De aangewezen luchtvaartmaatschappijen van beide Overeenkomstsluitende Partijen mogen op de overeengekomen routes, bij onverschillig welke vlucht, één of meerdere punten weglaten of ze in een andere volgorde bedienen, op voorwaarde dat het punt van vertrek of aankomst gelegen is in het land hunner nationaliteit.

(1) Eender welke internationale luchthaven in Kaapverdië

(2) Later te bepalen, bij voorlegging van de vluchtprogramma's door de aangewezen luchtvaartmaatschappijen volgens Artikel 11 lid 4

(3) Eender welke internationale luchthaven in België

SERVICE PUBLIC FEDERAL AFFAIRES ETRANGERES, COMMERCE EXTERIEUR ET COOPERATION AU DEVELOPPEMENT

F. 2003 — 4204 (2003 — 4132) [C − 2003/15214]

13 MAI 2003. — Loi portant assentiment à l'Accord entre le Gouvernement du Royaume de Belgique et le Gouvernement du Royaume de Norvège concernant la pose du gazoduc « Norfra » sur le plateau continental belge, et les Annexes 1re, 2 et 3, signés à Bruxelles le 20 décembre 1996. — Addendum (1)

(1) Voir le *Moniteur belge* n° 383 du 29 octobre 2003, Ed. 2, p. 52894-52920.

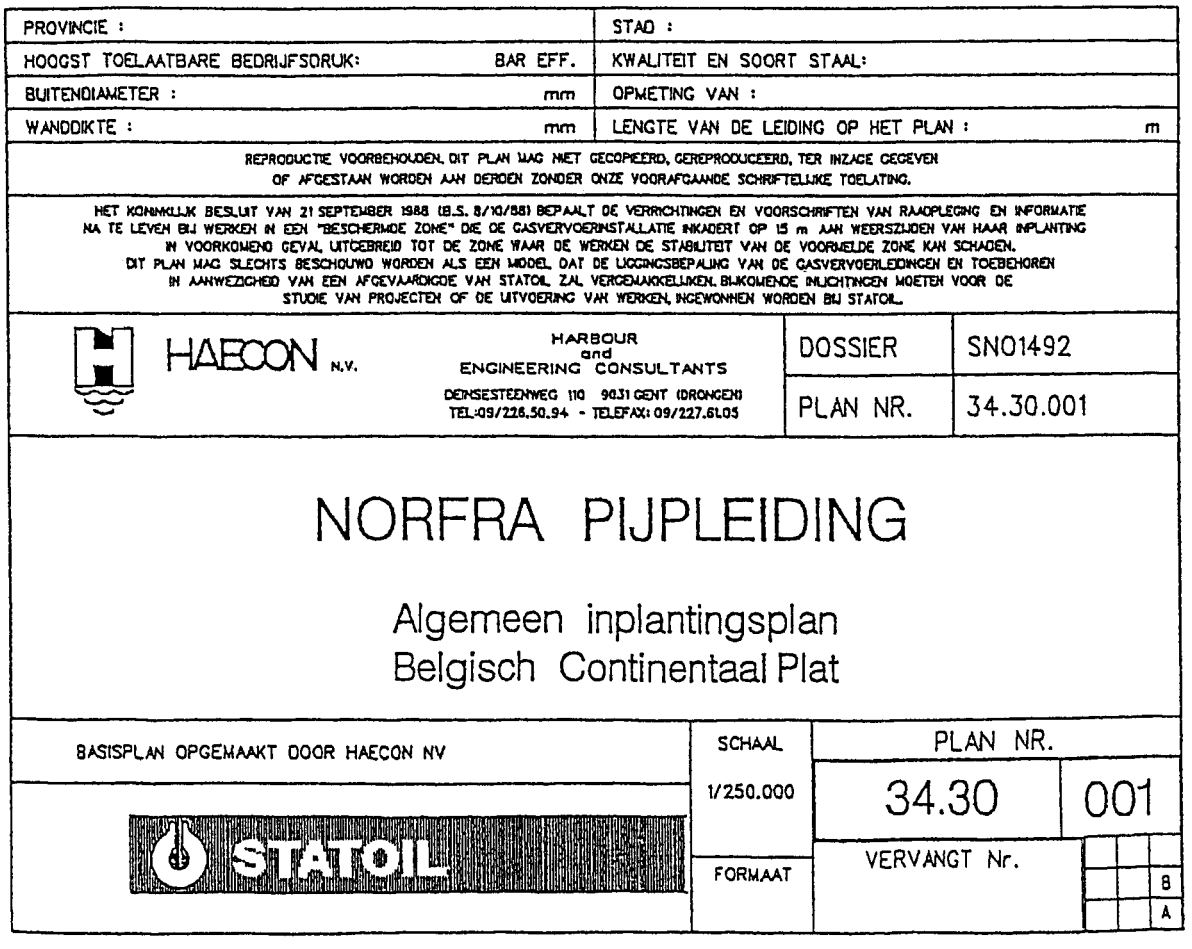
FEDERALE OVERHEIDSDIENST BUITENLANDSE ZAKEN, BUITENLANDSE HANDEL EN ONTWIKKELINGSSAMENWERKING

