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# M72 Certification of Engine Components

(Feb  
2015)

## 1. General

1.1 The engine manufacturer is to have a quality control system that is suitable for the actual engine types to be certified by the Society. The quality control system is also to apply to any sub-suppliers. The Society reserves the right to review the system or parts thereof. Materials and components are to be produced in compliance with all the applicable production and quality instructions specified by the engine manufacturer. The Society requires that certain parts are verified and documented by means of Society Certificate (SC), Work Certificate (W) or Test Report (TR).

### 1.2 Society Certificate (SC)

This is a document issued by the Society stating:

- conformity with Rule requirements.
- that the tests and inspections have been carried out on the certified product itself, or on samples taken from the certified product itself.
- that the inspection and tests were performed in the presence of the Surveyor or in accordance with special agreements, i.e. ACS.

### 1.3 Work's Certificate (W)

This is a document signed by the manufacturer stating:

- conformity with requirements.
- that the tests and inspections have been carried out on the certified product itself, or on samples taken from the raw material, used for the product to be certified.
- that the tests were witnessed and signed by a qualified representative of the applicable department of the manufacturer.

A Work's Certificate may be considered equivalent to a Society Certificate and endorsed by the Society under the following cases:

- the test was witnessed by the Society Surveyor; or
- an Alternative Certification Scheme (ACS) agreement is in place between the Class Society and the manufacturer or material supplier; or
- the Work's certificate is supported by tests carried out by an accredited third party that is accepted by the Society and independent from the manufacturer and/or material supplier.

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Notes:

1. The requirements of UR M72 are to be uniformly implemented by IACS Societies to engines with an application for certification dated on or after 1 July 2016.

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### 1.4 Test Report (TR)

This is a document signed by the manufacturer stating:

- conformity with requirements.
- that the tests and inspections have been carried out on samples from the current production.

1.5 The documents above are used for product documentation as well as for documentation of single inspections such as crack detection, dimensional check, etc. If agreed to by the Society, the documentation of single tests and inspections may also be arranged by filling in results on a control sheet following the component through the production.

1.6 The Surveyor is to review the TR and W for compliance with the agreed or approved specifications. SC means that the Surveyor also witnesses the testing, batch or individual, unless an ACS provides other arrangements.

1.7 The manufacturer is not exempted from responsibility for any relevant tests and inspections of those parts for which documentation is not explicitly requested by the Society. Manufacturing works is to be equipped in such a way that all materials and components can be consistently produced to the required standard. This includes production and assembly lines, machining units, special tools and devices, assembly and testing rigs as well as all lifting and transportation devices.

## 2. Parts to be documented

2.1 The extent of parts to be documented depends on the type of engine, engine size and criticality of the part.

2.2 Symbols used are listed in Table M72.1. A summary of the required documentation for the engine components is listed in Table M72.2.

**M72.1 Symbols used in Table M72.2**

Symbol	Description
C	chemical composition
CD	crack detection by MPI or DP
CH	crosshead engines
D	cylinder bore diameter (mm)
GJL	gray cast iron
GJS	spheroidal graphite cast iron
GS	cast steel
M	mechanical properties
SC	society certificate
TR	test report
UT	ultrasonic testing
W	work certificate
X	visual examination of accessible surfaces by the Surveyor

2.3 For components and materials not specified in Table M72.2, consideration will be given by the Society upon full details being submitted and reviewed.

## M72.2 Summary of required documentation for engine components

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Part <sup>4), 5), 6), 7)</sup>	Material properties <sup>1)</sup>	Non-destructive examination <sup>2)</sup>	Hydraulic testing <sup>3)</sup>	Dimensional inspection, including surface condition	Visual inspection (surveyor)	Applicable to engines:	Component certificate
Welded bedplate	W(C+M)	W(UT+CD)			fit-up + post-welding	All	SC
Bearing transverse girders GS	W(C+M)	W(UT+CD)			X	All	SC
Welded frame box	W(C+M)	W(UT+CD)			fit-up + post-welding	All	SC
Cylinder block GJL			W			CH	
Cylinder block GJS			W			CH	
Welded cylinder frames	W(C+M)	W(UT+CD)			fit-up + post-welding	CH	SC
Engine block GJL			W			>400 kW/cyl	
Engine block GJS	W(M)		W			>400 kW/cyl	
Cylinder liner	W(C+M)		W			D>300mm	
Cylinder head GJL			W			D>300mm	
Cylinder head GJS			W			D>300mm	
Cylinder head GS	W(C+M)	W(UT+CD)	W		X	D>300mm	SC
Forged cylinder head	W(C+M)	W(UT+CD)	W		X	D>300mm	SC
Piston crown GS	W(C+M)	W(UT+CD)			X	D>400mm	SC
Forged piston crown	W(C+M)	W(UT+CD)			X	D>400mm	SC
Crankshaft: made in one piece	SC(C+M)	W(UT+CD)		W	Random, of fillets and oil bores	All	SC
Semi-built crankshaft	See below	See below		See below	See below	All	SC
Crank throw	SC(C+M)	W(UT+CD)		W	Random, of fillets and shrink fittings	All	
Forged main journal and journals with flange	SC(C+M)	W(UT+CD)		W	Random, of shrink fittings	All	

