

**BUREAU
VERITAS**

Rules for the Classification of Tension Leg Platforms (TLP)

July 2012

**Rule Note
NR 578 DT R00 E**

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MARINE DIVISION

GENERAL CONDITIONS

ARTICLE 1

1.1. - BUREAU VERITAS is a Society the purpose of whose Marine Division (the "Society") is the classification ("Classification") of any ship or vessel or structure of any type or part of it or system therein collectively hereinafter referred to as a "Unit" whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

The Society:

- prepares and publishes Rules for classification, Guidance Notes and other documents ("Rules");
- issues Certificates, Attestations and Reports following its interventions ("Certificates");
- publishes Registers.

1.2. - The Society also participates in the application of National and International Regulations or Standards, in particular by delegation from different Governments. Those activities are hereafter collectively referred to as "Certification".

1.3. - The Society can also provide services related to Classification and Certification such as ship and company safety management certification; ship and port security certification, training activities; all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board.

1.4. - The interventions mentioned in 1.1., 1.2. and 1.3. are referred to as "Services". The party and/or its representative requesting the services is hereinafter referred to as the "Client". **The Services are prepared and carried out on the assumption that the Clients are aware of the International Maritime and/or Offshore Industry (the "Industry") practices.**

1.5. - The Society is neither and may not be considered as an Underwriter, Broker in ship's sale or chartering, Expert in Unit's valuation, Consulting Engineer, Controller, Naval Architect, Manufacturer, Shipbuilder, Repair yard, Charterer or Shipowner who are not relieved of any of their expressed or implied obligations by the interventions of the Society.

ARTICLE 2

2.1. - Classification is the appraisal given by the Society for its Client, at a certain date, following surveys by its Surveyors along the lines specified in Articles 3 and 4 hereafter on the level of compliance of a Unit to its Rules or part of them. This appraisal is represented by a class entered on the Certificates and periodically transcribed in the Society's Register.

2.2. - Certification is carried out by the Society along the same lines as set out in Articles 3 and 4 hereafter and with reference to the applicable National and International Regulations or Standards.

2.3. - It is incumbent upon the Client to maintain the condition of the Unit after surveys, to present the Unit for surveys and to inform the Society without delay of circumstances which may affect the given appraisal or cause to modify its scope.

2.4. - The Client is to give to the Society all access and information necessary for the safe and efficient performance of the requested Services. The Client is the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out.

ARTICLE 3

3.1. - The Rules, procedures and instructions of the Society take into account at the date of their preparation the state of currently available and proven technical knowledge of the Industry. They are not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.

Committees consisting of personalities from the Industry contribute to the development of those documents.

3.2. - The Society only is qualified to apply its Rules and to interpret them. Any reference to them has no effect unless it involves the Society's intervention.

3.3. - The Services of the Society are carried out by professional Surveyors according to the applicable Rules and to the Code of Ethics of the Society. Surveyors have authority to decide locally on matters related to classification and certification of the Units, unless the Rules provide otherwise.

3.4. - The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not in any circumstances involve monitoring or exhaustive verification.

ARTICLE 4

4.1. - The Society, acting by reference to its Rules:

- reviews the construction arrangements of the Units as shown on the documents presented by the Client;
- conducts surveys at the place of their construction;
- classes Units and enters their class in its Register;
- surveys periodically the Units in service to note that the requirements for the maintenance of class are met.

The Client is to inform the Society without delay of circumstances which may cause the date or the extent of the surveys to be changed.

ARTICLE 5

5.1. - The Society acts as a provider of services. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty.

5.2. - The certificates issued by the Society pursuant to 5.1. here above are a statement on the level of compliance of the Unit to its Rules or to the documents of reference for the Services provided for.

In particular, the Society does not engage in any work relating to the design, building, production or repair checks, neither in the operation of the Units or in their trade, neither in any advisory services, and cannot be held liable on those accounts. Its certificates cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.

5.3. - The Society does not declare the acceptance or commissioning of a Unit, nor of its construction in conformity with its design, that being the exclusive responsibility of its owner or builder, respectively.

5.4. - The Services of the Society cannot create any obligation bearing on the Society or constitute any warranty of proper operation, beyond any representation set forth in the Rules, of any Unit, equipment or machinery, computer software of any sort or other comparable concepts that has been subject to any survey by the Society.

ARTICLE 6

6.1. - The Society accepts no responsibility for the use of information related to its Services which was not provided for the purpose by the Society or with its assistance.

6.2. - If the Services of the Society cause to the Client a damage which is proved to be the direct and reasonably foreseeable consequence of an error or omission of the Society, its liability towards the Client is limited to ten times the amount of fee paid for the Service having caused the damage, provided however that this limit shall be subject to a minimum of eight thousand (8,000) Euro, and to a maximum which is the greater of eight hundred thousand (800,000) Euro and one and a half times the above mentioned fee.

