

Attachment A to Agenda File No. 2022-0005

C O N T R A C T – No. 17465

by and between

San Diego Unified Port District (Port of San Diego)

- hereinafter referred to as “BUYER” -

and

Konecranes GmbH

- hereinafter referred to as “SELLER” -

- BUYER and SELLER also individually referred to as “PARTY” and collectively referred to as “PARTIES” -

Preamble

Subject matter of this Contract is the delivery of 2 (two) new Mobile Harbour Cranes **ESP.9/200t** as specified below. This includes manufacture, assembly, commissioning, testing, shipping, delivery, warranty, and maintenance and other items and tasks as specified below. Pursuant to the conclusion of their contractual negotiations, the PARTIES agree upon the following terms and conditions:

1. Scope of Supplies and Services

1.1. The delivery shall include:

Two **(2)** Basic machines as described in ANNEX 1 consisting of the

- Lifting Capacities 17465-TT-05-1
- Technical Data 17465-TD-**06**-1
- Technical Description 17465-TB-05-1
- General Arrangement Drawing 17465-DC-05-0
- Quay Loadings 17465-QS-**06**-1

including the following items:

items 1.0 - 10.0 of Technical Description 17465-TB-05-1

and including the following extra items

Additional Equipment for Temperature Zone 3
Automatic lubrication on the chassis
Chassis intercom
Battery filling level indicator in the chassis cab
Automatic lubrication of rope pulley
Camera on Tower for Reverse Travel
Emergency descender device
Control Option: Hoisting Height Limiting
Control Option: Slewing Angle and Radius Limitation
Control option: Landside Lowering Limitation ("soft landing")
Special tower cab glazing
Additional tower cab seat
Equipment for Motor Grab Operation 45 kW
Extended smoke detector system
Lighting of the working area with LED lamps
Stairway and interior lighting with LED lamps
Spreader control
Preparation External Power Feed
External power supply via cable reel (medium voltage)
Cable reel for auxiliary power supply
Remote Crane Access / Teleservice
Spreader Bromma EH 5 U
Special oversize double propping pad system (30m ² per corner)
Aviation / Obstacle Beacon on Boom and Tower Tip
Vertical Lift Assistant
Control option: Tandem Lift Assistant and Vertical Lift Assistant

(hereinafter referred to as the "CRANES")

Assembly, commissioning and testing (including overload testing) of the CRANES in the North Sea Port. Hand Over of the CRANES in the Port of San Diego, CA, USA (hereinafter referred to as "Port of Destination").

- 1.2. The SELLER is obliged to perform only the obligations mentioned within this Contract.

2. Contract Price

- 2.1. The Contract Price for the Scope of Supplies and Services as set forth within Clause 1 above amounts to USD _____ net of tax, DAP Port of San Diego, CA, USA (INCOTERMS 2010).
- 2.2. The freight charges calculated by the SELLER from the North Sea port to the Port of San Diego, CA, USA as per clause 2.1 amount to EUR 1,550,000.00. The PARTIES agree that in case that the actual freight charges are higher or lower than the calculated amount, the PARTIES will share the increase or decrease in equal parts. As soon as SELLER booked the vessel, SELLER shall inform BUYER about the charges. The difference between the calculated and actual price shall be converted from EUR to USD with the same exchange rate that is used for the Contract Price according to Clause 2.1. This amount shall either be deducted from or added to the final invoice amount. BUYER shall not be responsible for any additional costs due by CRANES being shipped on multiple vessels.
- 2.3. Except as provided for in this Contract all levies, dues, fees, taxes, duties and other charges outside Germany shall be paid and borne by the BUYER, and all such inside Germany shall be paid and borne by the SELLER. Furthermore, BUYER shall be responsible and bear the costs for importation as well as for documents such as but not limited to permits, approvals, licenses and certificates and all charges for account of cargo at Port of Destination necessary in the BUYER's country respectively in the country of operation of the CRANES.

3. Terms of Payment

- 3.1. The BUYER shall pay the Contract Price, as adjusted by Clauses 2.2 and as otherwise set forth in this Contract, pursuant to the following terms of payment within 30 days after respective invoice date:

USD 10,000,000.00, after signature of the Contract (1st instalment), against invoice.

The remaining amount of the Contract Price of the respective CRANE on signature of Hand Over Certificate as described in Art. 8.5 or start of commercial use, whatever occurs first, however at the latest 3 months after date of Bill of Lading of the respective CRANE if hand over is delayed for reasons beyond SELLER's control against SELLER's written statement in this regard (2nd instalment), against invoice.

All Payments shall be made in favour of Konecranes GmbH to _____
_____ without any reservation or deduction and free of expenses and costs for the SELLER.

- 3.2. In the event of delay in payment the BUYER will pay to the SELLER interest at the rate of 5 percentage points over the interest rate of the European Central Bank for main refinancing operations (minimum bid rate) as applicable at that point of time

per year. Legal rights of the BUYER to set off against claims of the SELLER for payment are excluded, except where the corresponding claim of the BUYER has either been finally judicially determined or explicitly recognised by the SELLER in writing.

- 3.3. The SELLER retains the title to the CRANES until the Contract Price has been completely and irrevocably credited to the account of the SELLER. In case the legal order at the respective location of the CRANES does not acknowledge a retention of title in this respect, the BUYER undertakes to support the SELLER in order to establish a comparable security interest for the SELLER in relation to the CRANES. To the extent that any software scope is provided under this Contract then the title of such software shall not be transferred to BUYER. The BUYER shall receive, at no further cost, a royalty-free, perpetual, non-exclusive and non-transferable (except upon sale of CRANE(S), in such case, license is freely transferable to buyer of CRANE(S)), worldwide, subject to export restrictions as per clause 17 of this Contract, license to use this software for the purpose of this Contract. SELLER shall also provide to BUYER, at no additional charge, any relevant and necessary software updates made by SELLER, if any, for the life of the CRANES, such updates to be covered by the same license terms stated above.

4. Delivery

- 4.1. The SELLER undertakes to deliver the CRANES DAP Port of San Diego, CA, USA (Incoterms 2010), whereas the CRANES shall leave the factory in Duesseldorf, Germany within 30 weeks after signature of the Contract provided that the SELLER has received all due payments and BUYER has timely fulfilled any other obligations due before delivery in accordance with this Contract. In case the BUYER is in delay with any payment or any other obligation due before delivery of the CRANES, the date of delivery set forth above shall be postponed to a date agreed upon subject to available delivery slots and SELLER reserves the right to renegotiate the price and payment terms of the Contract.

5. Delay of Delivery

- 5.1. Should the CRANES not be delivered in accordance with Clause 4 of this Contract by reasons culpably caused by the SELLER, BUYER shall be entitled to claim damages of up to 0.5% of the Contract Price for the respective CRANE for each complete week of delay up to a maximum of 5% of the Contract Price for the respective CRANE. Any further liability of the SELLER to pay damages in relation to delayed delivery shall be explicitly excluded.
- 5.2. The foregoing restriction of liability shall not apply in the event of gross negligence or wilful misconduct of SELLER's executive employees or managing partners.

Without prejudice to Clause 9 of this Contract, the BUYER shall only be entitled to declare the Contract avoided by reason of delay of delivery in relation to the respective CRANE if SELLER has not delivered the respective CRANE DAP Port of San Diego, CA, USA (Incoterms 2010) until January 1, 2024, and SELLER shall refund 100% payments made by BUYER without setoff or deduction within 30 days of BUYER's notice of election avoiding contract due to failure to deliver and demand for refund.

6. Warranty

- 6.1. SELLER warrants its CRANES, to be free of defects in material or workmanship for a period of 36 months or 7,500 hours of operation, whichever occurs first, from the first to occur of the following: (a) the date of Hand Over Certificate as further defined in Clause 8.5, or (b) after commencement of commercial operation of the respective CRANES, provided, however, that in no event shall any warranty (except warranty as per 6.2 and 6.3) on respective CRANES be longer than 39 months from the date of shipment (Bill of Lading).
- 6.2. SELLER warrants the steel structure and the paint of the CRANES, to be free of defects in material or workmanship for a period of 5 years or 12,500 hours of operation, whichever occurs first from the first to occur of the following: (a) the date of Hand Over Certificate as further defined in Clause 8.5, or (b) after commencement of commercial operation of the respective CRANES, provided, however, that in no event this warranty shall be longer than 63 months from the date of shipment (Bill of Lading).
- 6.3. SELLER warrants that the battery packs of the CRANES have a life span (meaning that the batteries have at least 80% of its initial capacity) of 60 months or 1400 battery charge cycles, whichever occurs first, from the first to occur of the following: (a) the date of Hand Over Certificate as further defined in Clause 8.5, or (b) after commencement of commercial operation of the respective CRANES, provided, however, that in no event this warranty shall be longer than 63 months from the date of shipment (Bill of Lading).

