C	17 x 24	66	180	16,080	70,000	102,000	7' 6"	21' 5"	3500	1720	805	485	335	245	145	90	60
Matelas	8-30 C	18 x 24	66	180	18,020	77,000	115,000	7' 6"	21' 6"	4000	1930	900	545	375	275	165	105	65
Matelasser	8-32 C	19 x 24	66	180	20,070	85,000	128,000	8' 0"	22' 11"	4500	2140	1000	605	415	305	185	115	75
Matellarum	8-34 C	20 x 24	66	180	22,260	92,000	136,000	8' 6"	23' 4"	5000	2315	1085	655	450	330	200	125	80

Forney Type

Four Coupled with Four-Wheeled Rear Truck

Type 0-4-4 

Forney type locomotives, having two pairs of coupled wheels and a four-wheeled rear truck, are compact and powerful for their aggregate weight, and are suitable where the run is not long enough to necessitate a separate tender. The constant weight of the boiler and machinery is on the driving wheels, while the variable weight of fuel and water is on the truck. Locomotives of this type are used as double-enders, being run with equal facility forward or backward. The driving wheels are equalized together; the truck is center-bearing and has a swinging bolster. These locomotives readily traverse curves of short radius. Standard gauge locomotives of classes 8-16½-C and 8-18½-C have been used on curves of ninety feet radius in passenger service. The fuel and water are carried at the rear of the cab.

Four Coupled Locomotives

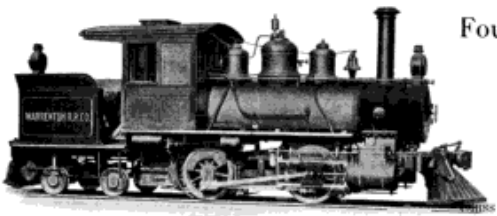
Forney Type

Gauge 3 Feet or 1 Metre

With Four-Wheeled Rear Trucks and Rear Tanks

Class 8½-C Type 0-4-4

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Water Capacity Tank Gallons	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank and Bunker Cu. ft.	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matellioni	8– 8½ C	7 x 12	27	150	2,780	14,000	24,000	3′ 8″	11′ 10″	400	300	140	85	60	45	25	20	10
Matellis	8–10½ C	8 x 12	28	160	3,650	19,000	32,000	4′ 0″	14′ 2″	500	395	185	110	80	60	35	25	15
Mateloce	8–11½ C	9 x 14	30	150	4,810	21,000	35,000	4′ 0″	14′ 2″	550	525	250	155	105	80	50	35	25
Matelot	8–12½ C	9 x 16	33	160	5,340	23,000	38,000	4′ 6″	14′ 7″	600	585	275	170	120	90	60	40	30
Matematica	8–14½ C	10 x 16	37	160	5,880	28,000	44,000	4′ 6″	15′ 1″	700	640	305	185	130	100	65	45	32
Matenmaker	8–16½ C	11 x 16	37	160	7,110	32,000	50,000	5′ 0″	17′ 0″	750	775	370	230	160	120	80	55	40
Mateolam	8–18½ C	12 x 18	42	160	8,390	37,000	56,000	5′ 6″	18′ 0″	800	900	430	265	185	140	90	65	45



Four Coupled Locomotives

Forney Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Rear Trucks and Rear Tanks

Class 8½-C

Type 0-4-4

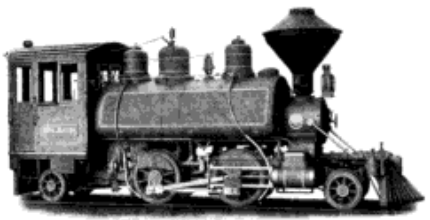
CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank and Water Space Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or 5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mateologie	8–12½ C	9 x 16	37	160	4,760	23,000	39,000	5′ 0″	14′ 8″	500	515	245	150	105	80	50	35	25
Materasso	8–14½ C	10 x 16	37	160	5,880	28,000	44,000	5′ 0″	16′ 1″	600	640	305	190	130	100	65	45	30
Matercula	8–16½ C	11 x 18	42	160	7,050	33,000	52,000	5′ 0″	16′ 1″	700	765	365	225	160	120	75	55	40
Materis	8–18½ C	12 x 18	42	160	8,390	41,000	62,000	6′ 6″	17′ 4″	800	915	435	270	190	145	95	65	45
Materially	8–20½ C	13 x 20	44	160	10,430	51,000	73,000	6′ 0″	17′ 5″	900	1140	545	335	240	180	115	80	60
Materamus	8–22½ C	14 x 22	50	160	11,730	57,000	79,000	6′ 0″	18′ 0″	1000	1280	610	380	270	205	135	95	70
Materiandi	8–24½ C	15 x 22	50	160	13,470	65,000	85,000	6′ 6″	19′ 6″	1200	1475	705	440	310	240	155	110	80
Materiarum	8–26½ C	16 x 24	50	160	16,710	70,000	93,000	7′ 0″	21′ 0½″	1500	1810	865	540	383	295	195	140	105
Materiato	8–28½ C	17 x 24	50	160	18,870	76,000	100,000	7′ 6″	22′ 0″	1500	1960	940	585	420	320	210	150	115

Four Coupled Double-Ender

Types 2-4-2- and 2-4-4

Locomotives having four coupled wheels and a truck at each end, are suitable for logging, industrial or light road service. These engines ride steadily on uneven tracks, and can be safely run in either direction. They are built with saddle, side, or rear tanks; or, if the runs are long, separate tenders may be used. As a rule, both the front and rear trucks have two wheels; but if the tank is placed back of the cab, on an extension of the engine frames, a four-wheeled rear truck should be used. When both trucks have two wheels, the front is center bearing and is equalized with the first pair of driving wheels; while the rear truck is side-bearing, and is equalizedwith the second pair of driving wheels.

The following pages present series of narrow and standard gauge locomotives with saddle or side tanks, and of standard gauge locomotives with rear tanks and with separate tenders.



Four Coupled Double-Ender Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Front and Rear Trucks and Saddle or Side Tanks

Class 8¼-C — Type 2-4-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water 83⅓ Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or 0.5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Materinux	8–8¼ C	7 x 12	30	150	2,400	13,000	22,000	3′ 9″	14′ 3″	250	270	125	75	50	40	25	15	10
Materiavis	8–10½ C	8 x 12	30	150	3,260	16,000	26,000	4′ 6″	15′ 10″	300	355	165	100	70	55	35	20	15
Materiell	8–11½ C	9 x 14	33	150	4,380	21,000	34,000	4′ 0″	15′ 0″	400	475	225	140	95	75	45	30	20
Materious	8–12½ C	9 x 16	33	150	5,000	24,000	37,000	4′ 6″	17′ 6½″	450	540	255	155	110	85	55	35	25
Materiosa	8–14¼ C	10 x 16	37	160	5,880	27,000	45,000	5′ 0″	18′ 2″	500	635	300	185	130	95	60	40	30
Maternal	8–16¼ C	11 x 16	37	160	7,110	32,000	50,000	5′ 0″	18′ 6″	600	775	370	225	160	120	75	55	40
Maternedad	8–18¼ C	12 x 18	42	160	8,390	37,000	60,000	5′ 8″	20′ 0″	700	915	435	270	190	145	90	65	45
Maternaser	8–20¼ C	13 x 18	42	160	9,850	44,000	70,000	5′ 8″	20′ 4″	800	1050	500	310	220	165	105	75	55
Maternity	8–22¼ C	14 x 18	42	160	11,450	48,000	75,000	5′ 8″	20′ 11″	900	1155	550	340	240	185	120	85	60

Four Coupled Double-Ender Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Rear Trucks and Saddle or Side Tanks

Class 8¼-C

Type 2-4-2

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driver Wheels	Wheel Base: Total	Capacity Tank for Water U.S. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: 10.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Materno	8–12¼ C	9 x 16	33	160	5,340	25,000	40,000	4′ 9″	15′ 2″	450	580	275	170	120	90	55	40	25
Materoza	8–14¼ C	10 x 16	33	160	6,560	30,000	47,000	5′ 0″	16′ 5″	500	715	340	210	150	110	70	50	35
Matertera	8–16¼ C	11 x 16	33	160	7,970	36,000	54,000	5′ 6″	17′ 3″	600	870	415	255	180	135	90	60	45
Mateur	8–18¼ C	12 x 18	37	160	9,520	42,000	62,000	6′ 0″	19′ 4″	700	1015	485	300	210	160	105	70	50
Matfelon	8–20¼ C	13 x 20	42	160	10,930	48,000	70,000	6′ 0″	19′ 11″	800	1150	555	345	245	185	120	85	60
Matgrass	8–20¼ C	13 x 22	44	160	11,480	52,000	74,000	6′ 0″	20′ 2″	900	1250	600	370	265	200	130	95	70
Mathamias	8–22¼ C	14 x 22	44	160	13,320	60,000	83,000	7′ 0″	21′ 7″	1000	1440	690	430	305	235	150	105	80
Mathematie	8–22¼ C	14 x 24	44	160	14,530	64,000	88,000	7′ 0″	21′ 7″	1000	1550	740	460	330	250	160	115	85
Mathemeg	8–24¼ C	15 x 24	44	160	16,090	70,000	98,000	7′ 0″	22′ 8″	1200	1740	855	520	370	280	185	130	95
Matheseos	8–26¼ C	16 x 24	44	160	18,980	82,000	110,000	7′ 0″	22′ 8″	1400	1980	955	595	425	325	210	150	110
Mathilde	8–28¼ C	17 x 24	50	170	20,040	90,000	125,000	7′ 6″	24′ 8″	1500	2160	1040	650	465	355	230	165	125

Four Coupled Double-Ender Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Rear Trucks and Separate Tenders

Class 8¼-C — Type 2-4-2

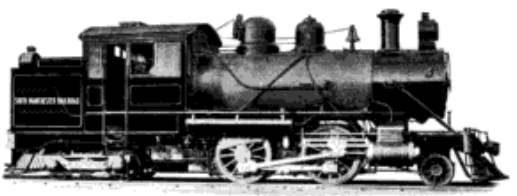
CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: of Driving Wheels	Wheel Base: Total	Capacity Tender Water Gallons	Load in Tons (2000 Pounds) of Cars and Ladies: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mathis	8–16¼ C	11 x 16	37	160	7,110	29,000	45,000	5′ 6″	17′ 6″	1600	730	340	205	140	100	60	35	25
Matheen	8–18¼ C	12 x 18	42	160	8,390	34,000	52,000	6′ 0″	19′ 4″	1800	860	400	240	165	120	70	45	30
Mathura	8–20¼ C	13 x 20	44	160	10,430	42,000	61,000	6′ 6″	20′ 8″	2000	1070	500	300	210	155	95	60	40
Mathusala	8–22¼ C	14 x 20	44	160	12,120	49,000	69,000	7′ 0″	21′ 7″	2300	1245	580	355	245	180	110	70	50
Matiane	8–24¼ C	15 x 22	48	160	14,020	56,000	79,000	7′ 6″	23′ 2″	2500	1425	655	405	280	210	125	85	55
Matieine	8–26¼ C	16 x 22	50	160	15,320	63,000	89,000	7′ 6″	23′ 6″	2800	1600	705	455	315	235	145	95	65

Four Coupled Double-Ender Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Four-Wheeled Rear Trucks and Rear Tanks

