Prüfbericht-Nr.: *Test report no.*:	**CN23WVC9 002 Part II of II**	**Auftrags-Nr.:** *Order no.*:	178224864 10	Seite 1 von 27 *Page 1 of 27*
Kunden-Referenz-Nr.: *Client reference no.*:	2533689	**Auftragsdatum:** *Order date:*	2027-07-29	
Auftraggeber: *Client*:	SHANDONG RIPPA MACHINERY GROUP CO., LTD. The norht of Guang'an Road and east of Gaoxin Avenue (Liaohe Road), High tech Zone, Jining City, Shandong 272000, P.R. China			
Prüfgegenstand: *Test item*:	Hydraulic Excavator			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	R22, R32, R330, R350, R57			
Auftrags-Inhalt: *Order content*:	Type test			
Prüfgrundlage: *Test specification*:	EN 474-5:2022 EN 474-5:2022/AC:2022 *Earth-moving machinery - Safety - Part 5: Requirements for hydraulic excavators*			

Wareneingangsdatum: *Date of sample receipt*:	2025-08-04
Prüfmuster-Nr.: *Test sample no:*	Engineering samples
Prüfzeitraum: *Testing period*:	2025-08-04 - 2025-08-07
Ort der Prüfung: *Place of testing*:	As client
Prüflaboratorium: *Testing laboratory:*	TUV Rheinland (Guangdong) Ltd.
Prüfergebnis*: *Test result**:	Pass

geprüft von: tested by:	X Billy Shen 2025.08.15 08:17:14 +08'00'	**genehmigt von:** *authorized by*:	X Senmo He 2025.08.15 08:58:03 +08'00'
Datum: *Date:*		**Ausstellungsdatum:** *Issue date:*	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Sachverständige(r)/Expert

Sonstiges / *Other*:
This report is to add the corrigendum standard EN 474-5:2022/AC:2022.
This report is to change the manufacturer address, refer to page 4 for details.
This report is to change the type number, refer to page 4 for details.
This report is only valid together with CN23WVC9 001.
This report is only valid in its full version including Part I of II and part II of II.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* *Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
1	Scope		P
	This document together with EN 474-1:2022 deals with all significant hazards, hazardous situations and events relevant to hydraulic excavators when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A) associated with the whole lifetime of the machine as described in EN ISO 12100:2010, 5.4. The requirements of this document are complementary to the common requirements formulated in EN 474-1:2022. This document does not repeat the requirements of EN 474-1:2022 but supplements or modifies the requirements for hydraulic excavators. This document does not provide requirements for main electrical circuits and drives of machinery when the primary source of energy is an external electrical supply. The following significant and relevant hazards are not covered in this document: — Laser; — Lightning. This document does not provide performance requirements for safety related functions of control system(s). This document does not deal with towing of trailers. This document does not deal with demolition machinery. This document also deals with lifting operation application, shovel application, log application, grapple application, and magnetic plate application. This document is not applicable to hydraulic excavators which are manufactured before the date of publication of this document by CEN.		P
2	Normative references		-
3	Terms and definitions		-
4	Safety requirements and/or protective/risk reduction measures		P
4.1	General		P
4.1.1	Context		P

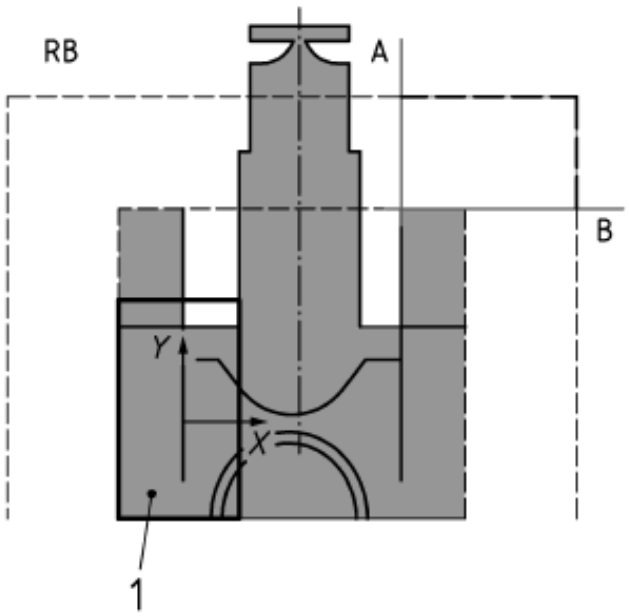
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	Hydraulic excavators shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machines shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.		P
4.1.2	Specific relation to EN 474-1		P
	Hydraulic excavators shall comply with the requirements of EN 474-1:2022, as far as not modified or replaced by the requirements of this part.		P
	There are general requirements specified in EN 474-1:2022 that are not applicable because the risk assessment has shown that for hydraulic excavators the corresponding hazard does not exist. For hydraulic excavators 4.4.2.2 and 4.14.2.3 in EN 474-1:2022, are not applicable.	Refer to Part I for details.	P
4.2	Operator's station		P
4.2.1	Minimum space		P
	EN 474-1:2022, 4.3.1.2 shall apply with the following modification: On excavators with retractable front window, the cab height above SIP according to EN ISO 5353:1998 shall not be less than 920 mm measured with the window retracted into the cab.	Compact machines Technical files are provided and checked.	P
4.2.2	Roll over and tip over protective structures (ROPS and TOPS)		P
4.2.2.1	General		P
	EN 474-1:2022, 4.3.3 does not apply for hydraulic excavators except for walking excavators, see 4.10.3.	Not walking excavators	P
	EN 474-1:2022, Annex B, B.7 does not apply for hydraulic excavators with moveable cabs, see 4.2.2.4.	Not moveable cabs	P
4.2.2.2	Compact excavators		P

