WEATHER BIRD

Designer Vladimir Orloff & Henri Rambaud
Builder Chantelot & Lemaistre, Fécamp
Date 1931
Length overall 101 ft 8 in / 31 m
Beam 21 ft 4 in / 6.5 m
Draft 11 ft 5 in / 3.48 m
Construction Carvel oak on oak

MARCH 2021

LEVER GROUP

Ship & Yacht
Service & Repair
34 Asklipiou str. 18545
Piraeus-Greece
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Fax: +30 210 4412285
info@leverteam.gr
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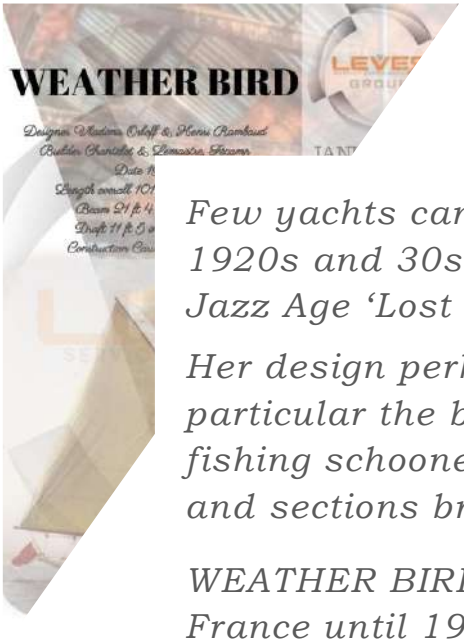
SAILING YACHT RENOVATION


WEATHERBIRD
CHANTIER DE LA NORMANDIE - 1931



Few yachts can match WEATHER BIRD's embodiment of the spirit of 1920s and 30s Côte d'Azur as the summer playground to America's Jazz Age 'Lost Generation'.

Her design perhaps borrows from American styles and trends, in particular the bow profile, reminiscent of the great east coast USA fishing schooners, while her generous beam and underbody profile and sections bring to mind the work of John G. Alden.

WEATHER BIRD was launched in November 1931, based in South France until 1947 that Her name changed to JAVA and her home port to Monaco. In 1958 restored her name to WEATHER BIRD with her port listed as Cannes, until 1966. Eventually disappeared from the register after 1969.

WEATHER BIRD has been a western Mediterranean based yacht all of her life. It makes sense; she's the perfect yacht for cruising these waters. Owners over the past 20 years have given this much loved schooner just deserts and more.

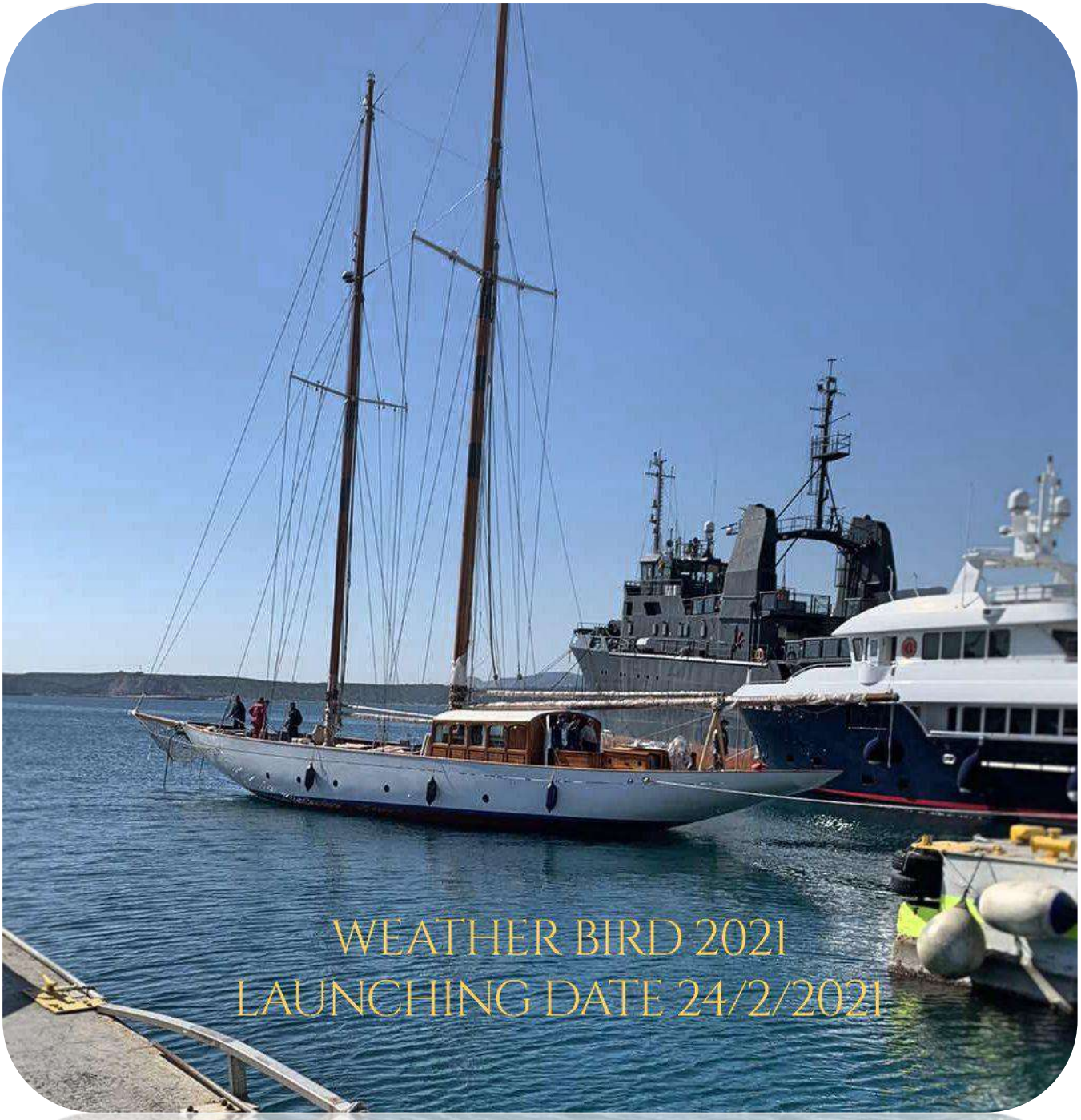
Weather bird boasts an impressive career as one of the world's most historic sailing yachts. On-board, she has hosted some prominent artists including Hemingway, Dos Passos, Picasso, Dorothy Parker, Man Ray and Archibald MacLeish while inspiring some of the works from Fernand Leger and F. Scott Fitzgerald. Her keel also holds a sealed-in record of a Louis Amstrong song.

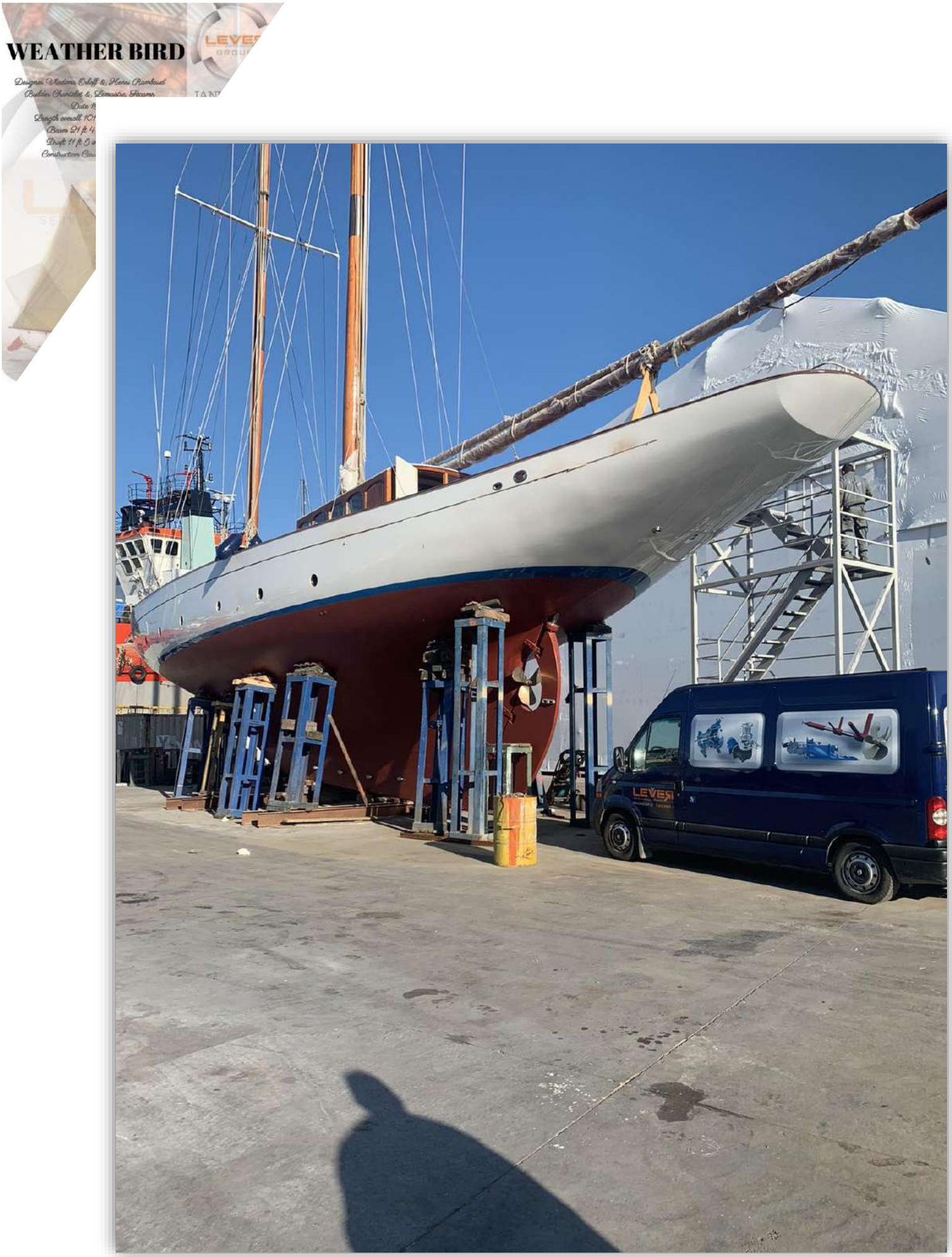
SAILING TO AGIOS KOSMAS MARINA

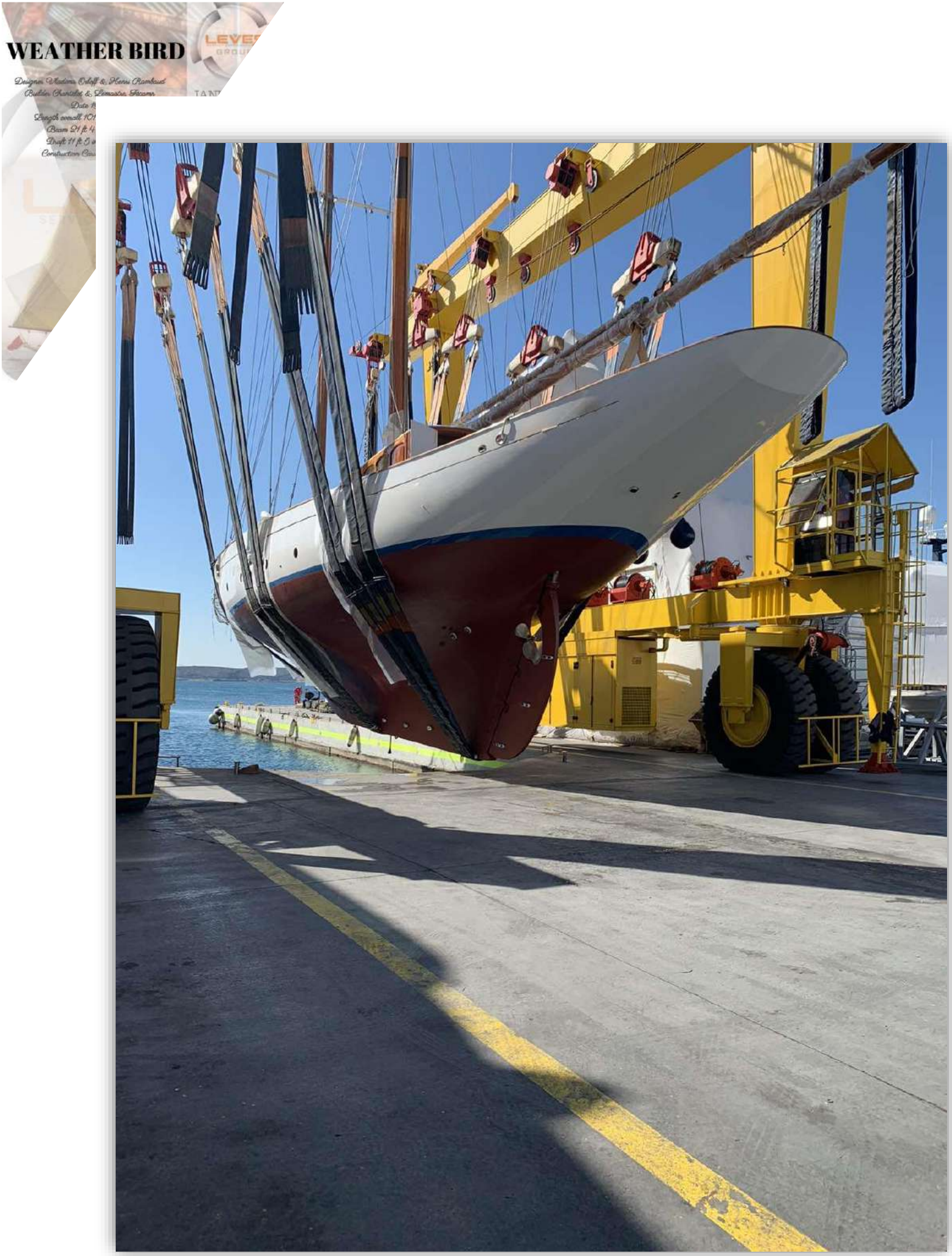
AT 13/3/2021


WEATHER BIRD


WEATHER BIRD


WEATHER BIRD 2021
LAUNCHING DATE 24/2/2021

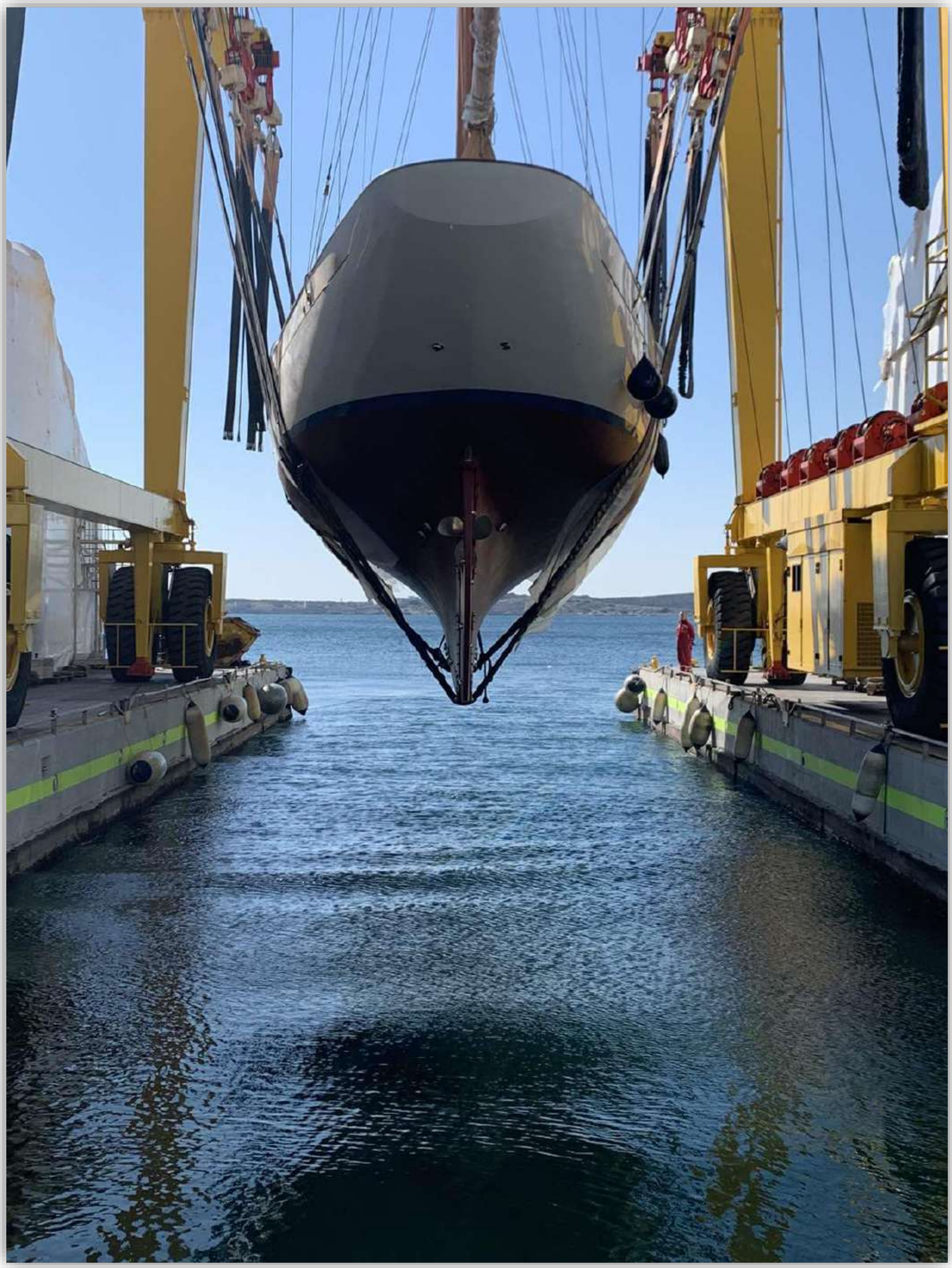

WEATHER BIRD


WEATHER BIRD


WEATHER BIRD

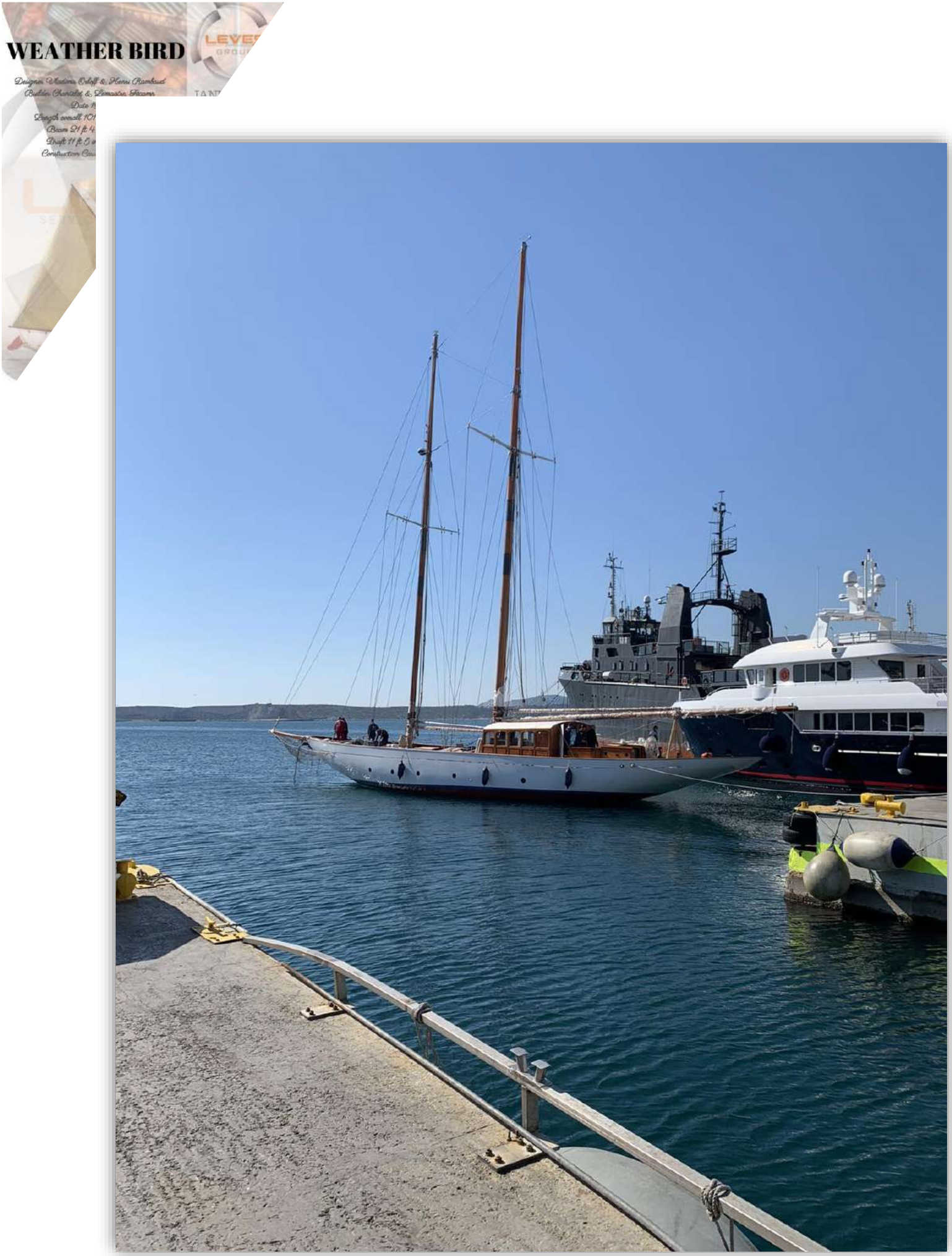
WEATHER BIRD

Designer Vladimir Orloff & Henri Rambaud
Builder Chantelot & Lemasson Frères
Date 1
Length overall 101
Beam 21 ft 4
Draft 11 ft 5
Construction Cas

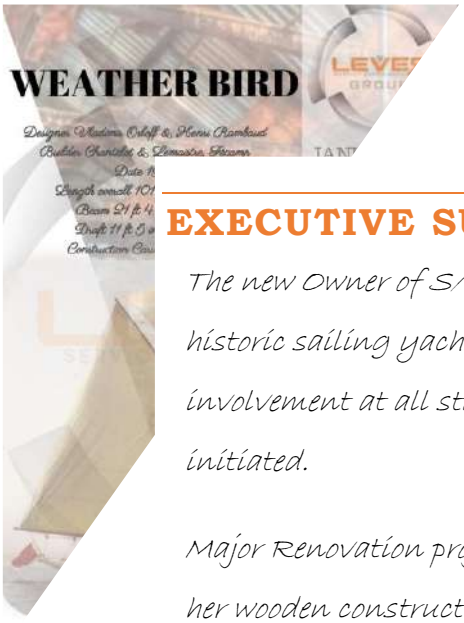



WEATHER BIRD


WEATHER BIRD


WEATHER BIRD

Contents



EXECUTIVE SUMMARY

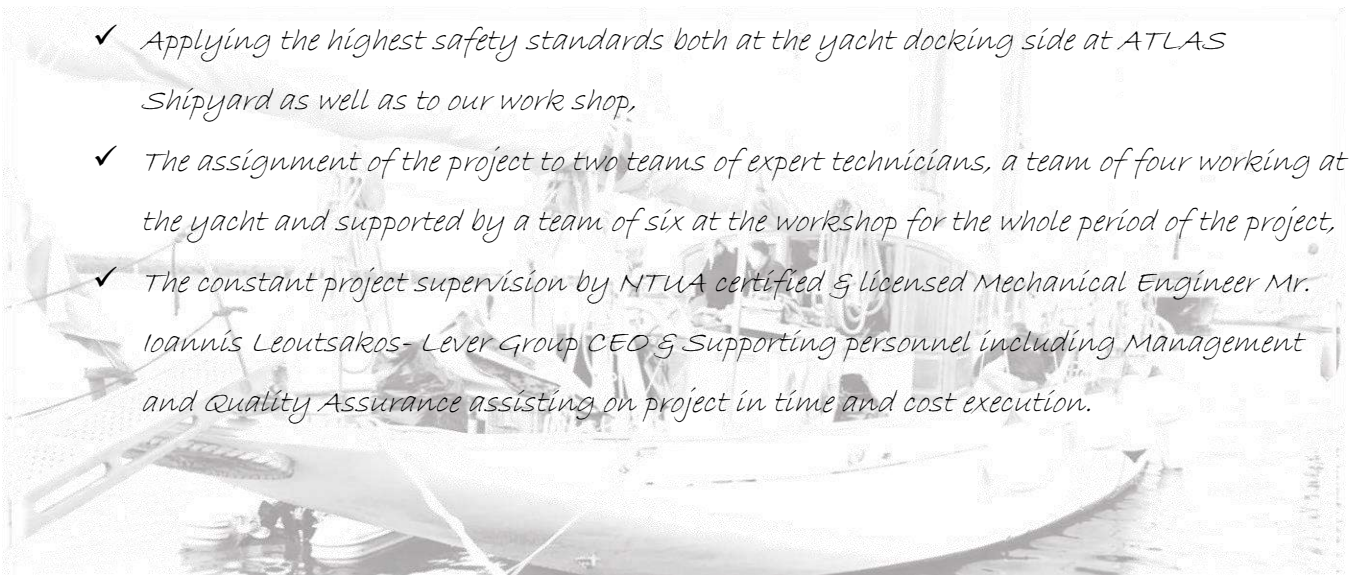
The new Owner of S/Y WEATHER BIRD dreamed, of not only, restoring this historic sailing yacht but to bring her to today. So in April of 2020 with his personal involvement at all stages, the complete restoration and renovation of the S/Y WEATHER BIRD initiated.

Major Renovation project of 2020-2021 to the S/Y WEATHER BIRD included the refurbishing of her wooden construction as well as the overhauling & renovation of the S/Y propulsion machinery and mechanical systems.

During the 12 months refit project, operational & cruising efficiency of the S/Y WEATHER BIRD improved to the highest standards. Methodical overhauling and replacement of all major mechanical systems organized and executed with the constant and dedicated support of her owner.

Installation of new Generator, Main Engine Anti-Vibration mountings & High Flexible Couplings replacement, Air condition unit, as well as Main engine, Gear box and their peripheral components, Propulsion Shafting system, Rudder & Bow Thruster overhauling were the key projects performed towards cruising efficiency increase. Furthermore, major operational mechanical systems overhauling included pumps, sea valves as well as capstan- windlass.
During the 12 months project, under difficult conditions due to the COVID-19 the optimum result achieved by:

- ✓ Following all technical instructions and requirements pre-designed from the systems' manufacturer,
- ✓ By ordering and installing, of high quality materials for all applications ordered directly either from the manufacturer or from reputable suppliers suggested by the manufacturer,
- ✓ Applying the highest safety standards both at the yacht docking side at ATLAS Shipyard as well as to our work shop,
- ✓ The assignment of the project to two teams of expert technicians, a team of four working at the yacht and supported by a team of six at the workshop for the whole period of the project,
- ✓ The constant project supervision by NTUA certified & licensed Mechanical Engineer Mr. Ioannis Leoutsakos- Lever Group CEO & Supporting personnel including Management and Quality Assurance assisting on project in time and cost execution.

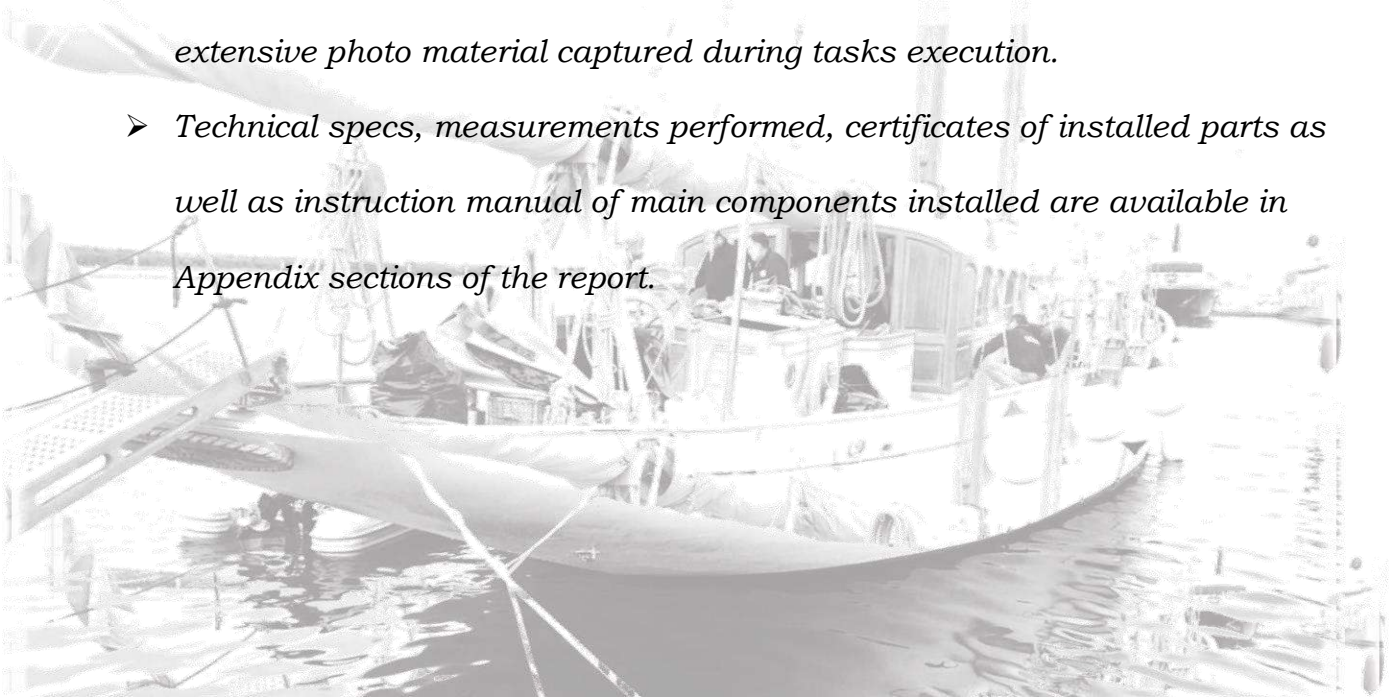


The mechanical refurbishing of S/Y WEATHER BIRD was a challenging project that required the cooperation of multiple subcontractors as to organize in an efficient and time & cost manner the execution of interloping tasks.

The vast experience mainly of Mr. Leoutsakos LEVER GROUP CEO & Technical Director utilized as to consult both the Owner as well as the other subcontractors of the optimum planning and execution of the project.

REPORT GUIDE LINE

- *LEVER GROUP performed all dismantling and installing tasks of the systems included in this report. However some of the systems either overhauled by other Technical subcontractors organized by the Owner or supplied directly by the Owner. That for there is a clear distinction of Overhauled or replaced - upgraded systems and to who assigned. For these not supplied by LEVER GROUP in the report there is limited or no presentation.*
- *The main purpose of the report is to demonstrate the final condition of the S/Y after all the overhauling services and replacements. Minor presentation of the previous condition is available in the report and only for before and after indication.*
- *For easier navigation to the report, the project services divided to sections.*
- *In each section, the main tasks performed described and presented with an extensive photo material captured during tasks execution.*
- *Technical specs, measurements performed, certificates of installed parts as well as instruction manual of main components installed are available in Appendix sections of the report.*



MECHANICAL REFURBISHING PROJECT 2020-2021 OVERVIEW

PROJECT PHASES

The key project phases were:

1. Dismantling of Mechanical Systems
2. Assessment & Redesigning
3. Repairs & Replacement of Mechanical Components.
4. Installation and Testing of Mechanical systems
5. Sea trial & verification of Mechanical systems well operation during Sailing.

1st Phase: Dismantling Of Mechanical Systems

The project initiated by an extensive mapping, of the installed mechanical components in the engine room and front section of the S/Y, followed by complete dismantling. The engine room stripped completely enabling wooden reconstruction of her keel. All dismantled parts transported to LEVER GROUP' W/Shop.

While the 1st phase of the project was rather straightforward, the most challenging phase was the 2nd phase of Assessment & Redesigning.

2nd Phase: Assessment & Redesigning

The goal of the 2nd phase was to bring safely the historic sailing yacht to 2021 and to uplift all of her mechanical operations to the demanding expectations of her new owner.

During the 2nd phase, the dismantled systems assessed of their operational and structural condition and their overhauling or replacement decided. Disassembling of all systems performed in LEVER GROUP' W/Shop during this phase.

Major replacement impose a significant number of systems' replacements was the selection of the new Marine Generator with variable speed technology. Accommodating the 24V running condition of the Generator all the running systems in the Engine room as well as the power pack modified or replaced.