Class 10¼-C Type 2-4-4



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matigden	10-12¼ C	9 x 16	37	160	4,760	22,000	41,000	5′ 0″	21′ 0″	500	510	240	145	100	75	50	30	20
Matigende	10-14¼ C	10 x 16	37	160	5,880	27,000	50,000	5′ 6″	23′ 0″	600	635	300	175	130	95	60	40	25
Matigheid	10-16¼ C	11 x 18	42	160	7,050	33,000	61,000	6′ 0″	24′ 9″	700	760	360	220	155	115	70	50	35
Matiging	10-18¼ C	12 x 20	46	160	8,500	40,000	72,000	6′ 6″	25′ 9″	800	920	435	265	185	140	85	60	40
Matilira	10-20¼ C	13 x 20	46	160	10,000	44,000	84,000	6′ 6″	26′ 3″	1000	1085	510	315	220	165	105	70	50
Matin	10-22¼ C	14 x 22	50	160	11,730	51,000	95,000	7′ 0″	26′ 7″	1200	1270	600	370	260	195	120	85	60
Matisco	10-24¼ C	15 x 22	50	160	13,470	57,000	106,000	7′ 0″	28′ 6″	1500	1460	690	420	295	220	140	95	65
Matisronem	10-26¼ C	16 x 24	56	160	14,920	64,000	118,000	7′ 6″	28′ 7″	1800	1625	770	470	330	250	160	110	80
Matitatoio	10-28¼ C	17 x 24	56	160	16,840	71,000	130,000	7′ 6″	30′ 1″	2000	1815	860	530	370	280	180	125	90
Matizuda	10-28¼ C	17 x 24	56	180	18,950	76,000	150,000	7′ 0″	31′ 4″	2500	1940	915	565	395	295	185	130	90

Atlantic Type

Four Coupled with Four-Wheeled Front Truck and Trailing Wheels

Type 4-4-2

Locomotives of this type are particularly suitable for high-speed passenger service. The driving wheels are located under the waist of the boiler, and the front end of the engine is carried on a four-wheeled truck. A firebox having ample grate area and volume is placed back of the rear driving axle, and the overhanging weight is carried by a pair of trailing wheels. This arrangement provides a boiler having large steaming capacity in proportion to the adhesion—an essential feature of a high-speed locomotive.

In locomotives of this type the firebox may be placed entirely back of the driving wheels if desired, thus allowing an increased width of furnace. The trailing wheels may be placed in a radial truck, or may be held in rigid pedestals. In either case, these wheels are equalized with the driving wheels. The leading truck is provided with a swing bolster, and all the wheels under the locomotive have flanged tires. The compact grouping of the driving wheels permits the use of short coupling rods, thus reducing the liability of breakage when running at high speed.

Four Coupled Locomotives

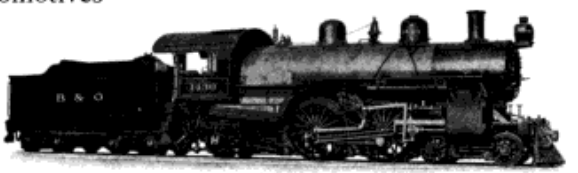
Atlantic Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Front Trucks

One pair of Trailing Wheels and Separate Tenders

Class 10¼-C Type 4-4-2



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water U.S. Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	132.0 ft. or 2½ %	158.4 ft. or 3 %
Matinare	10-30½ C	18 x 24	68	180	17,500	70,000	126,000	6′ 0″	23′ 6″	4500	1745	805	480	325	235	175	130
Matinaseis	10-32¾ C	19 x 24	72	180	18,410	74,000	132,000	6′ 3″	23′ 8″	5000	1840	850	505	340	245	180	140
Matines	10-32¾ C	19 x 24	72	200	20,460	85,000	146,000	6′ 3″	24′ 11″	5000	2140	985	585	400	290	215	165
Matlockite	10-34⅛ C	20 x 26	78	180	20,400	88,000	159,000	6′ 9″	26′ 0″	5500	2160	995	590	400	290	215	165
Matoiserie	10-36¼ C	21 x 26	78	180	22,490	95,000	178,000	7′ 0″	27′ 0″	6000	2365	1090	645	435	315	235	175
Matojos	10-36¼ C	21 x 26	78	200	25,000	105,000	184,000	7′ 0″	27′ 3″	6000	2625	1220	730	495	360	270	210
Matombo	10-36¼ C	21 x 28	78	200	26,920	111,000	198,000	7′ 6″	30′ 6¾″	6000	2780	1290	770	525	385	290	225
Matones	10-38¼ C	22 x 26	80	205	27,400	126,000	215,000	7′ 5″	30′ 9½″	7000	2925	1340	820	540	390	295	225

Six Coupled Switching

Locomotives of this type are more generally used for switching service than any other. They are also suitable for heavy contractors' service, and for industrial work about mills, furnaces and large manufacturing plants. Tank locomotives of this type are suitable for short runs, and for switching work where large fuel and water capacity are not required. Ordinarily, however, a separate tender is to be preferred; especially with the heavier classes of narrow gauge engines, where the use of saddle or side tanks may raise the center of gravity too high. In the case of heavy standard gauge engines also, it is difficult to secure adequate fuel and water capacity without using a separate tender.

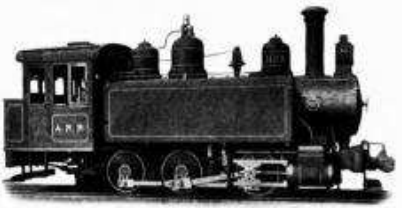
The table on page 62 gives particulars regarding six coupled tank frame locomotives. In general design, these engines are similar to the four coupled locomotives described on page 34.

Six Coupled Locomotives

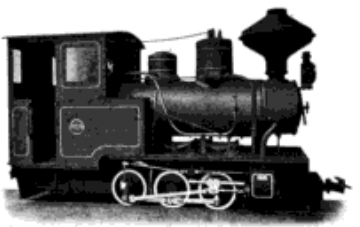
Gauge 3 Feet or 1 Metre

With Saddle or Side Tanks

Class 6-D Type 0-6-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Drivers Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in working order Pounds	Wheel Base	Capacity Tank for Water 9/4-lb. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: On a Level	20.4 ft. or 1 ½	33.4 ft. or 1 %	70.2 ft. or 1 %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matosis	6– 8 D	7 x 12	24	150	3,120	18,000	5′ 3″	250	340	160	100	70	55	35	25	20
Matos	6–10 D	8 x 12	26	150	3,760	22,000	5′ 5″	300	410	195	120	85	65	40	30	24
Matraccio	6–11 D	9 x 14	28	150	5,160	26,000	5′ 8″	350	570	270	170	120	90	60	45	35
Matracula	6–12 D	9 x 16	31	160	5,680	31,000	6′ 9″	400	625	300	190	130	100	65	48	37
Matralia	6–14 D	10 x 16	31	160	7,020	37,000	7′ 7″	450	775	370	230	165	125	85	60	45
Matraqueo	6–16 D	11 x 16	33	160	7,970	42,000	7′ 7″	500	875	420	260	185	145	95	70	50
Matrarium	6–18 D	12 x 16	33	160	9,490	48,000	8′ 1″	600	1040	500	315	225	170	115	85	65
Matrasjes	6–20 D	13 x 18	37	160	11,170	56,000	9′ 0″	800	1230	590	370	265	205	135	100	75
Matratura	6–22 D	14 x 18	37	160	12,970	63,000	9′ 6″	900	1425	690	430	310	240	160	115	90
Matratas	6–24 D	15 x 18	37	160	14,880	70,000	9′ 6″	1000	1640	790	495	355	275	185	135	100
Matrem	6–26 D	16 x 20	42	160	16,580	78,000	10′ 0″	1200	1825	880	550	395	305	205	150	115



Six Coupled Locomotives

Gauge 2 Feet 6 Inches

With Tanks Between Plate Frames

Class 6-D — Type 0-6-0

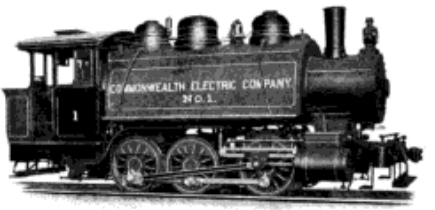
CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tank for Water Gals. Coal Lbs.	Load in Tons (2000 Pounds) of Cars and Locos On a Grade per Mile of							
									On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	132.4 ft. or 2½ %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matremosis	6- 8 D	7 x 12	23	170	3,700	19,000	4′ 6″	160	405	195	120	85	65	45	33	25
Matremt	6-10 D	8 x 12	23	170	4,830	22,800	4′ 8″	200	530	255	160	115	90	60	44	34
Matremtopo	6-11 D	9 x 14	28	170	5,850	28,000	5′ 4″	250	640	310	195	140	105	70	50	40
Matrepan	6-14 D	10½ x 16	32	170	7,960	32,000	6′ 0″	270	830	400	250	180	140	95	65	50
Matrepel	6-16 D	11 x 16	32	170	8,750	36,000	6′ 6″	300	935	450	285	205	155	105	75	60
Matreporvi	6-18 D	12 x 16	32	170	10,400	43,000	6′ 6″	320	1110	540	340	245	190	125	90	70

Six Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Saddle or Side Tanks

Class 6-D Type 0-6-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weights in Working Order Pounds	Wheel Base	Capacity Tank for Water Gals.	Load in Tons (2000 Pounds) of Cars and Lading							
									On a Grade per Mile of							
									On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matreseet	6–12 D	9 x 16	31	160	5,680	32,000	6′ 9″	400	625	295	185	130	100	65	45	35
Matrescunt	6–14 D	10 x 16	31	160	7,020	38,000	7′ 7½″	450	775	370	230	165	125	80	60	45
Matricaire	6–16 D	11 x 16	33	160	7,970	44,000	7′ 7½″	500	875	420	260	185	145	95	65	50
Matricalis	6–18 D	12 x 18	37	160	9,520	50,000	8′ 0″	600	1050	505	315	225	170	115	80	60
Matricarto	6–20 D	13 x 20	42	160	10,930	57,000	8′ 6″	700	1200	580	360	260	200	130	95	70
Matricem	6–20 D	13 x 22	44	160	11,480	60,000	9′ 0″	750	1260	605	380	270	210	140	100	75
Matriceibus	6–22 D	14 x 24	44	160	14,530	70,000	9′ 6″	900	1600	770	485	345	265	175	130	100
Matricida	6–24 D	15 x 24	44	160	16,690	81,000	10′ 0″	1000	1830	885	555	400	305	205	150	115
Matriciosa	6–26 D	16 x 24	44	160	18,980	95,000	10′ 0″	1100	2090	1010	630	450	345	230	165	125
Matricola	6–28 D	17 x 24	44	160	21,440	104,000	10′ 6″	1200	2360	1135	710	510	390	260	190	145
Matricular	6–30 D	18 x 24	44	160	24,030	112,000	11′ 0″	1300	2660	1285	805	575	445	295	215	165
Matrigna	6–32 D	19 x 24	50	180	26,500	124,000	11′ 0″	1400	2925	1410	885	635	490	325	240	185
Matrignavi	6–34 D	20 x 24	50	180	29,380	134,000	11′ 0″	1600	3160	1530	960	690	530	355	260	200
Matrikel	6–34 D	20 x 26	50	180	31,810	142,000	11′ 0″	1800	3500	1695	1065	765	590	395	290	220
Matrimony	6–36 D	21 x 26	50	180	35,080	155,000	11′ 0″	1800	3760	1820	1145	820	635	425	310	240

