liftinstituut
SINCE 1933

PRODUCTEN
RvA C 067

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	:	5 / 17-11-2022
Requirements	:	Lifts Directive 2014/33/EU Standards: EN 81-20:2020, EN 81-50:2020, EN 81-1:1998+A3:2009
Project number	:	P220196

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	MCK100	MCK200; MCB100; MCB200	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	:	SISE, No.6, Chuangye Road, near Shunchengji Industrial park, Qinghu Dahe Road, New Longhua District, Shenzhen, P.R. China

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Date of examination	:	November 2022
Examination performed by	:	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.

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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

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

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

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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 (SISE). All results are described in the following SISE Test Reports:

	EMK7K	**EMK9K**	**EMK12K**
ACOP	2016AF0786	2017AF0458	2016AF1298
UCMP	2017AF0951	2016AF0707	2017AF0758

  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 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.

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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.

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- 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 SISE, 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.

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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:

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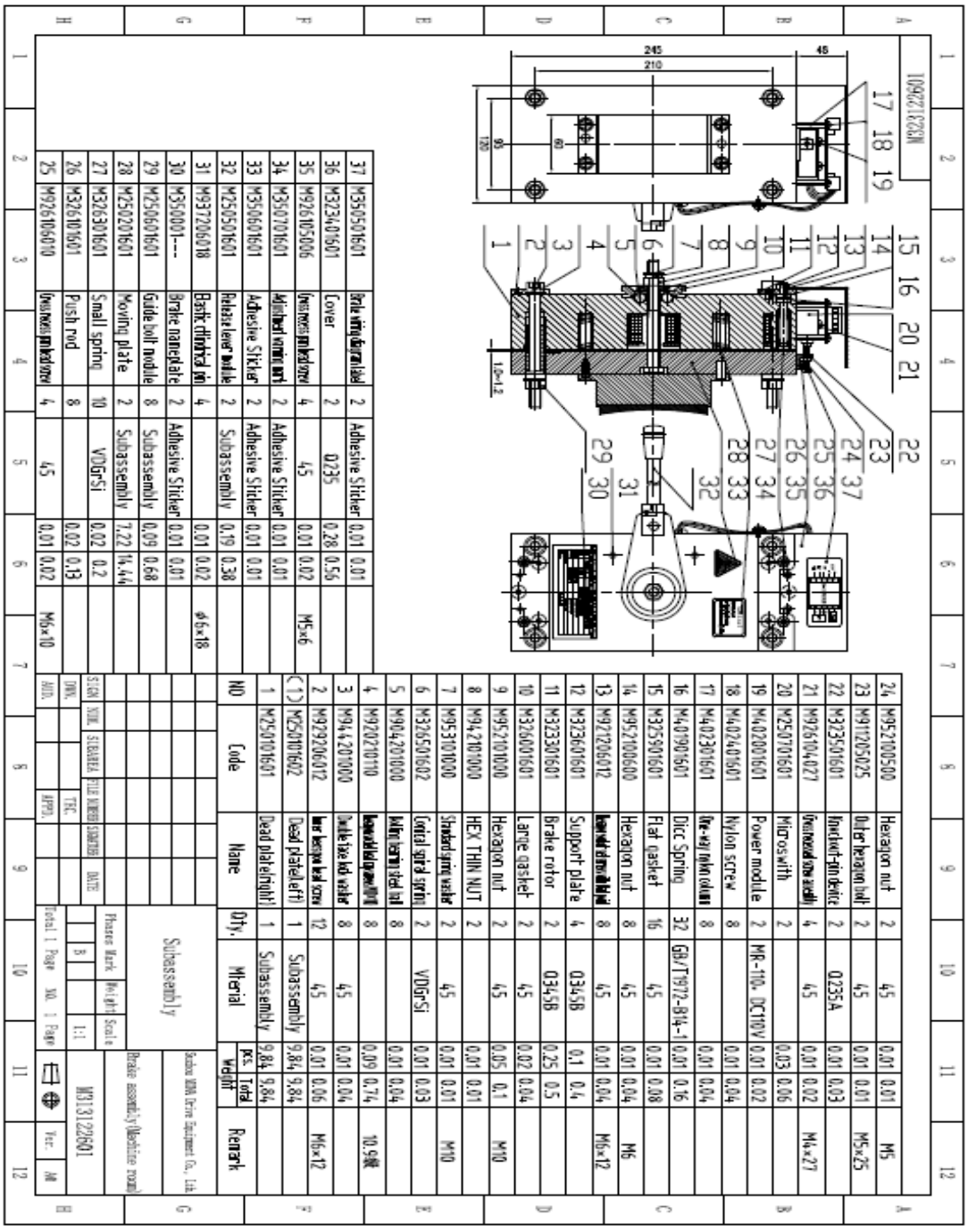
Annexes

