A Guide to
DP-Related Documentation for DP Vessels

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IMCA M 109 Rev. 2 – June 2016

1 Introduction

1.1 Overview

This document results from a review and updating of IMCA publication 109 DPVOA, produced by Global Maritime in 1993.

In 2004 a revision of the guidance incorporated developments such as IMCA's framework for competence assurance and assessment schemes, the Common Marine Inspection Document (CMID), the introduction of the International Safety Management (ISM) Code; and there have been a number of lessons learnt.

A further revision of the document was completed in 2016; this recognised the use of activity specific operating guidelines (ASOG) and the requirement for operational and emergency drills. It further identified the requirement to maintain records of DP familiarisation and training of key DP personnel. The list of IMCA guidance relating to DP operations was also updated.

1.2 Scope

A non-mandatory guide to relevant DP documentation.

1.3 Objective

The primary objective was to provide a useful guide and checklist of DP documentation for DP vessels, both for those on board the vessels and those ashore.

1.4 Documents Reviewed

- IMCA M 103 – *Guidelines for the design and operation of dynamically positioned vessels*;
- Other current IMCA publications with relevance to DP operations;
- The International Safety Management (ISM) Code;
- International Convention for the Safety of Life at Sea (SOLAS), 1974 plus amendments.

2 Abbreviations Used

ASOG	Activity specific operating guidelines
CMID	Common Marine Inspection Document (IMCA M 149)
CV	Curriculum vitae
DGPS	Differential global positioning system
DOC	Document of compliance
DOT	Department of Transport (USA)
DP	Dynamic positioning
DPVOA	Dynamic Positioning Vessels Owners Association
FMEA	Failure modes and effect analysis
IMCA	International Marine Contractors Association
IMO MSC	International Maritime Organization Maritime Safety Committee
ISM	International Safety Management
NMD	Norwegian Maritime Directorate
ROV	Remotely operated vehicle
SMC	Safety management certificate
SOLAS	International Convention for the Safety of Life at Sea
UPS	Uninterrupted power supply
USCG	United States Coast Guard
WSOG	Well specific operating guidelines

3 Guidance to General Documentation Carried Onboard DP Vessels Relating to DP Systems

In assessing the documentation required in respect of DP for any vessel operating with DP, it is necessary to consider what relevant equipment is on board, how it is used, what operations the vessel will be involved in when DP is in use and what the vendor of the equipment can supply. With relation to the latter, it is important that the documents on board relate to that specific vessel and are not generic. DP is used on a large range of vessels, often for basic navigation, but in the offshore industry particularly for a wide range of tasks where station keeping or adherence to track is especially critical. This results in explicit requirements for DP equipment appropriate to the vessel's operational use.

The particular changes made to a manufacturer's standard product on installation need to be clearly identified in the documents on board the vessel, as do all subsequent modifications. It would then be necessary to identify any areas in the documentation which lack this clarity and rectify the situation by provision of appropriate information. DP documentation needs to be vessel specific. When it is not, difficulties can arise in understanding the system, control, troubleshooting, service and in any subsequent modifications.

The list below sets out the basic certification and guidance which have a relevance to DP and which are usually carried on board vessels and in the operators' company offices.

3.1 Certification, Official Documentation and Standard Guidance

- DP classification certificates;
- ISM document of compliance (DOC) or interim DOC endorsed for current verification (in company office only);
- copy of ISM DOC (on board copy not required to be authenticated or certified);
- ISM safety management certificate (SMC) or interim SMC endorsed for current verification;
- safety management manual;
- flag state safety memoranda;
- relevant statutory instruments;
- reports of safety audits;
- company quality assurance manual;
- safety case, if applicable;
- vessel operations manual;
- DP operations manual;
- IMCA M 149 – *Common Marine Inspection Document*;
- DP audit and inspection reports;
- vessel/operational specific set of IMCA guidelines/documentation (see Appendix 1 for general overall guide).

4 Recommendations in Respect of Specific DP Operational Documentation

Companies will have DP operations manuals, but these will probably vary as to their content. There might also be overlap between these manuals and other documents carried on board or in the office.

