OECD publishing

Please cite this paper as:

Fliess, B. *et al.* (2010-07-19), "The Use of International Standards in Technical Regulation", *OECD Trade Policy Papers*, No. 102, OECD Publishing, Paris.
http://dx.doi.org/10.1787/5kmbjgkz1tzp-en

OECD Trade Policy Papers No. 102

The Use of International Standards in Technical Regulation

Barbara Fliess

Frédéric Gonzales

Jeonghoi Kim

Raymond Schonfeld

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

19-Jul-2010

English - Or. English

TRADE AND AGRICULTURE DIRECTORATE
TRADE COMMITTEE

Cancels & replaces the same document of 16 July 2010

Working Party of the Trade Committee

THE USE OF INTERNATIONAL STANDARDS IN TECHNICAL REGULATION

OECD Trade Policy Working Paper N°102

by Barbara Fliess, Frédéric Gonzales, Jeonghoi Kim and Raymond Schonfeld

The paper is available on the OECD website: http://www.oecd.org/trade.

JT03286810

English - Or. English

ABSTRACT

To what extent are governments drawing on relevant international standards in their technical regulations, as mandated by the WTO TBT Agreement? A number of sources of data exist, including electronic databases maintained by governments, but they cannot be used to obtain systematic, international perspective, because there is no harmonised international format and they are incomplete. This study develops an analytical frame for collecting and presenting data on the use of standards in regulation in any sector, as a basis for effective monitoring of the actual extent of use of international standards in regulation and for empirical analysis of the trade effects. This template is then applied to collect and report for five OECD countries detailed factual information on technical regulations, their objectives and standards use in three sectors – electrical household appliances, equipment for natural gas and telephony.

The research finds that core government policies confirm the receptiveness of policy and regulation to the use of international standards. It illustrates the difficulty of identifying, for a given sector, which standards are used, for which regulatory objectives, and with which links – direct or indirect – to standards used internationally. The data collected in the harmonised format of the template show how transparency of data on standards use could be improved. Improved transparency can facilitate efforts to improve harmonisation where this can help to remove barriers to trade. Explicit identification of regulatory objectives can ensure that attempts to promote wider harmonisation take account of those objectives. Also, the range of non-national standards actually used as a basis for technical regulation is greater than sometimes acknowledged, and wider knowledge of their availability and use could be helpful to regulators. Another benefit of transparency is that factual presentations of the use of standards in technical regulations provide a source of rich and accurate data for use in empirical work on how regulatory use of standards influences international trade.

Keywords: standards, international standards, technical regulation, technical barriers to trade, Canada, European Union, Korea, Mexico, United States, household appliances, natural gas, telephones, WTO, Agreement on Technical Barriers to Trade, harmonisation, transparency,

ACKNOWLEDGEMENTS

This study has been prepared by Barbara Fliess, Frédéric Gonzales, Jeonghoi Kim of the OECD Trade and Agriculture Directorate and Raymond Schonfeld, expert consultant. The authors would like to thank Frank van Tongeren for his support and comments. The paper has benefited from helpful inputs from regulatory authorities, officials of standards development organisations and industry representatives in the countries covered, and comments from delegates of the Working Party of the Trade Committee.

The Working Party of the OECD Trade Committee agreed to make the findings more widely available through declassification under its responsibility. The paper is available on the OECD website: http://www.oecd.org/trade

TABLE OF CONTENTS

Acronyms

ADR	The European Agreement concerning the International Carriage of Dangerous Goods by Road
AGA	American Gas Association
AHAM	Association of Home Appliance Manufacturers
ANSI	American National Standards Institute
APEC	Asia-Pacific Economic Cooperation
API	American Petroleum Institute
APRI	American Petroleum Institute
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BIPM	International Bureau of Weights and Measures
BSI	British Standards institution
CANENA	Council for the Harmonization of Electromechanical Standards of the Nations of the Americas
CENELEC	European Electrotechnical Standards Committee
CEPT	European Conference of Postal and Telecommunications Administrations
CFR	Code of Federal Regulation
CISPR	International Special Committee on Radio Interference (IEC)
CSA	Canadian Standards Association
DECT	Digital Enhanced Cordless Telecommunications
EMC	Electromagnetic Compatibility
EMF	Electromagnetic Fields
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility
ETSI	European Telecommunications Standards Institute
FAO	Food and Agriculture Organization
ICAO	International Civil Aviation Organization
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IMO	International Maritime Organization
IRPA	International Radiation Protection Association
ISO	International Organization for Standardization
ITU	International Telecommunications Union

JISC	Japanese National Standards Body
MEPS	Mandatory Minimum Energy Performance Standards
MSS	Manufacturers' Standardization Society of the Valve and Fittings Industry
NAFTA	North American Free Trade Agreement
NFPA	National Fire Protection Association
NIST	National Institute of Science and Technology
NOM	Normas Oficiales Mexicana
NSB	National Standards Body
OGP	International Association of Oil and Gas Producers
OIML	Organisation Internationale de Métrologie Légale/International Organization of Legal Metrology
RID	The European Agreement Concerning the International Carriage of Dangerous Goods by Rail
RoHS	Restriction of Hazardous Substances
SCC	Standards Council of Canada
SDO	Standards Development Organization
VAP	Voluntary Alignment Programme (APEC)
WEEE	Waste of Electrical and Electronic Equipment
WHO	World Health Organization
WTO	World Trade Organization
3GPP	Third Generation Partnership Project

EXECUTIVE SUMMARY

Fulfilling a mandate from the Working Party of the Trade Committee issued in October 2008, this study aims to deepen insight into the *use of international standards as a basis for technical regulation* (a requirement of the WTO TBT Agreement), based on pilot study of three sectors (domestic electrical appliances, natural gas, and telephone handsets) and 5 OECD member countries - Canada, EU, Korea, Mexico and the United States. Some general information about standards use policy and available data sources is included for Japan as well.

Review of past work and of core government policies covering this field confirmed take-up by policy and regulation of international standards, but also revealed gaps in data on where they are used or how often, and gaps in the analysis of the impact of such use. A number of sources of data exist which offer some help, including electronic databases, but they cannot be used to obtain a systematic, international perspective, because there is no harmonised international format and they are often incomplete or limited to the function of counting totals. And, despite extensive analysis of the economic impact of harmonising standards *outside* technical regulation, the specific subject at the heart of this study has not been addressed elsewhere: broadly, past studies lead to the logical conclusion that the use of international standards in regulation *should* help trade, but have failed to produce hard evidence that it actually does so. This study therefore aims to address those two central questions: the nature and extent of use, and approaches to measuring impact of use.

A preparatory phase of work considered how the term *"use of relevant international standards as the basis for technical regulation*" should be defined:

A pragmatic approach was taken to the term *international standards*, with a focus on standards which can demonstrate international use and whose issuers can claim to respect a set of principles for international standards development adopted by the WTO TBT Committee.

Although there is no definitive definition of *relevance* (the TBT Agreement refers to *relevant international standards*), sources appear to concur that the term must include *relevance to the market* as well as fitness for use in regulation.

De jure use was distinguished from *de facto* recognition, and data collection concentrated on the former; the latter was acknowledged to have some potential importance, but was excluded from data collected in this study because by definition, it cannot be identified through reviews of legal texts, and must be based on surveys or estimates of field practice beyond the scope of this study.

An analytical frame was then developed for classifying and recording data. That analytical frame was developed into a *template* for data presentation, with the following sequential elements:

- what products;
- what issues or objectives are subject to technical regulation in each sector: examples are safety, energy efficiency, interoperability and waste disposal;
- which specific regulations are used to achieve those objectives;

- whether those regulations reference standards which are accepted as a basis for compliance with regulations, and if so, which standards;
- if regulations do reference standards, what international linkages to those standards, if any, can be identified. A pragmatic definition is used of *international standard*: links to any standard developed outside the country in question.

This standard template demonstrates the potential for improved transparency and comparison between regulatory practice in individual countries. Notably, it makes measurement possible of:

- the number of distinct regulatory objectives targeted in that sector
- the frequency of actual regulation to meet those objectives.
- the frequency of use of standards as a specified means of compliance with the regulation.
- the proportion of those standards for which some relevant link can be demonstrated with international standards.

Those benefits outweigh some acknowledged limitations of the template. Notably: 1) it appeared unrealistic to attempt to quantify with any precision the degree to which standards, even if used for a given regulatory objective, actually meet the objective in full; and 2) despite the existence of an ISO Guide on the subject, there is no universally applied methodology for classifying the nature of the linkage between national and international standards.

Data were collected in this form on each country/sector combination in the study. In summary, it shows:

- For **household appliances**, seven categories of regulatory objective can be identified, including safety, energy efficiency, and end-of-life waste disposal. But only the first two (safety and energy efficiency) are the subject of technical regulation in all countries studied. An extensive range of internationally used standards is used in the field of electrical safety and electromagnetic compatibility. There is evidence of growing interest in developing and using international standards for energy efficiency, but there is little use of such international standards yet; in this field, there is also evidence of interest in the use of common standards at the regional level, notably in North America. There is no evidence of significant use of international standards for waste management, for eco-design, or for hygiene of materials (e.g., for kitchen appliances). In some of these cases, there are no standards at all, even at the national level.

- In the **natural gas** sector, products covered are very heterogeneous, and one government consulted in the study commented on the high degree of complexity … in this area and the difficulty to clearly determine the regulatory responsibility and risks covered. The study confirmed this difficulty, but nevertheless concluded that regulatory objectives can be broken down into six broad categories, dominated by quality and safety. In practice regulation is broken down not primarily by those goals, but by separable phases of the extraction and production process. Here, while a substantial body of international standards exists and is publicly recognised and promoted by the main international industry association of oil and gas producers, they are relatively little used as de jure evidence of compliance in regulation, and efforts to develop a common set of international standards for de jure use have largely failed. One sub-sector of the field – transport of natural gas under pressure – is covered by a set of treaty-based international regulations, as is the general field of legal metrology, but otherwise

there is little explicit de jure harmonisation. Second-level regulation (*i.e*. below federal level) is particularly interesting here, although outside the direct scope of this study. The second level may be represented by (member) states or by national monopoly companies which set their own requirements. At that level, there is evidence of significant recognition, de jure and/or de facto, of standards developed by major US standards bodies which operate internationally. Recognition of comprehensive, internationally-agreed umbrellas of standards is more limited.

- In **telephony**, eight types of regulatory objective were identified, including safety, electromagnetic compatibility (EMC), radio spectrum allocation and use, interoperability, and the avoidance of toxic waste. Accessibility (e.g. the ability to work with hearing aids), and social protection (e.g. tracking children or protecting them from offensive content) are emerging. Only one of those issues – radio spectrum allocation and use – is subject to mandatory regulation in all the countries studied; here, the ITU (International Telecommunications Union) provides a global umbrella for regulation, but ITU rules are normally complemented by a second-level of regulation which imposes product-specific requirements to ensure that the radio spectrum allocations of the ITU are properly used. That second-level of regulation often uses global voluntary standards as a base, but the process of integrating them into regulation is complex and opaque. Other issues outside radio spectrum are regulated by product-specific regulation in only some countries or not at all. Regulation of safety risks posed by electromagnetic fields (EMF), where it exists at all, generally takes account of recommendations from an international-level body, but there is no universal regulatory consensus. Other safety risks are generally left to general, multi-sectoral regulations (e.g., *products must be safe*) without sector-specific rules. The most striking consensus on regulatory use of international standards in the sector is in the field of EMC, where IEC standards are taken as a base wherever EMC is regulated; but it is not regulated in all countries.

The positive conclusion of the study is essentially that all countries studied have revealed hard evidence of action which aims at achieving the objective of the TBT Agreement which forms the starting point of the study, in addition to their statements of commitment in principle which were already available.

However, a striking negative conclusion also emerges: that a lack of transparency complicates the task of monitoring or measuring the detail. In this context, *transparency* is taken to mean the ability to identify, for a given sector, which standards are used, for which regulatory objectives, and with which links – direct or indirect – to standards used internationally. Without transparency, it is impossible either to take stock of practice or to follow progress over time, or to assemble objective data in a form which may lead to evaluation of the impact on trade of the use of standards in regulation. Nor is it easy for the many stakeholders with interests in transparent identification of standards used in international trade to identify which they are and where they are used.

The research has revealed opportunities to improve transparency of data on the extent of the direct or indirect use of standards with international links in national technical regulations. Notably:

- Identification of regulatory objectives can ensure that attempts to promote wider harmonisation take account of those objectives: there is no point in encouraging a country to use international standards as the basis of regulation of a given issue if that country does not regulate that issue in the first place.

- The range of non-national standards actually used, directly or indirectly, as a basis for technical regulation is greater than sometimes acknowledged, and wider knowledge of their availability and use could be helpful to regulators.

- Although hard to measure, the importance of *de facto* recognition of standards has emerged clearly, and needs to be taken into account in considering whether an adequate basis exists for use of standards in a given sector.

- The nature of the linkage between national standards and international standards is often opaque.

Greater transparency may in itself be of value, if it leads to an improvement of understanding of what is regulated and where standards are actually used to meet regulatory objectives. If more countries know what standards are used, where, and how, it can only help discussion of the case for their wider use.

Besides offering regulators a tracking tool with which cross-border use of standards can be monitored over time, the methodology developed for classifying and recording data generates detailed factual information for quantitative trade effect analysis of standards use. Attempts to correlate the use of standards with the trade flows of countries are most likely to be useful if regulatory analysis develops measures of:

- the degree of alignment of regulatory objectives for a product/sector (are different countries trying to regulate the same issues?)

- the extent to which identical standards bodies are used as the basis of direct or indirect citations in regulations (are different countries using common sources for their standards or not?)

- where national transpositions of documents developed outside the country are used, the degree of equivalence between those national transpositions and the source (are the documents direct, identical transpositions, or modified versions?)

If simple, factual data became more widely available across countries, for one or several economically important sectors, it would be possible to investigate the link between trade and regulatory use of standards at different levels of detail.

THE USE OF INTERNATIONAL STANDARDS IN TECHNICAL REGULATION

I. Introduction and goals

1. This study aims to make a modest contribution to filling a void in data available to assess the implementation of one core requirement of the WTO TBT Agreement: the requirement to *use relevant international standards as a basis for technical regulations except where they are inappropriate*.[1] There is only limited measurement of their actual use for that purpose, and no harmonised data formats for measurement. During preparatory work, some databases had been identified which record lists of standards used in regulations, but their scope and usability for the purpose of systematic stocktaking of international standards usage was shown to be variable and limited.

2. Against that background, the project aims to provide deeper insights on the use of international standards, using pilot examination of three sectors and five OECD member economies for pilot analysis (see Methodology below). That analysis aims to improve understanding of how and to what extent they are in fact used in regulations, and on whether it is possible to express that use in a form that can be used to measure its impact on trade. Actual measurement of trade impact was not included in this work, but left as a possible later goal to be considered if this pilot work produced evidence that such measurement might be possible.

3. This goal of factual monitoring and trade analysis is distinguished from the goal of much other work which aims to throw light on *how international standards can be used* in regulations. This study leans towards providing evidence on *how far they are in fact used and whether the impact can be measured*. The emphasis is on evidence and on taking stock of current practice. The project does not attempt to evaluate the performance of individual member governments in applying the TBT Agreement, but has aimed to provide at least an embryonic methodology for assessing progress in this field, thus supporting the work of the WTO TBT Committee.

II. Methodology

4. The project reports detailed factual data on standards use for five OECD countries and three sectors. The countries are Canada, EU, Korea, Mexico and the United States. The sectors are domestic electrical appliances, telephone terminal sets (mobile and fixed) and batteries, and the natural gas sector including equipment for production, exploration, and industrial processing, and distribution within that chain. The research is limited to standards used in regulation under federal jurisdiction. Although regulations below federal level (EU level in the case of EU) were not explicitly targeted, they emerged in some cases as important, and where that happened, it was noted.

1. All the words in italics can be found in a single Article 2.4 of the WTO TBT Agreement, which states *Where technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them…as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued…*

5. A first phase of work examined the following:

- definitions of the words in phrases in the requirement to *use relevant international standards as the basis* [for technical regulation]. The terms *use, relevant, standards,* and *the basis* were all examined and clarified;

- the core, multi-sectoral policies for using standards in regulation in the five countries;

- earlier, relevant literature available to the OECD Secretariat.

6. Following that preparation, an analytical process was sought, which would be suitable for classifying and recording data. That was achieved through the development of a simple template, which breaks the task down into five manageable steps, suitable for identifying and recording data:

a. what products?

b. what issues or objectives are subject to technical regulation in each sector? Here, the focus is on product or sector-specific regulation, such as safety, energy efficiency and interoperability, and not on general technical regulations of wider scope that might affect the products, such as those covering paints or packaging?

c. which specific regulations (reference number and/or title) are used to achieve those objectives? Examples could be the *Electrical Products Safety Act* or *Directive 2006/95*?

d. do those regulations reference standards which are accepted as a basis for compliance, and if so which standards?

e. if they do reference standards, what international linkages to those standards, if any, can be identified?

7. To support this process, we produced 1) guidance on what we mean by *standards accepted as a basis for compliance* and *international links*, and 2) a simple tabular presentation of the headings.

8. This methodology offers a simple basis for improved analytical capability. For example, there is little point, for a given country and product field, in trying to identify technical standards used to regulate interoperability if the very issue of interoperability of products in that field[2] is not addressed in technical regulation. But it does offer a basis for preparing a comparative table showing which countries regulate what. Also, before considering what *international standards* are used as the basis for a national technical regulation, it is first necessary to determine whether standards are used at all for that purpose, and if so which ones, for the linkage with *international standards* may be direct or indirect.

9. Within this methodological frame, the study then moved on to data collection. Data have been compiled from a variety of sources, including databases maintained by government agencies and standards development organisations (SDOs), documents available on the Internet sites of governments and other entities, and sector-specific analytical work. The initial search lead to identification of some relevant data and document references for country-specific regulatory activity and standards use in the three sectors studied, but often not at the level of detail, completeness and/or clarity desired. Inquiries with regulators, SDO officials and industry representatives hence proved an indispensable part of the identification of relevant regulation and information about use of standards. Face-to-face meetings took place in spring 2009 with officials in Canada, Mexico, the United States and at the European Commission in Brussels.