The compensation shall be calculated with a so called "Pro-Rata Warranty" for the batteries being part of the Scope under this Contract based on the following "Pro-Rata Warranty Overview":

Years completed	1	2	3	4	5
Completed charging cycles	280	560	840	1120	1400
Pro-Rata Compensation by SELLER	100%	100%	100%	56,00%	34,00%

The above-mentioned compensation by the SELLER shall be calculated based on the valid sales price of the affected battery at that point of time when BUYER is claiming, and SELLER is accepting the warranty of respective battery in line with this Contract. For the purpose of clarity, the current value of the batteries is EUR 260.000,00 per CRANE.

Furthermore, it is agreed between the PARTIES, that SELLER's compensation shall not apply in such case if the BUYER is purchasing a new battery as replacement for affected battery by itself directly from supplier, dealer or the like.

- 6.4. In the event that a Spare Parts Package / Initial Starter Package are/is delivered under the Scope of Supplies and Services under this Contract, SELLER warrants the Spare Parts Package / Initial Starter Package ordered to be free of defects in material or workmanship in no event longer than for a period of twelve (12) months

from the date of Hand Over Certificate of the CRANE to the BUYER, provided, however, that in no event shall any warranty on Spare Parts / Initial Starter Package be longer than fifteen (15) months from the date of shipment (Bill of Lading). For the avoidance of any doubt, parts delivered as Spare Part Package/Initial Starter Package under the Contract are not to be considered as warranty parts.

If repair or replacement of defective parts of the CRANE under SELLER's warranty is necessary, the individual warranty period for such warranty part shall be equal to the remaining overall warranty period of the respective CRANE.

- 6.5. The foregoing warranties shall be honored provided that BUYER sends SELLER written notice of the defect within fourteen (14) days of its discovery and establishes that: (i) the respective CRANE has been operated and maintained in strict compliance with the SELLER's operating and maintenance manuals; and (ii) the defect did not result in any manner from the intentional or negligent action or inaction by BUYER, its agents or employees. If requested by SELLER, BUYER must return the defective equipment or parts to SELLER's manufacturing facility for inspection, and if BUYER cannot establish that conditions (i) and (ii) above have been met, then this warranty shall not cover the alleged defect. Failure to give written notice of defect within such period shall be a waiver of this warranty and any assistance rendered thereafter shall not extend or revive it.
- 6.6. This warranty shall not cover any item on which serial numbers have been altered, defaced or removed. Routine maintenance and wear parts are not covered by this warranty and are the sole maintenance responsibility of BUYER. This warranty is limited to the first user and is not assignable or otherwise transferable without written agreement of the manufacturer.
- 6.7. **This warranty is expressly in lieu of and excludes all other warranties, express or implied (including the warranties of merchantability and fitness for a particular purpose) and all other obligations or liability on SELLER's part. There are no warranties that extend beyond the limited warranty contained herein.**
- 6.8. SELLER neither assumes nor authorizes any other person to assume for SELLER any other liability in connection with the sale of SELLER's CRANE. This warranty shall not apply to any of SELLER's CRANES or any part thereof which has been subject to misuse, alteration, abuse, negligence, accident, acts of God or sabotage. No action by either party shall operate to extend or revive this limited warranty without the prior written consent of SELLER.
- 6.9. In the event of any breach of the warranty by SELLER, the parties agree that SELLER's liability shall be limited exclusively to the remedies of repair or replacement (at seller's sole discretion) of any defective equipment covered by the warranty, whereby parts and components necessary for repair or replacement shall be delivered by SELLER DAP Port of San Diego, USA, Incoterms 2010, unless Parties agree to other location, which means SELLER bears transport cost and BUYER bears import customs duties and taxes and will act as importer of the records if necessary. In no event shall any repair or replacement of any defective part covered by the SELLER's warranty extend the length of the warranty beyond the period specified in Clause 6.1 respectively Clause 6.2 above.

7. Final Liability Provision

- 7.1. The SELLER is only obliged to pay damages in accordance with this Contract if it intentionally or negligently breaches obligations owed to the BUYER.
- 7.2. **SELLER shall in no event and irrespective of the legal basis (contract, tort or any other area of law) be liable to pay damages to the BUYER for loss of profit or revenue, loss of use, loss of data, cost of capital, down-time costs, cost of substitute goods, facilities, property damage external to the goods and any damage or loss arising out of such damage or any special, incidental, indirect or consequential damage or any of the foregoing suffered by a customer of the BUYER or any third party.**
- 7.3. **Furthermore, except in accordance with Clause 7.4 of this Contract, SELLER's overall liability for all claims of any kind, irrespective of their legal basis shall in no event exceed in the aggregate 30% of the Contract Price. However, this clause shall not limit SELLER's obligation of refund as per Clause 5.2.**
- 7.4. **The aforementioned restrictions of liability shall not apply in the event of gross negligence or wilful misconduct of SELLER's managing partners or of its executive employees, in case of bodily injury or insofar as mandatory law provides otherwise.**
- 7.5. To the extent that SELLER's liability is excluded or limited, this also applies to the personal liability of the employees, servants, members of staff, representatives of the SELLER and those employed by the SELLER in the performance of its obligations.

8. Unloading, Assembly, Commissioning Hand Over and Training

- 8.1. The CRANES will be assembled, commissioned and comprehensively tested (including overload test) by the SELLER in the North Sea Port.
- 8.2. BUYER shall be responsible that the vessel nominated by the SELLER and carrying the CRANES will get a "priority berthing" at the unloading berth in the Port of Destination. In case the vessel cannot berth and start unloading within 24 hours after having given N.O.R. (Notice of Readiness) due to reason(s) beyond control of the vessel and/or the shipping company and/or the SELLER, all arising demurrage/detention charges charged to the SELLER have to be reimbursed by the BUYER.
- 8.3. BUYER shall be responsible for the unloading of the CRANES in the Port of Destination; however, SELLER shall provide free of charge ship's gear and crane drivers for unloading if allowed by local authorities. The BUYER shall provide and

bear the costs for stevedores on vessel and landside on due time when vessel arrives.

The BUYER shall provide at the times requested by SELLER and free of charge to the SELLER a mobile (truck) crane and a manlift for the unloading/positioning of the counterweights of the CRANE, if required.

- 8.4. SELLER shall be responsible for safety of all of his activities in the Port of Destination and for ensuring that relevant occupational health and safety laws and regulations are followed.

In the event that SELLER issues any kind of safety procedure or health, safety and environment requirements relating to the onsite testing and commissioning then BUYER shall acknowledge the receipt of such instructions and shall be liable and immediately notify and advise his affected employees, subcontractors, contractors, customer etc.

BUYER shall comply with all applicable health, safety and environment laws, rules and regulations and maintain required safe working conditions at the Site. BUYER shall immediately remedy any unsafe working condition at the Site.

SELLER shall be entitled to a job pause of his activities in the event that he determines that the site is unsafe.

In the event that any unsafe working condition or failure of the worksite to comply with a regulation results in an increase in the SELLER's cost of, or the time required for, performance of the Scope of Supply, SELLER may make an equitable adjustment in price and schedule.

Upon unloading until Hand Over at the Port of Destination the BUYER shall be responsible to protect the CRANES and its parts against theft and vandalism and other intervention of third persons.

- 8.5. Immediately after arrival of the CRANES in the Port of Destination, the CRANES shall be inspected by the PARTIES based on SELLER's "Technical Acceptance Report". At the end of the inspection, and before the commencement of commercial use, the PARTIES shall sign a Hand Over Certificate. Minor deficiencies and shortcomings, which do not prevent the safe and economical operation of the CRANES, shall not entitle the BUYER to refuse the signature of the Hand Over Certificate.

- 8.6. Immediately after arrival of the CRANES in the Port of Destination SELLER's technical staff shall provide an instruction for BUYER's technical staff. Training at SELLER's premises shall be provided for 4 technical staff of BUYER (which may include BUYER's employees and any crane operators or other technical staff that are not SELLER's competitors) for the purpose of operation, maintenance, or repair of CRANES for a period of two weeks. All transportation costs for BUYER's staff will be paid and borne by BUYER, costs for local boarding and lodging by SELLER.

9. Force Majeure

- 9.1. In case the execution of this Contract is affected by acts of Force Majeure such as war, warlike events and other hostilities (whether war be declared or not), riots, natural disaster, epidemics, pandemics, accidents, abnormal low or high water or other acts of God, invasion or acts of foreign enemies, rebellion, acts of terror, revolution, civil war, industrial disputes, governmental regulations or acts or other impacts not within the reasonable control of BUYER or SELLER, the time for execution of the Contract has to be adapted accordingly and the impacts to the Contract shall be discussed and agreed between BUYER and SELLER. SELLER shall not be liable for a failure to perform any of its obligations due to the aforementioned reasons. The Parties acknowledge COVID-19 as Force Majeure, although COVID-19 is known at the time of signing of this Contract.
- 9.2. The party claiming Force Majeure must inform the other party in writing of the time of occurrence, the expected duration and the cessation of the Force Majeure, as well as of the effects on its performance of the Contract and of reasonable measures to mitigate the consequences.
- 9.3. In the event of Force Majeure, the delivery dates and other affected terms agreed under this Contract shall be renegotiated and jointly determined between the Parties within a reasonable time. In such case that the Parties cannot find a mutually agreement or in the event of force majeure lasting longer than 6 months, each PARTY shall have the right to solely terminate the Contract by sending a written notice to the other Party.
- 9.4. In the event of termination as provided herein the SELLER shall place at the disposal of the BUYER all work completed or part completed and the BUYER shall pay to the SELLER the value of such work as agreed by the parties together with any amount due in respect of services less all amounts previously paid by the BUYER to the SELLER in respect of such work.

