



NOTIFIED BODY
No 0191

CERTIFICATE OF TYPE APPROVAL

(EC Certificate of Type Examination - Module B)
(Marine Equipment Directive - 96/98/EC, as amended*1)

Applicant:-
Kelvin Hughes Ltd
New North Road, Hainault
Ilford, Essex IG6 2UR
United Kingdom

Manufacturer:-
Kelvin Hughes Ltd
New North Road, Hainault
Ilford, Essex IG6 2UR
United Kingdom

This is to certify that the applicant has submitted details of a:-

Shipborne Radar Equipment (IEC 62388 Cat 1H & Cat 1HC) (COMMISSION DIRECTIVE 2009/26/EC – ITEM A.1/4.37 & ITEM A.1/4.38)

Of system types known and designated as:-

- a) MantaDigital™, X-Band Marine HSC Radar, CAT1H Systems
- b) MantaDigital™, S-Band Marine HSC Radar, CAT1H Systems
- c) MantaDigital™, X-Band Marine HSC Chart Radar, CAT1HC Systems
- d) MantaDigital™, S-Band Marine HSC Chart Radar, CAT1HC Systems

(Comprising component parts and having technical characteristics shown in schedule 2 to 5)

and that these have been assessed, tested and when used in a combination of component parts as described in the attached schedules, is CERTIFIED as complying with the relevant parts of:

IEC 62388 : 2008, "Marine Shipborne Radar Equipment"

IEC 60945 : 2002, "General Requirements for Marine Navigation Equipment"

IEC 62288 : 2008 "Presentation of navigation-related information on shipborne navigational displays"
(being testing standards listed in column 5 of Annex A.1 of Directive 2009/26/EC for Item 4.37 & 4.38)

Note: The presentation standard of this equipment has been assessed against clauses in IEC 62388:2008 derived from IMO Resolution MSC.191(79) and which equate those published in IEC 62288:2008.

It is also RECOGNISED that the equipment conforms to performance standards not inferior to those adopted by the International Maritime Organisation, and which are contained in the relevant parts of Resolution MSC.191(79), Resolution MSC.192(79) and Resolution A694(17).

SIGNED:

P J Goddard
Authorised Signatory
for and on behalf of QinetiQ Ltd

DATE of ISSUE: 20th September 2010

DATE of EXPIRY: 19th September 2015

Certificate Number: QQ-MED-12/10-01

EU/USCG Mutual Recognition Agreement
Council Decision 2004/425/EC

HSC Radar is not currently included in the USCG/EU MRA

This Certificate is Valid until expiry date shown, subject to the standard conditions of issue printed on page 6
Kelvin Hughes Ltd are Module D registered with QinetiQ in accord with standard condition 3, ref; Certificate DQAS-06/01-KH001R4

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Cody Technology Park
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Maritime and Coastguard Agency
The MCA is an Executive Agency of
the Department for Transport

Under the terms of the United Kingdom Statutory Instrument, No 1957 : 1999, QinetiQ Ltd has been Notified to the European Commission by the Maritime and Coastguard Agency as a Body authorised to conduct Conformity Assessment procedures under the provisions of the European Council Directive 96/98/EC (as amended) on Marine Equipment and issue Certificates of Type Approval.

Schedule 1

Statement on New “Radar Systems” Standard IEC 62388

The International Maritime Organisation (IMO) adopted RESOLUTION MSC.192(79) on 6 December 2004 On the REVISED PERFORMANCE STANDARDS FOR RADAR EQUIPMENT. These standards are mandated to be implemented on or after 1st July 2008.

The Scope recognised that radar should provide the integration and display of radar video, target tracking information, positional data derived from own ships position (EPFS) and geo referenced data. The integration and display of AIS information should be provided to complement radar. The capability of displaying selected parts of Electronic Navigation Charts and other vector chart information may be provided to aid navigation and for position monitoring.