The Society bears no liability for indirect or consequential loss such as e.g. loss of revenue, loss of profit, loss of production, loss relative to other contracts and indemnities for termination of other agreements.

6.3. - All claims are to be presented to the Society in writing within three months of the date when the Services were supplied or (if later) the date when the events which are relied on were first known to the Client, and any claim which is not so presented shall be deemed waived and absolutely barred. Time is to be interrupted thereafter with the same periodicity.

ARTICLE 7

7.1. - Requests for Services are to be in writing.

7.2. - Either the Client or the Society can terminate as of right the requested Services after giving the other party thirty days' written notice, for convenience, and without prejudice to the provisions in Article 8 hereunder.

7.3. - The class granted to the concerned Units and the previously issued certificates remain valid until the date of effect of the notice issued according to 7.2. here above subject to compliance with 2.3. here above and Article 8 hereunder.

7.4. - The contract for classification and/or certification of a Unit cannot be transferred neither assigned.

ARTICLE 8

8.1. - The Services of the Society, whether completed or not, involve, for the part carried out, the payment of fee upon receipt of the invoice and the reimbursement of the expenses incurred.

8.2. Overdue amounts are increased as of right by interest in accordance with the applicable legislation.

8.3. - The class of a Unit may be suspended in the event of non-payment of fee after a first unfruitful notification to pay.

ARTICLE 9

9.1. - The documents and data provided to or prepared by the Society for its Services, and the information available to the Society, are treated as confidential. However:

- clients have access to the data they have provided to the Society and, during the period of classification of the Unit for them, to the **classification file** consisting of survey reports and certificates which have been prepared at any time by the Society for the classification of the Unit;
- copy of the documents made available for the classification of the Unit and of available survey reports can be handed over to another Classification Society, where appropriate, in case of the Unit's transfer of class;
- the data relative to the evolution of the Register, to the class suspension and to the survey status of the Units, as well as general technical information related to hull and equipment damages, are passed on to IACS (International Association of Classification Societies) according to the association working rules;
- the certificates, documents and information relative to the Units classed with the Society may be reviewed during certifying bodies audits and are disclosed upon order of the concerned governmental or inter-governmental authorities or of a Court having jurisdiction.

The documents and data are subject to a file management plan.

ARTICLE 10

10.1. - Any delay or shortcoming in the performance of its Services by the Society arising from an event not reasonably foreseeable by or beyond the control of the Society shall be deemed not to be a breach of contract.

ARTICLE 11

11.1. - In case of diverging opinions during surveys between the Client and the Society's surveyor, the Society may designate another of its surveyors at the request of the Client.

11.2. - Disagreements of a technical nature between the Client and the Society can be submitted by the Society to the advice of its Marine Advisory Committee.

ARTICLE 12

12.1. - Disputes over the Services carried out by delegation of Governments are assessed within the framework of the applicable agreements with the States, international Conventions and national rules.

12.2. - Disputes arising out of the payment of the Society's invoices by the Client are submitted to the Court of Nanterre, France.

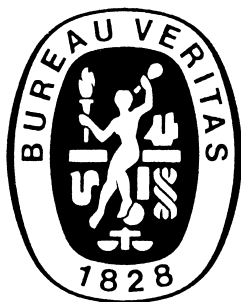
12.3. - Other disputes over the present General Conditions or over the Services of the Society are exclusively submitted to arbitration, by three arbitrators, in London according to the Arbitration Act 1996 or any statutory modification or re-enactment thereof. The contract between the Society and the Client shall be governed by English law.

ARTICLE 13

13.1. - These General Conditions constitute the sole contractual obligations binding together the Society and the Client, to the exclusion of all other representation, statements, terms, conditions whether express or implied. They may be varied in writing by mutual agreement.

13.2. - The invalidity of one or more stipulations of the present General Conditions does not affect the validity of the remaining provisions.

13.3. - The definitions herein take precedence over any definitions serving the same purpose which may appear in other documents issued by the Society.



RULE NOTE NR 578

NR 578

Rules for the Classification of Tension Leg Platforms (TLP)

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SECTION 1GENERAL

1 General

1.1 Application

1.1.1 The present Note provides requirements for the classification of Tension Leg Platforms (TLP) intended for various offshore services.

1.1.2 The requirements of the present Note apply only for units intended to be granted the class notations specified in [1.2].

1.1.3 The requirements of the present Note are complementary to provisions of the Offshore Rules, Pt A, Pt B and Pt C, which remains applicable, except where otherwise specified in the present Note.

1.1.4 The requirements of the present Section are consistent with the recommendations of API RP 2T. The Society may refer to this standard when deemed necessary, in order to define minimum criteria for classification purpose.
Interpretations of API RP 2T and additional requirements are given in the present Note.

1.1.5 When relevant requirements of IMO MODU Code, as amended, applicable for column stabilized units, are referenced in the present Note, these requirements are adopted as minimum criteria for classification purpose.