2. This happens, for example, in the field of mobile telephony, where interoperability is sometimes left to the market.

III. Background

A. Definitions

10. While, the WTO TBT Agreement is used to provide focus to this study, it does not define key words and phrases. Its relevant requirement is to *use relevant international standards as the basis for technical regulations* – in the clause of the WTO TBT Agreement[3] which forms the background to this study. But differences of interpretation may emerge on 1) what is an *international standard*, 2) what determines *relevance*, and 3) what does the term *as the basis for technical regulation* mean?

11. This study uses a pragmatic approach under those headings, and details appear in **Annex 1.** Notably, the study limits the definition of a *standard* to documents from recognised bodies which have some existence independent of the regulatory authority which produces the regulation in question, for the sectors and countries studied. It collects data on all such standards – or bodies of standards[4] – which are used outside their country of issue or which have demonstrable international links, without restricting data to particular types of standards developments organisation, and limits data collection to standards which have *de jure* recognition in regulation itself, ignoring those which may have *de facto* recognition by enforcement authorities.

B. National policies on using standards as the basis for regulations

12. At the level of broad policy, all five countries, and Japan, offer some policy and mechanisms which permit the use of international standards as the basis for technical regulations.

13. All countries have general policies which encourage or require the use of voluntary consensus standards in technical regulation, although in only one case (Canada) a direct requirement has been identified – at the level of general policy – to use *international standards*. Links to standards which may be considered as *international* are often provided through national standards bodies (NSBs) which themselves have some formal affiliations to bodies operating at a transnational level.

14. A short overview of relevant policies appears in Annex 3 to this report. The heart of the present study lies in the detail of how the policies are in fact applied in practice.

C. Existing databases and tools for monitoring

15. All countries covered by this study maintain relevant databases, and those were reviewed at an early stage, to determine whether they provided an accurate and/or comprehensive picture of the use of international standards in technical regulation. These information tools are described in **Annex 4.** International sources which might offer help were also consulted, notably those of the WTO and standards bodies operating internationally.

16. The conclusion was that, although existing tools offer methods of identifying at least some of the standards referenced in their regulations, none offers a complete, multi-sectoral, explicit identification or calculation of standards which are *international standards*, in any of the senses in which that term has been used under the WTO TBT Agreement. While these tools may be helpful for detailed research in an

3. Article 2.4, already quoted in the *Introduction and Goals* section of this report.

4. In many cases, it appeared unnecessary to record the reference number of each individual standard or text referenced in regulation: frequently, identification of bodies or sets of standards (e.g., ASTM standards for the materials strength of in gas pipelines) appeared adequate to permit conclusions on the availability and use of internationally-used standards in a particular field.

individual case, extensive and time-consuming research would be needed to distil data and to produce meaningful sectoral overviews. They do not lend themselves to international comparability or benchmarking, and no internationally agreed methodology exists for doing that.

17. Examples of the weaknesses in government databases are: one of the major national databases claimed to offer a search capability by category of regulation, but when the term *electrical* safety[5] was introduced, it produced only standards used in products used on-board ships or underground in mines; another identified national standards which were based on standards from ISO or IEC, but when the national transposition modified the original international standard, no details appeared of the nature of the modification or the reason for it; two databases failed to distinguish between international technical specifications whose use was directly imposed on national regulators by international treaties,[6] and standards whose international use is not mandatory and which appear to be covered by the exhortations in the WTO TBT Agreement.

18. Other databases are offered by standards bodies. Examples are the PERINORM database in Europe and the databases offered by ANSI in the United States. These sometimes go one level deeper than the government databases above: for example, they may offer any or all of an abstract (short summary) of content, a listing of regulations in the country of its issuer under which it is referenced (i.e., a check on the government databases above), or *normative references* – lists of other standards to which the standard in question refers as a source of detailed specifications on issues indirectly relevant to its primary purpose. However, as for government-maintained databases above, the databases offer no rapid, manageable method of obtaining meaningful summaries or overviews of practice. More detailed information and comments appear in **Annex 3.**

IV. Identifying the link between standards and regulations: a template

19. It emerged early in this work that many sources we consulted, in government and in standards bodies, felt that data needed to drive this project forward was complex (large numbers of potentially overlapping regulations and overlapping ministries/agencies), voluminous (hundreds or thousands of standards that might be considered to be within the scope of the study), and analytically unmanageable as a result. An early phase of work therefore aimed to determine whether the process of analysis and presentation could be simplified, to facilitate identification and analysis of key issues relevant to the goals of this study. That attempt led to the table shown as Figure 1**.**

20. This table represents a summary for a given product category/country combination, in which:

- the flow of data collection is from left to right, starting with a definition of the objective, against which all later data in the table can be set
- the regulatory objectives vary between product sectors but, for any given sector or product, a comparison between countries is immediately possible, at the level of regulatory objectives. The list in the sample above is illustrative only, and can vary from case to case.
- the definitions of *standards* and *international links* are uniform, as shown in Annex 1.
- The circled numbers lead to numbered notes which explain any aspects of the row in question

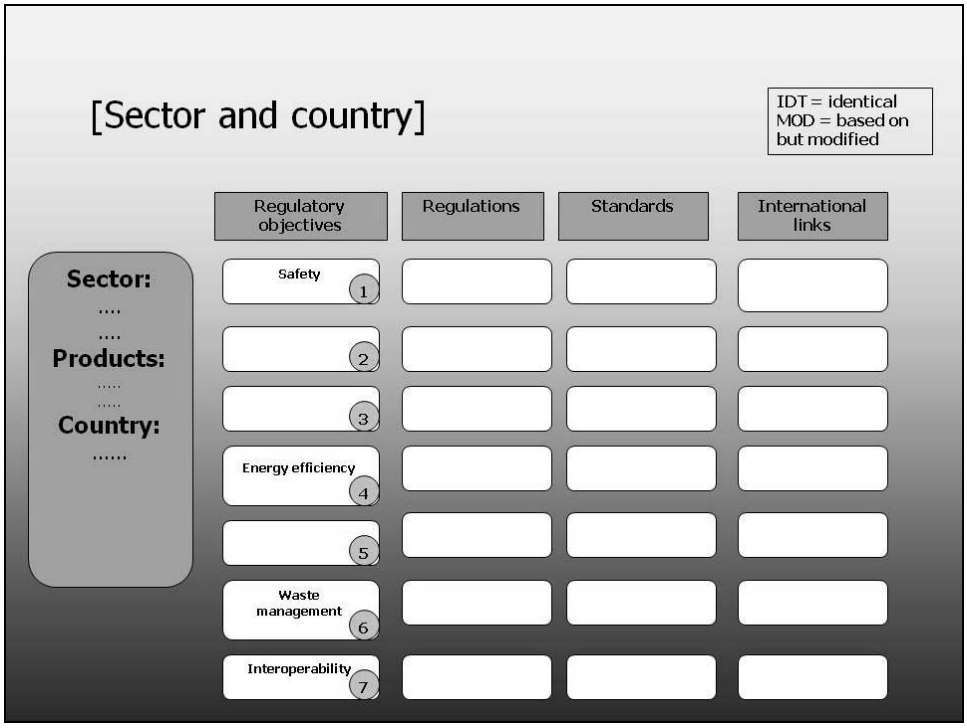
5. And a number of variants of that term, which were tried in order to make sure that the problem was not simply one of terminology.

6. Such as those imposed by the International Maritime Organisation (IMO).

which need to be developed in more detail.

21. The terms used in the template require definitions, which appear in Annex 1.

Figure 1: Data table template



A. Potential benefits of the template

22. The case examples of data collection provided by this study suggest that this template offers a number of benefits:

- In any combination of country/sector/ regulatory objective, a distinction between *regulated* and *unregulated* is possible, by objective, and comparisons between countries under that heading should be easily possible. Examples are interoperability of mobile telephones, or regulations intended to facilitate end-of-life waste treatment. Both are regulated in some countries but not in others.

- Research so far suggests that, although the regulatory objectives applicable to a given product or sector will vary by product or sector, the list in any given case is manageable. This study uncovered no case where more than eight regulatory objectives applied.

- It is likely to emerge quite easily whether a relevant body of standards exists at all which has a hope of meeting our criterion of "cross-border international use". If international standards are not being used because there are none to use, that needs to be reported. The importance of this goes far beyond the sectors in this study: it is a central point in current discussion of achieving toy safety in international trade, for at the time this study was undertaken no single standard was globally accepted as the basis for toy safety, although there are some that have cross-border use. An example from within this project is the field of waste management, where

there are almost no global standards: for example, for classifying materials, or for determining suitability for different methods of disposal.

- The pragmatic definition of *international links* (see Annex 1) may lead to a larger number and range of bodies which may reasonably be considered as producers of *relevant international standards* than generally realised. Bodies have emerged in this research which do not normally appear on lists of recognised international standards bodies: examples are 3GPP and ICNIRP. Still more are in the quite close background: 3GPP2, IRPA, WHO.

23. Taking all those points together, it should be possible to quantify by sector:

- The number of distinct regulatory objectives targeted in that sector, anywhere in the world
- The frequency of actual regulation to meet those objectives.
- The frequency of use of standards as a specified means of compliance with the regulation.
- The proportion of those standards for which some relevant link can be demonstrated with standards which we may class as "international". Indeed, it would be possible to develop analysis of the linkages further: some countries classify the relationship with international standards as "identical" or "modified". But that further level of classification has not been attempted in this initial study.

B. Flexibility of the template

24. An additional benefit of the template is its flexibility to incorporate different types of *de jure* use of standards, within a single broad definition of that term. That is important because a search based on a single, narrow definition of the applicable clause in the TBT Agreement may miss relevant data. For example, if Art. 2.4 were taken to mean only "imposition of a given, referenced and internationally used standard" (the middle box in row 1 of the table below), important data could be missed. The template also makes sure that the standard actually referenced in regulation appears in the table itself, even if it is a modified national transposition of an international standard.

25. The various cases covered by the template are summarised in Table 1**.**

Table 1: Variants of use of standards.

	Unique national standard	**Direct transposition or citation of a standard from outside the country**	**Other linkage with a standard from outside the country**
Imposed *de jure* as exclusive basis for compliance			
Recognised *de jure* as a basis for compliance but not imposed as the exclusive basis			
Recognised de facto as a basis of compliance	Excluded from data presentations in this report See comment in Annex 1		

26. **Annex 1** gives illustrative examples of specific cases identified in this study, for each of the boxes in the two blank rows in Table 1.

C. Limitations of the template

27. Unsurprisingly, the template is not perfect. Limitations which emerged from early research were:

- It is difficult to provide objective estimates of the degree to which standards cover the regulatory objectives. A standard listed used as the basis for a technical regulation may, but need not necessarily, cover all the regulatory objectives or technical requirements of the regulation.

- There is no universally applied methodology for classifying the degree of equivalence between national and international documents, and this works against transparency. One uniform method has been identified: ISO Guide 21 provides a frame for such classification,[7] and could help any regulator or any trader to determine quickly whether an *international* document he is using is likely to be acceptable in a market of interest. But ISO Guide 21 is not used in all cases.[8]

28. The template was used to collect the data for each sector and country.

29. The following chapter presents results for five countries: Canada, the EU, Korea, Mexico and the United States.

V. Domestic appliances

A. Scope

34. Data were collected for household-type electrical appliances belonging to the following product families: cleaning equipment, dishwashers, food preparation equipment, ironing and sewing equipment, laundry machines, refrigerators and freezers and air-conditioning equipment.

35. Specification used for search for technical regulations:

> Technical regulations which mention specifically any of the products above, but also generic technical regulations covering any of the *objectives of regulation* in **Annex 2**, including notably mechanical as well as electrical safety, EMC, energy efficiency labelling and/or performance, hygiene or chemical standards where products come into contact with foods (e.g., refrigerators, food preparation equipment).

36. The results of the research are presented in Figure 2.

---

7. ISO offers 3 levels of classification of the degree of equivalence between a national and an international standard: IDT (= identical) where a national standard transposes an international standard with 100% equivalence; MOD (= modified), where the international standard forms the basis of the national standard, but where the latter applies some deviations; and NEQ (= not equivalent), a terminology which has been used for example in APEC classifications, where a national standard is unrelated to an international standard.

8. Even in the EU, where the classifications of ISO Guide 21 are used in many sectors, those classifications are not used in one of the sectors covered in this study: mobile telephony

B. Data highlights

1. Relevant regulatory objectives identified

37. The research has identified the following categories of regulatory objective as relevant or potentially relevant:

- Safety
- Electromagnetic fields as a sub-category of safety (EMF)
- Electromagnetic compatibility (EMC)
- Energy efficiency
- Waste management
- Hygiene (only for products intended to come into contact with foods, which in this context means kitchen machines and refrigerators/freezers).

2. Comments on regulations and standards

38. The only common regulatory objectives (i.e., issues for which technical regulations actually exist today) across all countries in this study are safety and energy efficiency. Other issues shown in the template are regulated in some countries but not in others.

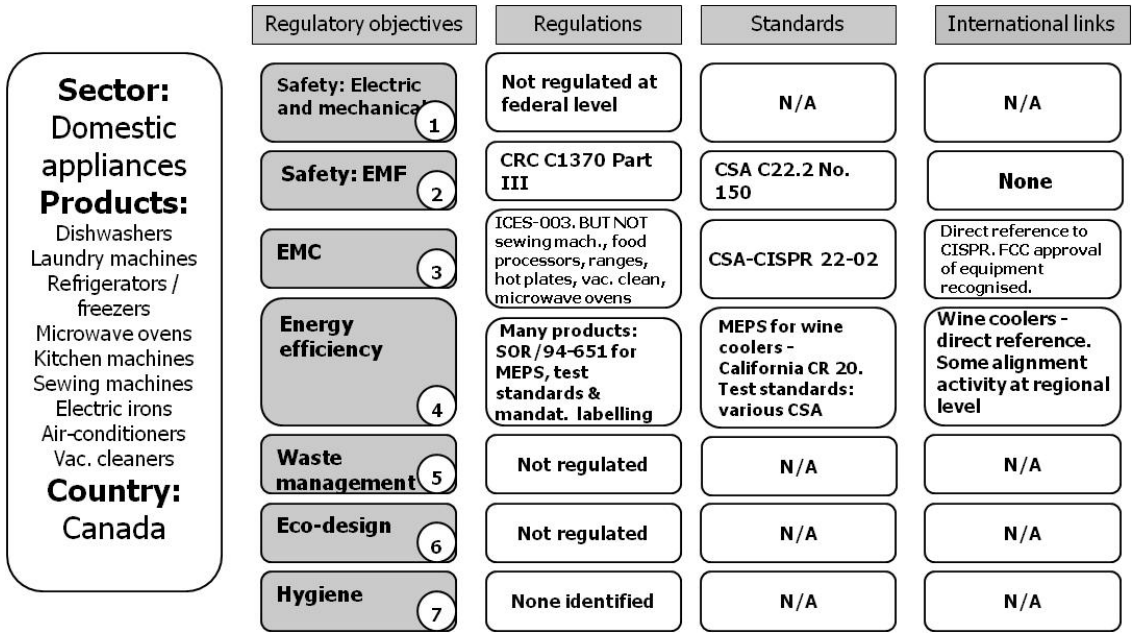
39. IEC standards provide a widely used basis for regulation of electrical safety and electromagnetic compatibility, and are widely used for that purpose. But transparency of modifications to the IEC core is poor.

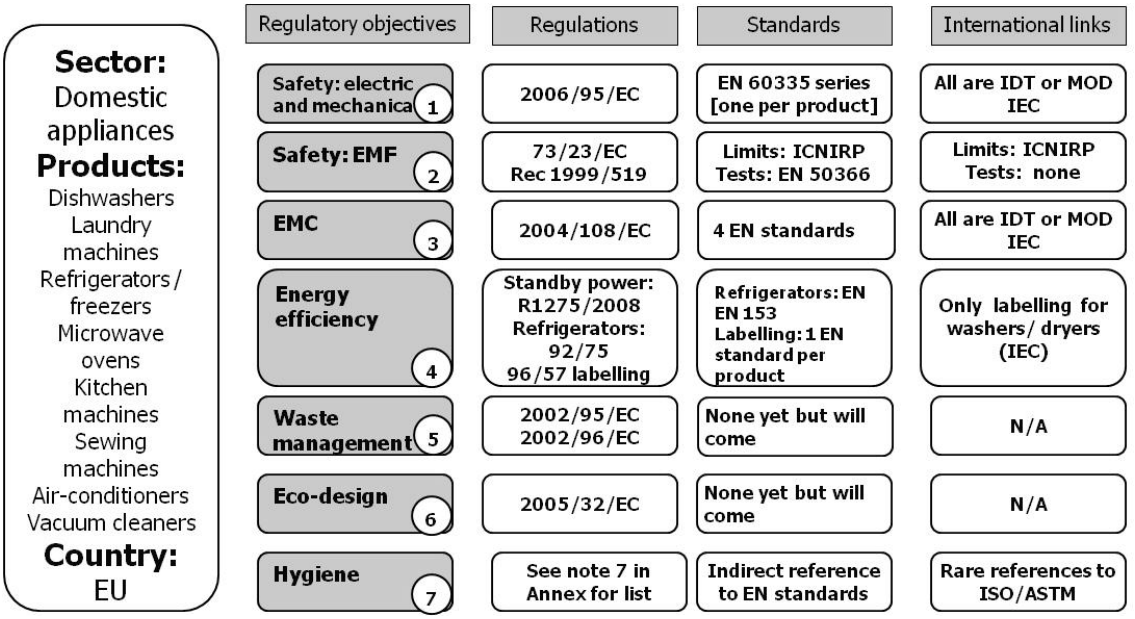
40. There appears to be no common source of standards used in EMF regulation – applicable here to microwave ovens. NIRP recommendations are widely known as a possible basis for safety-related regulation of electromagnetic fields, but have limited use by the countries with data reported here.

