Offshore Support Vessels - Ripe for an Independent Regulatory Regime

Francis Tang, A. K. Seah, and W. F. Cheung

American Bureau of Shipping
438 Alexandra Road, #10-00 Alexandra Point, Singapore 119958

ABSTRACT

Since the introduction of IMO Resolution A.469(XII) in 1981, supply vessels have been recognized as a vessel type that is unique in many respects from the regulatory perspective. While this resolution addresses chiefly the stability criteria, which were then considered deserving a different treatment from that of conventional cargo vessels, it did not go far enough as it left other statutory requirements that were, arguably, just as deserving, untouched. Over the years, many compromises have to be made by designers, and many exemptions on a case-by-case basis have to be sought from Flag Administrations. This paper attempts to summarize some of these issues with a view to illustrate that perhaps IMO should accord OSVs with due independence in the form of a code, just as it did for gas carriers, chemical carriers and high-speed crafts.

Meanwhile, IMO issued several non-mandatory documents relating to operational aspects of OSVs that are important for their safety and environmental performance. This paper discusses these documents and their impact on OSVs.

As OSVs become bigger, more powerful, more technology-intensive, and packed with more functional roles, all to serve the needs for supporting offshore activities in deeper waters and harsher environments and increasingly further away from shore bases, this papers argues that the time is ripe for OSVs to have their own independent regulatory regime. More deserving now than ever before.

INTRODUCTION

When supply vessels were first introduced into the marine industry many years ago, the objectives were simple; to transport people, equipment and supplies between shore sites and various offshore installations. Those were the supply vessels then.

Nowadays, these vessels are often involved in towing, anchor handling, fire fighting, underwater inspection and positioning of mobile drilling rigs, as well as assisting in various offshore construction works, and in some cases, the provision of certain specialty services.

Perhaps that is how the terminology evolved from ‘offshore supply vessels’ to what they are now more commonly referred to as ‘offshore support vessels’. The evolution of this specific vessel type has been well recognized, and perhaps will soon be reaching its stage of maturity.

As more and more offshore support vessels were being deployed in offshore sites, the IMO, in recognizing that the design and normal operation of such vessels were somewhat different from those of conventional cargo ships consequently introduced the IMO Resolution A.469(XII) in 1981. Clearly, such vessels were different when one seeks to understand the intent of the regulations as applicable for general cargo vessels and for offshore support vessels. And in this regard, the application of the International Convention for the Safety of Life at Sea, 1974 is often inappropriate for such vessels.
This resolution however, addresses primarily the stability criteria, which were then considered deserving special treatment from that of conventional cargo vessels. It did not address other statutory aspects, which were perhaps, just as deserving.

Accordingly, due to the unique design of support vessels which ought to have been addressed with this resolution, but which was not, various compromises have to be made by designers, and exemptions had to be sought from the Flag Administrations on a case-by-case basis. Some of these are further elaborated in the following sections.

COMMON ISSUES OF CONTENTION

Navigational Lights Arrangement

As per the requirements of COLREG ’72, for vessels greater that 50m in length, they are to be provided with both a forward and aft masthead lights. In addition, the horizontal distance between the forward and aft masthead lights is not to be less than 0.5L. Currently, the majority of offshore support vessels are often in the 60m – 70m range. For these vessels, and those greater in length, it would not be practical to meet this requirement as this would then lead to the aft mast being located somewhere on the cargo deck.

In addition, the stern lights, aft anchor lights and towing lights are required to be placed as close as practicable to the stern. Again, for offshore support vessels, this would not be practical due to the unique operational requirement for unobstructed stern area for cargo stowing and cargo handling in offshore environments, as well as for duties such as anchor handling and towing.

The usual practice in such cases would be for the owners to approach the Flag Administration for waivers which is usually granted with certain conditions. For instance, one such requirement would be that the minimum spacing of lights where carried in a vertical line shall be spaced at least a meter apart and another would require that the after deck be illuminated with a searchlight to give other ships a warning of the ship’s after end.