1.2 Class notations

1.2.1 Structural type notation

The provisions of the present Note apply to floating units intended to be granted the structural type notation **offshore TLP**, as defined in Pt A, Ch 1, Sec 2 of the Offshore Rules.

1.2.2 Service notations

Units covered by the present Note may be granted relevant service notations defined in Pt A, Ch 1, Sec 2, [4.2] of the Offshore Rules. Usual service notations for TLP are given in Tab 1.

Table 1 : Usual service notations for TLP

Service notation	Description
production	For units intended to oil production and fitted with production plant
gas production	For units intended to gas production and fitted with gas production plant
drilling	For units intended to drilling activities and fitted with drilling equipment
accommodation	For units intended to accommodate offshore personnel
special service (dry wellhead support)	For units intended to provide offshore support of dry wellheads

1.2.3 Additional service features

The additional service features given in Tab 2, and defined in Pt A, Ch 1, Sec 2, [7] of the Offshore Rules are mandatory for units covered by the present Note.

Table 2 : Additional service features

Additional service feature	Items covered
AUTO	Automated installations enabling periodically unattended operations of machinery spaces
HEL	Helideck fitted onboard the unit

1.2.4 Additional features TLS and TLS PLUS

One of the additional features **TLS** or **TLS PLUS** is mandatory for units covered by the present Note.

The additional feature **TLS** covers the classification of tendon legs system, including tendons and their components, top and bottom connectors and foundations. Specific requirements for this additional feature are given in Sec 6 of the present Note. In principle, additional feature **TLS** adopts the same level of safety as API RP 2T.

The additional feature **TLS PLUS** may replace **TLS** upon the request of the party applying for classification. In addition to the requirements applicable for **TLS**, **TLS PLUS** requires the verification of tendon legs system under loading conditions more severe than API RP 2T, as follows:

- tendon removal condition under 100 years environment
- broken tendon condition
- flooded tendon condition.

Further requirements are given in Sec 4 and Sec 6 of the present Note.

Requirements for foundations are given in Sec 7.

1.2.5 Site, transit and navigation notations

Site and transit notations are to be granted in accordance with the provisions of Pt A, Ch 1, Sec 2, [5] of the Offshore Rules. Navigation notations are not relevant for classification of TLP.

For towing/transit phase, TLP are to be granted with the notation **transit-specific criteria**. Criteria for the assessment in towing/transit phase are based on data and assumptions specified by the party applying for classification, and stated in the Design Criteria Statement.

1.2.6 Additional class notations

The additional class notations stated in Tab 3 may be granted to units covered by the present Note. Other additional class notation as given by the Offshore Rules may be granted on a case-by-case basis.

Table 3 : Additional class notations

Additional class notation	Description	Reference for definition
ALM	Lifting and deck appliances	Pt A, Ch 1, Sec 2, [6.2.2] of the Offshore Rules
COMF HEALTH-NOISE-g	Comfort and health requirements relating to noise level	Pt A, Ch 1, Sec 2, [6.2.11] of the Offshore Rules
COMF HEALTH-VIB-g	Comfort and health requirements relating to vibration level	Pt A, Ch 1, Sec 2, [6.2.11] of the Offshore Rules
HIPS	High integrity protection systems	Pt A, Ch 1, Sec 2, [6.2.12] of the Offshore Rules
LSA	Life saving appliances	Pt A, Ch 1, Sec 2, [6.2.7] of the Offshore Rules
Spectral Fatigue	Fatigue check through spectral fatigue techniques	Pt A, Ch 1, Sec 2, [6.2.13] of the Offshore Rules NI 539 Spectral Fatigue Analysis Methodology for Ships and Offshore Units
STI (1)	Specific thickness increments	Pt A, Ch 1, Sec 2, [6.2.10] of the Offshore Rules
DRILL	Requirements for the classification of drilling equipment and installations	NR570 Classification of Drilling Equipment
PROC	Process plant on production units	Pt A, Ch 1, Sec 2, [6.2.5] of the Offshore Rules NR459 Process Systems on board Offshore Units and Installations.
RIPRO	Risers	Pt A, Ch 1, Sec 2, [6.2.6] of the Offshore Rules
RBVS-xxx	Classed units for which the Society provides risk based verification services	NI 567 Risk Based Verification of Offshore Units
IVBS	Classed units for which the Society provides independent verification services, acting as Independent Verification Body	NI 567 Risk Based Verification of Offshore Units
RBA	Units for which the classification process is carried out through a risk analysis approach	NR568 Classification of Offshore Units - Risk Based Approach
(1) The additional class notation STI defined in Pt A of the Offshore Rules may be granted to units covered by the present Note taking into account the requirements of Sec 3, [6.2].		

