

MILOP Design and Consulting Pty Ltd

Mechanical and steel structure engineering, design & consulting. Concrete pumping equipment, tower cranes, inspection and certification. Professional engineer
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Callaghan Concrete Pumps Pty Ltd
17 Econo Place
SILVEDALE, NSW 2752

Attn. Brian Callaghan

26/03/2015



RE: Concrete Boom Pump, CP 24 ZX, Inspection and Lifting Lugs Capacity Certification Report no: 646/15, 26/03/2015

A visual inspection of the concrete boom pump CCP 24m has been carried out on 24/03/2015 in the yard of the manufacturer. The report presents assessment and certification of the capacity of the lifting lugs for the lifting of the complete machine.

Concrete boom pump's specifications:

Boom and pump manufacturer:	Callaghan Concrete Pumps / KCP
Model and size	CP 24 ZX / M24 2014
Boom / pump serial number:	027
Year of manufacture:	2014.12
Oil Pressure, max	300 bars
Concrete pressure, max	69 bar
Concrete output, max	81 m ³ /h
Work Cover Reg. number:	
Truck rego plate	WCP 024

The concrete pump manufacturer supplied data in regards to the truck mass:

Concrete boom pump mass,	23.0 tonne
Truck wheel base	4.60 m
Truck front axle load	6.0 tonne
Truck rear axle load	17.0 tonne



Figure 1. Concrete boom pump CP 24ZX

Lugs Load

The inspected concrete boom pump is shown on the Figure 1.

During the inspection the following dimensions are taken:

- Distance front lifting lug from front axle 0.85m
- Distance rear lifting lug from mid of the buggy 1.40 m

The lifting lugs are incorporated in the chassis of the concrete boom pump, Figure 2 and Figure 3. In accordance to above data and dimensions the following loads on the lifting lugs are calculated. It is assumed the mass on the truck is equally distributed on the left and right hand side of the truck.

- Front lifting lug: 56.9 kN (5.80 tonne) per lug.
- Rear lifting lug: 55.9 kN (5.70 tonne) per lug.

This is a vertical force on the lug. Certainly, the force in the chain will be increased by factor of the chain angle (factor is $1/\cos\alpha$, where is α angle of the chain to vertical plane, angle of 30 deg to vertical plane will increase load in the chain for 15.5%, chain angle 45 deg will increase load 41%)

Lugs capacity

Lugs dimensions are:

- Front lug plate: ID/OD/ Plate thickness dia 60/140/ 20 mm
- Rear lug plate ID/OD/ Plate thickness dia 50/110/ 30 mm

The steel grade of the plate is assumed as minimum, yield stress 200 MPa.
(if grade of the steel cannot be confirmed, in accordance to AS).

The minimum design lug capacity for above data (for yield stress 200 MPa) is:

- Front lug: 96 kN (9.8 tonne) per lug.
- Rear lug: 94 kN (9.6 tonne) per lug.

It should be noted that above lugs capacity is calculated for steel grade 200 MPa, and its factor of safety for rupture is greater than 3.0. This means the lug breakage could occur at the load 30 tonne, per lug.



Figure 2. Front LH and RH lifting lugs

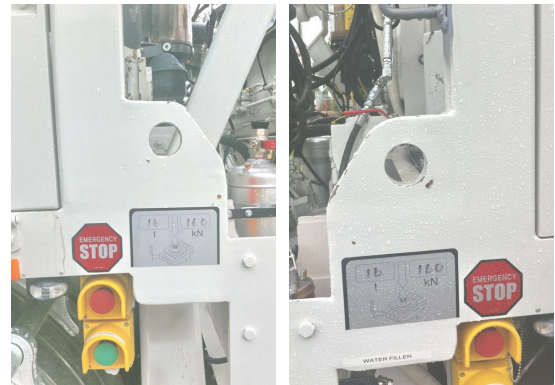


Figure 3. Rear LH and RH lifting lugs.

Conclusion

Based on the visual inspections of structural components and lifting lugs of the concrete boom pump and conducting calculations of the loads and lugs capacity I certify there is no reason why above concrete boom pump should not be lifted by a crane and the attached chains on the lugs.

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*) Michael Podinic, professional engineer, member of The Institution of Engineers Australia, membership no: 1047610, more than 25 years experience in development, design, analysis and certification of a concrete pumping equipment, heavy machinery, tower cranes, mobile drilling equipment, and other mechanical machinery.
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