

Report EU-type examination

Report belonging to EU-type examination certificate number : NL17-400-1002-263-01
Date of issue of original certificate : 17-11-2017
Certificate applies to : Safety component
Revision number / date : 6 / 26-11-2023
Assessment basis : Lifts Directive 2014/33/EU
Standards:
EN 81-20:2020, EN 81-50:2020,
EN 81-1:1998+A3:2009
Project number : P230349

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

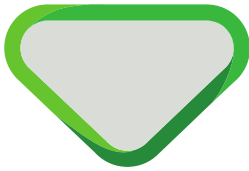
Trademark : MONADRIVE

Type no. :

Brake type	EMK7K	EMK9K	EMK12K
Brake torque	2x425 Nm	2x975 Nm	2x2150
Machines for 2:1 traction ratio	MCK100	MCK200; MCB100; MCB200	MCK300; MCK500
Machines for 4:1 traction ratio	-	MCK200	MCK300; MCK500

Name and address of the manufacturer : Suzhou Mona Drive Equipment Co.,Ltd.
(Shanghai)
No.66 Changfengdang Road, Lili Town,
Wujiang District, Suzhou City, 215200
P.R. China.

Laboratory : SIOS, No.6, Chuangye Road, near Shunchengji
Industrial park, Qinghu Dahe Road, New
Longhua District, Shenzhen, P.R. China



Address of examined safety component : Suzhou Mona Drive Equipment Co.,Ltd. (Shanghai)
No.66 Changfengdang Road, Lili Town, Wujiang District, Suzhou City, 215200 P.R. China.

Date of examination : November 2023

Examination performed by : E. Akcay/M. Issa

2. Description safety component

The Suzhou Mona Drive EMK7K-2x425 Nm, EMK9K-2x975 Nm and EMK12K-2x2150 Nm are brakes that consist of two independent electro-mechanical block brakes, which fulfils the requirements for lift brakes according to clause 5.9.2.2.2 of EN 81-20:2020 mounted to gearless machines as displayed in the below table traction machine application data.

The brake parts act on the traction sheave (e.g. on the brake drum that is bolted to the traction sheave directly by bolts), connected to the drive shaft by key and keyway. In that case, the connections are proven to have built-in redundancy. The brakes are also used as holding brakes during normal lift operations. The brake lining is glued to the brake shoes and the shoes are bolted to the base.

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

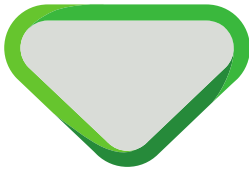
The brake can be used as a braking element for Unintended Car Movement Protections according to clause 5.6.7 of EN 81-20:2020.

The brake torque for each type is pre-determined in the factory by the 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

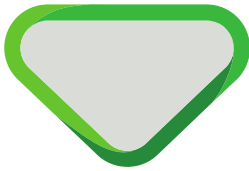
A brake connection box is mounted on top of the machine. It has a 110VDC input from a rectifier inside the lift control panel. Main contactors are on the DC side.

BRAKE DATA

Manufacturer	Suzhou Mona Drive Equipment Co.,Ltd.		
Type	EMK7K	EMK9K	EMK12K
Number of friction surfaces	2	2	2
Number of brake springs	2 x 10	2 x 4	2 x 8
Air gap between brake sheave and brake shoe [mm]	0,2-0,5	0,2-0,5	0,2-0,5
Max allowed tripping speed	278 rpm	308 rpm	257 rpm
Nominal torque	2 x 425 Nm	2 x 975 Nm	2 x 2150 Nm
Exciting / holding voltage [VDC]	110 / 110	110 / 110	110 / 110
t-10 (maximum value measured)	39 msec	53 msec	42 msec
t-90 (maximum value measured)	100 msec	147 msec	74 msec