Contained within MSC.192(79) were details of the Differences in the performance requirements for various sizes/categories of ship/craft to which SOLAS applies, these were contained in TABLE 1.

Size of ship/craft	Cat 3	Cat 2	Cat 1
	<500 gt	500 gt to <10,000 gt and HSC<10,000 gt	All ships/craft ≥10,000 gt
Minimum operational display area diameter	180mm Dia.	250mm Dia	320mm Dia
Minimum display area	195 x 195 mm	270 x 270 mm	340 x 340 mm
Auto acquisition of targets	-	-	Yes
Minimum <i>acquired</i> radar target capacity	20	30	40
Minimum <i>activated</i> AIS target capacity	20	30	40
Minimum <i>sleeping</i> AIS target capacity	100	150	200
Trial Manoeuvre	-	-	Yes

In addition radar equipment can optionally conform to two other sets of performance criteria for High Speed Craft and/or for electronic chart display.

IMO resolution MSC.192(79) performance standard was taken by the International Electrotechnical Standards Organisation (IEC) and turned into the International Standard IEC 62388, first edition 2008.

IEC 62388 replaces 7 other standards that covered the various aspects of radar performance; these were IEC 60936-1, IEC 60936-2, IEC 60936-3, IEC 60936-5, IEC 60872-1, IEC 60872-2 and IEC 60872-3.

The Marine Equipment Directive (96/98/EC) details the European procedure for conformity assessment and approval for the range of IMO mandated marine equipment. The particular requirements for each equipment item is listed and the test requirement is detailed in the Equipment Annexes. Current version being contained in 5th Amending Directive, 2009/26/EC which contains the international instruments and testing standards in their up-to-date version and allocated to existing MED equipment item numbers for radar equipment as detailed below.

MED Item.	Previous Description 4 th Amendment & earlier	IEC 62388 Category & 5 th Amendment listing	Radar Display area
A.1/4.34	Radar with ARPA	Cat 1	320mm Dia.
A.1/4.35	Radar with ATA	Cat 2	250mm Dia.
A.1/4.36	Radar with EPA	Cat 3 (EPA no longer accepted)	180mm Dia.
A.1/4.37	HSC with ARPA	Cat 1H	320mm Dia.
A.1/4.37	HSC with ARPA	Cat 2H	250mm Dia.
A.1/4.38	Chart Radar (HSC Radar with ATA No longer used)	Additional. Suffix 'C' on Cat 1, Cat 2, Cat1H or Cat 2H above	

Presentation Standard – IMO Resolution MSC.191(79) and IEC 62288

IEC 62388 was also written to include all the appropriate Presentation criteria and performance standards for a shipborne navigation displays as detailed in IMO Resolution MSC.191(79) and therefore any radar assessed by the QinetiQ Notified Body as compliant with IEC 62388 is also deemed to have presentation standards compliant with Resolution MSC.191(79) and is also recognised as compliant with identical standards for presentation of Radar equipment contained in IEC 62288:2008.

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Certificate Number **QQ-MED-12/10-01**

Schedule 2a –Category 1H Radar

MantaDigital™ HSC Radar Displays & Processor, CAT1H Systems

The applicant declared that the following units form the radar processing and display section of the system designations a) & b), given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file.

The resultant radar systems are consistent with the Item Descriptions A1/4.37, given in Annex A1 of Commission Directive 2009/26/EC and Category 1 of MSC.192(79) and IEC 62388.