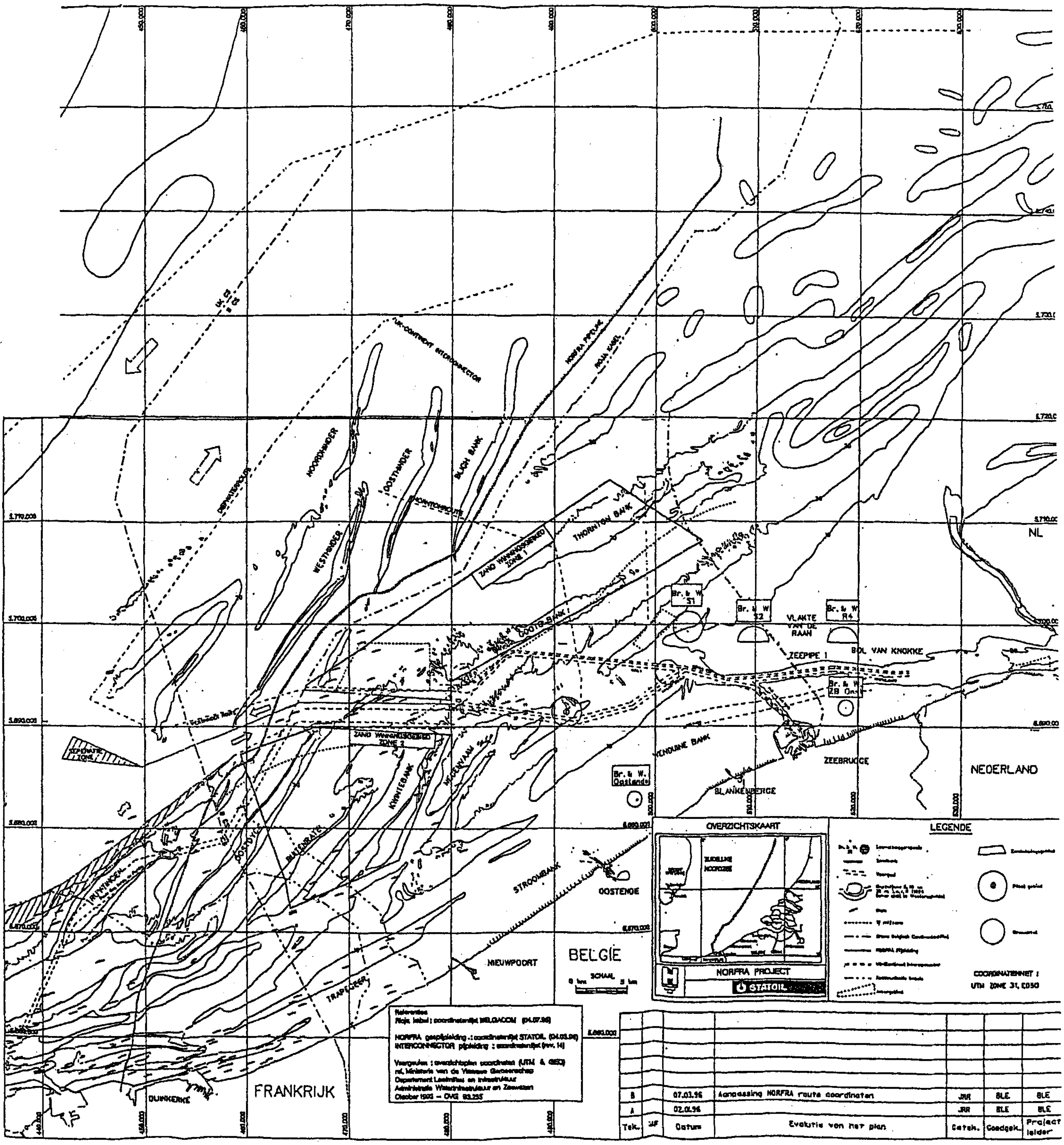
N. 2003 — 4204 (2003 — 4132) [C − 2003/15214]

13 MEI 2003. — Wet houdende instemming met de Overeenkomst tussen de Regering van het Koninkrijk België en de Regering van het Koninkrijk Noorwegen inzake het leggen van de « Norfra » gaspijpleiding op het Belgische continentaal plat, en de Bijlagen 1, 2 en 3, ondertekend te Brussel op 20 december 1996. — Addendum (1)

(1) Zie het *Belgisch Staatsblad* nr. 383 van 29 oktober 2003, Ed. 2, blz. 52894-52920.

Annex 1




NL
NEDERLAND
BELGIE
FRANKRIJK
THORNTON BANK
VLAKTE VAN DE RAAN
BOL VAN KNOKKE
ZEEPIPE I
ZEEBRUGGE
BLANKENBERGE
OOSTENDE
STROOMBANK
NIEUWPOORT
DUINKERKE
OVERZICHTSKAART
LEGENDE
NORFRA PROJECT
STATOIL
COORDINATENNET : UTM ZONE 31, ED50
SCHAAL
B 07.01.96 Aanpassing NORFRA route coordinaten JRR BLE BLE
A 02.01.96 JRR BLE BLE
Tek. Datum Evolutie van het plan Getek. Goedgek. Project leider

ANNEX 2

Procedure concerning the approval by the Government of the Kingdom of Belgium of the definitive delineation of the course of the NORFRA pipeline; as foreseen in Article 79 of the UN Convention on the Law of the Sea of 1982

Article 1.. Application for approval by the Government of the Kingdom of Belgium of the definitive delineation of the course of the gas transportation pipeline ″NORFRA″ on the Belgian continental shelf, as foreseen in the article 79 of the UN convention on the Law of the Sea of 1982, shall be addressed to the Belgian Minister competent for energy.

Art. 2. This application shall mention the name or company name of the applicant, his address, the purpose of the application, the list of maps and documents attached, and the date of submission; it shall be signed by the applicant or his authorised representative.