TRACTION MACHINE APPLICATION DATA FOR TRACTION RATIO 2:1

Machine type Suzhou Mona Drive	MCK100	MCB100	MCK200	MCB200	MCK300	MCK500
Q=Nominal capacity range [kg]	320-630	320-630	320-1150	320-1150	630-1600	630-2000
P=Car mass range [kg]	400-1100	400-890	400-1600	400-1600	750-2280	750-2400
Rated torque [Nm]	340	320	780	780	1110	1660
Roping factor	2:1	2:1	2:1	2:1	2:1	2:1
Brake sheave diameter [mm]	398	509	525	680	667	667
Traction sheave diameter [mm]	320	320	400 / 450	400 / 480	400 / 480	480
Max. rpm traction sheave /speed lift	209 rpm / 1,75 m/s	209 rpm / 1,75 m/s	239 rpm / 2,5 m/s	239 rpm / 2,5 m/s	199 rpm / 2,5 m/s	199 rpm / 2,5 m/s
Max. tripping rpm / speed ACOP	278 rpm / 2,33 m/s	278 rpm / 2,33 m/s	308 rpm / 3,225 m/s	308 / 3,225 m/s	257 rpm / 3,225 m/s	257 rpm / 3,225 m/s
Bolted connection traction sheave - brake disc	8 x M12	6 x M10	8 x M12	6 x M12	6 x M16	6 x M16
Max. allowed lift inertia ACOP [kgm ²]	40	40	40	40	40	40



TRACTION MACHINE APPLICATION DATA FOR TRACTION RATIO 4:1

Machine type Suzhou Mona Drive	MCK200	MCK200	MCK300	MCK500
Q=Nominal capacity range [kg]	1260-2300	1260-2000	1260-3200	1260-4000
P=Car mass range [kg]	1500-3200	1500-2800	1500-4560	1500-4800
Rated torque [Nm]	780	780	1110	1660
Roping factor	4:1	4:1	4:1	4:1
Brake sheave diameter [mm]	525	525	667	667
Traction sheave diameter [mm]	400	450	400 /450 /480	480
Rpm traction sheave /speed lift	239 rpm / 1,25 m/s	212 rpm / 1,25 m/s	199 rpm / 1,25 m/s	199 rpm / 1,25 m/s
Max. tripping rpm / speed ACOP	336 rpm / 1,76 m/s	299 rpm / 1,76 m/s	280 rpm / 1,76 m/s	280 rpm / 1,76 m/s
Bolted connection traction sheave - brake disc	8 x M12	8 x M12	6 x M16	6 x M16
Max. allowed lift inertia ACOP [kgm ²]	20	20	20	20

See annex 1 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.

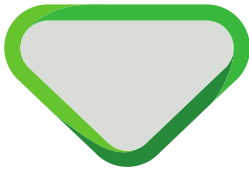
The examination included:

- Examination of the technical file (See annex 2):
- Check of performed calculations according to EN 81-20:2020 and EN 81-50:2020.
- 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 81-50:2020; clauses 5.7 and 5.8 at Shenzhen Institute of Special Equipment Inspection and Test (SIOS).

All results are described in the following SIOS Test Reports:

	EMK7K	EMK9K	EMK12K
ACOP	2022AF1076	2022AF0836	2022AF0837
UCMP	2022AF0798	2022AF1002	2022AF0977

Liftinstituut recognizes the tests and the results by this ISO 17025 accredited laboratory.



- Tests to verify the required monitoring according to clause 5.6.7.3 of EN 81-20:2020.
- 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 clockwise 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

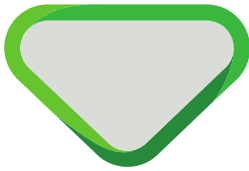
4.1 Calculations

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 connecting bolts between the brake disc and traction sheave were checked and found in order.

Calculations of acceleration, retardation and stopping distances were checked and found in order.



4.2. Measurements

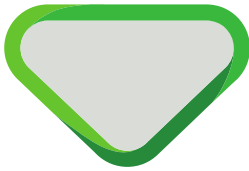
The tests on the test bench showed that the measured torque of the brake was significantly higher than the calculated torque by the manufacturer and that the brake is capable of absorbing sufficient kinetic energy.

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 used as brake set for lift applications. Each brake set consists of two independent electro-mechanical block brakes and fulfil the requirements for lift brakes according to clause 5.9.2.2.2 of EN 81-20:2020.
- Lifts to be built according EN 81-20:2020 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 Mona Drive 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 MCK100 machine with EMK7K brake, MCB100, MCB200 and MCK200 machine with EMK9K brake or the MCK300 and MCK500 machine with EMK12K 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 releveling 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 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 to the descriptions of chapter 2 in this report.