SYSTEM comprising of:-

MantaDigital™ 26" Display & Radar Processor (Pedestal Unit including Trackerball)	MDD-A1-26	*1
or MantaDigital™ 26" Desktop Display (including Trackerball)	MDD-A30-26	*1
and MantaDigital™ Radar Processor	MDP-A1	
or MantaDigital™ 26" Console Display	MDD-A20-26	*2
and MantaDigital™ Radar Processor	MDP-A1	
and MantaDigital™ Remote Trackerball	MDD-A110	*2
SOFTWARE:-		
MantaDigital™ Core Software (ZM-2144)	Version 1.xx	*3
Manta Transmitter interface Firmware (ZM-2114)	Version 1.xx	*3
Manta Transmitter interface FPGA (ZM-2160)	Version 1.xx	*3
Manta Display interface Firmware (ZM-2007)	Version 1.xx	*3
Manta Systems interface Firmware (ZM-2008)	Version 1.xx	*3

----- End of List -----

The system will include a suitable transceiver selected from Schedule 3 and may also include ancillary items from the list of optional items found in Schedule 4 on Page 6.

* NOTES:-

- 1 The Trackerball unit integrated into the control area of this unit may be replaced with one of the other control options listed in Schedule 4.
- 2 These units are supplied separately for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with one of the other control options listed in Schedule 4.
- 3 This approval remains valid for equipment including subsequent minor software amendments, as allowed by the N.xx format (xx represents numerals), where written details of any such modifications have been submitted to and accepted by QinetiQ.

Technical Characteristics

Notified Body 0191

PRESENTATION DISPLAY TYPE	26" Colour LCD	IEC 62288:2008 Category :- Full operational radar display Multi-function trackerball and on-screen controls allows quick & easy control functions and data entry.
RADAR DISPLAY CIRCLE	≥320mm	Effective Diameter
RADAR TARGET CAPACITY ACQUIRED	100 targets	40 minimum for Cat 1
AUTO ACQUISITION OF TARGETS	Yes	Required for Cat 1
TRIAL MANOEUVRE	Yes	Required for Cat 1
AIS TARGET CAPACITY ACTIVATED SLEEPING	≤500 ≤500 (500 max, any mix)	40 minimum for Cat 1 200 minimum for Cat 1
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - 8 Talker - 8	Conformity to IEC 61162-1:2000. Configurable to IEC 61162-2 for AIS port.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	Internal UPS available or configure to external UPS (Kelvin Hughes recommended installation)

Conditions of Issue of this certificate are printed on Page 8.

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Certificate Number **QQ-MED-12/10-01**

Schedule 2b –Category 1HC Radar

MantaDigital™ HSC Displays & Chart Radar Processor, CAT1HC Systems

The applicant declared that the following units form the radar processing and display section of the system designations c) & d), given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file.

The resultant radar systems are consistent with the Item Descriptions A1/4.37 and A.1/4.38, given in Annex A1 of Commission Directive 2009/26/EC and Category 1 and 1C of MSC.192(79) and IEC 62388

SYSTEM comprising of:-

MantaDigital™ 26" Display & Radar Processor (Pedestal Unit including Trackerball)	MDD-A9-26	*1
or MantaDigital™ 26" Desktop Display (including Trackerball)	MDD-A30-26	*1
and MantaDigital™ Radar Processor	MDP-A9	
or MantaDigital™ 26" Console Display	MDD-A20-26	*2
and MantaDigital™ Radar Processor	MDP-A9	
and MantaDigital™ Remote Trackerball	MDD-A110	*2
SOFTWARE:- MantaDigital™ Core Software (ZM-2144)	Version 1.xx	*3
Manta Transmitter interface Firmware (ZM-2114)	Version 1.xx	*3
Manta Transmitter interface FPGA (ZM-2160)	Version 1.xx	*3
Manta Display interface Firmware (ZM-2007)	Version 1.xx	*3
Manta Systems interface Firmware (ZM-2008)	Version 1.xx	*3

----- End of List -----

The system will include a suitable transceiver selected from Schedule 3 and may also include ancillary items from the list of optional items found in Schedule 4 on Page 6.