Navigation Bridge Visibility

SOLAS Regulations V/22 requires vessels to comply with specific requirements with regards to their navigation bridge deck layout and arrangement. In particular, the ship’s sides are to be visible from the bridge wings. Most offshore support vessels do not have bridge wings. Contrary to these requirements, such vessels often employ a set-in wheelhouse configuration.

Typically, by addressing the intent of the regulations; insofar as the field of vision and arc of visibility is satisfactorily addressed from the navigation bridge layout, we would accept the as-designed bridge configuration.

Guard Rails

The International Convention of Load Lines 1966 requires the existence of guardrails or bulwarks to be fitted on exposed decks for crew protection. As indicated above, operationally anchor handling and towing require the stern ends of these vessels to be open-ended and it is not practical to have permanent fixtures such as guard rails or bulwarks. Although it has not been specifically spelt out, the industry practice has been to provide portable rails at the stern area for crew protection.
Double Bottom

SOLAS Regulations II-1/12-1 requires double bottoms to be fitted for vessels as far as practicable. Commonly encountered OSV designs have well streamlined hull forms and a large skeg to improve maneuverability and towing function. As a result, designers are often hard pressed to fit double bottoms in these engine rooms of limited vertical space. Where the fitting of double bottom has been found to be impracticable, the acceptable practice, as has been interpreted by some Administrations, is to require survivability in the event of assumed flooding of the engine room. Thus, when encountered with these configurations, we would normally request designers to perform a one-compartment damage stability analysis with regards to the space in consideration.

Stern Tubes

SOLAS Regulations II-1/11.9 requires that stern tubes to be enclosed in a watertight space of moderate volume. For reasons cited above for aft end double bottoms, vessel survivability in the event of assumed damage to engine room compartment can be accepted as an alternative.

Stability

One of the key objectives of IMO Resolution A.469(XII) was to address the stability issue of OSVs. The general intact stability criteria applicable for all ships are also recommended for OSVs. However, in the event where compliance with the foregoing criteria is impracticable due to the vessel’s characteristics, an alternative criteria is available (see Table 1).

In addition to meeting intact stability requirements for OSVs, due consideration should also be given to damage stability. With damage assumptions as recommended by IMO Resolution A.469(XII) as follows:

- Longitudinal extent: assumed to occur anywhere in the vessel’s length between transverse watertight bulkheads.
- Vertical extent: assumed from the underside of the cargo deck or the continuation thereof, for the full depth of the vessel.
- Transverse extent: assumed as 760 mm, measured inboard from the side of the vessel perpendicularly to the centerline at the level of the summer load waterline.

In the final stage of flooding, the angle of heel due to unsymmetrical flooding should not exceed 15°. This angle may be increased up to 17° if no deck immersion occurs. In addition, the righting lever curve should have a range of at least 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 100 mm within this range.

SUMMARY

Lately, we have noticed a trend that is becoming apparent in the industry; that is the support vessels that are being ordered and built are getting bigger, and more technologically advanced. All of these, presumably due to the fact that the search for oil has led to deeper waters, further away from shore bases, and requiring more powerful, technologically intensive support vessels to play their crucial roles. It is perhaps the right time now for the IMO to look beyond the regulation A.469(XII) (as amended) in their recognition of the uniqueness in design and service operation of offshore support vessels by according such vessels a code from the regulatory perspective.
RECENT STATUTORY DEVELOPMENTS AFFECTING OFFSHORE SUPPORT VESSELS

The unique features of OSV design and operations have not gone unheeded by IMO. In this respect several documents have been adopted by IMO over the years. While these documents contain requirements that are mostly voluntary, at least one has been made mandatory through MARPOL. It is therefore advisable for designers and operators to review these documents at least to appreciate the kind of regulatory changes that could be forthcoming. These IMO documents are briefly reviewed as follows.