Six Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Separate Tenders

Class 6-D Type 0-6-0

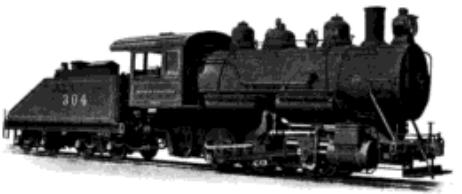
CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels over Tires Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender Coal Space Tons	Water Gallons	Load in Tons (2000 Pounds) of Cars and Lading						
										On a Grade per Mile of						
										On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matrimorum	6– 8 D	7 x 12	24	150	3,120	15,000	5′ 3″	600	340	160	95	65	50	30	20	15
Matrimos	6–10 D	8 x 12	26	150	3,760	19,000	5′ 5″	700	405	190	115	80	60	35	25	18
Matrissage	6–11 D	9 x 14	30	150	4,810	23,000	6′ 3″	800	520	245	150	105	80	50	35	25
Matritense	6–12 D	9 x 16	33	160	5,340	27,000	6′ 9″	1000	575	270	165	115	85	55	37	26
Matroca	6–14 D	10 x 16	33	160	6,590	31,000	7′ 5″	1200	710	335	205	145	105	70	45	30
Matronaca	6–16 D	11 x 16	33	160	7,970	36,000	7′ 7″	1300	865	410	250	175	135	85	55	40
Matronalis	6–18 D	12 x 16	33	160	9,490	44,000	8′ 1″	1400	1025	490	300	210	160	100	70	50
Matronarum	6–20 D	13 x 18	37	160	11,170	49,000	9′ 0″	1500	1215	580	355	250	190	120	85	60
Matronhood	6–22 D	14 x 18	39	160	12,300	54,000	9′ 2″	1600	1345	640	395	280	210	135	95	65
Matronize	6–24 D	15 x 18	39	160	14,120	62,000	9′ 6″	1800	1540	730	450	320	240	155	105	75
Matronlike	6–26 D	16 x 20	42	160	16,580	71,000	9′ 6″	2000	1805	865	535	380	285	185	130	95

Six Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Separate Tenders

Class 6-D Type 0-6-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender Coal Tons	Water Gallons	Load in Tons (2000 Pounds) of Cars and Lading							
										On a Grade per Mile of							
										On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matronly	6-12 D	9 x 16	33	160	5,340	30,000	6′ 9″	1000	575	270	165	115	85	55	35	25	
Matrose	6-14 D	10 x 16	33	160	6,390	35,000	7′ 7″	1200	710	335	205	145	105	65	45	30	
Matroszn	6-16 D	11 x 16	33	160	7,970	40,000	8′ 0″	1300	880	410	250	175	130	85	55	40	
Matruelis	6-18 D	12 x 18	37	160	9,320	47,000	8′ 1″	1500	1030	490	300	210	160	100	65	50	
Matserving	6-20 D	13 x 20	42	160	10,930	52,000	8′ 6″	1800	1190	565	345	240	185	115	80	55	
Matshamers	6-20 D	13 x 22	44	160	11,480	55,000	8′ 9″	2000	1240	590	360	255	190	120	85	60	
Matsuri	6-22 D	14 x 24	44	160	14,530	64,000	9′ 6″	2200	1580	750	475	325	245	155	110	80	
Matsvot	6-24 D	15 x 24	44	160	16,690	72,000	9′ 9″	2400	1810	865	535	375	285	185	125	90	
Matsvotten	6-26 D	16 x 24	50	180	18,800	82,000	9′ 9″	2600	2055	975	605	425	325	210	145	105	
Matsya	6-28 D	17 x 24	50	180	21,210	92,000	10′ 6″	2800	2320	1105	685	485	365	235	165	120	
Mattabas	6-30 D	18 x 24	50	180	23,790	102,000	10′ 6″	3000	2600	1235	765	545	410	265	185	135	
Mattaccino	6-32 D	19 x 24	50	180	26,500	112,000	10′ 6″	3500	2900	1375	855	605	460	295	210	155	
Mattaeugig	6-34 D	20 x 24	50	180	29,380	124,000	11′ 2″	4000	3060	1490	925	650	495	320	225	160	
Mattamore	6-34 D	20 x 26	50	180	31,810	133,000	10′ 10″	4000	3390	1615	1000	710	540	350	245	180	
Mattanah	6-36 D	21 x 26	50	180	35,080	141,000	11′ 0″	4000	3620	1730	1070	760	580	375	265	195	
Mattarios	6-38 D	22 x 26	50	180	38,500	155,000	11′ 6″	4000	3960	1895	1175	835	635	415	290	215	

Mogul Type

Six Coupled with Two-Wheeled Front Truck

Type 2-6-0

The Mogul type, with three pairs of coupled wheels and a two-wheeled leading truck, is primarily designed for road service, and is suitable where the eight-wheeled or American type would not afford sufficient power, or where the requisite weight on the driving wheels, if carried on only two pairs, would be greater than the rails could safely bear. The front and rear driving wheels are always flanged, while the middle pair usually has no flanges. The pony truck has a swinging bolster and radius bar. The plans illustrated show:

First.—A locomotive with a deep firebox between the middle and rear driving axles. This design has the advantage of giving ample depth of firebox, but necessitates a greater spread of wheels than is admissible in some instances.

Second.—A locomotive with a firebox placed above the frames and over the rear axle. This design admits of the driving wheels being grouped closely together. It answers well where coal is the fuel, but where wood is burned a deep firebox is desirable.

Third.—A locomotive with the driving wheels grouped closely together and a firebox placed entirely back of them. The depth of firebox is sufficient for burning either wood or coal. The short driving wheel base admits of traversing curves of short radius. Connection to the tender is made by means of a radial drawbar passing through the ash pan.

Six Coupled Locomotives

With Two-Wheeled Front Trucks

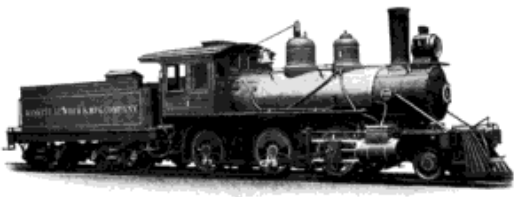
Mogul Type

Gauge 3 Feet or 1 Metre

With Fireboxes between Main and Rear Axles and Separate Tenders

Class 8-D Type 2-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water 6½-lb. salvos	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mattathias	8-12 D	9 x 16	33	160	5,340	24,000	30,000	9′ 6″	15′ 0″	1200	575	270	165	115	80	50	30	20
Mattuva	8-14 D	10 x 16	33	160	6,590	29,000	35,000	10′ 4″	16′ 2″	1400	710	330	200	140	105	65	40	25
Matthias	8-16 D	11 x 16	33	160	7,970	34,000	42,000	10′ 9″	16′ 10″	1500	860	405	245	170	130	80	50	35
Matthlond	8-18 D	12 x 16	33	160	9,490	38,000	47,000	11′ 8″	17′ 8″	1800	960	450	275	190	140	85	55	40
Matteam	8-20 D	13 x 18	37	160	11,170	45,000	54,000	12′ 0″	17′ 11″	2000	1140	540	330	230	170	105	70	50
Mattelin	8-22 D	14 x 18	37	160	12,970	52,000	64,000	13′ 5″	19′ 11″	2200	1320	625	380	265	200	125	85	60
Mattenbies	8-24 D	15 x 18	37	160	14,880	60,000	70,000	14′ 6″	21′ 0″	2500	1525	720	440	310	230	145	100	70



Six Coupled Locomotives

With Two-Wheeled Front Trucks

Mogul Type

Gauge 4 Feet 8½ Inches

With Fireboxes between Main and Rear Axles and Separate Tenders

Class 8-D Type 2-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds		Wheel Base		Capacity Tender for Water 8½-in. inches	Load in Tons (2000 Pounds) of Cars and Lading							
											On a Grade per Mile of							
						On all Driving Wheels	Total	Of Driving Wheels	Total		On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mattenkorn	8–16 D	11 x 18	37	160	8,000	35,000	44,000	9′ 4″	15′ 6″	1600	860	405	245	170	125	80	50	35
Mattenman	8–18 D	12 x 18	37	160	9,520	40,000	49,000	10′ 0″	16′ 2″	1800	1015	475	290	200	150	95	65	40
Mattecla	8–20 D	13 x 20	42	160	10,930	47,000	57,000	12′ 0″	18′ 10″	2000	1170	550	335	235	175	110	75	50
Matteremmo	8–22 D	14 x 22	44	160	13,320	56,000	67,000	12′ 0″	18′ 10″	2200	1435	675	415	290	215	135	90	65
Matterless	8–24 D	15 x 22	44	160	15,300	63,000	74,000	13′ 2″	20′ 6″	2500	1610	755	465	325	245	155	105	75
Matterullo	8–26 D	16 x 24	46	160	18,160	75,000	89,000	14′ 6″	21′ 10″	2800	1925	905	555	390	295	185	125	90
Mattest	8–28 D	17 x 24	50	170	20,040	83,000	102,000	15′ 0″	22′ 8″	3000	2130	1005	615	435	325	205	140	100
Mattgelb	8–30 D	18 x 24	54	180	22,040	91,000	110,000	15′ 0″	22′ 8″	3500	2330	1100	675	470	355	225	150	105
Mattgold	8–32 D	19 x 24	54	180	24,550	98,000	117,000	15′ 2″	23′ 6″	4000	2500	1180	720	505	380	240	160	115

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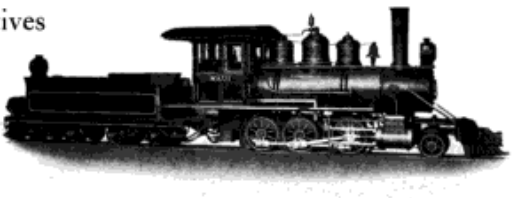
Six Coupled Locomotives

With Two-Wheeled Front Trucks

Mogul Type

Gauge 3 Feet or 1 Metre

With Deep Overhanging Fireboxes and Separate Tenders



Class 8-D Type 2-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water 6½-ft. Rivets	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 20.4 ft. or ½ %	32.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264 ft. or 5 %
Mattolina	8–16 D	11 x 16	33	160	7,970	34,000	39,000	7′ 0″	13′ 6″	1500	815	380	230	160	120	75	50	35
Mattona	8–18 D	12 x 16	33	160	9,490	38,000	46,000	7′ 0″	13′ 6″	1800	960	450	275	190	140	85	55	40
Mattoncino	8–20 D	13 x 18	37	160	11,170	45,000	53,000	7′ 3″	13′ 11″	2000	1140	540	330	230	170	105	70	50
Mattonello	8–22 D	14 x 18	37	160	12,970	52,000	61,000	7′ 3″	14′ 5″	2200	1320	625	380	265	200	125	85	60
Mattotto	8–24 D	15 x 18	37	160	14,880	60,000	69,000	8′ 0″	15′ 4″	2500	1525	720	440	310	230	145	100	70
Mattress	8–26 D	16 x 20	42	160	16,580	67,000	76,000	9′ 0″	16′ 4″	2800	1700	805	495	345	260	165	110	75
Mattsetsen	8–28 D	17 x 20	42	160	18,720	76,000	85,000	9′ 0″	16′ 4″	3000	1940	920	565	395	295	190	130	90

Six Coupled with Two-Wheeled Rear Truck

Type 0-6-2 ▭○○○○

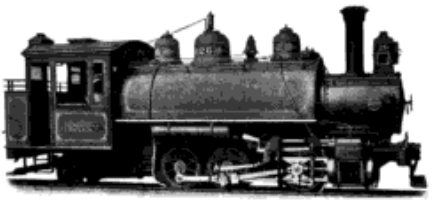
Six coupled locomotives, with two-wheeled rear trucks, are suitable where the runs are not long enough to require a separate tender. The addition of a truck avoids the uneven motion to which short wheel base locomotives, with a long overhang, are subject.