6. Conclusions

Based upon the results of the EU-type examination and the Test reports of SIOS, 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 Lift 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.

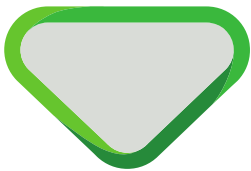
An EU type-certified safety component shall be random checked e.g. according to annex IX of the Lift directive 2014/33/EU before these safety components may be CE-marked and may be placed on the market. For further information see regulation 2.0.1 'Regulations for product certification' on www.liftinstituut.com.

Prepared by:

Mohamed Issa
Product Specialist Certification

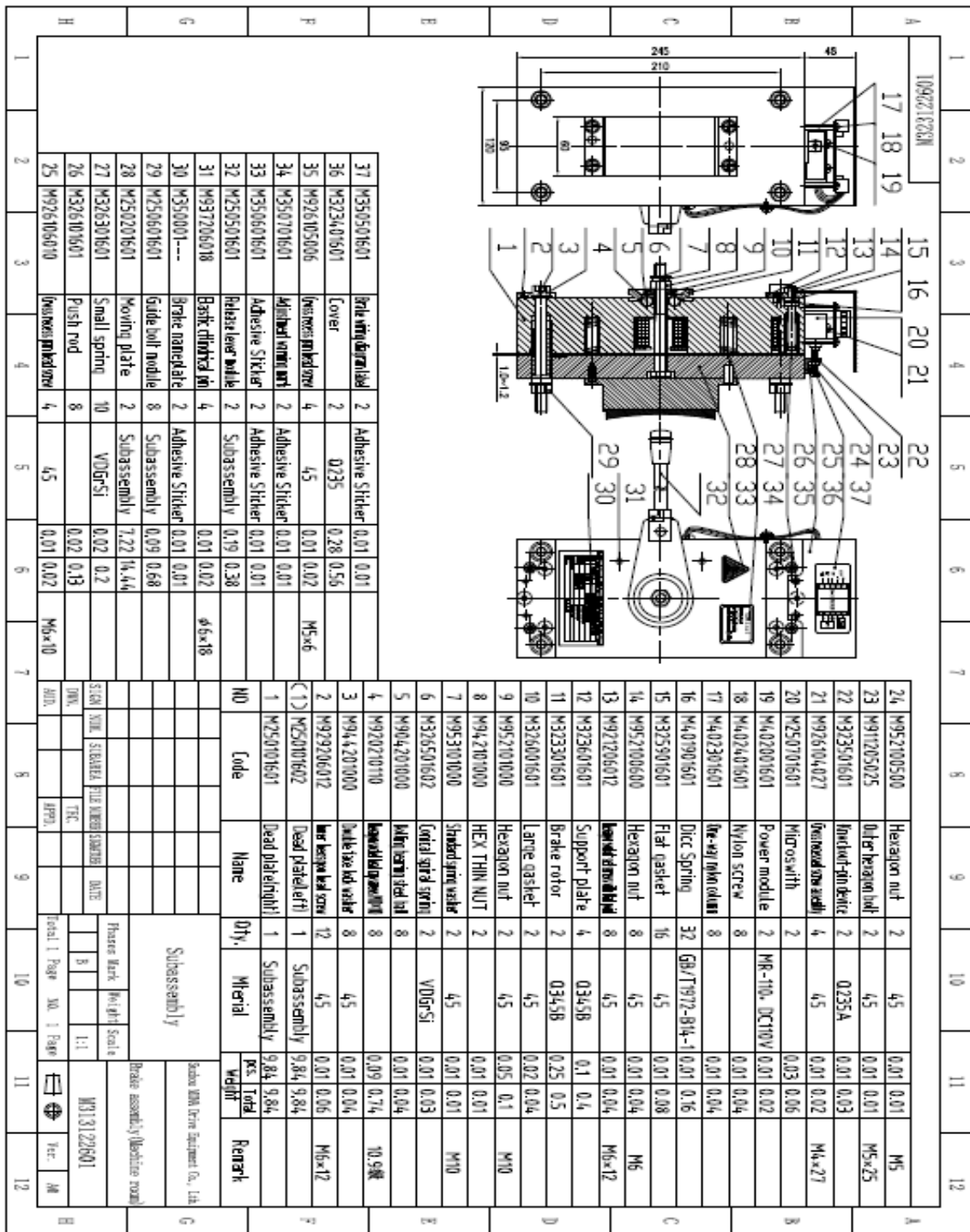
Certification decision by:

