





**Distributed Power, Required TPC Data Formats  
Specific Input Values w/ Examples**

Required TPC Input Data by Vehicle Type	Program Default Value	Notes	Vehicle A	Vehicle B	Vehicle C	Vehicle D	Vehicle E	Vehicle F	Vehicle G	Vehicle H
C		Davis Equation used in Amtrak's TPC;								
W		5. Suggested maximum cant deficiency value.								
V		6. Power Factor curve at maximum propulsion in 2 mph increments								
A		7. Propulsion System Efficiency curve at maximum propulsion in 2 mph increments								

## Concentrated Power, Required TPC Data Formats Specific Input Values w/ Examples

Required TPC Input Data by Vehicle Type	Program Default Value	Notes	Vehicle A	Vehicle B	Vehicle C	Vehicle D	Vehicle E	Vehicle F	Vehicle G	Vehicle H
<b>Lead Vehicle Data (per unit, each unit to be accounted for):</b>			Populate the appropriate cells below for the corresponding vehicle above.							
Tractive effort curve, pounds force at 2 mph increments (note the data point position as previous or following MPH increment, or mid-point between) 12 kV 25 Hz Operation	-	See "Acela Tractive Effort" for example.								
Power Factor curve at 2 mph increments (note the data point position as previous or following MPH increment, or mid-point between) 12 kV 25 Hz Operation										
Propulsion System Efficiency curve at 2 mph increments (note the data point position as previous or following MPH increment, or mid-point between) 12 kV 25 Hz Operation										
Weight, tons(AW0)	-									
Length, ft	-									
Horsepower (annotation purposes only), Gross w/ HEP Load (train electrical power)	-									
Number of axles	-									
Weight per axle, tons	-									
Dynamic/electric brakes (y/n)	-									
Percent of empty weight in rotation	5%									
Cross-sectional area, sq. ft. (see additional requests, below)	-									
Coefficient of flange resistance	0.030									
Coefficient of air resistance (lead vehicle)	0.0024									
Coefficient of air resistance (trailing vehicle)	0.00034									
Auxiliary Power Demand - Full AC Load (kW)	-									
Auxiliary Power Demand - Full Heat Load (kW)	-									
<b>Trailing Vehicle Data (per unit):</b>										
Weight, tons (based on fully loaded Trainset at 80kg per passenger)	-									
Length, ft	-									
Number of axles	-									
Total Weight per axle, tons (AW0)										
Passenger load, tons (based on fully loaded Trainset at 80kg per passenger)										
Percent of empty weight in rotation	5%									
Cross-sectional area, sq. ft. (see additional requests, below)	-									
Coefficient of flange resistance	0.030									

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Coefficient of air resistance	0.00034									
Auxiliary Power Demand - Full AC Load (kW)	-									
Auxiliary Power Demand - Full Heat Load (kW)	-									
<b>General Resistance Data:</b>										
Constant of inertial resistance	1.3									
Constant of journal resistance	29									
<b>Braking Data:</b>										
Deceleration limit in mph/sec	-									
<b>Note 1: The data must be supplied in English units as specified.</b>										
<b>Note 2: The data must be supplied on a "by unit" basis if there are significant differences between cars.</b>										
<b>All inputs for the Basic (or Modified Basic) Davis Equation (for reference)</b>										
<b><math>R = I + J/w + bV + CAV^2/W</math> where,</b>										
R	is the resistance in pounds per ton	Offeror to provide:								
I	is the Constant of inertial resistance	1. Tractive effort curve in 2mph increments;								
J	is the Constant of journal resistance	2. A level, tangent track simulation to MAS for verification purposes;								
w	is the weight per axle in tons	3. Suggested curve rolling resistance equations/coefficients if different than the AREMA Standard of 1 degree curve being equivalent to +0.04 percent grade used in Amtrak's TPC;								
b	is the coefficient of flange resistance	4. Suggested train aerodynamic/rolling resistance equations/coefficients if different than the Davis Equation used in Amtrak's TPC;								
C	is the coefficient of air resistance	5. Suggested maximum cant deficiency value.								
W	is the weight of the car in tons	6. Power Factor curve at maximum propulsion in 2 mph increments								
V	is the velocity in miles per hour	7. Propulsion System Efficiency curve at maximum propulsion in 2 mph increments								
A	is the vehicle cross-section in square feet	8. Vehicle cross-sectional diagram for lead vehicle to verify Frontal Area computation.								
Note: Unless otherwise provided with alternate information, the TPC will be run with the, "Program Default Values."										