LEVER GROUP during this phase and with the co-operator of the other involved subcontractors redesigned the Engine room with the new positioning of all the machinery and controlling.

Furthermore, LEVER GROUP designed the foundation of all the machineries in the newly renovated engine room accommodating the need for accessibility to running systems for maintenance and space optimization.

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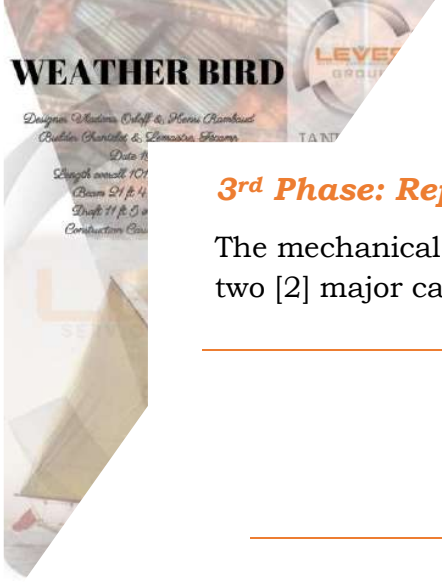

3rd Phase: Repairs & Replacement of Mechanical Components

The mechanical systems repaired, replaced, or upgraded during the project presented in two [2] major categories:

A. OVERHAULED SYSTEMS

B. REPLACED- UPGRADED SYSTEMS

	A. OVERHAULED SYSTEMS	ORGANIZED BY OWNER	PERFORMED BY LEVER GROUP
1	CUMMINS MAIN ENGINE		√
2	GEAR BOX		√
3	PUMPS		√
4	BATTERIES ARAY	√	
5	FANS		√
6	FUEL TANKS		√
7	PROPELLER	√	
8	BOW THRUSTER		√
9	RUDDER & STEERING GEAR SYSTEM		√
10	ANCHOR WINDLASS		√

In the report we present, with services analysis and photo material, only the Overhauled systems by LEVER GROUP.

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	B. REPLACED- UPGRADED SYSTEMS	SUPPLIED BY THE OWNER	SUPPLIED BY LEVER GROUP
1	MARINE GENERATORS	√	
2	REVERSE OSMOSIS WATERMAKER- ESSENTIAL 400	√	
3	ANTI-VIBRATION MOUNTINGS		√
4	EXHAUST OF MAIN ENGINE & GENERATORS	√	
5	AIR CONDITION UNIT	√	
6	COMPRESSOR REFRIGERATOR	√	
7	FAN COIL	√	
8	FRESH WATER PUMPS ITEMS 2, BLACK WATER PUMP, DIESEL OIL PUMP & WATER PUMP		√
9	ALUMINUM BASES SUPPORTING MAIN ENGINE & ALL MACHINERIES		√
10	HYDRAULIC MOTOR POWER PACK	√	
11	PROPELLER SHAFT		√
12	STERN TUBE		√
13	SHAFT MECHANICAL SEAL		√
14	PROPELLER SHAFT BEARING		√
15	SAILING –ENGINE AUTO CONTROL- SHAFT BRAKE		√
16	BOW THRUSTER HYDRAULIC CYLINDER		√
17	RUDDER PACKING		√

In the report Technical data, info and photos are available only for the Replaced-Upgraded systems by LEVER GROUP.

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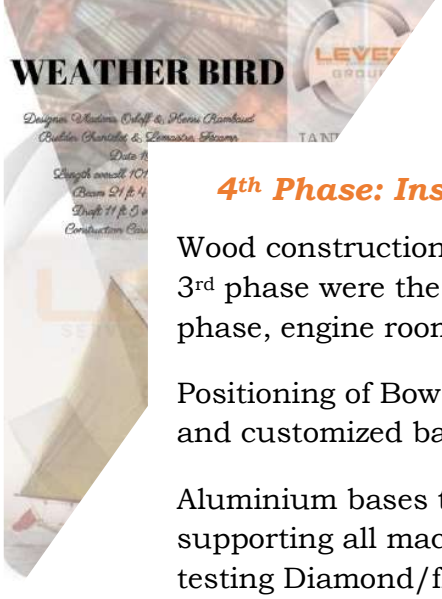

4th Phase: Installation and Testing of Mechanical systems

Wood construction renovation and replacement of the majority of the systems during the 3rd phase were the key factors influenced the installation phase. In the initial steps of this phase, engine room measurements reconfirmed and machinery positioning adjusted.

Positioning of Bow thruster and Rudder shaped accordingly while shafting system adapted and customized based on spacing.

Aluminium bases that measured, modified to correct dimensions, painted, installed supporting all machineries in the engine room. While at the end of all installations and testing Diamond/floor plate, steel sheets installed.

At the end of the 4th phase of installation and testing all the drawings updated to the actual size, incorporating all required modifications decided during installation. The drawings are available in **APPENDIX A** of the report.

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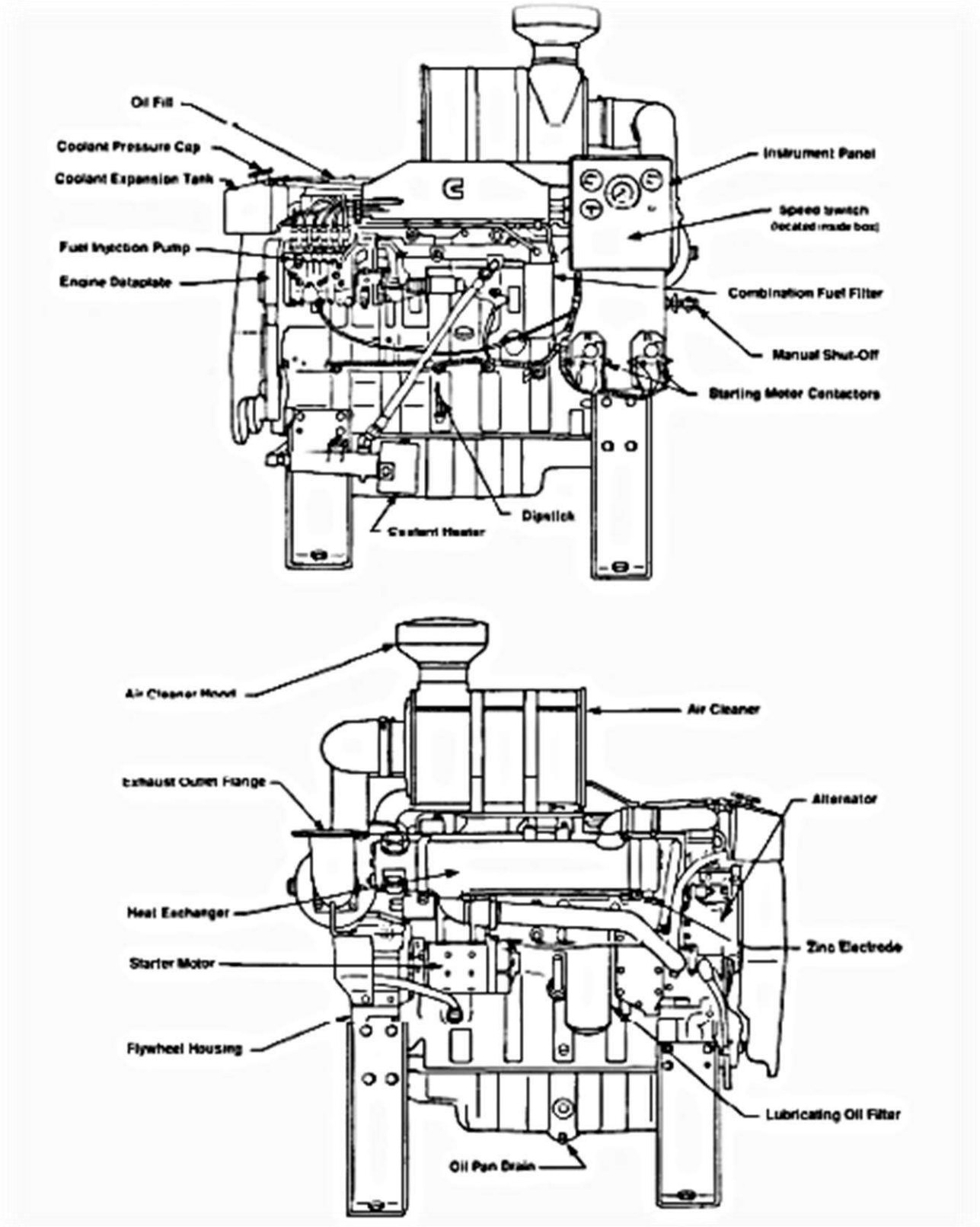
SECTION A1& A2: MAIN ENGINE CUMMINS MARINE 6CTA 8.3 & GEAR BOX ZF 280 (IRM 280 PL 2.478:1 RATIO TRANSMISSION) SERVICE



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1.1. Provided Services- Project steps

Main Engine & Gear box disassembled into the w/shop,
All disassembled parts thorough cleaned & assessed,
Sandblasted main boy of Main engine,
Serviced cylinder block by:

Serviced Engine Turbocharger,
Serviced Oil Injector,
Original Spares replaced as required

Part Description	**Items**
PISTON CTM 4019886 -4020058 W/F	6
PISTON SPRING N14(3)RE 3804500	6
BEARINGS STD C/QSC	12
NOZZLES	6
COCKS	6
TILES	6
OIL FILTER CUM FLD	1
FUEL FILTER CUM B RE FF5052 FL	1
WATER FILTER CUM-CAT (WF2059)-4 units	1
TB FLANGE EX	1
HEAD FLANGE SET6C RE	1
BODY FLANGE SET 6CRE3802389	1
THERMOSTAT 6CT8,3 RE3907242	2
ANODE	1
BELT 7/8 39.50"(2)	1

Replaced Water pump with CUMMINS 6CT RE 5473305,
Serviced Oil pump,
Serviced Fresh & Sea water pumps, replaced Shaft bearing, Roller bearing, Mechanical Seal, Safety Pin, Gasket and O'ring,
Replaced flexible tubes, hoses & Teflon tube.
Assembled main engine with serviced parts & purchased spares,

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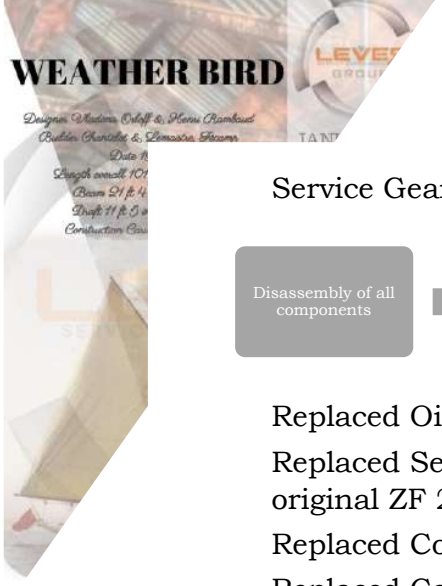

Service Gear box by:

Replaced Oil Pump along with Pump spring ZF original

Replaced Sealing rings, Gaskets, Steel rings, Seal washers, O-rings' included in the original ZF 280KIT,

Replaced Conical Bearing,

Replaced Coupling VULKAN TROFLEX 1600 (technical data sheet in APPENDIX A),

Main engine & Gear box coated with primer and Polyurethane Direct Gloss coating with hardener,

Filled with Diesel [Shell Fuel Save Diesel], Oil [TOTAL OIL CAPRANO TDI 15W40 20 & NIPCO HEAVY DUTY LUBE SAE30] and water as required for testing,

Tested and confirmed well operation in the presence of the owner.

1.2. Photo Material

The Photos to the following pages presented all the performed tasks.

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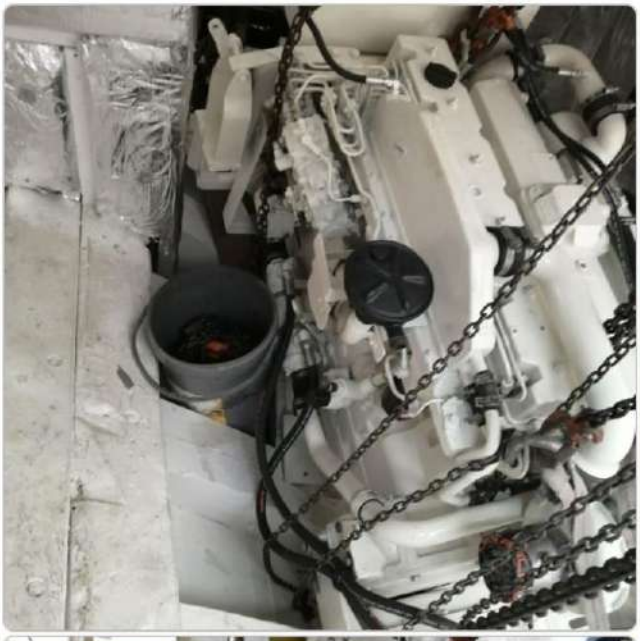



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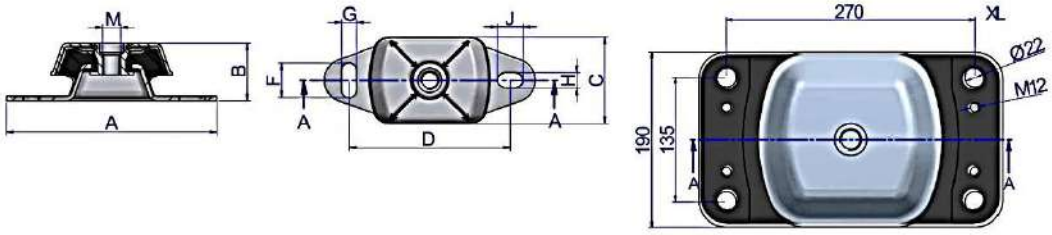
SECTION B3: MAIN ENGINE ANTI-VIBRATION MOUNTINGS

A combination of mountings applied **VETUS** flexible engine mounting type **LMX340** with HARDNESS IN ° SHORE **55** & **AMC MECANOCAUCHO** marine mount **– MEDIUM** with HARDNESS IN ° SHORE **75** with **ADJUSTING SYSTEM: HI SEC**

Rubber Metal anti vibration mounts

MARINE ENGINE MOUNT

DRAWINGS



DIMENSIONS

Type	Tightening torque MAX (Nm)	A (mm)	B (mm)	C (mm)	D (mm)	F (mm)	G (mm)	H (mm)	J (mm)	M	Weight (gr)	Shore	Load (kg)	Code
SMALL	55	120	40	60	100	14	11	14	11	M-12	397	40 Sh	35	136001
												45 Sh	45	136002
												55 Sh	70	136003
												65 Sh	95	136004
												75 Sh	110	136005
MEDIUM	125	184	50	75	140	30	13	13	22	M-16	857	35 Sh	95	136021
												45 Sh	120	136022
												55 Sh	220	136023
												65 Sh	280	136024
												75 Sh	450	136025
LARGE	190	228	68	112	182	34	18	18	26	M-20	2250	45 Sh	350	136041
												55 Sh	525	136042
												65 Sh	800	136043
												75 Sh	1080	136044
XL	285	330	112	190	270	-	-	-	-	M-24	9600	40 Sh	950	136061
												50 Sh	1400	136062
												60 Sh	2200	136063
												70 Sh	3000	136064

PRODUCT TECHNICAL SPECS AT **APPENDIX A**

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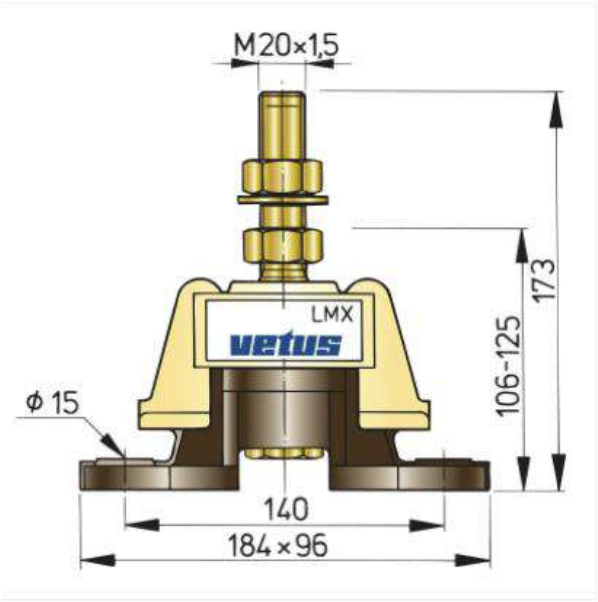
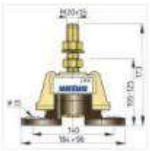
Flexible engine mountings KSTEUN/MITSTEUN/HY/LMX




FLEXIBLE ENGINE MOUTING

SKU: LMX340

This flexible engine mounting is suitable for marine diesel engines in the power range between 70 and 350 kW (95 - 480 HP). It has a maximum load of 340 kg.

Description | **Specifications**

STIFFNESS RATIO - VERTICAL	1
STIFFNESS RATIO - ATHWARTSHIPS	1
STIFFNESS RATIO - FORE AND AFT	7
MIN. LOAD (KG) - STATIC	205
MIN. COMPRESSION (MM) - STATIC	3
MAX. LOAD (KG) - STATIC + DYNAMIC	340
MAX. COMPRESSION (MM) - STATIC + DYNAMIC	5
HARDNESS IN ° SHORE	55

PRODUCT TECHNICAL SPECS AT **APPENDIX A**

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Rubber Metal anti vibration mounts

HI SEC

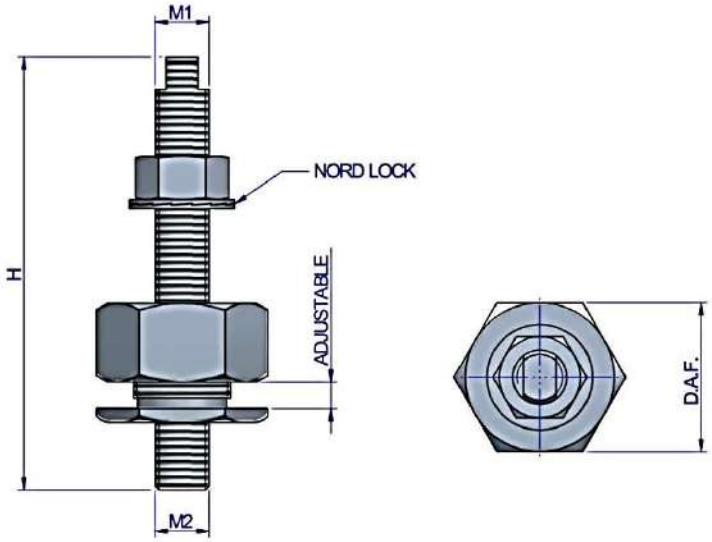
AMC MECANOCAUCHO NOISE AND VIBRATION SOLUTIONS

This height adjusting system is Zinc plated and chromate according to DIN 50691/ISO 2081 to protect against the corrosion.

TECHNICAL CHARACTERISTICS

DNV rules for ships/ High Speed light craft, Issue Jan 2001 Point 4 Chapter 3 Section1 F202, establishes that standard height adjusters are not acceptable for leveling, due to cyclic bending moments that the studs and bolts are subjected to. This is the reason why leveling of mounts using shims beneath the mounts is the only recommended method for leveling.

AMC-MECANOCAUCHO shares also this method and that is the reason why AMC-MECANOCAUCHO® Shims have been developed. In order to achieve a fine leveling HI-SEC height adjusters allow a final precise adjusting with security.



DIMENSIONS

Type	H (mm)	M1	M2	ADJUSTABLE (mm)	MACHINED HEAD	D.A.F.	Weight (gr)	Code
HI SEC	110	M16	M12	+5	Y	46	357	708077
	110	M16	M16	+5	Y	46	514	708007
	130	M20	M20	+5	N	46	775	708094
	110	M20	M16	+10	Y	55	1095	708079
	160	M20	M20	+10	Y	55	1011	708029
	160	M20	M20	+10	N	55	1096	708005
	200	M24	M24	+10	N	120	2234	708011

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Marine & Offshore

Certificate number: 49933/A0 BV
File number: ACM182/2310/1
Product code: 0021H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

TYPE APPROVAL CERTIFICATE

This certificate is issued to

AMC MECANOCAUCHO
ASTEASU - SPAIN

for the type of product

FLEXIBLE MOUNTS FOR PROPULSION OR AUXILIARY MACHINERY
Vibration Damper BSB, BRB, Marine

Requirements:
Bureau Veritas Rules for the Classification of Steel Ships

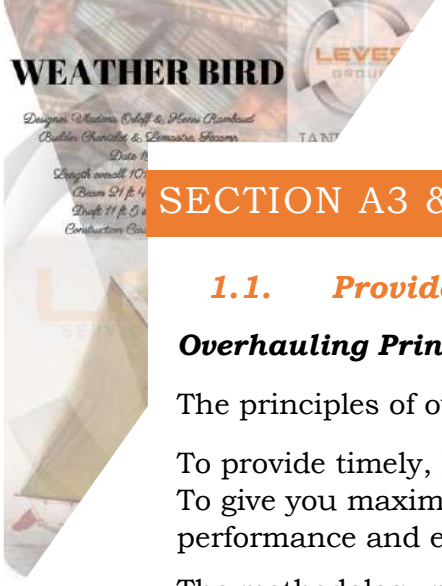
This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 30 Jul 2023

For Bureau Veritas Marine & Offshore,
At BV MADRID, on 30 Jul 2018,
Montserrat Espin

BUREAU VERITAS SURVEYORS AT PARIS 1828 MADRID INTERNATIONAL REGISTER

TOTAL CERTIFICATE AT **APPENDIX A**



1.1. Provided Services- Project steps

Overhauling Principles

The principles of our services are the following:

To provide timely, high quality, cost-effective repair services
To give you maximum value from the repair process with measurable improvements in performance and efficiency after installation

The methodology monitored for the pump' service was the following:
1. Mapping of previous installation and operation
2. Disassembling pump, motor as well as base from current position
3. After disassembling, transporting to our w/shop and dismantling of the pump
4. Evaluation of the pump' condition addressing:
5. Overall condition
6. Detailed examination of all critical parts and their condition
7. List of parts suitable for re-use or refurbishment
8. List of pumps & parts to be replaced
9. Proposals for material or design upgrades & replacement
10. Notification and on site confirmation of findings and proposed solutions from the S/V responsible
11. Servicing pumps' following the below guide lines or Purchase new Pump of same or improved specs
12. Assembling, testing operational as well as structural efficiency under functional conditions
13. Painting
14. Packing with protective pneumatic POLYSTYRENE and plastic cover
15. Transportation back to the S/Y, installation to position of new bases and pumps
16. Confirmation of well operation
17. Full documentation of service process - preparation & delivery of service report for each serviced pump.

Services' Guide Lines

Typical repairs include some or all of these services:

Sandblasting & cleaning of all parts
Motor inspection and evaluation; dip & bake windings, re-wind, or replace
Replacement of pump and motor bearings
Replacement of seals
Inspection of shaft; reconditioning or replacement
Installation or replacement of wear rings to re-establish running clearances
Inspection and reconditioning of impeller(s)
Balance of rotating parts to API (4W/N), ISO1940 G2.5, or other standard
Re-assembly
Test under pressure and certify well operation of the pump at the Lever Pressure Testing Bench
Hydraulic test / check Motor Engine Megger test and maintenance of insulation

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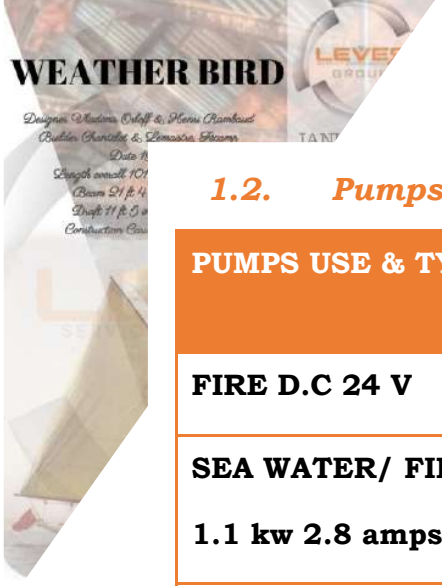

1.2. Pumps' serviced record

PUMPS USE & TYPE	OVERHAULED	REPLACED - UPGRADED
FIRE D.C 24 V	√	
SEA WATER/ FIRE with NEW MOTOR DEMAC 1.1 kw 2.8 amps 1450rpm 380v 50hz ip 55	√	√
PRESSURE FRESH WATER PUMP –STAINLESS STEEL C.E.M. ELETTROMECCANICA SRL J-INOX 24V		√
PRESSURE FRESH WATER PUMP –STAINLESS STEEL C.E.M. ELETTROMECCANICA SRL J-INOX 24V		√
BLACK WATER PUMP ROVER MARINA 25 24V		√
DIESEL OIL PUMP PIUSI CARRY 3000 24V AR		√

1.3. Photo Material

The Photos to the following pages presented all the tasks performed.

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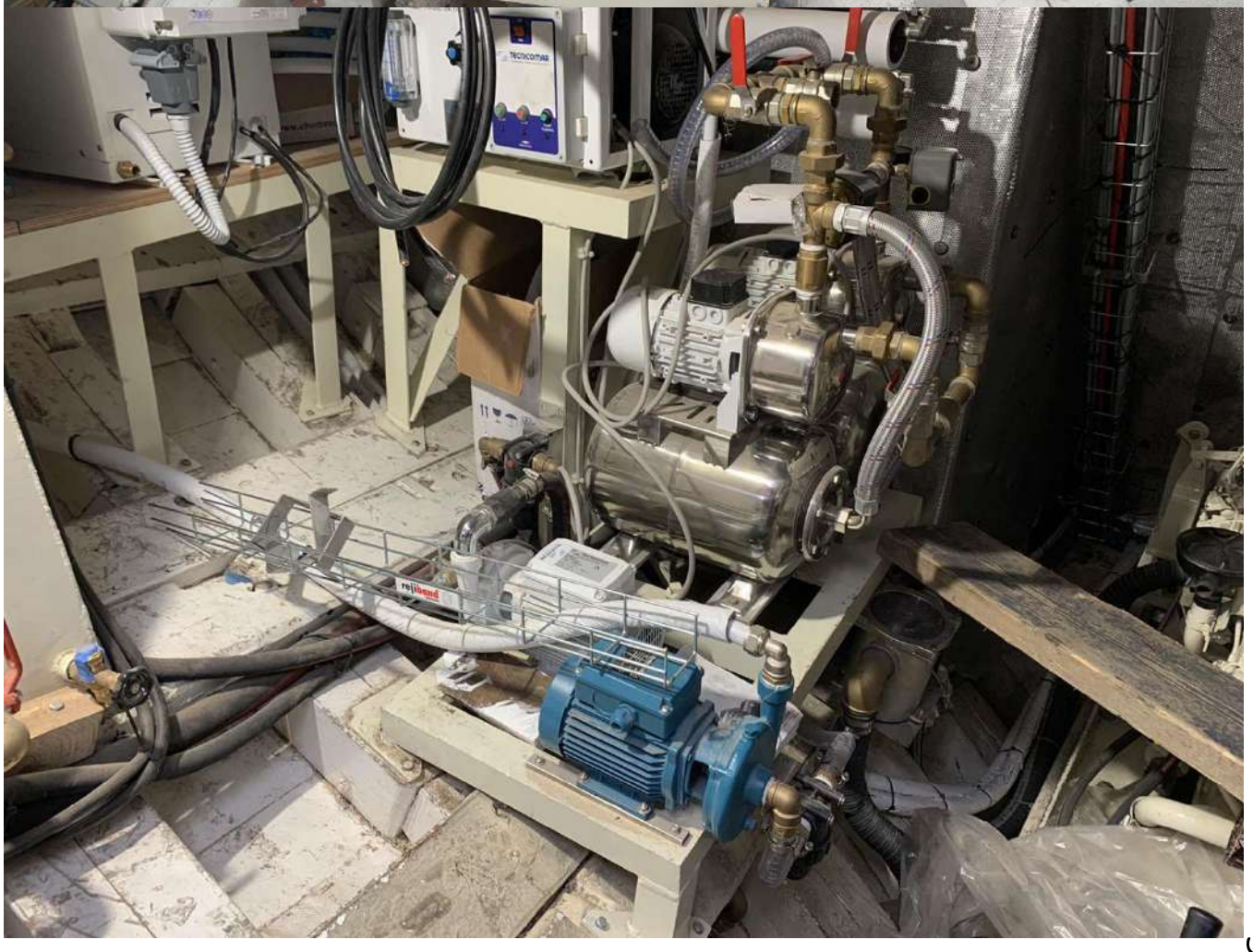

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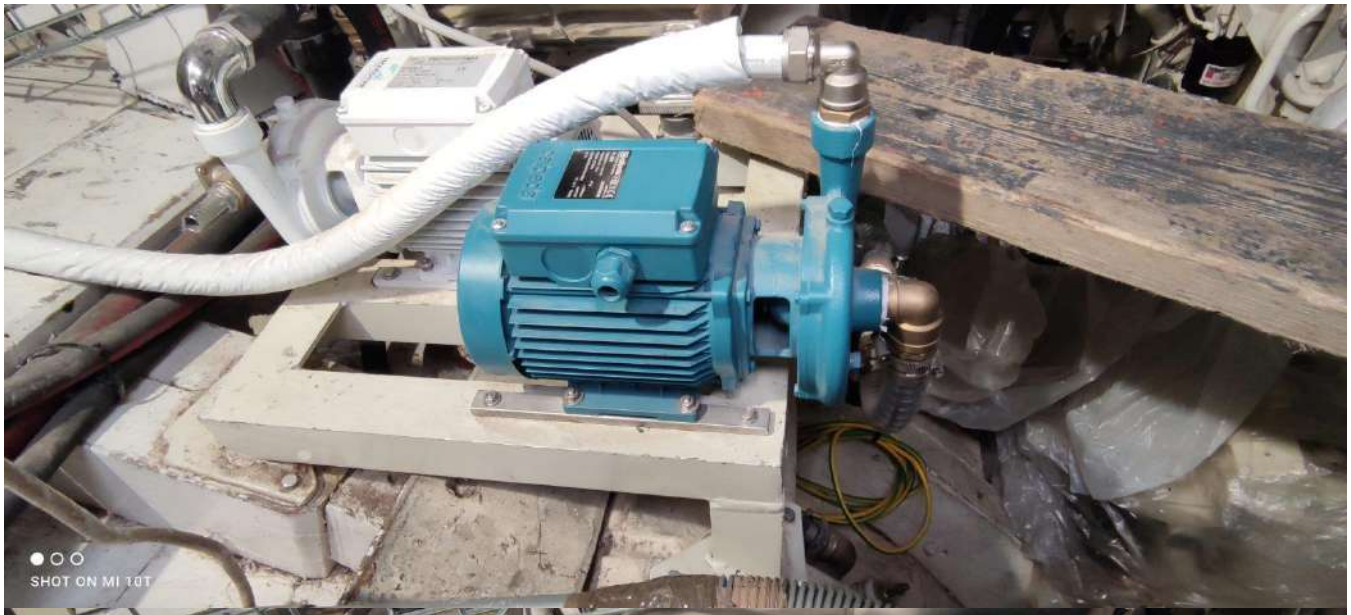