* NOTES:-

- 1 The Trackerball unit integrated into the control area of this unit may be replaced with one of the other control options listed in Schedule 4.
- 2 These units are supplied separately for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with one of the other control options listed in Schedule 4.
- 3 This approval remains valid for equipment including subsequent Minor software amendments, as allowed by the N.xx format (xx represents numerals), where written details of any such modifications have been submitted to and accepted by QinetiQ.

Technical Characteristics

Notified Body 0191

PRESENTATION DISPLAY TYPE	26" Colour LCD	IEC 62288:2008 Category :- Full operational radar display Multi-function trackerball and on-screen controls allows quick & easy control functions and data entry.
RADAR DISPLAY CIRCLE	≥320mm	Effective Diameter Radar Circle and Chart area
RADAR TARGET CAPACITY ACQUIRED	100 targets	40 minimum for Cat 1
AUTO ACQUISITION OF TARGETS	Yes	Required for Cat 1
TRIAL MANOEUVRE	Yes	Required for Cat 1
AIS TARGET CAPACITY ACTIVATED SLEEPING	≤500 ≤500 (500 max, any mix)	40 minimum for Cat 1 200 minimum for Cat 1
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - 8 Talker - 8	Conformity to IEC 61162-1:2000. Configurable to IEC 61162-2 for AIS port.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	Internal UPS available or configure to external UPS (Kelvin Hughes recommended installation)

Conditions of Issue of this certificate are printed on Page 8.

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Certificate Number **QQ-MED-12/10-01**

Schedule 3 – Category 1H & 1HC Radar Transceivers MantaDigital™ HSC Radar & Chart Radar Systems

The applicant declared that the following units form the radar Transceiver section of the system designations given on Page 1. The resulting systems have been assessed & tested, and satisfactory details of these units were included in the technical file.

X-Band Systems:-

10kW, X-Band Transceiver & Hi-Speed Turning Unit
with transmitter Interface Unit
or 25kW X-Band Transceiver Unit (Bulkhead Mount)
and X-Band & Hi-Speed Turning Unit
and 1.3m, 1.9m or 2.5m Low Profile X-Band Antenna

CAE-A30-21
NNR-A66
CTX-A8
CAE-A30-23
LPA-A13 or LPA-A19 or LPA-A25

S-Band Systems:-

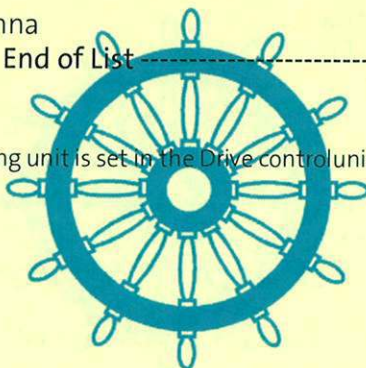
Manta 30kW, Transceiver/Turning Unit
and Drive control unit
or Mk 7 30kW Transceiver Unit (Bulkhead Mount)
and Manta, Turning Unit
and Drive control unit
and 3.9m, S-Band Low Profile Antenna

GTX-A16 *1
GTX-A24 *1
CTX-A9
GTX-A11 *1
GTX-A24 *1
LPA-A1 or LPA-A3

----- End of List -----

* NOTES:-

- 1 The rotational speed of the S-Band turning unit is set in the Drive control unit to 46RPM for High speed craft.



Technical Characteristics

FREQUENCY OF OPERATION	9.410 GHz – X-Band 3.050 GHz – S-Band	±30MHz ±10MHz
PULSE REPETITION FREQUENCY	3000, 1500, 750, 375	
PULSE LENGTHS	0.05-0.07µs, 0.16-0.25µs, 0.6-1.0µs	Transceiver dependent.
EMISSION CODE	3M00P0NAN	
POWER CHARACTERISTIC: - X-Band	10kW or 25kW	(PEP)
POWER CHARACTERISTIC: - S-Band	30kW	(PEP)
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	The S-Band turning units use a 3 phase supply.

Conditions of Issue of this certificate are printed on Page 8.