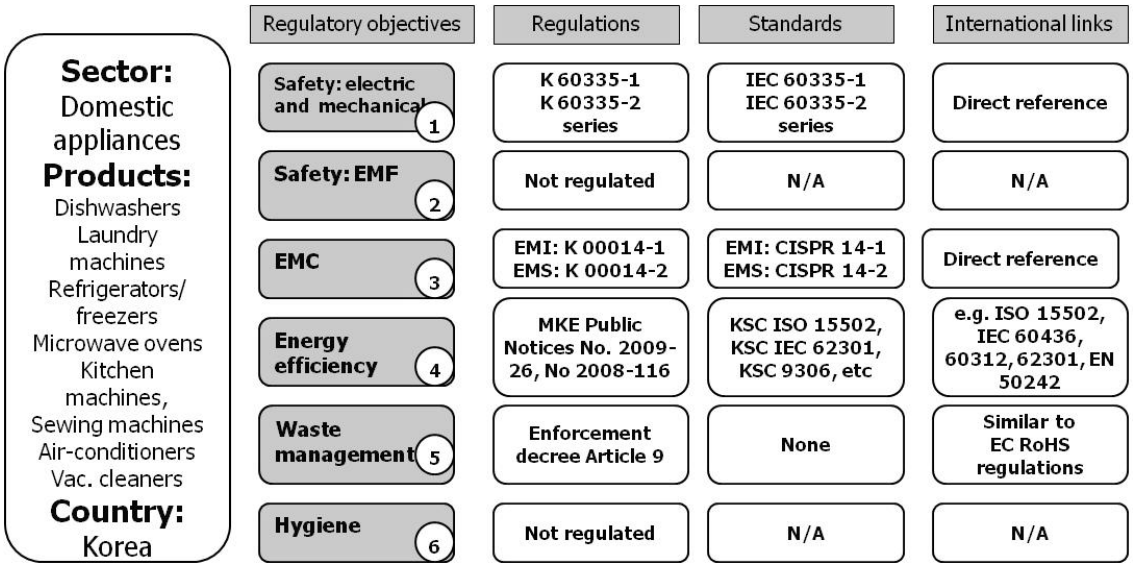
41. Energy efficiency is a fast-evolving field of regulation, as part of the global response to climate change, with the number of sector-specific regulations increasing rapidly. There is evidence of interest in cross-border recognition and harmonisation, but actual international use of specific standards is patchy. Europe has begun to use some IEC standards, but does not use them everywhere. In North America, Mexico and Canada recognize some standards from their NAFTA trading partners and harmonisation of energy efficiency performance and test standards is under way at the regional level.

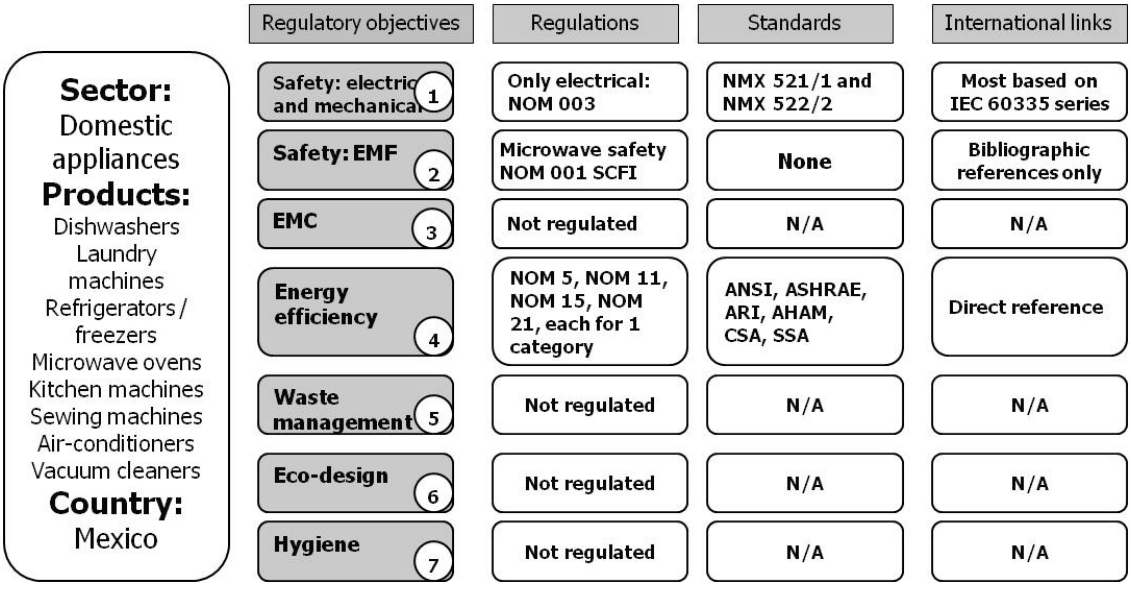
42. There is no evidence of the use of international standards for waste management, for broader eco-design issues beyond energy efficiency, or for hygiene of electrical products intended to come into contact with foods, even where those issues are regulated (e.g., US and EU). In hygiene, there is an unexplained mixture of local and cross-border standards: in the EU, for example, EN, ISO and ASTM standards are all used. There is also significant recognition by regulators of locally produced standards.

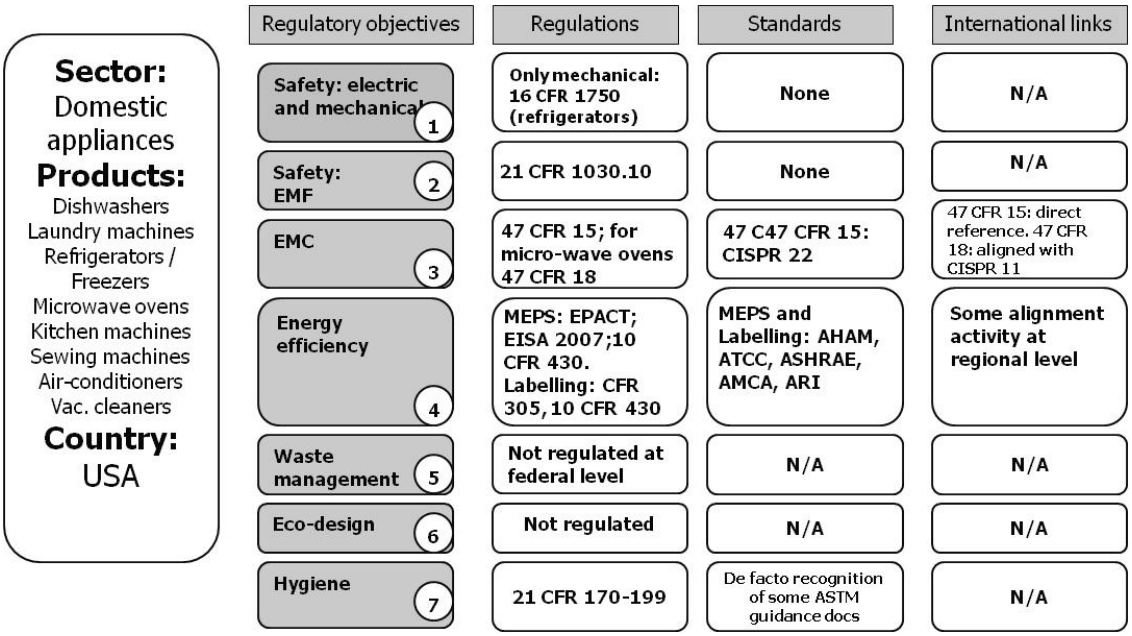
Figure 2. Standards and regulations for domestic appliances: Overview Tables






Sector:
Domestic appliances
Products:
Dishwashers
Laundry machines
Refrigerators/ freezers
Microwave ovens
Kitchen machines,
Sewing machines
Air-conditioners
Vac. cleaners
Country:
Korea
Regulatory objectives
Regulations
Standards
International links
Safety: electric and mechanical 1
K 60335-1 K 60335-2 series
IEC 60335-1 IEC 60335-2 series
Direct reference
Safety: EMF 2
Not regulated
N/A
N/A
EMC 3
EMI: K 00014-1 EMS: K 00014-2
EMI: CISPR 14-1 EMS: CISPR 14-2
Direct reference
Energy efficiency 4
MKE Public Notices No. 2009-26, No 2008-116
KSC ISO 15502, KSC IEC 62301, KSC 9306, etc
e.g. ISO 15502, IEC 60436, 60312, 62301, EN 50242
Waste management 5
Enforcement decree Article 9
None
Similar to EC RoHS regulations
Hygiene 6
Not regulated
N/A
N/A


Sector:
Domestic appliances
Products:
Dishwashers
Laundry machines
Refrigerators / freezers
Microwave ovens
Kitchen machines
Sewing machines
Air-conditioners
Vacuum cleaners
Country:
Mexico
Regulatory objectives
Regulations
Standards
International links
Safety: electric and mechanical 1
Only electrical: NOM 003
NMX 521/1 and NMX 522/2
Most based on IEC 60335 series
Safety: EMF 2
Microwave safety NOM 001 SCFI
None
Bibliographic references only
EMC 3
Not regulated
N/A
N/A
Energy efficiency 4
NOM 5, NOM 11, NOM 15, NOM 21, each for 1 category
ANSI, ASHRAE, ARI, AHAM, CSA, SSA
Direct reference
Waste management 5
Not regulated
N/A
N/A
Eco-design 6
Not regulated
N/A
N/A
Hygiene 7
Not regulated
N/A
N/A



43. Tables with more detailed information about regulations and standards and Notes corresponding to the number labels shown in the *Regulatory Objectives* column in the overview data tables, are available in the Annex Compendium.

VI. Natural gas sector

A. Scope

44. The goal was to collect data for natural gas, covering terminology, quality specifications, measurement methods and tests for natural gas and for the materials, equipment and offshore structures used in associated drilling, production, transport, and processing, within the natural gas sector.

45. Specification for search for technical regulations:

Technical regulations within the scope of the *objectives of regulation* in Annex 2, and covering notably the following: natural gas itself, drilling and exploration equipment for gas, containers for natural gas including pressure equipment, and including containers used in transport by road and rail, pipelines for the transmission of natural gas, but excluding piping used for final distribution to end-users.[9]

46. The results of the research are presented in Figure 3.

9. We consider relevant here the catalogue produced by OGP (International Association of Oil and Gas Producers) of *international standards used in the petroleum and natural gas industries*, on http://www.ogp.org.uk/pubs/362.pdf, and we have taken the fields covered by those standards – not the numerical references of the standards themselves – as a helpful guide to identifying relevant technical regulations

B. Data highlights

1. Relevant regulatory objectives identified in research

47. Compared with the other sectors in this study, the structure of technical regulation in the country studies is unusual. It has led to a classification of objectives which includes a breakdown by stage of the production process as well as by policy goal. Policy goals in this sector are essentially any or all of quality and safety. In practice, regulatory responsibilities are not broken down by those goals. Pipelines, for example, are often regulated under regulations quite different from those used for the extraction installations, even if safety is the paramount objective in both cases. The study covered only natural gas, and not oil or liquid petroleum gas (LPG). The objectives used here have been:

- The quality of the gas itself.
- Exploration and extraction. Essentially the safety of equipment used in getting gas out of the ground, on- and offshore.
- Storage. Installations where gas is stored in any form. These may be above or below ground.
- Pipelines. The pipes through which long-distance transport of gas is undertaken.
- Transport. Tanks placed on means of transport in the road or rail sectors. Transport by ship is excluded here, because there is no scope for variation between countries, despite the apparent complexity of the field, research suggests that it is possible to break down technical regulation into a limited number of categories and comparison would therefore be superfluous: all countries in the study are bound by treaty to apply the provisions of the International Maritime Organisation (IMO).
- Processing facilities. Covers equipment to keep gas, including notably pressure equipment.

2. Comments on regulations and standards

48. Regulatory jurisdictions are complex in the sector: for example, in the EU, Mexico, Canada, and the US, there are significant mandatory specifications imposed below the federal level, i.e., outside the scope of the federal regulations which are the primary focus of this project. In all except Mexico, that second level consists of states and provinces; in Mexico, it is represented by a government-protected national monopoly which sets its own rules.

49. The second level of regulation above is particularly interesting in the EU. While regulations at the EU (federal level) give a privileged position to European standards, national governments in the EU appear to accept other standards more readily than the federal EU authorities, and notably those from ASTM, API, and ASME, although no systematic survey was made of all 27 EU member states. That evidence from Europe supports the view from elsewhere in the world that standards from US-based standards bodies may be a very widely used source of regulation in all the areas of the natural gas sector covered in this project.[10]

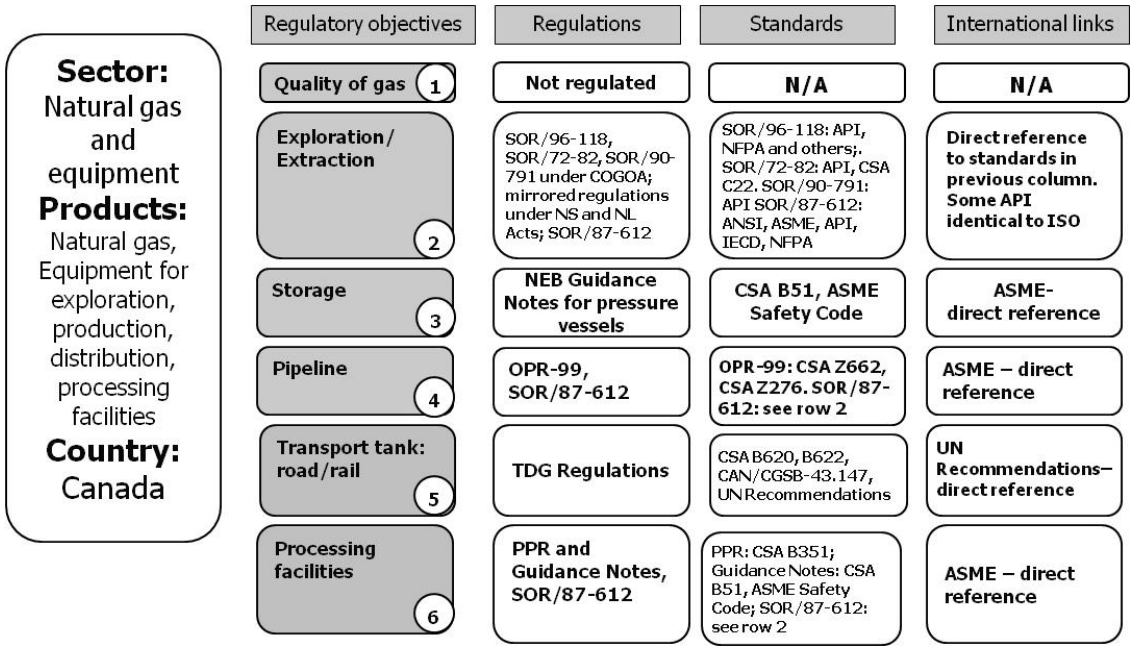
10. Examples of this recognition appear in Annex 7 (Annexes to this report), and notably under *Pipeline Safety*.

50. Regulations covering installations and pipelines often set standards directly and are highly prescriptive. There is evidence of governments seeking to make regulation more goal or performance oriented (e.g., Canada).

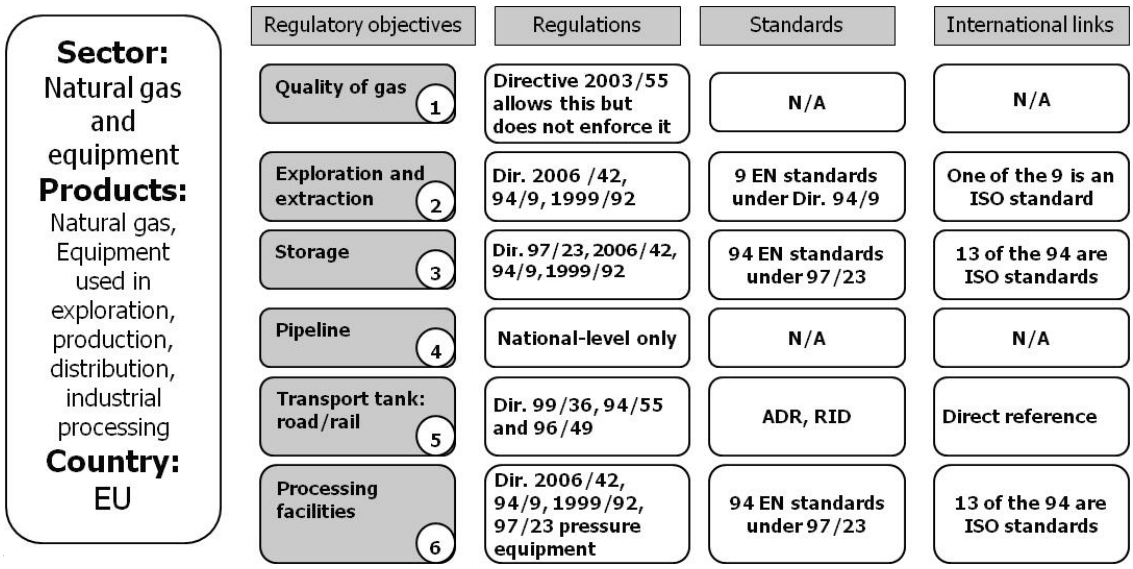
51. Standards produced by major US-based standards bodies are widely used – de facto or de jure – by Canadian regulators responsible for the safety of drilling and extraction equipment, and of pipelines for natural gas. Despite a substantial and growing body of international standards in the sector under the umbrella of ISO,[11] across the countries studied there is little evidence of its use in technical regulation as such, and much of its use appears to be voluntary.

52. Technical regulations normally do not extend to the quality of natural gas. The only major areas of technical regulation where harmonised global standards appear to be widely used are the transport of natural gas under pressure, which is regulated by a range of binding international codes, and notably those of ADR, RID, and the IMO (the latter is ignored in this study because its obligations are automatic and binding for all countries, while for ADR and RID the obligations do not apply to domestic transport), and measuring and metering of flows at various stages where the standards of OIML appear to be used directly or indirectly as a basis of regulation. No attempt was made to identify the use of OIML documents.