A helpful format for DP documentation is as follows:

4.1 Interface Document

Where a safety case is required for DP operations conducted at an installation, an interface document will be needed for the installation safety case.

4.2 DP Operations Manual

The DP operations manual ideally only contains information necessary for operating the vessel under DP system control. The following structure is recommended.

4.2.1 Introduction

Information relating to the purpose of the manual and an index of the contents.

4.2.2 Organisation and Responsibility

Reference can be made to IMCA C 002 – *Guidance on competence assurance and assessment: Marine Division* – where applicable. This section of the manual should describe the manning requirements and responsibilities for DP operations, including but not necessarily limited to the following:

- office management;
- superintendents;
- operations managers;
- master;
- DP operators;
- chief engineer;
- watchkeeping engineers;
- project manager;
- company representative;
- driller;
- toolpusher.

This section defines the lines of command and responsibilities, for example:

i) on the vessel;

ii) between vessel and shore office;

iii) in the shore office.

Its purpose is to:

- describe the responsibilities of each person involved in dp operations;
- describe the working hours of personnel whilst in dp mode;
- describe the requirements for project planning prior to commencement of any project.

4.2.3 Vessel Data

The basic information about the vessel relevant to DP operations, for example:

A one page, simple diagram, clearly showing:

- location of thrusters;
- location of propellers and rudders;
- location of moon pools;
- location of taut wires;
- location of position referencing systems, aerials, etc;
- location of ROV station;
- location of other relevant equipment, for example well service apparatus, cranes, or pipelay stingers, carousels and/or other subsea equipment.

A separate sheet(s) could also contain:

- A brief description of the make, type and operational limits of each of these systems.

4.2.4 DP Philosophy

This section to describe the company's philosophy in regard to DP operations, containing reference to the manufacturer's manuals where necessary.

4.2.5 DP System Description

An overall description of the DP and periphery systems on the vessel, which also includes:

- control and display information;
- a description of available position referencing systems;
- a simple line diagram of the DP system specific to the vessel and including all of the modifications to it;
- reference to DP manufacturers' manuals, which are recommended to be vessel-specific;
- simple line diagram of power distribution system and ups;
- description of propulsion system, power production and distribution, thrusters, thrust affected zones, diver umbilical lengths;
- description of monitoring and alarms;
- communication systems matrix;
- DP system operation.

Describes the procedure for operating the DP system.

Describes the procedure for setting vessel up prior to going into DP mode, entering DP mode, maintaining DP mode and coming out of DP mode.

4.2.6 Standing Orders Regarding DP Operations

Describes operational procedures in DP including:

- watchkeeping requirements;
- action in emergency situations;
- the production of activity specific operating guidance/well specific operating guidance (ASOG/WSOG).

Describes action to be taken in various operational scenarios, for example:

- change in DP status;
- in close proximity to an installation, other vessel or obstruction;
- vessel moves whilst operating in DP mode;
- limited visibility and any other deteriorating environmental conditions;
- maximum thruster power used;
- loss of redundancy in DP systems;
- excursions.

Defines station keeping limits in DP mode.

Provides up to date advice on DP references such as DGPS, dual DGPS; and it could be useful to include information about other station keeping navigational aids carried on board.

Defines DP status, DP alert levels.

Describes communication requirements between e.g. Master/DP operators/project control/ operations control/company representatives/OIM.

Describes instructions and actions that are required to be recorded in a log (see 4.4) and the level of detail required, for example in relation to DP excursions and incidents.

Describes information to be passed to operational parties e.g. diver umbilical lengths.

Defines standards to apply when operating inside anchor patterns.

Defines standards to apply when operating in a multipoint mooring system.

Advises of company policy regarding access by third parties to DP computers, navigational input and related systems.

Details requirements for DP operational and emergency drills.

4.2.7 DP Guidelines

Contains company operational guidelines relating to DP. Refers to current industry practice including the relevant statutory requirements and industry guidelines, e.g. IMO, DOT, NMD, USCG and IMCA.

Details guidelines relevant to the vessel and explains company's policy regarding these documents.

References flag state guidance, regulations and official notices.

