



**OTC 20062**

## **Changes in Anchoring Rules and Regulations for MODUs**

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### **Abstract**

The past few years have seen the updating of codes for the use of drag embedment anchors (fluke and plate anchors). Examples are the specific requirements for drag embedment anchors in the Gulf of Mexico due to the hurricanes and the updating of anchor codes in Norway. This paper will summarize the current rules and recommended practices for drag embedment anchors and their application. It will then show the effect on drag embedment anchors and the application for MODU moorings.

### **Introduction**

Most floating MODUs are moored using drag embedment anchors, either fluke or plate anchors. Setting of the anchors using conventional guidelines has generally been sufficient to ensure a safe mooring. However recent hurricanes in the Gulf of Mexico resulted in a number of mooring failures. Storms in the North Sea have also resulted in a number of mooring failures. These mooring failures and specifically anchor failures have resulted in new guidelines and regulations being developed for among others the Gulf of Mexico region and the Norwegian section of the North Sea. This paper will focus on these guidelines / regulations with regards to the use of drag embedment anchors for MODU operations.

### **Background**

#### **Gulf of Mexico**

In the period 2002 to 2008 a number of severe hurricanes passed through the Gulf of Mexico region causing severe damage to offshore infrastructure. Damage consisted of floating MODUs drifting off station due to mooring line failures and damage to fixed platforms and jack-ups. During hurricanes Ivan (2004), Katrina and Rita (both 2005) a total of 17 moored MODUs broke free from their moorings and drifted off-station for a distance larger than 1 mile. Of these, only four cases reported the drag embedment anchors dragging for a significant distance. The damage that occurred to the platforms has led to the development of interim guidance for the 2006 and 2007 hurricane seasons (API 2006) and an amendment to API RP 2SK (API 2008).

#### **North Sea**

The regulation of offshore safety in UK Continental Shelf (UKCS) is the role of Health and Safety Executive (HSE) and Department of Energy. In Norwegian Continental Shelf this role is shared by Norwegian Maritime Directorate (NMD), Petroleum Safety Authority (PSA) and Norwegian Petroleum Directorate (NPD).

For the UK continental shelf the audits and accident statistics between 1981 and 2003 are published by Health and Safety Executive (HSE 2005). Within this period, among 3485 reported incidents on all moored units (permanent and mobile), 240 incidents relate to mooring system failures (a failure frequency of about 0.2). The mooring system failures include problems with mooring lines, mooring devices, winching equipment or fairleads, and anchors. Among the 240 mooring incidents only 34 incidents are categorized as accidents, the rest are incidents of near misses or insignificant situations. Only one of the 34 incidents categorized as accident relates to anchor drag due to one line being damaged and the tension control on the winches could not be implemented.