10. Effectiveness of Contract

This Contract shall come into effect with its signature by the PARTIES.

11. Insurance

SELLER shall arrange for insurance coverage with leading European insurers on his account in relation to

- marine transport of the CRANES to the Port of Destination
- SELLER's erection staff
- all damage that may be caused during assembly and commissioning of the CRANES to third parties by failure of SELLER's staff or wrong equipment handling.

12. Confidentiality Obligation

- 12.1. BUYER undertakes to keep confidential with respect to third parties the know-how, data and/or information furnished by the SELLER to the BUYER under this Contract, in particular any and all drawings, manuals and other technical information etc. unless a) the contents thereof have been made otherwise public, b) the SELLER has authorized the BUYER in writing to disclose such know-how, data and/or information to a third party, c) the BUYER has acquired such information rightfully without any limitation on disclosure or d) the BUYER has developed such information independently. SELLER hereby authorizes BUYER to disclose any such know-how, data and/or information to any crane operators or other technical staff that are not SELLER's competitors for the purpose of operation, maintenance, or repair of CRANES, provided that they have the same confidentiality obligations as the BUYER.
- 12.2. In order to secure SELLER'S business secrets, BUYER furthermore undertakes that any and all trainings that may be provided by the SELLER pursuant to this Contract shall be solely attended by its own personnel or crane operators or other technical staff that are not SELLER's competitors for the purpose of operation, maintenance, or repair of CRANES, provided that they have the same confidentiality obligations as the BUYER. In particular, SELLER shall not be obliged to train any external personnel except as stated above, in particular but not limited to the personnel of any of SELLER's competitors.

13. Arbitration

Any dispute, controversy or claim arising out of or in connection with this Contract including any question regarding its existence, validity or termination which cannot be settled amicably by the parties shall be finally settled in accordance with the Rules of Arbitration of the International Chamber of Commerce (ICC) with no recourse to the courts of law by three arbitrators appointed in accordance with the said rules. The place of arbitration shall be Stockholm, Sweden. The language of the arbitration shall be English. The arbitrators shall determine the matters in dispute in accordance with the provisions of this contract and the law as set forth in Clause 14 of this Contract in this order of priority. Either PARTY may approach any court having jurisdiction for the sole purpose of enforcement of the arbitral award in case the PARTY against whom an arbitral award has been made refuses to comply with the award.

The PARTIES may however apply to any competent juridical authority for interim and conservatory measures.

14. Governing Law

The legal relationship between the PARTIES shall be governed by the United Nations Convention on the International Sale of Goods (CISG) in the English version. Questions concerning matters which are not governed by this Convention or which cannot be settled in conformity with general principles, on which it is based, shall be settled in conformity with Swedish Law.

15. Entire Agreement; Severability

- 15.1. This Contract represents the entire understanding between the PARTIES. There is no other prior agreement between the PARTIES in connection with the subject matter of this Contract, whether verbal or written, other than that contained or referred to in this Contract, and this Contract supersedes and makes obsolete any and all previous verbal or written representations, inducements, arrangements or understandings. Any changes, additions or amendments to this Contract shall only be valid and come into effect if made in writing. The same shall apply to any agreement setting aside the written-form requirement.
- 15.2. Should any of the provisions of the present Contract be or become invalid or otherwise unenforceable, the same shall not affect the validity of the remaining provisions. The PARTIES shall replace the inoperative provision by an operative one coming as close as possible to the economic purpose and effect intended by them.

16. Compliance and Anti-Corruption

The PARTIES agree that they shall, and that any party retained by BUYER shall, comply with all applicable laws and regulation including, but not limited to, laws prohibiting public corruption, commercial bribery and trade and laws setting rules for trade. Notwithstanding anything to the contrary contained in any agreement between SELLER and BUYER or in any other document (including purchase terms and conditions) or instrument relating to the Products, SELLER is not obliged to comply with requests related to the boycott of any country or other jurisdiction.

The BUYER shall defend, indemnify and hold the SELLER harmless from all fines, penalties and all associated expenses arising out of or resulting from any violation by the BUYER of any of its obligations in this Clause.

Failure to comply strictly with this Clause and all applicable laws, regulations and licensing/approval requirements shall be grounds for immediate termination of this agreement by SELLER

17. Export Controls and Trade Restrictions

BUYER agrees that it shall, and that any retained party shall, comply with all applicable export controls, economic sanctions, embargoes and regulations regarding the export, re-export, shipment, distribution and/or sale of the products, technology, information or warranty related services, including normally the laws or the EU, USA and UN (Trade Laws and Regulations). In case of conflicting Trade Laws and Regulations resulting in ambiguity over applicability of different Trade Laws and Regulations, the BUYER shall contact the SELLER for SELLER's final decision. The BUYER will accept SELLER's decision without any further claims or demands.
For the avoidance of doubt, this clause also applies to software.

Prior to any transfer of the CRANES to a third party or use of the CRANES delivered by the SELLER, the BUYER shall in particular check and guarantee by appropriate measures that:

- (i) The BUYER shall not infringe any applicable Trade Laws and Regulations, also considering the prohibitions of by-passing them;
- (ii) The CRANES are not intended for use in connection with armaments, nuclear technology or weapons, if and to the extent such use is subject to prohibition or authorization, unless required authorization is provided, however, SELLER's authorization as per this clause is not required for any use of the CRANES at BUYER that are authorized by the United States Government;
- (iii) If required to enable authorities to conduct export checks, the BUYER, upon request by the authorities, shall promptly provide the authorities with necessary information required by mandatory law or regulations.

The BUYER shall maintain all documentation required under the Trade Laws and Regulations and shall provide the same to the SELLER without delay at SELLER's reasonable request. This recordkeeping obligation of the BUYER shall continue for five (5) years from the signature of the Hand Over Certificate.

The BUYER understands that the requirements and restrictions of the Trade Laws and Regulations vary depending on the product, software, documentation and technical data provided under this Agreement and may change over time and that the BUYER is obliged to know about and comply with such changes.

18. Addresses and Communication

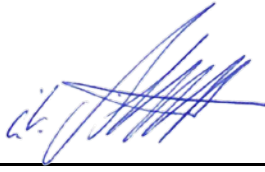
Complete addresses:

San Diego Unified Port District (Port of San Diego)	Tel.:
Marine Operations	Fax:
P.O. Box 120488	email:
San Diego 92112 – 0488	
United States of America	

Konecranes GmbH	Tel.:	+49 - 211 - 7102-0
Forststrasse 16	Fax:	+49 - 211 – 7102 3651
D 40597Duesseldorf / Germany	email:	ps.info@konecranes.com
VAT No. DE164416080		



Date:



Konecranes GmbH

**San Diego Unified Port District
(Port of San Diego)**

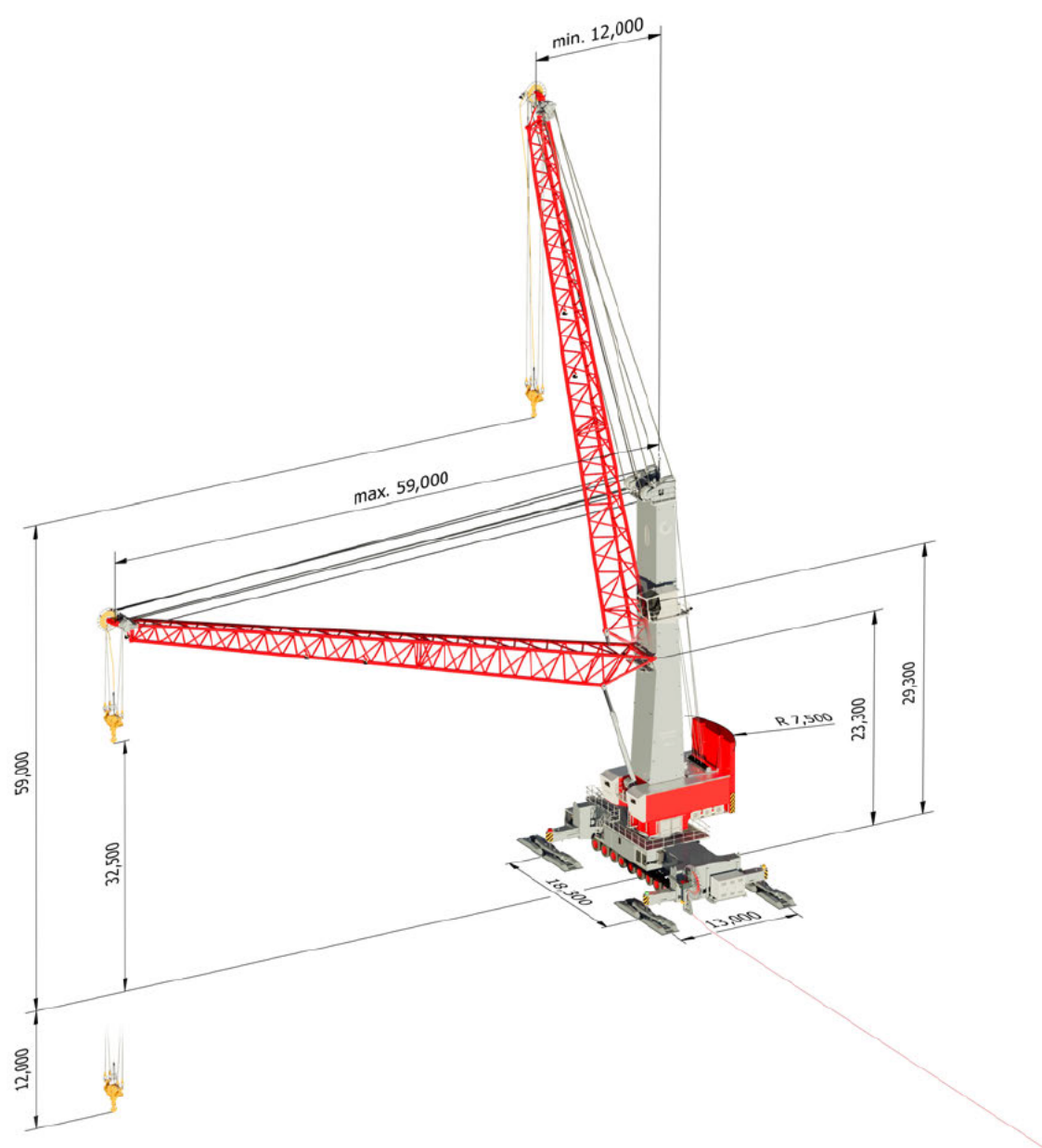
Approved as to form and legality:
GENERAL COUNSEL

By: _____
Deputy

ANNEX 1: Technical documents

Annex 1

ESP.9 MOBILE HARBOR CRANE



17465-DC-05-1

Konecranes GmbH, P.O. Box 18 03 43, Forststrasse 16, 40597 Düsseldorf, Germany
 Subject to change without notice.

17465-DC-05-1

KONECRANES[®] | GOTTWALD

LIFTING CAPACITIES

ESP.9 MOBILE HARBOR CRANE

RADIUS [m]	CAPACITIES [t]				
	Heavy Lift	Heavy Lift	General cargo	Container	Grab
	on ropes (75%)*	on hook (75%)*	on hook (75%)*	on spreader 1 singlelift (75%)*	on hook (50%)*
12	207,4	200,0	74,0	41,0	50,0
13	207,4	200,0	74,0	41,0	50,0
14	207,4	200,0	74,0	41,0	50,0
15	207,4	200,0	74,0	41,0	50,0
16	207,4	200,0	74,0	41,0	50,0
17	207,4	200,0	74,0	41,0	50,0
18	207,4	200,0	74,0	41,0	50,0
19	207,4	200,0	74,0	41,0	50,0
20	207,4	200,0	74,0	41,0	50,0
21	199,4	192,0	74,0	41,0	50,0
22	189,4	182,0	74,0	41,0	50,0
23	180,4	173,0	74,0	41,0	50,0
24	172,0	164,6	74,0	41,0	50,0
25	164,0	156,6	74,0	41,0	50,0
26	155,5	148,1	74,0	41,0	50,0
27	147,4	140,0	74,0	41,0	50,0
28	139,8	132,4	74,0	41,0	50,0
29	132,7	125,3	74,0	41,0	50,0
30	127,1	119,7	74,0	41,0	50,0
31	121,9	114,5	74,0	41,0	50,0
32	117,1	109,7	74,0	41,0	50,0
33	112,5	105,1	74,0	41,0	50,0
34	108,2	100,8	74,0	41,0	50,0
35	104,2	96,8	74,0	41,0	50,0
36	100,4	93,0	74,0	41,0	50,0
37	96,8	89,4	74,0	41,0	50,0
38	93,4	86,0	74,0	41,0	50,0
39	90,1	82,7	74,0	41,0	50,0
40	87,1	79,7	74,0	41,0	50,0
41	84,2	76,8	71,6	41,0	50,0
42	81,4	74,0	69,4	41,0	48,3
43	78,8	71,4	67,2	41,0	46,5
44	76,3	68,9	65,2	41,0	44,8
45	73,9	66,5	63,2	41,0	43,2
46	71,7	64,3	61,4	41,0	41,6
47	69,5	62,1	59,6	41,0	40,2
48	67,4	60,0	57,8	41,0	38,8
49	65,4	58,0	56,2	41,0	37,5
50	63,5	56,1	54,4	41,0	36,2
51	61,5	54,1	52,6	41,0	34,9
52	59,5	52,1	50,9	41,0	33,5
53	57,7	50,3	49,3	41,0	32,5
54	55,9	48,5	47,7	39,5	31,5
55	54,2	46,8	46,3	37,8	30,5
56	52,6	45,2	45,0	36,2	29,6
57	51,0	43,6	43,5	34,6	28,7
58	49,6	42,2	42,2	33,2	27,9
59	48,4	41,0	41,0	32,0	27,0

Deadweight of hook swivel gear SMAG SW200:

7,4 t

Deadweight of spreader 1 Bromma EH 5U:

9,0 t

* Indicates the percentual utilization of the tipping load
 17465-TT-05-1

TECHNICAL DATA

ESP.9 MOBILE HARBOR CRANE

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Offer 17465**1.0 MAIN DIMENSIONS**

Length of chassis without stabiliser pads	approx.	22,2 m
Width of chassis without stabiliser pads	approx.	9,6 m
Size of stabiliser pads	2 x	2,5 m x 6,0 m
Propping base (width, length)		13,0 m x 18,3 m
Tail radius		7,5 m
Height of boom pivot point	approx.	23,3 m
Crane operator viewing height	approx.	29,3 m
Boom length		60,0 m
Maximum radius		59,0 m
Minimum radius		12,0 m
Hoisting height on hook above quay	12 m to 41 m radius	59,0 m
	59 m radius	32,5 m
Hoisting height on hook below quay		12,0 m

2.0 WEIGHTS

Counterweight		153,0 t
Total weight of operational crane*	approx.	685 t

3.0 MAIN DRIVE

Type of drive system	electric power supply by harbor mains	
Voltage		4.2 kV/60 Hz
Voltage tolerance at crane switchboard		± 10%
Peak current demand (peaks of 2-3 s)		340 A
Current demand in average operation		170 - 225 A
Travelling distance (length of trailing cable)		170 m

4.0 HOIST

Number of rope drums		2
Number of ropes		4
Hoisting speeds:		
	without load	120,0 m/min
	10,0 t	110,0 m/min
	45,0 t	48,0 m/min
	74,0 t	33,0 m/min
	100,0 t	25,0 m/min
	200,0 t	13,0 m/min

5.0 SLEWING GEAR

Number of slewing gear drive units		2
Slewing speeds:		
	to 74,0 t	to 1,6 rpm
	to 100,0 t	to 0,6 rpm
	to 200,0 t	to 0,3 rpm

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Maximum peripheral speeds at boom head:	without load	to 300 m/min
	to 74,0 t	to 200 m/min
	to 100,0 t	to 80 m/min
	to 200,0 t	to 40 m/min

6.0 LUFFING GEAR

Average luffing speeds:	to 74,0 t	85 m/min
	to 100,0 t	27 m/min
	to 200,0 t	11 m/min

7.0 TRAVEL GEAR

Travel speed	up to	80 m/min
Total number of axles		10
Number of steered axles		10
Number of driven axles		2
Number of wheels		40
Tyre size		14.00-24
Climbing ability		6,0 %
Vertical axle compensation		+250 mm / -250 mm
Minimum inner curve radius	approx.	6,4 m
Minimum outer curve radius	approx.	18,8 m
Maximum crab steering angle	approx.	25°

8.0 AMBIENT CONDITIONS

Permissible wind speeds:		
Crane in operation	to	24 m/s
Crane in travel operation	to	24 m/s
Crane out of service	to	46 m/s

At wind speeds above 46 m/s, the boom head should be lowered and secured.