Annex 1.a Outline drawing of EMK7K 2x450 Nm brake



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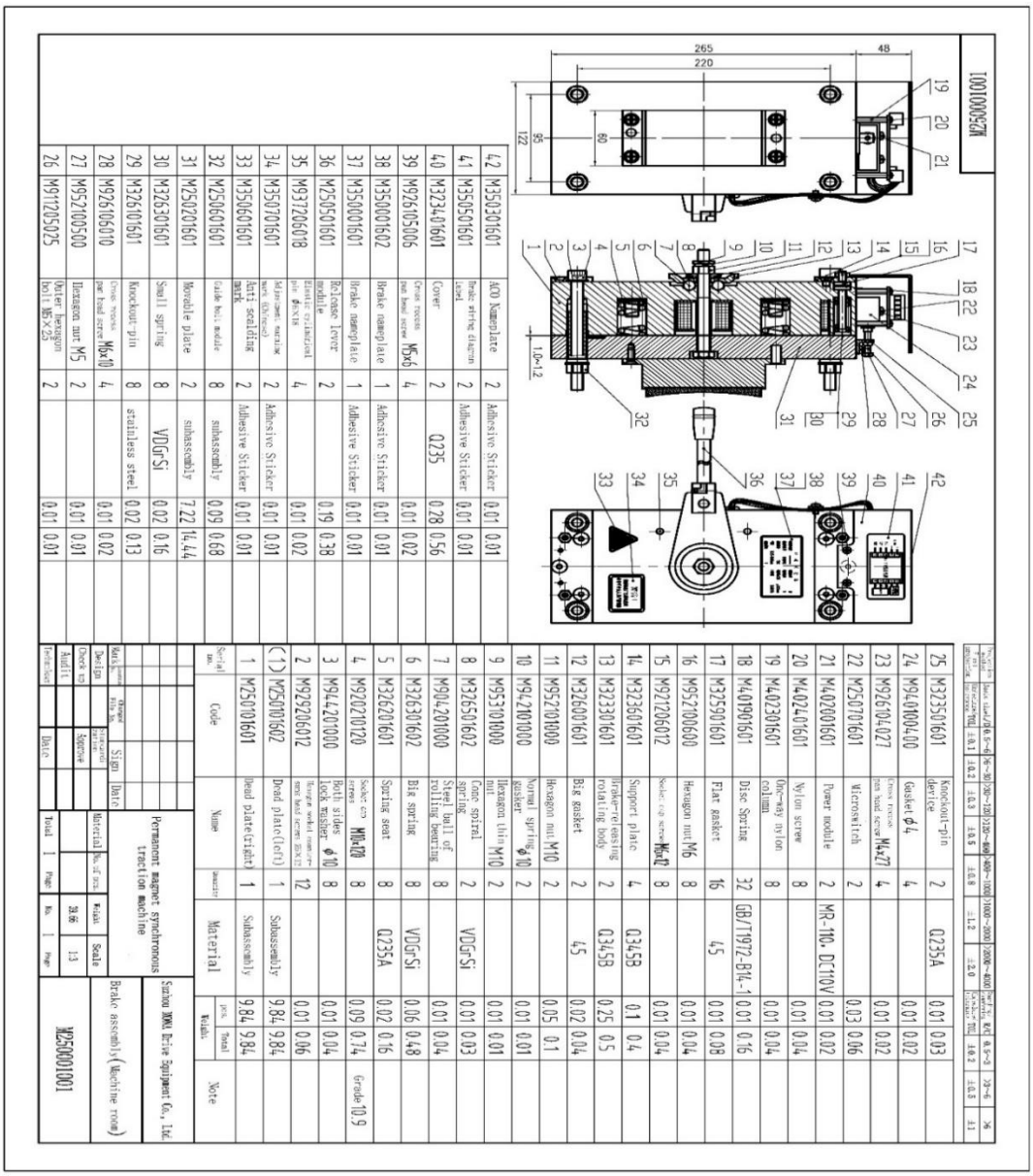
Annex 1.b Outline drawing of EMK9K 2x975 Nm brake