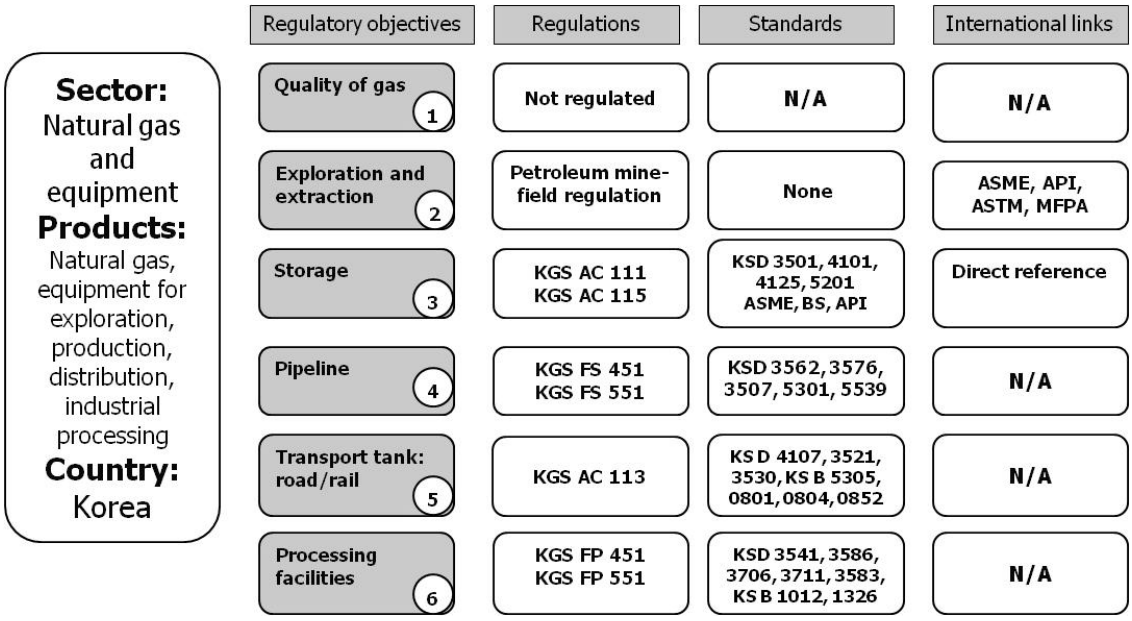
Figure 3. Standards and regulations for natural gas sector: Overview Tables

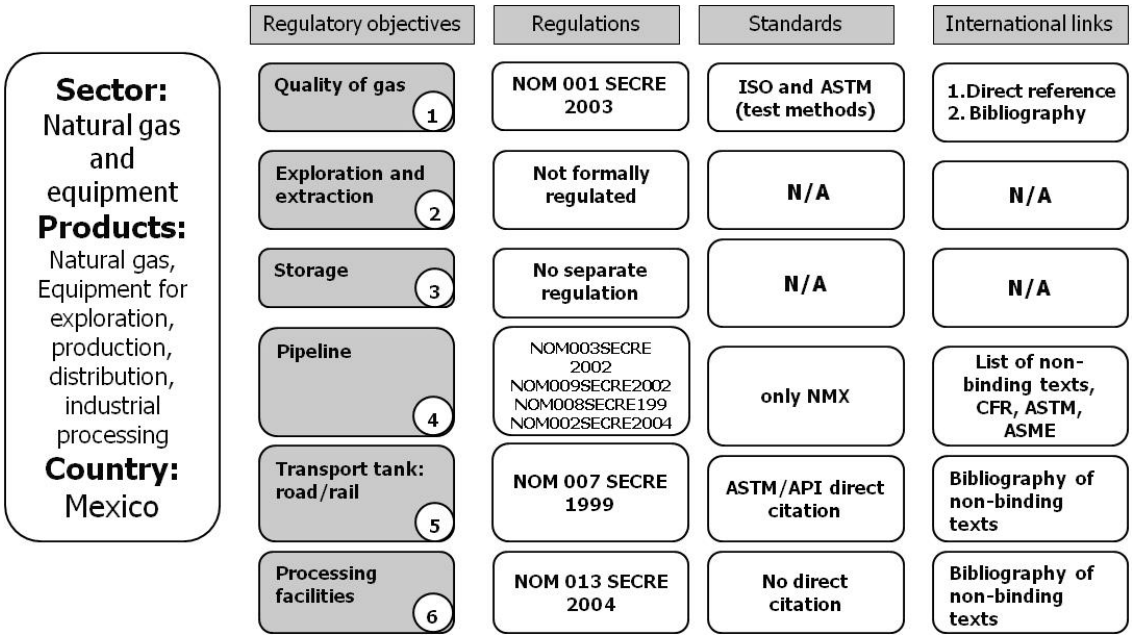


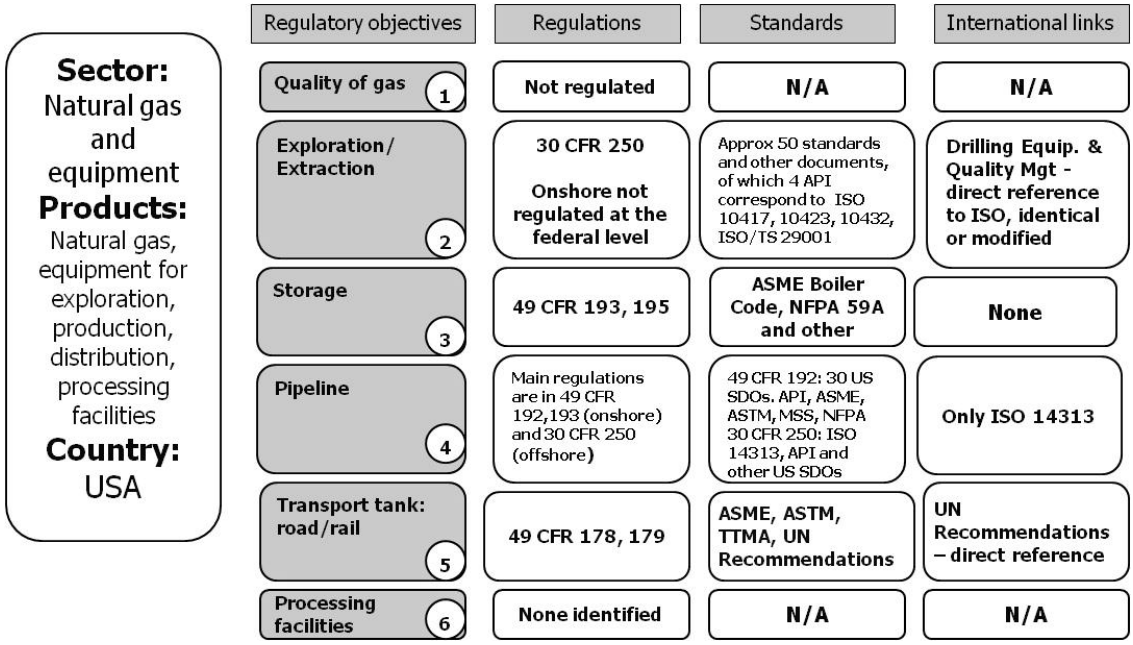
11. Publications of the OGP (Oil and Gas Producers Association) produce evidence of this



Note: the EU does not regulate any of rows 1, 2 and 4 at the federal (EU) level.







53. Tables with more detailed information about regulations and standards and Notes corresponding to the number labels shown in the *Regulatory Objectives* column in the overview data tables, are available in the Annex Compendium**.**

VII. Telephony / ICT

A. Scope

54. The task consisted of collecting data for a small number of well delineated product classes qualifying as telecommunications equipment in the OECD's proposed ICT goods definition.[12] The sector of telephony was chosen, comprising broadly three categories of products: mobile telephones, cordless telephones (often called DECT) where handsets may have wireless connection with a central reception point in the building but cannot roam as mobile telephones can, and conventional fixed line telephones.

55. Specification for search for technical regulations:

> Telephone sets including cordless and mobile telephones, and batteries for mobile telephones, but excluding computers, electrical equipment and cables for line telephony including optical fibre cables, radar equipment, printed circuits, radar equipment, and semiconductors. Technical regulations which mention specifically any of the products above, but also generic technical regulations covering any of the *objectives of regulation* in the Annex, including notably EMC, interoperability through radio spectrum regulation, and energy efficiency labelling as well as performance levels.

56. The results of the research are presented in Figure 4.

B. *Data highlights*

1. Relevant regulatory objectives identified in research

57. The categories of regulatory objective identified as relevant or potentially relevant are:

- Safety
- Electromagnetic fields as a sub-category of safety
- Electromagnetic compatibility
- Radio spectrum frequencies - allocation
- Radio spectrum –-interference
- Waste (e.g. avoiding toxic waste)
- Interoperability
- Accessibility (e.g. hearing impaired persons)
- Social protection (e.g., childrens' safety)

58. Radio issues evidently only apply to wireless products.

59. For ease of presentation, two tables, one for wired and the other for wireless products, are shown for Canada.

12. See *Guide to Measuring the Information Society*, DSTI/ICCP/IIS(2005)/6/FINAL, pp. 92-97.

2. Comments on regulations and standards

60. Only one issue is subject to sector-specific or product-specific regulation in every country studied: radio spectrum usage and the avoidance of harmful interference. Here, all regulation is based on ITU (International Telecommunications Union) agreements on allocation of radio spectrum. Those agreements are then converted into second-level specifications which ensure efficient usage of the radio spectrum and the avoidance of harmful interference within the frame established by the ITU.

61. At that second level of regulation of radio spectrum usage, specifications and standards diverge, with surprising complexity. Some experts in the field have expressed the view that these regulations and specifications were unreasonably difficult or complex to identify, despite the fact that the market for telecommunications equipment is a global market.

62. Product safety is in theory regulated everywhere – all countries prohibit unsafe products from being sold – but the issue does not emerge as a significant issue for sectoral regulation here, with the exception of EMF (see below). Telephones, and even the batteries used in mobile telephones, generally fall under non-specific product safety regulation. Even in the EU, which does include product safety for these products in the scope of its applicable directive on radiocommunications and telecommunications terminal equipment and which lists two standards under that directive covering safety issues which appear relevant, experts interviewed in this study considered that the most significant regulatory requirement for these products was not contained in specific standards, but was covered by the general requirement of the Product Safety Directive.

63. EMC can be regulated by regulating emissions, immunity, or both. Some countries (e.g., EU, Korea) regulate both, others (e.g., Canada, USA) regulate only emissions, while others (e.g., Mexico) regulate neither. Where the issue is regulated, an IEC standard is generally recognised.

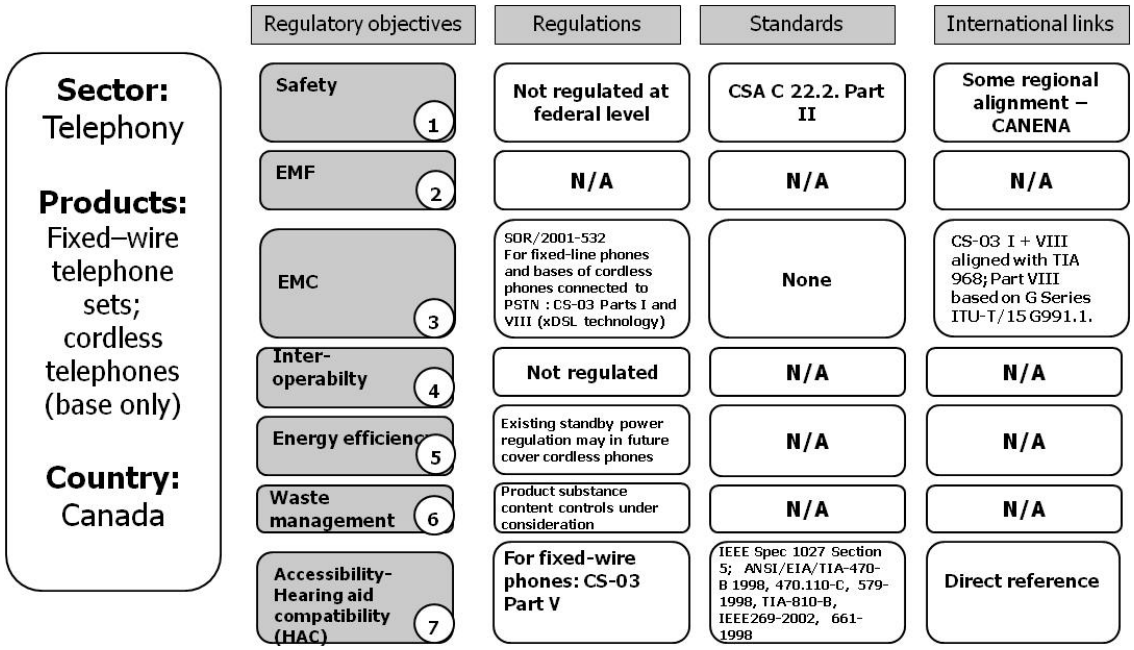
64. Interoperability is often unregulated, with regulators taking the view that if telephones are not interoperable, nobody will buy them, and that the market will therefore deal with the issue without regulatory intervention. There are some exceptions to that: for example, a partial exception in Mexico.

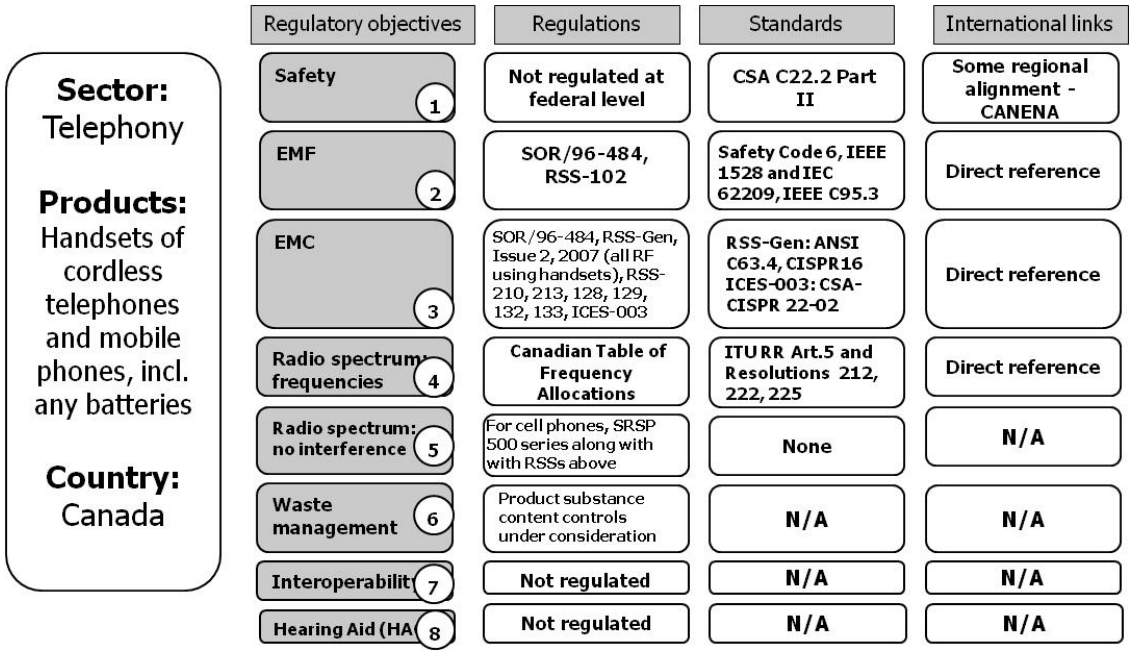
65. The dangers posed by EMF (electromagnetic fields) are sometimes subject to regulation, and attention to the issue is growing: Mexico, for example, has a regulation in draft. When they are, the standards accepted as the basis for limits are either ICNIRP recommendations or IEEE standards. For testing of EMF, IEC standards provide a widely accepted basis.

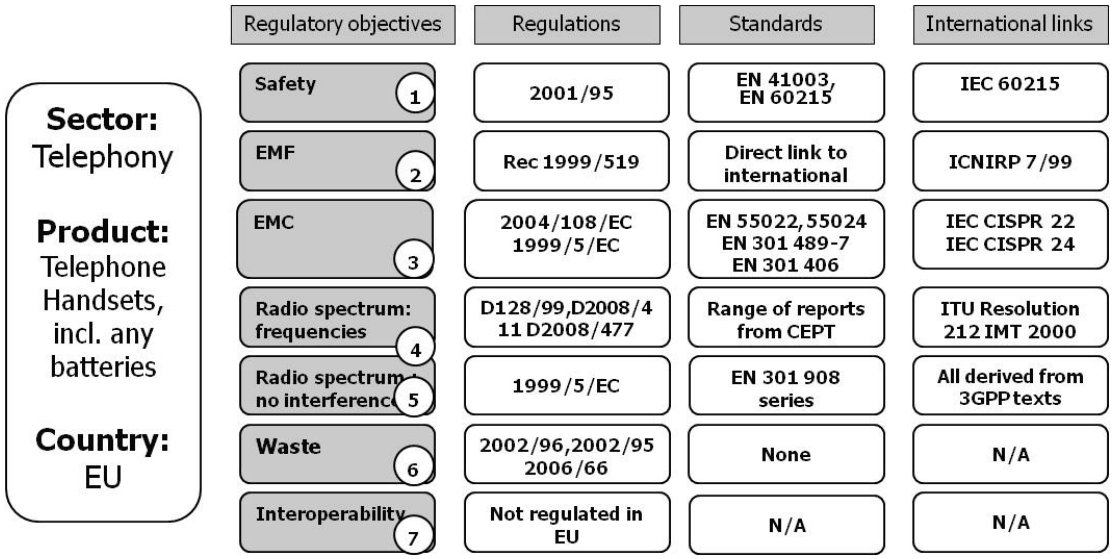
66. For the current generation of mobile telephones (3G), product standards to ensure efficient use of allocated radio frequencies developed by 3GPP are widely used as the indirect basis for regulatory reference of standards, but no direct reference to 3GPP standards in regulation has been traced in this study. 3GPP are converted in some way before regulatory recognition.

