

Allison Transmission
Bundled Report

Application	116-A355070-1
Iteration	1
Date	April 23, 2025 13:31:36
Units Of Measure	SI

The vehicle performance calculated by iSCAAN is an estimate for the specified vehicle and power train operating at standard engine conditions per SAE J1995 at 91 m (300 feet) altitude of 100 kPa barometric pressure and 25°C (77°F) inlet air temperature. Engine performance is significantly affected as operating altitude increases, therefore, Allison Transmission, Inc. does not represent and hereby disclaims that, under all conditions, the actual vehicle will achieve the simulated performance.

Application Profile

Application Name	Titan HET Z80 - Mercedes red. 447kW 2345Nm - 4700 - Tractor payloaded
Owner	Andreas Wolf @ DGS Mainz
SCAAN Analysis Type	Standard Vehicle Run
Optional Analysis Type	
Classification	Standard
Review Status	Not Submitted

Mission

End User	Unknown
Selected Vocation	Heavy Haul — Equipment Hauler with Escort or Permit — Tractor Trailer (22-10-20)

Platform

Vehicle Manufacturer	Titan (Europe/ME/SA)
Vehicle Model	Z80
Vehicle Configuration	Hauler 6x6
Engine Rating	Mercedes Benz OM 473 -- 480kW@1600rpm 3100Nm@1300rpm Stufe 3a - red. 447kW 2345Nm -- without SEM/LRTP (116-L033081-E, Rev A)
Transmission	4700 INTL Retarder (1-L007442-T, Rev E)
Transmission Rating	4700 INTL Retarder Heavy Equipment Transport (HET) - Diesel Allison 6th Generation Controls without SEM/LRTP (1-L024294-R, Rev A)
Vehicle Parameters	Standard
Torque Converter	TC571 (1-L001261-TC, Rev D) - Recommended
Transmission Retarder	4000 Series High Capacity (1-L004745-TR, Rev E)
LRTP Status	

Allison Transmission Input Summary

Mission

End User	Unknown
Selected Vocation	Heavy Haul — Equipment Hauler with Escort or Permit — Tractor Trailer (22-10-20)

Platform

Vehicle Manufacturer	Titan (Europe/ME/SA)
Vehicle Model	Z80
Vehicle Configuration	Hauler 6x6
User Expected Engine Load	0%

Platform - Area and Weight

Frontal Area	14.000 m²
Height / Width	4.000 m / 3.500 m
Standard Wind Resistance Coefficient	0.800 (no Deflector)
User Defined Wind Resistance Coefficient	0.800 (no Deflector)
Gross Combined Weight	80000 kg (with Trailer)
Weight On Drive Wheels	80000 kg (100.00%)

Platform - Tires

Number Of Tires	6 (High Flotation (Terra))
Selected Tire	
Tire Revolutions	200 revs/km
Tire Rolling Radius	0.794 m
Standard Surface	Smooth Concrete (SC Factor = 1.00)
Selected Surface	Smooth Concrete (SC Factor = 1.00)
Standard On-Road Traction Limit Coefficient	0.700
Standard Off-Road Traction Limit Coefficient	0.000
User Defined On-Road Traction Limit Coefficient	0.700
User Defined Off-Road Traction Limit Coefficient	0.000
Tire/Wheel Inertia (estimated)	1373.3387 kg-m²

Accessory Losses (Power @ Governed Speed)

Accessory	Standard Loss (kW)	User Defined Loss (kW)
Fan (Clutch Fan)	39.4	39.4
Alternator / Generator	2.2	2.2
Air Compressor	2.5	2.5
Steering Pump	2.5	2.5
Air Conditioning	0.0	0.0
Implement Drive	0.0	0.0

Engine

Number of Power Packs	1
Engine Rating	Mercedes Benz OM 473 -- 480kW@1600rpm 3100Nm@1300rpm Stufe 3a - red. 447kW 2345Nm -- without SEM/LRTP (116-L033081-E, Rev A)
Engine Controls Type	Electronic
Evaluate at Altitude	No
Certifications	
Displacement	15.60 l
Peak Torque	2345.0 N-m
Peak Torque Speed	1300 rpm
Peak Power	442.0 kW
Peak Power Speed	1800 rpm
Governed Power	425.0 kW
Governed Speed	2000 rpm
Number Of Curves	1
Engine Curve Reference	100 07 315
Cruise Velocity @ Speed	0.0 km/h @ 0 rpm
Engine Retarder	
Engine Inertia (estimated)	2.2446 kg-m²
Engine Idle Speed	650 rpm