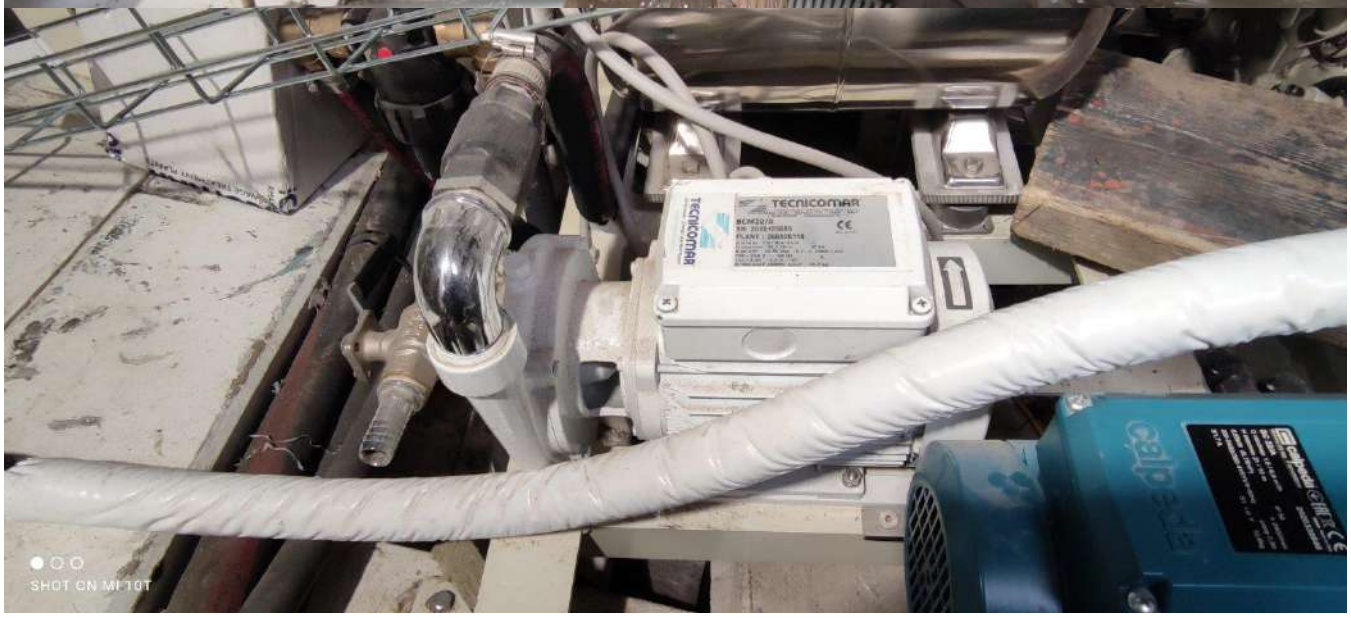

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FIRE D.C OVERHAULING







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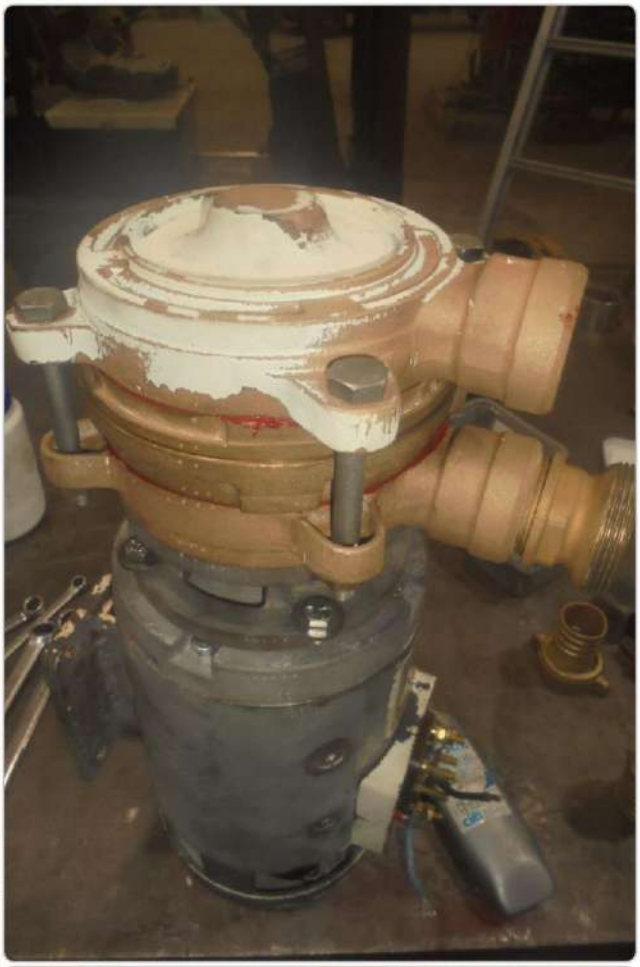

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SEA WATER/ FIRE WITH NEW MOTOR OVERHAULING

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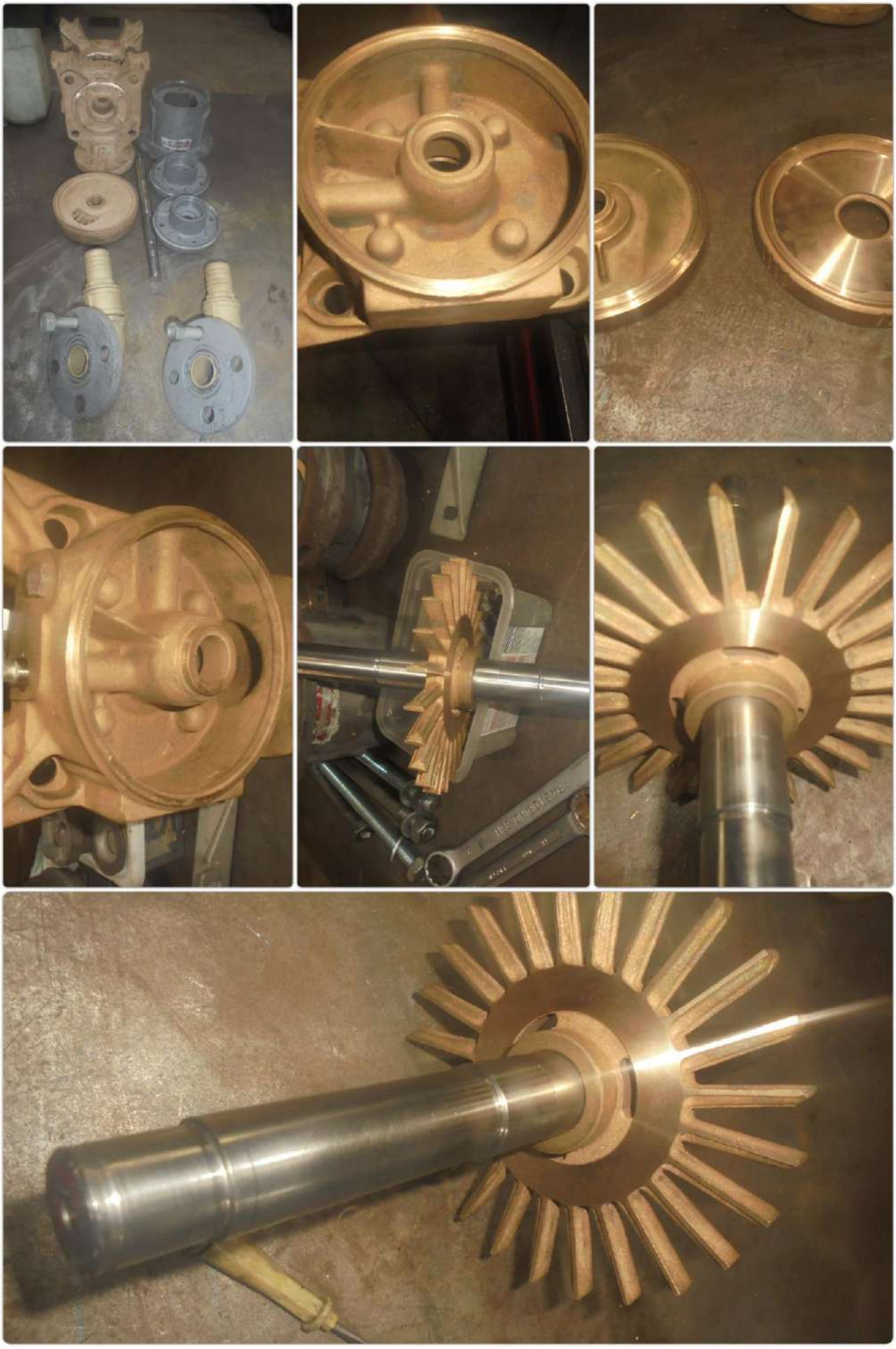

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PRESSURE FRESH WATER PUMP REPLACED

STAINLESS STEEL

C.E.M. ELETTROMECCANICA SRL J-INOX

J-mini • J-INOX • MG-INOX • JBR
Elettropompe autoadescanti / *Self-priming electric pumps*

PRESTAZIONI / *PERFORMANCES*

Modello *Type*	Materiale *Material*	Voltaggio *Voltage* (V)	Potenza *Power* HP	Potenza *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Portata Max. *Max. delivery* (l/min.)	Prevalenza Max. *Max. head* (m)
J-mini	Acciaio inox *Stainless steel*	12	0,4	0,3	33	2200	55	28
		24	0,5	0,4	16	2600	55	30
		230M	0,75	0,55	3,8	2800	55	39
		230÷400T	0,75	0,55	3,6÷1,9	2800	55	39
J-INOX	Acciaio inox *Stainless steel*	12	0,7	0,52	40	2400	50	30
		24	0,8	0,6	28	2650	50	38
		230M	0,9	0,7	4	2800	58	45
		230÷400T	0,9	0,7	3,8÷2	2800	58	45
MG-INOX	Acciaio inox *Stainless steel*	24	1	0,75	40	2800	90	50
		230M	1	0,75	5	2800	90	50
		230÷400T	1	0,75	4,8÷2,6	2800	90	50

Modello *Type*	Materiale *Material*	Voltaggio *Voltage* (V)	Potenza *Power* HP	Potenza *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Portata Max. *Max. delivery* (l/min.)	Prevalenza Max. *Max. head* (m)
JBR	Bronzo *Bronze*	12	0,7	0,52	42	2200	44	30
		24	0,8	0,6	28	2600	55	36
		230M	0,8	0,6	4,5	2800	55	52
		230÷400T	0,8	0,6	3÷1,7	2800	55	52
JBR 2	Bronzo *Bronze*	24	1	0,75	45	2800	75	40
		230M	1	0,75	5,7	2800	75	42
		230÷400T	1	0,75	3,7÷2,2	2800	75	42
JBR 3	Bronzo *Bronze*	24V	1,5	1,1	60	2800	100	50
		230M	1,5	1,1	7,4	2800	100	50
		230÷400T	1,5	1,1	5÷2,9	2800	100	50
JBR 4	Bronzo *Bronze*	230M	2	1,5	9,2	2800	160	50
		230÷400T	2	1,5	7,5÷2,3	2800	160	52
JBR 5	Bronzo *Bronze*	230÷400T	3	2,2	9,1÷5,3	2800	160	60

12V-24V: CORRENTE CONTINUA / *DIRECT CURRENT*
230M, 50Hz: corrente alternata monofase / *single-phase alternating current*
230÷400T, 50Hz: corrente alternata trifase / *three-phase alternating current*

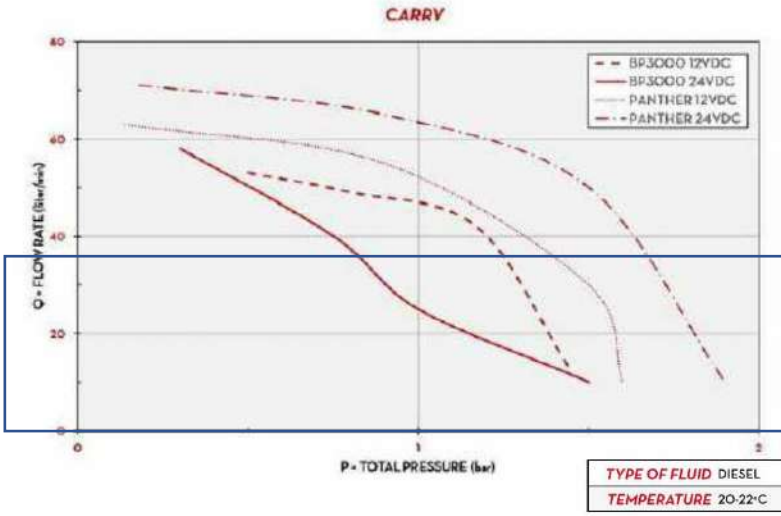
A richiesta disponibili altri voltaggi a 50Hz e 60Hz / *Available on request other voltages at 50Hz and 60Hz.*

PRODUCT TECHNICAL SPECS AT **APPENDIX A**

DIESEL OIL PUMP PIUSI CARRY 3000 REPLACED

AIR · ANTIFREEZE · AdBlue® · BIODIESEL · **DIESEL** · FOOD · GASOLINE · GREASE · KEROSENE · OIL · WATER · WINDSCREEN

CHART



TYPE OF FLUID DIESEL
TEMPERATURE 20-22°C

IN THE BOX

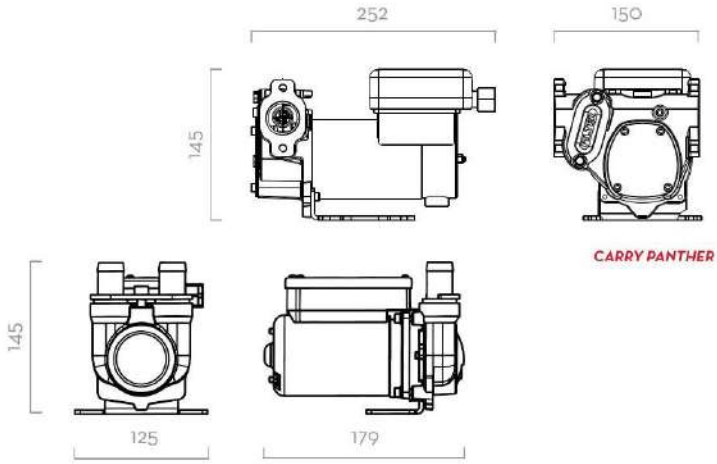
- CARRY PUMP
- HANDLE
- DISPENSING PIPE
- ELECTRIC CABLE WITH CLAMPS
- CONNECTIONS
- INSTRUCTION MANUAL

DETAILS


STURDY HANDLE


ELECTRIC CABLE WITH CLAMPS

DIMENSIONS



Dimensions expressed in millimeters

MATERIALS

- BODY: CAST IRON
- ROTOR: SINTERED STEEL
- VANES: ACETAL RESIN
- SEAL: NBR
- SHAFT: STEEL

TECHNICAL DATA

CODE	DESCRIPTION	FLUIDS TYPE	FLOW RATE		VOLTAGE			FUSES CAPACITY	DUTY CICLE	RPM	PRESSURE MAX	ON/OFF SWITCH	INLET/OUTLET
			L/MIN	GPM	DC VOLT	POWER WATT	AMP. MAX.	AMPERE	MINUTES		BAR		BSP
F0022300C	CARRY 3000 12V	D	50	13	12	300	24	25	30	2900	1,5	YES	3/4"
F0022400C	CARRY 3000 24V / 12V	D	50/30	13/6	24/12	310/80	13/6,5	15	30	2900/1500	1,5	YES	3/4"
F0022326O	CARRY 3000 INLINE 12V	D	50	13	12	300	24	25	30	2900	1,5	YES	3/4"
F0022424O	CARRY 3000 INLINE 24V	D	50/30	13/6	24/12	310/80	24	15	30	2900/1500	1,5	YES	3/4"
F0034004B	CARRY PANTHER 12V	D	56	15	12	420	13/6,5	40	30	2900	-	YES	1"
F0034104C	CARRY PANTHER 12V / 24V	D	35/70	9/18	24/12	600/200	13/6,5	30	30	3500/1800	-	YES	1"

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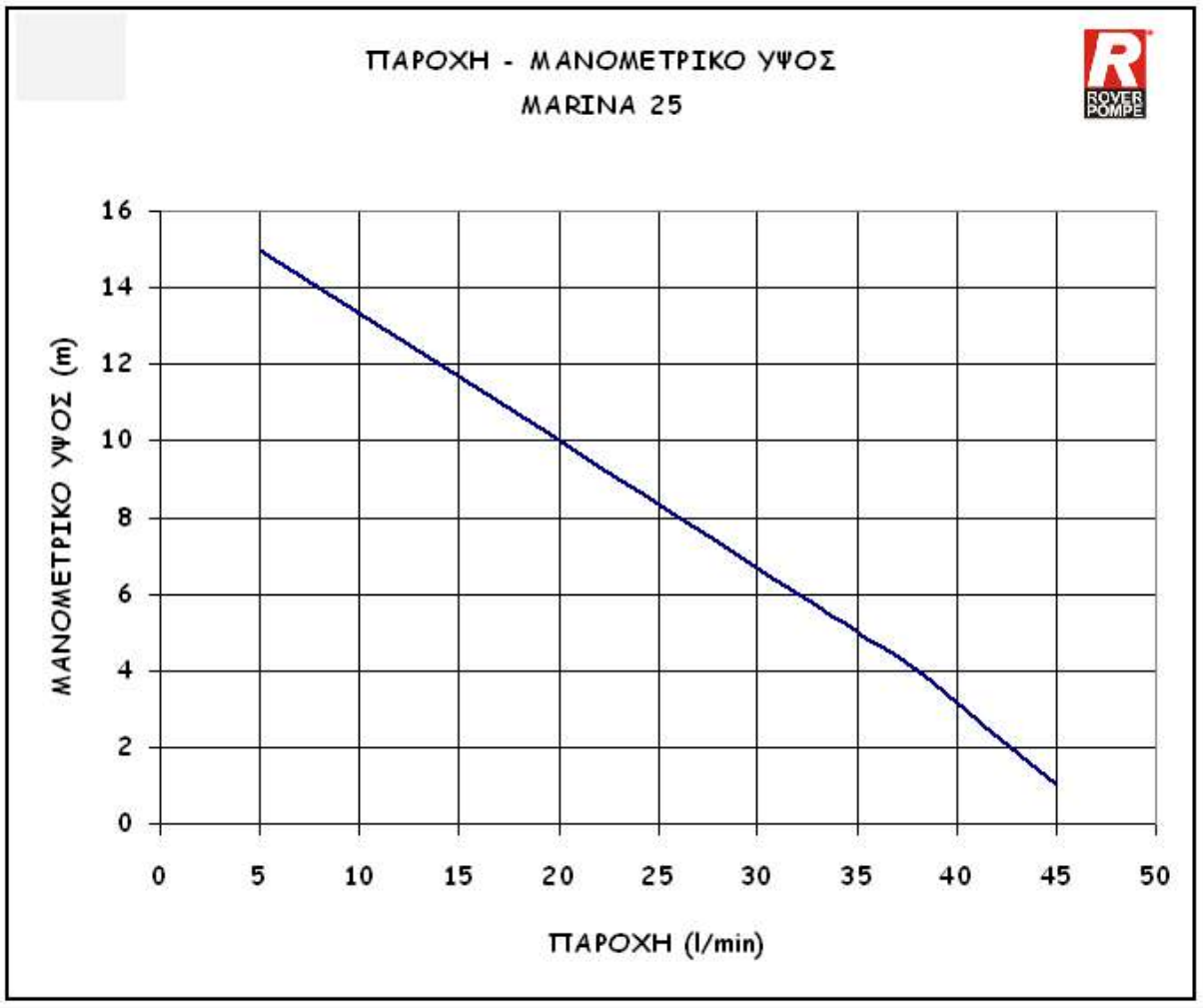
BLACK WATER PUMP ROVER MARINA 25 REPLACED

This is a classic self priming lateral liquid ring pump with starry impeller. This particular type of hydraulics provides the pump with an extraordinary self priming capacity, also in absence of a continuous flowing of the liquids in suction (presence of air or other gases). It is particularly made for the transfer of liquids such as WINE, MUST, SALTY AND SOFT WATER, MILK, OIL, GASOIL, whose viscosity is not over 30 degrees CENTISTOKES or over 4 degrees ENGLER. The fluids to be conveyed are to be neutral and clean or contain in suspension only a small percentage of solids (0.2-0.5% max). They are to have a hardness and granulation which prevent the damage of the inside pump surface. Yet a narrow mesh filter can be mounted on the suction piping.

Technical specifications:

Κατασκευαστής: ROVER POMPE
Τύπος: MARINA 25
Παροχή max(lt/min):45
Στόμιο:25mm
Στροφές/Λεπτό:1400
Επιπλέον Στοιχεία: ΜΕ ΗΛΕΚΤΡΙΚΟ ΜΟΤΕΡ 24VOLT



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SECTION A4: BATTERIES ARAY

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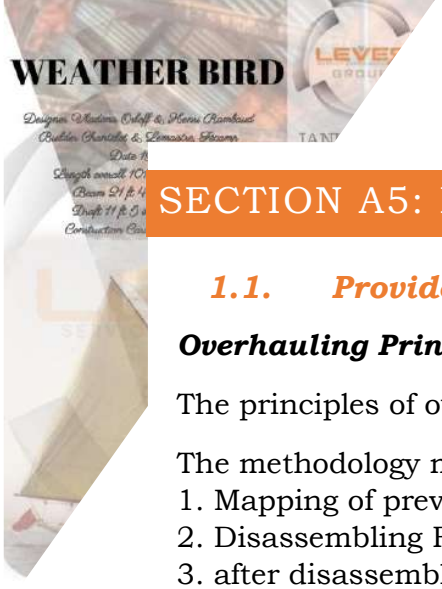

SECTION A5: FANS ITEMS 3 OVERHAULING

1.1. Provided Services- Project steps

Overhauling Principles

The principles of our services are the following:

The methodology monitored was the following:
1. Mapping of previous installation and operation
2. Disassembling Fans from current position
3. after disassembling, transporting to our w/shop and dismantling
4. Evaluation of the fans' condition addressing:
    5. Overall condition
    6. Detailed examination of all critical parts and their condition
    7. List of parts suitable for re-use or refurbishment
    8. List of parts to be replaced
10. Servicing fan' following the below guide lines
11. Assembling, testing operational as well as structural efficiency under functional conditions
12. Painting
13. Transportation back to the S/Y, installation to position
14. Confirmation of well operation

Services' Guide Lines

Typical repairs include some or all of these services:
- Sandblasting & cleaning of all parts
- Motor inspection and evaluation; dip & bake windings, re-wind, or replace
- Replacement of motor bearing
- Re-assembly
- Check Motor Engine Megger test and maintenance of insulation

1.2. Photo Material

The Photos to the following pages presented all the tasks performed.

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1.1. Provided Services- Project steps

In the w/shop cleaned and corrected surface issues

Waterblasted cleaning internally & check leakage

Coated with primer and Polyurethane Direct Gloss coating with hardener

Transported to S/Y & installed to position, secure positioning.

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SECTION B1: GENERATORS FISHER PANDA

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SECTION B2 & B5: OSMOSIS & AIR CONDITIONING UNIT

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SECTION B9: ALUMINUM BASES SUPPORTING MAIN ENGINE & ALL MACHINERIES

1.1. Provided Services- Project steps

- Purchase Aluminum based on drawings of 2nd phase for Main Engine & key machinery positioning
  - Confirm measurements after renovation construction works and tramsport of key machineries to S/Y
    - Create models for the key machineries and test positioning and spacing
      - Cut & weld to confirmed dimensions coated with primer and Polyurethane Direct Gloss coating with hardener applied
        - Transported to S/Y & installed to position, welded.

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SECTION B10: HYDRAULIC MOTOR POWER PACK

The Power Pack of about 65lt in relation to the existing hydraulic engine, that will give 1700 maximum speed to the Bow Thruster and maximum pressure of about 180 bar. Hydraulic assembly consisting of:

• Oil tank 100 lt, • Suction filter, • Return filter, • 22Kw electric motor, • 45cc piston pump, • Analog control with joystick & • Various fittings, breasts and piping.

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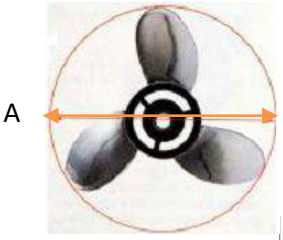
PROPELLER

DIAMETER (radius) : 800mm



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SECTION B11: PROPELLER SHAFT REPLACEMENT

1.1. Provided Services- Project steps

Mapping: Micro measured old propeller shaft

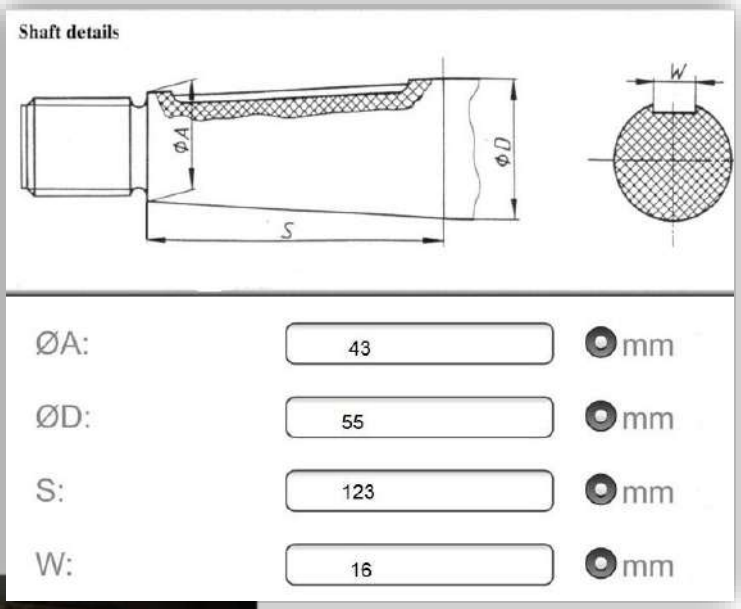
Purchased **STAINLESS STEEL 316L**

D: Shaft Diameter: Φ55

L: Shaft Length: 1920mm

Machined on Lathe and Boring, new propeller shaft of the same technical specs and conical ends.

Transported to the S/Y and armed.



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SANDVIK

CERTIFICATE

A03/Z02
No. A/19-842709 Rev 00
Date 2019-09-05 Page 1/4

A02/Z03
INSPECTION CERTIFICATE acc to
EN 10204 3.1

A06
TECHNOMETAL ABEE
20 DRAGATSANIOU STR.
18547 PIRAEUS GR

INSPECTION STAMP
SVQ

Customer References A07

	Customer order
001/2019	2019-01-16

250-00991 TECHNOMETA

Sandvik References A08

Order No.	Subs No.	ABSMT Dispatch note
317602	24954	10068/53

ABSMT No. C.Code
284-72968 87

Material description B01/B04
HOT WORKED STAINLESS BAR STEEL
ROLLED
ANNEALED & STRAIGHTENED
PEEL TURNED AND POLISHED

Steel making process Origin C70
E+AOD+LRF Sweden

Steel/material Designations B02
Sandvik
SANMAC 316/SANMAC 316L

AISI	UNS
316/316L	S31600/S31603
W.nr	EN no
1.4401/1.4404	1.4401/1.4404

Technical requirements B03
EN 10088-3:-2014, EN10272:-2016*, EN10060:2003, EN 10221:1996
EN10222-5:-2017*, PED 2014/68/EU, QQ-S-763 F,
NACE MR0175/ISO 15156-3:-2015, NACE MR0103/ISO 17945-1:-2015,
ASTM A-276-17, ASME SA-276-ED-29 SECT II PART A,
ASTM A-479-18, ASME SA-479-ED-19 SECT II PART A,
ASTM A-484-18, ASTM A-182-19*, ASTM A-965-14*, ASTM A-314-19*,
NORSOK M-630 ED-6, NORSOK MDS S01 REV. 5,
*For detailed information, please see the appendix

EXTENT OF DELIVERY B07-B13

It	Product designation	Heat	Lot	Pieces	Kg
01	MBR-SANMAC316L-55	554794	07601	1	94.0
			Total	1	94.0

TEST RESULTS
Chemical composition (weight%) acc. to ASTM A-751

Heat	C	Si	Mn	P	S	Cr	Ni	Mo
554794	0.010	0.24	1.73	0.028	0.025	16.85	10.12	2.03

Heat	N
554794	0.053

Quality assurance - Erik Jansson/QA-manager Primary Products A05/Z02
MTC Service / Certificates

TOTAL CERTIFICATE AT **APPENDIX A**

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SECTION B12: STERN TUBE REPLACEMENT

1.1. Provided Services- Project steps

Stern Tube replaced with new of specs **96x63x1.20cm Brass**. Material purchased and stern tube machined at Lathe.

Gaskets 2 items replaced. Material purchased and gaskets machined at Lathe.

Stern tube and gaskets transported to S/Y installed & tightened.

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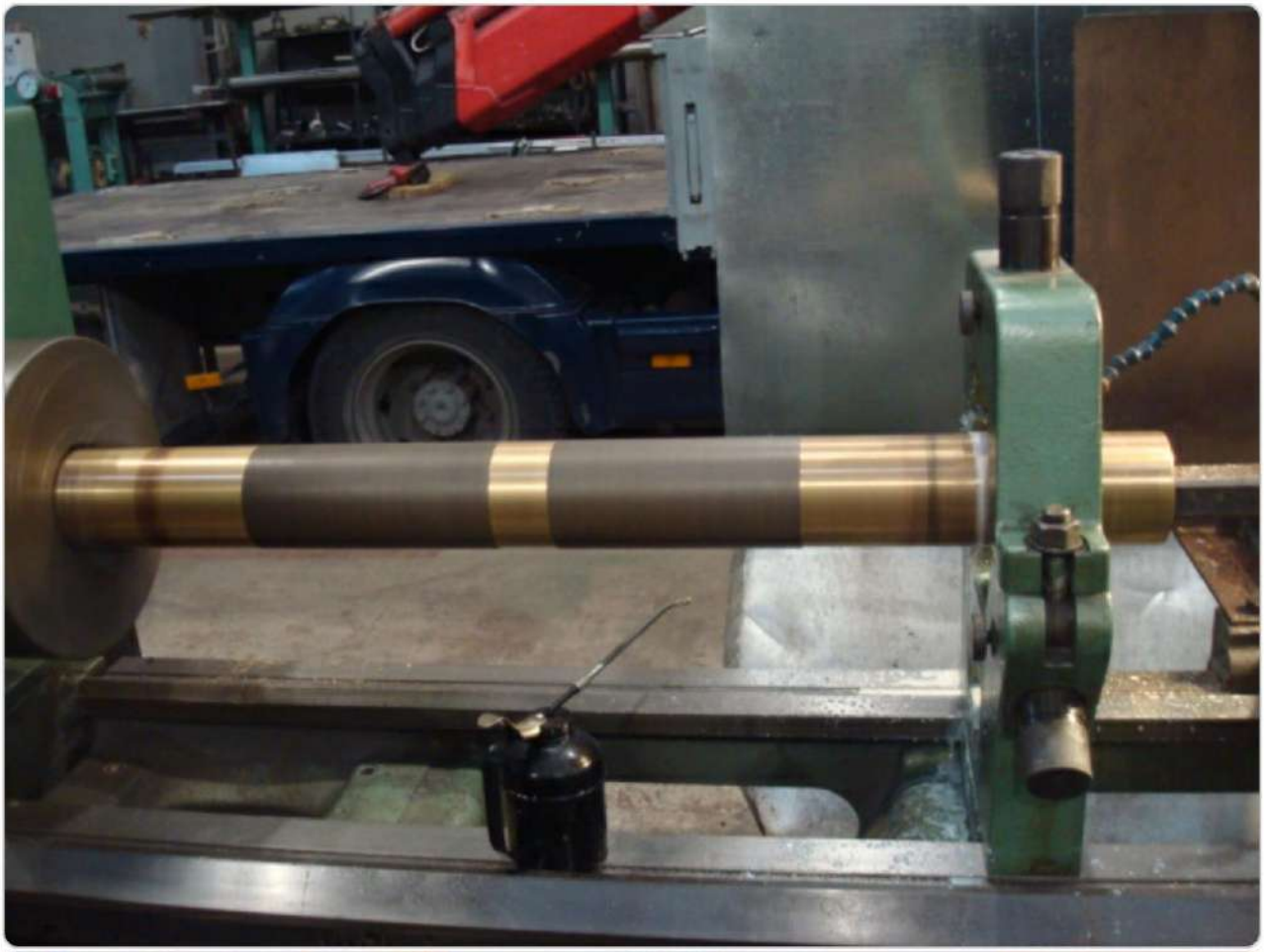

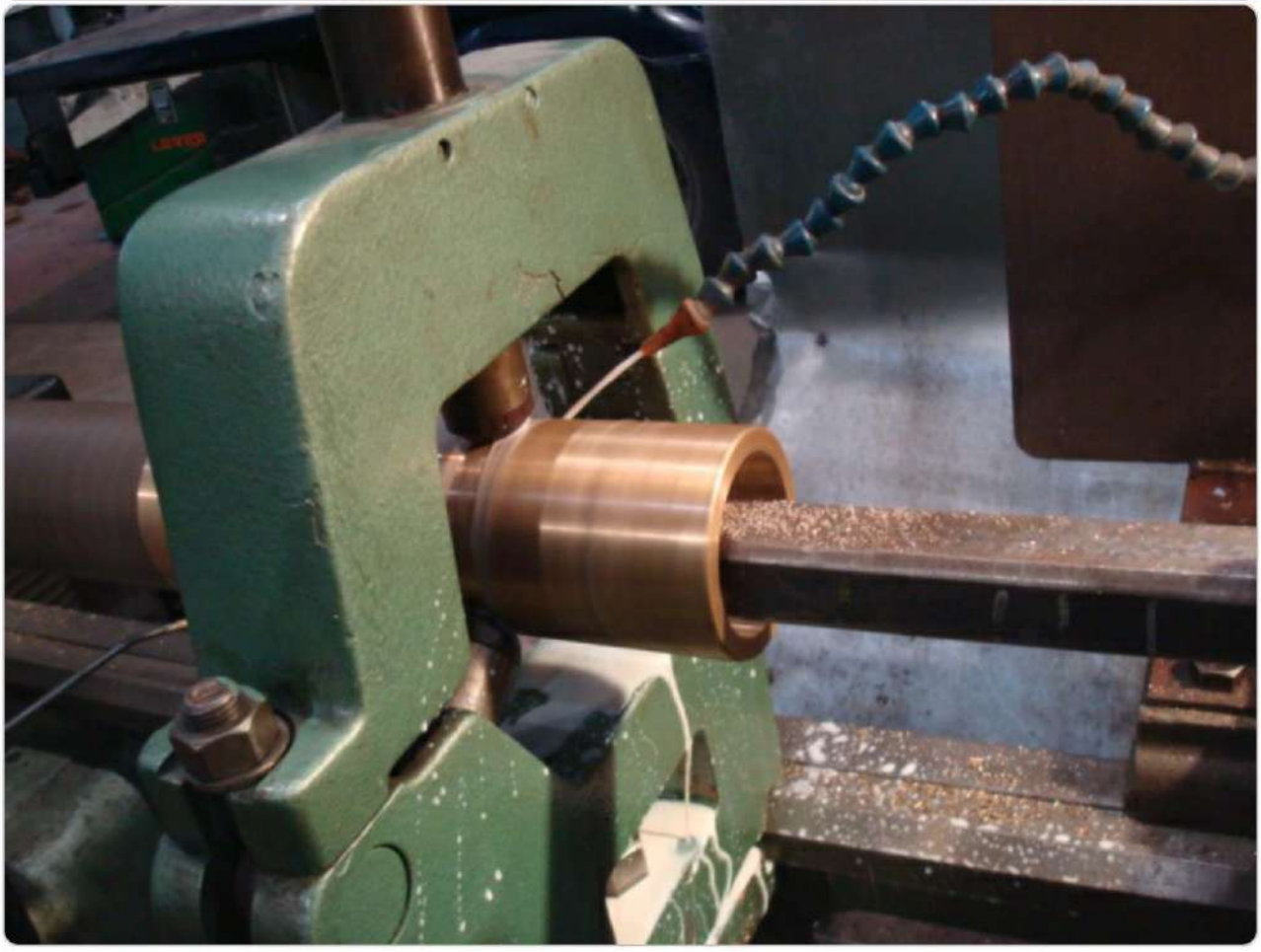

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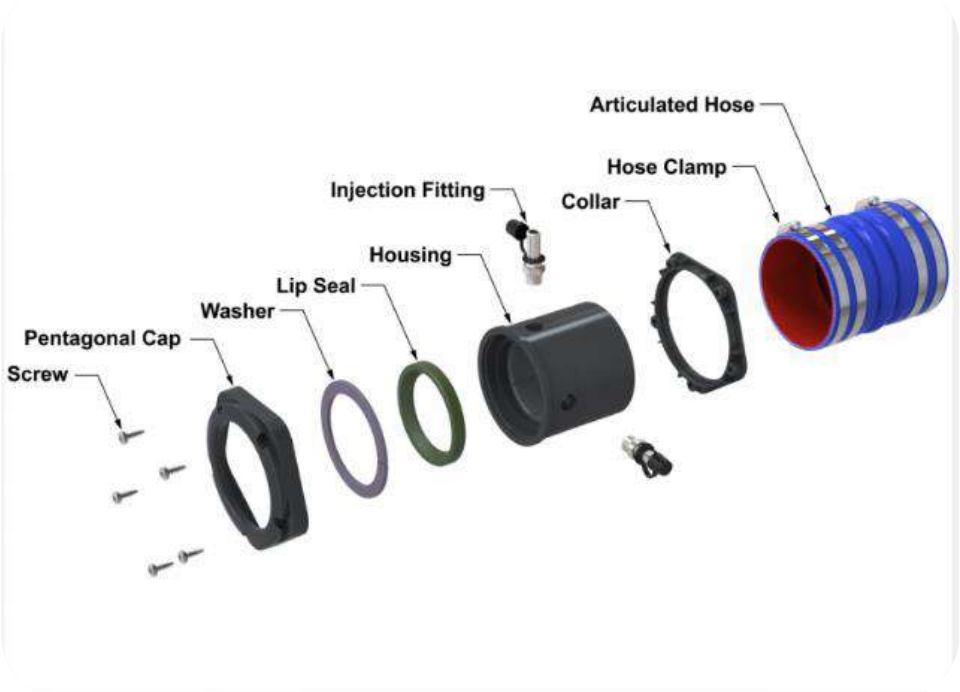
SECTION B13: SHAFT SEAL REPLACEMENT

1.1. Provided Services- Project steps

Mechanical seal replaced with new.