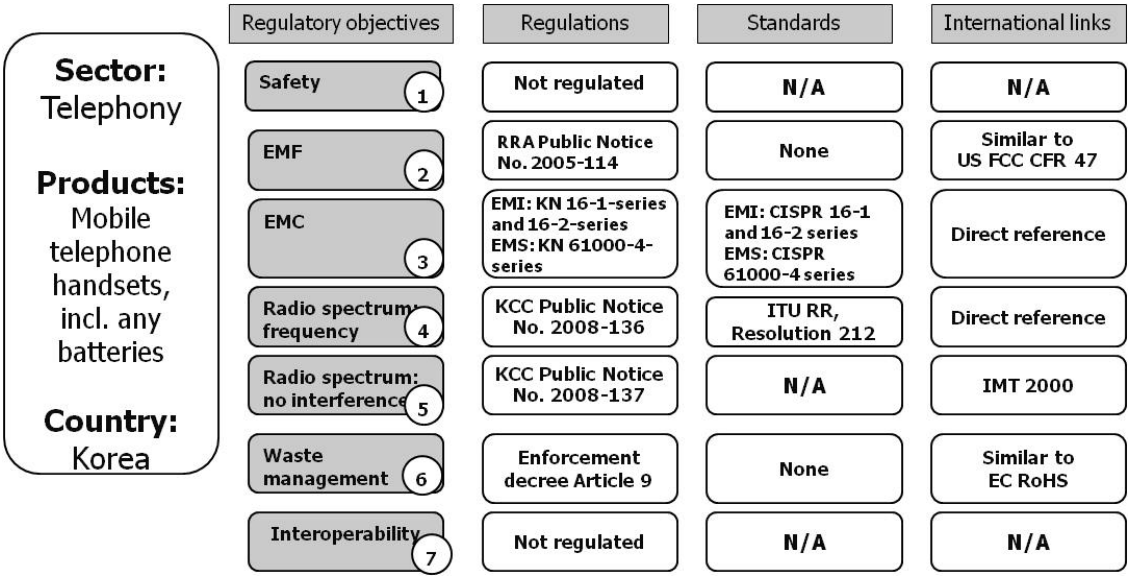
67. No international standards appear to exist that are relevant to end-of-life waste disposal in this sector regulated at the federal level. Fuller judgement awaits more complete information on batteries for use by mobile phones.

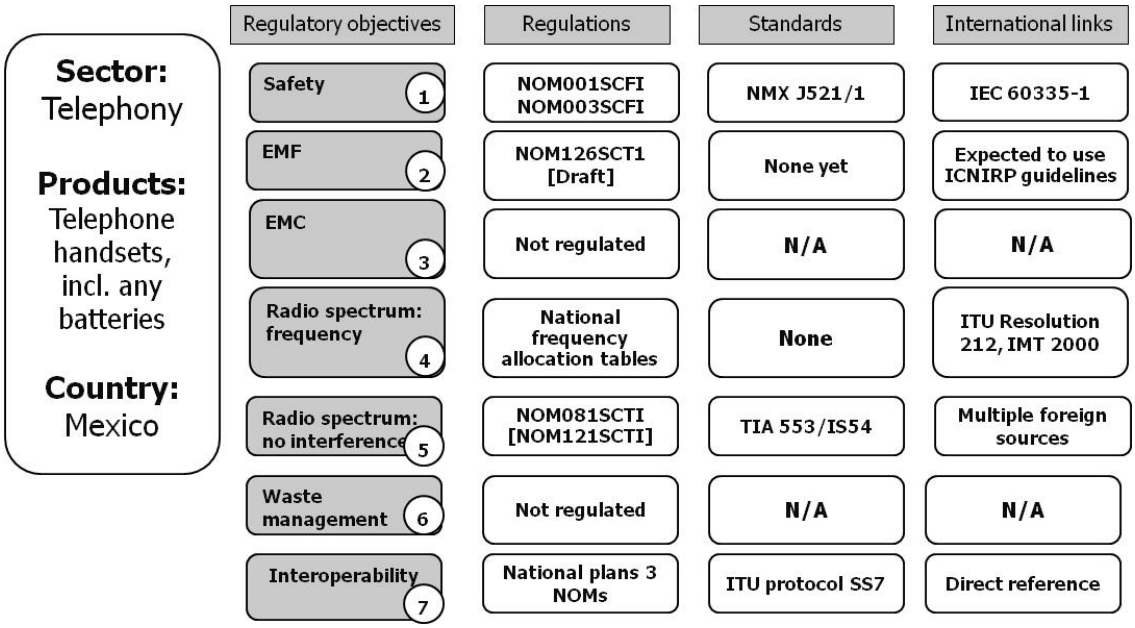
Figure 4. Standards and regulations for ICT/Telephony: Overview Tables

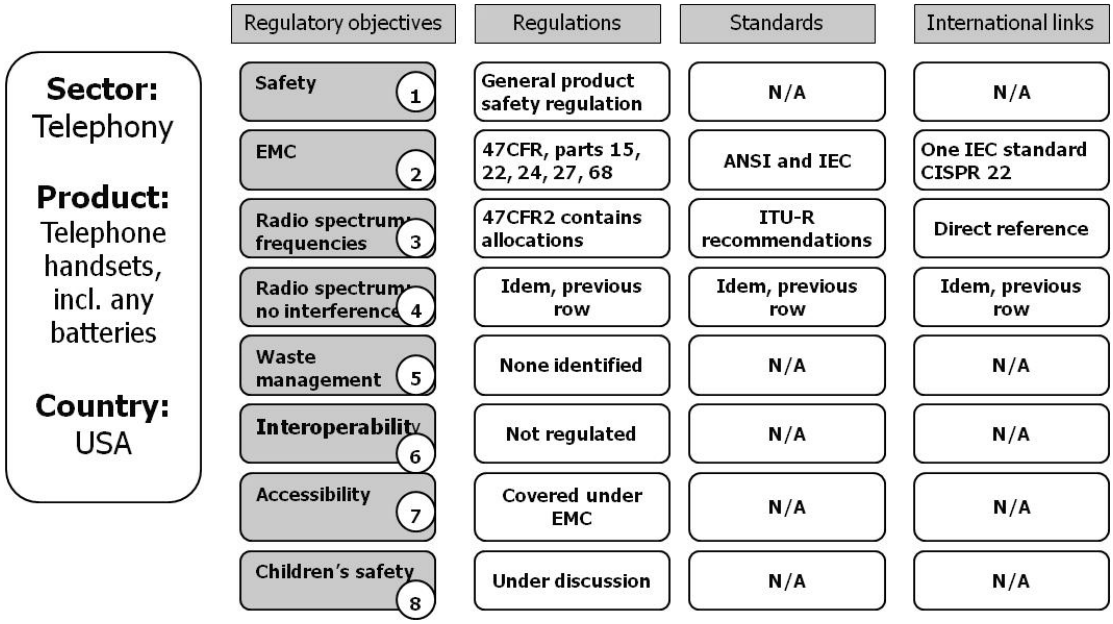





Sector: Telephony
Product: Telephone Handsets, incl. any batteries
Country: EU
Regulatory objectives
Regulations
Standards
International links
Safety 1
2001/95
EN 41003, EN 60215
IEC 60215
EMF 2
Rec 1999/519
Direct link to international
ICNIRP 7/99
EMC 3
2004/108/EC 1999/5/EC
EN 55022, 55024 EN 301 489-7 EN 301 406
IEC CISPR 22 IEC CISPR 24
Radio spectrum: frequencies 4
D128/99,D2008/411 D2008/477
Range of reports from CEPT
ITU Resolution 212 IMT 2000
Radio spectrum: no interference 5
1999/5/EC
EN 301 908 series
All derived from 3GPP texts
Waste 6
2002/96,2002/95 2006/66
None
N/A
Interoperability 7
Not regulated in EU
N/A
N/A


Sector: Telephony
Products: Mobile telephone handsets, incl. any batteries
Country: Korea
Regulatory objectives
Regulations
Standards
International links
Safety 1
Not regulated
N/A
N/A
EMF 2
RRA Public Notice No. 2005-114
None
Similar to US FCC CFR 47
EMC 3
EMI: KN 16-1-series and 16-2-series EMS: KN 61000-4-series
EMI: CISPR 16-1 and 16-2 series EMS: CISPR 61000-4 series
Direct reference
Radio spectrum: frequency 4
KCC Public Notice No. 2008-136
ITU RR, Resolution 212
Direct reference
Radio spectrum: no interference 5
KCC Public Notice No. 2008-137
N/A
IMT 2000
Waste management 6
Enforcement decree Article 9
None
Similar to EC RoHS
Interoperability 7
Not regulated
N/A
N/A





68. Tables with more detailed information about regulations and standards and Notes corresponding to the number labels shown in the *Regulatory Objectives* column in the overview data tables, are available in the Annex Compendium**.**

VIII. Conclusions and implications

69. This is a pilot study, whose goal has been to try to collect case-based data covering three sectors and a small group of OECD countries.

70. The complexity of the data, and the difficulties of reaching anything that can reasonably be called *complete* even for a single case, required a further phase of verification, which was carried out with

collaboration from officials that were consulted for the collection of the data presented in the tables and notes of the Annex document.

71. The following are broad conclusions followed by some comments on multi-sectoral implications for future monitoring and trade impact assessment.

A. Broad conclusions

72. A first conclusion is unsurprising: all countries studied are implementing, in various ways, the clause of the TBT Agreement that constitutes the starting-point of this research. In each case, implementation can be documented through both high-level policies or framework regulations, and sector-specific regulations in which some international basis of standards is used in practice.

73. The range of non-national standards used in technical regulations is broader than sometimes acknowledged. The pragmatic approach used in this study to the search for *international links*, as defined in an annex to this report, led to many standards development bodies which do not meet all definitions of *international standard* used today. This study makes it possible to identify the extent of the spectrum. Examples from the data presented in this report are:

- The known, major global bodies with no primary affiliation to a single country, whose standards are used directly or via national transposition.[13]

- Other global bodies or consortia, relatively unknown to the general public, whose standards influence regulations considerably, but without any public acknowledgment of the link by regulators.[14]

- Bodies with a clear primary affiliation with a single country – demonstrated in particular by their recognition of the primary jurisdiction of their own legal system – but globally recognised and used.[15]

- National standards from national bodies with no global recognition at all in any meaningful sense of that term.[16]

74. Beyond those very broad conclusions, a major negative conclusion has emerged from the research: that there is a striking lack of transparency, which severely complicates the task of measuring the detail. In this context, *transparency* means the ability to identify, for a given sector, which standards are used, for which regulatory objectives, and with which links – direct or indirect – to standards used internationally. [17]

---

13. ISO, IEC, and ITU are major examples.

14. For example, the European Telecommunications Standards Institute (ETSI) bases many of its standards on those of 3GPP, but the equivalence is not acknowledged in any published form.

15. US-based SDOs are examples.

16. An example is a Saudi-Arabian standard for air-conditioning, used in Mexico.

17 An example of good practice that has emerged from this study consists of maintaining the reference number of the non-national standard and/or the name of the source standards body. For example, when an ISO standard is transposed in an identical version at European level, the reference number of the European standard is identical with the ISO reference number; only the prefix EN is added (e.g. ISO 8230-1:2008 becomes EN ISO 8230-1:2008). This referencing method is not applied if the ISO standard is not being

75. Without transparency, it is impossible either to take stock of practice or to follow progress over time, or to assemble objective data in a form which may lead to evaluation of the impact on trade of the use of standards in regulation. It is impossible to identify the essential details of that practice, and no uniform data-format of long-term value can be established and applied internationally. Nor is it easy for the many stakeholders with interests in transparent identification of standards used in international trade to identify which they are and where they are used.

B. The problem of transparency

76. The single most important obstacle to transparency suggested by this pilot study is that the essence of the linkages to non-national documents is often impossible to identify without complex research. The *essence of the linkage* is a combination of 1) the identification of the documents through which the linkage is established, and 2) determination of the nature and extent of any modifications made in national regulation from an international core.

77. That central point forms part of a longer list of problems of transparency, which can be documented in several forms and at several levels. A search for standards within a given field of technical regulation may be pointless because no relevant technical regulation exists, or the issue under study is simply not included in the regulation. That most elementary fact, the starting-point for research, is simply not available from published sources. This study responded to that problem through extensive field research which made it possible to assess comprehensively, for each of the sectors covered, the scope of the countries' regulatory regimes as well as similarities and differences. A summary of these basic data for the five countries studied is provided in Annex 5.

78. Within a country, different regulatory authorities may employ different methods of using standards; for example one agency may incorporate a standard by reference, whereas another may state standards directly in a regulation.

79. A regulation may refer to standards, which in turn refer to yet other standards. Or the content of a standard may simply be copied into a regulation without acknowledgement of the source standard itself.

80. The few national multi-sectoral databases offer some help in measuring total standards used, but suffer from a number of problems. They may mix formal international treaty obligations to apply specific technical specifications[18] with voluntary consensus standards. Their search terms – such as *electrical safety* – may not produce lists that are remotely near comprehensive. They may fail to identify important links to non-national documents or standards or, even where a link is identified, they may fail to state whether the non-national standard is used in its original form or with modifications. Even if they claim to be comprehensive, they may omit significant areas of regulation, thus misstating the proportions of standards from any given organisation.

81. Even direct, face-to-face interviewing of regulators responsible for a given area of regulation may fail to identify the chain from regulation to standard to international link accurately. Their knowledge

---

transposed identically. In the case of IEC standards which are identically transposed at EU level, the European standard keeps the IEC numbering; and only the prefix is changed from IEC into EN and the reference of the IEC standard is also indicated. Where the European standard contains modifications with regards to the IEC standard, the fact of the modification is indicated (without specifying the relevant clauses). Similarly, when US and Canadian national standards transpose ISO or IECD standards, this can be reflected in the standards' names, for example CAN/CSA-CISPR 22-02 or CAN/CSA-E60335-2-3-06 (modified version of IECD 60335-2-3).

18. Examples are the obligations imposed for ships by IMO (International Maritime Organisation)

normally extends to 1) the first text recognised in the regulation, and 2) the broad policy context in which the recognition takes place. Therefore, if the standard directly recognised in a regulation is a national standard that is not identical to a named non-national standard, further research must be undertaken to identify the link.

82. The regulator does not always know whether there is any link at all to some document produced outside his country. For this identification, the best source appears to be the staff of standards bodies. Thus, further research is often possible through standards bodies, but it can be so resource-intensive as to become impractical. For example, the regulator or the standards body may identify a given national standard as a modified version of an international standard, but the nature of the modification can only be understood by purchasing and studying the standard itself, which may or may not offer a summary.[19]

83. The link with standards is identified in many different ways. Mention of a standard in a regulation may not always mean its formal recognition: a standard may be mentioned for guidance purposes only, in the regulation itself or in separate documents which constitute *de facto* recognition but without *de jure* force. Sometimes the identifying references of recognised standards do not appear in the regulation at all, but in separate documents.[20]

84. These difficulties made it impossible to develop a uniform research methodology to identify data. In effect, a separate methodology was needed for each country studied, and on occasion, more than one method was needed for a single country. For example, one country may have wider electronic databases that permit a text search for any standard from a named standards body using the standards code as the search criterion; another country may always accompany *de jure* recognition of a given standard with a specific form of words (e.g., *incorporated by reference*) which can then be used as the basis for searching, once the broad area of regulation can be identified; another country may have one large database covering standards emanating from one broad set of standards development bodies, but offer no central database for identifying other standards.

C. An approach for future monitoring?

85. Given the problems of transparency highlighted above, can anything be measured in a meaningful form, as a basis for monitoring progress?

86. The conclusion suggested here is that some limited measurement is possible, and that measurement should focus on the following facts in a given case:

- Do technical regulations have common objectives?
- Are standards used formally as evidence of compliance?
- If they are, can the standards be traced back (or linked) to a common, internationally used source?

19. A further element of research might be needed at the level of standards themselves, when international standards are modified for national use. Modifications can range from a few to extensive changes, and which can be major or minor. An example is the international standard IEC 60950, adopted by Canada, the United States and many other countries, as their national standard, with national deviations. Reportedly there are over one hundred differences between IEC 60950 and UL 1950/CSA 22.2 950, the national versions applicable in both Canada and the United States. (http://www.i-spec.com/IEC_60950/usa_canada950.html)

20. A good practice could be the publication of the reference of relevant standards under a given regulation on a consistently updated website.

- If they can be traced back to a common source, is the common source used in its original form without modification, or with modifications? The term *modification* can be defined: a definition of a *modified international standard* exists in ISO Guide 21, and is probably suitable for wider use.

87. These elements can be combined to form an analytical framework for presenting and assessing the use of standards in regulation in any sector. They offer regulators a tracking tool with which cross-border use of standards can be monitored over time. The same elements also generate data for quantitative trade effect analysis of standard use.

88. This study has applied the framework to learn more about the standards use in regulation of the five pilot countries. The template developed in the research makes it possible to grasp more easily and clearly, for the three product groups studied, differences between countries in regulatory objectives, and whether the product group and objective are regulated at all. As the overview tables in Annex 5 show, some issues are regulated by every country whereas other issues are at times left to the market.

89. Furthermore, even when they share the same objectives, regulators differ in their use of standards as a basis for technical regulations. It is not clear why this is: possible reasons include non-availability of relevant standards or a lack of understanding of how they can be used. Greater transparency might help elicit the reasons more easily. Examples of the differences from this study are:

- For domestic appliances, of the countries that regulate *EMC, energy efficiency*, *energy efficiency labelling and hygiene* at the federal level, all draw on independent standards to meet these objectives. Regulation of other issues, such as EMF or waste management, uses such standards less consistently.

- In the natural gas sector, all the countries that regulate the safety of *gas storage and road/rail gas transport tanks* make use of independent standards.