Engine Curve - Standard Losses - Combined Low & High Curves (AC On Where Applicable)

Speed (rpm)	Gross Power (kW)	Gross Torque (N-m)	Net Power Fan On (kW)	Net Torque Fan On (N-m)	Net Power Fan Off (kW)	Net Torque Fan Off (N-m)	Point Identification
800	196.5	2345.0	189.7	2264.5	192.2	2294.6	
900	221.0	2345.0	212.9	2259.5	216.5	2297.5	
1000	245.6	2345.0	235.9	2252.9	240.8	2299.9	
1100	270.1	2345.0	258.6	2245.0	265.2	2301.8	
1200	294.7	2345.0	281.0	2235.8	289.5	2303.5	
1300	319.2	2345.0	303.0	2225.4	313.8	2304.8	Peak Torque
1400	343.8	2345.0	324.6	2213.9	338.1	2306.0	
1500	368.4	2345.0	345.8	2201.3	362.4	2307.0	
1600	392.9	2345.0	366.5	2187.6	386.7	2307.9	
1700	417.5	2345.0	386.8	2172.8	411.0	2308.7	
1800	442.0	2345.0	406.6	2157.1	435.3	2309.4	Peak Power
1900	447.0	2246.6	406.3	2041.9	440.0	2211.6	
2000	425.0	2029.2	378.4	1806.8	417.8	1994.8	Governed
2100	375.0	1705.2	322.0	1464.0	367.5	1671.3	
2140	0.0	0.0	-55.8	-249.0	-7.6	-33.7	No Load Governed

Engine Curve - User Defined Losses - Combined Low & High Curves (AC On Where Applicable)

Speed (rpm)	Gross Power (kW)	Gross Torque (N-m)	Net Power Fan On (kW)	Net Torque Fan On (N-m)	Net Power Fan Off (kW)	Net Torque Fan Off (N-m)	Point Identification
800	196.5	2345.0	189.7	2264.5	192.2	2294.6	
900	221.0	2345.0	212.9	2259.5	216.5	2297.5	
1000	245.6	2345.0	235.9	2252.9	240.8	2299.9	
1100	270.1	2345.0	258.6	2245.0	265.2	2301.8	
1200	294.7	2345.0	281.0	2235.8	289.5	2303.5	
1300	319.2	2345.0	303.0	2225.4	313.8	2304.8	Peak Torque
1400	343.8	2345.0	324.6	2213.9	338.1	2306.0	
1500	368.4	2345.0	345.8	2201.3	362.4	2307.0	
1600	392.9	2345.0	366.5	2187.6	386.7	2307.9	
1700	417.5	2345.0	386.8	2172.8	411.0	2308.7	
1800	442.0	2345.0	406.6	2157.1	435.3	2309.4	Peak Power
1900	447.0	2246.6	406.3	2041.9	440.0	2211.6	
2000	425.0	2029.2	378.4	1806.8	417.8	1994.8	Governed
2100	375.0	1705.2	322.0	1464.0	367.5	1671.3	
2140	0.0	0.0	-55.8	-249.0	-7.6	-33.7	No Load Governed

Transmission

Transmission Manufacturer	Allison Transmission
Transmission Family	4000 Series (1-L001323-TF, Rev U)
Transmission	4700 INTL Retarder (1-L007442-T, Rev E)
Transmission Rating	4700 INTL Retarder Heavy Equipment Transport (HET) - Diesel Allison 6th Generation Controls without SEM/LRTP (1-L024294-R, Rev A)
Torque Converter	TC571 (1-L001261-TC, Rev D) - Recommended
Transmission Retarder	4000 Series High Capacity (1-L004745-TR, Rev E)

Controls

Controls Release	Production Calibration (PC) for 4000 Series (1-L007292-CR, Rev E)
------------------	---

Controls - Primary Gears (Shift Schedule)

DynActive	No
Speed Profile	Performance
Shift Speed & Strategy	2000 rpm S1 Performance
Equivalent DynActive Bias	0
Primary Mode: Gears	Low = 1, Start = 2, High = 7 (1-2-7)