4.2.8 Capability Plots

Calculated plots for intact operation and with various combinations of thrusters down including worst case failure. Include actual plots where available.

4.2.9 DP Checklists (Bridge and Engine Room)

Checklist for completion prior to setting up in DP including blank forms.

Status check, periodic checklist for completion during DP operations including blank forms.

Checklist for completion prior to starting, for example, heavy lifts, running drill strings, pipe laying, launch/recovery of bell or ROV, diving or any other activity requiring DP.

4.2.10 DP Trials Procedure

Describes procedure for mobilisation trials including blank forms.

Refers to procedure for annual trials contained in a separate document (see also IMCA M 212 – *Example of an annual DP trials report*).

Refers to procedures for any other trials

4.2.11 Failure Mode and Effect Analysis (FMEA)

Contains latest version of FMEA including company's comments and history of previous FMEAs. Refers to any relevant additional modifications made whether as a result of FMEAs or not (see IMCA M 166 – *Guidance on failure modes and effects analysis (FMEA)*).

4.2.12 Incident Reporting Policy

Contains detailed reporting procedure to be followed after a DP incident and details the scope of DP incident information that should be retained. It would need to clarify which data is to be recorded and retained, describe the method of reporting and how long documents are retained for; where documents are kept and/or who they are sent to.

Different areas of operation, vessel owners, charterers, operators, clients and other parties involved all could have different jurisdictional and/or administrational requirements; different types of operations might also affect the range of documents retained and the length of time they are required to be held.

Investigation of even minor incidents can require input of a larger amount of detail than might primarily appear necessary. It could be worthwhile to have a standard approach to all incidents. Company guidance could include, for example:

- ensuring proper completion of logs;
- who to report to and when;
- identifying the personnel required to complete a report;
- the scope and style of an incident report with a draft example.

The detail of information required, which, depending on the knowledge of the witness, could include, but not necessarily be limited to the following:-

- witness's own details, what their position is on the vessel, age, home address, experience, qualifications, time spent on vessel, how many days on board prior to the event;
- vessel details *(see note below)*;
- broad description of operation being undertaken;
- description of witness's part in the operation, their location, responsibilities, etc.;
- descriptions of equipment/machinery being used by the witness, controls available etc.;
- other personnel at the witness's location;
- positions of vessels, structures etc.;
- details of any courses/headings/tracks and speeds made good/through water of own and/or other vessels;
- description of environmental conditions, wind direction and force, sea state/height, swell height(s) and direction(s), tide/current speed and direction, visibility, precipitation, water depth if applicable;
- vessel draught fore and aft, any angle of heel, vessel motion, pitch/roll/heave, relevant information about deck conditions;
- any relevant stability information;
- deployment of equipment;

- power information – generators online, emergency systems;
- communication systems;
- how data was recorded;
- dates, timings;
- complete description of event and any immediate consequences, worded so that it will be understood by non-technical people, with avoidance of ambiguity and any attempts to apportion blame;
- when describing what was seen/heard, a precise indication of the exact location that witnesses were at when that event was seen/heard by them;
- records of verbal exchanges;
- indication of what written, automatically printed or other recorded data (e.g. electronic, video, voice tapes, voyage data recorders etc.) is available; if written by the witness, when it was written;
- how to deal with enquiries relating to the incident from outwith the company;
- defines the policy of safety meetings and debriefing following an incident.

Note: Regarding vessel details – all of the vessel's details might not be relevant to every incident, but they can prove helpful in incident reporting. At least the following should be considered:

- vessel name;
- broad description of type ('dive support', etc.)
- length, breadth and service (loaded) draught;
- gross tonnage;
- loaded displacement;
- brake horsepower of main engines and thrusters;
- number of propulsion propellers;
- number and disposition of thrusters;
- steering systems;
- navigational equipment;
- engine/thruster controls;
- relevant deck equipment involved – winches, windlasses, cranes, etc.