49375 2 MPH  
49359 4 MPH  
49344 6 MPH  
49328 8 MPH  
49312 10 MPH  
49297 12 MPH  
49281 14 MPH  
49266 16 MPH  
49250 18 MPH  
49234 20 MPH  
49219 22 MPH  
49203 24 MPH  
49188 26 MPH  
49172 28 MPH  
49156 30 MPH  
49141 32 MPH  
49125 34 MPH  
49110 36 MPH  
49094 38 MPH  
49078 40 MPH  
49063 42 MPH  
49047 44 MPH  
49032 46 MPH  
49016 48 MPH  
49000 50 MPH  
47687 52 MPH  
45992 54 MPH  
44415 56 MPH  
42944 58 MPH  
41567 60 MPH  
40275 62 MPH  
39062 64 MPH  
37919 66 MPH  
36841 68 MPH  
35822 70 MPH  
34856 72 MPH  
33940 74 MPH  
33069 76 MPH  
32241 78 MPH  
31452 80 MPH  
30699 82 MPH  
29980 84 MPH  
29291 86 MPH  
28632 88 MPH  
28000 90 MPH  
27409 92 MPH  
26841 94 MPH  
26296 96 MPH  
25772 98 MPH  
25267 100 MPH  
24780 102 MPH  
24311 104 MPH  
23859 106 MPH  
23422 108 MPH  
23000 110 MPH  
22174 112 MPH  
21362 114 MPH  
20563 116 MPH  
19775 118 MPH  
19000 120 MPH

ELECTRIC - Pueblo EST TO 206 MPH #494 Description of TE Curve

Tractive Effort in pounds of force at 2 mile per hour increments  
to slightly beyond the maximum speed of the power car

18780	122 MPH
18570	124 MPH
18371	126 MPH
18181	128 MPH
18000	130 MPH
17388	132 MPH
16779	134 MPH
16178	136 MPH
15585	138 MPH
15000	140 MPH
14767	142 MPH
14541	144 MPH
14321	146 MPH
14107	148 MPH
13899	150 MPH
13697	152 MPH
13501	154 MPH
13311	156 MPH
13127	158 MPH
12949	160 MPH
12777	162 MPH
12611	164 MPH
12451	166 MPH
12297	168 MPH
12149	170 MPH
12007	172 MPH
11871	174 MPH
11741	176 MPH
11617	178 MPH
11499	180 MPH
11387	182 MPH
11281	184 MPH
11181	186 MPH
11087	188 MPH
10997	190 MPH
10912	192 MPH
10831	194 MPH
10754	196 MPH
10683	198 MPH
10615	200 MPH
10551	202 MPH
10492	204 MPH
10442	206 MPH
0	208 MPH
0	210 MPH
0	212 MPH
0	214 MPH
0	216 MPH
0	218 MPH
0	220 MPH
0	222 MPH
0	224 MPH
0	226 MPH
0	228 MPH
0	230 MPH
0	232 MPH
0	234 MPH
0	236 MPH
0	238 MPH
0	240 MPH

0	242 MPH		
0	244 MPH		
0	246 MPH		
0	248 MPH		
0	250 MPH		
0	252 MPH		
0	254 MPH		
0	256 MPH		
0	258 MPH		
0	260 MPH		
0	262 MPH		
0	264 MPH		
0	266 MPH		
0	268 MPH		
0	270 MPH		
0	272 MPH		
0	274 MPH		
0	276 MPH		
0	278 MPH		
0	280 MPH		
0	282 MPH		
0	284 MPH		
0	286 MPH		
0	288 MPH		
0	290 MPH		
0	292 MPH		
0	294 MPH		
0	296 MPH		
0	298 MPH		
0	300 MPH		
0	302 MPH		
0	304 MPH		
0	306 MPH		
0	308 MPH		
0	310 MPH		
0	312 MPH		
0	314 MPH		
0	316 MPH		
0	318 MPH		
0	320 MPH		
0	322 MPH		
0	324 MPH		
0	326 MPH		
0	328 MPH		
0	330 MPH		
0	332 MPH		
0	334 MPH		
0	336 MPH		
0	338 MPH		
0	340 MPH		
197500	171 MPH	Required	Record 171 is 4 times the starting Tractive Effort
0	172 MPH	Optional	Record 172 is the continuous rating speed in miles per hour
0	173 MPH	n/a	
0	174 MPH	n/a	
140	175 MPH	Required	Record 175 is the auxiliary electricity consumption in kWh/Hour
40	176 MPH	Required	Record 176 is Head-end electricity consumption per trailing car in kWh/Hour/Car
0	177 MPH	n/a	
0	178 MPH	n/a	
0	179 MPH	n/a	
0	180 MPH	n/a	