The increased space back of the cab permits of greater coal capacity and more room for the enginemen than is practicable without the truck. The three pairs of driving wheels are equalized together; the truck is center bearing, and has a swinging bolster and radius bar.

Six Coupled Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Rear Trucks and Saddle or Side Tanks



Class 8½-D

Type 0-6-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water 8½-lb. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mattuccio	8–10½ D	8 x 12	26	160	4,010	21,000	26,000	5′ 5″	11′ 3″	300	440	210	130	95	70	45	30	24
Mattulla	8–11½ D	9 x 14	30	160	5,140	25,000	30,000	5′ 11″	12′ 6″	350	560	270	165	115	90	55	40	30
Mattunino	8–12½ D	9 x 16	33	160	5,340	28,000	34,000	6′ 10″	13′ 1″	400	585	280	170	120	95	60	44	33
Mattuxso	8–14½ D	10 x 16	33	160	6,590	34,000	40,000	7′ 0″	13′ 0″	450	720	345	215	150	115	75	55	40
Mattweiss	8–16½ D	11 x 16	33	160	7,970	40,000	46,000	7′ 4″	14′ 4″	500	875	420	260	185	140	90	65	50
Mattzug	8–18½ D	12 x 18	37	160	9,520	46,000	52,000	7′ 10″	15′ 6″	600	1045	500	310	220	170	110	80	60
Matucetae	8–20½ D	13 x 18	37	160	11,170	53,000	60,000	8′ 0″	16′ 5″	800	1225	590	365	260	200	135	95	70
Matulao	8–22½ D	14 x 18	37	160	12,970	63,000	70,000	8′ 0″	17′ 2″	900	1425	685	430	305	235	155	110	85

Ten-Wheeled Type

Six Coupled with Four-Wheeled Front Truck

Type 4-6-0 

The ten-wheeled type, having three pairs of coupled wheels and a four-wheeled front truck, is suitable where a locomotive of the American type would not afford sufficient power, or where the requisite weight, if carried on only two pairs of driving wheels, would be greater than the rails could safely bear. The greater length of these locomotives admits of a longer boiler, with increased heating surface as compared with the American type. The front and rear driving wheels are preferably flanged, and the truck made with swinging bolster. The main driving wheels are made with either plain or flanged tires, according to service requirements.

Three plans of standard gauge locomotives are shown, viz.:

First.—With firebox between the main and rear driving axles.

Second.—With firebox above the rear driving axle.

Third.—With firebox above the rear pair of driving wheels The last arrangement is particularly suitable for heavy engines, as a large grate area can be provided without using an excessively long firebox.

Six Coupled Locomotives

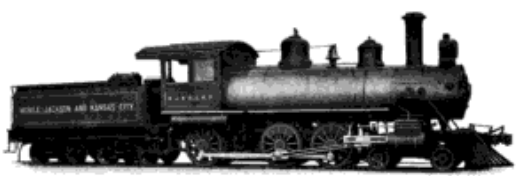
Ten-Wheeled Type

Gauge 3 Feet or 1 Metre

With Four-Wheeled Front Trucks and Separate Tenders

Class 10-D Type 4-6-0

CODE WORD	Class	Cylinders Diam. & Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water 8½-ft. inches	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matularum	10–18 D	12 x 18	42	160	8,390	38,000	51,000	9′ 6″	17′ 8″	1800	900	420	250	175	125	75	50	30
Matulis	10–20 D	13 x 18	42	160	9,850	45,000	58,000	9′ 6″	17′ 8″	2000	1055	495	300	205	155	90	60	40
Maturubunt	10–22 D	14 x 20	44	160	12,120	53,000	68,000	10′ 11″	19′ 5″	2200	1305	615	375	260	195	120	80	55
Maturusao	10–24 D	15 x 20	44	160	13,900	59,000	76,000	11′ 6″	21′ 3″	2500	1500	705	430	305	225	140	90	65
Maturanus	10–26 D	16 x 20	44	160	15,820	65,000	83,000	12′ 6″	21′ 10″	2800	1655	780	475	330	245	155	100	70
Maturandos	10–28 D	17 x 20	44	160	17,870	72,000	94,000	12′ 6″	21′ 10″	3000	1825	890	525	365	275	170	115	75



Six Coupled Locomotives

With Four-Wheeled Front Trucks

Ten-Wheeled Type

Gauge 4 Feet 8½ Inches

With Fireboxes between Main and Rear Axles and Separate Tenders

Class 10-D Type 4-6-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender Water Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 24.6 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.8 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maturarent	10-20 D	13 x 20	44	160	10,430	45,000	60,000	10′ 8″	19′ 8″	2000	1130	530	320	225	165	100	65	45
Maturneit	10-22 D	14 x 22	44	160	13,320	58,000	78,000	11′ 11″	21′ 3″	2200	1440	675	410	285	215	135	90	60
Maturnting	10-24 D	15 x 24	50	170	15,600	66,000	94,000	12′ 6″	22′ 7⅞″	2500	1680	785	480	335	250	155	100	70
Maturatori	10-26 D	16 x 24	56	180	16,780	73,000	98,000	12′ 10″	22′ 11¾″	2800	1810	850	520	360	270	165	110	75
Maturavero	10-28 D	17 x 24	56	180	18,950	78,000	105,000	12′ 10″	22′ 11¾″	3000	2000	940	575	400	300	185	125	85
Maturely	10-30 D	18 x 24	56	180	21,240	85,000	112,000	13′ 10″	24′ 0¾″	3500	2170	1020	620	435	325	200	135	90
Maturement	10-32 D	19 x 24	62	190	22,570	95,000	126,000	14′ 0″	24′ 9″	4000	2425	1135	695	485	360	225	150	100

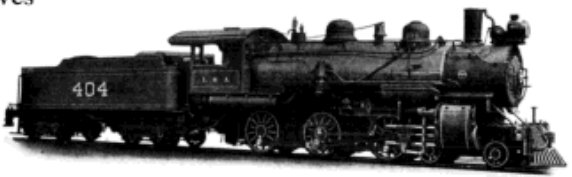
Six Coupled Locomotives

With Four-Wheeled Front Trucks

Ten-Wheeled Type

Gauge 4 Feet 8½ Inches

With Fireboxes Over Rear Driving Axles and Separate Tenders



Class 10-D Type 4-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water Gals. & Coal Kilos	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or 1/2 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matureness	10–26 D	16 x 24	56	180	13,780	75,000	97,000	10′ 0″	20′ 1¾″	3000	1810	850	520	360	270	165	110	75
Maturer	10–28 D	17 x 24	56	180	18,950	82,000	105,000	11′ 0″	21′ 3″	3500	2045	960	585	410	305	190	125	85
Maturitart	10–30 D	18 x 24	56	180	21,240	95,000	121,000	11′ 4″	21′ 7″	4000	2300	1080	655	460	340	210	140	95
Maturorum	10–32 D	19 x 26	62	180	23,160	103,000	136,000	13′ 4″	24′ 6″	4500	2510	1175	715	495	370	225	150	100
Maturserat	10–34 D	20 x 26	62	180	25,670	117,000	150,000	13′ 6″	24′ 6″	5000	2760	1295	785	545	405	245	160	105
Matusteabas	10–36 D	21 x 26	62	180	28,300	130,000	165,000	14′ 10″	25′ 10″	5000	3050	1435	875	605	450	280	185	125
Matusteando	10–36 D	21 x 28	68	200	30,870	145,000	187,000	15′ 0″	26′ 2″	6000	3320	1560	945	655	490	300	195	130
Matustearan	10–38 D	22 x 28	62	200	37,160	160,000	203,000	13′ 10″	25′ 10″	6000	4020	1900	1165	815	595	385	260	180

Six Coupled Locomotives

With Four-Wheeled Front Trucks

Ten-Wheeled Type

Gauge 4 Feet 8½ Inches

With Wide Fireboxes Over Rear Driving Wheels and Separate Tenders

Class 10-D Type 4-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Water for Water Gas Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or 0.5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matuteros	10–32 D	19 x 26	62	180	23,160	105,000	145,000	13′ 6″	24′ 4″	4500	2485	1170	705	490	360	220	145	95
Matutes	10–34 D	20 x 26	62	180	25,670	114,000	158,000	14′ 0″	25′ 1″	5000	2760	1295	785	545	405	245	160	105
Matutinal	10–36 D	21 x 26	62	200	31,440	132,000	174,000	14′ 4″	25′11″	5000	3400	1605	980	685	515	320	215	150
Maturvi	10–36 D	21 x 28	62	200	33,850	142,000	187,000	14′ 4″	25′11″	6000	3600	1700	1040	725	540	335	225	155
Matvijl	10–38 D	22 x 28	63	200	36,570	160,000	205,000	14′ 6″	26′ 3″	6000	3975	1805	1145	800	600	375	255	175

Six Coupled Double-Ender

Six coupled double-ender locomotives, with two-wheeled front and rear trucks are suitable where it is desired to run forward or backward without turning, and where the weight required for adhesion cannot be carried on two pairs of wheels without overloading the rails.

The front truck is equalized with the front pair of driving wheels, and the rear truck with the middle and rear pairs of driving wheels. The front truck is center-bearing, the rear truck is side-bearing. Each truck has a swinging bolster and radius bar. This arrangement enables the engine to ride smoothly, and each wheel finds a bearing on the most uneven track. The middle pair of driving wheels has plain tires. A saddle tank covering the boiler or two rectangular tanks, as illustrated, can be used.

For longer runs a separate tender is provided. A large number of engines of this type have been built for logging roads, and in such service they are giving most satisfactory results.

Six Coupled Double-Ender Locomotives

Gauge 3 Feet or 1 Metre

With Two-Wheeled Front and Rear Trucks and Saddle or Side Tanks

Class 10¼-D — Type 2-6-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds		Wheel Base		Capacity Tank for Water Gals. Coal Tons	Load in Tons (2000 Pounds) of Cars and Ladles							
						On all Driving Wheels	Total	Of Driving Wheels	Total		On a Level	On a Grade per Mile of						
												26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Matweed	10–10¼ D	8 x 12	26	150	3,760	18,000	28,000	5′ 6″	15′ 0″	350	405	195	120	85	60	40	25	20
Matwork	10–11¼ D	9 x 14	30	150	4,810	22,000	34,000	6′ 5″	17′ 2″	400	525	250	155	105	80	50	35	25
Matze	10–12¼ D	9 x 16	33	160	5,340	26,000	39,000	6′ 10″	18′ 10″	450	580	275	170	120	90	55	40	30
Maubeche	10–14¼ D	10 x 16	33	160	6,590	33,000	46,000	7′ 6″	19′ 9″	500	715	340	210	150	110	70	50	35
Maubois	10–16¼ D	11 x 16	33	160	7,970	38,000	53,000	7′ 6″	20′ 10″	600	870	415	255	180	140	90	65	45
Maubouge	10–18¼ D	12 x 18	37	160	9,520	45,000	62,000	8′ 4″	22′ 6″	800	1040	495	310	220	165	105	75	55
Maucleve	10–20¼ D	13 x 18	37	160	11,170	52,000	71,000	8′ 6″	23′ 0″	900	1220	585	360	255	195	125	90	65
Maudiries	10–22¼ D	14 x18	37	160	12,970	58,000	80,000	9′ 0″	21′ 4″	1000	1415	675	420	295	225	145	100	75
Maudiront	10–24¼ D	15 x18	37	160	14,880	66,000	90,000	9′ 0″	22′ 6″	1200	1625	775	480	340	260	170	120	90

Six Coupled Double-Ender Locomotives

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Rear Trucks and Saddle or Side Tanks

