GL - Type Approval SOFTWARE

Requirement class 3

The basis of all the tests to be carried out is the
„Regulation for the Use of Computers and Computer Systems"

General documents to be submitted	available yes	no	not necassary
• List of the functionalities of the system			
• Specification			
• Software Quality assurance plan			
• Test schedules			
• Instruction for use and commissioning			
• Descriptions of functions together with the drawings showing the functional relationships, interfaces with other systems and the spatial arrangement of the hardware			

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1. Assignment of the system to an appropriate requirement class

1.1 The system was assigned to requirement class 3 in accordance with the Regulations for the Use of Computers and Computer Systems.

1.2 Besides the technical tests stated under 3, 4 and 5., organisational measures may additionally become necessary.
- e.g. plausibility testing by the nautical personnel with radar and lookout

1.3 If, with the increasing complexity of the system,
  – Integration of various systems
  – Linking of functional features
should occur in future, the test criteria shall be extended by agreement with Germanischer Lloyd.

For Integrated systems, the configuration of all sub-systems shall be documented and the following relationships, among others, shall be identifiable from it:

– Hardware configuration
– Software configuration   (e.g. function diagram)
– Data exchange
– Redundancies
– System analysis

2. Measures required to comply with the requirement class

Through the use of demonstrably service–proven systems and components, the extent of the tests and evidence required may be adjusted by agreement with the Society.
A reference list of the systems installed may be submitted. Evidence of fault-free operation and a list of the known and experienced faults, as the case may be, shall also be submitted.

3. Survey, Testing and Validation

3.1. General

In addition to the above mentioned regulations manufacturers should ensure by means of a quality control system that their products meet with their specifications.
Evidence that the inspections and tests necessary for the requirement class 3 have been carried out shall be furnished by the manufacturer, who shall keep records of them.

3.2 Inspections and tests in accordance with the requirement class 3

For the system assigned to requirement class 3, the evidence as listed in the questionnaire (Section 4) shall be submitted to the society.
The tests listed in Table IV, item 5.4 to 5.7, should be performed in the presence of a body authorised by the society.
If other evidence are furnished and tests performed by the manufacturer which are of an equivalent nature, they may be recognized by the Society.

3.3 Survey, Testing and Validation

1. The software status should be documented at the time of delivery of the system.
2. Subsequent significant modifications to the software and hardware should be submitted to the Administration for approval. The modified documents should be identified in a retraceable manner.
   Software modifications essentially relate to program contents, system-specific data and changes of version.

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4. Questionaire on the tests and inspections to be performed

The following questionnaire on the tests ans inspections shall be completed by the firm and returned to GL prior to the start of the operational tests:

	YES	NO	Ref. to documen- tation
Evidence of certified quality assurance/quality management system			
Can evidence of a quality system (e.g. to ISO 9000 etc.) be furnished?			
If not :			
What procedures for quality assurance measures are established in the company?			
Software development manual			
Software QA plan			
Quality control in production and Software-development			
What influence do quality assurance measures have in production and on software development?			
Final Inspection in testing shop / completion of development and design			
Was the finished software product tested?			
Were the results of testing documented? (evidence required)			
Basic fault prevention and control measures			
1) Basic fault prevention measures			
What basic fault prevention measures have been carried out in terms of organisational and technical measures ?			
a) Organisational measures :			
– Project organisation			
– Preparation of a correct specification			
– Documentation			
Can the on-time production of the documentation be verified by the society?			
For the system softare, e.g. : – operating software – user software – executable code – database contents and structures – bitmaps for graphic displays can the use of systematic procedures during all phases of software development be proved by the manufacturer?			
b) Technical measures :			
– What software development tools were used?			
– Were tests performed throughout the production process in accordance with the test schedule?			
Was the test scheduling carried out after production of the specification? (Listing of the test cases and determination of the test software and the scope of testing).			
– Submission of the software QA plan			
– Submission of the test schedule The test schedule shall contain the following details: When, how and in what depth was the software tested?			