0	181 MPH	n/a
0	182 MPH	n/a
0	183 MPH	n/a
0	184 MPH	n/a
0	185 MPH	n/a
0	186 MPH	n/a
0	187 MPH	n/a
0	188 MPH	n/a
0	189 MPH	n/a
0	190 MPH	n/a
0	191 MPH	n/a
0	192 MPH	n/a
0	193 MPH	n/a
0	194 MPH	n/a
0	195 MPH	n/a
0	196 MPH	n/a
0	197 MPH	n/a
0	198 MPH	n/a
0	199 MPH	n/a
0	200 MPH	n/a
0	201 MPH	n/a
0	202 MPH	n/a
0	203 MPH	n/a
0	204 MPH	n/a
0	205 MPH	n/a
0	206 MPH	n/a
0	207 MPH	n/a
0	208 MPH	n/a
0	209 MPH	n/a







kmh	kN	mph	lbf
0.000	300.0	0.0	67443.0
3.218	299.1	2.0	67239.6
6.436	298.2	4.0	67036.1
9.654	297.3	6.0	66832.7
12.872	296.4	8.0	66629.3
16.090	295.5	10.0	66425.8
19.308	294.6	12.0	66222.4
22.526	293.7	14.0	66019.0
25.744	292.8	16.0	65815.6
28.962	291.9	18.0	65612.1
32.180	291.0	20.0	65408.7
35.398	290.0	22.0	65205.3
38.616	289.1	24.0	65001.8
41.834	288.2	26.0	64798.4
45.052	287.3	28.0	64595.0
48.270	286.4	30.0	64391.5
51.488	285.5	32.0	64188.1
54.706	284.6	34.0	63984.7
57.924	283.7	36.0	63781.2
61.142	282.8	38.0	63577.8
64.360	281.9	40.0	63374.4
67.578	281.0	42.0	63171.0
70.796	280.1	44.0	62967.5
74.014	279.2	46.0	62764.1
77.232	278.3	48.0	62560.7
80.450	277.4	50.0	62357.2
83.668	276.5	52.0	62153.8
86.886	275.6	54.0	61950.4
90.104	274.7	56.0	61746.9
93.322	273.8	58.0	61543.5
96.540	272.9	60.0	61340.1
99.758	271.9	62.0	61136.6
102.976	271.0	64.0	60933.2
106.194	270.1	66.0	60729.8
109.412	269.2	68.0	60526.4
112.630	268.3	70.0	60323.0
115.848	267.4	72.0	60119.6
119.066	266.5	74.0	59916.2
122.284	265.6	76.0	59712.8
125.502	264.7	78.0	59509.4
128.720	263.8	80.0	59306.0
131.938	262.9	82.0	59102.6
135.156	262.0	84.0	58899.2
138.374	261.1	86.0	58695.8
141.592	260.2	88.0	58492.4
144.810	259.3	90.0	58289.0
148.028	258.4	92.0	58085.6
151.246	257.5	94.0	57882.2
154.464	256.6	96.0	57678.8
157.682	255.7	98.0	57475.4
160.900	254.8	100.0	57272.0
164.118	253.9	102.0	57068.6
167.336	253.0	104.0	56865.2
170.554	252.1	106.0	56661.8
173.772	251.2	108.0	56458.4
176.990	250.3	110.0	56255.0
180.208	249.4	112.0	56051.6
183.426	248.5	114.0	55848.2
186.644	247.6	116.0	55644.8
189.862	246.7	118.0	55441.4
193.080	245.8	120.0	55238.0
196.298	244.9	122.0	55034.6
199.516	244.0	124.0	54831.2
202.734	243.1	126.0	54627.8
205.952	242.2	128.0	54424.4
209.170	241.3	130.0	54221.0
212.388	240.4	132.0	54017.6
215.606	239.5	134.0	53814.2
218.824	238.6	136.0	53610.8
222.042	237.7	138.0	53407.4
225.260	236.8	140.0	53204.0
228.478	235.9	142.0	53000.6
231.696	235.0	144.0	52797.2
234.914	234.1	146.0	52593.8
238.132	233.2	148.0	52390.4
241.350	232.3	150.0	52187.0
244.568	231.4	152.0	51983.6
247.786	230.5	154.0	51780.2
251.004	229.6	156.0	51576.8
254.222	228.7	158.0	51373.4
257.440	227.8	160.0	51170.0
260.658	226.9	162.0	50966.6
263.876	226.0	164.0	50763.2
267.094	225.1	166.0	50559.8
270.312	224.2	168.0	50356.4
273.530	223.3	170.0	50153.0
276.748	222.4	172.0	49949.6
279.966	221.5	174.0	49746.2
283.184	220.6	176.0	49542.8
286.402	219.7	178.0	49339.4
289.620	218.8	180.0	49136.0
292.838	217.9	182.0	48932.6
296.056	217.0	184.0	48729.2
299.274	216.1	186.0	48525.8