The following documents shall be attached to the application and shall be supplied on A4 paper as per the NBN 18 standard, i.e. measuring 210 x 297 mm or folded to that size :

1° One bathymetric map showing the proposed location of the planned transportation facilities and one sea bed profile, both to a scale of 1/100.000;

The map shall include in particular :

a) the proposed pipeline route drawn up in accordance with the indications given on a table of agreed signs;

b) the places where the projected pipeline will be parallel to or intersect telecommunications lines, electric power cables or oil, or existing or planned gas pipelines, and all facilities in general known to the applicant further to an enquiry and concerned by the route.

Should the planned pipeline be parallel to such facilities, they shall be indicated when they are less than one hundred metres from the planned pipeline.

Each intersection shall be indicated by means of a specific sequence number;

c) facilities classified as presenting a fire or explosion hazard and situated less than 50 metres from the pipeline;

d) areas of economical or environmental interest for Belgium.

2° Cross-sections,indicating the location of the planned transportation facilities with respect to commercial sea lanes.

3° The location of planned feed or supply points.

4° A descriptive summary giving the following information :

a) identity of the applicant;

b) technical information relating to the facilities such as : length, external and internal diameter of pipelines, type of material used, types of joints and protective coatings, protection systems, brief description of the emission, reception, compression and reducing stations, and in general all information relating to the safety precautions mentioned in the Annex 3 determining the safety precautions to be taken when establishing and operating facilities of the NORFRA pipeline and the intended measures for the decommissioning of the pipeline to avoid detrimental consequences to the environment;

c) the conditions of the gas transported through the pipeline.

5° An environmental impact assessment aiming at :

— the identification of the components of the biotic and abiotic environment, including fishing industry, that will be affected by the trenching works, laying of the pipe and its operation;

— the evaluation of the nature and scope of the effects;

— a quantification, if possible, of the economic impact of these effects;

— the identification of the options and measures likely to reduce the environmental effects;

— quantifying the economic impact of these options and measures and to recommend solutions.

6° All information relating to the quality, quantity, and nature of the gas transported.

7° An Emergency Plan taking into consideration leak, explosion and all incidents or accidents which may endanger the pipeline and facilities. A probabilistic approach being used.

This plan providing all informations relating to:

— list of key persons and communication procedures;

— list of foreseeable hazards/damages;

— emergency measures to be taken (mitigation actions);

— list of available ressources;

— descriptions of measures for implementing actions;

— list of documents of the Emergency Plan;

— follow-up and updating procedure of the plan.

8° Any further information enabling the Belgian authorities to specify the measures to be taken in respect of the article 79 of the UN Convention on the Law of the Sea of 1982, for the definitive course of the NORFRA pipeline.

These documents shall be supplied in triplicate.

The Belgian Minister competent for energy or his authorised representative may request additional copies of all or part of the documentation as he deems necessary.

Additional copies shall be supplied by the applicant within ten days of the date on which they have been requested.

The Belgian Minister competent for energy or his authorised representative shall send the applicant an acknowledgement of receipt of the application and documentation.

Applicants shall supply all documents and at their own cost.

Art. 3. Within thirty days of receipt of the documents listed in article 2, the Belgian Minister competent for energy shall send to any authorities or departments concerned by the route followed by the facilities, a copy of the maps and documents relevant to their specific concerns.

The aforementioned authorities and departments shall indicate the number of additional copies they require within eight days, and shall give their opinion and recommendations within sixty days of receiving the final documents.

Should these opinions and recommendations not have been received within the prescribed time limit, they shall be disregarded.

The Belgian Minister competent for energy or his authorised representative shall set the dates of any meetings on site of the representatives of the authorities and departments concerned as soon as possible.

The applicant of the approval shall also be invited to attend these meetings.

These meetings shall be chaired by an official appointed by the Belgian Minister competent for energy.

Art. 4. A certified true copy of the agreed definitive delineation course shall be sent to the applicant within eight days after its drawing-up by the Belgian Minister competent for energy.

A copy of these documents shall be sent to each of the departments and authorities concerned.

Art. 5. The Belgian Minister of Economic Affairs is responsible for implementing this procedure.

Annex 3

Regulation relating to the part of the « NORFRA » pipeline located on the Belgian continental shelf

SCOPE

This regulation is applicable to planning, engineering, construction, maintenance and operation of the NORFRA pipeline on the Belgian Continental Shelf.

CHAPTER I. — *Terminology*

For the application of the regulations, the following definitions shall apply :

1. Minister : the Federal Belgian Minister competent for energy;

2. N.P.D. : the Norwegian Petroleum Directorate, Stavanger, Norway;

3. Pressure : gauge pressure, i.e. the pressure measured above atmospheric pressure, unless the term ″pressure″ has been otherwise defined;

4. Maximum operating pressure : the maximum pressure at which a pipeline actually is or will be operated;

5. Maximum allowable operating pressure : the maximum pressure at which the pipeline may be operated in accordance with the provisions of the authorization;

6. Design pressure : the maximum operating pressure used in the wall thickness calculation formula;

7. On-site test pressure : the pressures at which the resistance test has been carried out;

8. Plant test pressure : the pressure at which the pipes and various accessories have been tested at the plant;

9. Hoop stress : the stress tangential to the outer circumference of the cross-section perpendicular to the longitudinal axis of a pipeline and generated by fluid pressure inside the pipeline;

