



CMEIG ADVISORY NOTICE

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RATED LOADS FOR WHEEL LOADERS

The aim of this information paper is to clarify the main differences between the various standards used to determine rated loads for wheel loaders.

Load mass, material density, centre of gravity location as well as the mass of the attachment and coupler (if fitted) is included in the determination of the rated operating load and the size / capacity of the attachment.

It is important to understand which standard has been applied by a manufacturer when determining a rated load as it may affect the conditions under which a wheel loader can be operated.

BUCKET APPLICATIONS

Rated loads for wheel loaders fitted with buckets are covered by the following standards;

- **ISO 14397-1:2007** *Earth-moving machinery - Loaders and backhoe loaders - Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*
- **EN474-3-2006** *Earth-moving machinery – Safety – Part 3: Requirements for loaders.*
- **SAE J 818 – 2007** *Rated Operating Load for Loaders*

PLEASE NOTE: **ISO 20474-3:2008** discusses rated loads for wheel loaders fitted with buckets and refers to **ISO 20474-14:2008** for mandatory national and/or regional provisions however there are no specific provisions for Australia in relation to wheel loaders fitted with buckets. The following standards also covered rated loads for wheel loaders fitted with buckets but have now been withdrawn:

AS 2954.1-1988 *Earth-moving machinery – Rated loads and volumetric ratings – Rated operating load for crawler and wheel loaders*

ISO 5998:1986 *Earth-moving machinery; Rated operating load for crawler and wheel loader.*

A comparison of the standards used to determine rated loads for wheel loaders fitted with buckets is given in Table 1.

FORK APPLICATIONS

Rated loads for wheel loaders fitted with forks are covered by the following standards;

- **ISO 14397-1:2007** *Earth-moving machinery - Loaders and backhoe loaders - Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*
- **EN474-3-2006** *Earth-moving machinery – Safety – Part 3: Requirements for loaders.*
- **SAE J 1197– 2002** *Rated Operating Load for Loaders Equipped with Log or Material Forks without Vertical Mast.*

PLEASE NOTE: There are currently no Australian standards that cover rated loads for wheel loaders fitted with forks. **ISO 20474-3:2008** discusses rated loads for wheel loaders fitted with buckets and refers to **ISO 20474-14:2008** for mandatory national and/or regional provisions however there are no specific provisions for Australia in relation to wheel loaders fitted with forks.

A comparison of the standards used to determine rated loads for wheel loaders fitted with forks is given in Table 2.

LOG HANDLING APPLICATIONS

Rated loads for wheel loaders fitted with log grabs are covered by the following standards;

- **ISO 14397-1:2007** *Earth-moving machinery - Loaders and backhoe loaders - Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*
- **EN474-3-2006** *Earth-moving machinery – Safety – Part 3: Requirements for loaders.*
- **SAE J 1197– 2002** *Rated Operating Load for Loaders Equipped with Log or Material Forks without Vertical Mast.*

PLEASE NOTE: There are currently no Australian standards that cover rated loads for wheel loaders fitted with log grabs. **ISO 20474-3:2008** discusses rated loads for wheel loaders fitted with buckets and refers to **ISO 20474-14:2008** for mandatory national and/or regional

provisions however there are no specific provisions for Australia in relation to wheel loaders fitted with log grabs.

A comparison of the standards used to determine rated loads for wheel loaders fitted with log grabs is given in Table 3.

LIFTING APPLICATIONS

Rated loads for wheel loaders fitted with attachments used to lift suspended loads are covered by the following standards;

- **AS 1418.8-2008** *Cranes, hoists and winches – Special purpose appliances*
- **EN474-3-2006** *Earth-moving machinery – Safety – Part 3: Requirements for loaders.*

PLEASE NOTE: There is currently no SAE standard that covers rated loads for wheel loaders used to lift suspended loads. **ISO 20474-3:2008** discusses rated loads for wheel loaders used to lift suspended loads and refers to **ISO 20474-14:2008** for mandatory national and/or regional provisions. The specific provision for Australia in relation to wheel loaders used to lift suspended loads is compliance to Section 5 of **AS 1418.8-2008**.

A comparison of the standards used to determine rated loads for wheel loaders used to lift suspended loads is given in Table 4.

IMPORTANT: The use of wheel loaders to lift suspended loads is highly regulated within Australia. Please refer to the Occupational Health and Safety legislation applicable to your state or territory for further guidance.

Standard	Terminology	Description	Max Travel Speed	Operating Surface	Load Centre of Gravity (C.O.G) Location
ISO 14397-1:2007	Rated Operating Capacity	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Hard, substantially smooth and level	Centroid of ISO rated bucket volume
EN474-3-2006	Rated Operating Capacity	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Hard, substantially smooth and level	Centroid of ISO rated bucket volume
SAE J818 – 2007	Rated Operating Load	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	6 km/hr	Hard, moderately smooth and level	Centroid of SAE rated bucket volume