Tides Marine SureSeal FSKM-55M-95M with Spare seal carrier KM-55MM & Lip seal 55MM



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Additional Company / Plant Detail

Confirmation of Type Approval

19-HS1890908-PDA

Company Name Detail:

Company Information

TIDES MARINE INC.

3251 S.W. 13TH DRIVE

FL 33442

United States

Tel 800-420-0949

Fax 954-420-0945

Certificate Number	Category	Expiry Date
19-FL3610950	RQS	20-JAN-2024

Product	Seals, Shaft Seals
Model	FSK
Intended Service	Sealing inboard Drive Shafts for new Construction or Retrofits on Pleasure or Commercial Craft.
Description	A Drive Shaft Sealing System consisting of a WaterLubricated Housing Assembly and integral Lip Seal attached to the Vessel with Silicone Hose and Hose Clamps. Hose Adapter available to fit on an Existing Drive Shaft through-hull Flange to a Hose connection, for New Construction and Retrofits, on Pleasure or Commerical Craft.
Ratings	For drive shaft sizes from 3/4" - 8" or 20 mm - 200 mm, from 0 - 10,000 rpm, and water temperatures from 32°F - 90°F.

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SECTION B14: SHAFT BEARINGS REPLACEMENT

1.1. Provided Services- Project steps

The old bearings replaced with new composite bearings ACM L2 Marine Bearings according to specs.

ACM L2 Marine Bearings imported and machined to dimensions and according to required clearances.

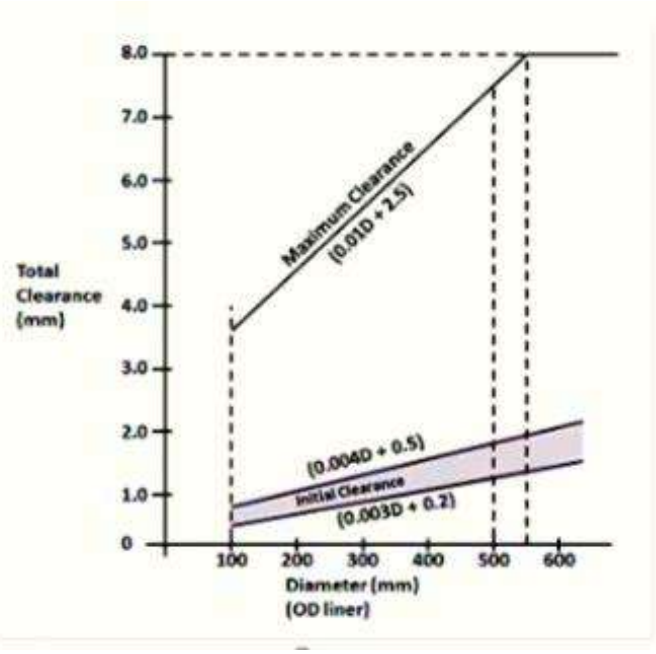
Shaft Bearings installed applying Freeze fitting.

Freeze fitting, using liquid nitrogen is a fast and efficient assembly method for composite bearing. The thermal proper-ties of the material allow a good clearance between the bearing and housing when frozen and the material does not be-come brittle at cryogenic temperatures.

The L2 bearings machined and freeze fitted based on classification requirements and manufacturer specs.

Clearances checked according to Classes requirements at the end of installation and confirmed as the following table. In addition, we took in consideration the fact that when the water temperature at use is 40º or more, the clearance has to enlarge to some degree.

Shaft diameter (mm)	Clearance (mm)
20-45	0.2-0.3
50-95	**0.3-0.5**
100-150	0.4-0.7
150-175	0.5-0.85
180-245	0.6-1.15
250-265	0.7-1.30
270-315	0.8-1.35
320-355	0.9-1.45
360-405	1.0-1.55
410-445	1.1-1.65
450-495	1.1-1.80
500 or more	1.2∼2.0



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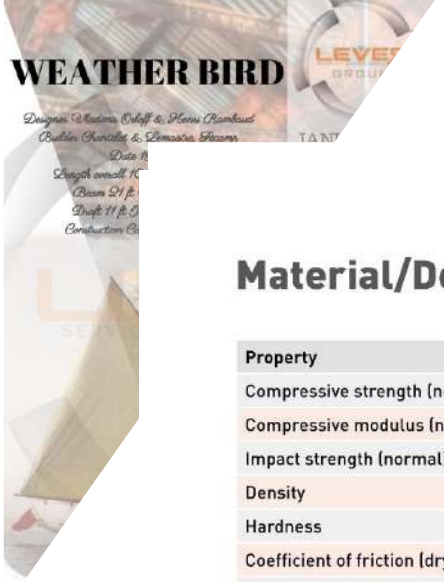
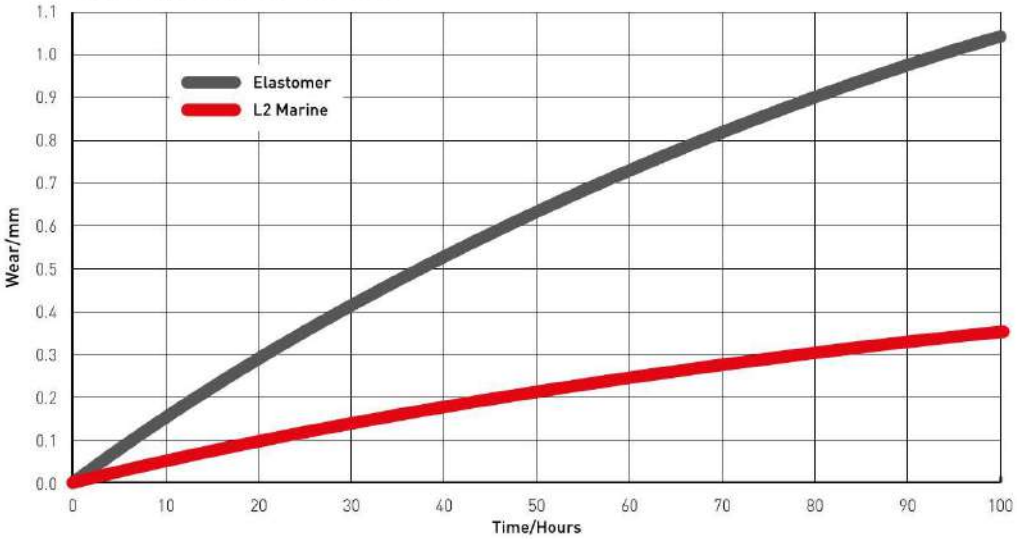


Material/Design Specification

Property	Unit	L2 Marine
Compressive strength (normal)	MPa	375
Compressive modulus (normal)	MPa	2,750
Impact strength (normal)	kJ/m²	100
Density	g/cm³	1.30
Hardness	Rockwell M	100
Coefficient of friction (dry)	-	0.13
Maximum operating temperature	°C	130
Minimum operating temperature	°C	-40
Thermal expansion coefficient (parallel)	/ °C	5×10^{-5}
Thermal expansion coefficient (normal)	/ °C	10×10^{-5}
Swell in water	%	< 0.15

(nominal values)

Wear Comparison In Gritted Seawater



[Test parameters: Bearing pressure 0.48 MPa, stainless steel (EN ISO 316) shaft diameter 50 mm, shaft speed 55 rpm, water flow rate 7.5 ℓ min⁻¹, silica particles of size specified by MoD]

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BUREAU VERITAS

Marine & Offshore Division

Certificate number: 19300/C0 BV
File number: ACM 119/2207/001
Product code: 0720H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

TYPE APPROVAL CERTIFICATE

This certificate is issued to

ACM BEARINGS LTD.
ROTHERHAM - UNITED KINGDOM

for the type of product

BEARING MATERIALS
ACM L2 MARINE

Requirements:
BUREAU VERITAS Rules for the Classification of Steel Ships.

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.
This certificate is a renewal of certificate N° 19300/B1 BV expiring on 04/04/2017

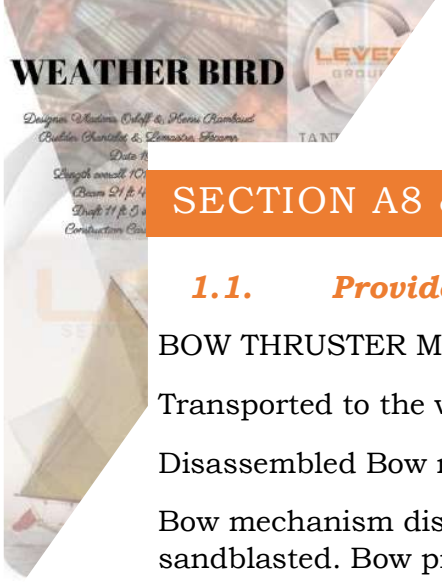
This certificate will expire on: 04 Apr 2022

For BUREAU VERITAS,
At BV LONDON, on 21 Mar 2017,
Spencer Yule

BUREAU VERITAS SURVEYORS AT PARIS 1828 LONDON INTERNATIONAL REGISTER

This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine & Offshore Division available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

COMPOSITE BEARING INFO & CERTIFICATE AT **APPENDIX A**



SECTION A8 & B16: BOW THRUSTER OVERHAULING

1.1. Provided Services- Project steps

BOW THRUSTER MECHANISM & HYDRAULIC MOTOR dismantled.

Transported to the w/shop.

Disassembled Bow mechanism from bow motor.

Bow mechanism disassembled and all parts cleaned and checked. Bow mechanism body sandblasted. Bow propeller cleaned and gridded. Bow propeller fitting to bow shaft checked and adjusted.

Roller and conical bearings replaced as well as V'rings, & gaskets during assembling of the bow mechanism.

Hydraulic Motor disassembled. Roller bearing replaced and greased. Motor assembled and tested.

Bow hydraulic cylinder replaced with new. Material purchased and machined to dimensions

All parts transported to S/Y.

Bow thruster box positioned and stabilized with the use of sealing materials as epoxy resin.

Arming of bow thruster mechanism (positioning, connecting & tightening) and assembling with bow thruster motor, testing of well operation.

1.2. Photo Material

The Photos to the following pages presented all the performed tasks.

1.3. Video Material

The below videos are from Bow Thruster testing at 22/2/2021 the end of system installation.

https://youtu.be/0CQJrMqfzpo

https://youtu.be/wkqEtChlEGA

https://youtu.be/zz8j7nFKxJI

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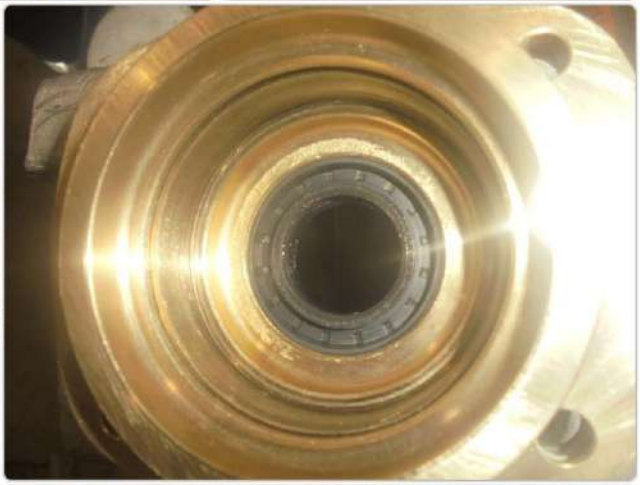


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SECTION A9 & B17: RUDDER & STEERING GEAR OVERHAULING

1.1. Provided Services- Project steps

Rudder and steering gear dismantled from the S/Y.

Rudder plate remained on site while steering gear parts transported to the w/shop.

All parts cleaned and maintained.

Rudderstock & three [3] positions pintle cleaned and maintained.

Steering house cleaning and positioning bolts replaced as required.

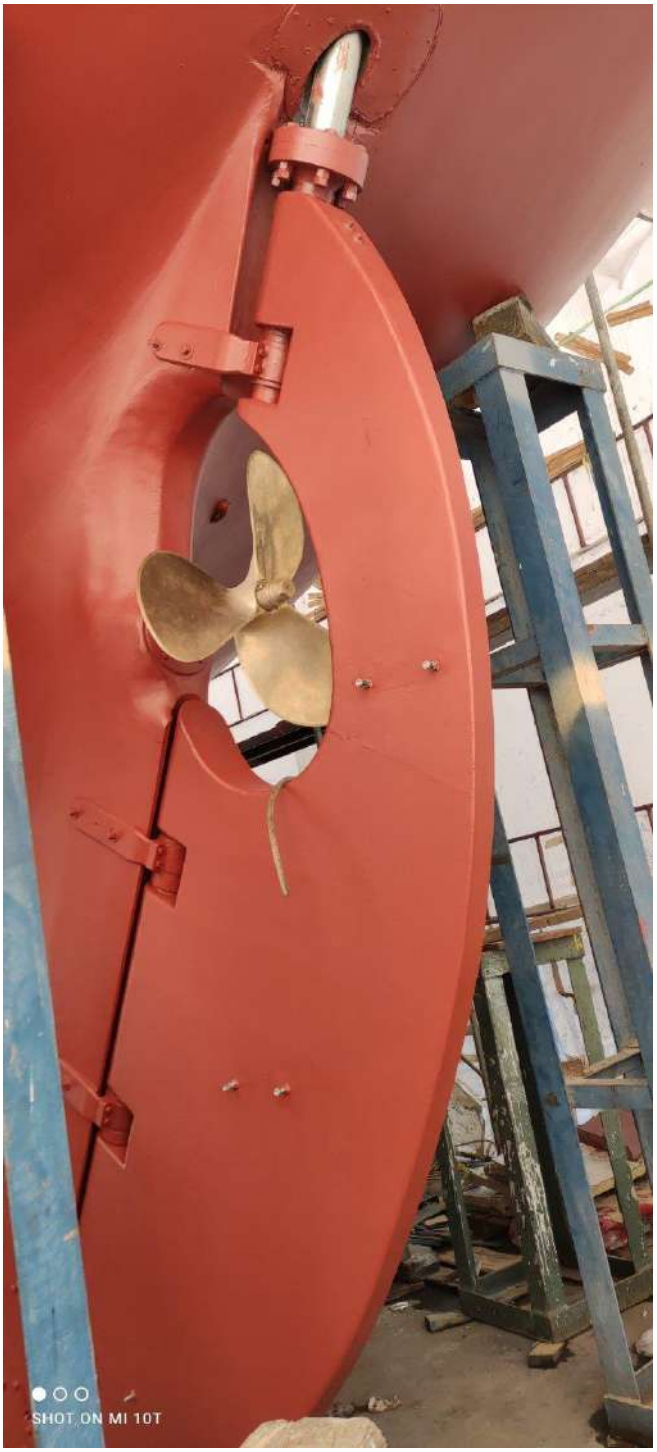
Transported back to S/Y all parts.

Shoe piece maintained and adjust positioning.

Rudderpost positioned and secured with the use of epoxy resins.

Anodes installed on Rudder plate.

Arm Rudder and steering gear & Replace packing at rudder stuffing box.



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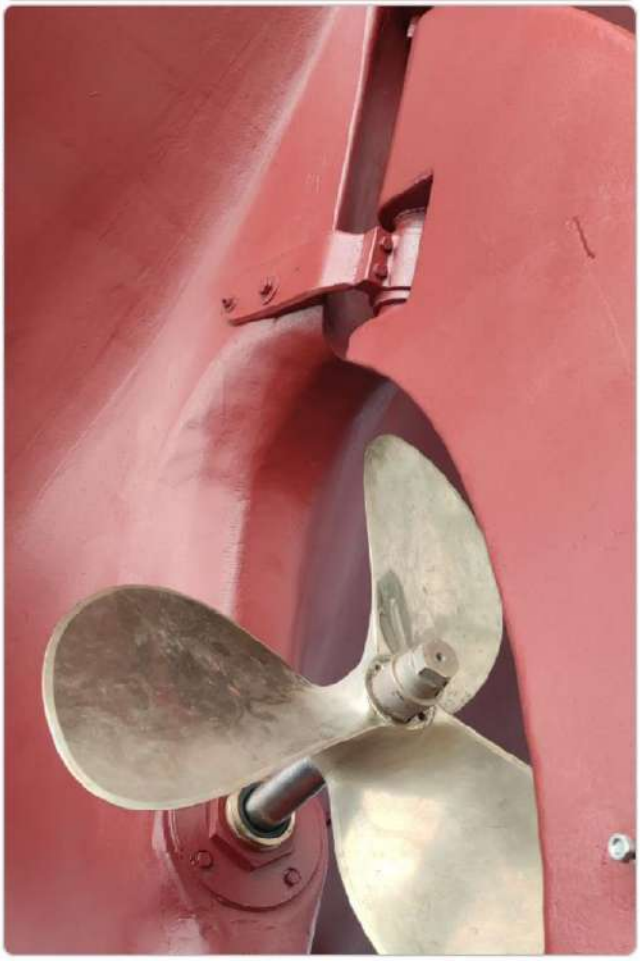

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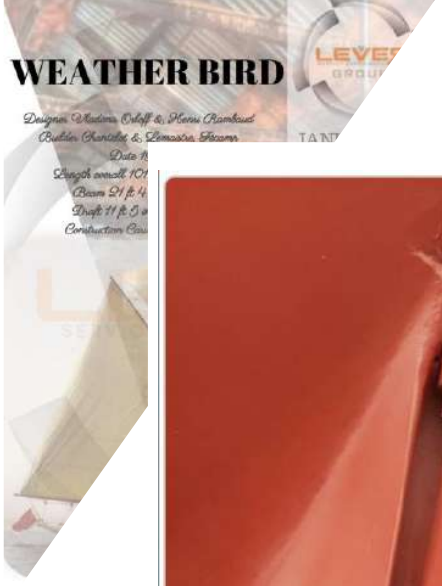

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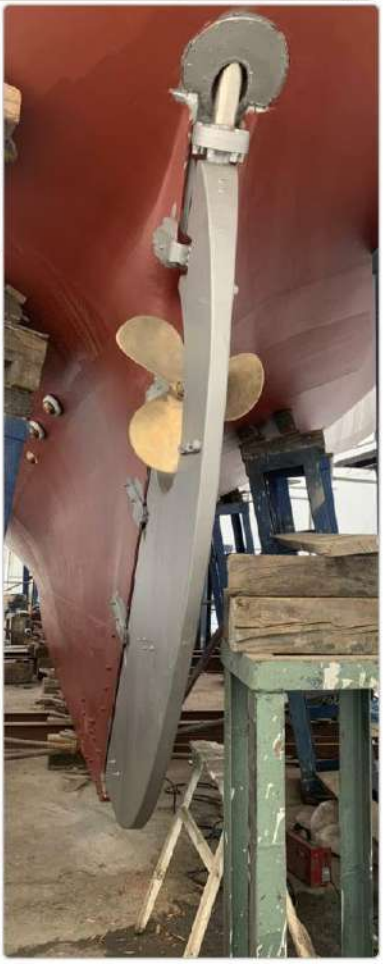

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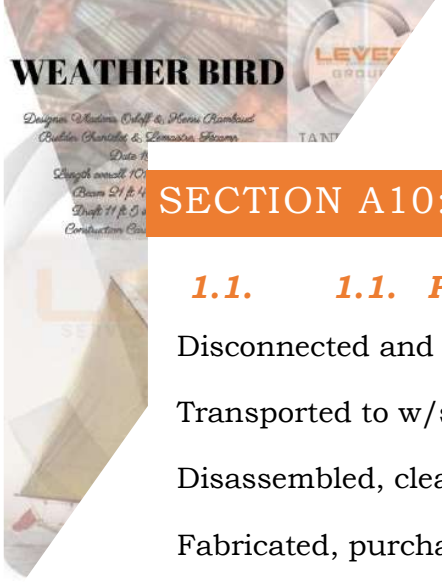

SECTION A10: ANCHOR WINDLASS OVERHAULING

1.1. 1.1. Provided Services- Project steps

Disconnected and dismantled anchor windlass from position.

Transported to w/shop with the use of suitable vehicle and crane

Disassembled, cleaned and checked all parts

Fabricated, purchased & replaced spares as required

Replaced during arming parts as O'ring, gaskets, screw & nuts

Checked shafts and repaired by lapping the conical parts

Serviced and performed Hydraulic Testing of the motor

Assembled the windlass

Transported from the w/shop with the use of suitable vehicle and crane back to S/Y

Installed, connected and tested well operation

1.2. Photo Material

The Photos to the following pages presented all the tasks performed.

1.3. Video Material

The below videos are from Anchor windlass testing at 24/2/2021 the end of system installation.

https://youtu.be/TlIxrGtaXFI

https://youtu.be/av91xPoTzsQ

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BEFORE SERVICE CONDITION

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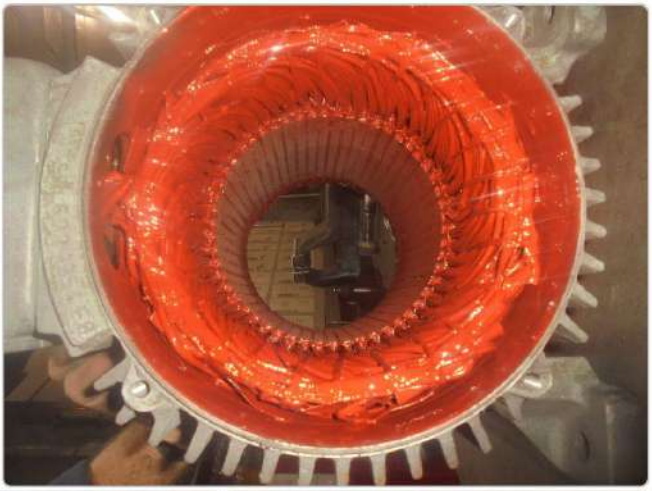




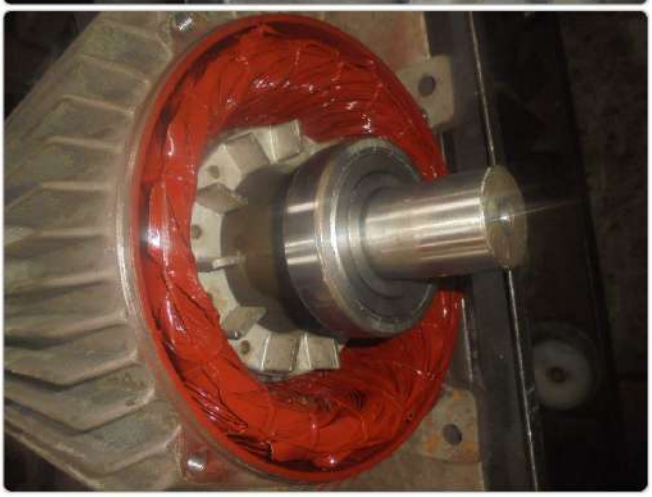

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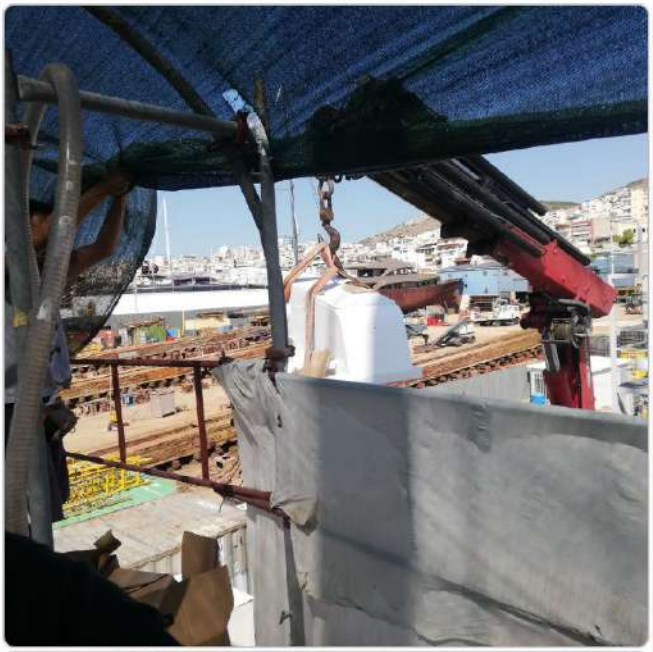

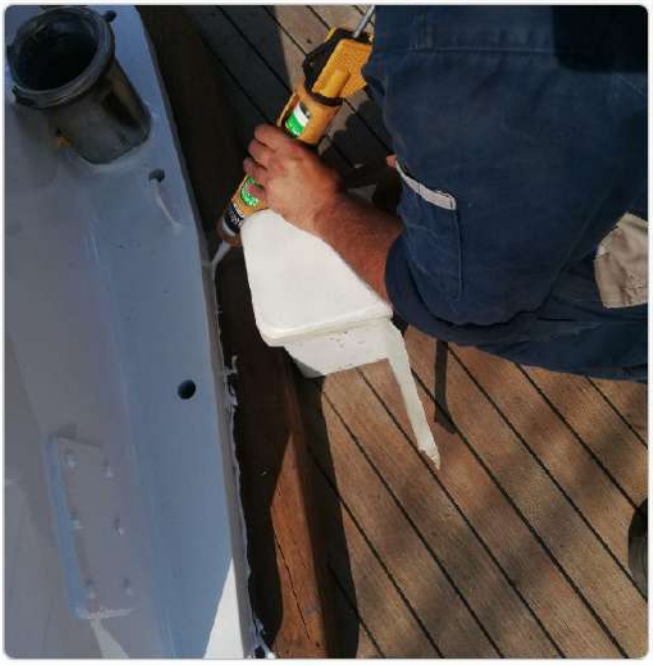

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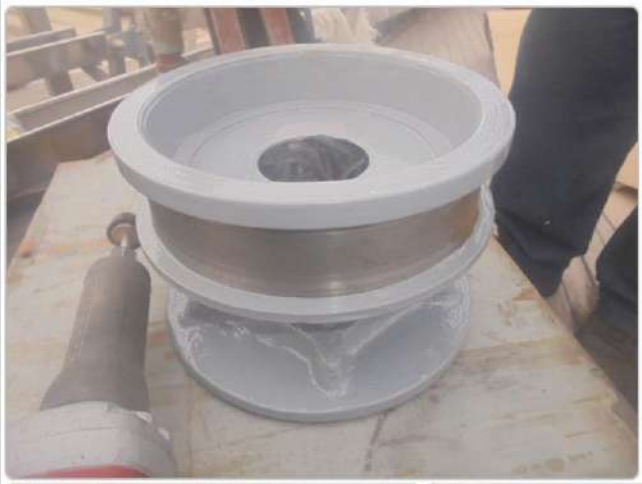