Driveline

Transmission Output Torque Limit	No
----------------------------------	----

Driveline - Components

Component	Description	Ratio	Standard Efficiency (%)	User Defined Efficiency (%)
Propshaft -- One Piece -- Two Joint (1-L003521-DL)	Single	1.000	98.60	98.60
Axle -- Off Hwy Single Red -- 6x6 (1-L003573-DL)	Single	12.700	88.40	88.40
Aux Gearing -- Transfer Case -- Two Speed (1-L003523-DL)	Low	1.450	97.00	97.00
Aux Gearing -- Transfer Case -- Two Speed (1-L003523-DL)	High	1.040	97.00	97.00

Driveline - Overall Driveline Ratio

Description	Ratio	Standard Efficiency (%)	User Defined Efficiency (%)	N over V Ratio (rpm/kph)
High	13.208	84.55	84.55	44.116
Low	18.415	84.55	84.55	61.507

Allison Transmission Ratings and Guidelines Check









Note

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.
Results indicate the vehicle operating conditions at steady state (acceleration = 0).
The exclamation symbol indicates that Wheel Slip may occur.








Converter Rating And Guideline Checks

✓ Section Score - OK		
C01	✓	Transmission / Converter Compatibility
Overall Status	OK: Acceptable	
C02	✓	Engine / Converter Compatibility
Overall Status	OK: Acceptable	
C04	⚠	Engine Speed at Converter Stall
Overall Status	Reference	
Actual	1513 rpm	
C05	✓	Minimum Engine Speed
Overall Status	OK: Acceptable	
Rating/Recommendation	900 rpm (Min)	
Actual	1449 rpm	
Notes	Net peak torque speed (800 rpm) + allowable variation (100 rpm).	
C07	✓	Turbine Torque at Converter Stall
Overall Status	OK: Acceptable	
Rating/Recommendation	3525.0 N-m (Max)	
Actual	3517.9 N-m	
C08	✓	Converter Speed Ratio at Engine Governed Speed
Overall Status	OK: Acceptable	
Rating/Recommendation	0.800 (Min)	
Actual	0.884	
C03	⚠	Converter Stall Torque Ratio
Overall Status	Reference	
Actual	1.620	

Transmission Rating And Guideline Checks

 Section Score - OK		
T01		Transmission / Vocation Compatibility
Overall Status		OK: Acceptable
T02		Transmission / Engine Compatibility
Overall Status		OK: Acceptable
T17		Transmission Permitted in End User/Chassis Mfg Locations
Overall Status		OK: Acceptable
T15		Transmission Input Power (Gross)
Overall Status		OK: Acceptable
Rating/Recommendation		447.0 kW (Max)
Actual		447.0 kW
T14		Transmission Input Torque (Gross)
Overall Status		OK: Acceptable
Rating/Recommendation		2508.0 N-m (Max)
Actual		2345.0 N-m
T03		Transmission Input Speed
Overall Status		OK: Acceptable
Rating/Recommendation		1700 rpm / 2300 rpm
Actual		2000 rpm
T04		Transmission Output Speed
Overall Status		Reference
Actual		3130 rpm
Notes		Check made in Range 7L at 2000 rpm Engine Governed Speed.

Vehicle Rating And Guideline Checks - Standard

 Section Score - C		
V22		2nd Range Converter Stall Gradeability
Overall Status		Reference
Actual		30.23 %
V47		2nd Range 80% Converter Efficiency Gradeability
Overall Status		Reference
Actual		19.629
V16		Gradeability Required at Governed Speed
Overall Status		OK: Acceptable
Rating/Recommendation		8.00 % (Min)
Actual		32.09 %
Notes		Check is in Lockup Mode.
V17		Maximum Geared Vehicle Speed at Engine Governed Speed
Overall Status		Reference
Actual		70.9 km/h
Notes		Check is in 7L Lockup.
V18		Maximum Speed on 0.5% Grade
Overall Status		C: Consider - manufacturer to assess
Rating/Recommendation		104.6 km/h (Min)
Actual		66.4 km/h
Notes		At 1872.4 rpm Engine Speed, Range 7L.
V45		Heat Generated in 2nd Range 80% Converter Efficiency
Overall Status		Reference
Actual		91.57 kW
Notes		At 1741.2 rpm Engine Speed.