Class 10¼-D Type 2-6-2

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Drivers Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water 8½-lb. gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 20.4 ft. or ½ %	42.3 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	126.4 ft. or 2½ %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maudissais	10–18½ D	12 x 18	37	160	9,520	43,000	62,000	8′ 10″	21′ 6″	800	1040	495	305	215	165	105	75	55
Maudissiez	10–20¼ D	13 x 20	42	160	10,930	50,000	72,000	9′ 0″	23′ 6″	900	1195	570	355	250	190	125	85	65
Maudissons	10–22½ D	14 x 22	44	160	13,320	60,000	84,000	9′ 0″	23′ 6″	1000	1460	695	435	305	235	155	110	80
Maudites	10–24¼ D	15 x 22	44	160	15,300	72,000	94,000	9′ 0″	24′ 8″	1200	1670	800	500	355	270	175	125	90
Maudlin	10–26¼ D	16 x 24	44	170	20,170	85,000	108,000	10′ 0″	25′ 9″	1400	2120	1015	635	450	345	230	165	125
Maudlinism	10–28¼ D	17 x 24	44	170	22,780	101,000	140,000	10′ 0″	26′ 6″	1700	2445	1170	725	515	395	255	180	135
Mauseran	10–30¼ D	18 x 24	46	180	25,870	114,000	164,000	10′ 0″	25′ 3″	1900	2825	1355	840	595	455	295	210	155
Mauserassel	10–30¼ D	18 x 26	62	200	23,100	130,000	190,000	14′ 0″	31′ 8″	3000	2500	1185	730	510	385	240	165	115

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Pacific Type

Six Coupled with Four-Wheeled Front and Two-Wheeled Rear Trucks

Type 4-6-2

The Pacific type is a high-powered design, having three pairs of driving wheels grouped under the waist of the boiler, a four-wheeled front truck, and a two-wheeled rear truck.

The firebox is placed back of the rear driving wheels, and the overhanging weight is supported by the rear truck. The result is a locomotive having ample adhesion weight and tractive force, together with a boiler of high steaming capacity, thus enabling the engine to haul heavy loads at sustained speeds.

The rear trucks can be designed with either inside or outside journals. They are equipped with radius bars, and are equalized with the driving wheels; by which means a flexible wheel base is obtained.

Pacific type locomotives are specially suitable for heavy, fast passenger service, and are also proving successful in fast freight service.

Six Coupled Locomotives

Pacific Type

Gauge 3 Feet or 1 Metre

With Four-Wheeled Front and Two-Wheeled Rear Trucks and Separate Tenders

Class 12¼-D Type 4-6-2

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: On Driving Wheels	Wheel Base: Total	Capacity Tender Water 8½ Lb. Coal Pounds	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per M. of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	132.4 ft. or 2½ %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mauerraute	12–24¼ D	15 x 20	42	160	14,570	60,000	90,000	8′ 4″	23′ 0″	2500	1520	715	430	300	225	135	90	60
Mauerries	12–26¼ D	16 x 20	42	160	16,580	66,000	98,000	8′ 6″	24′ 0″	2800	1675	785	475	330	245	150	100	65
Mauerritze	12–28¼ D	17 x 20	44	160	17,870	71,000	106,000	8′ 8″	24′ 2″	3000	1800	845	515	355	265	160	105	70
Mauersalz	12–30¼ D	18 x 20	44	160	20,020	78,000	116,000	9′ 0″	24′ 10″	4300	1975	925	560	390	285	175	115	75

Six Coupled Locomotives

Pacific Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Front and Two Wheeled Rear Trucks and Separate Tenders

Class 12¼-D

Type 4-6-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds			Wheel Base			Capacity Tender for Water 8½ Tons of Coal	Load in Tons (2000 Pounds) of Cars and Lading							
						On all Driving Wheels		Total	Of Driving Wheels		Total		On a Grade per Mile of							
													On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mauerspalt	12-30½ D	18 x 26	62	200	23,100	100,000		158,000	10′ 10″		28′ 9″	4500	2400	1155	700	485	355	215	135	90
Mauerstatt	12-32¾ D	19 x 26	62	200	25,740	107,000		167,000	11′ 0″		29′ 6″	5000	2715	1265	765	525	390	235	150	95
Mauerstein	12-34¼ D	20 x 26	68	200	26,000	118,000		184,000	12′ 0″		30′ 9″	5500	2790	1295	780	535	395	235	150	95
Mauerwall	12-36¾ D	21 x 28	68	190	29,330	125,000		193,000	12′ 0″		31′ 6″	6000	3160	1470	890	615	455	275	175	115
Mauerwerk	12-38¾ D	22 x 28	68	190	32,180	134,000		219,000	12′ 6″		32′ 10″	6000	3300	1580	950	660	485	290	185	120
Mausgrapen	12-38¾ D	22 x 28	73	200	31,550	144,000		231,000	12′ 10″		32′ 8″	7000	3365	1565	935	645	470	280	175	110
Mausgred	12-40¾ D	23 x 28	73	200	34,500	151,000		235,000	13′ 0″		34′ 0″	7000	3710	1730	1045	720	530	320	205	130
Mausgreens	12-42¾ D	24 x 28	73	190	35,080	157,000		247,000	13′ 0″		34′ 1″	7000	3840	1785	1080	745	550	330	210	135
Mausgreens	12-44¼ D	25 x 28	73	190	38,730	166,000		260,000	13′ 0″		34′ 1″	8000	4165	1940	1170	810	595	360	230	145
Mausgring	12-46¼ D	26 x 28	73	190	41,900	174,000		271,000	13′ 0″		34′ 1″	8000	4430	2060	1245	865	635	385	250	160
Maulbeere	12-48¼ D	27 x28	73	185	43,980	182,000		282,000	13′ 0″		34′ 1″	8000	4615	2160	1310	900	670	410	265	175
Maulens	12-48¾ D	27 x 28	73	200	47,500	192,000		302,000	13′ 8″		36′ 0″	9000	4850	2280	1385	960	710	435	280	185

Eight Coupled Switching

Type 0-8-0

This type of locomotive is suitable for heavy switching service, where the weight necessary for adhesion is too great to be safely carried on three pairs of wheels. Such requirements are found in hump yards, where locomotives of high tractive force are needed to push trains over the hump; also in heavy terminal and transfer service, and to a lesser extent in industrial work, or for general switching purposes where the engines must operate on light tracks. Separate tenders are preferably used with locomotives of this type.

Eight Coupled Locomotives

Gauge 4 Feet 8½ Inches

With Separate Tenders

Class 8-E Type 0-8-0

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender for Water Gals. for Coal Tons	Load in Tons (2000 Pounds of Cars and Lading) On a Level	On a Grade per Mile of 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maulerin	8-34 E	20 x 26	50	200	35,370	144,000	14' 0"	4500	3700	1770	1095	775	590	385	270	200
Maulesel	8-36 E	21 x 28	51	200	41,160	165,000	15' 4"	5000	4235	2025	1250	890	675	435	305	225
Maulfaeule	8-38 E	22 x 28	51	200	45,170	194,000	15' 6"	5500	4950	2355	1465	1035	785	510	360	265
Maulfreund	8-40 E	23½ x 32	57	200	52,700	224,000	16' 0"	6000	5750	2755	1710	1210	925	600	425	315

Consolidation Type

Eight Coupled with Two-Wheeled Front Truck

Type 2-8-0

The Consolidation type has four pairs of driving wheels and a two-wheeled front truck, and is specially suitable for heavy freight service. A large percentage of the total weight of the locomotive is available for adhesion; and as this weight is distributed over four pairs of driving wheels, a high tractive force can be developed without using excessive wheel loads. The front and rear pairs of driving wheels are flanged, while the intermediate pairs have either plain or flanged tires according to service requirements. The truck has a swinging bolster and radius bar.

Ordinarily in this type a long firebox is placed over the rear driving axle, and is especially adapted for burning coal. In some instances such engines have been satisfactorily used for burning wood. A plan for narrow gauge locomotives is also presented in which a deep firebox overhangs the rear driving wheels. The driving wheel base is shorter than in engines of the first mentioned type, because the wheels are placed as close together as possible under the waist of the boiler. In this design there is ample depth between the tubes and the grate for the combustion of wood, while the same plan answers equally well for bituminous coal.

The heaviest classes of standard gauge engines are preferably built with the grate placed above the rear pair of driving wheels. This plan provides sufficient grate area, without using a furnace of excessive length. The tables include a series of engines so arranged.

Eight Coupled Locomotives

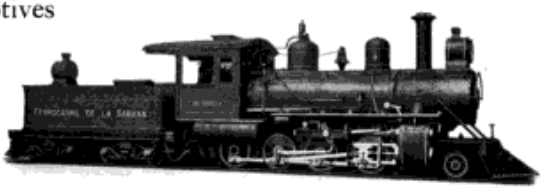
With Two-Wheeled Front Trucks

Consolidation Type

Gauge 3 Feet or 1 Metre

With Fireboxes Over Rear Axles and Separate Tenders

Class 10-E Type 2-8-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender Water Gals.	Capacity Tender Coal Lbs.	Load in Tons (2000 Pounds) of Cars and Locos: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maulfrowan	10-16 E	11 x 16	33	160	7,970	36,000	42,000	9′ 0″	14′ 4″	1600	860	400	245	170	130	80	50	35	
Maulheld	10-18 E	12 x 16	33	160	9,490	42,000	50,000	10′ 0″	15′ 6″	1800	1020	480	295	205	150	95	60	45	
Maulknmpf	10-20 E	13 x 18	36	160	11,450	49,000	57,000	11′ 2″	17′ 8″	2000	1250	590	360	250	190	120	80	55	
Maulkdemme	10-22 E	14 x 18	36	160	13,350	59,000	67,000	11′ 4″	17′ 10″	2200	1450	680	420	295	220	140	95	65	
Maulknebel	10-24 E	15 x 18	37	160	14,880	65,000	74,000	11′ 6″	18′ 0″	2400	1620	765	470	330	245	155	105	75	
Maulkorb	10-24½ E	15 x 20	37	160	16,540	68,000	77,000	11′ 9″	18′ 7″	2500	1735	825	505	355	270	170	115	85	
Maullabois	10-26 E	16 x 20	40	160	17,400	75,000	84,000	12′ 6″	19′ 4″	2800	1800	895	550	385	290	185	125	90	
Maullada	10-28 E	17 x 20	42	160	18,720	83,000	93,000	13′ 0″	20′ 0″	3000	2030	960	590	415	310	195	135	95	

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Eight Coupled Locomotives

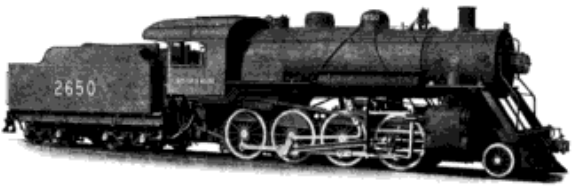
With Two-Wheeled Front Trucks

Consolidation Type

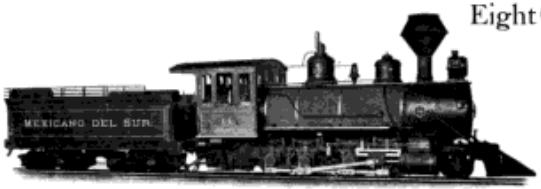
Gauge 4 Feet 8½ Inches

With Wide Fireboxes over Driving Wheels and Separate Tenders

Class 10-E Type 2-8-0



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water Gals. Gls. gallons	Coal Tons	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: Level	26.4 ft. or 2 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maulvoll	10–35 E	21 x 28	54	180	35,000	149,000	169,000	15′ 4″	23′ 8″	5500	3810	1800	1110	780	590	375	255	185
Maulwerk	10–38 E	22 x 28	56	180	37,000	162,000	180,000	15′ 4″	23′ 11″	6000	4015	1905	1170	820	620	390	265	190
Maulwurfes	10–38 E	22 x 28	56	200	41,140	175,000	196,000	16′ 2″	25′ 1″	6000	4470	2125	1310	925	700	445	310	220
Maumletdar	10–38 E	22 x 30	57	200	43,300	180,000	200,000	16′ 0″	24′ 7″	7000	4615	2180	1340	945	710	450	310	220
Maunage	10–40 E	23 x 30	57	200	47,400	193,000	215,000	16′ 0″	24′ 8″	7000	4960	2370	1440	1015	770	490	340	240
Maunea	10–42 E	24 x 32	63	200	49,740	210,000	234,000	17′ 0″	26′ 0″	7000	5370	2555	1575	1110	840	535	370	265