IMO Resolution A.863(20) – Code of safe practice for the carriage of cargoes and persons by offshore supply vessels [OSV Code]

This document was adopted by IMO General Assembly on 27 Nov 1997 in view of the specialised operations of OSVs which may expose both personnel and cargoes onboard to additional hazards and recognising further that with proper practice in operation and management of OSVs when interfacing with offshore installations, such hazards may be minimised and avoided.

Such situations can be dangerous especially when stowed cargoes have low friction coefficients and tends to float or move about.

Other issues are further detailed in the Code such as pre-planning, cargo stowage and securing, port operations and operations at the offshore installation with regards to offshore supply vessels’ operations.

IMO Resolution A.673(16) – Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels – As amended by IMO Resolution MEPC.158(55) and MSC.236(82)

IMO Resolutions A.673(16) was adopted by the General Assembly on 19 October 1989 recognizing that OSVs are called upon to carry hazardous materials to and from offshore installations, but that the quantity they carry are limited and therefore do not necessitate full compliance with prevailing IMO requirements in transportation of hazardous materials as contained in International Bulk Chemical (IBC) Code and MARPOL Annex II. The Resolution thus provides alternative safety and pollution prevention requirements for OSVs when carrying limited quantities of hazardous materials. These requirements are voluntary and have not been implemented, until now.

With the recent reclassification of chemicals by the IMO via the amendments to MARPOL Annex II and the IBC Code that was effected 01 January 2007, offshore supply vessels would now be required to comply with the operational and handling requirements as indicated in Resolution A.673(16), which are being amended by IMO Resolutions MEPC.158(55) and MSC.236(82).

For application of the Guidelines, “limited quantities” means that the aggregate quantity of bulk liquids as identified in 1.2.2 (of the Guidelines, as amended) is any amount not exceeding a maximum which is the lesser of 800m³ or a volume in cubic metres equal to 40% of the vessel’s deadweight calculated at a cargo density of 1.0.
For provisions regulating the transport of dangerous goods and marine pollutants in packaged form, including transport of dangerous goods in portable tanks, reference is made to the IMDG Code.

For well-stimulation vessels which are permitted to carry more than the maximum amounts as specified above, such vessels should be designed to meet the requirements for subdivision, intact and damage stability contained in the Guidelines for the Design and Construction of Offshore Supply Vessels 2006 (Resolution MSC.235(82)), but with damage occurring anywhere in the ship’s length at any transverse watertight bulkhead.

Location of cargo tanks containing such products subject to the provisions of the Guidelines should be located at least 760mm measured inboard from the side of the vessel perpendicular to the centreline at the level of the summer load waterline.

Tanks containing cargo or residues of cargo subject to the provisions of the Guidelines should also be segregated from machinery spaces, propeller shaft tunnels, dry cargo spaces, accommodation and service spaces and from drinking water and stores for human consumption, by means of a cofferdam, void space, cargo pump-room, empty tank, oil fuel tank, or other similar space. On deck stowage of independent tanks or installing independent tanks in otherwise empty hold spaces should be considered as satisfying this requirement.

For cargoes which react in a hazardous manner with other cargoes or oil fuels, further requirements for segregation, separate pumping and piping systems and separate tank venting systems are required as detailed in the Guidelines.

Cargo piping should not pass through any accommodation, service or machinery space other than cargo pump-rooms or pump-rooms. Pumps, ballast lines, vent lines and other similar equipment serving permanent ballast tanks should be independent of similar equipment serving cargo tanks.

Bilge pumping arrangements for cargo pump-rooms or for hold spaces in which independent cargo tanks are installed should be situated entirely within the cargo area (as defined in 1.3.1 of the Guidelines).