- For telephony, independent standards are used as a basis whenever *EMC* or *interoperability* is regulated. This is a less commonly observed practice in EMF or waste management regulations.

90. Where countries regulate for a similar objective and use independent standards, these standards must be identified before it is possible to determine convergence of use of standards.

91. Among the three sectors covered, the domestic appliances sector displays the longest list of standards common to at least two countries, for the same regulatory objective (safety). The natural gas sector is characterised by recognition abroad of standards developed by various US-based standardisation bodies. A standard developed by the American Society of Mechanical Engineers (ASME B31) is the standard most widely used by regulators of the countries covered. Other main developers of standards with usage outside the United States are ANSI (American National Standards Institute) API (American Petroleum Institute), ARI (Air-Conditioning and Refrigeration Institute),) or NFPA (National Fire Protection Association).

92. Concrete examples where two or more countries reference the same standard in their respective technical regulations are provided in Table 2. Countries that share a given standard could be divided further based on the nature of the international link, i.e. whether a country has adopted an identical or a modified version of the shared standard.

Table 2. Examples from pilot study of standards with an international use

In the sector of domestic appliances
for the regulatory objective of *Safety: electrical shock*:
— **IEC 60335-2-2** is used by EU, Korea and Mexico for vacuum cleaners.
— **IEC 60335-2-24** is used by EU, Korea and Mexico for refrigerators.
— **IEC 60335-2-14** is used by EU and Mexico for kitchen machines.
— **IEC 60335-2-28** is used by EU and Korea for sewing machines.
— **IEC 60335-2-7** is used by EU and Korea for washing machines.
for the regulatory objective of *Electromagnetic compatibility (EMC):*
— **IEC CISPR 22** is used by Canada and USA for all electrical appliances surveyed.
— **IEC CISPR 14-1** and **14-2** are used by EU and Korea for all electrical appliances surveyed.
for the regulatory objective of *Energy efficiency*:
— **ASHRAE 37** and **ARI 210** are shared by Canada, Mexico and USA for air conditioners.
In the sector of telephony, specifically for mobile telephones:
for the regulatory objective of *Spectrum frequency:*
— **ITU regulations** are referenced in regulations by Canada, EU, Korea, Mexico and USA.
for the regulatory objective of *EMC:*
— **IEC CISPR 22** is used by Canada, EU, and USA.
In the sector of natural gas
for the regulatory objective of *Safety of storage equipment*:
— Korea national standards are replaced by **US ASME standards** under certain conditions.
for the regulatory objective of *Safety of pipelines*:
— **ASME B 31** is used by Canada, EU and USA.
— EU follows **API RP579** for pipelines defects.
for the regulatory objective of *Safety of exploration and extraction equipment*:
— **API Spec 6A** (identical to **ISO 10423**) is used by Canada and USA.

Note: This list is not exhaustive. Instances where a standard from outside the country was recorded for one country but the same standard was not recorded for any of the other four countries of the pilot study, are not shown.

93. The research has revealed opportunities to improve transparency of data on the extent of the direct or indirect use of international standards as a basis for national technical regulations in individual sectors. Greater transparency may in itself be of value if it leads to an improvement of understanding of what is regulated and where standards are actually used to meet regulatory objectives. If more countries know what standards are used, where, and how, it can only help discussion of the case for their wider use.

D. Possible links with trade analysis

94. Factual presentations, in a harmonised format for a given product field, on whether countries have common regulatory objectives, whether they use standards to meet those objectives, and if so whether they use common sources or developers for those standards and identical versions of the texts, would be suitable for attempts to investigate the relative impact on trade of the regulatory use of country-specific and international standards.

95. Because of data constraints the empirical literature on the relationship between trade and standards has relied mostly on approximate measures of standards derived from secondary data. One approach has been to base measurement on counts of the stocks of voluntary standards available in

countries, by sector or nation-wide. These studies however cannot assess how many of the counted standards are *actually used*, or are used *as a basis for technical regulation*. The closest that existing studies come to assessing the effects of the *regulatory use of standards* is (a) (also count-based) work with regulations that WTO members notify to the TBT Agreement and (b) the small literature specialised in regional agreements. Because WTO members must notify only new or revised regulation under the TBT Agreement and only when specified criteria are met (one of them being that a relevant international standard does not exist or the technical regulation deviates from existing relevant international standards), the notifications provide an incomplete picture of the requirements that products must meet in individual countries, with a bias for recording regulation that does not make use of international standards. The literature on regional agreements usually examines the impact on both intra-regional trade and trade with third countries of various types of initiatives which harmonise national technical regulations or underlying standards at the regional level. [21]

96. The pilot research suggests that attempts to correlate the use of standards with the trade flows of countries are most likely to be useful if regulatory analysis develops measures of:

- the degree of alignment of regulatory objectives for a product/sector (**are different countries trying to regulate the same issues?)**
- the extent to which identical standards bodies are used as the basis of direct or indirect citations in regulations (**are different countries using common sources for their standards or not?)**
- where national transpositions of documents developed outside the country are used, possibly calculations of the degree of equivalence between those national transpositions and the source **(are the documents direct, identical transpositions, or modified versions?)**

97. If simple, factual data (even in the form of *yes/no* answers to these core questions) became available more widely across countries, in one or several economically important sectors, it would be possible to investigate the link between trade and regulatory use of standards at different levels of detail.

98. For example, the general presumption that internationally harmonised standards support trade could be investigated by including in an econometric model of bilateral trade (*e.g.* a gravity model) count variables which for a specific sector would measure the number of country-specific standards used in country A, the number of country-specific standards used in country B and the number of standards shared by A and B. Complementing the existing literature employing count measures of standards, the work would focus specifically on *standards embodied in technical regulations* and use data which if collected by way of the methodology developed here would significantly improve on the detail of the state of regulatory practice in individual countries which currently available data sources.

99. Instead of counting standards and looking for differences in the level of trade between country pairs, one could also count regulatory objectives. The number of objectives measures *the extent* to which products are regulated in different markets, a factor determining firms' product adaptation costs and hence likely to play a role for international trade. Econometric analysis could explore this linkage, and the extent to which use of international standards mitigate the cost of regulation. This could form a step towards developing a more sophisticated approach that would assess also the variety of regulatory regimes of countries. The analytical frame developed by this study acknowledges the importance of the regulatory context for understanding use of international standards in national technical regulation. This should be as

21. For a recent comprehensive survey of the empirical literature addressing the relationship between international standards and trade, see G.M. Swann, *International standards and trade: A review of the empirical literature*, TAD/TC/WP(2009)37/FINAL.

fully as possible reflected in the design of variables for empirical work. This could, for example, entail dividing national regimes of technical regulation into three types: (a) there is no technical regulation at all, (b) regulation exists but is not based on independent standards, and (c) regulation exists and is based on independent standards. Any commonalities between two countries, including sharing of objectives and sharing of standards, would be measured as well.

ANNEX 1

USE OF INTERNATIONAL STANDARDS IN REGULATION – DEFINITIONS

Standards used / recognised

100. The definition starts with one of the most widely used definitions of the word *standard* – the definition contained in ISO Guide 2 – subject to one comment on its final phrase, to take account of actual practice by regulators.

101. The ISO definition is: *a document approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for products....with which compliance is not mandatory.* The same guide defines a body as: *a legal or administrative entity that has specific tasks and composition*. Examples of bodies are organisations, authorities, companies and foundations.

102. One phrase of the definition above may present problems in this study: the phrase *with which compliance is not mandatory*. Our research has revealed documents which were developed by recognised bodies and exclusively for mandatory use in regulation; examples are ETSI standards used in EU regulation of mobile phones. Many international treaty organisations produce documents which have the other characteristics of a standard *and* which are binding on the signatories to the treaty. Such documents are frequently included in the databases of standards maintained by the OECD governments covered here. Therefore, the restriction of the term standard to documents that were developed for non-mandatory use would result in the exclusion of a large number of documents which regulators themselves consider to be *standards*.

103. The above comment has led to a decision to include, as *standards*, documents commonly referred to as such, on condition that they have some existence independent of the regulation itself and that they are produced by a recognised body.

104. Standards listed in this column are those which are referenced in the relevant regulation, or in supporting publications of an official gazette or similar publication which confers *de jure* recognition. The first phase of our research collected data on any standard used in this way, national or international.

105. This definition does not deal with the separate issue of *de jure* and *de facto* use, for which terms definitions are offered later in this Annex.

International standards and international links

106. As for definitions of *international standards*, the research for this project has aimed to accommodate the full range of opinion. The TBT Agreement uses the term *international standard*, but never defines it directly. *Idem* for its treatment of the standardising bodies which produce them. This research takes account of attempts made in the WTO, to clarify the concept of international standards under the TBT Agreement. Notably a 2002 decision of the TBT Committee[22] laid out *six principles and*

22. These criteria for the development of international standards are put forward in G/TBT/1/Rev.8 dated 23.5.2002, p. 26-29.

procedures for international standards development. The decision says that these principles and procedures should be observed when international standards are elaborated. It does not say that all bodies which apply the principles are by definition *international standardising bodies* and leaves unanswered the question of whether additional criteria may be applied. Some governments interpret the principles as applying in conjunction with the additional criterion that *international standardising bodies* should have national country representation.

107. The study has aimed to identify here formal or informal links to 1) purely national documents and 2) documents produced by a body outside the country being studied. A *document produced by a body outside the country being studied* means just that. The definition of *body* is the one already given above, and implies no judgement about whether the body may be universally accepted as an *international standards body* – a term for which various definitions are used.

108. Examples of international links which would qualify to be listed here are:

- a national standard in Korea which is derived from a standard issued in Japan or the USA. The Japanese or US standard should be listed under *international links*.
- a European standard which is derived from a standard issued by ISO or IEC. The ISO/IEC standard should be listed under *international link*.
- a national recommendation by a national professional association, referenced in national regulation, and which is derived from a recommendation issued by an international professional body, such as the International Association of Optometrists. The document issued by the international professional body would be listed under *international links*.

109. If a regulation in Mexico references directly a standard from a US body as a requirement in regulation, the research lists the US standard under *standards used*, and a note appears in the *international links* column stating "*direct reference*".

Relevant standards

110. Similarly, no formal definition exists of the word *relevant*, but a consensus emerged that the term must include relevance *to the market* as well as relevance to the objectives of the regulator. Two sources were used to provide additional perspective:

1. In its Second Triennial Review of the TBT Agreement,[23] the WTO TBT Committee offered a set of criteria for a *globally relevant standard*, stipulating that it should
    - effectively respond to regulatory and market needs (in the global marketplace)
    - respond to scientific and technical developments in various countries
    - not distort the market
    - have no adverse effects on fair competition
    - not stifle innovation and technological development
    - not give preference to characteristics or requirements of specific countries or regions when different needs or interests exist in other countries or regions
    - be performance based as opposed to design prescriptive

23. Annex 4, para. 10.

2. The Technical Management Board of ISO[24] has defined *global relevance* as *the required characteristic of an international standard that it can be used / implemented as broadly as possible by affected industries and other stakeholders in markets around the world.*

111. In this research, it was not felt necessary or feasible to subject each standard to scrutiny to determine if it was indeed *relevant* according to these criteria. No high-level policy in any country was identified which might suggest that standards referenced were not *relevant* according to these criteria. **The *a priori* assumption has been made that all standards referenced are considered relevant.**

De jure use and de facto use of standards

112. The difference between *de jure* and *de facto* in this context can be explained thus:

113. An example of *de facto* recognition arises when a regulation makes no reference, direct or indirect, to a specific standard, but imposes a general requirement – such as *good engineering practice*, or *ALARP* risk (As Low As Reasonably Practical), or simply *safe product* – and where market surveillance authorities recognise, *de facto*, identified standards or bodies of standards as an adequate demonstration of compliance with the requirement.

114. *De jure* recognition, on the other hand, involves formal recognition of a standard in the regulation itself, or through a clause in the regulation which leads to *de jure* recognition through later or separate publication in an official gazette or register.

115. In this study, **it was decided to limit research to *de jure* recognition**. The reasons: 1) *de facto* recognition is almost impossible to identify accurately except through extensive surveys beyond the resources allocated to this work, and 2) the text of the WTO TBT Agreement does ***not*** refer to the use of relevant international standards as *the basis* ***for compliance with*** *regulation*, but to their use as the *basis for regulation* as such. The importance of this exclusion of *de facto* recognition may deserve discussion. One source interviewed in this study suggested that *de jure* recognition might in practice be largely irrelevant, in cases where standards were accepted *de facto* as the basis of compliance.

116. The main body of this report has presented a table showing how de jure use of standards in technical regulation may vary. The same table is reproduced below, with examples from this study.

24. Annex 1 to TMB 58/2003 Rev.1

	Unique national standard	**Direct transposition or citation of a standard from outside the country**	**Other linkage with a standard from outside the country**
Imposed *de jure* as exclusive basis for compliance	*Examples* EN 153 Note 1 ASME/ANSI B 31.8 Note 2 MSS SP-44-96 **Note 2**	*Examples* ASTM D 1945 ISO 6974 **Note 3**	*Example* ICNIRP *Guidelines ... for exposure to ... electromagnetic fields* **Note 4** Imposition of a national standard which is in fact essentially identical to an identifiable standard from outside the country but where that fact is not confirmed in any official text
Recognised *de jure* as a basis for compliance but not imposed as the exclusive basis **Note 5**	*Example* EN 301 489-7 **Note 6**	*Example* IEC 60335-2-24 **Note 7**	*Example* IEC 60335-2-7 (mod) **Note 8**
Recognised *de facto* as a basis of compliance	Excluded from data presentations in this report. See comment earlier in this Annex.		

Note 1 Domestic appliances – Europe. This standard, issued by CENELEC – the European Electrotechnical Standards Committee – is imposed to measure the energy consumption of refrigerators, listed in the *domestic appliances* chapter of this report, and imposed under EU Directive 96/57/EEC. It has no reported equivalent outside Europe. A cross-reference is given to ISO 15502 (2005-10), which also covers refrigerators, but which deals with specifications other than energy efficiency.

Note 2 Natural gas - USA. These standards are *incorporated by reference* in Title 49 CFR (Code of Federal Regulation), Part 192.7. The ASME (American Society of Mechanical Engineers) standard covers *Gas Transmission and Distribution Piping Systems*. The MSS (Manufacturers Standardization Society of the Valve and Fittings Industry) covers *Steel Pipe Line Flanges*.

Note 3 Natural gas - Mexico. The standards listed here are listed as alternatives, one of which must be used to measure the presence of inert gases (N and CO2) in natural gas, to ensure that they remain below specified maxima. The standards are imposed by NOM 001, which is classified as a technical regulation by the Mexican government. Transpositions of the ISO standard shown here can be traced in other countries.

Note 4 1) Mobile telephones - Europe. ICNIRP (International Commission on Non-Ionising Radiation Protection) produces guidelines on safe exposure limits which have no direct regulatory force, but which are widely used internationally as a basis for regulatory action The case here refers to EU *Recommendation* 1999/519/EC, which explicitly refers to ICNIRP as the source of the limits which it recommends for use in mobile telephone frequency ranges. This *recommendation* lies at the edge of the spectrum of *regulation* as such: it has no binding regulatory force, but is published in the EC Official Journal and does in practice provide the legal basis for regulatory action.

2) An example of the de facto imposition of an international standard without any written, official confirmation of that fact came from Mexico, where identified Mexican standards were revealed, in interviews, to be essentially identical to identifiable IEC standards.

Note 5 In this study, only the European Union was identified as using this approach. It is what the EU calls the *New Approach*, under which – in this context – the EU authorities may formally recognise standards as providing a *presumption of conformity* to the directive, while leaving suppliers free to offer other (unspecified) proof of compliance if they prefer. A goal of this approach is to prevent regulations from stifling technological innovation.

Note 6 Mobile telephones - Europe. This standard issued by ETSI (European Telecommunications Standards Institute) defines common technical requirements for *EMC (electromagnetic compatibility) for radio equipment and services*, under Directive 1999/5/EC on radio-and tele-communications terminal equipment.

Note 7 Domestic appliances - Europe. This IEC (International Electrotechnical Commission) standard defines test procedures to prove the electrical safety of refrigerators. An identical European version, with the same reference number but using the prefix EN instead of IEC, is recognised by the European Commission under Directive 2006/95/EC on low-voltage electrical safety.

Note 8 Domestic appliances - Europe. This IEC (International Electrotechnical Commission) standard defines test procedures to prove the electrical safety of refrigerators. Al European version, with the same reference number but using the prefix EN instead of IEC, is recognised by the European Commission under Directive 2006/95/EC on low-voltage electrical safety. However, unlike the standard for refrigerators in the previous note, the EU announces that its European version is modified compared with the IEC standard. The EU does not state what modification(s) have been made.

ANNEX 2

DEFINITIONS OF REGULATORY OBJECTIVES

117. This Annex defines the various regulatory objectives for the sectors covered in this report.

118. The study has aimed to use simple definitions, and generally to use terms that are easily understood inside and outside the sectors studied. The classification is generally by policy goal (e.g., safety, environment). However, natural gas has required special treatment, since in that sector, regulatory responsibility is oftern divided by sector of the supply chain (e.g., extraction, pipeline) rather than by area of responsibility.

119. Generally and in all sectors, regulations covered are those which impose sector-specific specifications on the products covered. The study does not try to cover multi-sectoral regulation even if it is indirectly relevant. Examples of multi-sectoral regulations excluded here are:

- packaging
- general chemicals regulation which places blanket restrictions on the use of certain substances, such as carcinogenic substances.
- general product safety regulations that are not specific to the products covered in this study.

Regulatory objectives: domestic appliances

Safety This covers all hazards which may harm people, notably electrical or mechanical, except for 1) the narrow and unusual area of electromagnetic fields, and 2) health issues related to hygiene, both of which are dealt with separately below. The term in this context does not cover environmental safety.

EMF electromagnetic fields, which represents a narrow area of risk which, today, is subject to little regulation in domestic appliances but considerable research because of fears that hazards are not fully understood. EMF can present dangers to humans which go beyond disturbance and can cause physical harm.