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	YES	NO	Ref. to documentation
2.) Basic fault control measures			
Which of the following basic fault control measures does the system contain? :			
(single-channel structures with self-test and monitoring feature)			
– CPU self-test, program run monitoring			
– ROM/RAM testing at switch–on / on booting			
– I/O test (e.g. plausibility)			
– Supply units (e.g. voltage, clock pulse, cooling)			
– Correct data transfer (transmission protocols, e.g. parity check)			
– Error diagnosis			
Checking by means of checklists			
The checklists should state the criteria which serve to prove compliance with the specification. They also contain the rules for checking the specification. Therefore they are to be available before the commencement of testing.			
Hardware design and configuration			
Can the requirements of the specification be correctly translated into the hardware used ?			
Code inspektion, Walk through			
Can the evidence of manual testing of the programm be furnished?			
This evidence can be submitted by means of checklists listing well known frequently occurring faults (bugs) .			
Structure based testing / White Box Test			
Has the white box test - or a similar test - been carried out? Debugging in a program or part of a program, using the knowledge of the internal structure of the item under test. Test data are derived from the program's structure. Depending on the coverage, as far as possible all parts of the program are run through with the aid of test data sets:			
As far as possible, have all branches of the program been run with the aid of the test records ?			
Details of test records :			
Evidence of proven operating systems, compilers and assemblers			
Details of the compiler used: An operating system or a compiler is regarded as proven if its operational reliability has been demonstrated in practical use.			
Integration with the hardware			
Integration of the software onto the target hardware.			
Black Box Test			
Function tests under real–time conditions.			
What test cases were tested?			
What test data were used during the tests ?			
Data from acceptable ranges			
Data from unacceptable ranges			
Data from range limits			
Extreme values			
other			

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	YES	NO	Ref. to documen-tation
Was a checklist drawn up to enable specific analyses and test run to be performed ?			
Details of test records :			
Which records ?			
Evidence of influence of single failure			
Is the system configured in such a way that the consequences of a fault remain limited to the relevant functional unit ?			
The proof shall be furnished during the function test..			
Evidence of climatic, mechanical and electrical tests and measures			
Evidence should be furnished by the manufacturer of the fitness for use of the sub–assemblies and components used. e.g. burn in test. The proof shall be furnished during a type test.			
Evidence of recording of failures / causes of faults			
Weak–point analysis of the equipment as proof of operational reliability. Automatic recording of the faults on a data storage medium. This may enable some testing steps to be simplified.			
Checking of system documentation			
Evidence that the system documentation is complete and correct should be furnished by the manufacturer.			
Is the revision status of the system documentation clearly identifiable?			
The parts of the documentation which are part of the delivery documentation should be identified as such.			
Type test			
The type test for computer and computer systems for general use should be carried out in accordance with the „Regulations for the Performance of Type Tests".			
For this test, a testing program derived from specification shall be submitted.			
Operational testing in the real process environment			
For this test, a testing programme derived from the specification shall be submitted.			
The operational testing is carried out within the scope of classification in accordance with the testing programme approved by the society.			

5. Operational proofs

The operational proofs indicated by „YES" below shall be demonstrated to GL during the type testing or the FAT:

Operational proofs	yes	no
Is the system protected against unintentional or unauthorised modification of programs ?		
Is the computer and the computer systems protected against unintentional or unauthorised modification of data?		
Is the system protected against loss of data ?		
Is the system protected against viruses ?		
Is the user correctly informed under all operating conditions and are his instructions carried out at the correct time?		
Are self-tests performed?		
In what way?		
When are self-tests performed?		
Are programm execution and the flow of data monitored ?		
How ?		
Interface test		
Testing of the data and signal interfaces (e.g. of a tranfer component) for error-free transfer		
Does data transfer proceed correctly ?		
Failure of a functional unit should not impair the remaining functionality.		
Is failure of the power supply alarmed?		
Is an uninterruptable power supply provided ?		
Is the uninterruptable power supply monitored in such a way that towards the end of the bridging time, a controlled shutdown of the computer is ensured ?		
Is the operational readiness of the UPS monitored? ?		
Are errors and faults in the system software detected? ?		
How ?		
How does the system react in the event of failure and restarting ?		
Does the system reboot ?		
Are present values loaded ?		
Are the last user-defined settings reactivated ?		
Are measures taken to prevent the occurence of undefined and critical states which might influence the process?		
Does the man-machine communication represent all the functionalities for the monitoring andmanagement of the system ?		
Is the status of the computer system identifiable?		
How is the operational readiness of a computer system displayed?		

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	yes	no
Input devices		
If multiple functions are assigned to keys, is it possible to recognize which of the assigned functions is active ?		
Are equipment operations or functions performed or changed via keyboards?		
Are appropriate measures such as keyswitches and / or a password protection system employed so as to limit access of such operations or functions to authorized personnel ?		
Can the operation of keys results in dangerous operating conditions ? If so :		
What measures are taken to prevent dangerous operating conditions arising ?		
Output devices		
Can alarm messages be reliably read under all lihting conditions?		
Is the information displayed in the sequence required by the user ?		
Are the alarm messages clearly readable even in the event of failure of a primary colour ?		
Does the displaying of faults have priority over other information ?		

6.   System specified evidence(s) to be furnished during the Factory Acceptance Test:

REMARKS :

GL symbol for type-tested software:

Date :

....
Signature   Signature
of firm   of Germaischer Lloyd