4.3 Vessel Operations Manual

This manual describes the vessel operations external to the DP system. Any reference to the DP system should reference the DP operations manual. It is mentioned in this guidance because it will contain information that is relevant to the use of DP, depending on the operations anticipated for the particular vessel, for example:

- dive support;
- well servicing;
- trenching;
- cable laying;
- pipelaying;
- ROV operation;
- shuttle tanker operations;
- survey;
- dredging, rock dumping;

- helicopter operations;
- crane operations;
- rig moves;
- supply operations;
- other station keeping and/or subsea/construction activities;
- navigation and docking.

4.4 Activity Specific Operating Guidelines (ASOG)

An ASOG defines the operational, environmental and equipment performance limits for the location and the specific activity the vessel is undertaking. The performance limits are established based on the level of risk. A DP vessel may have a number of different ASOGs, each applying to different locations, activities and levels of risk. The terms well specific operating guidelines (WSOG), field specific operating guidelines (FSOG) and location specific operating guidelines (LSOG) denote equivalent concepts as applied by specific offshore sectors

4.5 Logs

This section provides guidance for describing what logs are compiled whilst in DP and what information they would contain. This could include, but not be limited to:

- **DP log** describing times and dates of various DP operations, such as, for example:
  - vessel going into DP
  - diving or other operations requiring DP, for example:
    - times of diving bells leaving surface and reaching working depth
    - times of divers leaving/entering diving bell and reaching/leaving worksite
    - instructions that were received from dive/subsea operation control
  - other relevant activities depending on type of operation (for example as listed in 4.3)
  - key DP personnel coming on/going off shift
  - faults occurring in DP system(s)
  - times and details of connecting lines to installations;
- **DP hours log** with running total of time spent in DP;
- **DP operator logbook** which should give running total of time operator spends on DP operations (see for example the IMCA DP logbook);
- **All data logging devices** relevant to the DP operation including electronic, video, voice tape and any other.

4.6 Operational Files

The following available and kept up to date:

- a file with a history of all relevant DP trials carried out on the vessel;
- a file with the results and recommendations of audits carried out on the vessel;
- a file of verifying footprints for the vessel. these should be checked occasionally against the capability plots to ensure they are accurate;
- a file with relevant drift trial data, verification of drift trial software;
- a file with the CVs of the key DP personnel;
- vessel DP familiarisation and training records;
- a maintenance file with records of all maintenance, including service reports, FMEA studies and modifications carried out on the DP system and related equipment including sensors;
- records of engine and thruster operating hours;

- records of engine and thruster lube oil and fuel oil analysis;
- records of power switchboard maintenance;
- records of communications systems maintenance.

4.7 Manufacturers' Manuals

Each DP vessel is likely to have, as a minimum, the following manufacturers' manuals available on board in the vicinity of the DP operations room, in the appropriate language and where possible vessel-specific (see section 2):

- DP system manufacturer's operating manual;
- DP system manufacturer's maintenance guide;
- DP system manufacturer's fault finding chart;
- DP sensor operation and maintenance manual;
- operating and maintenance manuals for other relevant navigational aids.

The following manuals are also recommended to be vessel specific (see section 2), available on the vessel in the appropriate language and where they can be accessed quickly by the personnel who will need them:

- power management system operation and maintenance manual;
- UPS system operation and maintenance manual;
- engine operation and maintenance manuals;
- engine spare parts manuals;
- thruster operation and maintenance manuals;
- thruster spare parts manuals;
- switchboard operation and maintenance manual;
- operation and maintenance manuals for all engineering equipment on board vessel;
- operation and maintenance manuals for the communication systems;
- documents showing hardware and software version numbers of relevant systems;
- appropriate back up copies of software where possible.

4.8 Planned Maintenance

DP vessels will have a planned maintenance system (PMS) to comply with the ISM Code. The PMS could include the following:

- DP system;
- UPS;
- power management system;
- switchboards;
- all relevant engine room equipment;
- auxiliaries;
- thrusters;
- oil sampling;
- communication systems.

Records of all maintenance and modifications carried out on these systems should be readily available.

4.9 Schematic Drawings

Drawings should be available on the vessel describing the layout of all systems including all modifications that have been made. Such schematic drawings could include, but not be limited to:

- DP systems;
- alarm systems;
- position referencing systems;
- power production systems;
- power distribution systems;
- UPS system;
- propulsion and steering and their control systems;
- communications systems.