EMC electromagnetic compatibility. The goal of EMC regulation is to prevent electromagnetic disturbance, which is broadly defined as any electromagnetic phenomenon which may degrade the performance of equipment. Examples of electromagnetic disturbance include electromagnetic noise, an unwanted signal, or a change in the propagation medium itself.

Energy efficiency. This covers regulation aimed to limit energy consumption – in the products covered here, this means electricity consumption. It normally reflects a wider goal of contributing to efforts to combat climate change.

Waste management. This covers only regulations which impose specifications on products in the interests of reducing environmental damage on end-of-life disposal of a product. Examples are restrictions

on the use of environmentally harmful materials. The definition does not include regulation of waste treatment processes or plants.

Hygiene Covers regulation of substances and materials whose use may endanger health. These are in practice limited to regulations of materials used in products which may come into contact with foods, such as refrigerator walls and kitchen machinery.

Regulatory objectives: telephone handsets

Safety This covers all hazards which may harm people, notably electrical or mechanical, except for the narrow and unusual area of electromagnetic fields, The term in this context does not cover environmental safety.

EMF Electromagnetic fields, which represents a narrow area of risk, which is examined particularly in the case of mobile telephones. EMF can present dangers to humans which go beyond disturbance and can cause physical harm. The public debate about the dangers from mobile telephone masts is an example of the impact of the problem, although masts are outside the scope of this study.

EMC Electromagnetic compatibility. The goal of EMC regulation is to prevent electromagnetic disturbance, which is broadly defined as any electromagnetic phenomenon which may degrade the performance of equipment. Examples of electromagnetic disturbance include electromagnetic noise, an unwanted signal, or a change in the propagation medium itself.

Spectrum frequency Applies only to wireless products. Regulation allocates and assigns bands of frequencies and specific frequencies of the radio spectrum for various uses (services) and users, under specified conditions.

Spectrum – interference Once frequency band allocation (above) is made, appropriate equipment characteristics are specified to ensure that use of the frequency band is efficient. For example, limits may be set on out-of-band radio emissions or on power strength or geographical coverage of the equipment, with the objective of preventing harmful signal interference between different types of services operating in close proximity on adjacent frequencies

Waste management This covers only regulations which impose specifications on products in the interests of reducing environmental damage on end-of-life disposal of a product. Examples are restrictions on the use of environmentally harmful materials. The definition does not include regulation of waste treatment processes or plants.

I**nteroperability** This is the ability of a product to work with other systems or products without intervention by the operator. Outside the telephony sector, an example is the interoperability of devices and software which use the Internet.

Other By definition, this category is open and unspecific. Technical specifications imposed with the objective of protecting children are an example: devices to facilitate tracking of location or to exclude harmful content.

Regulatory objectives: natural gas

120. The structure of technical regulation in the countries studies has led to a classification of objectives which includes a breakdown by stage of the production process as well as by policy goal. Policy goals in this sector are essentially any or all of quality, safety and measurement accuracy, for a variety of reasons. But *in practice*, regulatory responsibilities are not broken down by those three goals. Pipelines, for

example, are often regulated under regulations quite different from those used for the extraction installations, even if safety is the paramount objective in both cases. The study covered only natural gas, and not oil or LPG.

Quality The quality of the gas itself.

Exploration and extraction Essentially the safety of equipment used in getting gas out of the ground or the sea.

Storage Installations where gas is stored in any form. These may be above or below ground.

Pipelines The pipes through which long-distance transport of gas is undertaken.

Transport Tanks placed on means of transport in the road or rail sectors. Transport by ship is excluded here, because there is no scope for variation between countries, and comparison would therefore be superfluous: all countries in the study are bound by treaty to apply the provisions of the International Maritime Organisation (IMO).

Processing facilities Equipment in a plant for processing and keeping gas.

ANNEX 3

HIGH-LEVEL POLICY ON THE USE OF STANDARDS IN REGULATION

Canada

121. In Canada, the Standards Council of Canada (SCC) promotes the use of standards in regulations, but consideration of *international standards* is also an explicitly stated requirement of the regulatory policy of the Government of Canada. The 1995 regulatory policy was updated in 2007 with the passage of the *Cabinet Directive on Streamlining Regulation*, which *inter alia* establishes the responsibility of departments and agencies to seek advice and comply with Canada's international trade obligations.

122. The following subsections of Section 4.4 (Selecting, designing, and assessing regulatory responses) of the Cabinet Directive refer to international standards [relevant text in italics]:

> "Selecting the appropriate mix of government instruments:
> Departments and agencies are responsible for assessing the effectiveness and appropriateness of regulatory and non-regulatory instruments for achieving policy objectives.
> Departments and agencies are to:
> identify potential points for effective intervention;
> identify the institutions and parties that should be involved in addressing the public policy issue;
> identify the appropriate instrument or mix of instruments, including regulatory and non-regulatory measures, and justify their application before submitting a regulatory proposal;
> demonstrate that the regulatory response is designed to address policy objectives;
> demonstrate that the regulatory response is proportional to the degree and type of risk;
> demonstrate that the regulatory response will not unduly affect areas that it was not designed to address;
> specify, particularly for technical regulations, regulatory requirements in terms of their performance rather than their design or descriptive characteristics; and
> *make use of all or parts of relevant national or international standards, guidelines, and recommendations as a basis for technical regulations and for conformity assessment procedures when they fulfill intended policy objectives. …"*

> "International cooperation:
> Departments and agencies are to take advantage of opportunities for cooperation, either bilaterally or through multilateral fora, by:
> reviewing and influencing international best practices, sharing knowledge*, adopting or contributing to the development and updating of international standards and conformity assessment procedures, and developing and pursuing compatible approaches with international counterparts;*
> limiting the number of specific Canadian regulatory requirements or approaches to instances when they are warranted by specific Canadian circumstances and when they result over time in the greatest overall benefit to Canadians; and
> identifying the rationale for their approach, particularly when specific Canadian requirements are proposed."

123. In a separate Appendix B, the *Cabinet Directive* draws attention to certain specific requirements applicable to technical regulations, conformity assessment procedures, and sanitary and phytosanitary

measures contained in the World Trade Organization (WTO) Agreement on Technical Barriers to Trade, the WTO Agreement on the Application of Sanitary and Phytosanitary Measures, and Chapter Seven ("Sanitary and Phytosanitary Measures") and Chapter Nine ("Technical Barriers to Trade") of the North American Free Trade Agreement. Here again, the requirement is mentioned that departments and agencies *"use available international standards, guidelines, and recommendations as a basis for technical regulations and for conformity assessment procedures where they achieve the intended regulatory objective*."[25]

European Union

124. In Europe, the central authority responsible for proposing technical harmonisation legislation is the European Commission. The general frame for an important part of its activity in this sector is contained in the EU's *New Approach*[26] to technical harmonisation. The *New* Approach was initially introduced in the late 1980s and was renewed in 2008 in a set of reference texts which define its legal basis today.[27] Standards play a central role in the *New Approach*, which encourages their use as the primary method of providing detailed technical specifications to meet broader *essential requirements* of directives: standards may be formally recognised by the authorities as granting a *presumption of conformity* to the essential requirements of a Directive, and the recognition is confirmed by publication of a reference in the EC *Official Journal*. While the *New Approach* formally limits such recognition to European standards from any of three identified European standards development organisations, recognition may in practice be extended to non-European standards if they are transposed as European standards; this frequently happens with standards produced by ISO and IEC, and any applicable international reference to those bodies is published simultaneously in the EC Official Journal. The place of this option in the framework for using standards in regulation is presented in Annex I. The *New Approach* is widely used, although not universally, and many technical regulations still lie outside its scope.

125. For European regulations outside the New Approach, standards, if used at all in regulation, must be referenced in the text of regulations themselves; any requirements to do that are specified in individual, sectoral legal instruments rather than in any wider, mandatory policy. As an example of the effect of this approach, a search of the European Commission's legislative database in this project[28] revealed 295 legislative texts which contained references to ASTM, the US standards body, although only a minority of this number were technical regulations, and even where they were, the reference was not always to a requirement to use the standard.[29] The balance consists of texts used in trade agreements or decisions related to classification of products for customs purposes.

Japan

126. In Japan, the linkage between standards and regulation is complex, but several features emerge which demonstrate a willingness to use of voluntary consensus standards. It seems fair to say that there is

25. Government of Canada, Cabinet Directive on Streamlining Regulation, 2007, Appendix B. http://www.reglementation.gc.ca/directive/directive02-eng.asp

26. The EU experience in this field has already been commented on in this OECD project. See the 1998 analytical inventory of international standardisation, TD/TC/WP(98)36 FINAL and specifically paragraphs 142 - 144.

27. Decisions 765/2008 and 768/2008, both published in OJ L208 13.8.2008

28. http://eur-lex.europa.eu/RECH_mot.do

29. An example of a document related to regulation is Decision 2008/329 of the European Commission (OJ L114 26.4.2008), which refers in a preamble to an ASTM standard for toy safety, but without imposing its use.

no automatic or statutory linkage at all, but that regulatory authorities in practice try to take account of standards, both Japanese and international, when regulations exist. As in the EU and the United States, a multi-sectoral policy provides a frame. Encouragement to use standards in regulations is provided by a Japanese cabinet decision of 29 January 1999. Although there is no compulsion, international reviews have indicated that the encouragement does bring results in practice, and local databases exist which list JIS (Japanese standards) referenced in Japanese regulation. The Japanese cabinet decision cannot be considered identical to the EU's *New Approach* to technical regulation noted above, but does in practice appear influential in achieving broadly similar results. At the time of this study, discussion was under way in Japan on whether to move closer to the EU's New Approach above, and whether, as a consequence, to reduce the volume of unique technical specifications contained in Japanese regulations themselves. Since a government ministry -- MITI -- itself operates the secretariat of the Japanese national standards body JISC, and therefore influences decisions on adoption of Japanese standards, government involvement in the entire process is assured. In practice, government influences technical practice through an additional mechanism, beyond regulation. Public purchasing specifications (through the Ministry of Construction or MITI) are reported to be so widely used in construction contracts in Japan, that they play a *de facto* role as mandatory standards even if they do not in principle have regulatory force. These purchasing specifications may deviate from standards and impose unique requirements.

Korea

127. In Korea, the central authority responsible for technical harmonisation is the Korean Agency for Technology and Standard, and ground-rules and definitions for the use of standards in regulation are set in the National Standards Act. Article 20 of the Act provides that when enacting technical regulations or national standards, government should use international standards as much as possible as a basis for their technical regulations. The Industrial Standards Act (Article 29) also provides that the government should cooperate with international and foreign standards organizations to enhance broader application of international standards.

Mexico

128. In Mexico, ground-rules and definitions for the use of standards in regulation are set in the *Ley sobre Metrologia y Normalizacion* (Law on Metrology and Standardisation), first adopted in 1994. This law (Art. 39.1) establishes a general obligation to "integrate" standardisation activity in Mexico into the development of technical regulations.[30] While voluntary national standards are called *Normas Mexicanas* (NM), mandatory technical regulations containing specifications are called *Normas Oficiales Mexicanas* (NOM),[31] and administrative supervision of both categories is allocated to a single branch of the Ministry of the Economy: the Direccion General de Normas (DGN). Beyond this broad requirement of integration at the national level, the same law specifies (Art. 44) that international standards[32] must be taken into account in the development of a NOM, and that the degree of concordance with any relevant international standard must be stated (Art. 41.VI)

30. Technical regulations in Mexico frequently include the word for standard – Normas – in their title: Normal Oficiales Mexicanas, or NOMs.

31. Since NOMs have direct regulatory force, they are classified as technical regulations in this study, and not as independent *standards referenced in regulation*

32. The terms *international standards* (normas internacionales) and *take into account* (se tomarán en consideración) are not defined in the law.

United States

129. In the United States, similar policy-level encouragement exists to use standards in regulations. Notably, the *National Technology Transfer and Advancement Act* (NTTAA) has led to the issue of a procedural guideline, called OMB A119,[33] which requires federal government departments (or agencies) to use voluntary consensus standards as the basis for their regulations where practical and consistent with applicable laws. Although neither the base act nor the supporting circular refer explicitly to *international* standards in this context, the government agency responsible for monitoring compliance with the guideline (NIST, or National Institute of Science & Technology) indicated that it treats that specific aspect in its mandatory annual reviews. A number of other texts provide instructions or relevant guidance: a 2009 submission by the USA to the US-EU High-level Regulatory Cooperation Forum introduced a treatment of this issue with references to OMBA119 above, and also referred to the Administrative Procedures Act, the Trade Agreements Act (TAA), and "*Executive Orders and other official guidance."*

Notably, the NTTAA directs federal agencies to use, when practical and not otherwise prohibited by law, standards developed by voluntary consensus standards bodies to achieve public policy and procurement objectives, and the TAA prohibits federal agencies from engaging in any standards-related activity that creates unnecessary obstacles to trade and requires federal agencies to take into consideration international standards. OMB 119 instructs agencies to use voluntary consensus standards in lieu of government-unique standards, except where such usage is inconsistent with law or otherwise impractical. It defines "voluntary consensus standards" as standards developed or adopted by a voluntary consensus body. It also defines a "voluntary consensus body" as an organization – whether domiciled in the United States or elsewhere – that has the following attributes: openness, balance of interests, due process, an appeals process, and consensus.

33. OMB stands for Office of Management and Budget, a US federal agency.

ANNEX 4

DATABASES OF STANDARDS

130. This Annex lists databases consulted in this study, in 4 broad categories:

- National government databases (Canada, European Union, Japan, Mexico, USA)
- Databases operated by standards bodies (ANSI, PERINORM)
- TBT notifications system administered by the World Trade Organisation (WTO)

1. National government databases - Canada

131. Most relevant monitoring basis found:

- The Standards Council of Canada[34] offers what it calls a *RegWatch* database, on

  https://alert.scc.ca/rwh/search_action_e.jsp

It is described as a *searchable database of standards referenced in Canadian federal regulations*, and offers links to the full text of Canadian regulations and laws (not of the standards) which reference Canadian and international standards.

132. Relevant content: description at the time of this study

- The database contained references to
  1839 standards from all sources
  127 *Standards Developers*, a term which is used here to include voluntary consensus bodies, government standards-setting agencies, and treaty organisations.
- Permissible search criteria are:
  - Standards developer or issuer (by name)
  - Standards developer or issuer (by country of origin) – "international" is a permitted criterion, meaning in this context standards from bodies without any clear national affiliation (see below)
  - Regulation: but only with words that match words in the regulation itself: thus, for example, the term *medical devices* does match the title of identifiable regulations and therefore produces results, but the term *electrical safety* does not.
  - Standard reference number.
- Database covers far more than standards directly used in trade: for example, Occupational Health & Safety regulations feature prominently.

34. OMB stands for Office of Management and Budget, a US federal agency.

Does a picture emerge of the relative use of international standards?

- One example illustrates the need for great caution in any attempt to use raw statistics as a meaningful measure:
  - "EU" (European Union) can be entered as a search criterion, as the country of affiliation of a standards body. The criterion produces 23 hits – only a little over 1% of the total in the database, but more than half the total for ISO. However, examination of the 23 reveals that 11 come from UNECE (United Nations Economic Commission for Europe), which is not an EU body, and that the rest come from a single sector-specific standards body (ETSI) and are used in the single narrow field of navigational systems.

- Of the 1839 records in the database
  - 390 are identified under the heading *international* (i.e., from a body without a primary affiliation with an individual country – see above). Of these, however, over half (208) come from a single body – the IMO (International Maritime Organisation) – which is a treaty body which falls outside the category of voluntary consensus standards developers. ISO and IEC produce 36 and 37 hits respectively, and are both surpassed by the OECD (41 references).
  - 924 are classified as Canadian standards, of which CSA (Canadian Standards Association) appears to dominate with 270.
  - The rest are classed as originating in other countries, of which the USA dominates with 485.

- Other top standards developers listed in the 390 *international* standards – beyond the four listed above (IMO, OECD, ISO, IEC), are
  - RTCM (Radio Technical Commission for Marine Services)
  - AOAC (Association of Analytical Chemists),
  - DNV (sic, although not known as an international body in this sense)
  - ICUMSA (International Commission for Uniform Methods of Sugar Analysis)
  - IALA (international association of lighthouse authorities)
  - ICAO
  - IAGC (International Association of Geophysical Contractors)
  - CIE (Commission International de l'eclairage)
  - BIPM
  - WHO
  - IAEA
  - FAO/Codex
  - ICRP (International Commission on Radiological Protection)
  - ISTA (International Seed Testing Association)
  - SWIFT (Society for Worldwide Interbank Financial Telecommunication)
  - UPU (Universal Postal Union)
  - ITU (International Telecommunications Union)

It is evident that several of these lie outside the category of voluntary consensus standards: for example, ICAO, the WHO, FAO, AND BIPM.

- It is possible to obtain finer detail on where *international standards* are used. For example, ISO standards appear to be used in the following sectors
  - transport/navigation including systems
  - tobacco
  - chemical safety

  - motor vehicles
  - environmental / effluent
- The database also identifies standards from a number of US-based bodies which the US itself may claim to be *international standards bodies*: notably
  - ASTM with 86 hits,
  - ASME: 12
  - API: 117
  - UL: 1

2. Government databases – European Union

133. Most relevant monitoring basis found:

There is no single database which claims to contain searchable lists of all standards referenced in all EU regulations. Two search methods appear relevant:

- Lists of standards recognised under *New Approach* Directives are available via:
  http://ec.europa.eu/enterprise/newapproach/standardization/harmstds/index_en.html

  An explanation of the scope and limitations of this database is appropriate:

  The *New Approach* to technical regulation, developed by the EU in the 1980s, is a highly developed policy in which standards play an important regulatory role: the text of regulations under the *New Approach* contain only *essential requirements*, and leave the detailed specifications to be developed by European standards bodies, which are then eligible for formal recognition by the regulatory authorities as providing a presumption of conformity to the essential requirements.