10. Maximum allowable hoop stress : the hoop stress permitted when calculating the properties of the pipeline;

11. Elastic limit : the agreed elastic limit as defined by the value of the load related to the initial section of the test piece required to stretch this test piece by 0.5 % of its original length between reference marks. For test methods the recognised supervisory body will be consulted;

12. Relative elongation (strain) : the longitudinal elongation of a ruptured tensile test piece, expressed as a percentage of the original length between reference marks. (See recognised standards);

13. Resilience : the resistance to impact deflection of a notched test piece, expressed in Joules per square centimetre of the initial section, required to fracture a notched piece of given shape and size;

14. Transition temperature (°C) : the temperature at which a ductile fracture becomes a brittle fracture;

15. Recognised standard : Guidelines, standard and similar which within a specific field or profession is internationally and / or nationally recognised;

16. Verification : Examination to confirm that an activity, a product or a service is in accordance with specified requirements;

17. Pipeline : That part of the Norfra pipeline which is buried in, rests on or which is stored above the sea bed of the Belgian continental shelf, including corrosion protection system;

18. Zone 1 : That part of the pipeline which is located outside a distance of at least 500 meters from installations;

19. Zone 2 : That part of the pipeline which is located inside a distance of at least 500 meters from installations;

20. Functional loads : Loads caused by the physical existence of the pipeline and by the operation and handling of the system;

21. Environmental loads : Loads caused by environmental conditions;

22. Accidental loads : Loads to which the pipeline may be subjected as a result of improper operation, technical failure or undesired external effects.

CHAPTER II. — *Technical and operational provisions etc*

II-1 General Provisions.

2.1.1. General requirements relating to operations

Operations as mentioned in the scope shall be carried out in accordance with requirements stipulated by, or in pursuance of this regulation, and in accordance with recognised standards for such activities.

2.1.2. General requirements relating to verification

For the pipeline and any risers designed, constructed and operated in accordance with this regulation, the following items will, inter alia, be thoroughly verified :

a) design basis,

b) specifications,

c) design results,

d) welding and joining procedures,

e) testing procedures,

f) performance of welding, joining and testing,

g) handling of deviations from specified requirements,

h) choice of joining method, construction steel or pipeline type, fabrication and installation method,

i) methods, performance of and equipment for quality control,

j) condition control.

2.1.3. General requirements relating to technical documentation

Documentation required in order to ensure and provide documentation that operations are carried out in accordance with the regulations, shall be prepared and shall be available during the different phases.

Requirements and criteria relating to equipment and components of significance to safety, shall be specified.

The documentation shall include a description of the tests and the maintenance required in order to maintain a specified safety level. Reference to recognised standards may be included as a part of the operator's own specifications.

2.1.4. General requirements relating to personnel qualifications

The operator shall ensure that personnel engaged in design, construction and operation of pipelines have the necessary qualifications. Qualification requirements shall be stipulated for job categories of significance to safety.

II-2 Development Concept.

2.2.1. Safety objectives

To the extent it is practically feasible, the construction and design of the pipeline shall be such as to ensure that no single failure during operation shall lead to life threatening situations for any person, or to unacceptable damage to materiel or to the environment.

Risk analysis shall be carried out in order to determine the consequences of single failures and series of failures in and in the operation of the system, in order that necessary remedial measures may be taken.

2.2.2. Pipeline route and survey

In the choice of pipeline route all factors that may be of significance to safety during installation and operation of the pipeline shall be mapped, taken into consideration and taken account of.

A detailed survey of the pipeline route shall be carried out in order to obtain the necessary data for design, fabrication and installation. This survey shall comprise sea bed properties, topography and environment, as well as safety related aspects in connection with other activities along the pipeline route.

The results of the survey shall be submitted to the Minister and the NPD.

2.2.3. Safety systems

The pipeline shall be fitted with safety systems and shutdown systems.

The safety systems shall be capable of detecting abnormal incidents or operational conditions and shall prevent or limit possible damaging effects caused by such incidents or conditions.

Emergency shutdown valves shall be positioned such as to minimise the consequences of any leaks that may occur as much as possible.

2.2.4. Design

The pipeline, risers, emergency shutdown systems and launchers and receivers for internal maintenance and inspection shall have such location and such protection as may be required to minimise the risk to people, to the environment and to installations.

The pipeline shall be designed to allow safe and satisfactory condition control and maintenance.

The inside diameter of the pipeline shall normally be constant.

2.2.5. Choice of materials

Choice of materials, components and types of the pipeline shall be made taking into consideration the assumed use during the whole operational phase.

2.2.6. Protection systems

The pipeline shall be fitted with protection systems providing protection against corrosion, erosion and other deterioration during storage, installation and operation.

Parts of the pipeline with difficult accessibility for survey and maintenance, shall be subject to special consideration with regard to the choice of protection system.

When considering the need for internal protection, due account shall be taken to the choice of materials, corrosive properties of the transported medium and erosion aspects. Possible changes over time shall be taken into consideration and shall be taken account of.

2.2.7. Corrosion monitoring systems

The pipeline shall if necessary be fitted with corrosion monitoring systems.

With regard to those parts of the pipeline which have difficult accessibility for inspection and maintenance, special consideration shall be given to design.

II-3 Pipeline Calculations.

2.3.1. Loads and load effects

2.3.1.1. Classification of loads

In designing the pipeline, parameters that may be significant to the safety of the system and to the environment shall be related to anticipated loads.

Loads shall be classified as follows :

a) functional loads

b) environmental loads

c) accidental loads

The different loads are assumed to include the inherent reaction forces.

2.3.1.2. Types of loads

Functional loads :

In the case of constant functional loads, the expected value of the load shall be used.