1.3 Society involvement

1.3.1 Scope of classification

The scope of classification for units listed above is based on an appraisal of the integrated unit covering in general:

- a) Hull, accommodation, helideck and hull attachments and appurtenances including:
 - tendon supporting structure
 - foundations for the support of topsides equipment and the hull mounted equipment
 - support structure for life saving appliances
 - passive fire protection and cathodic protection
- b) Tendon legs system, including tendons and components, top and bottom connectors and foundations, within the scope of additional feature **TLS** or **TLS PLUS**.
- c) Moonpool arrangement
- d) Intact and damage stability, in pre-service and operating conditions
- e) Marine equipment (with foundations) pertaining to the offloading facilities, if any
- f) Accommodation quarters

- g) Lifting appliances (in case of the additional class notation **ALM**)
- h) Drilling equipment and installations (in case of additional class notation **DRILL**)
- i) Process plant and components (in case of additional class notation **PROC**)
- j) Rigid or flexible risers, as relevant (in case of additional class notation **RIPRO**)
- k) High integrity pressure protecting systems, in case of additional class notation **HIPS**)
- l) Equipment and systems necessary for the safe operation of the hull and to the safety of personnel on board as defined in the Rules for the Classification of Offshore Units and related applicable Rules (taking into account the additional service features **AUTO**, and the additional class notation **LSA**)
- m) Equipment and systems installed in the hull, the failure of which may jeopardise the safety of the floating unit
- n) The fire and gas detection system for the hull as well as the definition of the hazardous areas of the hull
- o) The fire water and foam system for the protection of the hull.

1.3.2 Detailed boundaries for classification

For each project, the detailed boundaries for the classification of units covered by the present Note are defined by the Society on case-by-case basis and with reference to the requested structural type and service notations, additional class notations and additional service features.

As a rule, any foundation, support or stool, and any structural part which is welded to the hull are within the scope of the classification, independently of the additional class notations.

1.4 Design Criteria Statement

1.4.1 Classification is based upon the design data or assumptions specified by the party applying for classification. A Design Criteria Statement is to list the services performed by the unit and the design conditions and other assumptions on the basis of which class is assigned to the unit.

The Design Criteria Statement is to be issued by the Society, based on the information provided by the party applying for classification.

1.4.2 The Design Criteria Statement is to be referred to on the unit's Classification Certificates.

1.4.3 The Design Criteria Statement is to be incorporated in the Operating Manual, as stated in Pt A, Ch 1, Sec 1, [3.4] of the Offshore Rules.

1.4.4 Additional details about the Design Criteria Statement are given in Pt A, Ch 1, Sec 1, [1.6] of the Offshore Rules.

1.5 Design life

1.5.1 The requirements about "Service Life", "Design life", unit modifications and unit re-assessment are given in Pt A, Ch 1, Sec 1, [1.7] of the Offshore Rules.

1.6 Statutory requirements

1.6.1 Project specification

Prior to commencement of the review of drawings, the complete list of Rules, Codes and Statutory Requirements to be complied with must be submitted for information. This list is to detail the requirements to be complied with:

- International Rules
- Flag state requirements
- Coastal state requirements
- Owner standards and procedures
- Industry standards
- Classification notations.

The project specification is also to specify the list of Owner requested statutory certificates.

1.6.2 Conflict of Rules

In case of conflict between the Classification Rules and any Statutory Requirements as given by Flag state or Coastal State, the latter ones are to take precedence over the requirements of the present Rules.

1.6.3 IMO MODU Code

Compliance with IMO MODU Code may be required by Owner, Flag and/or Coastal State.

The Society reserves the right to refer to the requirements in IMO MODU Code, when deemed necessary.

2 Definitions

2.1 Referenced documents

2.1.1 Offshore Rules

Offshore Rules means Bureau Veritas Rules for the Classification of Offshore Units (NR445). When reference is made to the Offshore Rules, the latest version of these ones is applicable.

2.1.2 Ship Rules

Ship Rules means Bureau Veritas Rules for the Classification of Steel Ships (NR467). When reference is made to the Ship Rules, the latest version of these ones is applicable.

2.1.3 API RP 2T

API RP 2T means the recommended practice published by American Petroleum Institute "Planning, Designing and Constructing Tension Leg Platforms". When reference is made to API RP 2T, the third edition of the document, from July 2010 is concerned.

2.1.4 API 2A WSD

API 2A WSD means the standard published by American Petroleum Institute "Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms - Working Stress Design" - latest edition.