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APPENDIX A

LEVER GROUP Ship & Yacht Service & Repair 34 Asklipiou str. 18545 Piraeus-Greece
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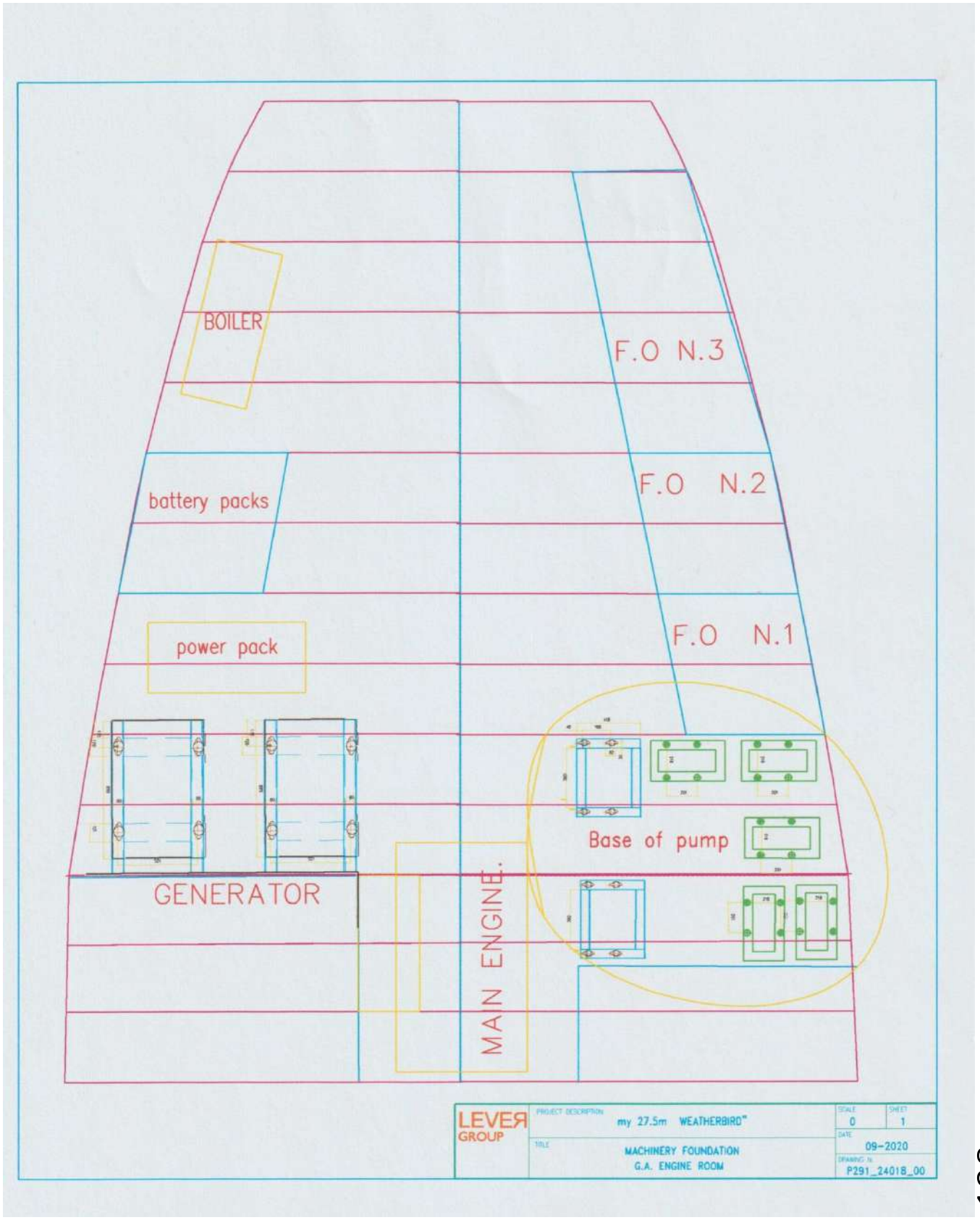

ENGINE ROOM DRAWINGS

LEVER GROUP Ship & Yacht Service & Repair 34 Asklipiou str. 18545 Piraeus-Greece
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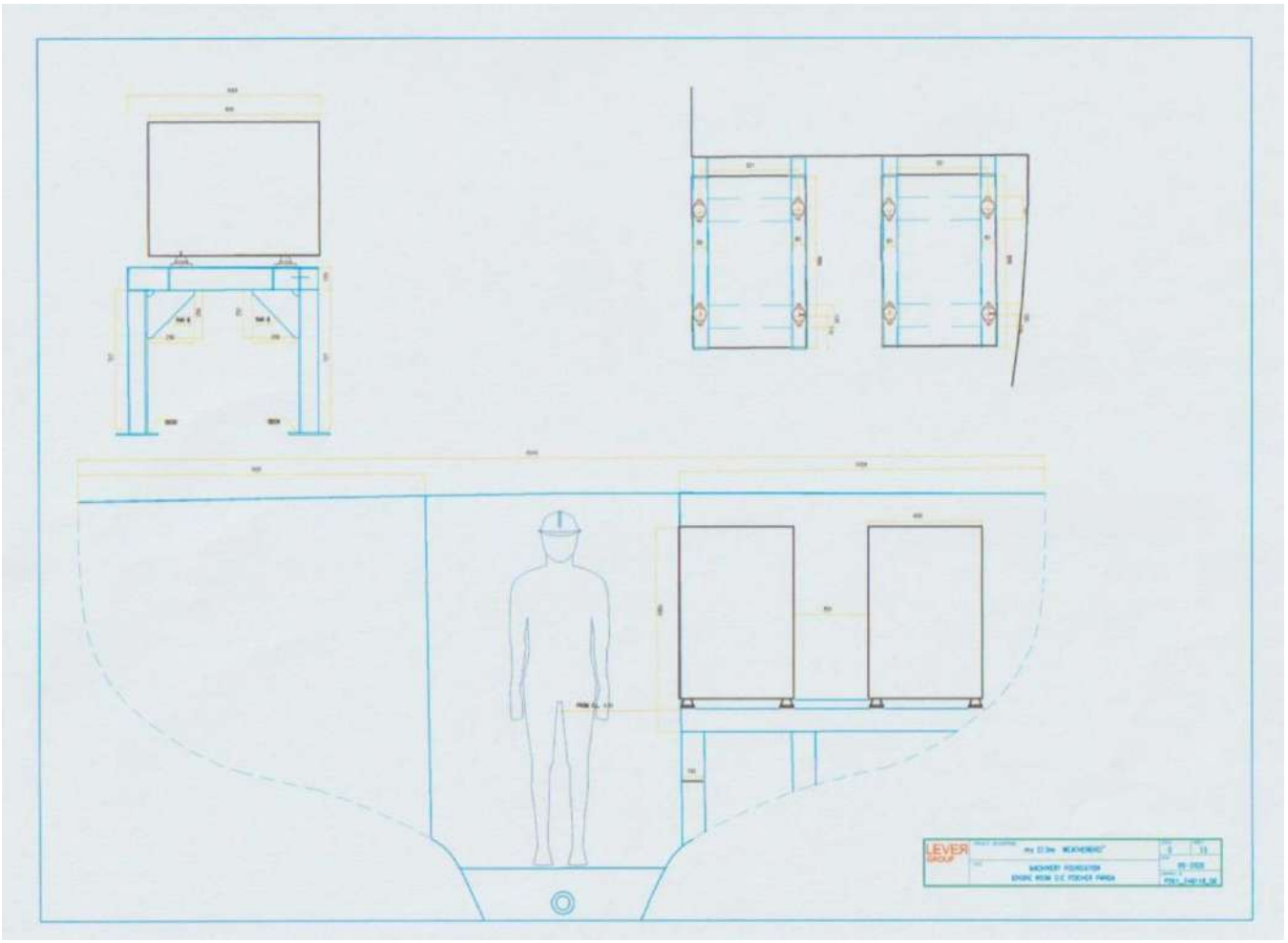

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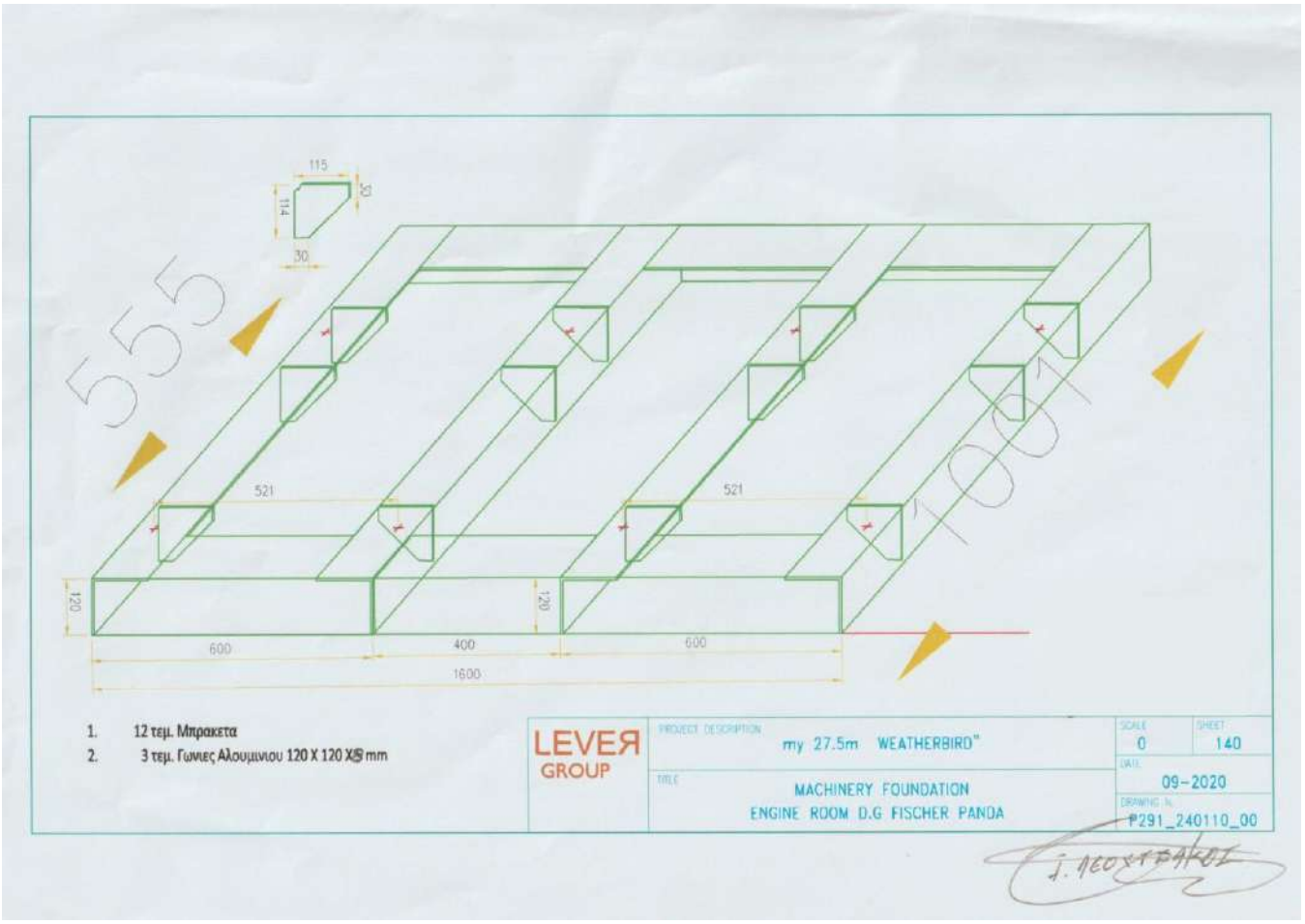

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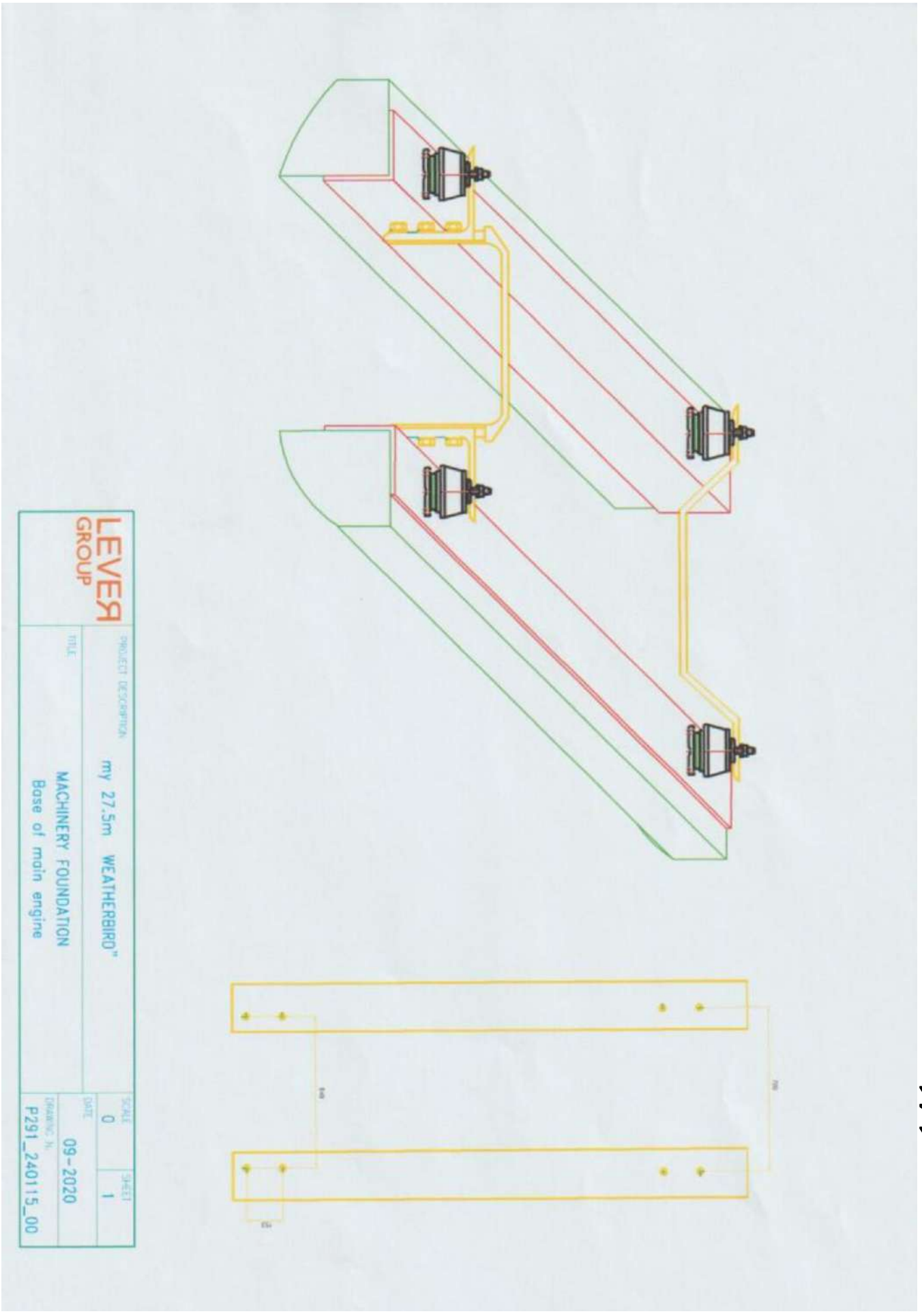

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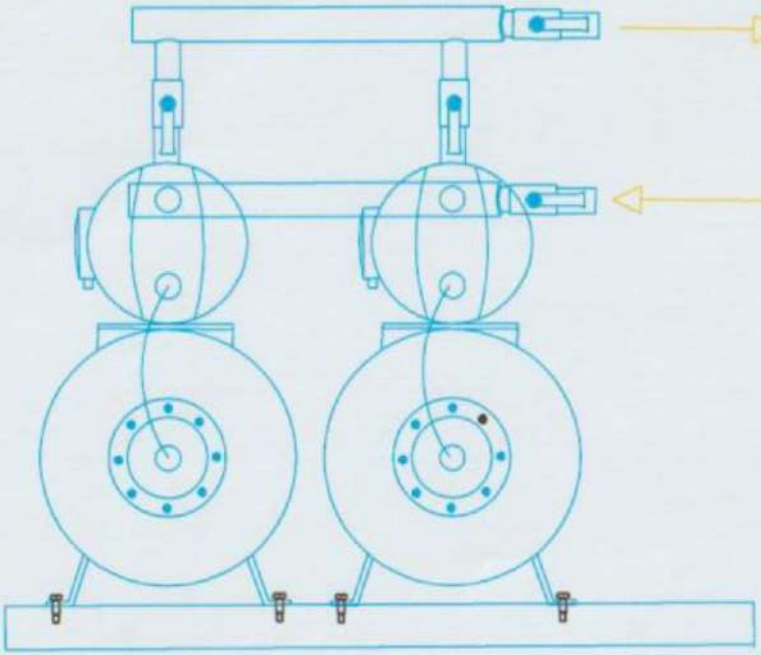
Πιεστικό σύστημα



Καταναλωσεις

Δεξαμενες γλυκου νερου

Παροχή μέγ. [l/h] 3.300
Πίεση εκτόπισης [bar] 3
Κοκκομετρία [mm] 2
Μεγ. ύψος μεταφοράς [m] 30
Ύψος αναρρόφησης μέγ. [m] 7
Αυτόματο σύστημα ενεργοποίησης [bar] 1,5
Αυτόματο σύστημα απενεργοποίησης [bar] 3

LEVER GROUP	PROJECT DESCRIPTION: my 27.5m WEATHERBIRD"	SCALE: 0	SHEET: 1
	TITLE: MACHINERY FOUNDATION ENGINE ROOM FRESH WATER PUMPS	DATE: 09-2020	DRAWING N.: P291_240112_00

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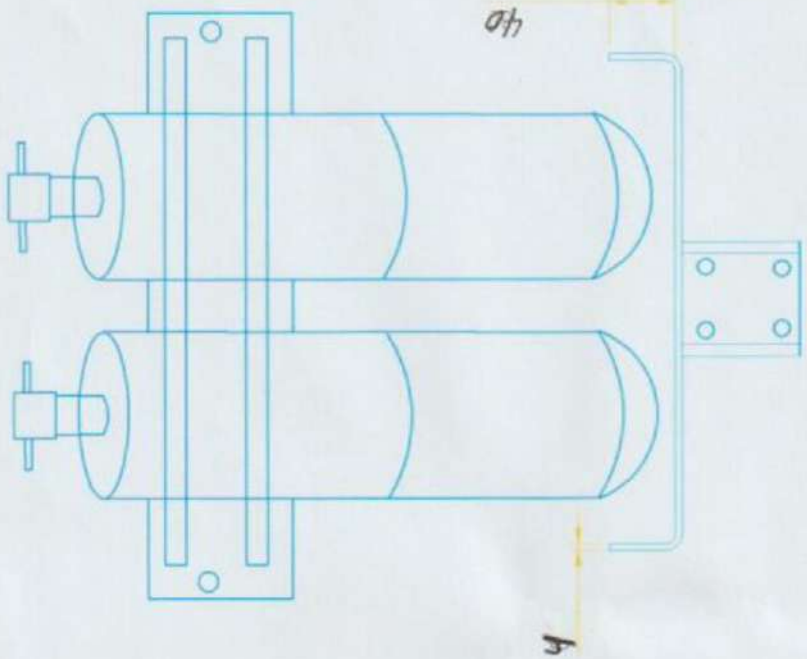

PROJECT DESCRIPTION	my 27.5m WEATHERBIRD"
TITLE	MACHINERY FOUNDATION Fuel filters system
SCALE	0
SHEET	1
DATE	09-2020
DRAWING N.	P291_24015_00

LEVER GROUP

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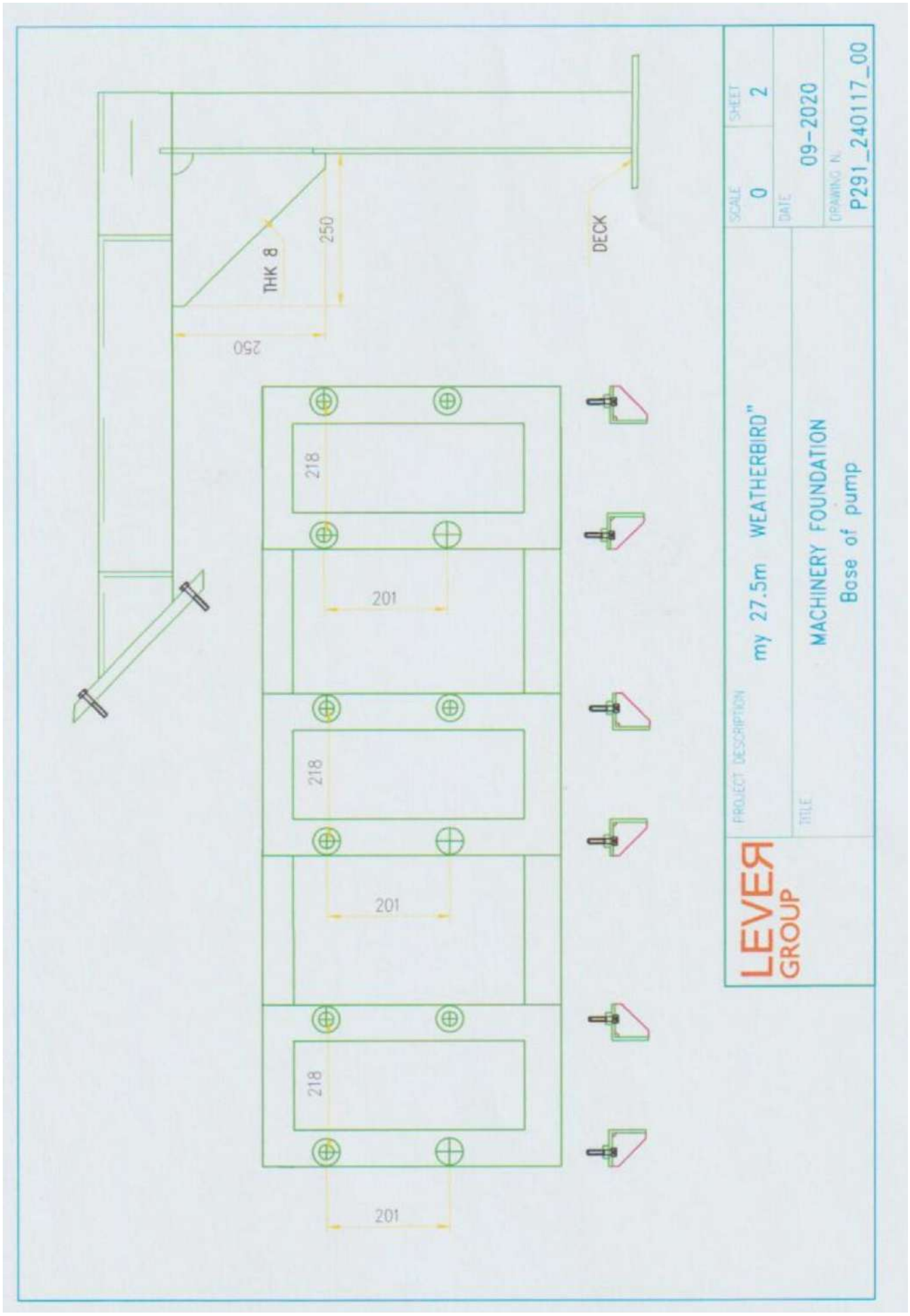

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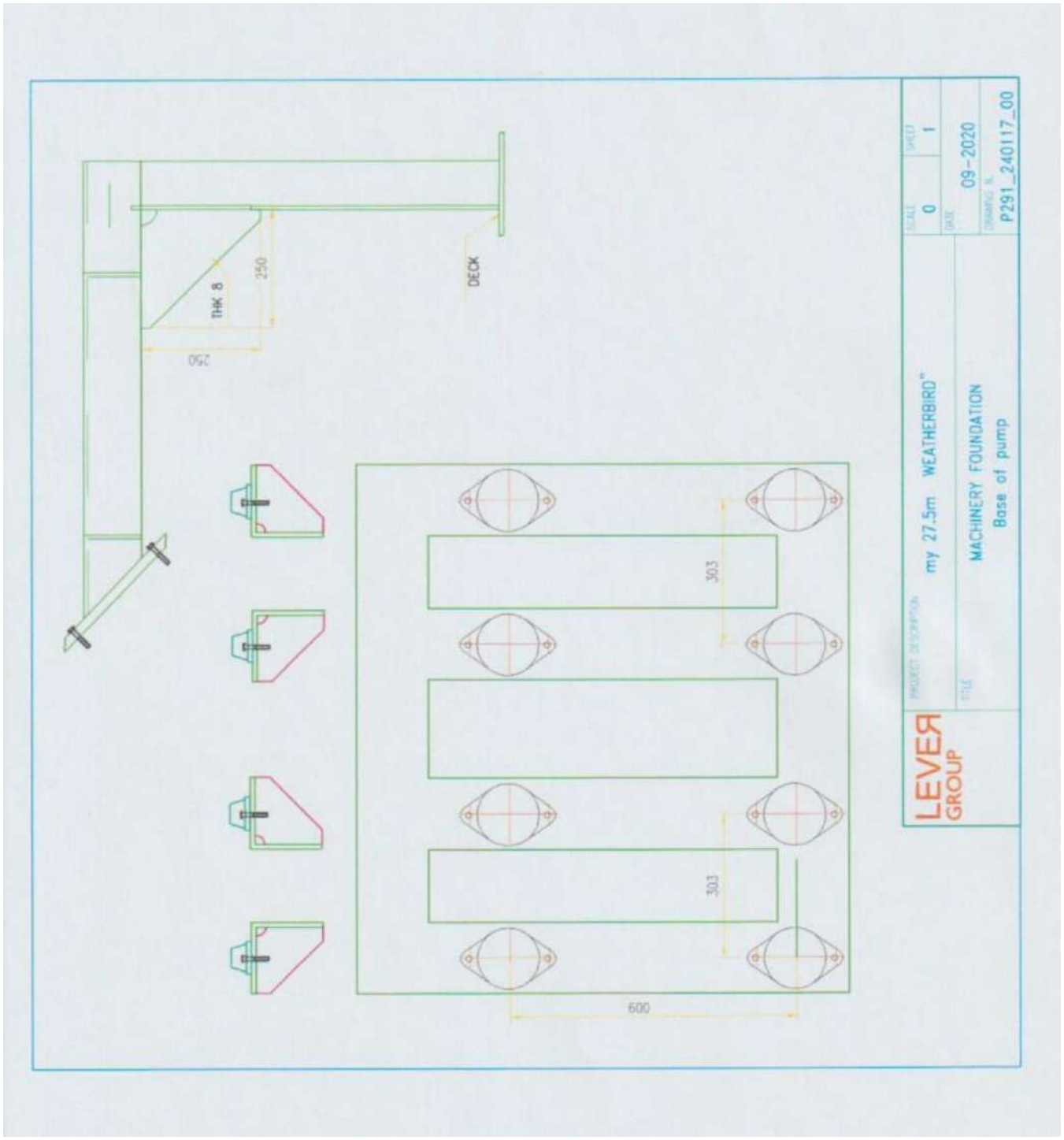

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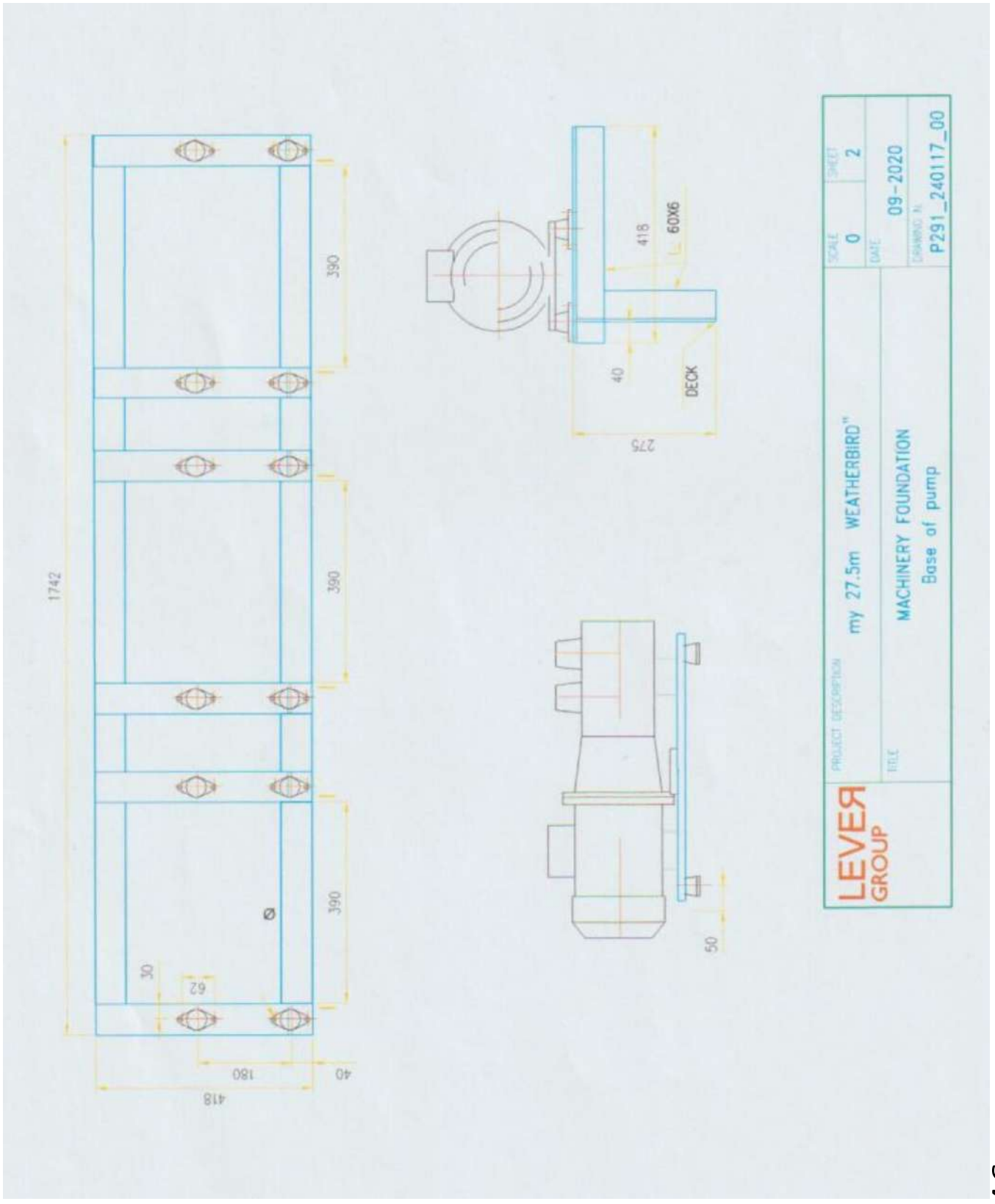

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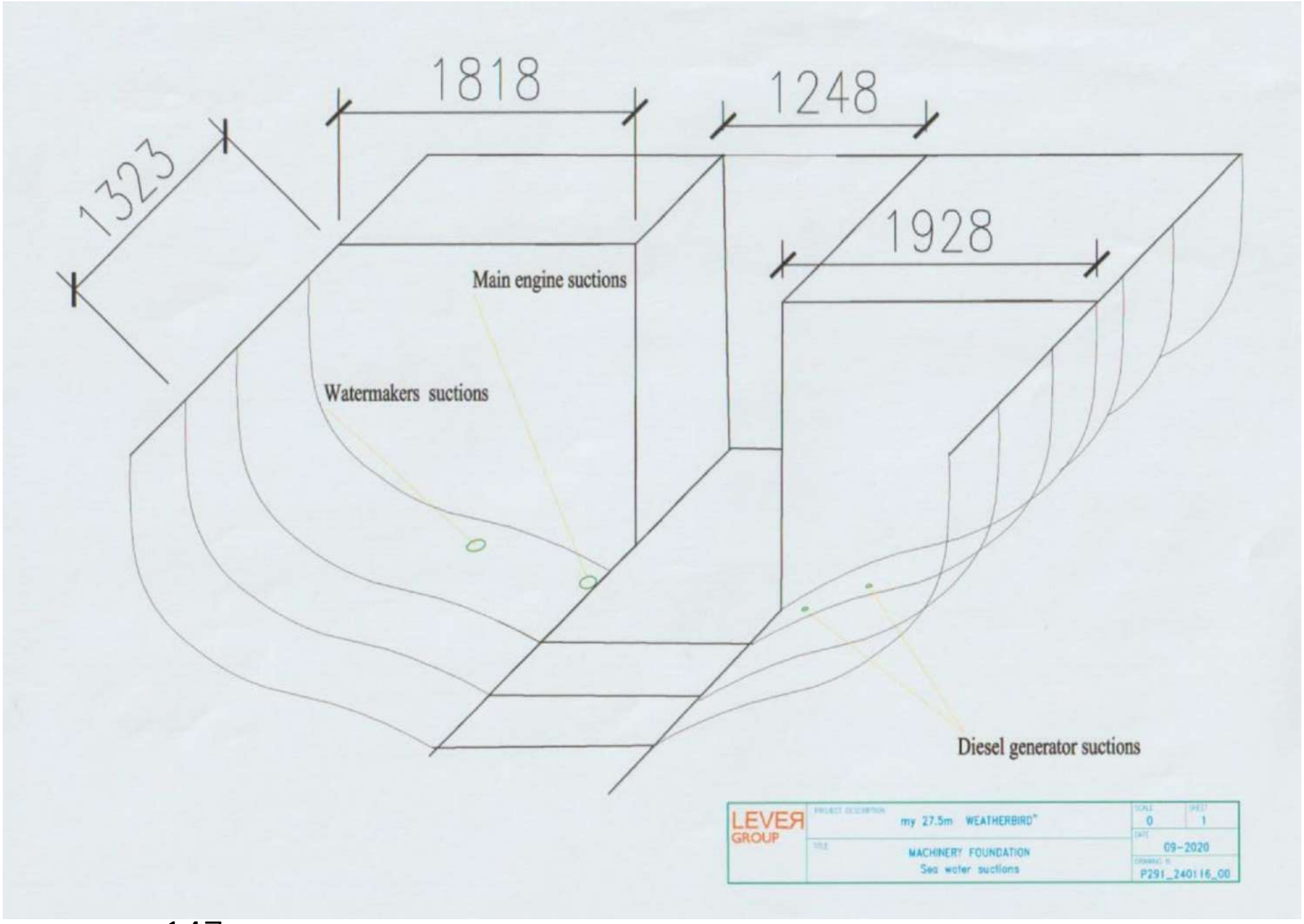