In the case of variable functional loads, the specified highest or lowest value shall be used.

In the case of functional loads caused by deformation, the expected extreme value shall be used.

In evaluation of combined functional and accidental loads, environmental loads shall also be taken into consideration.

The effects of functional loads caused by deformations shall only be taken into account to the extent that the capacity to withstand other loads is affected.

The term functional loads includes, inter alia :

a) weight of the pipeline with coating and marine growth,

b) weight of contents,

c) buoyancy,

d) internal pressure and flow,

e) external hydrostatic pressure,

f) deformation due to temperature, displacements / subsidence and pre-stress effects,

g) loads due to impact and towing of fishing gear etc.

Environmental loads :

Environmental loads shall be described by characteristic parameters based on observations at or in the vicinity of the location in question and based on general knowledge of the environmental conditions in the area. If accurate methods are not used, the least favourable wind, current and wave forces shall be assumed to occur simultaneously. In the case of a storm maximum wind and wave forces may be assumed to be uncorrelated.

The term environmental loads includes, inter alia, loads caused by :

a) waves,

b) current,

c) tides,

d) wind,

e) snow,

f) ice,

g) earthquake.

The following loads should similarly be taken into consideration :

a) increased loads due to ice and marine growth,

b) deformation of supporting structures or sea bed caused by environmental loads,

c) load effects of free spans caused by current induced vortex shedding.

Accidental loads :

The frequency and magnitude of accidental loads shall be estimated by means of risk analyses, taking duly into account factors such as operational procedures, the arrangement of the installation, the pipeline route and restrictions imposed on maritime operations, safety systems and control arrangements, etc.

The term accidental loads includes, inter alia :

a) hooking from fishing gear or ship anchors,

b) collision with vessel or floating objects,

c) explosions,

d) fire,

e) falling objects,

f) loss or increase of operational pressure and related temperature effects.

2.3.1.3. Design load effects

Load effects shall be determined by means of recognised standards. Variation of the loads in time and space, load effects from the pipeline and its foundation, as well as environmental and soil conditions shall be taken duly into account. Simplified methods may be applied when there is sufficient supportive documentation to the effect that such methods provide results with adequate accuracy.

Hydronamic load effects :

Hydronamic load effects shall be determined by means of methods giving the best possible description of the kinematics of the water and the interaction between liquid, pipeline and soil.

In cases where non-linear effects may be of significance due to loads, load effects or soil response properties, such effects shall be subject to special consideration.

Simplified deterministic analyses may be applied when based on recognised hydrodynamic coefficients.

Earthquakes :

Load effects from earthquakes shall be based on characteristic values from response spectra or time histories. Load effects from supporting constructions shall be taken into consideration in the analysis of risers.

Model tests and field measurements :

Model tests or fields measurements may be required if the value of the loads, load effects or detrimental effects cannot be determined with reasonable accuracy.

2.3.1.4. Load values

Load values shall be determined in accordance with Table 1, LOADS

Table 1 — Loads			
Type of load	CONDITION		
	Installation	Normal Operation	Abnormal Operation (Survival)
Function	Expected value, specified value or expected extreme value as suitable.	Expected value, specified value or expected extreme value as suitable.	Expected value, specified value or expected extreme value as suitable.
Environment	Probability of exceedence according to season and duration of installation period.	Annual probability of exceedence = 10^{-2}	Annual probability of exceedence = 10^{-4}
Accident	As appropriate to installation phase.	As appropriate to normal operational conditions, i.e. annual probability of exceedence = 10^{-2}	Individual consideration.

2.3.1.5. Load combinations

Load combinations shall be determined in accordance with Table 2, Load Combinations in the different conditions.

Table 2 — Load combinations in the different conditions			
Load / combination	CONDITION		
	Installation	Normal Operation	Abnormal Operation
Functional Load	X	X	-
Functional and environmentalload.	X	X	X
Functional and accidental load.	X	X	X

2.3.2. Design requirements and principles

2.3.2.1. Design requirements

The pipeline shall be designed to be able to :

a) function satisfactorily during normal operation, inter alia with regard to displacements, settlements, vibrations, internal and external corrosion, ageing, wear and other detrimental effects,

b) sustain all relevant loads, load combinations and deformations with satisfactory degree of security against fracture due to yielding, buckling or fatigue,

c) secure satisfactory resistance to fractures occurring and propagating,

d) achieve and maintain sufficient stability on or buried into the sea bed.

Furthermore, the pipeline shall, to the extent possible, be designed to withstand mechanical

damage due to other activities.

2.3.2.2. Design phases

Functional loads, environmental loads and accidental loads shall be combined in order to confirm the structural integrity of the pipeline during :

a) installation,

b) normal operation,

c) operation where operating assumptions are exceeded or operation in damaged condition.

2.3.2.3. Design of steel pipeline and risers

The design of steel pipeline shall be based on recognised standards, inter alia with regard to static and dynamic loads, material strength and geotechnical conditions.

The following utilisation factors will be used :

Table 3 — Utilisation factor for permissible stress					
Type of load	PHASE				
	Installation		Normal operation		Abnormal operation (survival)
	Zone 2	Zone 1	Zone 2	Zone 1	
Function Alone	0.75[1] 0.85[2]	0.90[1] 0.85[2]	0.6	0.72	-
Function and environment	0.96[2]	0.96[2]	0.8	0.96	1.0[3]
Function and accident	0.96[2]	0.96[2]	0.8	0.96	1.0[3]

1) Used only for hoop stress during hydrostatic testing.