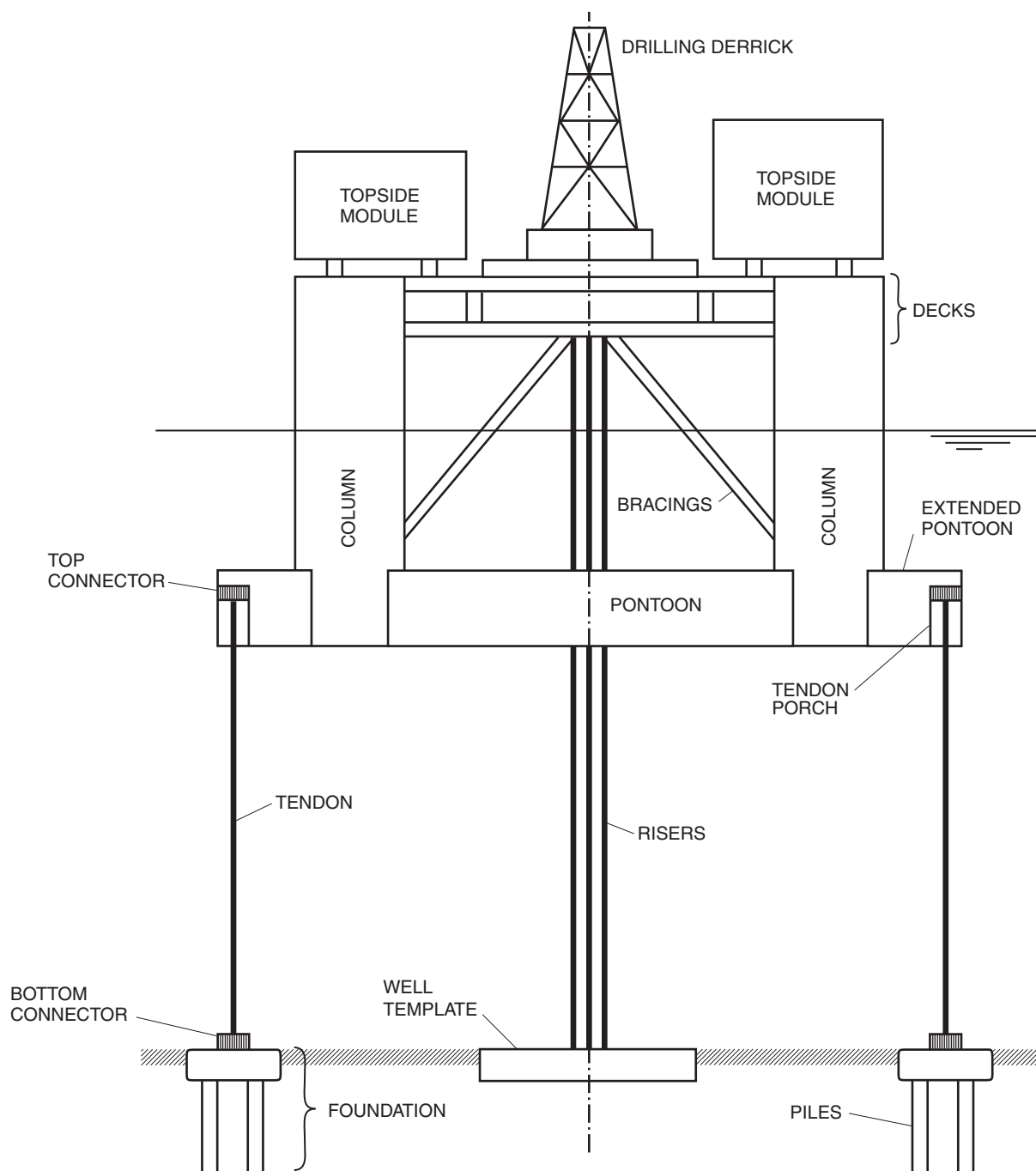
2.2 Technical definitions

2.2.1 Tension leg platforms (TLP)

Tension leg platforms are floating offshore units connected to the seabed through a tendon legs system (TLS). The TLS ensure the station keeping and restrains the motion of the unit due to wind, waves, current and tidal effects within specified limits (see Fig 1).

Tendons are pre-tensioned. Generally very stiff in axial direction, the tendons limit heave, pitch and roll responses to very small amplitudes.

Figure 1 : Example of Tension Leg Platform (TLP)



2.2.2 TLP hull

TLP hulls may be of various structural types; the most usual are as follows:

- conventional TLP, designed generally on the principle of column stabilized units with four columns, and having top tendon connectors inside the structure of columns or on tendon porches attached to the columns
- extended TLP, with smaller columns located inboard and extended pontoons; the tendons are connected at the extremities of extended pontoons
- seastar TLP, generally with one central column and at least three extended pontoons for connection of tendon legs system

- TLP designed by mixing the principles of extended and seastar TLP.

2.2.3 Tendon legs system (TLS)

Tendon legs system includes tendons, top and bottom connectors, foundations to the seabed, load measurement systems and inspection or monitoring apparatus.

Tendons may be of various types. Examples include:

- tubular members with connectors; the members may be void, partially void or flooded
- tubular or solid rod members with welded connections
- fabricated from small diameter high tensile strength wire or fiber strands, formed into bundles.

2.2.4 TLS Foundations

TLS foundations are installations at the seabed or in the seabed serving as anchoring of tendons and providing the transfer of tendons loads to soil.

2.2.5 Squeeze-pry effect

Squeeze and pry load effects are typical for column stabilized hulls under wave loads.