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	Compact excavators with an operating mass greater than 1 t and less than or equal to 6 t according to ISO 6016:2008 shall be equipped with a tip-over protective structure (TOPS). TOPS shall meet the requirements of EN 13531:2001+A1:2008.	The excavator is equipped with a TOPS structure. Test report of TOPS is provided.	P
4.2.2.3	Hydraulic excavators with no cab riser or with fixed cab riser below 500 mm		N/A
	Hydraulic excavators with no cab riser or with fixed cab riser up to 500 mm and with an operating mass greater than 6 t and less than or equal to 50 t according to ISO 6016:2008 shall be equipped with ROPS. ROPS shall meet the requirements of ISO 12117-2:2008 and its ISO 12117-2:2008/Cor 1:2010 and its ISO 12117-2:2008/Amd. 1:2016.	Compact machines	N/A
4.4.2.4	Hydraulic excavators with fixed cab riser above 500 mm or with movable operator's station		N/A
	— Hydraulic excavators with fixed cab riser above 500 mm or with movable operator's station and with an operating mass greater than 6 t and less than or equal to 50 t according to ISO 6016:2008 shall be equipped with TOPS. For evaluation of the performance of the TOPS, ISO 12117-2:2008 and ISO 12117-2:2008/Cor 1:2010 and ISO 12117-2:2008/AMD 1:2016 shall be used in respect of lateral loading only and with the following lateral load energy: Lateral load energy Us (J) = 6 500 × (M/10 000)1,25.	Compact machines	N/A
	— Hydraulic excavators with fixed cab riser above 500 mm or with movable operator's station and with an operating mass greater than 6 t and less than or equal to 50 t according to ISO 6016:2008 intended to be used where risk of rolling over exists (e.g. steep slope), shall be equipped with a roll over protective structure (ROPS). ROPS shall meet the requirements of ISO 12117-2:2008 and ISO 12117-2:2008/Cor 1:2010 and ISO 12117-2:2008/AMD 1:2016.		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	For hydraulic excavators with a movable operator's station as described in EN 474-1:2022, Annex B, the ROPS and TOPS tests shall be performed with the operator station in the hydraulic excavator's travel position. The operator station mounted to the moving linkage components shall be attached to the upper swing frame. The boom and any boom lift cylinders shall be attached to the upper swing frame as applicable based on potential contact with them during the test. The test load(s) shall be applied to the operator's station structure as specified in ISO 12117-2:2008 and ISO 12117-2:2008/Cor 1:2010 and ISO 12117-2:2008/AMD 1:2016. The test includes the whole lifting configuration (e.g. cab riser frame and mounted cab).		N/A
4.2.3	Operator protective guards		P
	EN 474 1:2022, 4.3.4 shall be replaced by the following:		P
	Operator protective guards shall comply with ISO 10262:1998 and ISO 10262:1998/Cor 1:2009. For hydraulic excavators with an operating mass less than or equal to 1 500 kg operator protective guards are not required. For hydraulic excavators with an operating mass greater than 1 500 kg fixing points for the operator protective guards shall be provided. For hydraulic excavators with an operating mass greater than 1 500 kg and equal or less than 6 000 kg according to ISO 6016:2008, the operator protective guards shall meet the requirements of ISO 10262:1998 and ISO 10262:1998/Cor 1:2009, Level I. For hydraulic excavators with an operating mass greater than 6 000 kg according to ISO 6016:2008, the operator protective guards shall meet the requirements of ISO 10262:1998 and ISO 10262:1998/Cor 1:2009, Level II. Hydraulic excavators used in log application shall be equipped with a front guard according to ISO 10262:1998 and ISO 10262:1998/Cor 1:2009.	The OPG is not fitted on the machine, the fixing points of OPG are provided on the cab. No log application	P
4.2.4	Defrosting system		P

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	EN 474-1:2022, 4.3.2.1.4 shall apply with the following addition: The defrosting system shall be capable of also defrosting the boom side window to meet the visibility requirements of EN 474-1:2022, 4.8.1.	The boom is located at the front and front window is capable of defrosting.	P
4.3	Seat		P
4.3.1	Adjustment		P
	For compact excavators, EN 474-1:2022, 4.4.1.3 shall apply with the following addition: For compact excavators with an operating mass ≤ 3 000 kg, the vertical adjustment of minimum 60 mm is not required.	The seat can be adjusted vertically. Technical files are provided and checked.	P
4.3.2	Vibration		N/A
	EN 474-1:2022, 4.4.1.4 shall apply with the following modifications: For excavators greater than 6 000 kg the seat shall comply with spectral class EM 6 of EN ISO 7096:2020. NOTE This clause makes reference to EN ISO 7096:2020 even though that standard gives no performance requirement for excavator seats.	Compact machines The operating weight is less than 6000 kg, the EM6 is not required.	N/A
4.3.3	Restraint system		P
	EN 474-1:2022, 4.4.1.5 shall apply with the following modification: Machines fitted with ROPS or TOPS shall have an operator restraint system that meets the requirements specified in EN ISO 6683:2008.	Operator restraint system is provided. Test report of restraint system is provided.	P
4.4	Steering system		P
	EN 474-1:2022, 4.6.1 shall apply with the following addition: The movements of the controls for steering do not need to correspond to the intended direction of movement if the upper structure is not in the normal driving direction.		P
4.5	Brake systems		P
4.5.1	Brake systems for travelling		P