2) During pipeline installation where the curvature is controlled by stinger geometry or applied tension, the bending stress used for determination of equivalent stress level may be reduced by 15 %.

This may be regarded as a method for assessment of residual strain.

3) The basic requirement is that the pipeline should not sustain any leak during extreme conditions.

The factors contained in this table are based on use of carbon steel, manufactured according to recognised standards, with a yield strength not exceeding 490 N/mm^2.

2.3.2.4. Design criteria

The ratio between the design pressure and the thickness is established by the following formula :

where :

P_i = design pressure in bar

P_e = external design pressure in bar

E = minimum elastic limit in N/mm^2 specified in the technical specifications

D_e = nominal outer diameter of pipes in mm

DD_e = tolerance in the outer diameter of pipes in mm

e_{min} = minimum wall thickness of the pipe in mm

e = nominal wall thickness of the pipe in mm

De = negative wall thickness tolerance

e_{min} = e - De

F = calculation coefficient, the value of which is 0,72.

Control of the integrity of the pipeline shall also be carried out according to criteria established in order to avoid, inter alia :

a) unacceptable material yielding,

b) buckling,

c) fatigue failure,

d) brittle fracture,

e) extensive damage to protective coating,

f) unacceptable vertical or horizontal displacement,

g) propagating ductile fracture.

Yielding

If design is carried out in accordance with the permissible stress method, current industrial practice indicates that the stress level in the pipe wall is to be checked against specified minimum yield strength, reduced by factors according to Table 3. Types of stress to be considered according to this practice, shall as a minimum include hoop stress and equivalent stress according to von Mises.

The use of nominal or minimum wall thickness when determining stress level, shall in accordance with the current industrial practice be such that maximum load effect or stress level is calculated.

If permanent deformations in the pipeline are permitted, the pipeline shall according to current industrial practice have acceptable fracture toughness after deformation.

Bending and local buckling

In accordance with Sections 2.3.2.1. and 2.3.2.4. the pipeline shall be designed so that local buckling or collapse caused by external pressure, applied bending forces or combinations of such should not occur.

Bending of the pipeline may be permitted if documentations can be provided to show that this does not lead to local damage, and that the integrity of the pipeline is maintained.

Fatigue

In accordance with Sections 2.3.2.1. and 2.3.2.4., fatigue lifetime for the pipeline shall exceed the anticipated service time.

In the evaluation of anticipated fatigue lifetime, it is important to take into consideration, inter alia, uncertainties associated with material properties, design methodology and possibilities for condition monitoring.

All stress cycles to which the pipeline is subjected during installation and operation shall be taken into account.

Stability

In accordance with Sections 2.3.2.1. and 2.3.2.4., the pipeline shall be designed as such that unacceptable movements in the horizontal or vertical plane will normally not occur.

II-4 Provisions concerning materials used.

2.4.1. General.

Steel pipes shall be used.

2.4.2. Specifications for the provision of materials.

2.4.2.1. The pipes shall either be seamless or longitudinally or helically welded.

The resistance of the weld must be equal to that of the metal of the body of the pipe.

2.4.2.2. 1° Technical specifications shall be established for the pipes, describing the quality and properties of the basic materials, the pipe manufacturing process, the dimensional tolerances, the defects tolerated, the tests, inspections and trials to which the basic materials, the products during manufacture and the finished products are subjected, and the acceptance, marking, and numbering conditions.

2° The technical specifications must include relative elongation, elastic limit, tensile strength and notch impact requirements.

2.4.2.3. The ratio of the elastic limit to the tensile strength of the steel may not exceed 0,87 in transverse direction.

2.4.2.4. The chemical composition of the metal and the pipe manufacturing process shall be such that they ensure that the pipes have good weldability, as well as the necessary ductility and resilience, the criteria for the latter being the relative elongation and transition temperature values respectively.

The transition temperature of the metal shall be less than the lowest temperature to which the pipeline is likely to be exposed, either in the course of construction or when in operation.

Determination of the transition temperature :

Welded joints shall be tested in order to establish clearly the notch impact toughness of the weld metal as well as the heat affected zone. During notch impact testing of the base material the samples shall be taken in the transverse direction, where this is practically feasible.

Dimensions and testing of notch impact test samples may be in accordance with ISO 148 or equivalent recognised standard.

Requirements relating to notch impact toughness shall be specified. The mean value (of three tests) for notch impact toughness (in Joule) taken in the transverse direction of rolling, forging or extrusion (KV_T), should be at least 10 % of the numerical value of minimum specified yield strength (in MPa). The specified mean value shall however be at least 28 Joule.

Requirements relating to test samples of the base material, if necessary taken in the longitudinal direction of rolling, forging or extrusion (KV_L) should be 50 % higher than the requirements applicable to transverse values.

No single value should be less than 70 % of the requirement applicable to mean value.

Test temperature shall be stipulated based on the lowest design temperature for the pipeline minus 20 °C, (T_D - 20 °C).

2.4.2.5. Changes made in the direction of the pipeline may be achieved either by means of bends produced on-site by cold bending without the formation of folds and with a curve radius of up to 40 times the outer diameter of the pipe, or by means of bends made in the factory, or bends manufactured by welding straight elements.

For bends made in the factory, technical specifications shall be drawn up describing the quality and properties of the material, the dimensional tolerances, and defects tolerated.

Changes made in the direction of the pipeline, may also be achieved by making use of the flexibility of the pipe, with a curve radius higher than 1200 times the outer diameter of the pipe.