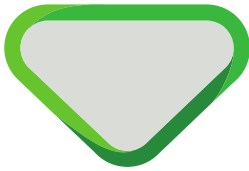
P.J. Schaareman
Product Manager C&S



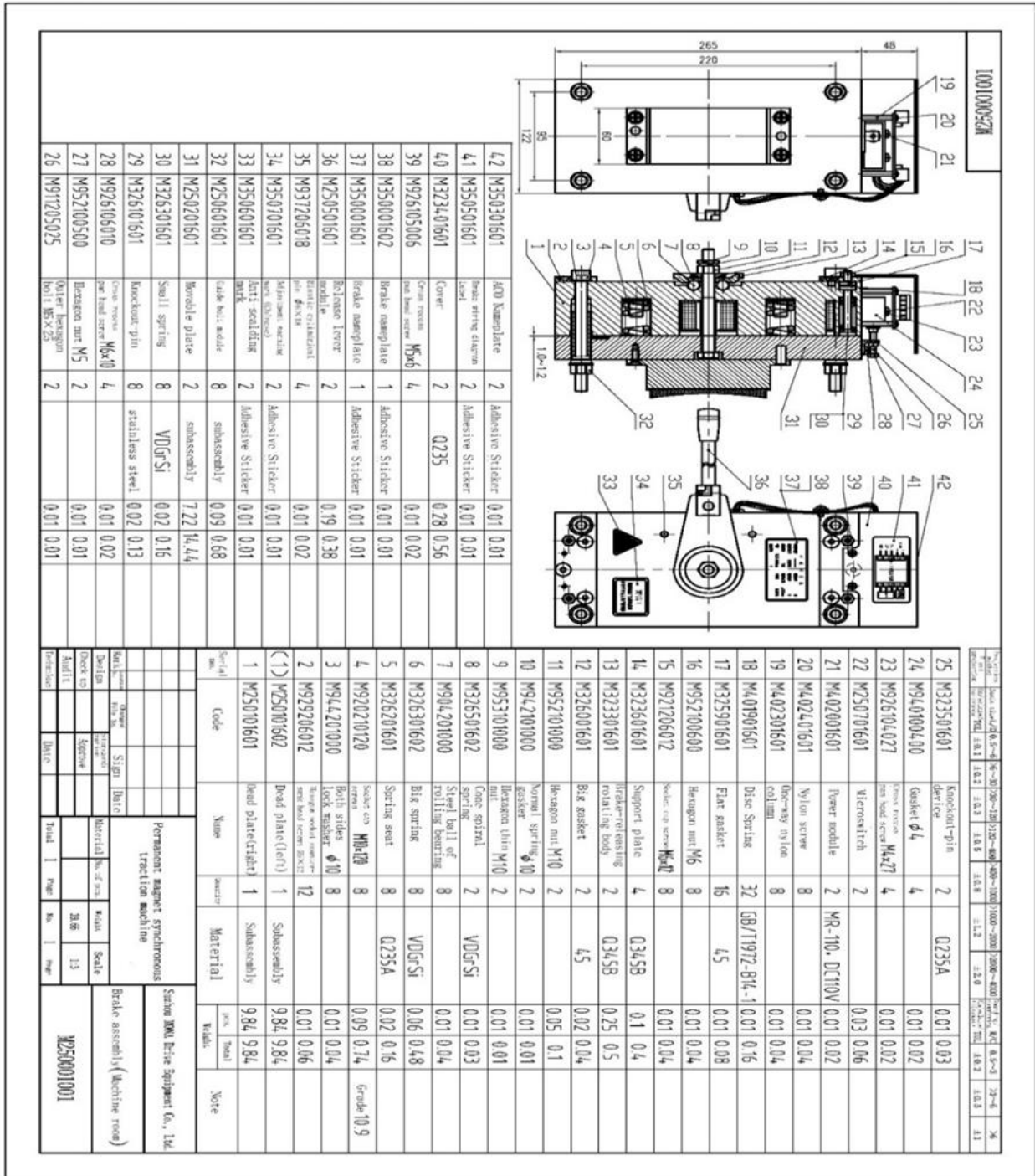
Annexes

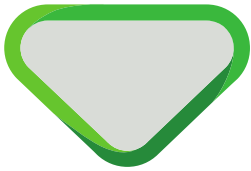
Annex 1.a Outline drawing of EMK7K 2x425 Nm brake