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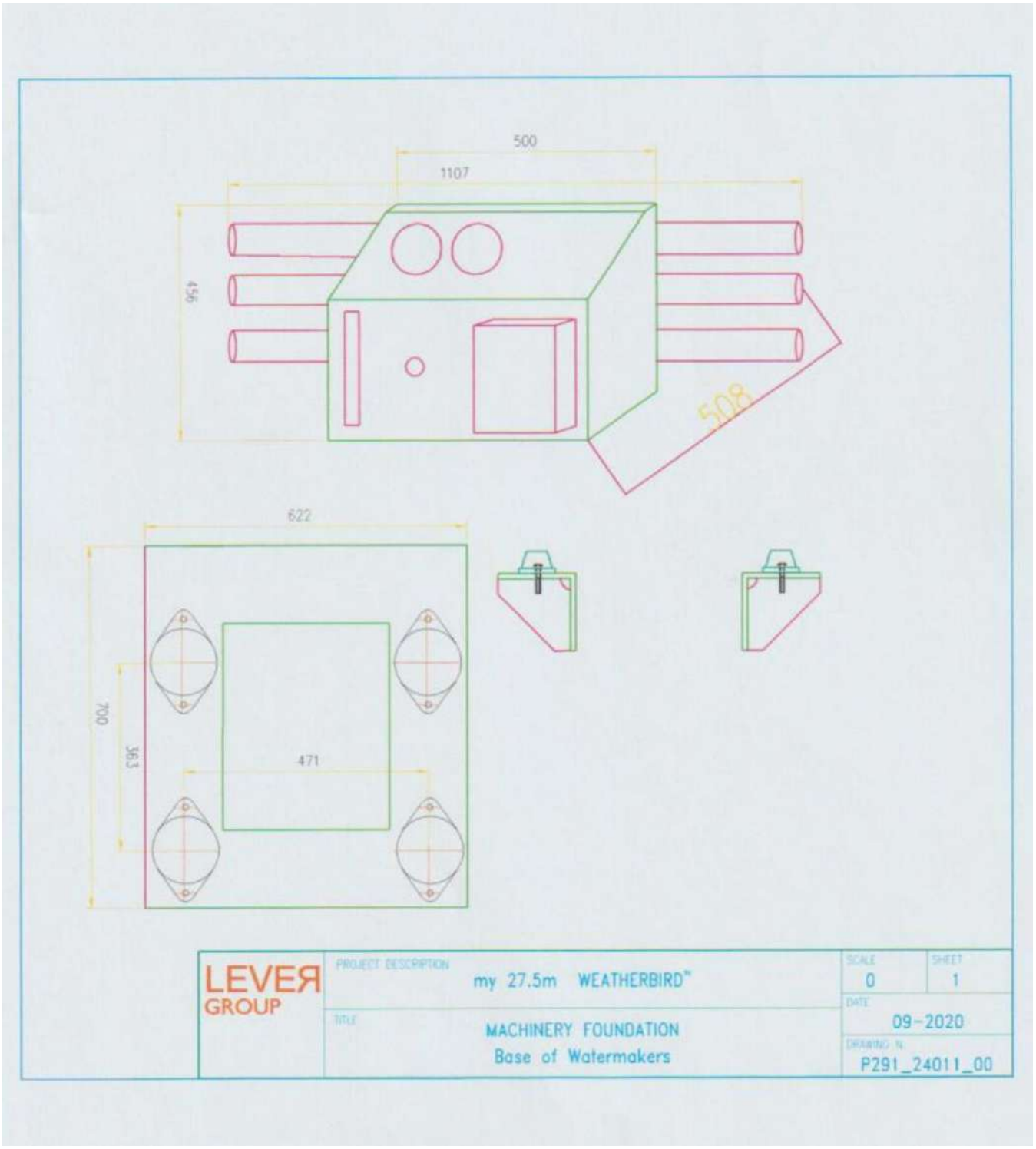

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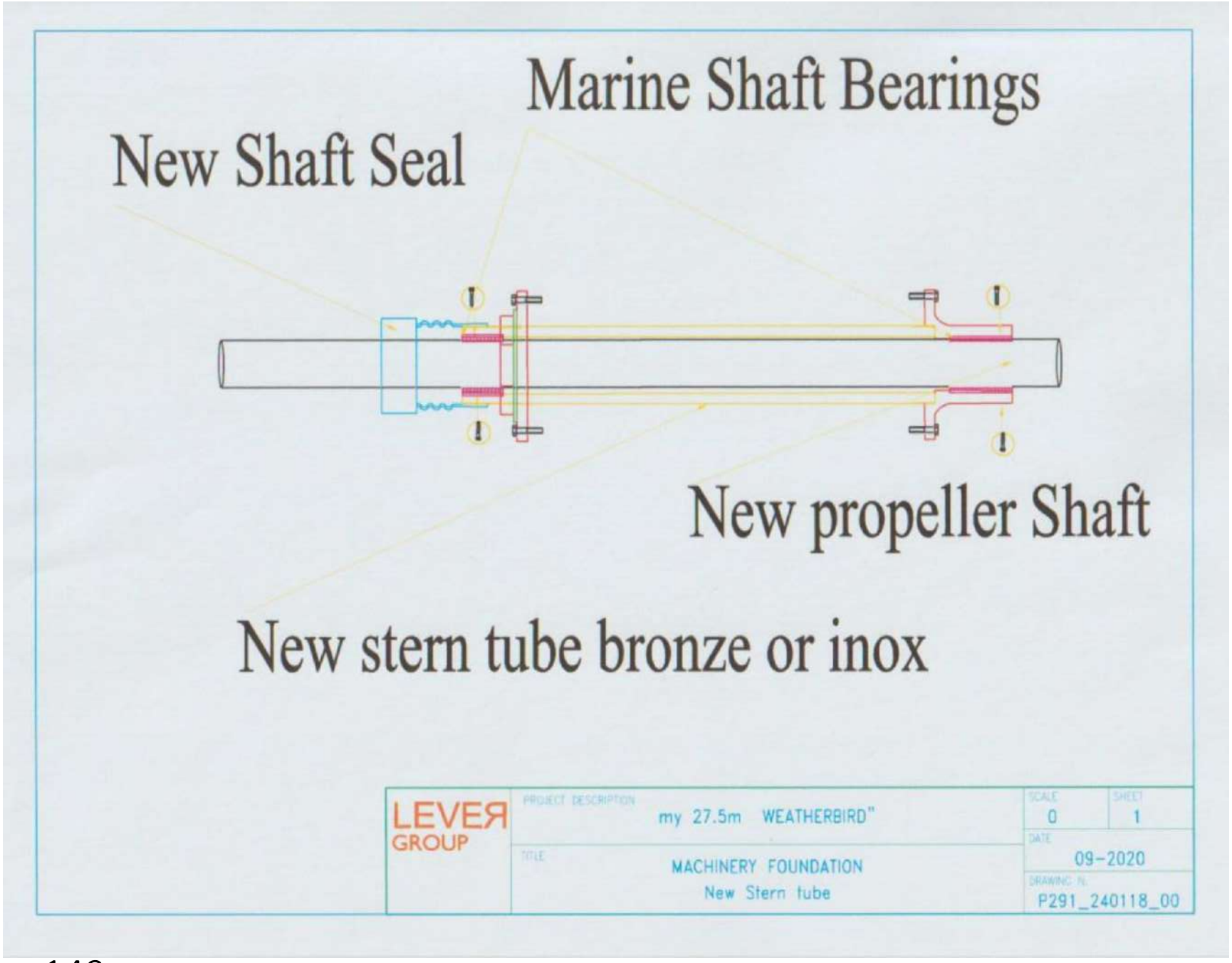

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VULKAN
COUPLINGS

TORFLEX

TECHNISCHE DATEN TECHNICAL DATA

VULKAN COUPLING SPECS

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TORFLEX

EIGENSCHAFTEN CHARACTERISTICS

DREHMOMENT TORQUE
0.25 kNm – 1.60 kNm

EINSATZGEBIETE

Glockeneinbauten im Freizeitbootbereich.
Die allgemein stark gestiegenen Anforderungen an Antriebssysteme erfordern heute auch bei elastischen Kupplungen verstärkt Sonderlösungen. Diese Anforderungen sind beispielsweise ein ruhiges Laufverhalten im Getriebe auch bei niedrigsten Leerlaufdrehzahlen der Dieselmotoren. Um dieses zu ermöglichen, hat VULKAN die TORFLEX, eine mehrstufige Kupplung mit progressiver Kennlinie entwickelt, welche bei Leerlaufdrehzahlen zu spürbar geringeren Vibrationen im angeschlossenen Getriebe führt. Die TORFLEX Kupplung ist für den Einsatz in geglockten Antrieben geeignet, wobei die Getriebeeingangswelle sowohl eine Vielkeilwelle sein darf als auch für einen Ölpressverband geeignet ist.

AREAS OF APPLICATION

Bell housing installations in pleasure boats.
Increased demands on drive systems require special solutions within the use of highly flexible couplings. These demands include a silent and smooth operation even at low running speeds during idling. To meet these requirements, VULKAN has developed the TORFLEX, a dual-stage coupling with progressive stiffness characteristics. Recognizable less vibration can be achieved due to the optimized design. The TORFLEX coupling is exclusively intended for installation in bellhousing applications and can be used where the gearbox input shaft has an external spline or will be used as Oil Press-Fit.

PRODUKTVORTEILE

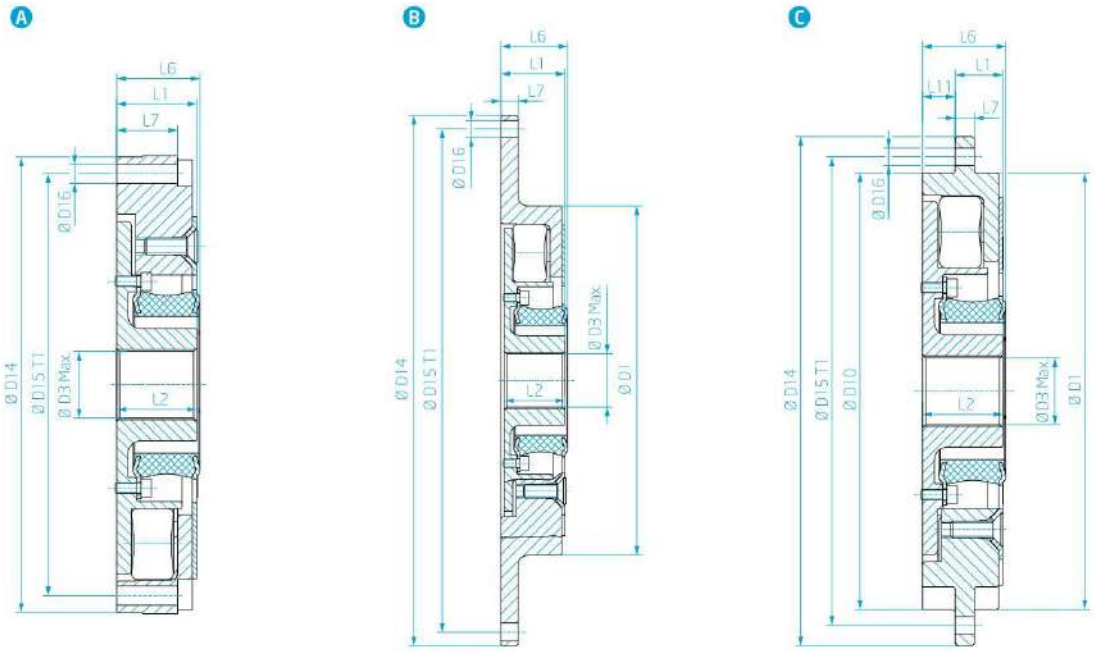
- Für maximalen Komfort: Ruhiges Laufverhalten bei Anwendungen mit geringeren Leerlaufdrehzahlen
- Drehweich bei Leerlaufdrehzahlen für höchste Komfortansprüche
- Progressiver Steifigkeitsverlauf für eine optimierte Leistungsübertragung und Systemverfügbarkeit bei Volllast
- Kompaktes und kurzbauendes Design für ein einfaches Handling
- Für SAE Glocken und Schwungräder optimiertes Design für eine höchste Lösungsflexibilität

PRODUCT BENEFITS

- For maximum comfort: Smooth and quiet running for applications with low idling speeds
- Torsionally soft at idling speed for highest comfort requirements
- Progressive stiffness characteristic for the best power transmission at high loads for a high system availability
- Compact and short-build design for an easy handling
- Optimized design for common SAE flywheels and SAE housings for a high solution flexibility

TORFLEX

YACHT-ANWENDUNGEN PLEASURE BOAT APPLICATION



Baugruppe Dimension Group	Schwungrad Flywheel	Abbildung Figure	Abmessungen Dimension						
	SAEJ620		D_1	D_3	D_{10}	D_{14}	D_{15}	T_1	D_{16}
	[*]		[mm]	[mm]	[mm]	[mm]	[mm]	[-] Teilung / holes	[mm]
KT 11	6½	C	180,0	35,0	180,0	215,9	200,00	6	9,0
KT 11	-	B	180,0	35,0	-	240,8	222,25	8	11,0
KT 11	-	C	180,0	35,0	180,0	276,0	250,00	6	9,0
KT 21	6½	A	-	38,0	-	215,9	200,00	6	9,0
KT 21	8	B	207,0	38,0	-	263,5	244,50	6	11,0
KT 21	10	B	207,0	38,0	-	314,4	295,30	8	11,0
KT 21	-	C	245,0	38,0	217,0	335,0	310,00	3x2	11,0
KT 21	11½	C	245,0	38,0	217,0	352,4	333,40	8	11,0
KT 31	11½	C	275,0	40,0	273,0	352,4	333,40	8	11,0
KT 31	-	C	275,0	35,0	273,0	335,0	310,00	3x2	11,0
KT 41	11½	C	305,0	46,0	305,0	352,4	333,40	8	11,0
KT 41	14	C	305,0	46,0	305,0	466,7	438,20	8	14,0

A B C

	Abmessungen Dimension					Massenträgheitsmomente Mass moments of inertia		Masse Mass		Anmerkungen Notes
	L_1	L_2	L_6	L_7	L_{11}	J_1	J_2	m_1	m_2	
	[mm]	[mm]	[mm]	[mm]	[mm]	[kgm²]	[kgm²]	[kg]	[kg]	
	23,0	35,0	35,0	8,0	12,0	0,005	0,006	0,9	1,3	
	33,0	35,0	45,0	6,8	-	0,007	0,006	1,1	1,3	
	23,0	35,0	35,0	8,0	12,0	0,011	0,006	1,3	1,3	
	38,0	38,0	39,8	29,0	-	0,015	0,017	1,9	7,8	
	38,0	38,0	39,8	10,0	-	0,021	0,017	2,6	7,8	
	38,0	38,0	39,8	10,0	-	0,027	0,017	2,8	7,8	
	17,0	38,0	39,8	6,0	21,0	0,028	0,017	2,6	7,8	
	22,5	38,0	39,8	11,5	15,5	0,046	0,017	3,8	7,8	
	28,0	38,0	44,0	11,0	16,0	0,046	0,078	2,9	14,6	
	23,0	33,0	39,8	11,0	16,0	0,041	0,078	2,7	14,6	
	24,0	74,0	79,7	10,0	50,0	0,062	0,077	3,6	4,5	
	81,0	94,0	94,0	4,0	13,0	0,081	0,077	4,3	4,9	

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Rubber Metal anti vibration mounts

MARINE ENGINE MOUNT

AMC MECANOCAUCHO
NOISE AND VIBRATION SOLUTIONS

AMC-Mecanocaucho® Marine Engine Mounts are also ideal for mobile applications thanks to their rugged architecture.

Their special design offers multi-axial stiffnesses values , high vertical elasticity,increased longitudinal stiffness and optimal lateral stiffness for improved vibration isolation on that axis.

TECHNICAL CHARACTERISTICS

- The top part of the hood has a cross-shaped indentation , which enhances its rigidity in mobile applications and also improves the flow of oils or liquids which splash onto it.

- The metal parts have an anticorrosive treatment which is suitable for outdoor applications.RoHs compliant.

- The mounts are clearly identified, as the bases are engraved with the type and hardness.

- They have an interlocking metal component that provides a fail-safe protection for mobile applications. This device limits vertical movement when the mounting is submitted to shock inputs.

- The top part protects the elastomer inside from possible dripping oil, diesel, ozone and ultraviolet rays which can cause major damage to the rubber. -For marine engine applications, contact the AMC Mecanocaucho ® Technical Department. The different stiffnesses for each axis make it possible to offer major flexibility in the direction perpendicular to the crankshaft of the engine. This provides more effective isolation from vibrations of all types of engines.

APPLICATIONS

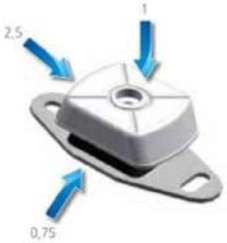
For use In mobile rotating machines that need maximum attenuation of vibration and noise, such as:

- Pumps

- Marine-Land units

- Mobile electrical panels

- Industrial vehicles



ANTI VIBRATION MOUNTINGS SPECS & CERTIFICATE

AMC MECANOCAUCHO
Industrialdea Zona A - Pab. 35.
Asteasu E-20159, Gipuzkoa
Spain

Tel.: +34 943 69 61 02
Fax: +34 943 69 62 19

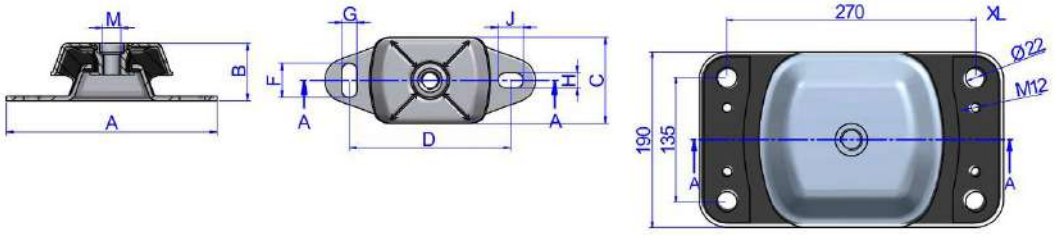
sales@amcsa.es

www.mecanocaucho.com
www.akustik.com

Rubber Metal anti vibration mounts

MARINE ENGINE MOUNT

DRAWINGS



DIMENSIONS

Type	Tightening torque MAX (Nm)	A (mm)	B (mm)	C (mm)	D (mm)	F (mm)	G (mm)	H (mm)	J (mm)	M	Weight (gr)	Shore	Load (kg)	Code
SMALL	55	120	40	60	100	14	11	14	11	M-12	397	40 Sh	35	136001
												45 Sh	45	136002
												55 Sh	70	136003
												65 Sh	95	136004
												75 Sh	110	136005
MEDIUM	125	184	50	75	140	30	13	13	22	M-16	857	35 Sh	95	136021
												45 Sh	120	136022
												55 Sh	220	136023
												65 Sh	280	136024
												75 Sh	450	136025
LARGE	190	228	68	112	182	34	18	18	26	M-20	2250	45 Sh	350	136041
												55 Sh	525	136042
												65 Sh	800	136043
												75 Sh	1080	136044
XL	285	330	112	190	270	-	-	-	-	M-24	9600	40 Sh	950	136061
												50 Sh	1400	136062
												60 Sh	2200	136063
												70 Sh	3000	136064

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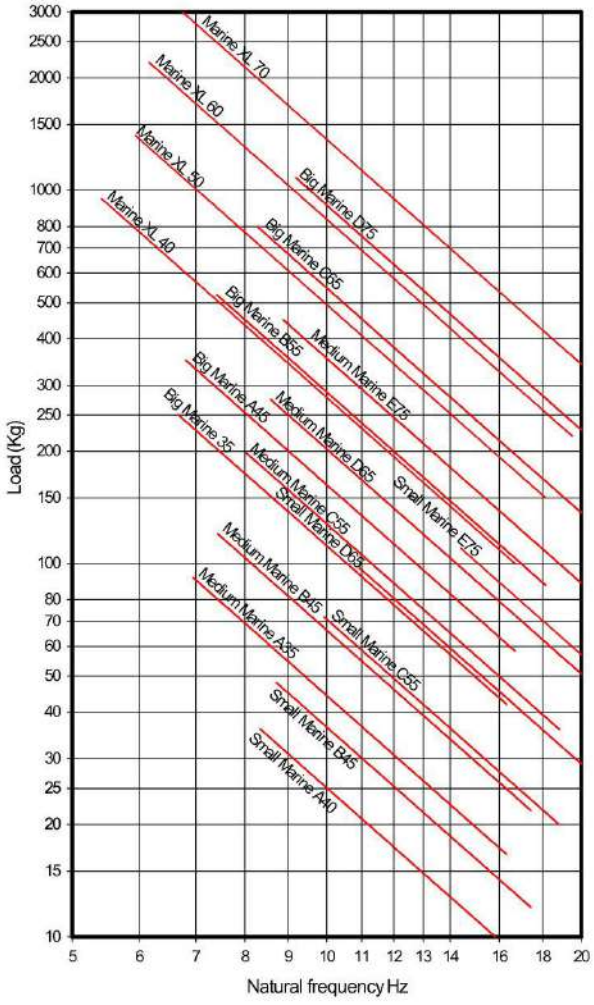
Rubber Metal anti vibration mounts

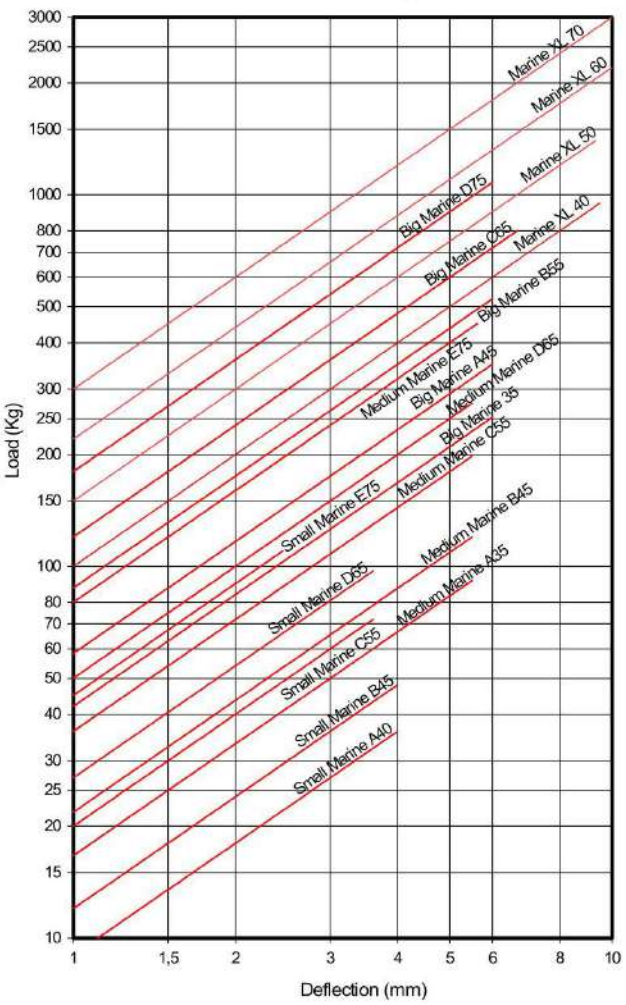
MARINE ENGINE MOUNT

Elastical properties

NATURAL FREQUENCIES
AMC MECANOCAUCHO® Type Marine



LOAD DEFLECTION GRAPHS
AMC MECANOCAUCHO® Type Marine



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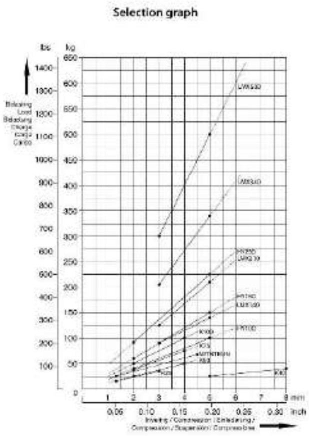
Type Typ Tipo	Stijfheidsverhouding / Stiffness ratio / Steifheitsverhältnis / Ratio de raideur / Relación de rigidez / Rapporto di durezza verticaal / vertical / vertikal / verticale / vertical / verticale	dwarsscheeps / athwartships / querschiffs / latérale / transversal / transversalmente	langsscheeps / fore and aft / längsschiffs / longitudinal / a lo largo / all'imbarcazione	Min. belasting / Min. load / Min. Belastung / Charge minimale / Carga min. / Carico minimo Statisch / Static / Statisch / Statique / Estática / Statico [kgf]	[lbs]	Min. invering / Min. compression / Min. Einfederung / Compr. minimale / Suspensión min. / Compr. minima [mm]	[inch]	Min. belasting / Min. load / Min. Belastung / Charge minimale / Carga min. / Carico minimo Statisch + dynamisch / Static + dynamic / Statisch + dynamisch / Statique + dynamique / Estática + dinámica / Statico + dinamico [kgf]	[lbs]	Max. invering / Max. compression / Max. Einfederung / Compr. maximale / Suspensión max. / Compr. massimo [mm]	[inch]	Hardheid / Hardness / Härte / Dureté / Dureza / Durezza [° Shore]
KSTEUN25V	1	1.4	1.4	15	33	1.3	(3/64")	25	55	3	(1/8")	45
KSTEUN35V	1	1.4	1.4	15	33	1.3	(3/64")	30	66	7	(1/4")	45
KSTEUN40A	1	1	2.4	25	55	5	(3/16")	40	88	8	(5/16")	50
KSTEUN50V	1	0.75	2.5	25	55	2	(5/64")	50	110	4	(5/32")	45
KSTEUN75V	1	0.75	2.5	38	84	2	(5/64")	75	165	4	(5/32")	55
KSTEUN80V	1	0.75	2.5	40	88	2	(5/64")	80	165	4	(5/32")	60
KSTEUN100V	1	0.75	2.5	50	110	2	(5/64")	100	220	4	(5/32")	65
MITSTEUN	1	1	1	25	55	1.3	(3/64")	67	148	4.5	(3/16")	45
HY100	1	1.2	3.5	40	88	2	(5/64")	100	220	5	(3/16")	40
HY150	1	1.2	3.5	60	132	2	(5/64")	150	331	5	(3/16")	50
HY230	1	1.2	3.5	92	203	2	(5/64")	230	507	5	(3/16")	60
LMX140	1	1	7	85	187	3	(1/8")	140	309	5	(3/16")	35
LMX210	1	1	7	125	276	3	(1/8")	210	463	5	(3/16")	45
LMX340	1	1	7	205	452	3	(1/8")	340	750	5	(3/16")	55
LMX500	1	1	7	300	661	3	(1/8")	500	1102	5	(3/16")	65

Selection graph



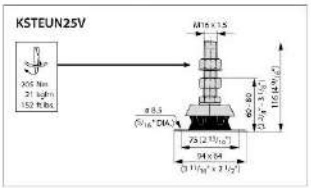
Installatie instructies
Installation instructions
Installationsvorschriften
Instructions d'installation
Instrucciones de instalación
Istruzioni per l'installazione

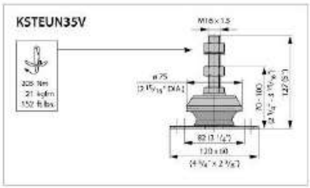
NEDERLANDS
ENGLISH
DEUTSCH
FRANÇAIS
ESPAÑOL
ITALIANO

Flexibele motorsteunen
Flexible engine mountings
Flexible Motorlager
Supports-moteurs flexibles
Soportes motor flexibles
Supporti motore flessibili

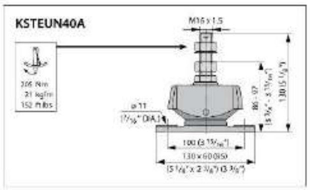
KSTEUN
MITSTEUN
HY
LMX

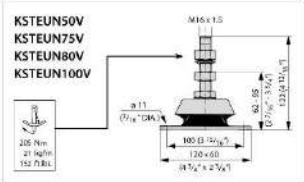
Hoofdafmetingen
Principal dimensions



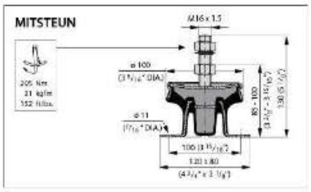


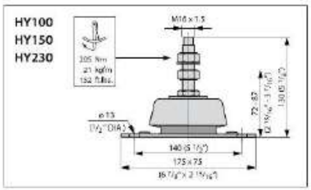
Hauptabmessungen
Dimensions principales



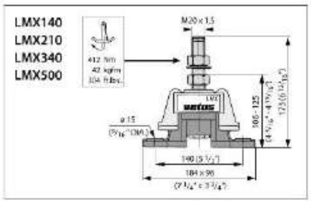


Dimensiones principales
Dimensioni principali





Hoofdafmetingen
Principal dimensions



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Rubber Metal anti vibration mounts

HI SEC

AMC MECANOCAUCHO
NOISE AND VIBRATION SOLUTIONS

This height adjusting system is Zinc plated and chromate according to DIN 50691/ISO 2081 to protect against the corrosion.

TECHNICAL CHARACTERISTICS

DNV rules for ships/ High Speed light craft, Issue Jan 2001 Point 4 Chapter 3 Section1 F202, establishes that standard height adjusters are not acceptable for leveling, due to cyclic bending moments that the studs and bolts are subjected to. This is the reason why leveling of mounts using shims beneath the mounts is the only recommended method for leveling.

AMC-MECANOCAUCHO shares also this method and that is the reason why AMC-MECANOCAUCHO® Shims have been developed. In order to achieve a fine leveling HI-SEC height adjusters allow a final precise adjusting with security.