2.4.3. In-plant testing and inspection

Each pipe shall be subjected to a hydraulic test lasting at least 15 seconds and at a pressure such that the hoop stresses of the pipe fall between 95 and 100 % of the minimum specified elastic limit, given the lower wall thickness tolerances laid down in the technical specifications mentioned in article 2.4.2.2..

The minimum and maximum in-plant test pressures which correspond to these stress limits, shall be calculated by means of the following formulae :

-

Hoop stresses (N/mm^2)		Corresponding test pressure (N/mm^2)	
Minimum	Maximum	Minimum	Maximum
0,95 E	E	$\frac{2(0,95E)e}{D} \cdot \frac{100-x}{100}$	$\frac{2Ee}{D} \cdot \frac{100-x}{100}$

where :

E = the minimum elastic limit specified for metal, in N/mm^2

D = nominal outer diameter of pipe in mm

e = wall thickness of the pipe in mm

x = lower wall thickness tolerance as a percentage of e

The in-plant tests for pipes laid down in the technical specifications include in particular :

non-destructive testing (e.g. ultrasonic inspection) for internal and rolling defects in the metal, as well as for welding defects which may adversely affect safety;

X-ray inspection of the end of each pipe, in order to detect any defects which may adversely affect safety.

II-5 Installation

2.5.1. Specifications for on-site operations

2.5.1.1. The tests, inspections and trials specified by this regulation must be supervised by a Belgian Supervisory Body (B.S.B.) recognised and agreed for this purpose by the Minister and the pipeline owner. The tests, inspection and trials specified by this regulation shall be carried out at the request and at the expense of pipeline owner.

2.5.1.2. The pipes and accessories shall be checked to ensure that they are in good condition after transportation and storage.

2.5.1.3. The pipes, joints and accessories of the pipeline shall be assembled by electric butt welding.

The mechanical properties of the welds shall be at least equal to those of the pipe metal.

The welding method, electrode type and diameter, number of passes per weld and current strength shall be determined in each case following appropriate testing.

The welders shall have successfully completed the approval tests held for one or several methods approved by the B.S.B. and the N.P.D..

2.5.1.4. A list of welding methods accepted by the B.S.B. and the N.P.D. for the purpose of constructing the pipeline, as well as a list of the welders approved for each of these methods, shall be drawn up. The latter shall also include additional information, such as ″first pass welder″, ″filling-pass welder″, ″finishing-pass welder″.

A record shall be kept of the welders responsible for each weld.

2.5.2. Inspection of welds on-site

The welds of all joints, without exception, shall be inspected by X-ray or radioactive isotopes over their entire length each time a new site is begun.

The proportion may be gradually reduced to a percentage not less than 10 % only with the consent of the B.S.B. and the N.P.D.. A record shall be kept stating the percentage of joints inspected.

2.5.3. Laying of pipes

2.5.3.1. Installation

During installation it shall be ascertained that the loads to which the pipeline is subjected, fall within the design assumptions.

Continuous buckle detection shall, if necessary, be carried out during installation.

In order to ensure that the pipeline is not subjected to excessive loads during installation, parameters indicating permissible variations should be determined. Typical parameters which should be established and checked, include :

a) environmental loads,

b) movements of vessel or stinger,

c) tension.

Crossing of other pipelines and cables shall be carried out according to a procedure agreed in each separate case between the pipeline owners.

2.5.3.2.Trenching and covering

The methods chosen for trenching and covering shall be such as to minimize impact to the environment and to reduce the risk of damage to the pipeline and to fishing gear. Visual inspection of the pipeline shall be carried out before and after covering.

When the pipeline is laid in the vicinity of other constructions, there shall be, between the parts of both installations closest to each other, a distance of at least 0.20 m at intersections and 0.40 m in the case of parallel installations. Wherever possible, these distances shall be increased, so as to reduce as much as possible the risks to both installations inherent in the performance of work on the neighbouring installation.

When it is not possible to comply with the minimum distances laid down in this article, or when the nature of the substances transported in the other installations so requires, special precautions shall be taken to protect the pipeline.

After the pipeline has been laid and prior to the acceptance tests, the inside of the pipeline shall be carefully cleaned and all foreign matter removed.

II-6 Acceptance tests for the completed pipeline.

2.6.1. Before the pipeline is brought into operation, it shall be subjected to an hydrostatic test over its entire length.

The necessary precautions shall be taken to ensure that the minimum test pressure requirement is respected at all high points during hydraulic tests.

The minimum hydrostatic test pressure will be at least 25 % above the maximum allowable operational pressure referred to normal water level.

During testing the equivalent stress in the pipeline should not exceed the plant test pressure to which the pipes have been subjected.

A basically stable test pressure shall be maintained for 24 hours, and documentation for all acceptable variations shall be available.

2.6.2. The combined pressure / leak tightness test shall be performed after all the precautions required to ensure the safety of the personnel taking part in the tests and of the public have been taken.

When these tests are performed with air or gas, the precautions shall be increased.

2.6.3. A record shall be kept for the pipeline of the dates of the combined resistance leak tightness test, as well as of the results or this test. This record shall be kept in the archives of the pipeline owner.

2.6.4. The gas shall be introduced into the pipeline in such a manner that a gas-air mixture does not form.

Whenever possible, the gas shall be separated from the air either by means of a ″plug″ of inert gas or of a blow-off piston. Should it not be possible to use either of these methods, the gas shall be introduced at one end of the pipeline at a speed which reduces the risk of gas-air mixture formation in the contact area between both fluids as much as possible.