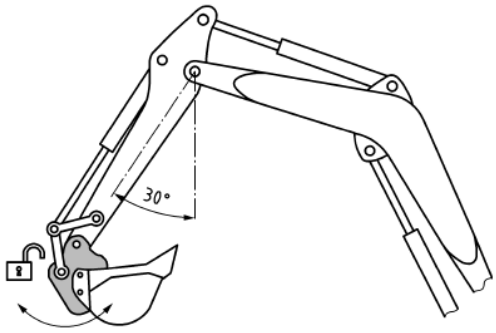
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	EN 474-1:2022, 4.7 shall apply with the following modification: For crawler excavators less than or equal to 3 000 kg, the working tool (e.g. bucket) or a special attachment (e.g. dozer blade) can substitute the parking brake to immobilise the machine.	Inspected and OK	P
4.5.2	Brake systems for swinging		P
	Hydraulic excavators shall be equipped with swing brakes and swing locks. Swing brakes shall comply with the requirements as defined in Annex C. For hydraulic excavators with an operating mass less than 1 000 kg swing parking brake is not required. Swing lock is not required if the swing parking brake complies with C.3.1.4 and C.4.2.	Refer to Annex C	P
4.6	Operator’s field of view		P
4.6.1	Position of display devices		P
	EN 474-1:2022, 4.8.1 shall apply with the modifications to ISO 5006:2017 as indicated in 4.6.1, 4.6.2 and 4.6.3. NOTE ISO 5006:2017 covers both travel mode and operating mode for excavators (see ISO 5006:2017, 8.3.3.3).	Tested and OK	P
	ISO 5006:2017, 7.2 shall be replaced by the following: The devices (e.g. CCTV display, mirror) used by the operator to view the area being monitored shall be placed such that they are in the 180° arc centred in front of the operator.		P
	If visibility of the portion on the rectangular boundary (RB) as defined below, is masked by the linkage movement as defined in ISO 5006:2017, 8.3.3.3, one additional mirror may be installed in the 180°-270° arc centred in front of the operator to provide visibility to this portion of the RB. Such a mirror shall neither be used for the assessment of visibility on any other portion of the RB or the visibility test circle, nor for the assessment of visibility in the travel position.		P

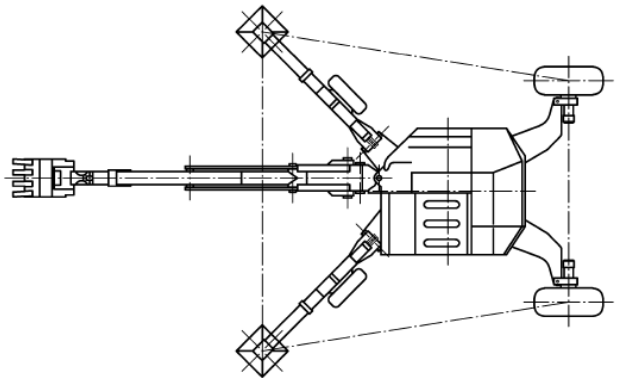
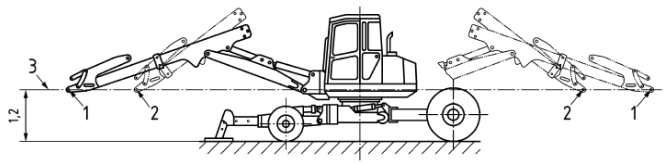
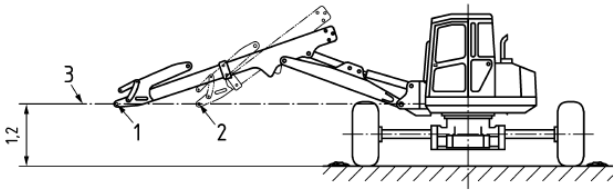
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The centre of the mirror shall be used as the reference for mirror location. The mirror locations shall be noted in the test report.		P
	Definition of RB portion: The portion of the RB between the intersections with the RB of a line from the inside of the track/tyre (A) opposite to the cabin location and a line from the front edge of the track/tyre or undercarriage attachment (B). See Figure 1.		P
	 Figure 1 — Example of the portion RB		P
4.6.2	Activation of visibility aids		P
	ISO 5006:2017, 7.4 shall apply with the following additions: CCTV system shall automatically display the camera image when machine movement is possible, e.g. controls are enabled. The camera image may temporarily be cancelled by a voluntary action by the operator during reviewing and setting of machine parameters. The camera image shall automatically return on the monitor. The monitor may temporarily display warnings in addition to the camera image.	Two rear-view mirrors are provided. One rear camera is provided.	P
4.6.3	Performance requirements of visibility aids		P

