



Exploration & Production

GENERAL SPECIFICATION

PIPELINES - RISERS

GS PLR 102

Design of submarine pipelines as per **API RP 1111**
and **ANSI B 31.4/31.8**

01	10/03	Change of Group name and logo
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Rev.	Date	Notes



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1. Scope

This General Specification is supplementing the **GS PLR 100** when the applicable reference for a specific project is either the **ANSI B 31.4** or the **ANSI B 31.8**.

In addition, the **DNV 81** rules shall be used whenever the prime reference documents are silent, especially for in-place stability analysis.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
ANSI B 31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
ANSI B 31.8	Gas Transmission and Distribution Piping System

Professional Documents

Reference	Title
API RP 1111	Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines
DNV 81	Rules for Submarine Pipeline Systems

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS PLR 000	General Specification Catalogue
GS PLR 100	Submarine Pipeline Systems

3. Amendments to ANSI B31.4 and B31.8

3.1 Yielding

The maximum allowable stress levels shall be determined for each section of the **Pipeline System**, according to the **API RP 1111** and the recorded stress levels shall be compared to the relevant maximum allowable values.

3.2 Local buckling

Local collapse analysis shall be based on **API RP 1111** and the recommended Safety Factor is **1.5**.

If results indicate any possibility of **buckling**, further analysis shall be made in accordance with par. 3.3 below and allowing for constraints during installation.

3.3 Propagation buckling

The propagation buckling pressure P_p shall be determined as per the next formula and shall then be compared to the external overpressure, that is $(P_e - P_i)$ where P_e is the external (hydrostatic) pressure at a given waterdepth:

$$P_p = 24 S \left[\frac{t}{d} \right]^{2.4} \quad \text{where:}$$

$S = \text{SMYS}$
 $t = \text{Wall thickness of the pipe}$
 $d = \text{Outside diameter on the pipe}$

For a safe approach, the buckling propagation pressure should be not less than 1.4 times the prevailing hydrostatical pressure at the considered location.

3.4 Bar buckling

Buckling of pipelines under longitudinal compression shall be analysed in accordance with **API RP 1111**. If the compression thrust load is significant then elastic limits shall be reanalysed taking into account lateral deformation using large deformation analysis.

3.5 Upheaval buckling

This particular check is not covered by the applicable reference but more recent DNV codes such as **DNV OS F 101** section D606 are reflecting the upheaval buckling concerns.

3.6 Cyclic loads and fatigue

Calculation of vibrations due to turbulence shall be made in accordance with **API RP 1111**.



3.7 In-place stability

The assessment of the hydrodynamic loads and the stability analysis shall be performed according to **GS PLR 100** requirements.