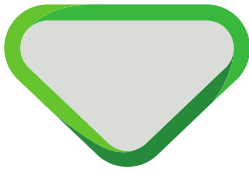


## Report EU-type examination

Report belonging to EU-type examination certificate number	: NL19-400-1002-263-03
Date of issue of original certificate	: 05-03-2019
Certificate applies to	: Safety component
Revision number / date	: 1 / 23-03-2022
Requirements	: Lifts Directive 2014/33/EU Standards: EN 81-20:2020, EN 81-50:2020 EN 81-1:1998+A3:2009
Project number	: P220117

### 1. General specifications

Description of the product	: Brake as Ascending Car Overspeed protection (ACOP) to prevent uncontrolled upward movement of the car and as Unintended Car Movement Protection (UCMP) means
Trademark	: Suzhou Mona Drive
Type no.	: EMM 600-2x750 Nm
Name and address of the manufacturer	: Suzhou Monadrive Equipment Co.,Ltd. (Shanghai) No.66 Changfengdang Road, Lili Town, Wujiang District, Suzhou City, 215200 P.R. China.
Laboratory	: SISE, No.6, Chuangye Road, near Shunchengji Industrial park, Qinghu Dahe Road, New Longhua District, Shenzhen, P.R. China
Data of examination	: March 2022
Examination performed by	: A.Santoe, T.Goktas



## 2. Description safety component

The Suzhou Monadrive EMM600-2x750 Nm is a brake that consists of two independent electro-mechanical disc brakes built in one housing. The brake has one brake disc and a split anchor, which fulfils the requirements for lift brakes according to clause 5.9.2.2.2 of EN 81-20:2020 and is mounted to a Mona320 gearless machine.

The brake can have either one common coil or two separate coils in the housing allowing separate electrical opening of the two brake halves.

The brake parts act on the same shaft as the traction sheave. The shaft and the connection from the brake and traction sheave to the shaft, by key-keyway and spline connections, are proven to have sufficient strength and built in redundancy. The brakes are also used as holding brakes during normal operation of the lift. The brake torque is determined by the diameter of the brake and the applied number of springs and cannot be adjusted in the field. The friction disc has friction lining extending to both sides of the disk.

### ACOP

The Ascending Car Overspeed Protection shall be actuated by a governor overspeed contact or an equivalent EU-type tested device which was no part of this investigation.

### UCMP

The brake can be used as braking element for Unintended Car Movement Protections according clause 5.6.7 of EN 81-20:2020.

The brake torque for each type is pre-determined in the factory by application of a fixed amount of guided compression springs. The torque is indicated on a label attached to the brake. This setting is sufficient until the air gap between magnetic core and brake lining exceeds 0,60 mm. Each brake part is separately provided with a monitoring contact. The controller of the lift in which these brakes are used, must check the signals from each brake contact according to clause 5.6.7.9 of EN 81-20:2020. If a failure is detected, the lift must be put out of service permanently.

The brake delay times  $t_{10}$  and/or  $t_{90}$  as indicated in this report shall be used to check by means of calculation that the stopping distance of the car fulfils the requirements.

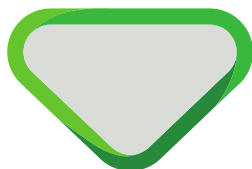
$t_{10}$  means the time from activation until the moment that 10% of the nominal brake torque has been reached and  $t_{90}$  means the time from activation until the moment that 90% of the nominal brake torque has been reached.

A value of brake delay time between  $t_{10}$  and  $t_{90}$  can be interpolated if needed.

The defined and calculated nominal torque per brake is the minimum guaranteed torque under the conditions which the manufacturer prescribes during the lifetime of the brake.

### Brake Coil Connections

A brake connection box is mounted on top of the machine. It has a 110VDC input from a rectifier inside the lift control panel. Main contactors are on the DC side.