Squeeze effect occur when lateral loads on columns due to waves are maximum inward toward the center of the TLP, "squeezing" the columns toward each other. Prying is the opposite effect, when the lateral load is outward away from the platform center.

Squeeze and pry load effects may be determinant for the connection between columns and pontoons and for the interconnection between the hull and decks.

2.2.6 Hydrodynamic global behaviour analysis

Hydrodynamic global behavior analysis defines all hydrodynamic calculations and tests aimed to determine the effects of environmental loads on the TLP coupled with tendons and risers. Further details are given in App 1.

2.3 Other definitions

2.3.1 Definitions given in the Offshore Rules are to be considered for the purpose of the present Note.

2.3.2 Reference is also made to relevant definitions of API RP 2T.

3 Documents to be submitted

3.1 General

3.1.1 Required documentation for classification purpose is given in Pt A, Ch 1, Sec 4 of the Offshore Rules.

3.1.2 The following information is to be provided as background data, at initial stage of classification:

- environmental design data (wind, wave, current, earthquake, etc.)
- soil data
- overall architecture of the installation
- functional specification of the installation.

3.2 Additional features TLS and TLS PLUS

3.2.1 The party applying for classification is to submit to the Society all relevant drawings, available certificates and calculation reports relating to the components of tension legs system within the scope of classification, as stated in Sec 6.

The Society is to be consulted for each project in order to define the list of documents that will be subject of approval.

SECTION 2

STABILITY, WEIGHT CONTROL,
WATERTIGHTNESS AND WEATHERTIGHTNESS

1 General

1.1 Application

1.1.1 The requirements of the present Section are applicable for all units covered by the present Note, as stated in Sec 1.

1.1.2 The present Section provides requirements for intact and damage stability of TLP covering pre-service conditions and operations on the intended site.

Requirements relating to weight control, inclining tests or equivalent procedures are given in [3].

Specific requirements relating to watertight and weatertight integrity of TLP are given in [4].

1.2 Documentation to be submitted

1.2.1 General

A stability file is to be submitted by the Owner or its representative. It has to include line plans, capacity plans, justification of lightweight characteristics, definition of loading conditions, trim and stability booklet, damage stability booklet, damage control plan, damage control booklet.

1.3 Operational procedures

1.3.1 General

Adequate instructions and information related to the stability, watertightness and weathertightness of the unit are to be provided by the Owner and included in the Operating Manual. In accordance with Pt A, Ch 1 of the Offshore Rules, the procedures and operating instructions do not fall into the scope of classification and need not to be approved by the Society.

1.3.2 Operating Manual

The results of the inclining test, or deadweight survey, or inclining test adjusted for weight differences when relevant, are to be indicated in the Operating Manual.

The lightweight particulars are to include the detailed list of the equipment (cranes, accommodation, features...) located on the unit when the test has been carried out.

A record of all changes to machinery, structure, outfitting and equipment that affect the lightweight data, are to be maintained in the Operating Manual or a in a lightweight data alterations log and is to be taken into account in daily operations.

A record of correlations between calculated and measured tendon tension is to be maintained in the Operating Manual and taken into account for daily operations.

Specific procedures relating to loading instrument (see [1.3.3]) are to be included in the operating manual.

1.3.3 Loading instruments

Appropriate loading instruments/load management tools are to be provided onboard TLP during operations on the intended site in order to facilitate safe management of weight and center of gravity control and tendon tensions during service. Clear procedures for the use of loading instruments and management of its parameters are to be included in the Operating manual.

2 Stability

2.1 Pre-service conditions

2.1.1 Intact and damaged stability of units covered by the present Note during pre-service conditions, while afloat, are to comply with the requirements of Pt B, Ch 1 of the Offshore Rules, applicable for column-stabilized units.

2.1.2 The references to the Offshore Rules which are to be considered for classification of TLP are given in Tab 1.

2.1.3 For damage stability purpose, the extent of damage to be taken into account is the one assumed in [2.3].

Table 1 : References for stability requirements in pre-service conditions

Item	Reference
Stability calculations	Pt B, Ch 1, Sec 2 of the Offshore Rules
Intact stability criteria	Pt B, Ch 1, Sec 3, [1] of the Offshore Rules
Damage stability	Pt B, Ch 1, Sec 3, [3.1] and [3.3] of the Offshore Rules

2.2 On-site conditions

2.2.1 Stability of TLP for on-site condition, with tendon legs system connected is not governed by a metacentric approach. The stability is typically provided by the pretension and stiffness of the tendon system, rather than by waterplan area and moments.

2.2.2 Stability analysis of TLP for on-site conditions is to show that the system is sufficiently constrained by tendon legs system to avoid overturning. Stability checks are implicit through minimum and maximum tendon tension criteria as defined in Sec 6.

2.2.3 It is to be checked that weight changes and center of gravity shifts during the most relevant operational phases and for design loading conditions defined in Sec 4 will generate tendon tensions within the allowable minimum and maximum limits defined in Sec 6.