## M72.2 Summary of required documentation for engine components (continued)

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Part <sup>4), 5), 6), 7)</sup>	Material properties <sup>1)</sup>	Non-destructive examination <sup>2)</sup>	Hydraulic testing <sup>3)</sup>	Dimensional inspection, including surface condition	Visual inspection (surveyor)	Applicable to engines:	Component certificate
Exhaust gas valve cage			W			CH	
Piston rod, if applicable	SC(C+M)	W(UT+CD) CD again after final machining (grinding)			Random	D>400mm	SC
Cross head	SC(C+M)	W(UT+CD) CD again after final machining (grinding and polishing)			Random	CH	SC
Connecting rod with cap	SC(C+M)	W(UT+CD)		W	Random, of all surfaces, in particular those shot peened	All	SC
Coupling bolts for crankshaft	SC(C+M)	W(UT+CD)		W	Random, of interference fit	All	SC
Bolts and studs for main bearings	W(C+M)	W(UT+CD)				D>300mm	
Bolts and studs for cylinder heads	W(C+M)	W(UT+CD)				D>300mm	
Bolts and studs for connecting rods	W(C+M)	W(UT+CD)		TR of thread making		D>300mm	
Tie rod	W(C+M)	W(UT+CD)		TR of thread making	Random	CH	SC
High pressure fuel injection pump body			W TR			D>300mm	
High pressure fuel injection valves (only for not autofretted)			W TR			D>300mm	

## M72.2 Summary of required documentation for engine components (continued)

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Part <sup>4), 5), 6), 7)</sup>	Material properties <sup>1)</sup>	Non-destructive examination <sup>2)</sup>	Hydraulic testing <sup>3)</sup>	Dimensional inspection, including surface condition	Visual inspection (surveyor)	Applicable to engines:	Component certificate
High pressure fuel injection pipes including common fuel rail	W(C+M)		W for those that are not autofretted			D>300mm	
High pressure common servo oil system	W(C+M)		W			D>300mm	
Cooler, both sides <sup>8)</sup>	W(C+M)		W			D>300mm	
Accumulator of common rail fuel or servo oil system	W(C+M)		W			All engines with accumulators with a capacity of >0,5 l	
Piping, pumps, actuators, etc. for hydraulic drive of valves, if applicable	W(C+M)		W			>800 kW/cyl	
Engine driven pumps (oil, water, fuel, bilge)			W			>800 kW/cyl	
Bearings for main, crosshead, and crankpin	TR(C)	TR (UT for full contact between basic material and bearing metal)		W		>800 kW/cyl	

**M72** FOOTNOTES:

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1. Material properties include chemical composition and mechanical properties, and also surface treatment such as surface hardening (hardness, depth and extent), peening and rolling (extent and applied force).
  2. Non-destructive examination means e.g. ultrasonic testing, crack detection by MPI or DP.
  3. Hydraulic testing is applied on the water/oil side of the component. Items are to be tested by hydraulic pressure at the pressure equal to 1.5 times the maximum working pressure. High pressure parts of the fuel injection system are to be tested by hydraulic pressure at the pressure equal to 1.5 maximum working pressure or maximum working pressure plus 300 bar, whichever is the less. Where design or testing features may require modification of these test requirements, special consideration may be given.
  4. For turbochargers, see M73.
  5. Crankcase safety valves are to be type tested in accordance with M66 and documented according to M9.
  6. Oil mist detection systems are to be type tested in accordance with M67 and documented according to M10.
  7. For Speed governor and overspeed protective devices, see M3.
  8. Charge air coolers need only be tested on the water side.

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