

15 December 2014

Engineering Report: ER14018.1

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Company: MFB Products

Site Address: 105 Lewis Road, Wantirna South, VIC. 3152

Outline

To determine the Working Load Limit calculations for Cabinet Lifting devices in accordance with AS4991-2004 Lifting devices.

Details

Proof Testing of 4 types of inserts. (Testing to be completed on machine calibrated in accordance with AS2193 to grade C requirements, lab procedures to comply with AS/ISO/IEC 17025).

Test 1– S2005/S280 mild steel eyelets inserted into steel chassis with ferrules (Part No 02082-51).

This test was a proof test of the complete assembly. The test was conducted to indicate maximum loading without undergoing plastic deformation. The results of this test were the complete assembly was loaded with a proof load of 800kg and this was maintained for a period of 15 minutes. There was permanent deformation of the steel chassis around the inserts. **Results would indicate a WLL of 400kg.**

Test 2 – S280 Stainless steel eyelets inserted into steel chassis with bushes and M8 nut and bolt (Part No 02082-50).

This test was a proof test of the complete assembly. The test was conducted to indicate maximum loading without undergoing plastic deformation. The complete assembly was loaded with a proof load of 800kg and this was maintained for a period of 15 minutes. There was permanent deformation of the steel chassis around the inserts. **Results would indicate a WLL of 400kg.**

Test 3 – 10mm forged eyelets (OD45mm).

This test was a proof test of the eyelet only. The test was conducted to indicate maximum loading without undergoing plastic deformation. A single eyelet was secured into a solid steel block and then loaded with a proof load of 500kg and this was maintained for a period of 15 minutes. There was a small amount of deformation but elastic limit was not exceeded. **Results would indicate a WLL of 250kg per eyelet – or 1000kg for a set of 4 eyelets**

Test 4- 10mm Stainless steel eyelets (Part code EBX-10).

This test was a proof test of the eyelet only. The test was conducted to indicate maximum loading without undergoing plastic deformation. A single eyelet was secured into a solid steel block and then loaded with a proof load of 900kg and this was maintained for a period of 15 minutes. There was a small amount of deformation but elastic limit was not exceeded. **Results would indicate a WLL of 450kg per eyelet – or 1800kg for a set of 4**

Test 5 – RF/S280 Spreader plate and arms assembly (Part No 03302-01)- (with High Tensile bolts substituted) together with D-shackles supplied.

This test was a proof test of the assembled Spreader/Arms and D-shackles. The test was conducted to indicate maximum loading without undergoing plastic deformation. A strapped pack of steel with a proof load of 4800kg was attached to the D-shackles and this was maintained for a period of 15 minutes. There was a small amount of deformation on the arms but elastic limit was not exceeded. **Results would indicate a WLL of 2400kg for the Spreader rig and a minimum 600kg for the D-shackles.**

Test 6- 8mm S2005/S280 (Dwg 02082-50) mild steel eyelets

This test was a proof test of the eyelet only. The test was conducted to indicate maximum loading without undergoing plastic deformation. A single eyelet was secured into a solid steel block and then loaded with a proof load of 850kg and this was maintained for a period of 15 minutes. There was a small amount of deformation but elastic limit was not exceeded. **Results would indicate a WLL of 425kg per eyelet – or 1700kg for a set of 4**

Test 7- 10mm S2005/S280 (Dwg 02082-51) mild steel eyelets

This test was a proof test of the eyelet only. The test was conducted to indicate maximum loading without undergoing plastic deformation. A single eyelet was secured into a solid steel block and then loaded with a proof load of 970kg and this was maintained for a period of 15 minutes. There was a small amount of deformation but elastic limit was not exceeded. **Results would indicate a WLL of 485kg per eyelet – or 1940kg for a set of 4**

Load Ratings

The Working Load Limit for these lifting systems is as follows:-

Working Load Limit 400 kg

Risk Assessment of Lifting duty

Designed for purpose of lifting cabinets onto and off transport, locating cabinets into place. The system has been designed to withstand a minimum of 20,000 lifting cycles. The Spreader plate and arms are designed to be adjustable to fit onto multiple sized cabinets.