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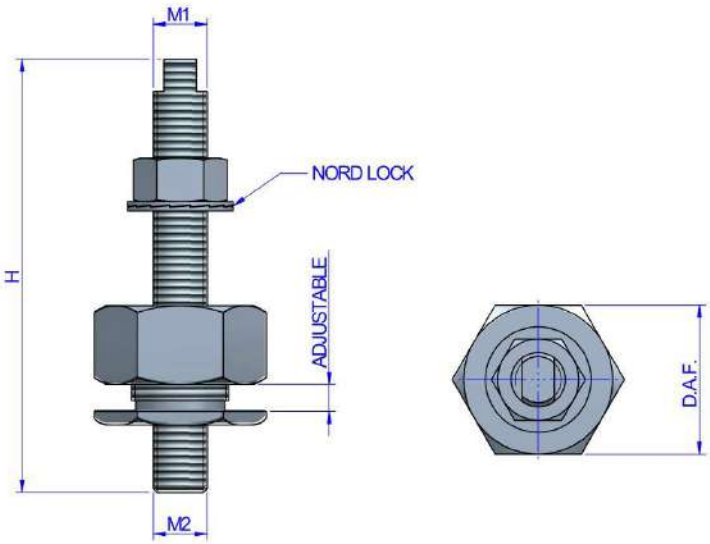
Rubber Metal anti vibration mounts

HI SEC

DRAWINGS



DIMENSIONS

Type	H (mm)	M1	M2	ADJUSTABLE (mm)	MACHINED HEAD	D.A.F.	Weight (gr)	Code
HI SEC	110	M16	M12	+ 5	Y	46	357	708077
	110	M16	M16	+ 5	Y	46	514	708007
	130	M20	M20	+ 5	N	46	775	708094
	110	M20	M16	+ 10	Y	55	1095	708079
	160	M20	M20	+ 10	Y	55	1011	708029
	160	M20	M20	+ 10	N	55	1096	708005
	200	M24	M24	+ 10	N	120	2234	708011

AMC MECANOCAUCHO
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Marine & Offshore

Certificate number: 49933/A0 BV
File number: ACM182/2310/1
Product code: 0021H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

AMC MECANOCAUCHO
ASTEASU - SPAIN

for the type of product

FLEXIBLE MOUNTS FOR PROPULSION OR AUXILIARY MACHINERY
Vibration Damper BSB, BRB, Marine

Requirements:
Bureau Veritas Rules for the Classification of Steel Ships

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 30 Jul 2023

For Bureau Veritas Marine & Offshore,
At BV MADRID, on 30 Jul 2018,
Montserrat Espin

BUREAU VERITAS SURVEYORS AT PARIS 1828 MADRID INTERNATIONAL REGISTER

This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

The electronic version is available at: http://www.veristarnb.com/veristarnb/jsp/viewPublicPdfTypec.jsp?id=qvfkzohtho
BV Mod. Ad.E 530 June 2017 This certificate consists of 5 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :
Elastomer vibration dampers, **Type: BRB, BSB, Marine**

Rubber antivibration mounts
- BRB/BSB
Sizes : 50, 60, 65, 70, 80, 95, 110, 125, 150, 180, 220
- Marine
Sizes : small, medium, large, XL

Characteristics are given in the following table :

Type	Maximum Load (kg)	Stiffness (Shore A)	Code
BRB 50	20	40	135451
	40	50	135453
	60	60	135455
	80	70	135457
BRB 60	30	40	135101
	45	50	135405
	65	60	135103
	75	70	135104
BRB 65 M10	50	40	135421
	75	50	135422
	120	60	135423
	140	70	135424
BRB 65 M12	50	40	135431
	75	50	135432
	120	60	135433
	140	70	135434
BRB 70	50	40	135251
	75	50	135252
	120	60	135253
	140	70	135254
BRB 80 M10	80	40	135231
	130	50	135232
	175	60	135233
	235	70	135234
BRB 80 M12	80	40	135275
	130	50	135276
	175	60	135277
	235	70	135278
BRB 95 M10	150	40	135771
	260	50	135772
	330	60	135773
	390	70	135774
BRB 95 M12	150	40	135761
	260	50	135762
	330	60	135763
	390	70	135764
BRB 110 M12	200	40	135241

	305	50	135242
	420	60	135243
	450	70	135244
BRB 110 M16	200	40	135331
	305	50	135332
	420	60	135333
	450	70	135334
BRB 125	310	40	135618
	500	50	135620
	700	60	135622
	900	70	135624
BRB 150 S.B.	450	40	135205
	570	50	135206
	800	60	135207
	1000	70	135208
BRB 150	450	40	135161
	570	50	135162
	800	60	135163
	1000	70	135164
BRB 180	875	40	135391
	1200	50	135392
	1700	60	135393
	2400	70	135394
BRB 220	1600	40	135201
	2400	50	135200
	3400	60	135202
	4200	70	135203

Type	Maximum Load (kg)	Stiffness (Shore A)	Code
BSB 60	70	40	135106
	130	50	135109
	170	60	135107
	245	70	135108
BSB 80 M10	110	40	135261
	160	50	135262
	231	60	135263
	300	70	135264
BSB 80 M12	110	40	135265
	160	50	135266
	230	60	135267
	300	70	135268
BSB 95 M10	180	40	135311
	230	50	135312
	270	60	135313
	330	70	135314
BSB 95 M12	180	40	135315
	230	50	135316
	270	60	135317
	330	70	135318
BSB 110 M12	250	40	135335
	350	50	135336

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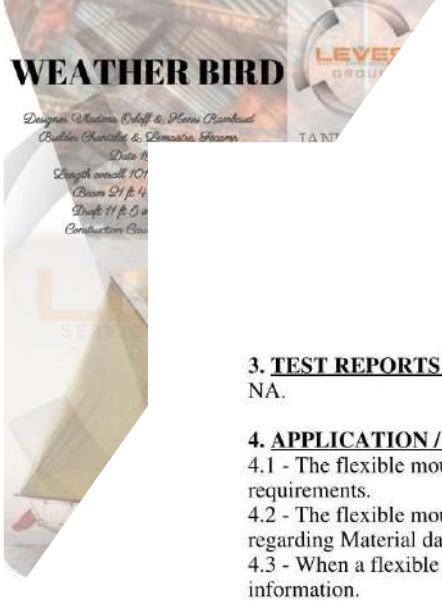
	450	60	135337
	550	70	135338
BSB 110 M16	250	40	135150
	350	50	135151
	450	60	135152
	550	70	135153
BSB 125	450	40	135351
	550	50	135352
	690	60	135353
	900	70	135354
BSB 150 B.C.	750	40	135371
	950	50	135372
	1300	60	135373
	1650	70	135374
BSB 150	750	40	135361
	950	50	135362
	1300	60	135363
	1650	70	135364
BSB 160	900	40	135381
	1200	50	135382
	1600	60	135383
	2300	70	135384
BSB 180	1300	40	135181
	1750	50	135184
	2100	60	135182
	2900	70	135183
BSB 220	2500	40	135301
	3200	50	135302
	4000	60	135303
	5000	70	135304

Type	Maximum Load (kg)	Stiffness (Shore A)	Code
SMALL	35	35	136001
	45	45	136002
	70	55	136003
	95	65	136004
	110	75	136005
MEDIUM	95	35	136021
	120	45	136022
	220	55	136023
	280	65	136024
	400	75	136025
LARGE	350	45	136041
	525	55	136042
	800	65	136043
	1080	75	136044
XL	950	40	136061
	1400	50	136062
	2200	60	136063
	3000	70	136064

2. DOCUMENTS AND DRAWINGS :
See Appendix.



3. TEST REPORTS :
NA.

4. APPLICATION / LIMITATION :
4.1 - The flexible mounts are to be installed according to the Manufacturer's instructions and BUREAU VERITAS Rules requirements.
4.2 - The flexible mounts will be selected according to the procedure as mentioned in the Manufacturer's catalogue and regarding Material datasheet.
4.3 - When a flexible mount for a particular engine is produced the first time, a Technical data sheet has to be submitted for information.

5. PRODUCTION SURVEY REQUIREMENTS :
5.1 - The **BSB, BRB & Marine flexible mounts** are to be supplied by **AMC MECANOCAUCHO** in compliance with the type described in this certificate.

5.2 - This type of product is within the category HBV of Bureau Veritas Rule Note NR320 and as such does not require a BV product certificate.

5.3 - **AMC MECANOCAUCHO** has to make the necessary arrangements to have its works recognised by Bureau Veritas in compliance with the requirements of NR320 for HBV products.
5.4 - **AMC MECANOCAUCHO** has declared to Bureau Veritas the following production site(s):

Pol. Zona A - Parc. 35
20159 ASTEASU
SPAIN

6. MARKING OF PRODUCT :
- Type designation
- Dealer/Manufacturer

7. OTHERS :

It is **AMC MECANOCAUCHO**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.

***** END OF CERTIFICATE *****

Appendix

Drawing reference	Date
BRB 50 SUPPORT	15/09/2017
BRB 60 SUPPORT	31/08/2016
BRB 65 M10 SUPPORT	10/03/2017
BRB 65 M12 SUPPORT	14/11/2017
BRB 70 SUPPORT	08/04/2016
BRB 80 M10 SUPPORT	26/11/2015
BRB 80 M12 SUPPORT	26/11/2015
BRB 95 M10 SUPPORT	13/02/2017
BRB 95 M12 SUPPORT	13/02/2017
BRB 110 M12 SUPPORT	26/08/2016
BRB 110 M16 SUPPORT	22/01/2016
BRB 125 SUPPORT	26/07/2016
BRB 150 SUPPORT SQUARE BASE	18/01/2016
BRB 150 SUPPORT	26/08/2016
BRB 180 SUPPORT	13/11/2015
BRB 220 SUPPORT	18/05/2016
BSB 60 SUPPORT	25/08/2016
BSB 80 M10 SUPPORT	10/06/2016
BSB 80 M12 SUPPORT	25/06/2015
BSB 95 M10 SUPPORT	02/10/2015
BSB 95 M12 SUPPORT	10/02/2017
BSB 110 M12 SUPPORT	07/03/2016
BSB 110 M16 SUPPORT	02/05/2017
BSB 125 SUPPORT	30/07/2015
BSB 150 SUPPORT SQUARE BASE	07/03/2016
BSB 150 SUPPORT	10/06/2016
BSB 160 SUPPORT	16/07/2015
BSB 180 SUPPORT	05/08/2015
BSB 220 SUPPORT	18/05/2016
MARINE SUPPORT LARGE	02/02/2016
MARINE SUPPORT MEDIUM	30/06/2015
MARINE SUPPORT SMALL	22/07/2016
MARINE SUPPORT XL	11/07/2016

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J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

J-mini 12/24V
Corrente continua / *Direct current*

J-INOX

MG-INOX
(N° 04 giranti / *impellers*)

REPLACED PUMPS TECHNICAL CHARACTERISTICS

JBR

JBR 3 24V
Corrente continua / *Direct current*

DESCRIZIONE E APPLICAZIONI

Elettropompe centrifughe **autoadescanti** tipo Jet a girante chiusa, dalla elevata capacità di aspirazione, comunemente utilizzate per la distribuzione di acqua in pressione nei servizi di bordo (docce, cucine, lavandini,wc, ecc.), per gruppi di condizionamento, antincendio, lavaggio ponti e catene.
Tale esercizio diviene automatico con l'ausilio di piccoli o medi serbatoi autoclave.
Le elettropompe serie **J-mini, J-INOX** e **MG-INOX** sono indicate per l'utilizzo con acqua dolce, le elettropompe serie **JBR** sono idonee all' utilizzo con acqua dolce e acqua di mare.

DESCRIPTION AND USE

Self-priming *centrifugal electric pumps Jet type with closed impeller, featuring a high suction capacity, widely used to deliver pressurized water to on-board appliances (such as showers, kitchens ,washbasins, toilets, etc.), for air-conditioning units, fire–fighting, washing of decks and chains.*
Automatic operation is achieved by equipping the pumps with small or medium-sized surge tanks.
*The pumps series **J-mini, J-INOX** e **MG-INOX** and are suitable for fresh water, the pumps series **JBR** are suitable for both fresh and sea water.*

CARATTERISTICHE COSTRUTTIVE

- **Serie J-mini / J-INOX / MG-INOX**
  Corpo pompa: ACCIAIO INOX AISI 304.
  Albero : ACCIAIO INOX AISI 316 (c.c.) - AISI 420 (c.a.).
  Diffusore e tubo Venturi: NORYL (Tecnopolimero).
  Girante/i: NORYL (Tecnopolimero).
  Tenuta meccanica: CERAMICA - GRAFITE-NBR(speciale anti-corrosione).
- **Serie JBR**
  Corpo pompa: BRONZO
  Supporto motore: BRONZO
  Albero : ACCIAIO INOX AISI 316
  Diffusore e tubo Venturi: POLICARBONATO.
  Girante: LEGA SPECIALE DI OTTONE
  Tenuta meccanica: CERAMICA - GRAFITE-NBR (speciale anti-corrosione)

CONSTRUCTION FEATURES

- ***J-mini / J-INOX / MG-INOX Series***
  Pump body: AISI 304 STAINLESS STEEL
  Shaft : AISI 316 (d.c.) - AISI 420 (a.c.) STAINLESS STEEL
  Diffuser and Venturi tube: NORYL (Technopolymer)
  Impeller/s: NORYL (Technopolymer).
  Mechanical seal: CERAMICS – GRAPHITE - NBR (special corrosion-proof).
- ***JBR series***
  Pump body: BRONZE
  Motor support: BRONZE
  Shaft : AISI 316 STAINLESS STEEL
  Diffuser and Venturi Tube: POLYCARBONATE
  Impeller: SPECIAL BRASS ALLOY
  Mechanical seal: CERAMICS – GRAPHITE - NBR (special corrosion-proof).

MOTORE

- **Corrente Continua:**
  Motore elettrico a bobine di campo e magneti permanenti 12/24V, protezione IP23, Classe di Isolamento F, Servizio continuo (S1).
- **Corrente Alternata:**
  Motore elettrico asincrono 230V monofase (M) / 230-400V trifase (T), 50Hz, protezione IP44-54, Classe di Isolamento F, Servizio continuo (S1).

MOTOR

- ***Direct Current:***
  Wound field and permanent magnet electric motor 12/24V, Protection IP23, Insulation Class F, Continuous Duty (S1).
- ***Alternating Current:***
  Induction electric motor, 230V single-phase (M) / 230-400V three-phase (T), 50Hz, Protection IP44-54, Insulation Class F, Continuous Duty (S1).

LIMITI DI IMPIEGO

- Liquido esente da impurità solide
- Temperatura del liquido: da +0 a +50 ° (70°C per la serie JBR).
- Profondità max. di aspirazione: 9 m.
- Pressione statica nel corpo pompa: 6 bar max.

SCOPE

- *Liquid free of solid impurities*
- *Temperature range of the liquid: from +0 to +50 °C (70°C for JBR series)*
- *Max. suction depth: 9 m.*
- *Static pressure inside the pump body: 6 bar max.*

ACCESSORI A RICHIESTA

- Valvola di non ritorno da 1" o da 1" 1/2
- Base omega in acciaio inox con antivibranti

ACCESSORIES ON REQUEST

- *Non-return valve 1" or 1" 1/2*
- *Omega base made in stainless steel with anti-vibration mounts*

J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

PRESTAZIONI / *PERFORMANCES*

Modello *Type*	Materiale *Material*	Voltaggio *Voltage* (V)	Potenza *Power* HP	Potenza *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Portata Max. *Max. delivery* (l/min.)	Prevalenza Max. *Max. head* (m)
J-mini	Acciaio inox *Stainless steel*	12	0,4	0,3	33	2200	55	28
		24	0,5	0,4	16	2600	55	30
		230M	0,75	0,55	3,8	2800	55	39
		230÷400T	0,75	0,55	3,6÷1,9	2800	55	39
J-INOX	Acciaio inox *Stainless steel*	12	0,7	0,52	40	2400	50	30
		24	0,8	0,6	28	2650	50	38
		230M	0,9	0,7	4	2800	58	45
		230÷400T	0,9	0,7	3,8÷2	2800	58	45
MG-INOX	Acciaio inox *Stainless steel*	24	1	0,75	40	2800	90	50
		230M	1	0,75	5	2800	90	50
		230÷400T	1	0,75	4,8÷2,6	2800	90	50

Modello *Type*	Materiale *Material*	Voltaggio *Voltage* (V)	Potenza *Power* HP	Potenza *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Portata Max. *Max. delivery* (l/min.)	Prevalenza Max. *Max. head* (m)
JBR	Bronzo *Bronze*	12	0,7	0,52	42	2200	44	30
		24	0,8	0,6	28	2600	55	36
		230M	0,8	0,6	4,5	2800	55	52
		230÷400T	0,8	0,6	3÷1,7	2800	55	52
JBR 2	Bronzo *Bronze*	24	1	0,75	45	2800	75	40
		230M	1	0,75	5,7	2800	75	42
		230÷400T	1	0,75	3,7÷2,2	2800	75	42
JBR 3	Bronzo *Bronze*	24V	1,5	1,1	60	2800	100	50
		230M	1,5	1,1	7,4	2800	100	50
		230÷400T	1,5	1,1	5÷2,9	2800	100	50
JBR 4	Bronzo *Bronze*	230M	2	1,5	9,2	2800	160	50
		230÷400T	2	1,5	7,5÷2,3	2800	160	52
JBR 5	Bronzo *Bronze*	230÷400T	3	2,2	9,1÷5,3	2800	160	60

12V-24V: CORRENTE CONTINUA / *DIRECT CURRENT*
230M, 50Hz: corrente alternata monofase / *single-phase alternating current*
230÷400T, 50Hz: corrente alternata trifase / *three-phase alternating current*

A richiesta disponibili altri voltaggi a 50Hz e 60Hz / *Available on request other voltages at 50Hz and 60Hz.*

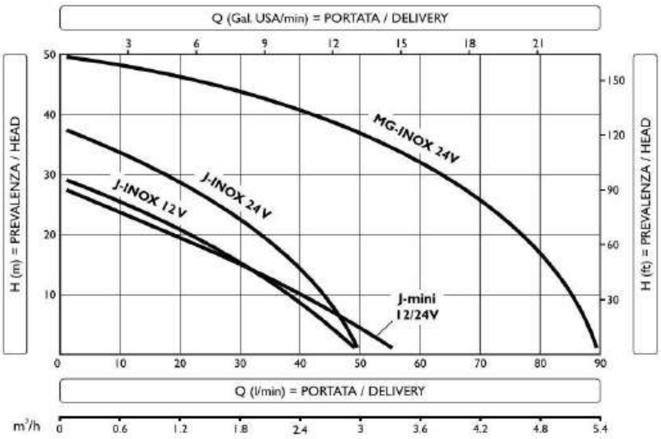
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

CORRENTE CONTINUA (c.c.) / *DIRECT CURRENT (d.c.)*

PRESTAZIONI / *PERFORMANCES*

J-mini / J-INOX / MG-INOX



Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power*		Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0	0,3	0,6	1,1	1,5	1,8	2,3	2,6	3	3,3	3,6	4,2	4,8	5,4
		HP	kW				l/min	0	5	10	18	25	30	38	43	50	55	60	70	80	90
J-mini	12V	0,4	0,3	33	2200	H (m)		28	26	25	20	18	16	9	7	5	0				
	24V	0,5	0,4	16	2600			30	29	28	24	20	18	11	9	7	0				
J-INOX	12V	0,7	0,52	40	2400			30	28	25	21	18	15	10	5	0					
	24V	0,8	0,6	28	2650			38	35	32	30	25	22	18	10	0					
MG-INOX	24V	1	0,75	40	2800			50	49	48	46	45	44	41	39	38	34	31	26	16	0

JBR / JBR 2 / JBR 3

Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power*		Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0	0,5	1	1,5	2	2,5	2,6	3	3,5	4	4,5	5	5,5	6
		HP	kW				l/min	0	8	17	25	33	42	44	50	58	67	75	83	92	100
JBR	12V	0,7	0,5	40	2200	H (m)		30	25	20	16	10	3	0							
	24V	0,8	0,6	28	2600			38	32	28	23	18	11	9	0						
JBR 2	24V	1	0,75	45	2400			40	38	35	33	31	29	28	26	24	21				
JBR 3	24V	1,5	1,1	60	2800			50	49	46	44	42	40	40	38	36	34	32	31	29	28

LEVER GROUP Ship & Yacht Service & Repair 34 Asklipiou str. 18545 Piraeus-Greece
Tel: +30 211 0120901-2 Fax: +30 210 4412285 info@leverteam.gr www.leverteam.gr

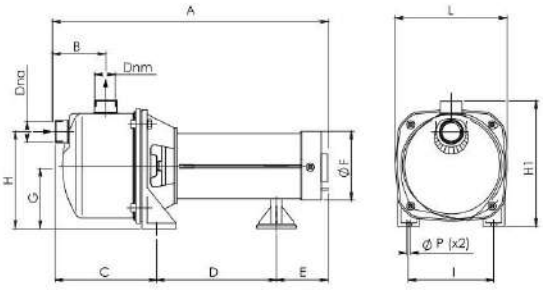
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

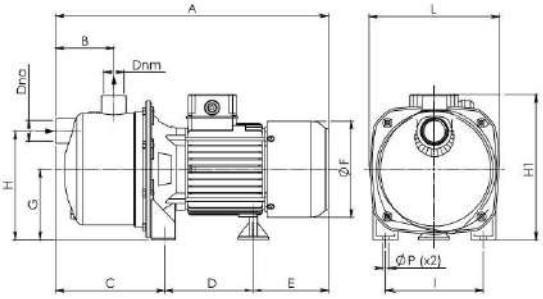
CORRENTE CONTINUA (c.c.) / *DIRECT CURRENT (d.c.)*

DIMENSIONI E PESI / *DIMENSIONS AND WEIGHTS*

J-mini



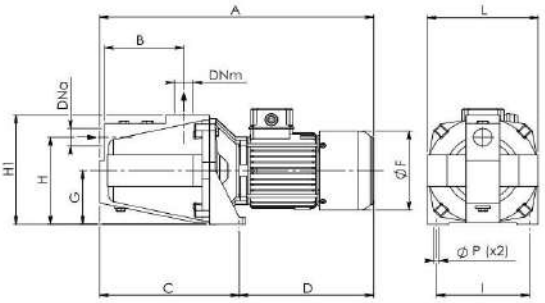
J-INOX / MG-INOX



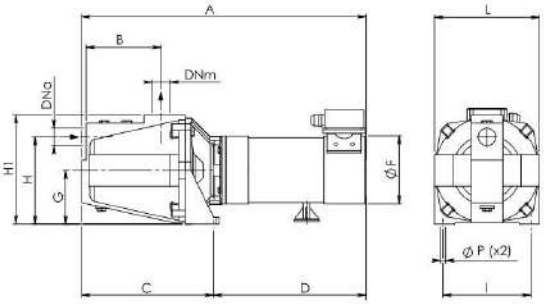
Modello *Type*	Corrente *Current*	Dna (Gas - *BSP*)	Dnm (Gas - *BSP*)	A	B	C	D	E	ØF	G	H	H1	I	L	ØP	Peso *Weight* (kg)
J-mini	c.c - *d.c.*	1"	1"	385	71	160	175	50	80	80	125	180	125	160	10	5
J-INOX	c.c - *d.c.*	1"	1"	400	80	160	130	110	139	95	150	215	140	185	10	10
MG-INOX	c.c - *d.c.*	1"	1"	507	128	205	162	140	156	95	150	230	140	200	10	15

Misure in millimetri (mm), dimensioni non impegnative / *Measures in millimeter (mm), dimensions approximated*

JBR / JBR 2



JBR 3



Modello *Type*	Corrente *Current*	Dna (Gas - *BSP*)	Dnm (Gas - *BSP*)	A	B	C	D	ØF	G	H	H1	I	L	ØP	Peso *Weight* (kg)
JBR	c.c - *d.c.*	1"	1"	455	130	233	222	139	95	150	195	155	185	9,5	25
JBR 2	c.c - *d.c.*	1"	1"	455	130	233	222	139	95	150	195	155	185	9,5	25,7
JBR 3	c.c - *d.c.*	1 1/2"	1"	630	165	290	340	116	110	165	222	175	215	13	30

Misure in millimetri (mm), dimensioni non impegnative / *Measures in millimeter (mm), dimensions approximated*

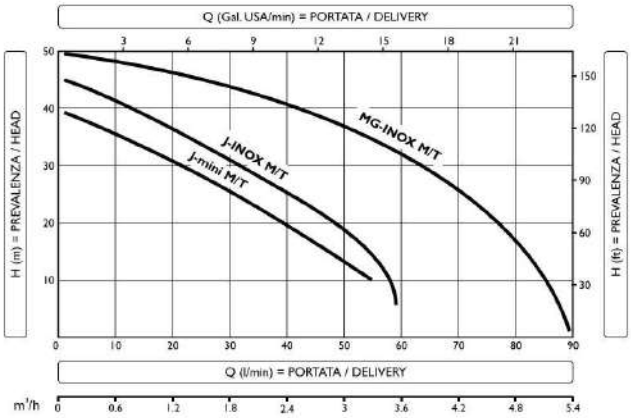
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

CORRENTE ALTERNATA (c.a.) / *ALTERNATING CURRENT (a.c.)*

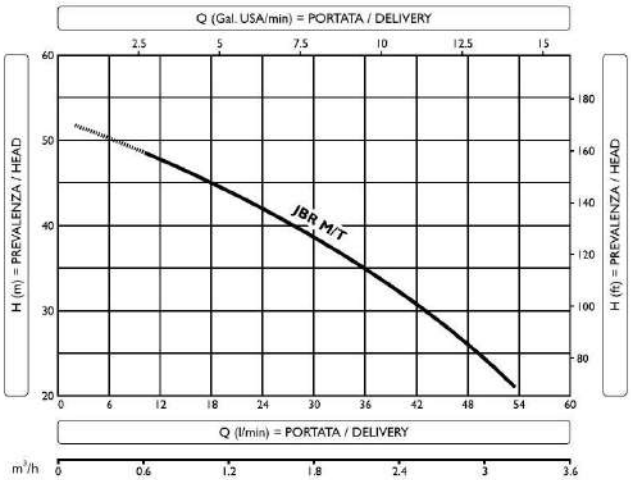
PRESTAZIONI / *PERFORMANCES*

J-mini / J-INOX / MG-INOX



Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power* HP	Potenza / *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0	0,6	1,2	1,5	1,8	2,4	2,9	3,3	3,5	3,9	4,5	5,1	5,4
							l/min	0	10	20	25	30	40	48	55	58	65	75	85	90
J-mini	230M	0,75	0,55	3,8	2800	H (m)		39	38	34	32	29	24	21	10					
	230÷400T	0,75	0,55	3,6÷1,9	2800			39	38	34	32	29	24	21	10					
J-INOX	230M	0,9	0,7	4	2800			45	42	36	33	31	26	23	15	5				
	230÷400T	0,9	0,7	3,8÷2	2800			45	42	36	33	31	26	23	15	5				
MG-INOX	230M	1	0,75	5	2800			50	48	47	45	44	40	43	39	32	28	21	12	0
	230÷400T	1	0,75	4,8÷2,6	2800			50	48	47	45	44	40	43	39	32	28	21	12	0

JBR



Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power* HP	Potenza / *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0,2	0,5	1	1,5	2	2,5	3	3,2
							l/min	4	8	17	25	33	42	50	54
JBR	230M	0,75	0,55	4,5	2800	H (m)		49	45,5	40	36	32	28	24	21
	230÷400T	0,75	0,55	3÷1,7	2800			49	45,5	40	36	32	28	24	21

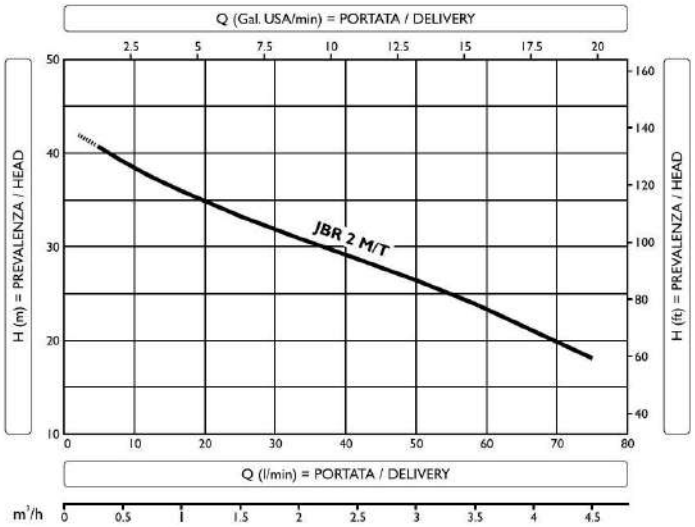
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

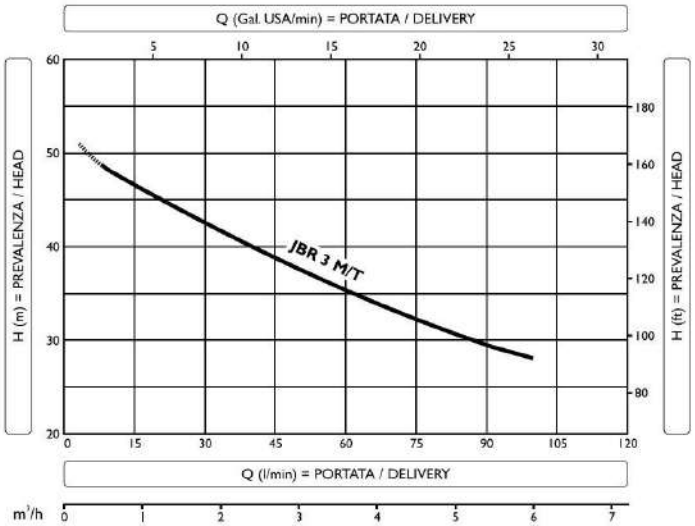
CORRENTE ALTERNATA (c.a.) / *ALTERNATING CURRENT (a.c.)*

PRESTAZIONI / *PERFORMANCES*

JBR 2



JBR 3



Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power* HP	Potenza / *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0,2	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6,5	7	8	9	9,5
							l/min	4	8	17	25	33	42	50	58	67	75	83	92	100	108	116	133	150	158
JBR 2	230M	1	0,75	5,7	2800	H (m)		41	39	36	33	31	29	26	24	21									
	230÷400T	1	0,75	3,7÷2,2	2800			41	39	36	33	31	29	26	24	21									
JBR 3	230M	1,5	1,1	7,4	2800				49	46	44	42	40	38	36	34	32	30	29	28					
	230÷400T	1,5	1,1	4,7÷2,7	2800				49	46	44	42	40	38	36	34	32	30	29	28					

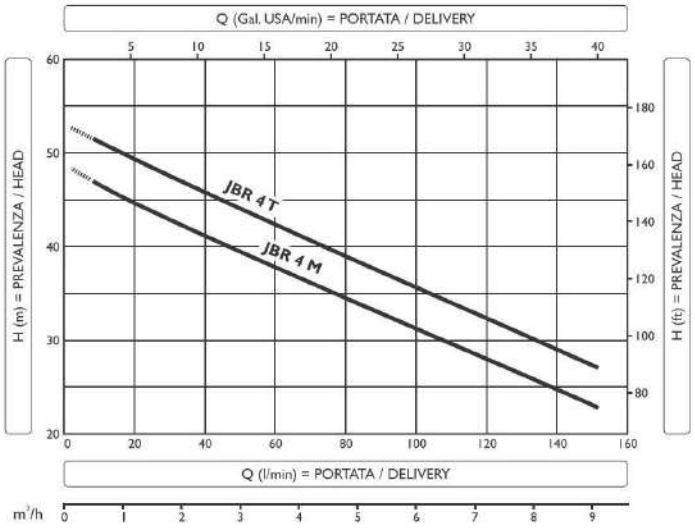
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

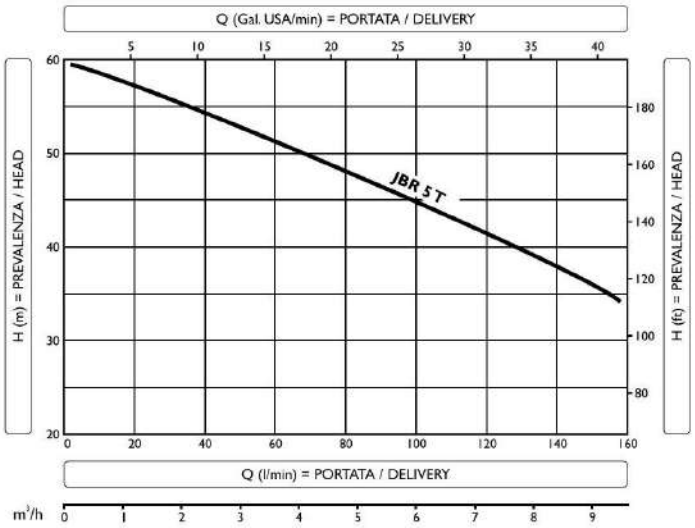
CORRENTE ALTERNATA (c.a.) / *ALTERNATING CURRENT (a.c.)*

PRESTAZIONI / *PERFORMANCES*

JBR 4



JBR 5



Modello *Type*	Voltaggio *Voltage* (V)	Potenza / *Power* HP	Potenza / *Power* kW	Assorbimento *Absorption* (A)	Giri/min. *RPM*	Q	m³/h	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6,5	7	8	9	9,5
							l/min	8	17	25	33	42	50	58	67	75	83	92	100	108	116	133	150	158
JBR 4	230M	2	1,5	9,2	2800	H (m)		47	45	44	42	41	40	38	37	36	35	33	32	31	30	27	24	23
	230÷400T	2	1,5	7,5÷4,3	2800			52	50	49	47	46	45	43	42	40	39	38	37	35	34	31	29	27
JBR 5	230÷400T	3	2,2	9,2÷5,3	2800			59	58	57	55	54	53	51	50	49	47	46	44	43	42	38	35	34

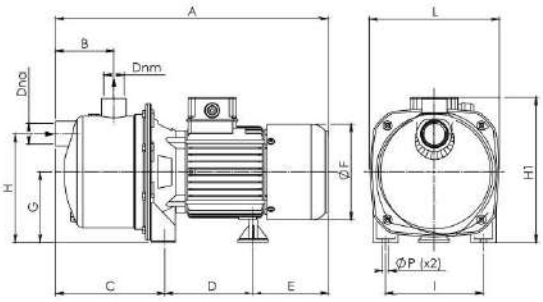
J-mini • J-INOX • MG-INOX • JBR

Elettropompe autoadescanti / *Self-priming electric pumps*

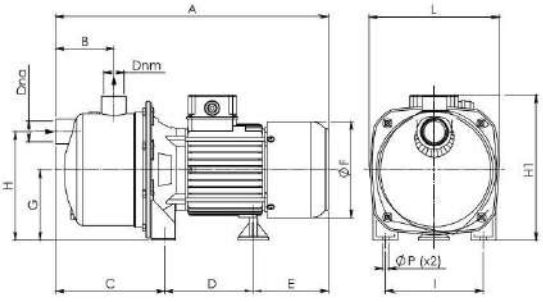
CORRENTE ALTERNATA (c.a.) / *ALTERNATING CURRENT (a.c.)*

DIMENSIONI E PESI / *DIMENSIONS AND WEIGHTS*

J-mini



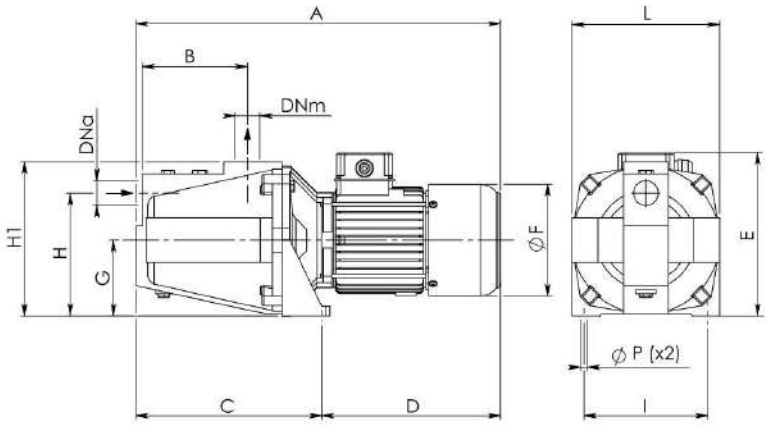
J-INOX / MG-INOX



Modello *Type*	Corrente *Current*	Dna (Gas - *BSP*)	Dnm (Gas - *BSP*)	A	B	C	D	E	ØF	G	H	H1	I	L	ØP	Peso *Weight* (kg)
J-mini	*c.a - a.c*	1"	1"	320	72	163	107	50	115	90	125	180	126	160	9	7
J-INOX	*c.a - a.c*	1"	1"	345	80	160	110	75	123	95	150	200	140	185	10	8,5
MG-INOX	*c.a - a.c*	1"	1"	420	128	205	125	90	139	95	150	215	140	200	10	11,5

Misure in millimetri (mm), dimensioni non impegnative / *Measures in millimeter (mm), dimensions approximated*

JBR



Modello *Type*	Corrente *Current*	Dna (Gas - *BSP*)	Dnm (Gas - *BSP*)	A	B	C	D	E	ØF	G	H	H1	I	L	ØP	Peso *Weight* (kg)
JBR	*c.a - a.c*	1"	1"	430	130	233	197	205	139	95	150	195	155	185	9,5	21
JBR 2	*c.a - a.c*	1"	1"	430	130	233	197	205	139	95	150	195	155	185	9,5	21,7
JBR 3	*c.a - a.c*	1"1/2	1"	560	160	290	270	230	158	105	165	222	175	215	11,5	31,5
JBR 4	*c.a - a.c*	1"1/2	1"	560	160	290	270	230	158	105	165	222	175	215	11,5	33
JBR 5	*c.a - a.c*	1"1/2	1"	560	160	290	270	230	158	105	165	222	175	215	11,5	33,5

Misure in millimetri (mm), dimensioni non impegnative / *Measures in millimeter (mm), dimensions approximated*

CARRY

FEATURES

- EASY TO INSTALL
- SAFE TO MOVE
- LONG LASTING APPLICATION

The PIUSI CARRY pump is a diesel transfer DC pump designed to meet the needs of those who are looking for a long-lasting, high quality and portable pump. CARRY 3000 is equipped with a sturdy handle to allow easy carriage and comes complete with dispensing pipe, power cables and the dispensing nozzle.