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Certificate Number **QQ-MED-12/10-01**

Certificate of Type Approval - Schedule 4

MantaDigital™ Radar Systems - Ancillary and Optional Units

The applicant declared that the following units may be added to the basic radar systems illustrated in schedules 1 to 4. These units have been assessed & tested in conjunction with MantaDigital™ and SharpEye series radar systems, and satisfactory details are included in the technical files.

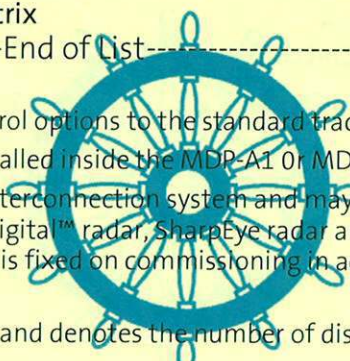
ANCILLARY UNITS:-

MantaDigital™ Keyboard & Trackerball	MDD-A101	*1
MantaDigital™ Control Panel & Trackerball	MDD-A102	*1
MantaDigital™ Trackerball & pencil tray	MDD-A100	*1
MantaDigital™ Remote Keyboard	MDD-A130	*1
Ergonomic Trackerball (Ergopod, right handed)	NRR-A18	*1
Ergonomic Trackerball (Ergopod, left handed)	NRR-A18-2	*1
MantaDigital™ Radar Interswitch Unit (6 display x 6 transceiver)	MDD-A12	
Serial Interface Module (provides 8 additional ports)	FSD-A198	*2
Dual DNC Unit	FSD-A10	*3
Network Audio & Video Control Unit	FSD-A13	*3
NTI Audio & Video Switch Matrix	IT-SM-8‡-AV-LCD	*3, 4

-----End of List-----

* NOTES:-

- 1 These are alternative/additional control options to the standard trackerball.
- 2 This option is an internal module installed inside the MDP-A1 Or MDP-A9 processor unit.
- 3 These items form a display/control interconnection system and may be used to form an adaptive workstation system between units of the MantaDigital™ radar, SharpEye radar and MantaDigital™ ECDIS. The exact configuration enabled by this system is fixed on commissioning in accordance with an agreed ships operating plan.
- 4 The ‡ is a numeral in the range 2 to 8 and denotes the number of display units which can be included in the interconnection system.



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Conditions of Issue of this certificate are printed on page 8.

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Certificate Number **QQ-MED-12/10-01**

Certificate of Type Approval - Schedule 5

Statement on Spurious and Out of Band Emissions and the Boundary between these emissions

The following Radar Transceiver, represents part of the systems shown on earlier schedules, has been subject to a measurement procedure as detailed in IEC 60936-1, Annex D, as contained in Amendment 1, dated July 2002 and the guidelines contained in ITU-R Recommendation RM.1177-3. This standard defines the test method and requirements for shipborne radar to meet in order to comply with Appendix S3 of the Radio Regulations and ITU-R Recommendations SM.1539-1 and SM.1541-1.

The results of the measurement procedure were satisfactory and provide sufficient evidence that these Radar Transceivers are compliant with the criteria contained in the stated standards.

The Transceivers Measured were:-

Description	Model No.	Modulator PCB	Magetron
10kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A30-7	CTX-A332	MSF1425B
25kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A12-20	CTX-A201-M	MG5437
25kW, X-Band,Transceiver (Downmast) and Turning Unit (24RPM)	CTX-A8 CAE-A30-6	CTX-A370	MG5437
30kW, S-Band,Transceiver (Downmast) and Turning Unit (24RPM)	CTX-A9 CAE-A42	CTX-A370	M1302LK

The test reports detailing the tests and test results obtained are:-

QinetiQ/FST/CMT/TR021828
QinetiQ/FST/CMT/TR022211
QinetiQ/FST/CMT/TR022389
QinetiQ/FST/TR031365
DERA/SS/PSD/CR010109

These reports together with manufacturers drawings and declarations also detail the build standard regarding items such as Antenna, waveguide, rotary joint and any filters fitted to the test unit which the test results specifically apply.