2.3 Extent of damage

2.3.1 In assessing the damage stability of TLP, the following extent of damage is to be assumed:

- a) Only those columns, underwater hulls and braces on the periphery of the unit are to be assumed to be damaged and the damage is to be assumed in the exposed outer portions of columns, underwater hulls and braces.

Note 1: The outer portions of a member are defined as portions located outboard of a line drawn through the centres of the peripheral columns of the unit; special consideration is to be given to units of particular design and to units provided with efficient fendering.

- b) Columns and braces are to be assumed to be flooded by damage having a vertical extent of 3 m occurring at any level between 5 m above and 3 m below the considered waterline.

Note 2: The waterline of a TLP is affected by tidal effects, storm surge, and mainly by the setdown due to environmental conditions. The vertical extent of damage is to be adjusted accordingly.

Where a watertight flat is located within this region, the damage is to be assumed to have occurred in both compartments above and below the watertight flat in question.

Lesser distances above or below the draughts may be applied to the satisfaction of the Society, taking into account the actual conditions of operation. However, in all cases, the required damage region is to extend at least 1,5 m above and below the draught specified in the Operating Manual.

- c) No vertical bulkhead fitted in columns is to be assumed to be damaged, except where bulkheads are spaced closer than a distance of one eighth of the column perimeter, at the draught under consideration, measured at the periphery, in which case one or more of the bulkheads are to be disregarded.
- d) Horizontal penetration of a member damage is to be assumed to be 1,5 m, measured at right angle to the shell of the member.
- e) Underwater hull or pontoons are to be assumed to be damaged when the unit is in a towing condition in the same manner as indicated in items a), b), d) and either item c) or item f), having regard to their shape.
- f) All piping, ventilation systems, trunks, etc., within the extent of damage are to be assumed to be damaged; positive means of closure are to be provided, in accordance with Pt B, Ch 1, Sec 4 of the Offshore Rules, at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

3 Weight control

3.1 General

3.1.1 Weight control procedure includes:

- a detailed breakdown of components and modules estimates during design phase

- weight measures or equivalent acceptable calculations of components during construction
- tracking of weights during assembly and commissioning
- inclining test.

Relevant reports and calculations are to be submitted to the Society. An inclining test is to be performed, when possible, as required in [3.2]. Alternative requirements of [3.3] are also to be considered.

3.2 Inclining test

3.2.1 An inclining test is to be carried out on each unit at the time of construction or following substantial modification during pre-service conditions, to determine accurately the lightweight data (weight and position of centre of gravity).

3.2.2 The inclining test is to take place, when the unit is as near as possible to completion, in the presence and to the satisfaction of the attending Surveyor. The test procedure is to be submitted to the Society for examination prior to being carried out.

3.2.3 The results of the inclining test are to be submitted to the Society for review.

3.3 Alternative

3.3.1 For special configurations of TLP or special installation procedures, for which an inclining test on the complete structure cannot be performed, alternative methods for determining the TLP weight and center of gravity may be accepted.

Alternative methods may include weighing of TLP or components using certified load cells. The procedures to assemble the final weight and center of gravity of the unit are to be documented to the satisfaction of the Society.

4 Watertightness and weathertightness

4.1 General

4.1.1 Units covered by the present Note are to comply with the relevant requirements of Pt B, Ch 1, Sec 4 of the Offshore Rules, applicable for column stabilized units.

4.1.2 A plan identifying the location of all watertight and weathertight closures and all non-protected openings and identifying the position open/closed of all non-automatic closing devices is to be submitted to the Society for review. This plan will be included in the Operating Manual.

4.1.3 External openings having lower edges below the levels to which weathertightness is requested are to be provided with weathertight closing appliances. Closing appliances are to effectively resist to ingress of water due to intermittent immersion.

SECTION 3

STRUCTURAL DESIGN REQUIREMENTS

1 General

1.1 Scope

1.1.1 The present Section provides general requirements relating to the design and construction of TLPs.

1.1.2 Units covered by the present Note are to comply with the relevant requirements of Pt B of the Offshore Rules, applicable for columns stabilized units, except when otherwise specified in the present Note.

1.1.3 Relevant requirements of IMO MODU Code Ch 2, applicable for column stabilized units, are adopted through the present Rules and are to be considered as minimum requirements for classification purpose.

1.2 General design principles

1.2.1 Generally, units covered by the present Note are designed to sustain all loads liable to occur during pre-service conditions and during operations. For the purpose of classification, design loading condition for which checks are required are given in Sec 4.

1.2.2 The design submitted for classification is to take into account operating tolerances regarding important design parameters, such as tendon and riser tension or ballast and weight distribution. The most unfavorable operating tolerances are to be specified by the Designer.