Risks identified / Ratings

1. Injury caused by lifting spreader plate assembly. *Risk Rating – Medium.*
2. Injury caused by attaching shackles to eyelets. *Risk Rating – Low.*
3. Injury caused by items falling from cabinet whilst lifting. *Risk Rating – High.*
4. Injury caused by unstable loading conditions. *Risk Rating – Very High.*

Risk Ratings after control measures

1. Reduced to Low.
2. Reduced to Low.
3. Reduced to Medium.
4. Reduced to High.

Safety Precautions

The following control measures and operating procedure **MUST** be adhered to:

1. Lifting devices are **NOT AT ANY TIME** to be used for the movement of people.
2. Pre operation inspection must be conducted to ensure no damage to any component; to check date of last full inspection (if over 12 months **DO NOT USE**); to check load of cabinet does not exceed Working Load Limit.
3. A log of usage should be completed with every lift recording lift date and load.
4. The work area must be visually inspected to detect potential hazards before moving the cabinet.
5. The spreader plate assembly must be attached to the mechanical lifting device (forklift or crane) before being lifted into place to connect with the cabinet lifting lugs (eyelets), if manual lifting is the only option – then this must be carried out by a minimum of two personnel.
6. The load must be lifted gradually to avoid a sudden strong jerk to cabinet or lifting device.
7. The operator must make sure that no materials, tools, etc. have been left on top of the cabinet to be lifted.
8. Ensure that no people are in the area of influence of the lifting system before moving the load.
9. Never allow people to stand below a suspended load and never swing a load out over people.
10. Never leave the mechanical lifting device (forklift or crane) while the motor is running or a load is suspended.

11. Any job involving the movement of loads at heights must be indicated with signs on the ground and on its four sides. For this purpose, signs or barriers must be placed warning about the possibility of objects falling to the ground.
12. A spotter must be used to help the operator of the mechanical lifting device to avoid any collisions and to assist in an emergency situation.
13. Shackles that are bent, distorted, or worn in the crown or pin by more than 10% of their original diameter shall be removed from service.

Note: This Safe Operating Procedure must be reviewed:

- a) after any accident, incident or near miss;
- b) when training new staff;
- c) if adopted by new work group;
- d) if equipment, substances or processes change; or
- e) within 5 years of date of issue.

Equipment Markings

Marking of equipment can be done in two ways.

The first is to mark the actual surface of the equipment – by etching / engraving / stamping or painting the following information:-

1. In Compliance with AS4991-2004 Lifting Devices
2. Identification of manufacturer
3. Identification number
4. Date of manufacturer
5. Working Load Limit in kilograms.

The second method is to attach a non-corrosive tag to the equipment with the same information as listed above.

Information of use for end users

A method of use or operational procedure must be included for end users (including assembly drawing), together with Guidance for maintenance, terms of use including an inspection list before each use, how often a full inspection is required and what record keeping should be kept.

Guidance for Maintenance

Scheduled maintenance shall be done every 12 months by a competent person.

Defects requiring withdrawal from service:

1. Markings detached or illegible
2. Cuts, nicks, gouges, cracks, excessive corrosion, heat damage, bent or distorted components
3. Signs of overloading.

Lifting devices having any defects shall be clearly marked to indicate rejection and withdrawn from service.

Repairs

If any component has been found with defects the said item shall be disposed of in a manner so that it cannot be used again. A replacement part from MFB Products (manufacturer) shall be sourced. Assembly should be as per manufacturer's assembly drawing.

Verification and Inspections

Inspections shall be undertaken in an adequately lit location. Device to be cleaned before inspection. Any worn components shall be measured to determine the degree of wear which shall not exceed 10% of original thickness in any plane. All components shall be inspected for any sign of wear at their load bearing or high stress points. Signs of wear include cuts, nicks, gouging, cracks, stretching or distortion.

Examine the system before use to ensure no defects have affected any part of the device.

If any of the following defects are visible, the lifting device shall be tagged with a "Do Not Operate" tag, withdrawn from service and referred to a competent person.

Markings that have become detached or illegible. In such cases the lifting device may be returned to service after being assessed by a competent person that it:-

- i. Is in good condition; and
 - ii. Has been remarked following verification of its identity and capacity.
- a) Cuts, nicks, gouges, cracks, excessive corrosion, heat damage, bent or distorted components or any other defects; and
 - b) Signs of overloading, such as any visible deformation of components.

Any Damage incurred, however minor shall be reported so that its effect on safety can be immediately assessed. Check that the Working Load Limit is clearly marked

& that these loads are not exceeded. This lifting device shall not be altered to deviate from the system as supplied (and as per assembly drawing (Part No 03302-01)). Any physical alterations to components should not be made without approval from certified engineer. Inspections should be carried out at least once every 12 months.

Recommendations

As the working load limit specified is based on the lowest performing component, the WLL could be increased easily by increasing the strength of the cabinet top where the inserts for the eyelets are mounted. This could be done by inserting webbing of the same material into each corner diagonally thus doubling the thickness of material where the test rigs exceeded elastic limit deformity. I would estimate this would increase the WLL by approximately 30%.

Compliance Certificate

Once all of the documentation and markings required has been checked & verified I will be able to issue a AS4991-2004 compliance certificate.

Please do not hesitate to contact me if you require clarification on any point of this report.

Yours faithfully,



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Member of National Safety Council of Australia, Professional Engineers Australia,
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