For integral tanks, where not bounded by bottom shell plating, fuel oil tanks, cargo pump-room or pump-room, such tanks should be surrounded by cofferdams. Tanks for other purposes (except fresh water and lubricating oils) may be accepted as cofferdams for these tanks. Cargo tanks may extend to the deck plating, provided dry cargo is not handled in that area. Where dry cargo is handled on the deck area above a cargo tank, the cargo tank may not extend to the deck plating unless a continuous, permanent deck sheathing of wood or other suitable material of appropriate thickness and construction is fitted. Cargoes subject to the Guidelines should not be carried in either fore or aft peak tanks.

Further requirements on the location of other spaces relative to cargo space is mentioned in the Guidelines. Additional requirements for fire-fighting capability, cargo tank vent systems, ventilation of cargo space, acid spill protection and vapour detection should be further noted.

In addition to the requirements as indicated in the Guidelines for pollution, it should be highlighted here that each ship certified to carry noxious liquid substances should be provided with a Cargo Record Book, a Procedure and Arrangements Manual and a Shipboard Marine Emergency Plan developed for the ship in accordance with Annex II to MARPOL 73/78.

IMO Resolution MSC.235(82) – Adoption of the guidelines for the design and construction of offshore supply vessels, 2006

The IMO in recognition that the OSV Guidelines had been adopted in 1981 were based on the requirements of SOLAS 1974 (as amended in that year), while further amendments have since been adopted which may affect the Guidelines and in being desirous of keeping the OSV Guidelines up to date, adopts the Annex as set out in this Resolution.

MSC.235(82) which will supersede A.469(XII) has various important issues that warrants some highlight. Some of the more important aspects of these revisions are further elaborated herein.

Offshore Support Vessels (OSV) increasingly involve in more specialised work sometimes in deep waters and at greater distance from shore. These types of work often required the vessel to be located precisely in the target area, at the same time be able to effectively move away temporary when the situation arises and quickly
return to complete the work. For this type of operations, the vessel would be fitted with a dynamically positioning system and this system becomes an important feature of the support vessel.

For simple material or supply goods handling offshore and towing functions, a support vessel having DPS-1 notation may be deemed adequate. For other specialised activities such as diving support or fire fighting duties, the offshore industries are increasingly demanding OSV owners to provide a more reliable and robust methods of positioning. Accordingly, OSVs have to meet greater redundancy requirements, complying with at least IMO class 2 equipment or having a DPS-2 notation.

Dynamic position system was well recognised in the marine sectors and have brought many advantages for vessels or units operating around offshore structures. Following the NMD publication “Guidelines for Dynamic Positioning Vessels” in 1983, in 1994 IMO issued MSC/Circ.645, Guidelines for Vessel with DP. At about the same time, main classification societies had drawn up specific Rules for DP systems. As the offshore business flourished during the 90s, marine contractor and operator association (IMCA) and IMO issued various Guidelines for dynamic positioning system and specific training requirements. These Guidelines are contained in IMCA M103, M182 and IMCA 117 that complement the IMO document MSC/Cir.738.

On intact stability requirements, the previous intact stability paragraphs found in A.469(XII) is replaced with a reference to the IS Code (Code on Intact Stability for all types of ships covered by IMO instruments, as amended). The requirements of the equivalent intact stability criteria as applicable for OSVs are also incorporated in the IS Code under Chapter 4 of the Code – Special criteria for certain types of ships.

With regards to subdivision and damage stability requirements, a new longitudinal extent of damage is detailed in this part of the Guidelines. For vessels with length greater than 43m, the longitudinal extent of damage would be 3m plus 3% of the vessel’s length. For those with length not greater than 43m, the extent of damage should be 10% of the vessel’s length. Requirements for the transverse and vertical extent of damage remain as per the requirements of A.469(XII).

A new paragraph 3.2.7 which details that if the distance between adjacent transverse watertight bulkheads or the distance between the transverse planes passing through the nearest stepped portions of the bulkheads is less than the longitudinal extent of damage, only one of these bulkheads should be considered as effective for the damage stability analysis. The damage stability criteria remains as per the requirements of A.469(XII).