Allison Transmission
Vehicle Performance Summary

Note

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

Full Throttle, Automatic Upshifts (Gradeability)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.450

Gradeability	Percent Grade	Vehicle Speed (km/h)	Gear Range	Match Point
Stall Gradeability	30.2	0.0	2C	Stall
Launch Gradeability	28.2	0.0	2C	
Low Speed Gradeability	19.6	5.6	2C	80 Percent
Maximum Speed on Grade	0.0	53.3	7L	Road Load
	0.3	53.5	7L	
	0.5	52.5	7L	
	1.0	50.0	7L	
	2.0	40.0	6L	
	3.0	31.3	5L	
	4.0	21.9	4L	
	5.0	21.9	4L	
	6.0	17.5	4L	
	7.0	16.4	3L	
	8.0	15.8	3L	
	9.0	11.4	3C	
	10.0	10.0	3C	

Full Throttle, Automatic Upshifts (Gradeability)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.040

Gradeability	Percent Grade	Vehicle Speed (km/h)	Gear Range	Match Point
Stall Gradeability	20.7	0.0	2C	Stall
Launch Gradeability	18.7	0.0	2C	
Low Speed Gradeability	13.5	7.9	2C	80 Percent
Maximum Speed on Grade	0.0	70.5	7L	Road Load
	0.3	67.6	7L	
	0.5	59.2	6L	
	1.0	47.9	6L	
	2.0	40.8	5L	
	3.0	30.5	4L	
	4.0	22.9	3L	
	5.0	22.8	3L	
	6.0	15.9	3C	
	7.0	12.6	3C	
	8.0	9.7	2C	
	9.0	9.7	2C	
	10.0	9.7	2C	

Full Throttle, Automatic Upshifts (Acceleration)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.450

Speed (km/h)	Time (sec)	Distance (m)
0 - 20 km/h	6.3	22
0 - 30 km/h	14.0	76
0 - 40 km/h	27.6	209
0 - 60 km/h	Not Possible	Not Possible
0 - 80 km/h	Not Possible	Not Possible
0 - 100 km/h	Not Possible	Not Possible

Full Throttle, Automatic Upshifts (Acceleration)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.040

Speed (km/h)	Time (sec)	Distance (m)
0 - 20 km/h	6.9	24
0 - 30 km/h	14.3	76
0 - 40 km/h	28.2	211
0 - 60 km/h	88.8	1081
0 - 80 km/h	Not Possible	Not Possible
0 - 100 km/h	Not Possible	Not Possible

Allison Transmission
Vehicle Full Throttle Performance

Note

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.
Results indicate the vehicle operating conditions at steady state (acceleration = 0).
The exclamation symbol indicates that Wheel Slip may occur.