Transceiver Modules contained in the CAE-A12-30, CAE-A30-20 Transceiver/Turning units and GTX-A16 Transceiver unit are identical to those found in the CAE-A12-20, CAE-A30-7 and CTX-A9 units respectively. Since the applicable electronic circuitry and microwave component parts are identical a presumption of conformity can be applied by analogy

The measurement procedure as detailed in IEC 60936-1, Annex D has now been reproduced in IEC 62388, Annex B and the requirements and references to ITU-R documents are identical. This statement may be taken as applicable to IEC 62388, Annex B compliance.

For Information the above transceivers also have USA, FCC identities as follows:

Description	Model No.	FCC Identity
10kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A30-7	CICCAE-A30-7
25kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A12-20	CICCAE-A12-20
25kW, X-Band,Transceiver (Downmast)	CTX-A8	CICCTX-A8
30kW, S-Band,Transceiver (Downmast)	CTX-A9	CICCTX-A9

Conditions of Issue of this certificate are printed on Page 8.

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Certificate Number **QQ-MED-12/10-01**

Certificates of Type Approval
Conditions of Issue

1. Each Certificate will be used in its entirety and not reproduced in part.
2. This certificate remains valid until the date shown (normally 5 years) unless cancelled or revoked, provided:-
 - i) the design and manufacture remain unmodified from the specimen tested and recorded in the Technical Construction File;
 - ii) any conditions contained in the schedule are complied with;
 - iii) 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;
 - iv) and, the equipment remains satisfactory in service.
3. The mark of conformity may only be affixed to the equipment listed on this certificate and a manufacturer's Declaration of Conformity issued when the production Quality Assurance requirements laid down in Annex B, of the Directive (96/98/EC) is fully complied with and controlled by a written inspection agreement with a Notified Body.
The use of the QinetiQ Notified Body Number (0191) in combination with the Wheelmark implies that the manufacturer is Registered with the QinetiQ Quality Assurance Scheme. A Certificate of Registration is issued to the manufacturer and should be made available on request. The manufacturer is responsible for ensuring that certification renewal and periodic surveillance are maintained.
4. USCG Approval Number, A Mutual Recognition Agreement (MRA) on marine equipment exists between the European Commission and the US Coastguard but only applies to equipment types included in the listing of marine equipment annexed to the MRA. For included equipment a USCG Approval number may be issued. This can be found under the MED certificate number on the first page and should be used on the main identity label of the equipment. Radio and Radar equipment continues to need separate or additional approval by the USA FCC.
5. This certificate does not confer any approval status to this equipment other than defined by, and tested according to the specifications listed on Page 1.
6. The labeling requirements of IMO Resolution A694(17) shall be met. Descriptions of each unit of apparatus forming part of the equipment will be as given on this Certificate. Each unit of equipment will be marked with the minimum safe distance at which it should be mounted from a standard and steering magnetic compass.
7. No unit of apparatus shall be advertised or labeled as "approved" or "certified" on behalf of the Maritime and Coastguard Agency, the Department of Transport or the QinetiQ Group in any sense other than that it is a type that has been assessed as satisfactory against the specification;
8. The manufacturer must advise QinetiQ of any intended changes to the design or production of the equipment which might affect the equipment performance.
9. Minor Modifications to the equipment will be considered on a case-by-case basis. QinetiQ will review any factory test results, in consultation if necessary, with the test facility that conducted the original Type Approval testing on the equipment. QinetiQ will advise the manufacturer if any further testing is required to maintain valid certification.
10. If an equipment manufacturer wishes to have the type approved equipment designated under alternative names (e.g. agent/distributor's name and model number), a separate application should be completed and sent to QinetiQ.

QinetiQ Ltd
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