Permissible ambient temperatures:	minimum	-20° C
	maximum	+45° C

9.0 STABILITY REQUIREMENT (PERCENTAGE OF TIPPING LOAD)

Normal-load operation / heavy-load operation	≤ 75 %
Motor grab operation	≤ 60 %

10.0 CLASSIFICATION OF CRANE AND MECHANISMS

Classification in accordance with:

FEM 1.001, 3rd edition, 1998

10.1 CRANE CLASSIFICATION

Container operation (single lift)	41,0 t	A8
Motor grab operation	50,0 t	A8
Normal-load operation	74,0 t	A6
Heavy-load operation	100,0 t	A4
	200,0 t	A2

10.2 CLASSIFICATION OF MECHANISMS

Hoist:

Container operation (single lift)	41,0 t	M8
Motor grab operation	50,0 t	M8
Normal-load operation	74,0 t	M8
Heavy-load operation	100,0 t	M8
	200,0 t	M4

Slewing gear:

Container operation (single lift)	41,0 t	M7
Motor grab operation	50,0 t	M7
Normal-load operation	74,0 t	M7
Heavy-load operation	200,0 t	M7

Luffing gear:

Container operation (single lift)	41,0 t	M7
Motor grab operation	50,0 t	M7
Normal-load operation	74,0 t	M7
Heavy-load operation	200,0 t	M7

Travel gear:

M4

11.0 LIGHTING

Boom head	LED lamp	2 x 450 W
Bottom of boom	LED lamp	1 x 450 W
Front of tower	LED lamp	2 x 300 W
Rear of tower	LED lamp	1 x 300 W

Boom head obstacle beacon	1
Tower head obstacle beacon	1

12.0 SURFACE TREATMENT

The primary steel structure of the crane is externally coated in accordance with the following specification:		
Surface treatment of the steel structure:		EN ISO 12944
Surface preparation:		SA 2½ (ISO 8501-1)
Primer coat:	Two-component zinc rich epoxy resin	≥ 50 µm
Top coat:	Two-component acrylic-polyurethane	≥ 120 µm
Total nominal coating thickness:		≥ 170 µm

12.1 COLOR SCHEME

Boom	RAL 5015 Sky blue
Front section, boom head including rope pulleys	RAL 5015 Sky blue
Tower and rope pulleys	RAL 7001 Silver grey
Superstructure	RAL 5015 Sky blue
Luffing cylinder	RAL 5015 Sky blue
Chassis	RAL 7001 Silver grey
Counterweight	RAL 5015 Sky blue
Tower cab and chassis cab	RAL 1013 Oyster white
Stabiliser pads	RAL 7001 Silver grey
Wheel rims, axles, equalisers	RAL 7024 Graphite grey
Other color schemes on request.	

Key:

* Depending on the configuration selected.

Subject to technical modification without prior notice.

QUAY LOADINGS

ESP.9 MOBILE HARBOR CRANE

MAIN CRANE DATA:

Total crane weight: (approx.)	685 t
Maximum load:	200 t
Maximum load on operation:	885 t
Number of axles:	10
Propping base:	18,3 m x 13,0 m
Stabilizer pad size:**	2,5 m x 6,0 m
Stabilizer pads per corner:	2

**other sizes on request

CRANE IN TRAVELLING MODE:

UNIFORMLY DISTRIBUTED LOAD DURING TRAVELLING:

Area covered (19,5 m x 11,5 m)	224,84 m ²
Uniformly distributed load (685,0 t / 224,8 m ²)	3,05 t/m ²

PRESSURE UNDER WHEELS:

Axle Load:	68,5 t
Wheels / Axle:	4
Load / Wheel:	17,13 t
Supporting Area / Wheel:	1690 cm ²
Pressure under Wheel:	10,13 kg/cm ²

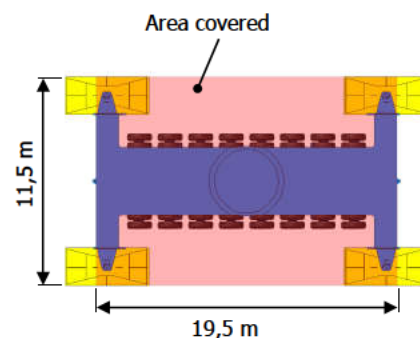


Figure 1: Area covered by the crane in travelling mode *

CRANE IN OPERATION:

MAXIMUM PROPPING FORCES [Heavy load - 75%]

BOOM POSITION	I	II	III
Load:	192,0 t	192,0 t	192,0 t
Radius:	21 m	21 m	21 m
Stabilizer pad loading:	318,7 t	391,3 t	359,3 t
Pad(s) on which load is exerted:	A, D	A	A, B
Stabilizer Pad Area:	30,00 m ²	30,00 m ²	30,00 m ²
Ground Pressure :	1,06 kg/cm ² 2176 psf	1,30 kg/cm ² 2671 psf	1,20 kg/cm ² 2453 psf

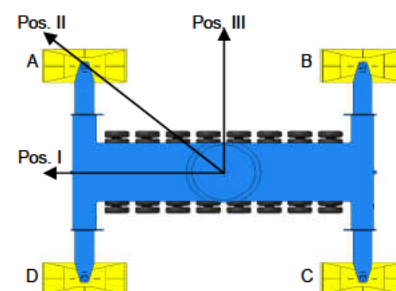


Figure 2: Determination of boom and pad position *

* Images are exemplary and may vary from configured crane

TECHNICAL DESCRIPTION

ESP.9 MOBILE HARBOR CRANE

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1 MOBILE HARBOR CRANES

Konecranes Gottwald Mobile Harbor Cranes are slewing boom cranes. They were introduced to the market in 1956 and have been developed continually since then. With maximum lifting capacities of up to 200 tonnes and working radii of up to 64 metres, Mobile Harbor Cranes are used to serve ships of all types and sizes.

Because their lifting gear can be changed quickly, Mobile Harbor Cranes are suitable for flexible handling of all types of cargo, including containers, general cargo, bulk materials and project cargo.

Konecranes Gottwald Mobile Harbor Cranes are equipped with rubber-tyred chassis and are highly mobile. They travel to the ships that are to be loaded and unloaded, and they can be used throughout virtually the entire terminal.

With its low energy consumption and low noise emissions, the high-efficiency electric drive concept of the Konecranes Gottwald Mobile Harbor Cranes ensures that environmental impacts are kept to a minimum. The cranes are designed to use external power sources as well as to operate independently of the grid with consumption-optimized diesel-generator sets and modern hybrid drives.

A Mobile Harbor Crane comprises four main assembly groups:

- chassis
- superstructure
- tower
- boom

With its rubber-tyred chassis, the fully rigged Konecranes Gottwald Mobile Harbor Crane can travel quickly and comfortably to its place of operation. The superstructure serves as a protective housing for the drives and the control system. The closed tower transmits forces between boom and superstructure and provides the crane operator with comfortable, weather-protected access to the tower cab. The boom is constructed as a torsionally stiff tubular-lattice structure.

The tower cab is the crane operator's ergonomically designed workplace and affords an excellent view of the work area. All the crane functions can be controlled from the tower cab. In addition, the crane is fitted with radio remote control.

Konecranes Gottwald Mobile Harbor Cranes are designed and manufactured to international standards and guidelines and in accordance with the state of the art. This, together with Konecranes long experience of crane manufacture, provides the basis for many years of reliable, high-performance crane operation.

2 CHASSIS

2.1 STEEL STRUCTURE

The chassis is constructed as a welded steel structure in a torsionally stiff box design. The structure is designed to carry the forces and moments occurring in crane and travel operation.

2.1.1 TRANSPORT LUGS

Four fixed lifting points for lifting the fully mounted crane are integrated in the steel structure of the chassis.

With these lugs, the crane can be transported, e.g. by means of a floating crane, in fully rigged condition, which minimises time-consuming disassembly and assembly work.

2.1.2 ACCESS TO THE SUPERSTRUCTURE

Access from quay to chassis is provided by the stairway mounted at one end of the chassis. The bottom step of the stairway is flexibly mounted to prevent it from being damaged, e.g. if it comes into contact with the ground.

The superstructure entrance safely can be accessed in every position from an ample platform at the top of the chassis. All stairways and walkways from ground to the superstructure are guarded by continuous handrails.

2.2 PROPPING SYSTEM

The steel structure of the chassis is fitted with two head beams. Each head beam accommodates two stabiliser beams. The stabiliser beams are extended and retracted by means of hydraulic cylinders that are also located in the head beams. The position of the stabiliser beams is constantly monitored by proximity sensors. By means of hydraulic cylinders located in the stabiliser beams, the stabiliser pads are lowered, to prop the crane, and raised. The stabilisers can be operated in automatic or manual modes. All the extension cylinders and jack cylinders are retracted or extended simultaneously.

In automatic mode, the stabiliser system levels the crane fully automatically. Manual fine adjustment is not necessary.

In manual mode, the stabilisers are operated from the tower cab by means of pushbutton switches on the monitor of the Visumatic® (crane management system) near the crane operator seat, or via the radio remote control (RRC). A level is provided in the chassis cab for monitoring whether the crane is in a horizontal position. In the tower cab, the horizontal position is indicated by an electronic level in the Visumatic®.

2.2.1 STABILISER PADS

The stabiliser pads are pivotably mounted on the jack cylinders. The stabiliser pads can be removed easily when the crane is to travel through narrow passages.

2.3 TRAVEL GEAR

2.3.1 TRAVEL DRIVE

In travel operation, the crane is driven by one hydraulic motor per driven axle. The hydraulically controlled torque distribution over the axles ensures uniform torque delivery. The same maximum speed is attained in both travel directions.

2.3.2 AXLES

Only two axle types are used; both have twin tyres. The driven axles are additionally braked and steered. They each have a differential in the middle of the axle and planetary gears in the wheel hubs. The other axles are steered axles.