Eight Coupled Locomotives

With Two-Wheeled Front Trucks

Consolidation Type

Gauge 3 Feet or 1 Metre

With Deep Overhanging Fireboxes and Separate Tenders

Class 10-E Type 2-8-0

CODE WORD	Class		Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water Gallons	Load in Tons (2000 Pounds) of Cars and Locomotive: On a Level	Load in Tons (2000 Pounds) of Cars and Locomotive: On a Grade per Mile of: 26.4 ft. or 0.5 %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maunderer	10-20	E	13 x 18	36	160	11,450	50,000	56,000	10' 4"	16' 1"	2000	1250	590	360	250	190	120	80	55
Maupiteux	10-22	E	14 x 18	36	160	13,350	58,000	66,000	10' 4"	17' 0"	2200	1450	680	420	295	220	140	95	65
Maurecat	10-24	E	15 x 18	37	160	14,880	66,000	73,000	10' 9"	17' 3"	2400	1610	765	470	330	250	155	105	75
Maurerish	10-24½	E	15 x 20	37	160	16,540	72,000	80,000	10' 9"	17' 3"	2500	1800	850	525	370	275	175	120	85
Maurerlade	10-26	E	16 x 20	37	160	18,820	80,000	89,000	11' 6"	18' 0"	2800	2040	970	600	420	315	200	140	100
Mauresque	10-28	E	17 x 20	40	170	20,900	91,000	98,000	11' 8"	18' 4"	3000	2275	1080	665	470	355	225	155	110
Mauretania	10-30	E	18 x 22	42	170	24,320	100,000	109,000	12' 0"	19' 5"	3500	2560	1215	750	530	400	255	175	125
Maurevel	10-32	E	19 x 22	40	180	30,380	121,000	131,000	11' 8"	19' 6"	4000	3100	1475	910	640	485	310	215	155

Mikado Type

Eight Coupled with Two-Wheeled Front and Rear Trucks

Type 2-8-2 

This type of locomotive is a development of the Consolidation. The two-wheeled rear truck permits the use of a wide and deep firebox, which is placed back of the driving wheels. This increases the steaming capacity in proportion to the adhesion, making these engines specially suitable for heavy freight service, where long, hard runs must be made. Owing to the liberal space available for the firebox, these locomotives can readily be designed to use inferior grades of fuel; and on several roads they are burning lignite successfully and economically.

Mikado type locomotives, having a truck at each end, are able to back into sharp curves and switches without danger of derailment; and for this reason are proving highly successful in heavy service on logging and industrial railways. This class of work frequently requires heavy hauling in addition to switching; and the combination of excellent steaming and tracking qualities, as found in the Mikado type, makes it particularly suitable for such service.

Eight Coupled Locomotives

Mikado Type

Gauge 3 Feet or 1 Metre

With Two-Wheeled Front and Rear Trucks and Separate Tenders

Class 12¼-E — Type 2-8-2

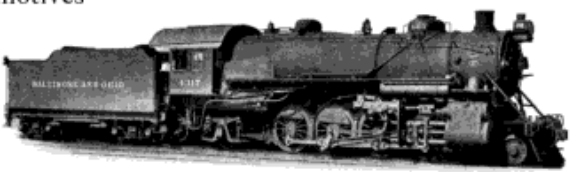
CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water Gals.	Capacity Tender for Fuel Lbs.	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 20.4 ft. or 1 %	32.8 ft. or 1 %	70.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mauricaud	12–24¼ E	15 x 20	37	160	16,540	66,000	86,000	10′ 8″	23′ 8″	2500	1685	790	485	340	255	160	105	75
Mauricorum	12–26¼ E	16 x 20	37	160	18,820	78,000	100,000	10′ 8″	23′ 8″	2800	1990	940	575	405	300	190	130	90
Mauricus	12–28¼ E	17 x 22	42	170	21,870	92,000	118,000	11′ 0″	24′ 2″	3000	2350	1110	680	480	360	230	155	110
Maurilio	12–30¼ E	18 x 22	42	170	24,520	102,000	130,000	11′ 6″	25′ 2″	3500	2610	1235	755	530	400	250	170	120

Eight Coupled Locomotives

Mikado Type

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Rear Trucks and Separate Tenders



Class 12¼-E Type 2-8-2

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender Water 8½ cb. inches	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maurisch	12–32½ E	19 x 26	48	180	29,920	125,000	163,000	13′ 0″	27′ 10″	5000	3200	1505	920	645	480	300	205	140
Mauritane	12–34½ E	20 x 26	48	180	33,170	140,000	182,000	13′ 1″	28′ 0″	5000	3570	1685	930	720	540	340	230	160
Maurocorni	12–36½ E	21 x 28	51	180	37,040	155,000	200,000	14′ 0″	31′ 0″	6000	3930	1845	1140	800	600	375	255	175
Maurum	12–38½ E	22 x 28	51	180	40,660	171,000	218,000	14′ 0″	31′ 1″	9000	4365	2060	1265	885	665	420	285	205
Maurusin	12–40½ E	23 x 28	51	180	44,440	184,000	236,000	14′ 0″	31′ 10″	7000	4700	2220	1355	950	710	450	300	210
Maurusium	12–42½ E	24 x 30	57	180	46,380	198,000	254,000	15′ 6″	33′ 0″	7000	5045	2375	1460	1025	770	485	330	235
Mauseholz	12–44½ E	25 x 30	57	180	50,320	208,000	268,000	16′ 0″	34′ 8″	8000	5320	2510	1540	1080	810	510	345	245
Mauserei	12–46½ E	26 x 32	63	180	52,540	221,000	285,000	16′ 9″	35′ 0″	8000	5630	2670	1640	1150	860	535	370	260
Mauserzeit	12–48½ E	27 x 30	63	185	54,580	230,000	304,000	16′ 6″	35′ 0″	8000	5880	2770	1700	1190	795	565	385	270
Mausestill	12–50½ E	28 x 30	63	180	57,120	238,000	320,000	17′ 0″	35′ 2″	9000	6080	2865	1755	1230	920	580	390	275

Mountain Type

Eight Coupled with Four-Wheeled Front and Two-Wheeled Rear Trucks

Type 4-8-2 

This type is especially suitable for heavy express passenger service on steep grades, where the necessary tractive force cannot be developed by a six coupled locomotive. The four-wheeled front truck provides excellent guiding qualities, and the driving-wheels can be made of sufficient diameter for fast running. The boiler is of large diameter, and has a deep, wide firebox, with ample grate area and furnace volume. This provides high steaming capacity in proportion to adhesion; an essential feature in heavy passenger service.

These locomotives are also suitable for fast freight service on divisions having comparatively light grades, where heavy trains must be moved at fairly high speeds.

Eight Coupled Locomotives

Mountain Type

Gauge 4 Feet 8½ Inches

With Four-Wheeled Front and Two-Wheeled Rear Trucks and Separate Tenders

Class 14¼-E Type 4-8-2

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter of Drivers Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Rigid Driving Wheels	Wheel Base: Total	Capacity of Tender Pounds of Coal	Capacity of Tender Pounds of Water	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mausey	14–48¼ E	27 x 28	63	170	46,820	210,000	292,000	16′ 6″	37′ 3″	8000	5060	2375	1480	1010	750	465	305	210
Mausfot	14–48¼ E	27 x 28	69	190	47,800	210,000	315,000	18′ 0″	38′ 11″	8000	5165	2415	1475	1025	765	470	310	210
Mausfell	14–50¼ E	28 x 28	69	200	54,100	220,000	330,000	18′ 0″	39′ 5″	8000	5585	2630	1605	1115	835	515	345	235
Mausfum	14–50¼ E	28 x 30	63	190	60,300	240,000	340,000	17′ 0″	38′ 0″	9000	6100	2885	1765	1235	925	575	385	270
Maushoe	14–52½ E	29 x 30	63	190	64,750	260,000	362,000	17′ 0″	38′ 6″	9000	6000	3135	1915	1340	1010	635	430	300

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Ten Coupled Locomotives

Santa Fe Type

Gauge 4 Feet 8½ Inches

With Two-Wheeled Front and Rear Trucks and Separate Tenders

Class 14¼-F Type 2-10-2

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water 1000 gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mausoleums	14–36½ F	21 x 24	44	180	36,800	154,000	192,000	16′ 0″	31′ 0″	5000	3945	1890	1150	805	610	385	295	190
Mausoli	14–38½ F	22 x 26	48	180	40,120	168,000	210,000	17′ 4″	33′ 2″	6000	4300	2035	1240	875	655	415	285	200
Mausoude	14–40¾ F	23 x 26	48	180	43,840	182,000	226,000	17′ 4″	33′ 2″	6000	4660	2205	1355	950	715	455	310	220
Maussolles	14–42½ F	24 x 28	51	180	48,380	200,000	248,000	18′ 0″	35′ 2″	7000	5123	2415	1485	1045	785	495	340	240
Mauthamt	14–44½ F	25 x 28	51	180	52,500	214,000	266,000	18′ 0″	35′ 2″	7000	5490	2595	1595	1120	845	535	365	260
Mauthbar	14–46½ F	26 x 28	51	180	56,800	228,000	280,000	18′ 0″	35′ 8″	8000	5875	2780	1710	1200	900	570	390	280
Mauthfrei	14–48½ F	27 x 30	57	180	58,720	244,000	304,000	20′ 0″	38′ 8″	8000	6250	2955	1815	1275	965	610	420	300
Mauthhaus	14–50½ F	28 x 30	57	180	63,140	260,000	324,000	20′ 0″	38′ 8″	9000	6650	3150	1930	1360	1025	650	445	315
Mauvaises	14–52½ F	29 x 30	57	180	67,700	276,000	344,000	20′ 0″	39′ 0″	9000	7073	3350	2060	1445	1095	695	480	340
Mauve	14–54½ F	30 x 32	60	180	73,430	302,000	378,000	20′ 0″	39′ 8″	10000	7735	3665	2255	1585	1195	755	520	370
Mauveap	14–54½ F	30 x 32	60	200	81,600	333,000	404,000	21′ 4″	40′ 7″	10000	8550	4070	2500	1770	1340	855	590	430
Mauveaux	14–56½ F	31 x 32	63	200	83,000	337,000	417,000	22′ 0″	41′ 3″	10000	8650	4115	2540	1790	1355	865	600	435

Mallet Articulated Locomotives

The Mallet articulated type employs compound cylinders and two groups of driving wheels. The rear group is driven by the high pressure cylinders and the forward group by the low pressure. The rear frames are held in rigid alinement with the boiler, while the front frames can swing about a hinge pin located on the center line of the engine between the high-pressure cylinders. The forward group of wheels thus constitutes a truck, giving sufficient flexibility to the wheel-base to enable the locomotive to easily traverse sharp curves. The receiver pipe between the high and low pressure cylinders, and the exhaust pipe from the low-pressure cylinders to the smoke-box, are necessarily provided with flexible joints. These pipes carry low pressure steam only, hence the joints can be kept tight without difficulty.