Relevant duplicate drawings should be made available at the DP operations room and/or on computer as well as in the relevant company office.

4.10 System Architecture

An index on the vessel and in the company office detailing all the documentation kept and its location in order that the information can be accessed easily when required. This could be kept in both electronic and hard copy formats. A system should be established to update documents when modifications or equipment changes are made.

Examples of IMCA Guidance Relating to DP Operations

Visit the IMCA website at www.imca-int.com/searchresults for a list of all current guidance and to identify what other documents might apply to the specific vessel/operations.

IMCA Marine Division Guidance

IMCA M 103	*Guidelines for the design and operation of dynamically positioned vessels*
113 IMO	*Guidelines for vessels with dynamic positioning systems (MSC Circular 645)*
115 DPVOA	*Risk analysis of collision of dynamically positioned support vessels with offshore installations (revised)*
IMCA M 117	*The training and experience of key DP personnel*
118 DPVOA	*Failure modes of Artemis Mk IV position referencing system*
IMCA M 119	*Fires in machinery spaces on DP vessels*
121 DPVOA	*DP position loss risks in shallow water*
IMCA M 125	*Safety interface document for a DP vessel working near an offshore platform*
127 DPVOA	*Guidelines to the issue of a flag state verification acceptance document*
IMCA M 134	*A comparison of moored and dynamically positioned diving support vessels*
IMCA M 140	*Specification for DP capability plots*
IMCA M 141	*Guidelines on the use of DGPS as a position reference in DP control systems*
IMCA M 149	*Common Marine Inspection Document*
IMCA M 151	*The basic principles and use of hydroacoustic position reference systems in the offshore environment*
IMCA M 159	*Guidance on thruster-assisted station keeping by FPSOs and similar turret-moored vessels*
IMCA M 163	*Guidelines for the quality assurance and quality control of software*
IMCA M 166	*Guidance on failure modes and effects analysis (FMEA)*
IMCA M 167	*Guidance on using the eCMID and the CMID inspection report database*
IMCA M 174	*A review of the Artemis Mark V positioning system*
182 MSF	*International guidelines for the safe operation of dynamically positioned offshore supply vessels*
IMCA M 185	*Considerations about the use of hold-back vessels during DP diving operations*
IMCA M 189	*Marine inspection for small workboats (Common marine inspection document for small workboats)*
IMCA M 190	*Guidance for developing and conducting annual DP trials programmes for DP vessels*
IMCA M 191	*Guidelines for annual DP trials for DP mobile offshore drilling units*
IMCA M 196	*Guidance on the design, selection, installation and use of uninterruptible power supplies onboard vessels*
IMCA M 199	*Guidelines on installation and maintenance of DGNSS-based positioning systems*
IMCA M 200	*Deep water acoustic positioning*
IMCA M 203	*Guidance on simultaneous operations (SIMOPS)*
IMCA M 206	*A guide to DP electrical power and control systems*
IMCA M 209	*RadaScan microwave radar sensor for dynamic positioning operations*
IMCA M 212	*Example of an annual DP trials report*
IMCA M 219	*Example specification for a DP FMEA for a new DP vessel*
IMCA M 220	*Guidance on operational activity planning*
IMCA M 223	*Guidance for the positioning of dynamically positioned (DP) jack-up vessels on and off the seabed*
IMCA M 224	*Guidance on RADius relative positioning system*
IMCA M 225	*Example redundancy concept and annual DP trials for a DP class 3 construction vessel*
IMCA M 229	*Mini RadaScan microwave radar sensor for dynamic positioning operations*

IMCA Competence Assurance & Assessment Guidance

IMCA C 002 *Guidance on competence assurance and assessment: Marine Division*

IMCA Diving Division (including AODC) Guidance

IMCA D 010 *Diving operations from vessels operating in dynamically positioned mode*

IMCA Offshore Survey Division Guidance

IMCA S 023 *Guidelines on the shared use of sensors for survey and positioning purposes*