PERFORMANCE

UP TO 70 L/MIN — FLOW RATE	12/24V — VOLTAGE — POWER
30 MIN — DUTY CICLE	

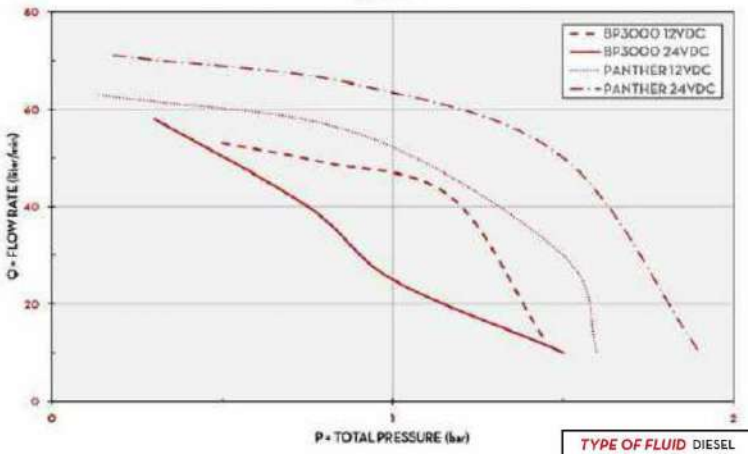
CARRY PANTHER — CARRY

CARRY 3000 INLINE

PACKAGING

CODE	WEIGHT		PACKAGING			N. BOXES / EUROPALLET	
	KG	LBS	MM	INCH	PCS/BOX	✈	🚚
F0022300C	4,2	9,3	260X235X164	-	1	84	120
F0022400C	4,2	9,3	260X235X164		1	84	120
F0022326O	4,2	9,3	260X235X164	-	1	84	120
F0022424O	4,2	9,3	260X235X164		1	84	120
F0034004B	4,2	9,3	260X235X164	-	1	84	120
F0034104C	4,2	9,3	260X235X164	-	1	84	120

CHART



TYPE OF FLUID	DIESEL
TEMPERATURE	20-22°C

IN THE BOX

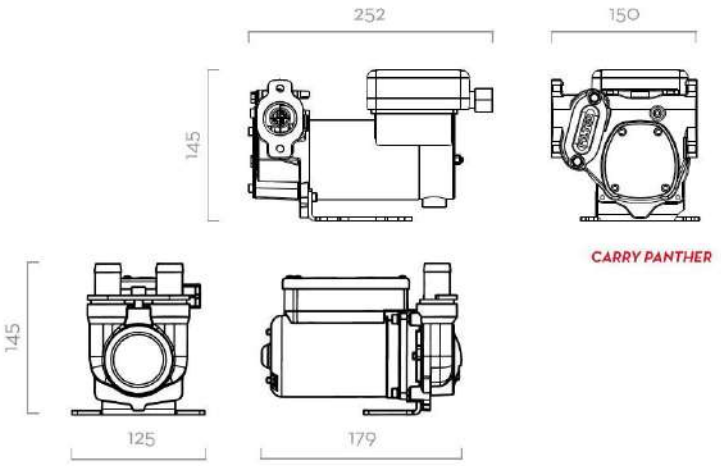
- CARRY PUMP
- HANDLE
- DISPENSING PIPE
- ELECTRIC CABLE WITH CLAMPS
- CONNECTIONS
- INSTRUCTION MANUAL

DETAILS


STURDY HANDLE


ELECTRIC CABLE WITH CLAMPS

DIMENSIONS



Dimensions expressed in millimeters

MATERIALS

- BODY: CAST IRON
- ROTOR: SINTERED STEEL
- VANES: ACETAL RESIN
- SEAL: NBR
- SHAFT: STEEL

TECHNICAL DATA

CODE	DESCRIPTION	FLUIDS TYPE	FLOW RATE		VOLTAGE			FUSES CAPACITY	DUTY CICLE	RPM	PRESSURE MAX	ON/OFF SWITCH	INLET/OUTLET
			L/MIN	GPM	DC VOLT	POWER WATT	AMP. MAX.	AMPERE	MINUTES		BAR		BSP
F0022300C	CARRY 3000 12V	D	50	13	12	300	24	25	30	2900	1,5	YES	3/4"
F0022400C	CARRY 3000 24V / 12V	D	50/30	13/6	24/12	310/80	13/6,5	15	30	2900/1500	1,5	YES	3/4"
F0022326O	CARRY 3000 INLINE 12V	D	50	13	12	300	24	25	30	2900	1,5	YES	3/4"
F0022424O	CARRY 3000 INLINE 24V	D	50/30	13/6	24/12	310/80	24	15	30	2900/1500	1,5	YES	3/4"
F0034004B	CARRY PANTHER 12V	D	56	15	12	420	13/6,5	40	30	2900	-	YES	1"
F0034104C	CARRY PANTHER 12V / 24V	D	35/70	9/18	24/12	600/200	13/6,5	30	30	3500/1800	-	YES	1"

141118

Reverse Osmosis Watermakers

LIGHTWEIGHT FRAME NEW!

ESSENTIAL

The Essential is a watermaker with production of 100 or 160 litres per hour, ideal for small boats. It is suitable for everyone who can do without electronic and remote controls and just wants a small and reliable system producing safe water. An automatic membrane flushing system is available as an option. The watermaker is mounted in a powder coated solid light alloy frame (compact version) or ready for modular installation in tight spaces (Essential Slim configuration). The compact version allows to install the membrane pack separately. Available for different electrical voltages and frequencies, on demand.

ASME APPROVED

FDA COMPLIANT filters

ESSENTIAL 400

Slim Configuration

Accessories

Optional automatic membranes flushing filter

Optional Carbon filter TCA-SL10

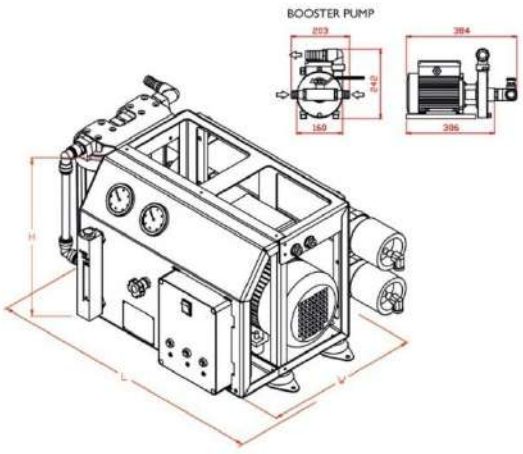
Optional Re-hardening filter TCC-SL10

TECHNICAL DATA

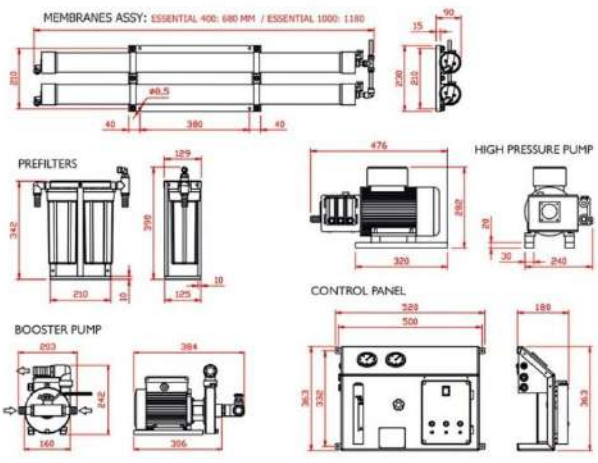
Model	Production per hour (litres / gallons)	Production per day (litres / gallons)	Voltage (Volt) / Frequency (Hz) Installed Power (kW)	Max Dimensions -L x W x H- (mm)	Weight (Kg)
ESSENTIAL 400	100 / 26.6	2400 / 639	230 V AC - 50 Hz* - 1.8 kW	680 x 406 x 260	43
ESSENTIAL 1000	160 / 42	3840 / 1014	230 V AC - 50 Hz* - 1.8 kW	1180 x 406 x 260	49

* single phase - other voltages and frequencies available on demand

MODULAR CONFIGURATION



SLIM CONFIGURATION



REVERSE OSMOSIS TECHNICAL CHARACTERISTICS

LEVER GROUP Ship & Yacht Service & Repair 34 Asklipiou str. 18545 Piraeus-Greece
Tel: +30 211 0120901-2 Fax: +30 210 4412285 info@leverteam.gr www.leverteam.gr

SANDVIK

CERTIFICATE

A03/Z02
No. A/19-842709 Rev 00
Date 2019-09-05 Page 1/4

A02/Z03
INSPECTION CERTIFICATE acc to
EN 10204 3.1

A06
TECHNOMETAL ABEE
20 DRAGATSANIOU STR.
18547 PIRAEUS GR

INSPECTION STAMP
SVQ

Customer References A07

	Customer order
001/2019	2019-01-16

250-00991 TECHNOMETA

Sandvik References A08

Order No.	Subs No.	ABSMT Dispatch note
317602	24954	10068/53

ABSMT No. C.Code
284-72968 87

Material description B01/B04
HOT WORKED STAINLESS BAR STEEL
ROLLED
ANNEALED & STRAIGHTENED
PEEL TURNED AND POLISHED

Steel making process Origin C70
E+AOD+LRF Sweden

Steel/material Designations B02
Sandvik
SANMAC 316/SANMAC 316L

AISI	UNS
316/316L	S31600/S31603
W.nr	EN no
1.4401/1.4404	1.4401/1.4404

Technical requirements B03
EN 10088-3:-2014, EN10272:-2016*, EN10060:2003, EN 10221:1996
EN10222-5:-2017*, PED 2014/68/EU, QQ-S-763 F,
NACE MR0175/ISO 15156-3:-2015, NACE MR0103/ISO 17945-1:-2015,
ASTM A-276-17, ASME SA-276-ED-29 SECT II PART A,
ASTM A-479-18, ASME SA-479-ED-19 SECT II PART A,
ASTM A-484-18, ASTM A-182-19*, ASTM A-965-14*, ASTM A-314-19*,
NORSOK M-630 ED-6, NORSOK MDS S01 REV. 5,
*For detailed information, please see the appendix

EXTENT OF DELIVERY B07-B13

It	Product designation	Heat	Lot	Pieces	Kg
01	MBR-SANMAC316L-55	554794	07601	1	94.0
			Total	1	94.0

TEST RESULTS
Chemical composition (weight%) acc. to ASTM A-751

Heat	C	Si	Mn	P	S	Cr	Ni	Mo
554794	0.010	0.24	1.73	0.028	0.025	16.85	10.12	2.03

Heat	N
554794	0.053

Quality assurance - Erik Jansson/QA-manager Primary Products A05/Z02
MTC Service / Certificates

A01 AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901
SE-81181 SANDVIKEN SWEDEN www.smt.sandvik.com mtc_service.smt@sandvik.com

SHAFT MATERIAL CERTIFICATE

Tensile test at room temperature acc. to ASTM A370/ISO 6892-1
Longitudinal
Location half radius

Lot	Yield strength Mpa Rp0.2	MPa Rp1.0	Tensile strength Mpa Rm	Elongation % A	% 2"
07601	281	335	585	51	51

Lot	Red.of Area % Z
07601	77

Hardness test acc.to ASTM A-370/ISO 6506-1

Lot	Min HRB	Max HRB
07601	88	93

Location half radius

Lot	Min HB	Max HB
07601	180	195

Grain size acc to ASTM E-112.
Location half radius

Lot		
07601	6.0	6.0

Impact test, J, 20 °C

Lot	Single values Joule	Joule	Joule	Avg. Joule
07601	208	212	220	213

Following controls/tests have been satisfactorily performed:
- Intergranular corrosion test acc to ASTM A-262 PR.E and EN ISO 3651-2A
- Material Identification.
- Ultrasonic test acc to EN 10228-4 Scan coverage 1, Quality Class 3 Tab 4, AD 2000 - A4-2003 6.3.1 F., ASTM A-388 API 6A PSL3/3G
- Visual inspection and dimensional control.

HEAT TREATMENT:
20-30mm: Material soaking 1050°C, min. 20 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C.

35-150mm: In process annealed according to ASTM A484 above the minimum hot rolling temperature of 1010°C and rapidly cooled.

155-350mm: Material soaking 1065°C, min. 30 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C.

355-370mm: Material soaking 1050°C, min. 60 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C.

375-450mm: Material soaking 1050°C, min. 120 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C.

The raw material is free from radioactive contamination.

SANDVIK

CERTIFICATE No. A/19-842709 Rev 00

Date 2019-09-05 Page 3/4

Material free from mercury contamination.

No welding or weld repair.

This is to certify that the contents of this certified material test report are correct and accurate and that all test results and operations are in compliance with the material specification.

Approved acc. AD 2000-Merkblatt W0 and certified acc. to Pressure Equipment Directive (2014/68/EU) (PMA 1326W113330-1) by TUEV NORD GmbH; notified body, reg.no. 0045.

The delivered products comply with the specifications and requirements of the order.

The material is manufactured according to a Quality system, approved and registered to ISO 9001:2015.

No unauthorized alterations. The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of AB Sandvik Materials Technology. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in Section 6 of EN 10204:2004. Contravention of this notice will be prosecuted to the fullest extent of applicable law.

The certificate is produced with EDP and valid without signature.

AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901
SE-81181 SANDVIKEN SWEDEN www.smt.sandvik.com mtc_service.smt@sandvik.com

SANDVIK

CERTIFICATE No. A/19-842709 Rev 00

Date 2019-09-05 Page 4/4

APPENDIX

Lab accreditation
Our lab is accredited under SWEDAC Accreditation number 1636 for testing as per ISO/IEC 17025

Applicable only to specific dimensions
20mm - 250mm: EN 10088-5 EN (Only valid for CE marked products together with Sandvik Declaration of Performance certificate).
20mm - 400mm: PED 2014/68/EU *EN 10272 (Stainless steel bars for pressure purposes)
20mm - 375mm: *AD-2000-W2/W10
20mm - 450mm: NORSOK M-630 Ed. 6 - NORSOK MDS S01 Rev. 5
180mm- 450mm: PED 2014/68/EU *EN 10222-5
70mm - 450mm: AMS 5648 Rev. L, AMS 5653 Rev. H
Suitable for manufacturing of components in acc. with *ASTM A-182, ASTM A-965, ASTM A-314.

Test location
Mechanical, ferrite, corrosion testing:
Bar dim <=50mm - Longitudinal test pieces in center of the bar.

Bar dim > 50mm - 160 mm - Longitudinal test pieces, 1/4 T and minimum 100 mm from any second surface.
Bar dim > 160mm- 450 mm - Transversal test pieces, 1/4 T and minimum 100 mm from any second surface.

One set of test samples per heat treatment lot.
Maximum lot size 15 ton.

Furnace calibration every third month according to API 6A
Thermocouples of S-type (+/- 5°C tolerance) are used to monitor the furnace temperature.

ABS

Additional Company / Plant Detail

Confirmation of Type Approval

19-HS1890908-PDA

Company Name Detail:

Company Information

TIDES MARINE INC.

3251 S.W. 13TH DRIVE

FL 33442

United States

Tel 800-420-0949

Fax 954-420-0945

Certificate Number	Category	Expiry Date
19-FL3610950	RQS	20-JAN-2024

Product	Seals, Shaft Seals
Model	FSK
Intended Service	Sealing inboard Drive Shafts for new Construction or Retrofits on Pleasure or Commercial Craft.
Description	A Drive Shaft Sealing System consisting of a WaterLubricated Housing Assembly and integral Lip Seal attached to the Vessel with Silicone Hose and Hose Clamps. Hose Adapter available to fit on an Existing Drive Shaft through-hull Flange to a Hose connection, for New Construction and Retrofits, on Pleasure or Commerical Craft.
Ratings	For drive shaft sizes from 3/4" - 8" or 20 mm - 200 mm, from 0 - 10,000 rpm, and water temperatures from 32°F - 90°F.

SHAFT SEAL CERTIFICATE

Service Restrictions	Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
Comments	1) The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product. 2) The hose material and that of the lip seal is to be suitable for the intended service. The burst pressure of the hose is not to be less than four times the design working pressure. In general, the hose may be installed in a system provided it is visible at all times, easily accessible, and confined to one watertight compartment in conjunction with the provisions of 4-4-1/9.19 of the ABS Guide for Building and Classing Yachts. 3) The equipment should be visually inspected by the attending Surveyor during periodic surveys, with particular attention being given to the flexible hose assemblies and nitrile lip seals. These are to be replaced if deemed necessary. 4) The manufacturer's recommended installation procedures are to be followed.
Notes, Drawing and Documentation	Part No. FSA-5000-6500-1, Rev. (B); Bill of Materials for 5" x 6-1/2" Shaft Seal Part No. FSH-5000-6500-1, Rev. (-); Strong Body Housing for 5" Shaft Seal
	This Product Design Assessment (PDA) Certificate remains valid until 28/Aug/2024 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).
Term of Validity	Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.
	This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.
ABS Rules	Rules for Conditions of Classification, Part 1 - 2019, 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following: 2019 Guide for Building and Classing Yachts: 4-3-1 Rules for Conditions of Classification, Part 1 - 2019 High-Speed Craft Rules 1-1-4/11.9, 1-1-A2, 1-1-A3, which covers the following: 2019 Rules for Building and Classing High-Speed Craft: 4-3-1
National Standard	NA

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Model Certificate	Model Certificate #	Issue Date	Expiry Date
PDA	19-HS1890908-PDA	29-AUG-2019	28-AUG-2024

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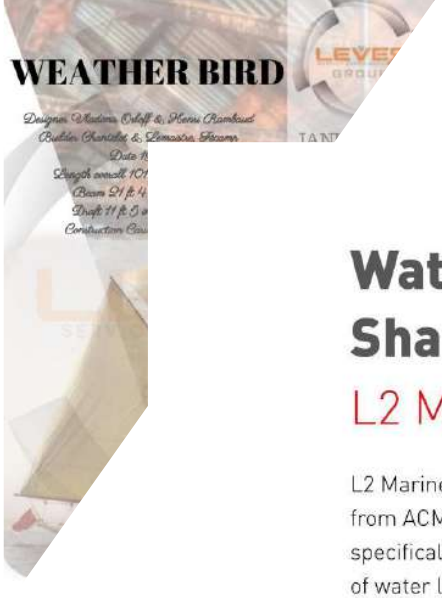

Water Lubricated Propeller Shaft Bearings

L2 Marine

L2 Marine material exclusively available from ACM Composite Bearings has been specifically developed for the requirements of water lubricated propeller stern shaft bearing applications in river boats and work boats; offering a maintenance free...

'Fit and Forget Bearing Solution'

L2 Marine has been tested for stern tube bearing applications and has been proven to offer superior performance in terms of wear, extended life and low shaft wear over other water lubricated propeller shaft bearing materials.

The material is available as finish machined bearings or in billet form for final machining in the ship yard.

The excellent bearing performance of L2 Marine coupled with its superior physical characteristics offers shipyards and ship owners operating in harsh conditions many advantages.

Advantages in using L2 Marine for propeller shafts

- High load capability
- Approved for wet and dry operation
- Very low stick - slip
- Short delivery time (repair 48 hours)
- Good elasticity
- Can be freeze fitted
- Classification approval
- Very low swell
- Low wear characteristics - long life
- Maintenance free
- Good dimensional stability
- Competitive price
- Environmentally friendly

acm COMPOSITE BEARINGS

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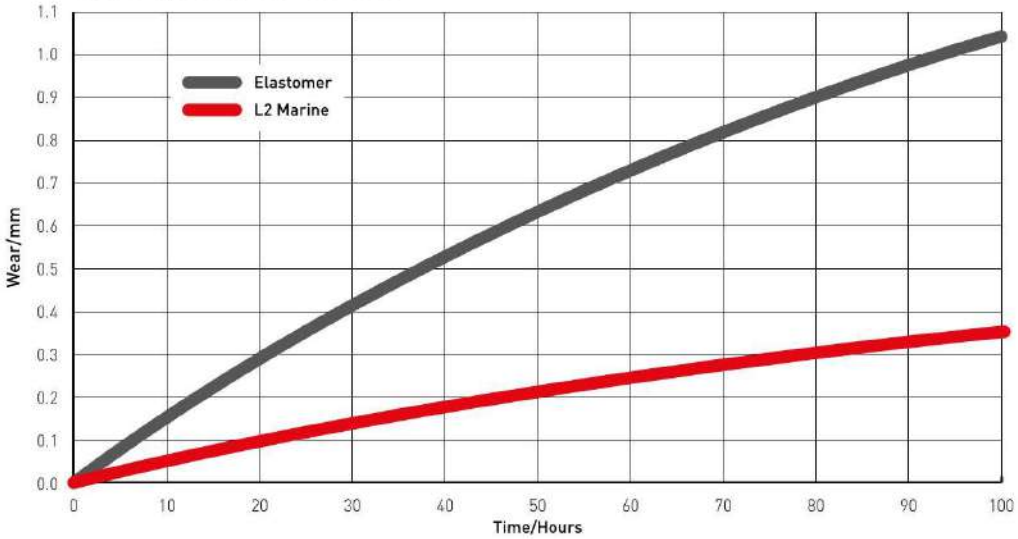
PROPELLER SHAFT BEARINGS INFO & CERTIFICATE

Material/Design Specification

Property	Unit	L2 Marine
Compressive strength (normal)	MPa	375
Compressive modulus (normal)	MPa	2,750
Impact strength (normal)	kJ/m^2	100
Density	g/cm^3	1.30
Hardness	Rockwell M	100
Coefficient of friction (dry)	–	0.13
Maximum operating temperature	°C	130
Minimum operating temperature	°C	-40
Thermal expansion coefficient (parallel)	/ °C	5×10^{-5}
Thermal expansion coefficient (normal)	/ °C	10×10^{-5}
Swell in water	%	< 0.15

(nominal values)

Wear Comparison In Gritted Seawater



[Test parameters: Bearing pressure 0.48 MPa, stainless steel (EN ISO 316) shaft diameter 50 mm, shaft speed 55 rpm, water flow rate 7.5 $\ell\ min^{-1}$, silica particles of size specified by MoD]

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BUREAU VERITAS

Marine & Offshore Division

Certificate number: 19300/C0 BV
File number: ACM 119/2207/001
Product code: 0720H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

TYPE APPROVAL CERTIFICATE

This certificate is issued to

ACM BEARINGS LTD.
ROTHERHAM - UNITED KINGDOM

for the type of product

BEARING MATERIALS
ACM L2 MARINE

Requirements:
BUREAU VERITAS Rules for the Classification of Steel Ships.

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.
This certificate is a renewal of certificate N° 19300/B1 BV expiring on 04/04/2017

This certificate will expire on: 04 Apr 2022

For BUREAU VERITAS,
At BV LONDON, on 21 Mar 2017,
Spencer Yule

BUREAU VERITAS SURVEYORS AT PARIS 1828 LONDON INTERNATIONAL REGISTER

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

ACM Grade L2 Marine

Rudder Bearing and Stern Tube Bearing Material

non-lubricated or seawater-lubricated or oil-lubricated

for shaft diameter up to 1000 mm, available as machined component, as tube or sheet form.

The material is a high load composite bearing material made of synthetic fabric reinforcement which is impregnated with a thermosetting resin and solid lubricant fillers (molybdenum disulphide & PTFE).

2. DOCUMENTS AND DRAWINGS:

ACM L2 Marine Engineering Manual dated 09 March 2012.

3. TEST REPORTS:

Results of mechanical and thermal tests conducted at Sheffield Testing Laboratory.
Results of mechanical and wearing tests (report issue 1.3 dated 16 Feb 2012).

4. APPLICATION / LIMITATION:

4.1 - **Application Limitation:**

Type of use of the Bearing	Type of Lubrication	Max. Bearing Mean Pressure	Max. Service Temperature	Length & Diameter
Rudder Stock & Rudder Pintle	Seawater Oil Lubricated	10.0 MPa	60°C	L/D not to be less than 1 & greater than 1.2 As per Part B, Ch 10, Sec 1 [6.3.3] of BV Rules
Rudder Stock & Rudder Pintle	Non-lubricated	5.5 MPa	60°C	L/D not to be less than 1 & greater than 1.2 As per Part B, Ch 10, Sec 1 [6.3.3] of BV Rules

Type of use of the multi groove Bearing	Type of Lubrication	Max. Bearing Mean Pressure relative to shaft speed	Length & Diameter
Stern Tube	Seawater Lubricated	Shaft velocity in metres per minute (V) / Bearing Pressure in bar (P) V/P = 25.5 or greater.	As per part C, Ch 1, Sec 7, [2.4.4 b)] of BV Rules

4.2 - **On board installation & Maintenance requirements:**

- As per ACM instructions. May be freeze-fitted.
- As per ACM Bearings Limited L2 MARINE ENGINEERING MANUAL Revision 2C-3
- Operating clearance as per ACM instructions.
- Visual and dimensional control.

5. PRODUCTION SURVEY REQUIREMENTS:

5.1 - The ACM Grade L2 Marine is to be manufactured, examined and tested by **ACM BEARINGS LTD.**, in accordance with the type described in this certificate and Bureau Veritas Rules for the Classification of Steel Ships.

5.2 - Production sites are to be recognized by Bureau Veritas as per NR320 for HBV products. To this end **ACM BEARINGS LTD.** has to make the necessary arrangements for a Society's Surveyor to perform visits and product audits at the production sites.

5.3 - **ACM BEARINGS LTD.** has declared to Bureau Veritas that the type of product described in this certificate is manufactured at the following production site:

ACM BEARINGS LTD.
Derwent Way
Wath West industrial Estate
Wath Upon Dearne
ROTHERHAM
South Yorkshire
UNITED KINGDOM

6. MARKING OF PRODUCT:

- Weight and dimension.
- Manufacturing Data and lot number.
- Nominal Shaft Diameter.

7. OTHERS:

7.1 - It is understood that the herewith mentioned manufacturer will give the shipyards and related subcontractors all the relevant information for the proper fitting and uses of the product covered in this Type Approval Certificate. This information has to include the conditions stated in the Certificate.
It is also understood that Bureau Veritas remains rightfully entitled to perform any check or test on the product at any time.

7.2 - This Certificate supersedes the TAC 19300/B1 BV issued on 20 Apr. 2012 by the Society.

*** END OF CERTIFICATE ***

BUREAU VERITAS
Certification

LEVER GROUP

34 ASKLIPIOU STREET 185 45 PIRAEUS
GREECE

Bureau Veritas Certification Holding SAS – UK Branch certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

MECHANICAL WORKS FOR SHIPS AND YACHTS.

Original cycle start date:	**01 October 2013**
Expiry date of previous cycle:	**N/A**
Recertification Audit date:	**19 September 2019**
Recertification cycle start date:	**30 September 2019**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **01 October 2022**

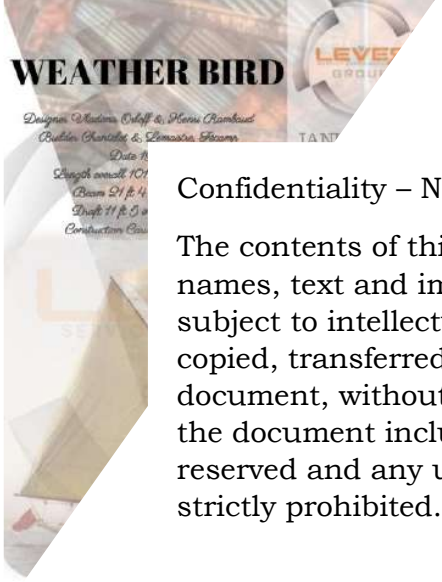
Certificate No. **GR000653** Version : **No.1** Revision date: **30 September 2019**

Signed on behalf of BVCH SAS UK Branch
N. Trilizas

UKAS MANAGEMENT SYSTEMS
0008

Certification body address: **5th Floor, 66 Prescot Street, London E1 8HG, United Kingdom**
Local office: **23, Etolikou Str., 185 45 Piraeus, Greece**

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call: **+30 210 40 63 000**



Confidentiality – Non-Disclosure

LEVER GROUP
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ΕΠΙΣΚΕΥΕΣ ΠΛΟΙΩΝ-ΣΚΑΦΩΝ ΑΝΑΨΥΧΗΣ
ΑΣΚΛΗΠΙΟΥ 34 - ΠΕΙΡΑΙΑΣ - Τ.Κ. 18545
ΤΗΛ: 2110120901-2, ΦΑΞ: 2104412285
ΑΦΜ : 801114248 – ΔΟΥ Ε ΠΕΙΡΑΙΑ

LEVER
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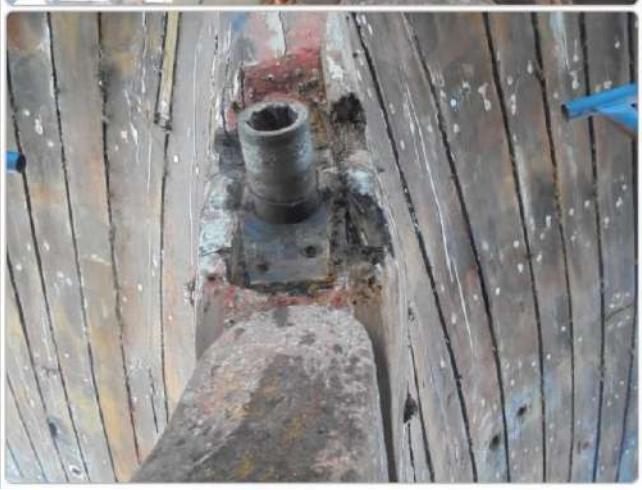


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