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	ISO 5006:2017, 7.3 and 7.4 shall apply with the following modification. The minimum dimension of the image of a 1,5 m height test object positioned at the RB shall be 10 mm for every 1,2 m that the visibility aid is positioned away from the FPCP as defined in ISO 5006:2017. This does not apply to CCTV systems with surround view. CCTV systems with surround view shall comply with EN ISO 16001:2017, G.4.		P
4.7	Stability		P
4.7.1	General		P
	EN 474-1:2022, 4.11 shall apply with the additions given in 4.7.1 to 4.7.3. All rated capacities as defined hereafter are based on test and/or calculations of machines being on horizontal level and on firm supporting surface. The mass of the intended load, its density and the location of its centre of gravity as well as the mass of the attachment and the quick coupler, if fitted, shall be included in the determination of the rated lift capacity and the size/capacity of the attachment. To provide a sufficient stability, the rated lift capacity in intended operations shall be determined in accordance with 4.7.2 and 4.7.3.		P
4.7.2	Bucket and shovel application		P
	The rated lift capacity for an excavator used in bucket or shovel application shall be determined according to ISO 10567:2007.	The rated lift capacity for bucket application is tested.	P
	The volumetric rating of the bucket or shovel shall be determined according to ISO 7451:2007 or ISO 7546:1983.	The volumetric rating of the bucket is calibrated.	P
4.7.3	Log application		N/A
	The rated lift capacity in stationary log application shall be determined according to ISO 10567:2007.	No log application	N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The rated lift capacity in moving (driving with load, oscillating axle locked) log application shall be determined according to ISO 10567:2007 modified by the following with a log in the most unfavourable position: — rated tipping load is 60 % of the tipping load.		N/A
4.8	Lifting operation		N/A
4.8.1	General		N/A
	EN474-1:2022, 4.12 applies with the following modification: For machines with a maximum rated lift capacity according to EN 474-1:2022, 3.6 greater than or equal to 1 000 kg, at a minimum lift point radius, as defined in ISO 10567:2007, 3.5, or an overturning moment greater than or equal to 40 000 Nm and — where the operating mass according to ISO 6016:2008 is lower or equal to 50 t, EN 474-1:2022, 4.12 applies to all machines irrespective of their intended use; — where the operating mass according to ISO 6016:2008 is greater than 50 t, EN474-1:2022, 4.12 applies only to machines, intended for use in lifting operations.	The machine is not intended for lifting operation.	N/A
4.8.2	Rated lift capacity in lifting operation		N/A
	EN 474-1:2022, 4.12 applies with the following addition: The rated lift capacity in lifting operation shall be determined according to ISO 10567:2007.	The machine is not intended for lifting operation.	N/A
4.8.3	Load capacity indicator		N/A
	EN 474-1:2022, 4.12.4 does not apply.		N/A
4.8.4	Rated capacity limiting device		N/A
	EN 474-1:2022, 4.12.5 does not apply.		N/A
4.8.5	Rated lift capacity chart		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	EN 474-1:2022, 4.12.6 shall apply with the following addition: A chart of the rated lift capacity in lifting operation in relation to the reach and turntable position, established by the manufacturer, shall be provided. Annex B gives an example for such a chart. The chart(s) shall be available at the operator's station for each lifting configuration specified in the operator's manual.	The machine is not intended for lifting operation.	P
4.9	Quick coupler	No quick coupler provided	N/A
	For powered quick couplers (as defined in ISO 13031:2016, 3.1.1), located at the end of the arm of hydraulic excavators, EN 474-1:2022, 4.21 shall apply with the following addition: Quick couplers shall have a means to minimize the possibility of an attachment being inadvertently dropped to the ground prior to correct engagement of the quick coupler system (i.e. fully engaged with the attachment in its working position).		N/A
	This means shall either: — provide automatic mechanical locking of the first pin contacted during the process of coupling. This automatic mechanical locking may be activated upon initial contact with the pin or upon activation of the engagement control. The mechanical lock shall only be able to be released as part of the disengagement function, or — prevent the lifting of the attachment until correct engagement is achieved, or — retain the attachment throughout the entire stroke of the bucket cylinder with the arm at an angle of 30° measured through the centreline of the boom pivot and bucket pivot, from vertical away from the operator’s station, according to Figure 2 and with the coupler not fully engaged, or — provide an acoustic and a visual signal, at the operator’s station if the engagement is not complete with the attachment in its working position.		N/A

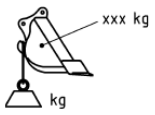
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The requirements above shall be verified with a functional test. The test shall be done with the attachments intended to be used according to the machine manufacturer's instructions.		N/A
	 Figure 2 — Test for the retaining feature		N/A
4.10	Specific requirements for walking excavators	Not walking excavators	N/A
4.10.1	Visibility		N/A
	EN 474-1:2022, 4.8.1 shall apply with the following additions: The requirements of ISO 5006:2017, Table 1 for crawler excavators also apply for walking excavators. The ground contacting part of each leg shall in all possible positions be visible from the operator's station to ensure that the operator can place the legs on firm ground.		N/A
4.10.2	Brake system for travelling		N/A
	EN 474-1:2022, 4.7 does not apply to walking excavators with not more than two wheels.		N/A
4.10.3	Roll-over protective structure (ROPS)		N/A
	EN474-1:2022, 4.3.3 applies with the following modification: Walking excavators shall be fitted with rollover protective structures (ROPS) that meet the requirements of EN ISO 3471:2008 for backhoe-loaders of equivalent mass.		N/A
4.10.4	Stability		N/A
	All leg cylinders shall be fitted with lock valves to prevent the machine from becoming unstable in case of a hydraulic system failure.		N/A