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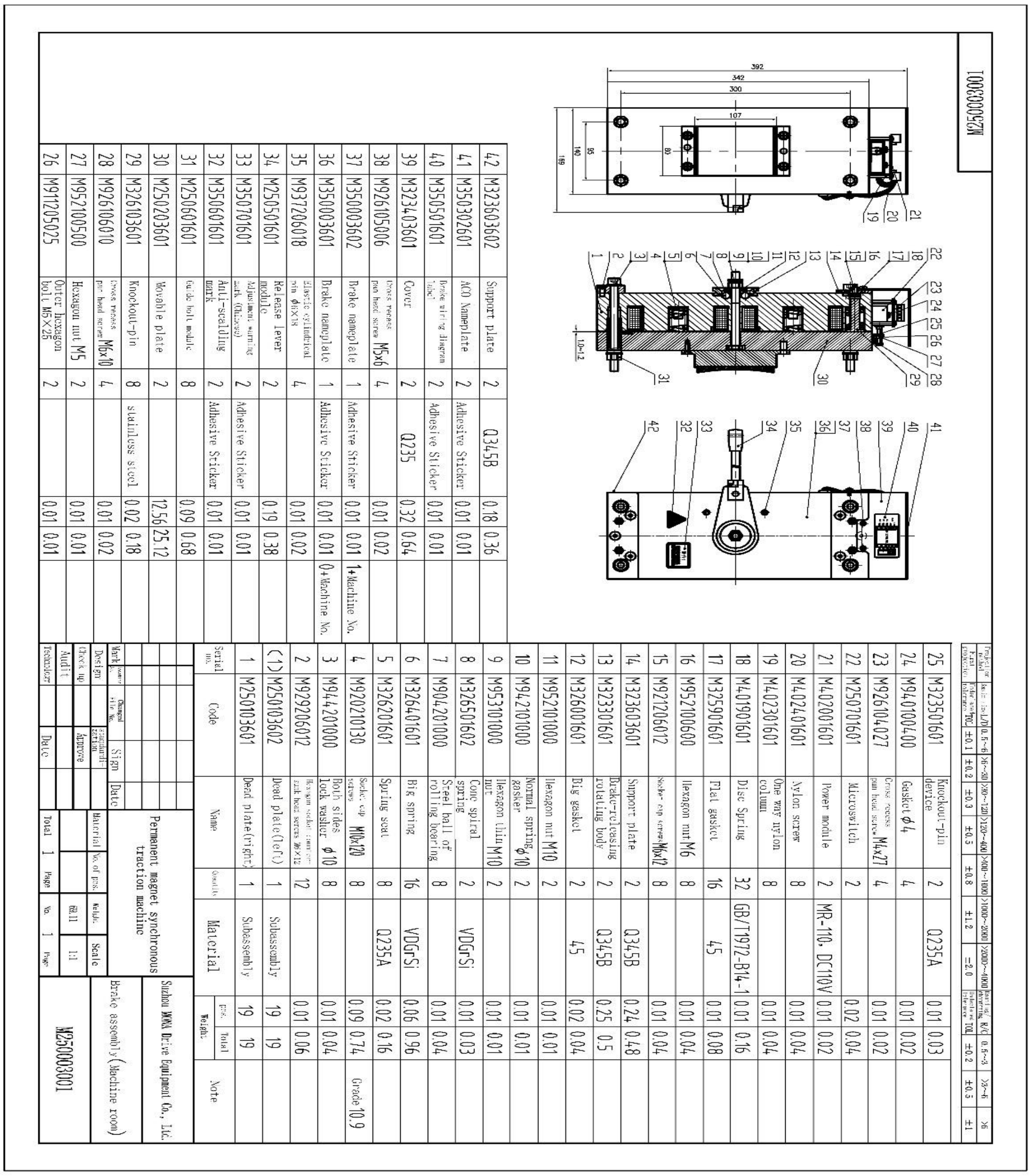

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Annex 1.d:	Test stand with EMK12K-2x2150 Nm brake and MCK500 traction machine

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

Title	document number	date
Design calculations	Annex.1	15-11-2017
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:	2016AF0786 2017AF0458 2016AF1298	16-07-2016 16-05-2017 30-11-2016
UCMP test reports:	2017AF0951 2016AF0707 2017AF0758	31-08-2017 06-07-2016 19-07-2017
Manual	Annex.10	15-11-2017
TCF		07-2020

Annex 3. Reviewed deviations from the standards

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

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 adaptions
3	20-10-2021	Textual adaptions 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.

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