1.3 Structural categorization

1.3.1 Definition of categories

Structural elements in welded steel are classed into three categories: second, first and special categories as listed:

- Second category: Second category elements are structural elements of minor importance, the failure of which might induce only localised effects.
- First category: First category elements are main load carrying elements essential to the overall structural integrity of the unit.
- Special category: Special category elements are parts of first category elements located in way or at the vicinity of critical load transmission areas and of stress concentration locations.

1.3.2 Structural categorization

Structural categories, as defined in [1.3.1], are to be indicated on drawings submitted to the Society for approval.

The Society may, when deemed necessary, upgrade any structural element to account for particular considerations such as novel design features or restrictions regarding access for quality control and in-service inspections.

1.3.3 Guidance for structural categorization

Structural categories specified in Tab 1 for various elements are given as guidance for the application of [1.3.2].

2 Materials for construction

2.1 Design temperature

2.1.1 Design temperature of structural elements is to be taken as follows:

- for the emerged part of the structure (in general, above the lowest astronomical tide), the design temperature is the air temperature defined in [2.1.3]
- for the immersed part of the structure (in general, below the lowest astronomical tide), the design temperature is the water temperature defined in [2.1.4].

2.1.2 The Society may accept values of design temperature obtained through direct calculation, provided that:

- the calculations are based on air temperature and water temperature as defined in [2.1.3] and [2.1.4]
- the calculations provide a design temperature corresponding to the worst condition of the unit in pre-service conditions and during operations
- a complete calculation report, including a documentation of methods and software, is submitted to the Society.

2.1.3 Air temperature requested by [2.1.1] is to be taken as the mean air temperature of the coldest day (24 h) of the year for any anticipated area of operation.

Where no particular value is specified, classification is to be based upon the following air temperature:

- 0°C for units not intended to operate in cold areas
- -10°C for units intended to operate in cold areas.

2.1.4 Water temperature requested by [2.1.1] is to be taken as the water temperature of the coldest day (24 h) of the year for any anticipated area of operation.

Where no particular value is specified, classification is to be based upon 0°C water temperature.

Table 1 : Guidance for structural categorization

Category	Structural element
Special	• Tendon and tendon connectors • Hull shell in way of intersections between columns, topside deck, pontoons and tendon porch; the extension is to be taken at least 1 m in all directions from the intersection • Highly stressed supports of cranes pedestals and flare booms • Derrick supporting structure • In general, supports and stools of equipment designed without soft-toe brackets
First	• Hull shell of columns, decks and pontoons other than special category • In general, supports of equipment designed with soft toe brackets • Structural elements providing reinforcement and structural continuity at intersections, other than special category • Diagonal bracings on deck • Helideck supporting structure • Main supporting structure of heavy substructures and equipment
Secondary	• Other structures than special and first • Substructure of laydown areas • Outfitting features • Stair towers and their substructure • Rest support structures for handling equipment • Reinforcing stiffeners, girders or bulkheads sustaining a low or moderate level of stress and easily available for inspection

2.2 Material requirements

2.2.1 Steels and products used for the construction of structural elements of TLPs are to meet the applicable requirements of NR 216 Materials and Welding.

Steels and products manufactured to other specifications may be accepted in specific cases provided that such specifications gives reasonable equivalence to the requirements referenced above.

2.2.2 Structural elements are to comply with the requirements relating to materials for construction given in Pt B, Ch 3, Sec 2 of the Offshore Rules, taking into consideration the structural categories defined in [1.3].

2.3 Steels with specified through thickness properties

2.3.1 The designer is to evaluate the risk of any lamellar tearing, i.e. shrinkage stresses of the weld during cooling, clamping of the structure close to a joint, thickness of material, any rolling defects at mid-thickness and importance of the weld runs.

2.3.2 The maximum allowable stress through thickness is 50% of the allowable yield stress. For Z-grade plates a maximum stress of 75% of allowable yield stress can be accepted as through thickness stress.

Special attention to the welding of Z-grade plates is to be paid by the designer. The Society may require ultrasonic inspection before and after welding of the plate.

3 Inspections and checks

3.1 General

3.1.1 Materials, workmanship, structures and welded connections are to be subjected, at the beginning of the work, during construction and after completion, to inspections by the Shipyard suitable to check compliance with the applicable requirements, approved plans and standards.

3.1.2 The manufacturer is to make available to the attending Surveyor a list of the manual welders and welding operators and their respective qualifications.

3.1.3 The manufacturer’s internal organisation is responsible for ensuring that welders and operators are not employed under improper conditions or beyond the limits of their respective qualifications and that welding procedures are adopted within the approved limits and under the appropriate operating conditions.

3.1.4 The manufacturer is responsible for ensuring that the operating conditions, welding procedures and work schedule are in accordance with the applicable requirements, approved plans and recognized good welding practice.

3.2 Inspection requirements

3.2.1 Requirements of Section 6 of NR426 “Construction Survey of Steel Structures of Offshore Units and Installations” are to be complied with.

3.2.2 The Society reserves the right to increase the number of non destructive examinations due to complexity of the structure and with particular attention to the intended service.