Table 1 – Rated Loads for Bucket Applications

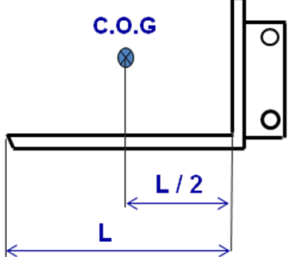
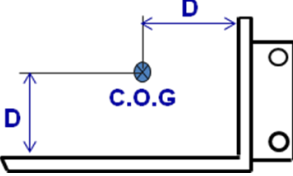
Standard	Terminology	Description	Max Travel Speed	Operating Surface	Load Centre of Gravity (C.O.G) Location												
ISO 14397-1:2007	Rated Operating Capacity	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Hard, substantially smooth and level	 <p>where L = fork tyne length</p> <p>PLEASE NOTE: Fork tynes must be in horizontal position.</p>												
EN474-3-2006	Rated Operating Capacity	60% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Rough terrain	 <table border="1"> <thead> <tr> <th>Load (N)</th> <th>D (mm)</th> </tr> </thead> <tbody> <tr> <td><10,000</td> <td>400</td> </tr> <tr> <td>10,000 – 50,000</td> <td>500</td> </tr> <tr> <td>50,000 – 100,000</td> <td>600</td> </tr> <tr> <td>100,000 – 200,000</td> <td>900</td> </tr> <tr> <td>>100,000</td> <td>1200</td> </tr> </tbody> </table> <p>PLEASE NOTE: Fork tynes must be in horizontal position.</p>	Load (N)	D (mm)	<10,000	400	10,000 – 50,000	500	50,000 – 100,000	600	100,000 – 200,000	900	>100,000	1200
		Load (N)	D (mm)														
<10,000	400																
10,000 – 50,000	500																
50,000 – 100,000	600																
100,000 – 200,000	900																
>100,000	1200																
80% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Firm and level ground															

Table 2 – Rated Loads for Fork Applications

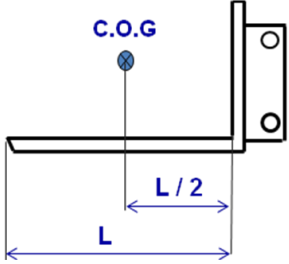
Standard	Terminology	Description	Max Travel Speed	Operating Surface	Load Centre of Gravity (C.O.G) Location
SAE J1197 – 2002	Rated Operating Load	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	6 km/hr	Hard, moderately smooth and level	 <p>where L = fork tyne length</p> <p>PLEASE NOTE: Fork tyne must be in horizontal position.</p>

Table 2 – Rated Loads for Fork Applications (continued)

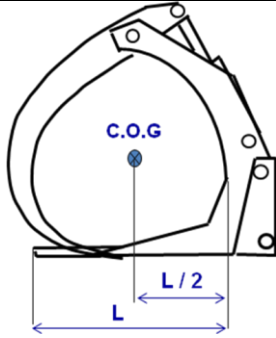
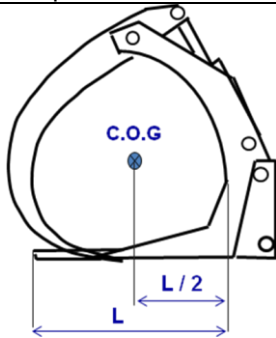
Standard	Terminology	Description	Max Travel Speed	Operating Surface	Load Centre of Gravity (C.O.G) Location
ISO 14397-1:2007	Rated Operating Capacity	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Hard, substantially smooth and level	 <p>where L = grab tyne length</p> <p>PLEASE NOTE: Grab tyne must be in horizontal position with clamp closed.</p>
EN474-3-2006	Rated Operating Capacity	75% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Rough terrain	 <p>where L = grab tyne length</p> <p>PLEASE NOTE: Grab tyne must be in horizontal position with clamp closed.</p>
		85% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Firm and level ground	

Table 3 – Rated Loads for Log Handling Applications

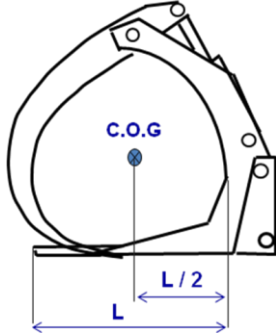
Standard	Terminology	Description	Max Travel Speed	Operating Surface	Load Centre of Gravity (C.O.G) Location
SAE J1197 – 2002	Rated Operating Load	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	6 km/hr	Hard, moderately smooth and level	 <p>where L = grab tyne length</p> <p>PLEASE NOTE: Grab tynes must be in horizontal position with clamp closed.</p>

Table 3 – Rated Loads for Log Handling Applications (continued)

Standard	Terminology	Description	Max Travel Speed	Operating Surface	Permissible Lift Point Locations	Load Centre of Gravity (C.O.G) Location
AS 1418.8-2008	Rated Capacity	50% of the tipping load OR 100% ¹ of the hydraulic lift capacity (whichever gives the lesser result)	As specified by the manufacturer on the load chart	As specified by the manufacturer on the load chart	Lifting lug located on the boom, bucket or coupler as specified by the manufacturer	Through lifting lug at maximum achievable reach
EN474-3-2006	Rated Operating Capacity	50% of the tipping load OR 100% of the hydraulic lift capacity (whichever gives the lesser result)	15 km/hr	Hard, substantially smooth and level	As specified by the manufacturer	Through load hooking point at reaches as specified by the manufacturer

Table 4 – Rated Loads for Lifting Applications

¹ AS 1418.8 Section 5 Clause 5.6 and 5.7.6 relate to hydraulic excavators and the backhoe portion of backhoe loaders, whereby one of the limiting factors is 87% of hydraulic lift capacity. This only relates to slewing machines, and the standard will be amended to reflect this applicability.