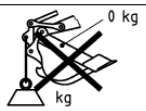
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The stability of walking excavators is determined according to EN 474-5:2022, 4.8 with the following test conditions: a) stabilizer and wheels (at max. spread position) extended as specified by the manufacturer; b) levelled position of the lower side of the under carriage; approximately 350 mm above the test surface; c) tipping lines as shown in Figure 3; d) at maximum reach with/without telescopic arm to the front/rear, as shown in Figure 4 and to the side as shown in Figure 5.		N/A
	 Figure 3 — Tipping lines of walking excavators		N/A
	 Figure 4 — Measurement of the tipping load to front/rear		N/A
	 Figure 5 — Measurement of tipping load to the side		N/A
4.10.5	Recovery, towing away for recovery purposes (TARP), tying-down, lifting and transporting		N/A
	EN 474-1:2022, 4.15 shall apply with the exception of EN 474-1:2022, 4.15.2 and 4.15.5.		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
5	Verification of the safety requirements and/or protective/risk reduction measures		P
	Safety requirements and/or protective/risk reduction measures of Clause 4 of this document shall be verified according to Table 1. Table 1 sets out verification methods which shall be applied for each safety requirement in this document. Where X(s) is indicated in the table, the corresponding verification method(s) shall be applied. Table 1 shall be read in conjunction with the corresponding clauses. Table 1 includes the following verification methods: a) calculation: to establish that the requirements of this document have been met; b) visual verification: to establish that something is present (e.g. a guard, a marking, a document); c) measurement: to show that the required numerical values have been met (e.g. geometric dimensions, safety distances, resistance of insulation of the electric circuits, results of physical tests); d) functional tests: to show that the adequate signals intended to be forwarded to the main control system of the complete machine are available and comply with the requirements and with the technical documentation; e) special verification: by reference to a standard which is mentioned in the corresponding clause.		P
6	Information for use		P
6.1	General		P
	Information for use shall be provided in accordance with EN ISO 12100:2010, 6.4.		P
6.2	Machine safety labels		P

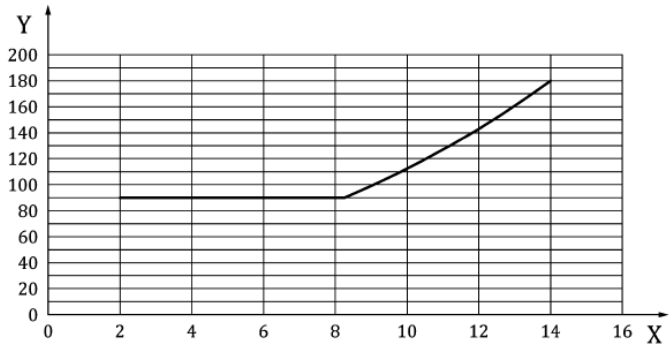
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	EN 474-1:2022, 6.2 shall apply with the following addition: Where hazards remain despite all measures adopted or in the case of potential hazards that are not evident, machine safety labels shall be provided and mentioned in the operator's manual. The hydraulic excavator shall at least be equipped with safety labels forbidding entry into the danger zone of the machine (see for example Figures 6 and 7).	Inspected and OK	P
	 Figure 6 — Example of warning sign — Crushing of the whole body — Stay safe distance from hazard [SOURCE ISO 9244, combination A19 and B.3]	Inspected and OK	P
	 Figure 7 — Example of warning sign — Crushing of the whole body — Stay safe distance from hazard [SOURCE ISO 9244:2008, C.5]	Inspected and OK	P

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
6.3	Operator's manual		P
	EN 474-1:2022, 6.3 shall apply with the following additions: — description of the excavator configuration required for lifting operation; — parking procedure for compact crawler excavators; — description of excavator stability in different applications; — safety instructions for selection and for use of additional protective guards, see 4.2.3 (e.g. demolition work); — instruction shall be given for compact excavators (less than or equal to 1 500 kg) which are not fitted with a protective guard that they shall not be used for applications where the risk of falling objects is possible; — special instructions for log application (reduced travelling speed, avoidance of abrupt brake- or steering-action, central fixing of the trunk, transport-position during movement, etc.); — necessity of a front guard and top guard, in log application; — instructions for the functioning, the use and the deactivation of the overload warning device of EN 474-1:2022, 4.12.3; — lifting operation capacity chart e.g. in accordance with Annex B; — information how mass and volumetric rating of the bucket and the density of the material shall be taken into account when a bucket is selected for a specific application.	Inspected and OK	P
Annex A	List of significant hazards	Information	-
Annex B	Rated lift capacity charts for lifting operation	The machine is not intended for lifting operation.	N/A
B.1	General		N/A
	This Annex provides guidance for the creation of “rated lift capacity charts” for lifting operation. Figures B.1 and B.2 illustrate examples for crawler and wheeled excavators.		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
B.2	Identification		N/A
	(See Figures B.1 and B.2.). 1) Chart identification (e.g. “Lift Capacity Chart”, Identification No.); 2) manufacturer identification and excavator type; 3) boom identification (length expressed in metres, m); 4) arm identification (length expressed in metres, m); 5) counterweight identification (mass expressed in kilograms, kg); 6) hydraulic working circuit pressure for each cylinder of the work equipment; (nominal hydraulic pressure according to ISO 10567:2007, 3.9); 7) working conditions according to B.4 a) or b); 8) working conditions according to B.4 c) or B.4 d); 9) locked oscillation axle; 10) information (e.g. ” * “) as to when the lift force is limited by hydraulic pressure (see operator's manual).		N/A
B.3	Illustration		N/A
	Preferably from the side-view. The excavator and its equipment can be stylised; the working area is shown on a vertically and horizontally spaced grid with line distances representing 0,5 m, 1 m, 1,5 m or 2 m scale.		N/A
B.4	Working conditions		N/A
	The working conditions should be clearly stated e.g.:		N/A
	a) If the values given in the rated lift capacity chart (distances and load values) have been established with the bucket installed, the following should be indicated: — with bucket 		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	b) If the values given in the rated lift capacity chart (distances and load values) have been established without the bucket, the following should be indicated: — without bucket 		N/A
	c) If the values given in the rated lift capacity chart (distances and load values) have been established for a defined position of the upper structure, the following should be indicated: — in travel direction  — right angle to travel direction  — against travel direction 		N/A
	d) The excavator configuration of the stabilization system should be stated by using the following descriptions: — on both side wheels/tracks  — on one side blade — on one side wheels/tracks  — on one side 2 outriggers — on one side wheels  — on both sides 2 outriggers  — on one side 2 outriggers — on one side blade  — on both side blade 		N/A
Annex C	Requirements for excavator swing brake		P
C.1	General		P
	This Annex specifies minimum performance criteria and methods of test for the swing service brake, swing parking brake and swing lock of hydraulic excavators.		P
C.2	Terms and definitions	Information	-
C.3	Minimum performance requirements		P
C.3.1	Swing drive system		P