Full Throttle, Automatic Upshifts (2C-3C-3L-4L-5L-6L-7L)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.450	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point	
2C	0.0	1513	0	239.54	226.99	0.0	30.23	348.61		
2C	1.6	1464	99	217.62	205.06	97.3	27.08	223.17		
2C	3.2	1503	198	195.54	182.98	174.8	23.99	139.58		
2C	4.0	1573	248	184.19	171.63	206.4	22.42	116.88	70 Percent	
2C	4.8	1651	297	173.37	160.81	232.5	20.94	101.86		
2C	5.6	1741	347	163.68	151.11	256.6	19.63	91.53	80 Percent	
2C	6.4	1825	396	152.84	140.26	273.3	18.17	83.30		
2C	6.9	1870	427	144.01	131.43	277.7	16.99	78.00		
3C	6.9	1550	427	102.50	89.92	197.6	11.54	122.38		
3C	8.0	1605	495	97.93	85.35	218.9	10.94	108.64		
3C	9.7	1695	594	91.85	79.25	246.4	10.15	94.56		
3C	11.3	1793	693	86.12	73.50	269.5	9.41	86.54		
3C	11.4	1802	703	85.44	72.82	271.2	9.32	85.86		
3L	11.4	1340	703	80.42	67.80	255.3	8.67	9.68		
3L	12.9	1510	792	79.59	66.95	284.6	8.57	11.14		
3L	14.5	1698	891	78.52	65.87	315.9	8.43	12.83		
3L	16.1	1887	990	74.13	61.45	331.4	7.86	14.36		
3L	16.4	1925	1010	71.37	58.69	325.5	7.50	14.31		
4L	16.4	1443	1010	60.10	47.41	274.1	6.05	9.60		
4L	17.7	1556	1089	59.63	46.92	293.2	5.99	10.64		
4L	19.3	1698	1188	59.00	46.26	316.5	5.91	12.04		
4L	20.9	1839	1287	57.22	44.45	332.5	5.68	13.16		
4L	21.9	1925	1347	53.59	40.80	325.9	5.21	13.85		
5L	21.9	1347	1347	42.30	29.51	257.3	3.76	8.82		
5L	22.5	1386	1386	42.19	29.38	264.0	3.75	9.27		
5L	24.1	1485	1485	41.88	29.04	280.8	3.70	10.47		
5L	25.7	1584	1584	41.55	28.67	297.2	3.66	11.76		
5L	27.4	1683	1683	41.20	28.28	313.1	3.61	13.08		
5L	29.0	1782	1782	40.84	27.87	328.6	3.55	14.42		
5L	30.6	1881	1881	38.89	25.88	330.3	3.30	15.63		
5L	31.3	1925	1925	37.29	24.25	324.1	3.09	15.97		
6L	31.3	1419	1925	30.37	17.33	264.0	2.21	16.33		
6L	32.2	1459	1980	30.27	17.20	270.6	2.19	17.08		
6L	33.8	1532	2079	30.08	16.97	282.4	2.16	18.45		
6L	35.4	1605	2178	29.90	16.73	294.0	2.13	19.83		
6L	37.0	1678	2277	29.70	16.47	305.4	2.10	21.20		
6L	38.6	1751	2376	29.50	16.21	316.5	2.07	22.57		
6L	40.2	1824	2475	28.96	15.60	323.6	1.99	23.74		
6L	41.8	1897	2574	27.72	14.30	322.2	1.82	25.22		
6L	42.5	1925	2612	26.82	13.37	316.3	1.70	25.23		
7L	42.5	1669	2612	25.38	11.94	299.4	1.52	26.47		
7L	43.5	1708	2673	25.29	11.80	305.3	1.50	27.40		
7L	45.1	1771	2772	25.13	11.58	314.6	1.48	28.85		
7L	46.7	1835	2871	24.54	10.91	318.2	1.39	30.14		
7L	48.3	1898	2970	23.59	9.89	316.4	1.26	32.05		
7L	49.9	1961	3069	21.72	7.94	301.0	1.01	33.15		
7L	50.9	2000	3130	20.56	6.72	290.5	0.86	34.81	Governed	
7L	51.5	2025	3168	19.49	5.63	278.9	0.72	34.74		
7L	53.1	2088	3267	16.75	2.80	247.1	0.36	36.56		
7L	54.2	2130	3334	0.00	-14.01	0.0	-1.79	34.22		

Full Throttle, Manual Hold (7.6269 Ratio) (1C-1L)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.450	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point	
1C	0.0	1513	0	515.03	502.48	0.0	83.40	348.61		
1C	1.6	1526	99	411.30	398.74	183.9	59.02	133.81		
1C	1.9	1573	114	394.90	382.35	203.7	55.81	120.14	70 Percent	
1C	2.6	1741	160	350.44	337.88	252.8	47.72	96.00	80 Percent	
1C	2.9	1821	181	328.50	315.95	268.5	44.00	89.03		
1L	2.9	1380	181	314.04	301.49	256.7	41.62	16.80		
1L	3.2	1510	198	311.29	298.73	278.3	41.18	18.73		
1L	4.3	2000	262	252.25	239.69	298.7	32.09	25.16	Governed	
1L	4.5	2131	279	7.87	-4.69	9.9	-0.60	18.35		