The small number of axle types reduces the number of spare parts that need to be stocked and simplifies maintenance and repair work.

2.3.3 AXLE SUSPENSION

The axle suspension with robust, low-maintenance equaliser beams guarantees uniform distribution of the total weight over all the axles. At the same time, the equaliser beams permit independent vertical motion of the axles.

Obstacles such as rails and dips can be travelled over or through without difficulty.

2.3.4 STEERING

All the axles are steered by means of hydraulic cylinders. The steering angles are synchronised with the aid of electronic linear encoders integrated in the steering cylinders.

The steering concept provides precise steering with the minimum possible tyre wear, and it allows crab steering for better manoeuvrability of the crane.

2.3.5 CRAB STEERING

In crab steering mode, the crane can travel sideways with a translational motion; for this, all axles are steered with the same steering angle. The sideways travel of the crane facilitates manoeuvring in confined harbors and provides a high level of mobility.

2.3.6 BRAKES

Crane travel is braked with the hydraulic service brake by means of brake valves. A low-maintenance, oil-immersed multi-disc brake assists the hydraulic service brake and facilitates starting on gradients. The spring-loaded parking brake is applied automatically after crane travel has been brought to a halt. All the brake systems act on the driven axles.

2.3.7 TRAVEL GEAR CONTROL

The travel motion of the crane is controlled from the tower cab, the driver cab or with the radio remote control (RRC). This control covers driving, steering, braking, lowering of the crane from the propped

position onto the wheels, and propping for crane operation. The crane can accelerate smoothly from standstill all the way up to maximum speed in both directions.

2.3.8 WARNING SIGNALS DURING CRANE TRAVEL

During crane travel, yellow lights flash on the superstructure and a pulsating audible alarm is sounded.

2.4 SUPPLY OF PRESSURISED OIL TO THE CHASSIS

Pressurised oil for the hydraulic stabiliser, steering, travel gear and brake systems is provided by the pressure oil unit in the superstructure.

2.5 CHASSIS CAB WITH REMOTE CONTROL

The crane is equipped at the front with a weatherproof cab that offers the crane operator a very good view during travel. It is equipped with:

- Radio remote control for operating all crane functions
- Mount for radio remote control
- Adjustable driver seat
- Safety glass
- Heating system
- Wiper system for windscreen
- Rooflight
- Ventilation system

3 SUPERSTRUCTURE

The superstructure is a torsionally stiff welded steel load-bearing structure designed to carry all the forces and moments occurring in crane operation. The superstructure has two floors and houses all electrical and mechanical components like hoists, slewing gear and the pressure oil unit, provides sufficient room for easy maintenance access and protects the environment from noise emissions. The crane control including the electrical control and monitoring systems is located in a separate room of the superstructure. At the rear side the counterweight is installed.

Integrated in the superstructure, a safe access from the chassis platform is provided. The superstructure is accessed via lockable doors.

The superstructure is illuminated with LED lamps, half of which serve also as emergency lighting.

3.1 PROTECTIVE HOUSING

The protective housing protects all components from environmental influences; it also protects the environment from noise emissions. The rope outlet on the roof of the superstructure is protected against ingress of rain and dust by means of rubber seals. Water ducts are provided for rainwater removal.

The side walls can be removed easily for replacement of individual drive units.

3.1.1 COMMUNICATION SYSTEM

The Mobile Harbor Crane is equipped with a communication system having headphones and microphones, which can be connected in:

- the machinery room for the hoist(s) and pressure oil unit
- the machinery room for the slewing gear
- the electrics room
- the chassis driver cab
- the tower cab

The system is supplemented with external loudspeakers and an amplifier with microphone in the tower cab.

3.1.2 VENTILATION SYSTEM

The superstructure is provided with forced ventilation. In the upper part of the tower above cab level fresh ambient air is sucked in and introduced into the superstructure via an airduct inside the tower. In the superstructure, the air is distributed to all relevant places inside the machinery rooms to cool the machine units. The heated exhaust air is removed in an upward flow through the closed tower and escapes via air outlet openings.

The slight positive pressure in the superstructure minimises the dust load on the drive units.

3.2 HOIST

The hoist assembly comprises two hoists, each having a modular design. Each hoist comprises a three-phase motor, a multi-disc brake, a planetary gear with a back gear and a single-layer rope drum.

The rope drums, the reduction gear units and the hoist motors are arranged in such a manner that all the maintenance points are easily accessible.

The hoist ropes are coiled in one layer on the rope drums in order to keep wear low. Two ropes are coiled on each drum. The rope ends are connected directly to the hook rotator, i.e. hook speed equals rope speed.

A horizontal load path during luffing is achieved by triple reeving of the ropes between tower and boom head.

The hoist gear units are equipped with a recirculating oil lubrication system.

The hoists are braked electrically by the hoist motors. When the hoisting speed is near zero, the spring-loaded hydraulically released disc brakes are applied automatically. These brakes also act as emergency brakes in the event of a power supply failure.

The electric motors are frequency-controlled three-phase asynchronous motors. The hoist motors are regulated by IGBT inverters. The frequency-controlled drive system provides smooth acceleration and deceleration of the hoisting motion. It thus protects the mechanical components and the steel structure from fatigue. The maximum possible hoisting speed is automatically increased with reduced load.

3.3 SLEWING GEAR

With the slewing gear, the superstructure can be slewed infinitely. The slewing gear has a modular design and comprises:

- three-phase motor
- elastic coupling
- disc brake
- three-row roller bearing slew ring
- fully enclosed planetary reduction gear unit.

The drive pinion of the planetary gear unit engages with the internal toothing of the slew ring.

3.3.1 SLEWING GEAR LUBRICATION

The slewing reduction gear unit is oil-immersed. The roller bearing slew ring and the toothing are lubricated by means of a central lubrication system.

3.3.2 SLEWING GEAR BRAKE

The slewing motion is braked electrically. When the slewing gear has been brought to a standstill, the spring-loaded hydraulically released disc brake is applied automatically. This brake also acts as an emergency brake in the event of a power supply failure.

3.3.3 SLEWING GEAR CONTROL

The electric motor is a frequency-controlled three-phase asynchronous motor. The slewing gear motor is regulated by an IGBT inverter. The frequency-controlled drive system provides smooth acceleration and deceleration of the slewing motion. The maximum slewing speed depends on the boom position and is controlled automatically.

3.4 LUFFING GEAR

The boom is luffed in and out by means of a hydraulic differential luffing cylinder that holds the boom in position. The cylinder is mounted below the boom. Brake valves control the cylinder movement. For safety reasons, pipe-break valves are fitted.

The boom head can be lowered to a convenient working height for maintenance purposes.

For maintenance work, the valve block on the luffing cylinder can be accessed easily from the chassis platform or a platform on the superstructure.

3.4.1 LUFFING GEAR DRIVE

The pressure oil unit in the superstructure supplies the luffing cylinder with pressurised oil for its operation.

3.4.2 LUFFING GEAR CONTROL

Acceleration and deceleration of the luffing motion are controlled smoothly and in an infinitely variable fashion by means of valves and by alteration of the volumetric flow rate of the oil.

3.5 PRESSURE OIL UNIT

The pressure oil unit supplies pressurised oil to the luffing gear on the superstructure and to the propping, steering, travel gear and brake systems on the chassis. It comprises:

- a three-phase squirrel-cage motor
- an elastic coupling
- an axial piston pump.

The axial piston pump has an adjustable oil displacement. The displacement is adapted as necessary during crane operation.

3.6 CENTRAL LUBRICATION SYSTEM

The automatic central lubrication system supplies the following lubrication points on the crane:

- boom root bearing
- upper and lower pivot point of the luffing cylinder
- roller bearing slew ring
- rope drum bearings

The central lubrication system is installed at an easily accessible point and has an integrated lubricant reservoir. The points to be lubricated are supplied automatically and regularly with a sufficient quantity of lubricant via a pipework and lubricant distributors.

A second automatic lubrication system supplies the internal toothing of the roller bearing slew ring with lubricant by means of a lubricating pinion.

3.7 COUNTERWEIGHT

The counterweight is mounted in a positive-fitting manner in T-rails at the rear of the superstructure.

4 TOWER/BOOM SYSTEM

The high boom pivot point on the tower allows the crane to be positioned very close to the ship without risk to ship freight, ship superstructure or crane components.

The elevated position of the tower cab offers an excellent view of the entire work area and into the ship's hold.

4.1 TOWER

The tower is a torsionally stiff, welded steel structure. It has a closed design up to the tower cab. The transmission of forces and moments to the superstructure takes place in a uniformly distributed manner over the entire circumference of the tower. The tower is equipped with an integrated airduct for feeding fresh air from above cab level into the superstructure.

4.1.1 ROPE PULLEYS

A rope pulley set is provided on the tower head. Rope guides prevent the hoist ropes jumping out of the pulleys. The rope pulleys run in anti-friction bearings and are of a low-maintenance design. Grease nipples are, however, provided for lubricating the bearings.