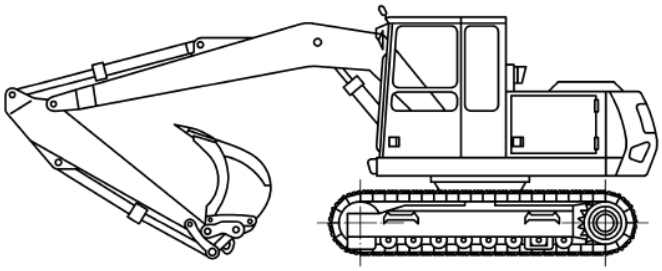
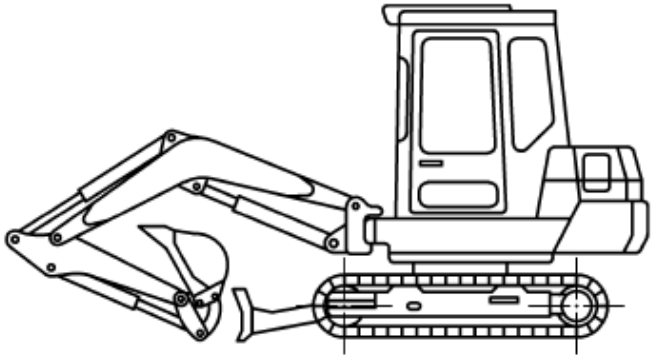
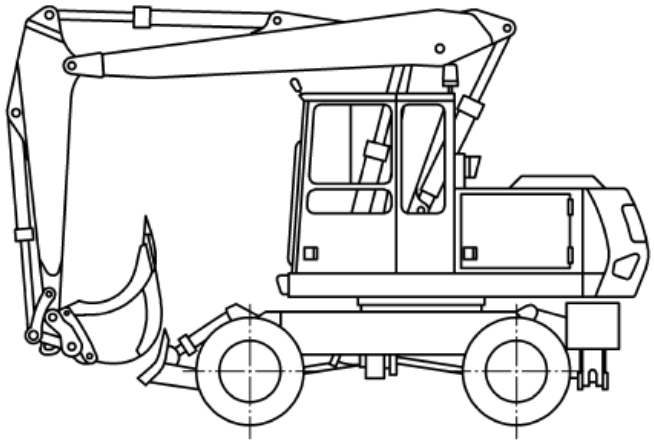
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
C.3.1.1	Swing service brake		P
	The swing service brake shall be tested according to C.4.1. The swing service brake shall be capable to decelerate the upper structure to a complete stop from the test swing revolution speed as specified in C.3.1.2, see Figure C.1. During ten (10) tests, the deceleration swing angle shall not exceed by more than 20 % of the deceleration swing angle βB as defined in C.3.1.3. For machines that by design have a restricted swing angle, the swing service brake shall be able to bring the upper structure to a complete stop from the mid-position of the permissible swing angle before reaching the outer end of the permissible swing angle from the test swing revolution speed as specified in C.3.1.2.		P
C.3.1.2	Test-swing revolution speed		P
	The test-swing revolution speed shall be the working swing revolution speed as defined in C.2.2. The test-swing revolution speed for machines that by design have a restricted swing angle shall be the swing revolution speed achieved at the mid position of the permissible swing angle when accelerating the upper structure at maximum available swing motor torque from the outer end of the permissible swing angle.		P
C.3.1.3	Deceleration swing angle βB		P