Annex 1.b Outline drawing of EMK9K 2x975 Nm brake



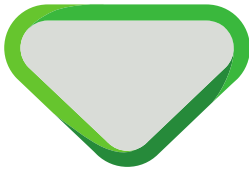


liftinstituut
SINCE 1933



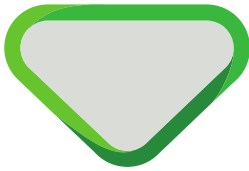
Annex 1.c Outline drawing of EMK12K 2x2150 Nm brake

Type		Material		Finish		Tolerance		Weight		Volume		Surface area		Paint	
Part No.	Code	Material	Code	Finish	Tolerance	Weight	Volume	Surface area	Paint	Weight	Volume	Surface area	Paint	Weight	Volume
42	M323603602	Support plate	2	03458	0.18	0.36									
41	M350302601	AD1 Vaneplate	2	Adhesive Sticker	0.01	0.01									
40	M350501601	Brake spring & diaphragm	2	Adhesive Sticker	0.01	0.01									
39	M323403601	Cover	2	0235	0.32	0.64									
38	M926105006	Coarse thread	4	M5x6	0.01	0.02									
37	M350003602	Brake vaneplate	1	Adhesive Sticker	0.01	0.01	1 Machine No.								
36	M350003601	Brake vaneplate	1	Adhesive Sticker	0.01	0.01	0 Machine No.								
35	M937206018	Direct electrical	4		0.01	0.02									
34	M250501601	Release lever	2		0.19	0.38									
33	M350701601	Adjustment spring	2	Adhesive Sticker	0.01	0.01									
32	M350601601	Anti-springing	2	Adhesive Sticker	0.01	0.01									
31	M250601601	Coarse lock module	8		0.09	0.68									
30	M250203601	Washable plate	2		12.56	25.12									
29	M326103601	Knockout-pin	8	stainless steel	0.02	0.18									
28	M926106010	Coarse thread	4	M6x10	0.01	0.02									
27	M952100500	Hexagon nut	2		0.01	0.01									
26	M912105025	Outer hexagon	2		0.01	0.01									



Annex 1.d: Test setup with EMK12K-2x2150 Nm brake and MCK500 traction machine





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

Title	Document number	Date
Design calculations	Annex.1	15-11-2017
	Annex.1 Additional Calculations	30-10-2023
Technical drawings	Annex.2	15-11-2017
Risk Analysis	Annex.3	15-11-2017
Assessment drawings	Annex.4	15-11-2017
Product description	Annex.5	15-11-2017
ACOP test reports:	2022AF1076	13-10-2022
	2022AF0836	23-08-2022
	2022AF0837	23-08-2022
UCMP test reports:	2022AF0798	16-08-2022
	2022AF1002	27-09-2022
	2022AF0977	21-09-2022
Manual	M050050038	22-05-2018
	M050050014	22-05-2018
TCF		07-2020
		11-2023

Annex 3. Reviewed deviations from the standards

EN xx-x par.	Requirement	Accepted design
-	-	-

Annex 4. Revision of the certificate and its report

Rev.:	Date	Summary of revision
-	17-11-2017	Original.
1	24-05-2018	Small adding to company name.
2	23-07-2020	Adding machines MCB100 & MCB200 for EMK9K brake, Textual adaptations,
3	20-10-2021	Textual adaptations, Adapted test report number 2016AF0786
4	23-03-2022	Updated to EN 81-20:2020 and EN 81-50:2020
5	17-11-2022	Certification renewal.
6	03-11-2023	Added new calculations for traction ratio 4:1, Updated UCMP and ACOP test reports, Updated manual.

--- End of report ---