There is now also a new sub-paragraph 3.5 which states requirements for subdivisions. In addition to the familiar collision and afterpeak bulkheads requirements, the machinery space for such vessels should be separated from other working and living spaces in the hull by watertight bulkheads. Further to these, arrangements are to be made to maintain the watertight integrity of openings in watertight subdivisions in accordance to the requirements of SOLAS 1974 (as amended) for cargo ships.

CONCLUDING REMARKS

The subject paper aims to provide readers with a brief understanding on the various complex design constraints pertaining to offshore support vessels. The first part of the paper presented some of the common issues of contention that are not practical for such vessels to meet. Often these issues require the special consideration of individual flag administrations to grant waivers of some form.

The second part of the paper briefly highlights the various regulatory documents that affect offshore support vessels in their operational, design and construction aspects. Often, it can be seen that requirements contained therein refer to other IMO documentation (i.e. SOLAS, MARPOL 73/78, IBC code etc.). Given that the foreseeable number of supply/support vessels being contracted for construction are not diminishing in any way, it may be worthwhile for the IMO to give due consideration to the implementation of a code for such vessels.
<table>
<thead>
<tr>
<th>General Intact Stability Criteria</th>
<th>Equivalent Intact Stability Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area under righting lever curve</td>
<td>Area under righting lever curve</td>
</tr>
<tr>
<td>&gt; 0.055 m-rads up to 30° angle of heel, and &gt; 0.09 m-rads up to 40° or downflood.</td>
<td>&gt; 0.070 m-rads up to 15° when max. righting lever occurs at 15° and &gt; 0.055 m-rads up to 30° when max. righting lever occurs at 30° or above.*</td>
</tr>
<tr>
<td>Area under righting lever curve between 30° and 40° or flood</td>
<td>Area under righting lever curve between 30° and 40° or flood</td>
</tr>
<tr>
<td>&gt; 0.03 m-rads.</td>
<td>&gt; 0.03 m-rads.</td>
</tr>
<tr>
<td>Righting lever GZ</td>
<td>Righting lever GZ</td>
</tr>
<tr>
<td>&gt; 0.20 m at heel angle equal to or greater than 30°.</td>
<td>&gt; 0.20 m at heel angle equal to or greater than 30°.</td>
</tr>
<tr>
<td>Max righting arm</td>
<td>Max righting arm</td>
</tr>
<tr>
<td>Occurs at heel angle &gt; 30° but not less than 25°</td>
<td>Occurs at heel angle &gt; 15°</td>
</tr>
<tr>
<td>Initial metacentric height GM</td>
<td>Initial metacentric height GM</td>
</tr>
<tr>
<td>&gt; 0.15 m</td>
<td>&gt; 0.15 m</td>
</tr>
</tbody>
</table>

*When max righting lever occurs at between 15° and 30°, the corresponding area under the righting lever curve should be: 0.055 + 0.001(30° - θmax) m-rads. Where θmax is angle of heel at which the righting lever curve reaches its max.

Table 1. Intact Stability Requirements for OSVs [IMO Res. A.469(XII)]

REFERENCES

International Maritime Organisation (1989). “Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels”, *IMO Resolution A.673(16)*.


International Maritime Organisation (2006). “Amendments to the Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels”, *IMO Resolution MEPC.158(55)*.

International Maritime Organisation (2006). “Adoption of amendments to the Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels”, *IMO Resolution MSC.236(82)*.


International Marine Contractor Association Guidelines for Design and Operation of Dynamically Positione

Vessels (1999), IMCA M 103

International Marine Contractor Association Guidelines for the Safe Operation of Dynamically Positioned Offshore Support Vessels, IMCA M 182

International Marine Contractor Association Guidelines for the Training and Experience of Key DP Personnel, IMCA 117