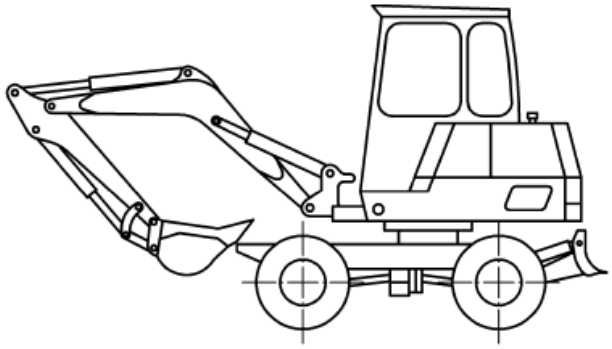
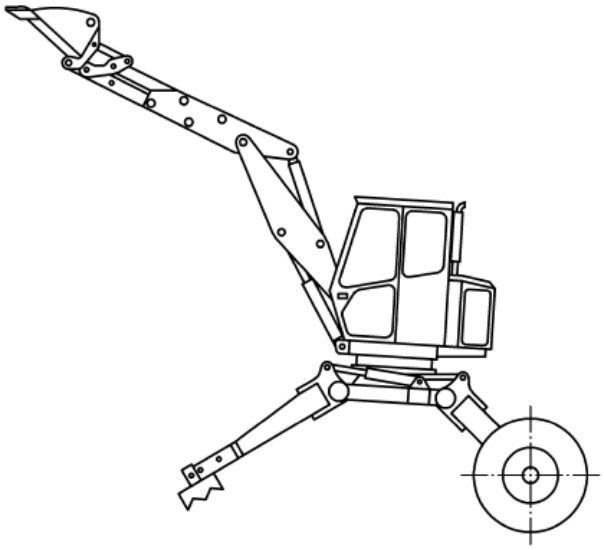
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The deceleration swing angle βB shall be less than the highest of the following values: $\beta_B = 90°$ $\beta_B = \frac{n^2 \times 360}{2 \times n'_B} + \beta_{B0}$ Where βB is the deceleration swing angle expressed in degrees [°]; n=n is the test-swing revolution speed expressed in revolutions per minutes [min−1]; n'B = 250 [min-2]; βB0 = 40 degrees [°]		P
	 Key X upper structure-revolution [min−1] Y deceleration swing angle [°] Figure C.1 — Swing service brake performance		P
C.3.1.4	Swing parking brake		P
	The swing parking brake shall be tested according to C.4.2.		P
	The swing parking brake shall be capable of holding the upper structure in a steady position for 30 min.		P
	The swing parking brake shall apply automatically when the engine is not running or shall be capable of being manually applied, with and without the engine running.		P

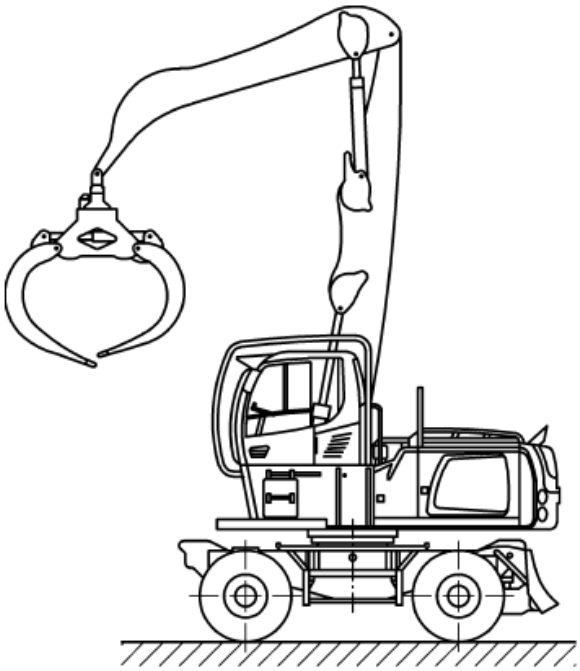
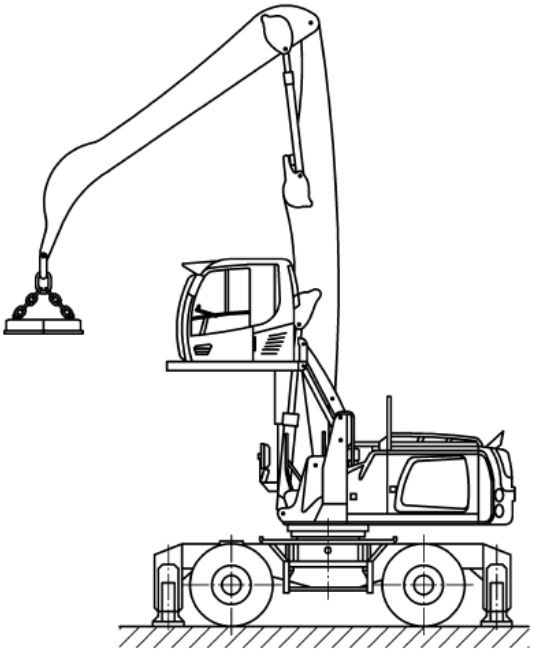
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The swing parking brake shall remain effective when the source of energy fails.		P
	The swing parking brake on excavators with an operating mass greater than or equal to 6 000 kg shall be fully mechanical, e.g. a spring friction brake. On excavators with an operating mass less than 6 000 kg the swing parking brake may be a hydraulic lock valve applied directly to the swing motor and if so a separate swing lock according C.2.7 shall be provided.		P
C.3.2	Swing lock		P
	Where provided, the swing lock shall be tested according to C.4.3. The swing lock shall be capable of withstanding without permanent deformation the maximum swing motor torque.		P
C.4	Conditions for testing		P
C.4.1	Testing the swing service brake		P
C.4.1.1	Standard machines		P
	The tests shall be made in the machine configuration or with the machine loaded to a mass representing the maximum moment of inertia to be anticipated for each of the available swing brake configurations and -settings specified by the manufacturer.		P
	A manufacturer may provide different swing speed settings for different machine configurations provided that arrangements are made to ensure that the maximum swing speed for each of the defined configurations is in accordance with the swing brake performance requirements and cannot be exceeded during operation.		P
	Stability aids such as outriggers and blade, if present, shall be in their working position as specified by the manufacturer.		P
	All fluid systems shall be filled as specified by the manufacturer. The fuel tank shall be at least half full. The swing system pressures shall be adjusted to nominal working pressure and functioning as specified by the manufacturer.		P