Full Throttle, Manual Hold (3.5102 Ratio) (2C-2L)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.450	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point	
2C	0.0	1513	0	239.54	226.99	0.0	30.23	348.61		
2C	1.6	1464	99	217.62	205.06	97.3	27.08	223.17		
2C	3.2	1503	198	195.54	182.98	174.8	23.99	139.58		
2C	4.0	1573	248	184.19	171.63	206.4	22.42	116.88	70 Percent	
2C	4.8	1651	297	173.37	160.81	232.5	20.94	101.86		
2C	5.6	1731	342	164.61	152.04	254.2	19.75	92.40		
2L	5.6	1200	342	148.33	135.76	229.0	17.57	10.15		
2L	6.4	1390	396	146.73	134.16	262.4	17.36	12.09		
2L	8.0	1738	495	143.11	130.52	319.9	16.87	15.92		
2L	9.3	2000	570	118.31	105.72	304.4	13.60	18.40	Governed	
2L	9.7	2085	594	98.36	85.76	263.8	11.00	18.33		
2L	9.9	2133	608	-0.51	-13.11	-1.4	-1.67	14.84		

Full Throttle, Automatic Upshifts (2C-3C-3L-4L-5L-6L-7L)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.040	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point	
2C	0.0	1513	0	171.81	159.25	0.0	20.73	348.61		
2C	1.6	1480	71	160.26	147.71	71.6	19.17	256.80		
2C	3.2	1452	142	149.48	136.92	133.6	17.72	177.60		
2C	4.8	1523	213	137.86	125.30	184.9	16.18	131.95		
2C	5.6	1573	248	132.11	119.54	206.4	15.42	116.88	70 Percent	
2C	6.4	1629	284	126.32	113.75	225.9	14.65	105.33		
2C	7.9	1741	347	117.40	104.82	256.6	13.48	91.53	80 Percent	
2C	8.0	1756	355	116.32	103.74	260.0	13.34	90.36		
2C	9.7	1869	426	103.47	90.87	277.5	11.66	78.14		
2C	9.7	1870	427	103.29	90.69	277.7	11.64	78.00		
3C	9.7	1550	427	73.52	60.92	197.6	7.79	122.38		
3C	11.3	1607	497	70.14	57.53	219.5	7.35	108.29		
3C	12.9	1671	568	66.95	54.32	239.4	6.94	97.66		
3C	14.5	1741	639	64.11	51.45	257.9	6.57	89.87		
3C	15.9	1802	703	61.28	48.60	271.2	6.21	85.86		
3L	15.9	1340	703	57.68	45.00	255.3	5.75	9.68		
3L	16.1	1353	710	57.63	44.95	257.6	5.74	9.79		
3L	17.7	1489	781	57.16	44.45	281.1	5.68	10.96		
3L	19.3	1624	852	56.63	43.89	303.8	5.60	12.14		
3L	20.9	1760	923	56.05	43.28	325.7	5.52	13.36		
3L	22.5	1895	994	52.93	40.12	331.2	5.12	14.51		
3L	22.9	1925	1010	51.19	38.38	325.5	4.90	14.31		
4L	22.9	1443	1010	43.10	30.29	274.1	3.86	9.60		
4L	24.1	1522	1065	42.88	30.03	287.5	3.83	10.32		
4L	25.7	1624	1136	42.56	29.68	304.4	3.79	11.29		
4L	27.4	1725	1207	42.22	29.30	320.9	3.74	12.28		
4L	29.0	1827	1278	41.34	28.37	332.6	3.62	13.09		
4L	30.5	1925	1347	38.44	25.42	325.9	3.24	13.85		
5L	30.5	1347	1347	30.34	17.33	257.3	2.21	8.82		
5L	30.6	1349	1349	30.34	17.32	257.7	2.21	8.84		
5L	32.2	1420	1420	30.18	17.12	269.9	2.18	9.67		
5L	33.8	1491	1491	30.02	16.91	281.9	2.16	10.55		
5L	35.4	1562	1562	29.85	16.68	293.6	2.13	11.45		
5L	37.0	1633	1633	29.68	16.44	305.1	2.10	12.41		
5L	38.6	1704	1704	29.50	16.20	316.5	2.07	13.38		
5L	40.2	1775	1775	29.31	15.95	327.5	2.03	14.32		
5L	41.8	1846	1846	28.47	15.05	330.9	1.92	15.03		
5L	43.5	1917	1917	27.00	13.51	325.9	1.72	15.97		
5L	43.6	1925	1925	26.75	13.25	324.1	1.69	15.97		
6L	43.6	1419	1925	21.78	8.29	264.0	1.06	16.33		
6L	45.1	1465	1988	21.70	8.14	271.6	1.04	17.19		
6L	46.7	1518	2059	21.60	7.97	280.1	1.02	18.18		
6L	48.3	1570	2130	21.51	7.80	288.5	0.99	19.15		
6L	49.9	1622	2201	21.41	7.63	296.7	0.97	20.14		
6L	51.5	1675	2272	21.31	7.45	304.9	0.95	21.13		
6L	53.1	1727	2343	21.21	7.26	312.9	0.93	22.12		
6L	54.7	1779	2414	21.11	7.07	320.8	0.90	23.12		
6L	56.3	1832	2485	20.68	6.56	323.5	0.84	23.84		
6L	57.9	1884	2556	20.04	5.83	322.5	0.74	24.86		
6L	59.2	1925	2612	19.23	4.95	316.3	0.63	25.23		
7L	59.2	1669	2612	18.21	3.92	299.4	0.50	26.47		
7L	59.5	1679	2627	18.19	3.88	300.9	0.49	26.71		
7L	61.2	1724	2698	18.11	3.71	307.7	0.47	27.76		
7L	62.8	1770	2769	18.03	3.53	314.4	0.45	28.81		
7L	64.4	1815	2840	17.82	3.21	318.6	0.41	29.76		
7L	66.0	1860	2912	17.33	2.62	317.6	0.33	30.78		
7L	67.6	1906	2983	16.77	1.96	315.0	0.25	32.15		
7L	69.2	1951	3054	15.80	0.88	303.7	0.11	32.85		
7L	70.8	1997	3125	14.82	-0.22	291.5	-0.03	34.63		
7L	70.9	2000	3130	14.74	-0.30	290.5	-0.04	34.81	Governed	
7L	72.4	2042	3196	13.44	-1.71	270.4	-0.22	34.95		