### BRAKE DATA

Manufacturer	Suzhou Monadrive Equipment Co.,Ltd.
Type	EMM600
Number of friction surfaces	2
Number of brake springs	2 x 10
Spline connection module / # teeth	2 / 28
Outer diameter of brake friction [mm]	245
Inner diameter of brake friction [mm]	185
Nominal Air gap [mm]	0,2-0,5
Max allowed tripping speed	278 rpm
Nominal torque	2 x 750 Nm
Exciting / holding voltage [VDC]	110 / 110
t-10 (maximum value measured)	54 msec
t-90 (maximum value measured)	280 msec

### TRACTION MACHINE APPLICATION DATA

Machine type Suzhou Monadrive	Mona320
Q=Nominal capacity range [kg]	320-1150
P=Car mass range [kg]	400-1600
Rated torque [Nm]	630
Roping factor	2:1
Traction sheave diameter [mm]	320
Max. rpm traction sheave /speed lift	209 rpm / 1,75 m/s
Max. tripping rpm/speed ACOP	278 rpm / 2,16 m/s
Max. allowed lift inertia ACOP [kgm <sup>2</sup> ]	40

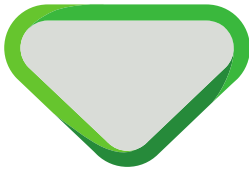
See annex 1a, 1b, 1c for a general overview of the product.

## 3. Examinations and tests

The examination covered a check whether compliance with the Lifts Directive 2014/33/EU is met, based on the harmonized product standards EN 81-20:2020 and EN 81-50:2020.

The examination included:

- Examination of the technical file (See annex 2):
- Check of performed calculations according to EN 81-20 and EN 81-50.
- Examination of the representative model in order to establish conformity with the technical file.
- Inspections and tests to check compliance with the essential requirements of the EN 81-50 clause 5.7 and 5.8 at Shenzhen Institute of Special Equipment Inspection and Test (SISE), witnessed on site by Liftinstituut. SISE is an this ISO 17025 accredited laboratory.
- Tests to verify the required monitoring according to clause 5.6.7.3 of EN 81-20.



- The machine was placed on a test stand with a coupling to an intermediate shaft with a torque meter. (See annex 1d). On the other side of this intermediate shaft is an electric driving motor with overrated power to the shaft. The torque is stored as a function of time with a digital oscilloscope.
- The torque meter was calibrated in advance by an ISO 17025 accredited laboratory.
- The test stand is provided with additional flywheels that can be coupled to the setup but the inertia of the test stand on its own ( $> 40 \text{ kgm}^2$ ) was found to be more than the maximum inertia for the application range defined for the ACOP for these traction machines.
- The electromotor is run with high torque at the highest speed anticipated before deceleration occurs (tripping rpm's of the brake). These maximum tripping rpm's are calculated based on the maximum tripping speed of the applied overspeed governor, which overspeed tripping contact activates the brake as ACOP. After constant speed is reached, the brake holding voltage is cut and the brake set is applied until the machine has come to a full stop, while the electromotor continues giving the unbalance torque calculated from the maximum allowed unbalance for the applicable machine. This test is done 10 times in clockwise direction and 10 times in counter clock wise direction with the complete brake.
- The results of the torque measurement has been recorded and studied. From these results the dynamic torque and the reaction times  $t_{10}$  and  $t_{90}$  have been established. Also the functioning of the monitoring contacts has been tested. Immediately after each test the temperature of the brake housing and brake discs was checked.
- The test has been performed with brake contactors on the DC side. DC values for each brake are mentioned in chapter 2 of this report. The power to the brake shall always be interrupted on DC side to ensure the specified delay times.

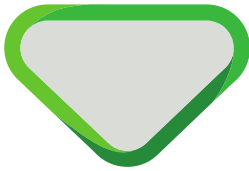
## 4. Results

### 4.1. Calculations

Calculations of the maximum torque of the machine/system and brake torque were checked and found in order.

Brake clutch surface pressure calculations and brake spring calculations were checked and found in order.

The strength calculations of the key, keyway connection between the traction sheave and the drive shaft and the strength calculations of the spline connection between the brake and the drive shaft and the drive shaft itself were checked and found in order. Calculations of acceleration, retardation and stopping distances were checked and found in order.



#### 4.2. Measurements

The tests on the test bench showed that the measured torque of the brake was significantly higher than the calculated torque by the manufacturer and that the brake is capable of absorbing sufficient kinetic energy.

After the final examination the product and the technical file were found in accordance with the requirements.