Superheaters have been applied to a large number of Mallet locomotives, with most satisfactory results. The heater is placed between the throttle and the high pressure cylinders, and sufficient superheat is obtained to avoid difficulties due to condensation in the low pressure cylinders.

Mallet locomotives are specially suitable for pushing service, and for road service where grades are steep, speeds moderate, and operating conditions unusually severe. They are also fitted for switching service in hump yards, where heavy trains must be pushed up one side of the hump before being classified.

The following pages contain illustrations and data covering the principal designs of Mallet locomotives. Modifications of the wheel arrangements shown can, if necessary, be made to suit special conditions.

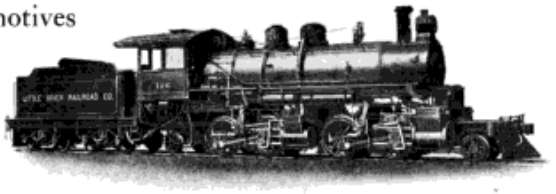
Mallet Articulated Locomotives

Gauge 4 Feet 8½ Inches

With Two Pairs of Driving Wheels in Each Group

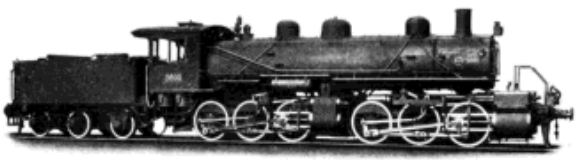
Two-Wheeled Front and Rear Trucks and Separate Tenders

Class 12¼-CC Type 2-4-4-2



CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds		Wheel Base		Capacity Tender Water Gals.	Coal Tons	Load in Tons (2000 Pounds) of Cars and Lading						
						On all Driving Wheels	Total	Of Driving Wheels	Total			On a Grade per Mile of						
												On a Level	21.4 ft. or ¼ %	32.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mauveine	12–$\frac{19}{32}$¼ CC	H.P. 12½ x 18 L.P. 19 x 18	37	200	18,200	82,000	106,000	16′ 2″	28′ 0″	3000	1970	925	565	395	295	185	120	85
Mavali	12–$\frac{20}{34}$¼ CC	H.P. 13 x 20 L.P. 20 x 20	40	200	20,250	92,000	116,000	17′ 6″	30′ 8″	4000	2190	1025	825	435	325	200	130	90
Mavioso	12–$\frac{24}{40}$¼ CC	H.P. 15 x 22 L.P. 23 x 22	44	200	27,000	120,000	150,000	19′ 0″	33′ 5″	4500	2935	1380	845	590	440	275	185	130
Mavolo	12–$\frac{28}{46}$¼ CC	H.P. 17 x 24 L.P. 26 x 24	48	200	34,700	150,000	188,000	20′ 6″	35′ 6″	5000	3775	1780	1095	780	580	365	250	175
Mavolunt	12–$\frac{32}{52}$¼ CC	H.P. 19 x 26 L.P. 29 x 26	51	200	44,200	188,000	230,000	22′ 2″	38′ 4″	6000	4800	2275	1405	985	745	475	325	235

Mallet Articulated Locomotives



Gauge 3 Feet or 1 Metre

With Three Pairs of Driving Wheels in Each Group and Separate Tenders

Class 12-DD Type 0-6-6-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base Total Engine	Capacity Tender for Water 8½ lb. Coal	Load in Tons (2000 Pounds) of Cars and Ladle: On a Level	On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mavorcio	12-$\frac{10}{32}$ DD	H.P. 12½ x 20 L.P. 19 x 20	37	200	20,200	100,000	20′ 4″	3000	2205	1045	640	450	340	215	150	105
Mavortia	12-$\frac{22}{38}$ DD	H.P. 14½ x 20 L.P. 22 x 20	37	200	27,300	118,000	20′ 11″	3500	2985	1420	880	625	475	305	215	155
Mavortium	12-$\frac{26}{44}$ DD	H.P. 16 x 20 L.P. 25 x 20	37	200	33,200	144,000	21′ 4″	4000	3633	1730	1070	760	575	375	285	195

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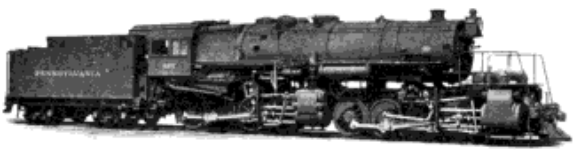
Mallet Articulated Locomotives

Gauge 4 Feet 8½ Inches

With Three Pairs of Driving Wheels
in Each Group
Two-Wheeled Front and Rear
Trucks and Separate Tenders

Class 16¼-DD Type 2-6-6-2

CODE WORD	Class	Cylinders, Diam. Stroke Inches	Diameter of Driving Wheels Inches	Boiler Pressure per Square Inch	Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender for Water kilo-lit. gallons	Load in Tons (2000 Pounds) of Cars and Ladles: On a Level	Load in Tons (2000 Pounds) of Cars and Ladles: On a Grade per Mile of: 26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Maximilian	16-$\frac{20}{34}$¼ DD	H.P. 13 x 20 L.P. 20 x 20	57	200	21,900	105,000	124,000	20′ 6″	32′ 6″	4000	2360	1120	680	475	355	220	145	100
Maximist	16-$\frac{24}{40}$¼ DD	H.P. 15 x 22 L.P. 23 x 22	49	200	29,700	134,000	156,000	22′ 4″	35′ 0″	5000	3215	1520	930	650	490	305	205	145
Maximize	16-$\frac{28}{46}$¼ DD	H.P. 17 x 24 L.P. 26 x 24	44	200	37,800	168,000	192,000	24′ 10″	39′ 0″	5500	4120	1950	1200	840	635	405	275	200
Maximizing	16-$\frac{30}{50}$¼ DD	H.P. 18 x 26 L.P. 28 x 26	48	200	42,200	192,000	220,000	26′ 6″	40′ 10″	6000	4600	2170	1340	940	710	450	310	220
Maximopere	16-$\frac{34}{56}$¼ DD	H.P. 20 x 28 L.P. 31 x 28	51	200	52,800	240,000	278,000	27′ 8″	42′ 10″	7000	5750	2730	1680	1180	890	570	390	280
Maximorum	16-$\frac{36}{58}$¼ DD	H.P. 21 x 30 L.P. 32 x 30	55	210	60,800	278,000	316,000	28′ 11″	43′ 9″	7000	6635	3140	1930	1370	1035	665	460	330
Maximum	16-$\frac{37}{60}$¼ DD	H.P. 21½ x 32 L.P. 33 x 32	55	200	64,800	296,000	336,000	29′ 8″	45′ 4″	8000	7065	3350	2060	1450	1100	705	490	350
Maxyer	16-$\frac{40}{64}$¼ DD	H.P. 23 x 32 L.P. 35 x 32	55	200	74,000	314,000	360,000	29′ 8″	45′ 4″	8000	8090	3850	2380	1690	1280	830	580	425
Mayada	16-$\frac{42}{68}$¼ DD	H.P. 24 x 32 L.P. 37 x 32	57	200	77,500	334,000	384,000	30′ 4″	46′ 4″	8000	8485	4125	2600	1765	1345	895	605	445



Mallet Articulated Locomotives

Gauge 4 Feet 8½ Inches

With Four Pairs of Driving Wheels in Each Group and Separate Tenders

Class 16-EE Type 0-8-8-0

CODE WORD	Class	Cylinders High Pressure Inches	Low Pressure Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Capacity Tender for Water Gallons	Load in Tons (2000 Pounds) of Cars and Lading							
										on a Level	On a Grade per Mile of						
											26.4 ft. or ¼ %	52.8 ft. or ½ %	79.2 ft. or ¾ %	105.6 ft. or 1 %	158.4 ft. or 1½ %	211.2 ft. or 2 %	264.0 ft. or 2½ %
Mayeux	16–$\frac{34}{56}$ EE	H.P. 29 x 28	L.P. 31 x 28	51	200	52,800	260,000	35′ 10″	7000	5760	2730	1680	1185	900	575	400	290
Mayhap	16–$\frac{37}{60}$ EE	H.P. 21½ x 32	L.P. 33 x 32	55	200	64,800	316,000	38′ 6″	8000	7075	3350	2070	1460	1105	710	495	360
Mayhem	16–$\frac{40}{64}$ EE	H.P. 23 x 32	L.P. 35 x 32	55	200	73,900	350,000	38′ 6″	8000	8080	3845	2385	1685	1285	830	585	430
Mayoralia	16–$\frac{44}{72}$ EE	H.P. 24½ x 32	L.P. 38 x 32	57	200	81,000	390,000	39′ 6″	8000	8860	4225	2625	1855	1415	915	645	475
Mayorazgo	16–$\frac{46}{74}$ EE	H.P. 26 x 32	L.P. 40 x 32	57	200	91,200	435,000	39′ 6″	9000	10000	4765	2945	2095	1595	1035	730	540

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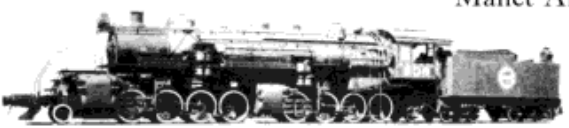
Mallet Articulated Locomotives

Gauge 4 Feet 8½ Inches

With Four Pairs of Driving Wheels in Each Group
Two-Wheeled Front and Rear Trucks and Separate Tenders



Class 20¼-EE Type 2-8-8-2

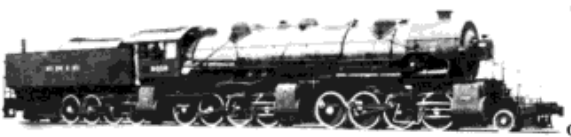
CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tender Tank Gallons	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of 26.4 ft. or ½ %	32.8 ft. or 1 %	39.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mayormente	20-28/46 ¼ EE	H.P. 17 x 26 L.P. 26 x 26	48	200	37,600	178,000	204,000	33′ 10″	47′ 10″	5500	4090	1925	1685	835	625	395	270	190
Maythorn	20-32/52 ¼ EE	H.P. 19 x 28 L.P. 29 x 28	51	200	47,600	224,000	256,000	35′ 10″	50′ 6″	6000	5200	2460	1510	1065	800	510	350	255
Mayusculs	20-34/56 ¼ EE	H.P. 20 x 28 L.P. 31 x 28	51	200	52,800	250,000	286,000	35′ 10″	50′ 6″	7000	5750	2715	1665	1170	885	560	385	275
Mazaca	20-37/60 ¼ EE	H.P. 21½ x 32 L.P. 33 x 32	55	200	64,800	300,000	342,000	38′ 6″	54′ 0″	8000	7065	3340	2090	1450	1095	700	485	350
Mazacibus	20-40/64 ¼ EE	H.P. 23 x 32 L.P. 35 x 32	55	200	73,900	332,000	380,000	38′ 6″	54′ 0″	8000	8065	3830	2370	1670	1270	815	570	415
Mazacorum	20-43/70 ¼ EE	H.P. 24½ x 32 L.P. 38 x 32	57	200	81,000	366,000	420,000	39′ 6″	55′ 6″	8000	8850	4210	2610	1840	1400	900	630	460
Mazacote	20-46/74 ¼ EE	H.P. 26 x 32 L.P. 40 x 32	57	200	91,200	405,000	465,000	39′ 6″	55′ 6″	9000	9975	4750	2930	2080	1580	1020	715	525
Mazaeum	20-50/78 ¼ EE	H.P. 28 x 32 L.P. 42 x 32	57	200	105,500	460,000	520,000	41′ 2″	56′ 10″	10000	11560	5490	3400	2410	1830	1190	840	615

Triple Articulated Compound Locomotives

This type is a development of the Mallet. It has three groups of driving wheels, two placed under the boiler and the third under the tender. The cylinders of the middle group of wheels are the high-pressure, and these exhaust simultaneously into the front and back cylinders. All the cylinders are of the same size, and are cast from the same pattern; hence the ratio of compounding is as one to two. The exhaust from the front cylinders is utilized to create a draft for the fire, while that from the rear cylinders, after passing through a feed-water heater, is discharged up a pipe at the rear of the tank. The boiler is held in alinement with the frames of the middle group of wheels, and the front and rear frames are hinged to the middle frames. With this construction these locomotives traverse curves without difficulty. Front and rear trucks have been applied to all the triple locomotives thus far built.