7L	74.0	2087	3267	12.03	-3.24	247.4	-0.41	36.54	
7L	75.6	2130	3334	0.00	-15.38	0.0	-1.96	34.22	

Full Throttle, Manual Hold (7.6269 Ratio) (1C-1L)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.040

Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point
1C	0.0	1513	0	369.40	356.85	0.0	51.07	348.61	
1C	1.6	1459	71	316.41	303.86	141.4	42.01	169.84	
1C	2.6	1573	114	283.24	270.68	203.7	36.76	120.14	70 Percent
1C	3.2	1671	142	262.74	250.18	234.9	33.65	103.07	
1C	3.6	1741	160	251.35	238.79	252.8	31.95	96.00	80 Percent
1C	4.1	1821	181	235.62	223.06	268.5	29.66	89.03	
1L	4.1	1380	181	225.24	212.68	256.7	28.16	16.80	
1L	4.8	1625	213	221.34	208.78	296.8	27.61	20.48	
1L	5.9	2000	262	180.93	168.36	298.7	21.97	25.16	Governed
1L	6.3	2134	280	-7.25	-19.82	-12.8	-2.53	18.13	

Full Throttle, Manual Hold (3.5102 Ratio) (2C-2L)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.040

Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point
2C	0.0	1513	0	171.81	159.25	0.0	20.73	348.61	
2C	1.6	1480	71	160.26	147.71	71.6	19.17	256.80	
2C	3.2	1452	142	149.48	136.92	133.6	17.72	177.60	
2C	4.8	1523	213	137.86	125.30	184.9	16.18	131.95	
2C	5.6	1573	248	132.11	119.54	206.4	15.42	116.88	70 Percent
2C	6.4	1629	284	126.32	113.75	225.9	14.65	105.33	
2C	7.8	1731	342	118.07	105.48	254.2	13.57	92.40	
2L	7.8	1200	342	106.38	93.80	229.0	12.04	10.15	
2L	8.0	1246	355	106.11	93.53	237.2	12.01	10.60	
2L	9.7	1496	426	104.53	91.93	280.4	11.80	13.22	
2L	11.3	1745	497	102.58	89.97	321.0	11.54	16.00	
2L	12.9	1994	568	85.55	72.91	305.9	9.33	18.22	
2L	12.9	2000	570	84.86	72.22	304.4	9.25	18.40	Governed
2L	13.8	2133	608	-1.45	-14.10	-5.6	-1.80	14.86	

Full Throttle, Reverse Performance (Standard 4.801 Ratio) (R1C-R1C)

Engine Fan	Air Conditioning	Engine Power	Vehicle Parameters	Axle Ratio	Auxiliary Gearing Ratio
On	Off	Standard Power Curve	Standard	12.700	1.450

Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)	Match Point
R1C	0.0	1513	0	319.53	306.98	0.0	42.52	348.61	
R1C	1.6	1450	99	281.48	268.93	125.8	36.49	186.39	
R1C	3.0	1573	181	247.47	234.91	202.8	31.38	121.21	70 Percent
R1C	3.2	1608	198	240.67	228.11	215.2	30.39	113.69	
R1C	4.1	1741	254	220.30	207.74	252.5	27.46	96.40	80 Percent
R1C	4.8	1841	297	202.14	189.58	271.1	24.90	85.85	
R1C	5.3	1892	323	188.44	175.87	275.0	23.00	81.08	85 Percent
R1C	6.0	2000	368	158.40	145.83	263.5	18.92	66.76	Governed
R1C	6.4	2093	396	126.92	114.34	226.9	14.73	57.42	
R1C	7.2	2132	446	1.31	-11.26	2.6	-1.44	12.69	

Full Throttle, Reverse Performance (Optional 17.120 Ratio - LRTP Required) (R2C-R2C)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.450	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)		Match Point
R2C!	0.0	1513	0	1134.77	1122.22	0.0	999.00	348.61		
R2C!	0.8	1573	51	879.72	867.17	202.1	999.00	122.00		70 Percent
R2C!	1.2	1741	71	783.36	770.80	251.7	527.47	97.29		80 Percent
R2C!	1.5	1892	91	670.28	657.72	274.3	153.80	81.95		85 Percent
R2C!	1.6	1951	99	600.79	588.23	268.6	113.32	74.36		
R2C!	1.7	2000	103	563.68	551.12	262.9	98.71	67.47		Governed
R2C	2.0	2132	125	5.89	-6.67	3.3	-0.85	11.89		

Full Throttle, Reverse Performance (Standard 4.801 Ratio) (R1C-R1C)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.040	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)		Match Point
R1C	0.0	1513	0	229.18	216.63	0.0	28.73	348.61		
R1C	1.6	1465	71	209.58	197.03	93.7	25.95	227.65		
R1C	3.2	1498	142	189.02	176.46	169.0	23.08	145.51		
R1C	4.1	1573	181	177.49	164.93	202.8	21.50	121.21		70 Percent
R1C	4.8	1641	213	168.36	155.80	225.8	20.26	107.90		
R1C	5.8	1741	254	158.01	145.44	252.5	18.87	96.40		80 Percent
R1C	6.4	1813	284	149.46	136.88	267.2	17.72	90.49		
R1C	7.3	1892	323	135.15	122.57	275.0	15.82	81.08		85 Percent
R1C	8.0	1957	355	120.19	107.60	268.6	13.85	72.71		
R1C	8.3	2000	368	113.61	101.03	263.5	12.99	66.76		Governed
R1C	9.7	2118	426	41.47	28.87	111.2	3.68	21.50		
R1C	10.1	2132	446	0.94	-11.66	2.6	-1.49	12.69		

Full Throttle, Reverse Performance (Optional 17.120 Ratio - LRTP Required) (R2C-R2C)

Engine Fan		Air Conditioning		Engine Power		Vehicle Parameters		Axle Ratio	Auxiliary Gearing Ratio	
On		Off		Standard Power Curve		Standard		12.700	1.040	
Gear Range	Vehicle Speed (km/h)	Engine Speed (rpm)	Output Speed (rpm)	Tractive Effort (kN)	Drawbar Pull (kN)	Wheel Power Available (kW)	Net Grade (%)	Transmission Heat Rejection (kW)		Match Point
R2C!	0.0	1513	0	813.90	801.35	0.0	999.00	348.61		
R2C!	1.2	1573	51	630.97	618.42	202.1	128.10	122.00		70 Percent
R2C!	1.6	1740	71	562.30	549.75	251.4	98.22	97.40		
R2C!	1.6	1741	71	561.86	549.30	251.7	98.06	97.29		80 Percent
R2C	2.1	1892	91	480.75	468.20	274.3	74.37	81.95		85 Percent
R2C	2.3	2000	103	404.29	391.74	262.9	57.63	67.47		Governed
R2C	2.8	2132	125	4.22	-8.33	3.3	-1.06	11.89		