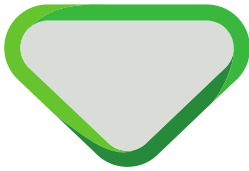
## 5. Conditions

Additional to or in deviation of the applicable demands in the considered requirements / standards (see certificate and/or page 1 of this report), the following conditions shall be taken into account:

- The application of this certificate is limited to the brakes mentioned in chapter 2 The brake consists of two independent electro-mechanical disc brakes with one common housing and one brake disk and fulfil the requirements for lift brakes according clause 5.9.2.2.2 of EN 81-20:2020.
- Lifts to be built according EN 81-20 shall fulfil clause 5.9.2.2.2.7 allowing that it is possible to test each brake set independently from outside of the well.
- This brake set can be used as braking element for an Ascending Car Overspeed Protection and as braking element for an Unintended Car Movement Protection according EN 81-20:2020.
- For Ascending Car Overspeed Protection the tripping speed of governor contact shall be according clause 5.6.6 of EN 81-20:2020.
- Any controller shall take the lift out of service when a fault in the correct lifting and dropping of the brake parts occurs.
- The Suzhou Monadrive document "Installation and Maintenance manual" must be provided with every brake/machine, in order to make the correct installation and maintenance.
- The installer of the lift needs to define the final complete UCMP solution taking into account the key-parameters of the machine with EMM600, 2x750 Nm brake, as UCMP stopping means.

An additional calculation shall be done to check whether the deceleration and stopping distance of the car is within the limits as required by EN 81-20:2020.

- In case of no releveing and no pre-door opening condition, there is no need of any additional safety devices for unintended car movement protection, but only where this brake is mounted on a gearless machine. The controller of the lift must check the signal from the brake monitoring contacts. If a failure is detected, the lift must be put out of service. Its release or the reset of the lift shall require the intervention of a competent person.

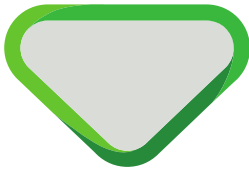


- The air-gap around the disc brake shall be covered by a rubber band, to prevent dirt from entering.
- The brake must be interrupted at the DC side of the brake connection to ensure the specified delay times  $t_{10}$  and  $t_{90}$ .
- The components are according the descriptions of chapter 2 in this report. suitability of the brake-machine combination shall be proven. The key, keyway connection between the traction sheave and the drive shaft, the spline connection between the brake and the drive shaft and the drive shaft itself shall meet the strength and fatigue requirements and the maximum speeds shall be within the brake certificate limits.

## 6. Conclusions

Based upon the results of the EU-type examination, Liftinstituut B.V. issues an EU-type examination certificate.

The EU-type examination certificate is only valid for products which are in conformity with the same specifications as the type certified product. The certificate is issued based on the requirements that are valid at the date of issue. In case of changes of the product specifications, changes in the requirements or changes in the state of the art the certificate holder shall request Liftinstituut B.V. to reconsider the validity of the certificate.



## 7. CE marking and EU Declaration of conformity

Every safety component that is placed on the market in complete conformity with the examined type must be provided with a CE marking according to article 18 of the Lifts Directive 2014/33/EU under consideration that conformity with eventually other applicable Directives is proven.

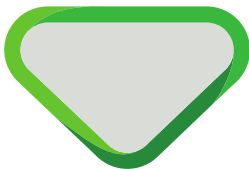
Also every safety component must be accompanied by an EU declaration of conformity according to annex II of the Directive in which the name, address and Notified Body identification number of Liftinstituut B.V. must be included as well as the number of the EU-type examination certificate.

An EU type-certified safety component shall be random checked e.g. according to annex IX of the Lifts Directive 2014/33/EU before these safety components may be CE-marked and may be placed on the market. For further information see regulation 2.0.1 'Regulations for product certification' on [www.liftinstituut.com](http://www.liftinstituut.com).

Prepared by:

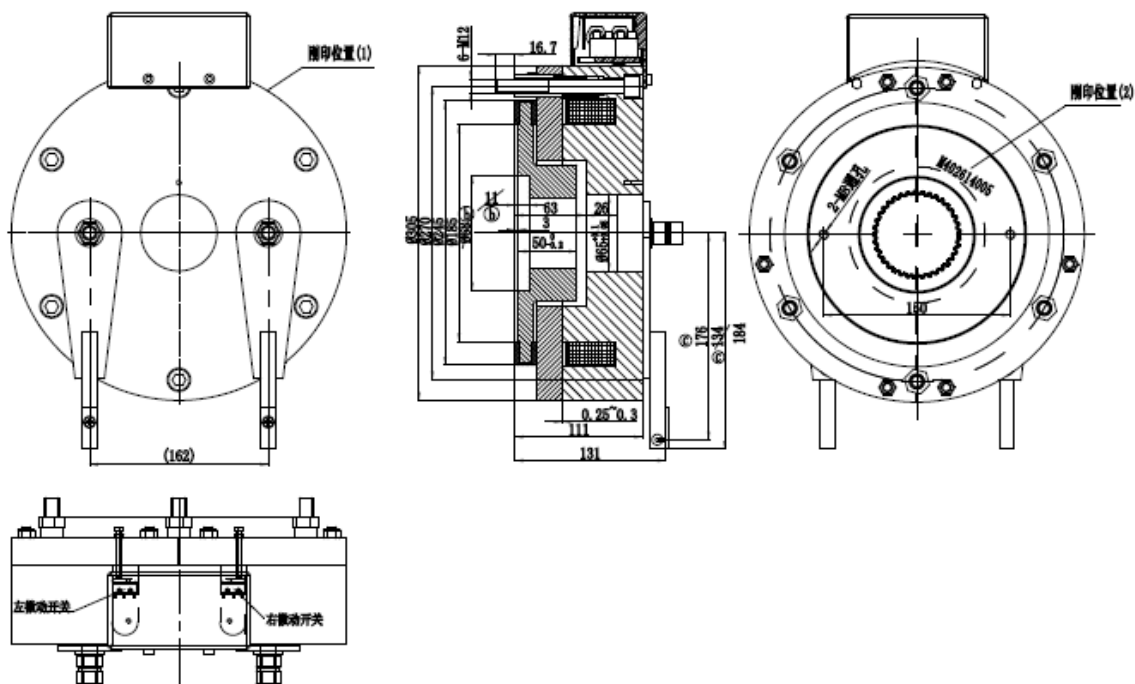
Azaad Santoe  
Product specialist Certification

Certification decision by:

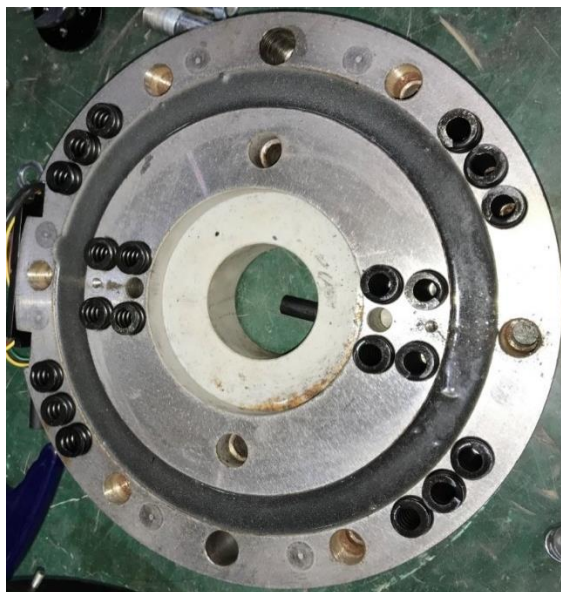


# Annexes

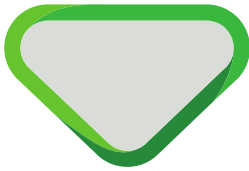
## Annex 1a Outline drawing of EMM600-2x750 Nm brake



## Annex 1b Brake springs alignment

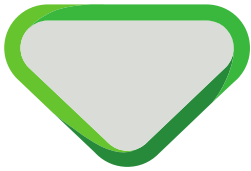






Annex 1c EMM600 on a MONA320 machine



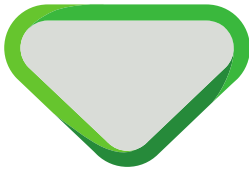


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Annex 1d Test stand with EMM600-2x750 Nm brake and Mona320 traction machine





Annex 2. Documents of the Technical File which were subject of the examination

Title	document number	date
Design calculations	Annex.4.9	26-02-2019
Technical drawings	Annex.4.4	28-12-2018
Risk Analysis	Annex.4.8	29-01-2019
Manuals	Annex.4.5	28-12-2018

Annex 3. Reviewed deviations from the standards

No deviation from the standard.

Annex 4. Revision of the certificate and its report

Rev.:	Date	Summary of revision
-	05-03-2019	Original
1	23-03-2022	Updated to EN 81-20:2020 and EN 81-50:2020