These engines, with a large percentage of total weight on driving wheels, are especially suitable for heavy pushing service where high tractive force must be developed at comparatively slow speeds.

Triple Articulated Compound Locomotives



Gauge 4 Feet 8½ Inches

With Four Pairs of Driving Wheels in Each Group and Front and Rear Trucks

Classes 28¼-EEE and 30¼-EEE

Types 2-8-8-8-2 and 2-8-8-8-4

CODE WORD	Class	Cylinders Diameter and Stroke Inches	Diameter Driving Wheels Inches	Boiler Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds: On all Driving Wheels	Weight in Working Order Pounds: Total	Wheel Base: Of Driving Wheels	Wheel Base: Total	Capacity Tank for Water 9½-in. radius	Load in Tons (2000 Pounds) of Cars and Lading: On a Level	Load in Tons (2000 Pounds) of Cars and Lading: On a Grade per Mile of: 26.4 ft. or ¼ %	52.8 ft. or ½ %	79.2 ft. or ¾ %	105.6 ft. or 1 %	158.4 ft. or 1½ %	211.2 ft. or 2 %	264.0 ft. or 2½ %
Mazitus	28-54-54-54 ¼ EEE	(6) 30 x 28	51	210	126,400	612,000	689,000	64′ 11″	82′ 7″	9000	13875	6085	4175	2985	2295	1515	1095	825
Mazmorras	28-62-62-62 ¼ EEE	(6) 34 x 32	58	210	153,000	720,000	805,000	71′ 6″	90′ 0″	9500	16785	8095	5045	3625	2775	1845	1335	1015
Mazologist	30-62-62-62 ¼ EEE*	(6) 34 x 32	56	215	160,300	726,000	844,000	67′ 7″	91′ 3″	13090	18300	8825	5515	3955	3045	2015	1465	1115
Mazology	28-66-66-66 ¼ EEE	(6) 36 x 32	63	210	160,000	766,000	860,000	71′ 6″	91′ 0″	11600	17570	8470	5280	3780	2900	1920	1390	1050

* This class is built with a two-wheeled front truck and four-wheeled rear truck. The other classes have two-wheeled trucks both front and rear.

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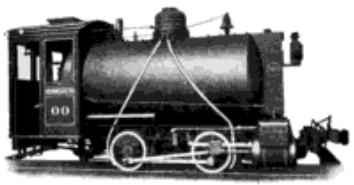


Four Coupled Fireless Locomotives

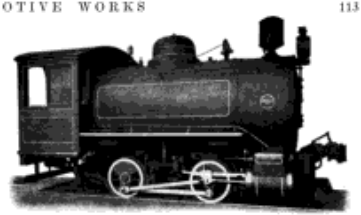
Gauge 2 Feet 6 Inches to 1 Metre

Class 4-C Type 0-4-0

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driver Wheels Inches	Cylinder Working Pressure Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Load in Tons (2000 Pounds) of Cars and Lading						
								On a Level	On a Grade per Mile of					
									26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mazombo	4–14 C	10 x 10	20	50	2,500	20,000	4′ 8″	270	125	75	55	40	25	15	10
Mazonado	4–18 C	12 x 12	24	50	3,600	26,000	4′ 8″	390	185	115	80	60	40	25	20
Mazone	4–20 C	13 x 12	24	50	4,220	30,000	5′ 0″	460	220	135	95	70	47	33	24
Mazonerias	4–22 C	14 x 12	24	50	4,900	35,000	5′ 6″	530	255	155	110	85	55	38	28
Mazonomi	4–24 C	13 x 14	28	50	5,630	40,000	6′ 0″	610	290	180	125	95	63	44	32
Mazonomos	4–26 C	16 x 16	32	50	6,400	50,000	6′ 6″	695	330	200	140	105	69	47	34

Four Coupled Fireless Locomotives

Gauge 4 Feet 8½ Inches



Class 4-C **Type 0-4-0**

CODE WORD	Class	Cylinders Diam. Stroke Inches	Diameter Driving Wheels Inches	Cylinder Working Pressure, Pounds per Square Inch	Rated Tractive Force Pounds	Weight in Working Order Pounds	Wheel Base	Load in Tons (2000 Pounds) of Cars and Lading							
									On a Grade per Mile of						
								On a Level	26.4 ft. or ½ %	52.8 ft. or 1 %	79.2 ft. or 1½ %	105.6 ft. or 2 %	158.4 ft. or 3 %	211.2 ft. or 4 %	264.0 ft. or 5 %
Mazomorum	4–20 C	13 x 14	28	50	4,220	32,000	5′ 0″	460	215	135	105	70	45	32	23
Mazopatis	4–22 C	14 x 14	28	50	4,900	37,000	5′ 0″	530	250	155	110	84	54	37	27
Mazoren	4–24 C	15 x 16	30	50	6,000	44,000	5′ 6″	650	310	190	135	100	65	46	33
Mazoreal	4–26 C	16 x 16	32	50	6,400	52,000	5′ 6″	695	325	200	140	105	68	47	33
Mazzacorto	4–28 C	17 x 16	32	50	7,220	58,000	6′ 0″	785	370	230	160	120	77	53	38
Mazzamurro	4–30 C	18 x 18	36	60	9,720	77,000	6′ 6″	1055	500	305	215	165	105	70	50
Mazzaroth	4–32 C	19 x 18	36	60	10,800	85,000	7′ 0″	1175	555	340	240	180	115	80	58
Mazzatello	4–34 C	20 x 18	36	60	12,000	95,000	7′ 6″	1300	615	380	265	200	129	89	64

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Matereula	8-16¾	C	4′ 8½″	52
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Mattigkeit	8-28	D 3′ 0″	69
Mattimando	8-26	D 4′ 8½″	70
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Mattinava	8-30	D 4′ 8½″	70
Mattinorai	8-32	D 4′ 8½″	70
Mattiola	8-34	D 4′ 8½″	70
Mattithiah	8-34	D 4′ 8½″	70
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Matuciae	8-20½	D 3′ 0″	73
Matulso	8-22½	D 3′ 0″	73
Matularum	10-18	D 3′ 0″	75
Matulis	10-20	D 3′ 0″	75
Maturabunt	10-22	D 3′ 0″	75
Maturacao	10-24	D 3′ 0″	75
Maturamus	10-26	D 3′ 0″	75
Maturandos	10-28	D 3′ 0″	75
Maturarent	10-20	D 4′ 8½″	76
Maturascit	10-22	D 4′ 8½″	76
Maturating	10-24	D 4′ 8½″	76
Maturatori	10-26	D 4′ 8½″	76
Maturavero	10-28	D 4′ 8½″	76
Maturely	10-30	D 4′ 8½″	76
Maturemen	10-32	D 4′ 8½″	76
Matureness	10-26	D 4′ 8½″	77
Maturer	10-28	D 4′ 8½″	77
Maturitaet	10-30	D 4′ 8½″	77
Maturorum	10-32	D 4′ 8½″	77
Maturscrat	10-34	D 4′ 8½″	77
Matutesbas	10-36	D 4′ 8½″	77
Matutsando	10-36	D 4′ 8½″	77
Matutsaran	10-38	D 4′ 8½″	77
Matuteros	10-32	D 4′ 8½″	78

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Code Word	Class	Gauge	Page
Mayhap	16-37/60 EE	4′ 8½″	106
Mayhem	16-40/64 EE	4′ 8½″	106
Mayoralis	16-44/72 EE	4′ 8½″	106
Mayoralty	16-46/74 EE	4′ 8½″	106
Mayordomia	18-34/56 EE	4′ 8½″	107
Mayoress	18-40/64 EE	4′ 8½″	107
Mayorgado	18-46/74 EE	4′ 8½″	107
Mayorlista	18-50/78 EE	4′ 8½″	107
Mayormente	20-28/46¾ EE	4′ 8½″	108
Maythorn	20-32/52⅜ EE	4′ 8½″	108
Mayuscula	20-34/56¾ EE	4′ 8½″	108
Mazaca	20-37/60¾ EE	4′ 8½″	108
Mazacite	20-40/64¾ EE	4′ 8½″	108
Mazacorum	20-43/70¾ EE	4′ 8½″	108
Mazacote	20-46/74¾ EE	4′ 8½″	108
Mazacum	20-50/78¾ EE	4′ 8½″	108
Mazitias 28-54-54-54¼	EEE	4′ 8½″	110
Mazmorra 28-62-62-62¼	EEE	4′ 8½″	110
Mazologist 30-62-62-62¼	EEE	4′ 8½″	110
Mazology 28-66-66-66¼	EEE	4′ 8½″	110
Mazombo	4-14 C	2′ 6″	112
Mazonado	4-18 C	2′ 6″	112
Mazone	4-20 C	2′ 6″	112
Mazonerism	4-22 C	2′ 6″	112
Mazonomi	4-24 C	2′ 6″	112
Mazonomos	4-26 C	2′ 6″	112
Mazonomum	4-20 C	4′ 8½″	113
Mazopatia	4-22 C	4′ 8½″	113
Mazores	4-24 C	4′ 8½″	113
Mazorral	4-26 C	4′ 8½″	113
Mazzacorto	4-28 C	4′ 8½″	113
Mazzamurro	4-30 C	4′ 8½″	113
Mazzaroth	4-32 C	4′ 8½″	113
Mazzatello	4-34 C	4′ 8½″	113

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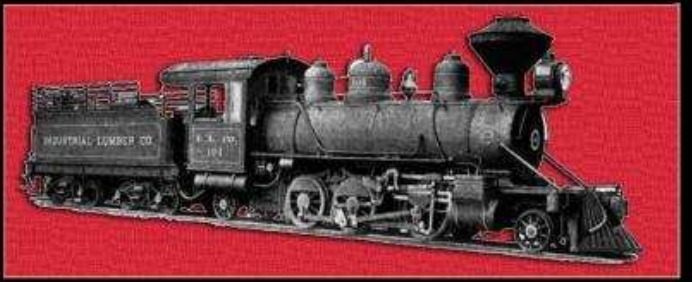
BALDWIN LOCOMOTIVE WORKS

Manufacturers of Locomotive Engines

Philadelphia, Pennsylvania



Founded in the early 1830's by Philadelphia jeweler Matthais Baldwin, the Baldwin Locomotive Works built a huge number of steam locomotives before ceasing production in 1949. These included the 4-4-0 American type, 2-8-2 Mikado and 2-8-0 Consolidation. This 1881 illustrated catalog shows the company's full line of steam locomotives, from switchers to the massive, triple-articulated compound model.

Catalogue of Locomotives • 1881

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