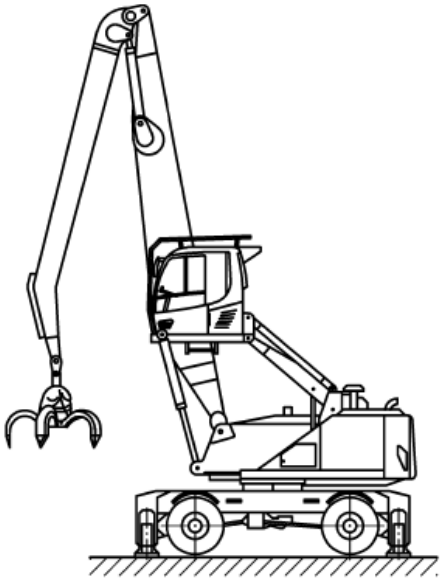
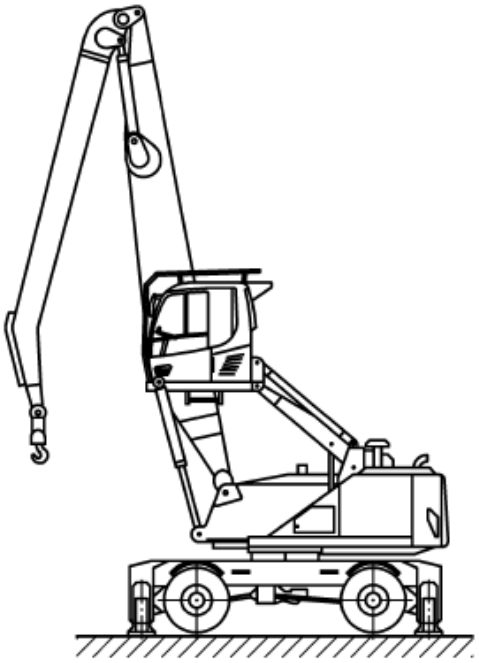
Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	The machine shall be positioned on a flat surface with a maximum gradient slope of ± 1 %.		P
	The tests to define the test swing revolution speed according to C.3.1.2 and deceleration swing angle according to C.3.1.3 shall be made with the working equipment extended to maximum radii with the working tool in the most unfavourable position.		P
	The measurement starts with the actuation of the brake at test swing revolution speed.		P
	The test is repeated ten (10) times, five (5) times in each swing direction. These ten actuations shall be in a sequence rate as rapidly as the swing acceleration, deceleration and positioning will allow.		P
	Alternatively, the work equipment may be replaced with weights fixed in a lower position to the upper structure, representing an equivalent moment of inertia to the swing axis.		P
C.4.1.2	For machines that by design have a restricted swing angle		N/A
	For machines that by design have a restricted swing angle and where maximum swing speed cannot be determined, an alternative test procedure is allowed:	Standard machines	N/A
	The tests shall be made in the machine configuration or with the machine loaded to a mass representing the maximum moment of inertia to be anticipated for each of the available swing brake configurations and -settings specified by the manufacturer.		N/A
	A manufacturer may provide different swing speed settings for different machine configurations provided that arrangements are made to ensure that the maximum swing speed for each of the defined configurations is in accordance with the swing brake performance requirements and cannot be exceeded during operation.		N/A
	Stability aids such as outriggers and blade, if present, shall be in their working position as specified by the manufacturer.		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	All fluid systems shall be filled as specified by the manufacturer. The fuel tank shall be at least half full. The swing system pressures shall be adjusted to nominal working pressure and functioning as specified by the manufacturer.		N/A
	The machine shall be positioned on a flat surface with a maximum gradient slope of ± 1 %.		N/A
	The tests shall be made with the working equipment extended to maximum permissible radii with the working tool in the most unfavourable position.		N/A
	Alternatively, the work equipment may be replaced with weights fixed in a lower position to the upper structure, representing an equivalent moment of inertia to the swing axis.		N/A
	The permissible swing operation angle is to be divided in two equally sized sections. The machine upper structure is positioned at one outer end of the permissible swing angle and accelerated at maximum available swing motor torque until the upper structure reaches the mid position of the permissible swing angle. Swing service braking is applied as soon as the mid position is reached. The swing service brake shall be able to bring the upper structure to a complete stop before reaching the other outer end of the permissible swing angle.		N/A
	The test is repeated ten (10) times, five (5) times in each swing direction. These ten actuations shall be in a sequence rate as rapidly as the swing acceleration, deceleration and positioning will allow.		N/A
C.4.2	Testing the swing parking brake		P
	The test shall be performed with the equipment and attachment as specified by the manufacturer that creates the greatest moment with the upper structure in the maximum gradient slope, where possible this should be a minimum of 5°, and in the most unfavourable position of the upper structure, as specified by the manufacturer. The working equipment shall be extended to maximum permissible radii as specified by the manufacturer with the empty attachment in most unfavourable position. NOTE In order to perform this test safely it is advisable to secure the machine to the ground.		P

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
C.4.3	Testing the swing lock		P
	For the test of the swing lock the machine shall be positioned on a flat surface with a maximum gradient slope of ± 1 %.		P
Annex D	Illustrations	Information	P
	 Figure D.1 — Crawler excavator		N/A
	 Figure D.2 — Compact crawler excavator		P
	 Figure D.3 — Wheeled excavator		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	 Figure D.4 — Compact wheeled excavator		N/A
	 Figure D.5 — Walking excavator		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	 Figure D.6 — Wheeled excavator in log application		N/A
	 Figure D.7 — Wheeled excavator with magnet plate		N/A

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
	 Figure D.8 — Wheeled excavator with multi-claw grab		N/A
	 Figure D.9 — Wheeled excavator with hook attachment		N/A

The End of Test Report Part II of II