II-7 Protection and inspection of the pipeline.

2.7.1. Pipeline shall be protected against external corrosion by means of a continuous coating with satisfactory resistance, adhesiveness, plasticity and mechanical resistance properties at the temperatures to which they are exposed when they are laid and during operation.

2.7.2. Cathodic protection shall be provided for the pipeline when necessary. The purpose of this is to ensure the existence of a minimum negative potential of 0,85 V in relation to the environment at all times and at all points of the pipeline.

This potential shall be measured by means of a non-polarisable electrode immersed in copper sulphate, and shall be at least 0,95 V if there is a risk of corrosion by sulphate reducing bacteria.

2.7.3. The coating shall, wherever possible, be inspected to ensure that it is in good condition.

2.7.4. The pipeline shall be inspected when it is being laid, in order to ensure that there are no local deformations, wear, or other defects which might cause stress concentration.

CHAPTER III.. — 3.1. Operating Conditions.

3.1.1. Pressure limiting devices limiting the pressure to the maximum admissible operating pressure shall be installed on the pipeline.

3.1.2. Devices shall be installed to measure gas pressure at each supply or reception point.

3.1.3. The pipeline owner shall draw up and update maps showing the position of the pipeline throughout the period that it is in operation. These maps shall in particular include : the route, the altitude of the location, and the depth at which the pipeline has been laid, the diameter, thickness and material of the pipeline, the type of coating, the cathodic protection devices, and the location of the instruments and devices required by sections 3.1.1. and 3.1.2..

The pipeline owner shall keep in his archives the documents countersigned by the B.S.B. and the N.P.D. or photocopies of the same, mentioning the results of the pipeline acceptance tests.

3.1.4. The work shall be performed to professional standards and in such a manner as to safeguard public safety.

3.1.5. Any installation, maintenance, repair, replacement or removal work on the pipeline shall be subject to the dispatching by the pipeline owner, of notification sent by registered mail or requiring an acknowledgement of receipt, giving at least thirty days notice of the date on which the work is scheduled to begin, to the Minister and the N.P.D..

The agreement of the N.P.D. is required for work to begin.

Urgent repair work may begin, provided the N.P.D. is notified by telephone. This notice shall be confirmed within twenty-four hours by registered mail or recorded delivery to the Minister and the N.P.D..

Notification of work which may damage or disrupt the functioning of a telecommunications line of public interest will be sent by registered mail or requiring an acknowledgement of receipt, giving at least eight days notice of the date on which the work is scheduled to begin, to the telecommunication line owner.

3.1.6. Work to be carried out shall be started and performed with all possible speed, and even, should this be made necessary by a justifiable emergency at the simple written request of the Minister to the N.P.D..

This work shall be performed in such a way as to minimize any damage to the environment, to reduce to a minimum any damage or impediment to traffic, navigation and the free flow of water, and so as not to disrupt the normal operation of the public services.

3.1.7. Repair work or alterations on the pipeline which are made necessary during operation, will be planned, engineered, constructed, tested and inspected in accordance with this regulation. Assembly welds will be inspected using X-rays or radioactive isotopes and / or ultrasonic examination over their entire length.

3.1.8. The pipeline owner shall check the quality of the gas, the value of the operating pressure of the pipeline and the tightness of the latter.

In order to carry out tightness control, monitoring of the gas transportation facilities shall be organised, the purpose of which is to identify leakages.

Reports shall be drawn up on the results of this monitoring and must be kept in the archives of the pipeline owner. Special reports, drawn up in the event of any leak which may occur, shall indicate the causes and repair procedures.

3.2. Condition control and condition evaluation.

3.2.1. In addition to the inspection carried out by means of corrosion monitoring systems and analyses of transported commodities, an annual inspection should include :

a) inspection of the pipeline by means of the methods most suitable at all times, with emphasis given to the type of pipeline and its location. The methods must provide satisfactory data for mapping of burial, localisation of free spans, mechanical damage, corrosion, etc.,

b) potential measurements to the extent necessary to establish that the cathodic protection system is functioning satisfactorily.

If internal inspection is impossible due to the design or the type of material of the pipeline, alternative methods for condition control may be used in order that a condition evaluation may be carried out.

In order to establish necessary reference values, the first inspection should be carried out as soon as it is practically feasible, subsequent to the pipeline being put into service.

The Minister may, if conditions call for it, require specific inspections mentioned in literas *a)* and *b)* above.

Such inspection should be considered particularly in connection with anchoring or other activity above or in the vicinity of the pipeline.

Results of such inspections are presented to the Minister.

3.2.2. The B.S.B. and the N.P.D. shall keep each other duly informed of all matters of importance to the safe operation of the part of the NORFRA pipeline which is situated on the Belgian continental shelf.

The B.S.B. and the N.P.D. shall duly notify each other prior to carrying out inspection activities on the part of the NORFRA pipeline which is situated on the Belgian continental shelf within the purpose of allowing the other party to suggest joint inspection activities.

A detailed Memorandum of Understanding (MOU) will be entered into between the B.S.B. and the N.P.D. for further specification of this item 3.2.2.

3.2.3. To ensure safe operation, the pipeline owner shall organise a maintenance service which shall intervene on an emergency basis should an accident occur and carry out any necessary repair work as quickly as possible.

3.2.4. The pipeline owner shall without undue delay inform the Minister and the N.P.D. of any incident or damage occured to the part of the NORFRA pipeline which is situated on the Belgian continental shelf.

The pipeline owner shall specify the location of the incident / accident and the nature of the damage observed.