The rope pulleys can be accessed easily via ladders and platforms.

4.2 LUFFING BOOM

The luffing boom is constructed as a torsionally stiff, welded tubular-lattice structure with two upper chords and one lower chord. The boom comprises the boom root and the boom head, which are connected together by an advanced pin connection that remains immovable even in the long term.

4.2.1 BOOM ROOT BEARING

The boom root is mounted in plain bearings on the tower. A maintenance platform provides easy, safe access to the boom root bearing.

4.2.2 ROPE PULLEYS

A rope pulley set is provided on the boom head. The design of the rope pulley set is the same as that of the rope pulley set on the tower head. The distance between the rope pulleys is selected such that load is stabilised below the boom.

4.2.3 CABLE REEL AT BOOM HEAD

A motorized cable reel is installed at the boom head in order to coil and uncoil the electrical cable for the remotely controlled hook rotator and lifting gear such as automatic spreaders, electro-hydraulic grabs or magnetic lifting devices.

The cable reel is torque-controlled for an automatic slack cable adjustment and the prevention of shock loads on the cable. Thus the cable service life is increased.

4.3 ACCESS TO TOWER CAB

Weather-protected access to the tower cab is provided via the fully enclosed tower. The tower cab can be reached easily via wide, safe stairways having a stair angle of 50°. Spacious platforms facilitate maintenance work.

5 TOWER CAB

The crane operator controls all the functions of the crane from a spacious, ergonomically designed tower cab. Large windows and the cab position high on the tower provide an excellent view of the work area and the ship's holds.

The tower cab is made of steel plates and sections which are protected against corrosion in a salt-laden, marine environment by a tried-and-tested paint finish. The tower cab is fitted with safety glass windows. The windows are arranged in such a manner that they are easy to clean from inside and outside. The near-silent ventilation system with its air outlets on the windscreen and side windows and in the footwell ensure the windows do not mist up.

The non-glazed surfaces in the cab are panelled with a material which is heat and sound insulating. The dark, carefully matched colour scheme inside the cab minimises reflections from the windscreen. A number of practical and ergonomic features make the tower cab a pleasant place to work:

- windows of tinted safety glass
- a floor window
- sound and heat insulating interior panelling
- upholstered operator seat, which is adjustable in the vertical and horizontal directions
- controls and indicators
- air outlets for the windscreen and side windows and the footwell
- infinitely adjustable sun blinds on the side windows, rooflight and windscreen, and on the door
- automatic heating and climate control system
- near-silent ventilation system with electric heater
- wiper/washer system for the front and roof windows
- interior lighting
- electric socket including USB socket
- electric horn
- internal and external communication system
- ashtray
- radio with Bluetooth connection.

5.1 CONTROLS AND INDICATORS

The controls and indicators for all crane functions are located in control panels on both sides of the operator seat and on the Visumatic®.

The controls comprise light switches and control levers and switches for all main and auxiliary crane functions.

5.2 VISUMATIC® – CRANE MANAGEMENT SYSTEM

Konecranes Gottwald Visumatic®, Konecranes crane management system, displays all the crane functions in a structured, easy-to-understand form on a monitor near the crane operator seat. The individual functions are indicated by coloured pictograms and are selected with function keys on the monitor.

All the data required for operating and monitoring the crane are shown on the Visumatic® monitor. These data include:

- check list with status indicator for crane, travel and propping operations
- actual and limit values for load, radius and hoisting height
- wind speed
- operating mode (hook, spreader or grab operation)
- diagnostic messages
- support for fault finding and remedying
- indication of remaining operating hours until end of maintenance interval
- statistics for diagnostic messages and performance data.

6 HOOK ROTATOR

The crane is equipped with a hook rotator, which rotates the hook so that the load can be turned to any desired position from the tower cab. The hook can rotate freely or be locked in position.

The lifting gear comprises a beam from which a ramshorn hook equipped with safety catches is suspended by means of a universal joint. The hook, which is mounted in roller bearings, is remote-controlled from the tower cab. It is infinitely rotatable.

The electro-hydraulic hook rotator comprises an electric motor, a hydraulic pump, a hydraulic motor and a gear unit. These assemblies plus the slipring assembly are accommodated in a closed rotator beam and protected from environmental effects and jolts or impacts.

The rotator beam and the rotator are equipped with power supply and remote control connections for spreaders, grabs and other lifting gear.

7 SAFETY EQUIPMENT

The safety devices installed comply with currently applicable EU Directives for mobile cranes. Additional safety equipment further enhances operational safety.

7.1 SAFE LOAD INDICATOR

The crane is equipped with an automatic safe load indicator that ensures its safe operation.

The system indicates the actual load on the hook and the actual radius of the boom. As soon as the permissible load is reached, motions that would increase the load moment are disabled and an audible alarm is sounded in the tower cab.

7.2 SECURING FOR CRANE TRAVEL

Before crane travel, the superstructure and chassis must be locked together mechanically and the boom must be in the travel position. When these conditions are satisfied, the slewing gear is switched off and the travel drive enabled.

7.3 STABILISER MONITORING

The propping status is monitored. If the crane is correctly propped, the superstructure/chassis locking device can be unlocked and the crane drives can be operated.

Before the stabiliser pads can be raised into the travel position, the superstructure and chassis must be locked.

7.4 LIMIT SWITCHES

The hoisting and lowering motions of the crane are limited by electronic limit switches. In the pre-limit switch range, the speed of the hoisting motion is reduced. When the switch-off point is reached, the hoisting motion is stopped.

For the electronic limit switch of the hoist, the lifting height is detected by two redundant systems. This securely detected value is verified in a fault tolerant control system. When the deactivation criterion is reached, the hoist is deactivated through two channels

The limit switching of the luffing gear functions in the same manner as that of the hoist.

7.5 SAFETY VALVES

The jack and luffing cylinders are equipped with pipe-break valves that hold the cylinders in position should a leak occur.

Pressure limiting valves protect the hydraulic circuits from excessive pressure.

7.6 ANEMOMETER

An anemometer is located on the tower head. The wind speed is shown on the Visumatic® monitor. If the allowed wind speed is exceeded, an audible alarm will be sounded in the tower cab.

7.7 EMERGENCY STOP

In case of danger to staff in the work area or to the crane itself, the motions of the crane can be stopped immediately by actuating an emergency stop switch.

Emergency stop switches are mounted in the chassis and tower cabs, in all machinery rooms including the electrics room. When one of these switches is actuated, all crane motions are stopped immediately.

Further emergency stop switches are mounted at the front and rear of the chassis. When one of these emergency stop switches is actuated, all crane travel motions are stopped immediately.

7.8 DEADMAN SWITCH

The function of the deadman circuit is controlled by a switch installed in the crane operator's seat. The crane drive units can only be activated when someone is sitting on the seat.

7.9 EMERGENCY DESCENDER DEVICE

If the stairway in the tower cannot be used, descent is possible using the emergency descender device, which is located on the tower cab platform. Alternatively, descent from the tower cab platform is possible along the tower or directly from the front window of the cab.

8 ELECTRICAL EQUIPMENT

The main drives of the crane are driven by means of electric motors. This drive concept, which is the most wide-spread and commonly used drive concept in port technology applications, offers the following advantages:

- low operating and maintenance costs
- reliable operation even in continuous, multi-shift operation
- reliable operation under extreme climatic conditions
- long machine-unit service lives with unvarying high efficiency
- easy service and maintenance.

The three-phase drive system provides smooth acceleration and deceleration of the crane motions and reduces the peak loads acting on the generator. If the crane is connected to the shore power supply, there is a further advantage in that the harmonics are reduced.

8.1 SHORE POWER SUPPLY

A motor-operated cable reel fitted with a trailing cable is installed at the portal chassis. The position of the cable reel can be adapted to the requirements of the specific application. Optionally the trailing cable can be equipped with fiber optic wires for communication purposes.

The feed voltage is converted into the correct voltage for the crane mains via a dry-type transformer. This transformer is located in a separate compartment located at the portal chassis. Also located in this compartment is the main power disconnecter on the secondary side of the transformer.

8.2 ELECTRICS ROOM

The closed, lockable electrics room is located in the superstructure. Accommodated in this room are the crane control system and the electric control equipment.

The electric control equipment is arranged by function groups. All cables, plugs and terminal strips are clearly marked so that maintenance work can be performed easily.

The electrics room is air conditioned and can be heated, so that moisture problems can be prevented and it is possible to carry out maintenance work safely and reliably in all weather conditions.

8.3 CENTRAL COMPUTER

The programmable logic controller of the crane is installed in the electrics room. It detects and monitors all electric signals and diagnostic messages via a bus system. In addition, data is exchanged between the controller, the crane drives and the tower cab via a high-speed bus system.

8.4 LIGHTING

The tower cab, all rooms of the superstructure, and the entrances, stairways and platforms are illuminated by LED lamps. Half of these lamps serve also as emergency lighting. Thanks to the installed lighting, it is possible to walk safely on and in the crane, and to perform maintenance work without difficulty, when it is dark outside.

