There is a growing interest in using marine phospholipids (PL) as ingredient for food fortification due to their numerous health benefits. However, the use of marine PL for food fortification is a challenge due to the complex nature of the degradation products that are formed during the handling and storage of marine PL. For example, nonenzymatic browning reactions may occur between lipid oxidation products and primary amine group from phosphatidylethanolamine or amino acid residues that are present in marine PL. Therefore, marine PL contain products from nonenzymatic browning and lipid oxidation reactions, namely, Strecker aldehydes, pyrroles, oxypolymers, and other impurities that may positively or negatively affect the oxidative stability and quality of marine PL. This review was undertaken to provide the industry and academia with an overview of the current understanding of the quality changes taking place in PL during their production and their storage as well as with regards to their utilization for food fortification.