

**GSE - Horsepower, Load Factor and Emission Factors**

Type	Fuel	Horse power (hp)	Horse Power for emission calculation (hp) <sup>[1]</sup>	Load factor (%) <sup>[2]</sup>	Total Operating Time in 2011 (Hour) <sup>[3]</sup>	Estimated Operating Time in 2031 (Hour)(3RS) <sup>[4]</sup>	Estimated Operating Time in 2031 (Hour)(2RS) <sup>[4]</sup>	GSE Age (Year) <sup>[5]</sup>	GSE Lifespan (Year) <sup>[6]</sup>	Unadjusted Emission Factor (g/hp/hr)				
										CO	HC	NO <sub>x</sub>	SO <sub>x</sub> <sup>[7]</sup>	PM <sub>10</sub>
Aircraft Tractor	Diesel	100-670	670	85 (operation) / 25 (idling)	25835	49028	33212	11	14	0.200000	0.130000	0.280000	0.002586	0.009200
Baggage Tractor	Diesel	48	48	55	591010	1121591	759788	8	13	0.230000	0.130000	3.000000	0.002876	0.202400
Belt Loader	Diesel	48-50	49	50	177297	336466	227929	6	11	0.230000	0.130000	3.000000	0.002847	0.202400
Cargo Loader	Diesel	100-175	120	50 (operation) / 25 (idling)	249393	473287	320613	10	11	0.130000	0.130000	0.280000	0.003022	0.009200
Catering Truck	Diesel	199-260	210	53	404921	768440	520556	10	10	0.110000	0.130000	0.280000	0.002561	0.009200
Hydrant Truck	Diesel	235	235	70	15773	29933	20277	10	10	0.110000	0.130000	0.280000	0.002561	0.009200
Lavatory Truck	Diesel	199-260	260	25	22106	41951	28418	12	13	0.110000	0.130000	0.280000	0.002561	0.009200
Fuel Truck	Diesel	235	235	25	-	-	-	14	14	0.110000	0.130000	0.280000	0.002561	0.009200
Passenger Stands	Diesel	48	48	57	2123	4029	28418	9	10	0.230000	0.130000	3.000000	0.002847	0.202400

Note:

- [1] Horse Power for emission calculation is based on the weighted average value of corresponding type of GSEs. The weighted average value is calculated by the horse power and number of corresponding GSEs provided by the operators. If no weighted average value is available, the maximum value of horsepower is used. If no information from operator is provided, the default value in EDMS v5.1.4.1 is used.
- [2] The operation and idling load factors of the GSE are based on the operator's information. If no information is available, the load factors are based on the EDMS v5.1.4.1 default value.
- [3] No information for fuel truck is available. For other GSE, operating time per GSE is calculated based on information provided by operators. The total operating time is obtained by multiplying the operating time per GSE with the number of the GSE.
- [4] The operating time in 2031 is estimated based on ratio of number of ATM in 2031 and that in 2011. (Operation time in 2031 = Operation time in 2011 x (Number of ATM in 2031 / Number of ATM in 2011))
- [5] SO<sub>x</sub> emission indices are copied from the EDMS v5.1.4.1 directly.
- [6] GSE Age is based on the weighted average value of corresponding type of GSEs. The weighted average value is calculated by the age and number of corresponding GSEs provided by the operators. If no information from operator is provided, the age is a 27 year
- [7] The lifespans of GSE are based on the EDMS v5.1.4.1 default value.

Type	Deterioration of GSE <sup>[8]</sup>								Deterioration Factor <sup>[9]</sup>				Adjusted Emission Factor (g/hp/hr) <sup>[9]</sup>				
	CO		HC		NO <sub>x</sub>		PM <sub>10</sub>		CO	HC	NO <sub>x</sub>	PM <sub>10</sub>	CO	HC	NO <sub>x</sub>	SO <sub>x</sub> <sup>[10]</sup>	PM <sub>10</sub>
	coefficient A	coefficient b	coefficient A	coefficient b	coefficient A	coefficient b	coefficient A	coefficient b									
Aircraft Tractor	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1186	1.0212	1.0063	1.3716	0.223729	0.132758	0.281760	0.011755	0.012619
Baggage Tractor	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.0929	1.0166	1.0049	1.2911	0.251372	0.132160	3.014769	0.013073	0.261314
Belt Loader	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.0824	1.0147	1.0044	1.2580	0.248944	0.131915	3.013091	0.012941	0.254619
Cargo Loader	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1373	1.0245	1.0073	1.4300	0.147845	0.133191	0.282036	0.013736	0.013156
Catering Truck	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1510	1.0270	1.0080	1.4730	0.126610	0.133510	0.282240	0.011641	0.013552
Hydrant Truck	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1510	1.0270	1.0080	1.4730	0.126610	0.133510	0.282240	0.011641	0.013552
Lavatory Truck	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1394	1.0249	1.0074	1.4366	0.125332	0.133240	0.282068	0.011641	0.013217
Fuel Truck	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1510	1.0270	1.0080	1.4730	0.126610	0.133510	0.282240	0.011641	0.013552
Passenger Stands	0.151	1.000	0.027	1.000	0.008	1.000	0.473	1.000	1.1359	1.0243	1.0072	1.4257	0.261257	0.133159	3.021600	0.012941	0.288562

Note:

- [8] Deterioration Factor = 1 + A x (GSE Age/GSE Lifespan)<sup>3</sup>
- [9] Adjusted Emission Index = Unadjusted Emission Index x Deterioration Factor
- [10] The diesel fuel sulphur content in 2031 is 11ppm in EDMS v5.1.4.1. As advised by the operator, the diesel fuel sulphur content for GSE is 50ppm. The SO<sub>x</sub> emission is adjusted by scaling factor 4.55 (50ppm/11ppm = 4.55).