LED floodlighting is provided for illumination of the work area in night operation of the crane. Lights are mounted on the boom head, below the boom, on the front of the tower and on the rear of the tower.

8.5 OPERATING HOURS COUNTER

The operating hours counters record the operating hours of the various crane drives.

8.6 VIDEO CAMERA ASSISTANCE

The crane is equipped with a camera system that assists the crane operator during loading and unloading of cargo. The image captured by a video camera on the boom head is displayed on a monitor in the tower cab. The monitor is mounted in a clearly visible position close to the operator seat. Further, a video camera pointing to the rear is installed at the height of the tower cab. The image is displayed on the monitor in the tower cab, enabling obstacles to be recognised in good time.

8.7 RADIO REMOTE CONTROL

All the crane functions can be controlled by the radio remote control unit. The control unit is portable, robust and weatherproof. The radio remote control is equipped with displays that show, among other things, the operating mode, radius and lifting capacity. The individual functions are indicated with the same symbols and pictograms as are used on the screen in the tower cab. With the radio remote control, the crane can be travelled and positioned easily from the ground. Miscommunication between the crane operator and ground staff during repair and maintenance work can thus be avoided.

8.8 REGENERATIVE BRAKING

For brake processes of the hoist and slewing gear, electrical energy is recovered and made available to other consumers connected to the on-board grid of the crane if these consumers have a simultaneous energy requirement. When being operated electrically from the shore grid, whatever electrical energy is not used by other consumers is fed back to the shore grid and can be consumed by other machines in the terminal, e.g. adjacent cranes.

8.9 HOISTING HEIGHT LIMITING

The Hoisting Height Limiting control feature assists the crane operator when he is operating the hoist manually. If a previously defined upper hoisting height is achieved during a hoisting motion, the system automatically stops the hoisting motion. Hoisting can then be resumed at creep speed. In the same way, during lowering, the lowering motion of the hoist is automatically stopped when the lowest hoisting height is reached.

8.10 LANDSIDE LOWERING LIMITATION ("SOFT LANDING")

This control feature helps the crane operator to avoid unintentional lowering of the load on the quay surface with excessive speed by automatically braking the hoist from a previously defined height when lowering on the landside.

9 SURFACE PROTECTION

All load-bearing parts are sandblasted and painted using proven methods. These methods meet the requirements of a salt-laden, marine environment.

10 OPTIONAL EQUIPMENT

The selected options complement the standard equipment and enable the cranes to be adapted to the special requirements of customers.

1210.2 BATTERY POWER FOR TRAVELLING AND EMERGENCY OPERATION

The crane is equipped with an advanced lithium-ion battery drive system for travelling without having any electric connection to the land-side electric grid. Besides travelling, actuating the outriggers and the propping cylinders also is possible when running on battery.

The battery unit is sufficiently designed for typical travel distances of mobile harbor cranes within the port. The battery unit is connected to the crane grid via the DC link and a special frequency inverter and supplies energy for all electric consumers of the crane. The battery unit is charged via the medium-voltage power supply of the crane.

In case of a power outage of the land-side electric grid the battery unit temporarily acts as an emergency power supply and allows an emergency operation of the hoist, the slewing and the luffing gear, so the crane driver can safely finish the current working cycle and can bring the crane into safe conditions.

2203.3 FOILED PANES

The window panes of the tower cab are coated with a special adhesive foil which provides sun protection and reduces light reflections.

2204.2 FOLDING SEAT IN THE TOWER CAB

A folding seat is installed inside the tower cab and offers the opportunity for a further person to sit down if required.

2211.2 TRAVELLING WITH EXTENDED STABILISER BEAMS

To travel the crane over the short travelling distances e.g. to the next ship's hatch, the stabiliser beams can remain extended. The time required to move the crane is reduced as a result.

2320.3 TANDEM-LIFT ASSISTANT

The Tandem-lift Assistant allows one crane driver to perform computer assisted, synchronous tandem lifts by controlling two cranes simultaneously. By using the Tandem-lift assistant, the load capacity of both cranes can fully be utilized without the necessity of any down-rating (subject to national regulations).

Synchronous crane operation is achieved via state-of-the-art hardware and software installed on both cranes. This includes the Tandem-lift Assistant software, safety PLCs, a wireless LAN system with a safe radio link between both PLCs plus the sophisticated Vertical Lift Assistant. This system monitors the rope inclination angle and the controller automatically ensures that the boom tip is positioned exactly above the hook. This prevents unwanted lateral movement after the load is lifted off the ground and also

ensures a stable system between load and cranes. The two cranes are operated in a master-slave combination, where one crane (the master) has unidirectional control over the other (slave).

With the Tandem-lift Assistant two Konecranes Gottwald Mobile Harbor Cranes of the same model and version can be paired. For other combinations, further details have to be checked by the Konecranes specialist engineers.

2330.2 SLEWING ANGLE AND RADIUS LIMITATION

With this control option, the crane operator can limit the working area of the crane by means of virtual limit positions. Once the limit positions have been moved to and saved, the crane operator can then work manually as usual within the range defined in this way. As he approaches a previously saved limit position, the speed is automatically reduced before the limit position is reached so that the speed is zero when the limit position is reached. This means that leaving the defined working area unintentionally is not possible. This function can be helpful in avoiding an overlap of the working areas of adjacent cranes.

2410.1 DIGITAL SERVICES STANDARD PACKAGE (TRUCONNECT)

The crane is equipped with a Konecranes connectivity hardware set consisting of a Konecranes TRUCONNECT® router with built-in software firewall including a Konecranes global data roaming SIM card (private APN). This enables the access option for various digital services if a connection to a suitable local mobile network can be built up.

Once connected, it is possible for authorized Konecranes personnel to access the crane from any computer connected to the internet to provide e.g. fault diagnosis or troubleshooting remotely (Remote Support). Separate agreements apply for the use of Konecranes Gottwald Remote Support.

In parallel, it enables crane data transmission to the Konecranes cloud service. These data can be accessed through the TRUCONNECT data insights feature on the yourKonecranes web platform if respective access credentials to the platform have been given.

The standard TRUCONNECT Basic Module provides data on crane operating status, load data as well as fuel level and consumption information. Moreover, the crane's geographical position can be made visible on a map or satellite view through the GPS functionality integrated in the router.

2505.2 CHASSIS INTERCOM

To improve communication between the crane driver and people who want to access the crane, an intercom is installed on the chassis stairway.

2511.2 EXTENDED SMOKE DETECTOR SYSTEM

The smoke detector system of the basic equipment with its sensors in the electrics room is supplemented by additional sensors in the machinery room and in the tower cab.

2601.4 AUTOMATIC LUBRICATION OF ROPE PULLEY

The crane is equipped with an additional automatic central lubrication system, which supplies the bearings of the rope pulleys on the tower and boom head.

2602.2 AUTOMATIC LUBRICATION ON THE CHASSIS

The crane is equipped with an additional automatic central lubrication system, which supplies the lubrication points of the axles.

2710.2 SPREADER BROMMA EH 5 U

Automatic, telescopic single-lift spreader for handling 20, 30 and 40-foot ISO containers. The spreader is secured to the hook rotator by a bolt connection. Power is supplied via the cable drum on the boom head.

3103.8 EXTERNAL POWER SUPPLY WITH CABLE REEL (4,16 V)

For feeding the crane with electrical power from the wharfside grid at 4,16 kV level, a motor-operated cable reel is installed on the chassis. The cable reel is fitted with a single cable. The quay end of the cable is not fitted with a plug-in connector. On customer request, a medium voltage connecting plug and a medium voltage socket for the shore mains can be supplied. The incoming voltage is converted into the correct onboard voltage via a dry-type transformer. This transformer is located in a separate compartment in the crane chassis. Connecting crane to the quayside power grid is not included in Konecranes' scope of supply and service due to stipulations in the national and regional regulations in the country of use.

3104.6 TRAILING CABLE LENGTH

The length of the trailing cable coiled on the cable reel is customer-specific. Exact length to be agreed on.

3107.3 CABLE REEL FOR AUXILIARY POWER SUPPLY

For supplying auxiliary consumers of the parked crane with electric energy a cable reel driven by a hand crank is installed on the chassis. The quay end of the cable is fitted with a plug-in connector. The length of the cable is 100 m.

3108.2 INFEEED VOLTAGE OF AUXILIARY POWER SUPPLY

The auxiliary power supply is equipped for a shore voltage of 400 V.

3111.2 SPREADER COMMUNICATION

The communication between the spreader and the crane control system is established via a hard-wired cable connection. The crane control is able to control both singlelift and twinlift spreaders. In case the spreader is equipped with a TTDS system (twin-twenty detection system), its signals can be utilised by the crane as well.

3113.2 EQUIPMENT FOR MOTOR GRAB OPERATION (54 KW)

The crane is equipped for operation of an electro-hydraulic motor grab with rated power up to 54 kW. The motor grab can be attached to the crane hook and rotated by means of the hook rotator.

Offer 17465



3117.1 RADIO REMOTE CONTROL FREQUENCY RANGE

The radio remote control provided with the crane is of DECT standard.

Subject to change.