  The Internet site above leads to a detailed list of regulations covered by the *New Approach*: sectoral coverage is wide but not total, and includes sectors as diverse as electrical products, machinery, pressure equipment, medical devices, telecommunications equipment, measuring instruments, small boats, and packaging. For each regulation listed on the site, a full list of standards recognised is available.

  While the *New Approach* policy \stipulates[35] that only European standards may be recognised, use of international standards is strongly encouraged *de facto* by other mechanisms through which European standards bodies adopt or transpose standards from international bodies. Appendix 3 to this report gives a specific example of the effect of this policy.
- No other official EU database systematically classifies standards references in EU regulations. Searching is possible of all EU regulations on the main official site of the European institutions:
  http://ec.europa.eu/index_en.htm
  but the method is laborious and imperfect.

134. Separately, European standards bodies publish quantitative data on the extent to which they base regional European standards on international standards from ISO and IEC. While such data does not directly lead to a measure of the use of international standards *in regulation* (since European standards are

35. See para. 127 above on high-level EU policy

consensus documents, available for use outside regulation), it does illustrate the penetration of international standards in Europe.

135. Relevant content: description at the time of this study

- The lists of standards recognised under *New Approach* directives reference thousands of standards. They have not been counted in this study. By definition under the *New Approach*, all standards referenced in this way must be adopted by European standards bodies. A sample of two major directives was examined in this study. The results, and a comment on the linkage with international standards, appear below.
- Beyond the *New Approach*, it is only possible to provide examples, unless a regulation-by-regulation search is undertaken. http://ec.europa.eu/index_en.htm

Does a picture emerge of the relative use of international standards?

136. Only for some sectors, and even within those sectors, not necessarily for all regulations applicable in the sector. But for the first category listed here (*New Approach*, immediately below), calculations are possible based on the ISO definition of an *international standard*, which is the one used by the EU.

137. Quantified calculations of the use of international standards are possible for *New Approach* Directives, although laborious. Only European standards are listed directly, but where a European standard is based directly on a specific international standard from ISO or IEC, that fact is noted, and a line-by-line check is possible. Two examples are given below, for two individual regulations, in each case based on the most recently published list of standards recognised, which present diametrically opposite patterns. In the first case, international standards represent a relatively small proportion of the total, in the second case the situation is reversed:

Directive 98/37/EC for machinery safety

Total number of European standards recognised without international equivalent	526
Total number of European standards recognised which are directly based on ISO standards	103
Grand total	**629**

Directive 2006/95/EC on low-voltage electrical safety

Total number of European standards recognised without international equivalent	108
Total number of European standards recognised derived from or based on IEC standards[36]	492
Grand total	**600**

36. This figure combines standards which are identical to IEC standards and those which explicitly acknowledge that they are modified versions

For *New Approach* directives, a directive-by-directive repetition of this calculation would be possible.

For EU regulations outside the scope of the *New Approach*, examples emerge quickly, but both comprehensive lists and overviews are difficult or impossible.

For example, a search for ISO 10315 – the example is a real one[37] – may be complicated by the fact that it is sometimes grouped with other standards in a longer list: *ISO standards 4317 for...., 10315 for...., and 8454 for .....* a specific standard (e.g., ISO 12345 or ASTM 67890). No centralised compilation or count is available.

138. With that reservation, careful searching can reveal a host of specific examples, such as:

- In a 2008 regulation specifying flammability properties for tobacco (Decision 2008/264/EC), a privileged position is given to a named ASTM standard in the development of European equivalents.
- ISO 8317 is specified as a test method for child-resistant package closures of dangerous chemicals, in 67/548 Annex IX
- ISO 11683 is imposed for tactile warnings of chemicals dangers, in the same directive.
- A range of ISO test standards is imposed in the EU Tobacco Directive 2001/37, for yields of tar, nicotine
- In preparation for new regulation for the use of hydrogen power, – called EIHP - European Integrated Hydrogen Project, the EU is paying for work to put a US standard into ISO: SAEJ2600 into ISO DIS 17268 for a filling connector,[38] with a view to its use as an international standard in EU regulation.

139. A picture also emerges from examination of the overlap between European and international standards. The main body of this report refers to European regulatory policy under the *New Approach*. While the *New Approach* stipulates[39] that only European standards may be recognised as providing a presumption of conformity with technical regulations, it strongly encourages the *de facto* use of international standards through various mechanisms of cooperation with international standards bodies. A specific example of the effect of these mechanisms of cooperation appears below, from the electrotechnical sector. It shows the percentage of European standards identical to or based on standards from the main body of international standards in this sector, IEC. A recent presentation showed that:

- 56% of CENELEC standards were identical to IEC standards
- 17% were based on IEC standards (i.e., modified them to varying degrees).
- 27% were purely European with no IEC connection.

37. This standard for nicotine yield from tobacco is referenced in the EU's so-called Tobacco Directive: 2001/37/EC.

38. http://ec.europa.eu/research/energy/pdf/8_eihp2_rcs_conclusions_infrastructure_en.pdf.

39. See para. 127 above on high-level EU policy

3. Monitoring systems - Japan

140. Of the four countries whose databases were studied, Japan's monitoring mechanisms are the least developed, for international standards.

Most relevant monitoring basis found

141. Only one relevant, official database could be identified, and its scope is limited to identifying cross-references domestic regulations and national standards (JIS). It exists only in Japanese, and is on: http://www.jisc.go.jp/app/JPS/JPSO0010.html .Two-way search is possible: by regulation or by standard.

142. No data could be obtained on the total number of JIS documents listed in the database, and the database appears to offer no direct possibility at all of identifying links between JIS documents and international standards.

143. The possibility of more extensive research is discussed in the concluding section of this report: to build on the database by checking individual JIS documents for references to international standards.

4. Monitoring systems – Mexico

Most relevant monitoring basis found:

144. The Ministry of the Economy, which oversees the basic law on metrology and standards (Ley Sobra la Metrologia – see para. 131 above), also maintains a database of sectoral regulations adopted in implementation of that basic law. The database is on http://www.economia-noms.gob.mx/noms/inicio.do

145. As the name implies, the data-base permits identification of NOMS. These are Normas Oficiales Mexicanas, and although the use of the word "normas" might suggest that the data-base is a database of standards (normas = standards in Spanish), that is in fact not the case. NOMS are acknowledged to be technical regulations.[40]

146. The same Ministry is responsible for the Mexican national standards body DGN, and operates a separate database of standards: http://www.economia-nmx.gob.mx/normasmx/index.nmx

Relevant content at the time of this study

147. The first database above – which includes NOMs – is of considerable value and was extensively used in this study. Notably, the data-base 1) is searchable by sector, and in some cases by subject (e.g., energy efficiency), as well as by numerical number of the regulation, and 2) leads directly to the full .pdf text of the regulations identified. The full text in turn identifies the reference number and title of standards whose use is mandatory. Such standards may be national (e.g., NMX, for Norma Mexicana, the classification used for standards from the national standards body) or international (e.g., IEC). This database does not offer a *counting* facility, through which total numbers of standards referenced can be counted, or complete lists of standards presented in a single series. It is usable only to identify the regulations applicable to a given product category, and the standards actually referenced under each of

40. A quotation from one of the NOMs studied in this project illustrates this: NOM 003-SCFI-2000 for electrical appliances. This states, in its para. 1: *Esta norma ... establece las especificaciones de seguridad que deben cumplir los aparatos y productos electricos.....* There is no suggestion that its use is optional, and field research in this project confirmed that this represents the view of the Mexican authorities: NOMs are technical regulations, while NMX (Normas Mexicanas) have no automatic regulatory force unless they are referenced in a NOM or other regulation.

those specific regulations. It was unclear from this study whether the data-base could invariably be relied on to identify all technical regulations applicable to a particular product, against all regulatory objectives which emerged as the project proceeded. In practice in this project, searches of the data-base were complemented by personal contacts with knowledgeable specialists inside or outside government, to improve the reliability of the final list of regulations.

148. It was not clear, from this study, whether the database can always be relied on to identify international linkages in standards, once the applicable regulations have been identified. But the linkages are often made clear: for example, the explicit identification of an IEC standard, as in the citation of NMX 521/1 (norma Mexicana) and IEC 60335-1 in NOM 003.

149. The separate standards database listed above was not considered directly relevant to this study. It appears to be, in effect, a catalogue, searchable by product class. It did not lead to identification of international linkages, or to any summary counts of such linkages.

***Does a picture emerge of the use of international standards*?**

150. Not directly from the databases above, which offer no total counts, and no listing, in any single section , of standards referenced or their international linkages. Indirectly, however, the first database above is of considerable value: through a search by individual regulation it is possible to identify references to regulatory texts, and international linkages are generally made transparent.

5. Monitoring systems – United States

Most relevant monitoring basis found

151. The US federal government offers a single, searchable database whose scope is similar to that of the Canadian RegWatch system reported above. It is available via http://standards.gov:80/sibr/query/index.cfm.

152. An actual search can be started on:

http://standards.gov/sibr/query/index.cfm?fuseaction=Home.regulatory_sibr

153. The US federal government also issues an annual report on use of voluntary consensus standards by the federal government. The most recent is on

http://standards.gov/NTTAA/agency/index.cfm?fuseaction=NTTAAReports.main

Relevant content: description at the time of this study

154. The database contained references to 9372 standards which are in some way referenced in US Federal regulation. The standards are listed in a scrollable, 93 page list.

155. Approximately 400 standards developers are listed in the database: a combination of

- national and international,
- regulatory bodies (including international treaty organisations and government bodies outside the federal government itself, such as state governments in individual states of the USA)) and voluntary bodies,
- bodies that meet the classic definition of an SDO producing voluntary consensus standards and bodies that do not.

156. As in Canada, the data base can be searched by standards developer, standards reference number, or regulation, and also by federal government department. But unlike the Canadian database, this US database does not contain any grouping of standards under the heading *international*.

Does a picture emerge of the use of international standards?

157. No, because the United States does not identify the standards that it considers *international standards*. As noted in the *Policy* chapter of this report, the United States is one of the countries which prefer a definition based on the 2002 decision by the TBT Committee, but it has never offered a list of the bodies which it considers to meet that definition. No calculation is therefore possible of the kind quoted for the EU above where, in the field of electrical safety, five-sixths of standards recognised in regulation are based on *international standards* according to one of the definitions of that term.

158. It is, however, possible to list the number of standards listed in the US database, by individual standards bodies, and to compare them with the total of 9372. Some examples of standards bodies which the US might be prepared to accept as international are:

- ASTM (2582)
- ASME (597)
- SAE (418)
- NFPA (380)
- API (271)
- UL (120)
- IEC (113)
- ISO (75)
- IEEE (64)

6. Databases - standards bodies

159. Two databases were reviewed, which are both bibliographic and without full texts

- PERINORM: Web-address: www.perinorm.com (Available on subscription only)
- ANSI database: www.nsnn.org

160. Both databases can be used to check for links between a given standard and other standards: both direct links to international standards and what are called *normative references* to separate standards which are provide finely detailed specifications of indirect relevance to the case in question. PERINORM contains no information on the use of standards in regulation outside Europe.

7. WTO system of notifications submitted by Members on technical regulations and conformity assessment procedures

161. The Committee on Technical Barriers to Trade (TBT) has put in place detailed procedures for notification by central governments of technical regulations and other measures subject to provisions of the TBT Agreement, which have been refined over the years. The notification documents are publicly available and researchable through http://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm at the WTO website. According to the guidelines for notification procedures, notifications are to state *inter alia* the

products covered by the measure notified, the title of the proposed or adopted measure, an abstract describing the content of the measure, the measure's objective and rationale. Besides the publication where notice of the measure appears and other relevant documents, Members are asked *to give reference, whenever practicable, to relevant international standards*.[41]

162. Referencing relevant international standards in not an obligation, and a review for this study of a random selection of notifications submitted to the WTO system by OECD members and non-members found very uneven practice in citing international standards. Moreover, the notification system captures only a subset of technical regulations in effect at the level of central government in individual countries. One reason is that members can differ in their assessment of the significance of the effect on trade of technical regulations, and which effectively triggers the obligation to notify a technical regulation under Articles 2.9.2 or 2.10.1 of the TBT Agreement. Moreover, as the notification obligation applies only to new or proposed measures following the coming into effect of the WTO TBT Agreement, if a Member has not modified a technical regulation that predates 1995, this regulation will not appear under the WTO system of notifications.

41. See page 42 of *Decisions and Recommendations Adopted by the WTO Committee on Technical Barriers to Trade since 1 January 1995*. Note by the Secretariat. G/TBT/1/Rev.9 of 8 September 2008, WTO: Geneva.

ANNEX 5

CROSS-COUNTRY CHECKLIST OF REGULATORY ACTIVITY, BY OBJECTIVE
(FEDERAL LEVEL ONLY)

Domestic appliances

Regulatory objectives	Canada	European Union	Korea	Mexico	USA
Safety: electric shock	Regulated at sub-federal level	Yes	Yes	Yes	Yes (only mechanical)
Safety: EMF	Yes	Yes	No	Yes	Yes
EMC	Yes	Yes	Yes	No	Yes
Energy efficiency (consumption limits)	Yes	Yes	Yes	Yes	Yes
Energy efficiency labelling	Yes	Yes	Yes	Yes	Yes
Waste management	No	Yes	Yes	No	Regulated at sub-federal level
Eco-design	No	Yes	No	No	No
Hygiene (products in contact with foods)	None identified	Yes	No	No	Yes

Natural gas

Regulatory objectives	Canada	European Union	Korea	Mexico	USA
Quality of natural gas	Regulated at sub-federal level	Yes	No	Yes	No
Exploration and extraction equipment	Yes	Yes	Yes	No	Yes (onshore at sub-federal level)
Storage	Yes	Yes	Yes	No	Yes
Pipeline	Yes	Regulated at national level	Yes	Yes	Yes
Transport tank: road/rail	Yes	Yes	Yes	Yes	Yes
Processing facilities	Yes	Yes	Yes	Yes	None identified

Telephony

Regulatory objectives	Canada	European Union	Korea	Mexico	USA
Safety	Regulated at sub-federal level	Yes	No	Yes	Yes
EMF	Yes	Yes	Yes	Yes	No
EMC	Yes	Yes	Yes	No	Yes
Radio spectrum (frequency)	Yes	Yes	Yes	Yes	Yes
Radio spectrum (no interference)	Yes	Yes	Yes	Yes	Yes
Waste management	No	Yes	Yes	No	None identified
Interoperability	No	No	Yes	Yes	No
Accessibility-Hearing aid compatibility (HAC)	No	No	No	No	Yes

For Official Use **TAD/TC/WP(2009)12/ANN/FINAL**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

27-Jul-2010

English - Or. English

TRADE AND AGRICULTURE DIRECTORATE
TRADE COMMITTEE

TAD/TC/WP(2009)12/ANN/FINAL
For Official Use

Cancels & replaces the same document of 19 July 2010

Working Party of the Trade Committee

THE USE OF INTERNATIONAL STANDARDS IN TECHNICAL REGULATION: ANNEX

OECD Trade Policy Working Paper No. 102

by Barbara Fliess, Frédéric Gonzales, Jeonghoi Kim and Raymond Schonfeld

JT03286982

English - Or. English

Abstract

This Annex describes in more detail, for each country covered by the study, the regulations, standards used and international links shown in the Overview Tables of the Report (OECD Trade Policy Working Paper N°102).

Each table is supplemented by end notes providing further data, explanations or comments about a country's regulations, standards use and international links. The numbers of the notes refer to the numbers shown in the "Regulatory objectives" column of the tables and also to the circled numbers in the "Regulatory objectives" column of the country overview tables included in Section V – VII of the report.

Keywords: standards, international standards, technical regulation, technical barriers to trade, Canada, European Union, Korea, Mexico, United States, household appliances, natural gas, telephones, WTO, Agreement on Technical Barriers to Trade, harmonisation, transparency,

ACKNOWLEDGEMENTS

This study was prepared by Barbara Fliess, Frédéric Gonzales, Jeonghoi Kim of the OECD Trade and Agriculture Directorate and Raymond Schonfeld, expert consultant. The authors would like to thank Frank van Tongeren for his support and comments. The paper has benefited from helpful inputs from regulatory authorities, officials of standards development organisations and industry representatives in the countries covered, and comments from delegates of the Working Party of the Trade Committee.

The Working Party of the OECD Trade Committee agreed to make the findings more widely available through declassification under its responsibility. The paper is available on the OECD website: http://www.oecd.org/trade

ACKNOWLEDGEMENTS:

The following ministries and agencies were consulted in the course of collecting data and information for this project:

- In Canada, Industry Canada, the National Energy Board and Natural Resources Canada.
- In the European Commission, DG Energy, DG Enterprise and DG Information Society, as well as the Health and Safety Executive in the United Kingdom.
- In Mexico, the Federal Commission on Telecommunications, the Ministry of Economy and the Ministry of Energy.
- In Korea, the Korean Agency for Technology and Standards, the Korea Communication Commission, the Ministry of Environment, the Ministry of Knowledge Economy and the Radio Research Agency.
- In the United States, the Federal Communications Commission, the International Trade Administration of the U.S. Department of Commerce, the U.S. Department of Energy, the U.S. Department of Transportation, the U.S. Environmental Protection Agency and the U.S. Food and Drug Administration.

Also consulted were a number of standards bodies, including the umbrella *National Standards Bodies* in the sense normally used, conformity assessment bodies and professional associations representing industries or private certification bodies.

While the accuracy and completeness of the data and information cannot be guaranteed, they have been subject to a verification process in which many of the regulatory authorities of the countries covered participated.

TABLE OF CONTENTS

Annex 1
Regulations and Standards for Domestic Appliances: Canada

Coverage: dishwashers, laundry machines, refrigerators/freezers, sewing machines, food preparation and cooking equipment, air-conditioners, cleaning equipment

Regulatory objectives	Regulations	Standards used	International links
Safety: electrical and mechanical Note 1	. Regulated at provincial and territorial level.	CSA C22.2. Canadian Electrical Code, Part II (appliances) See list under Note 1. Safety of electric irons: CAN/CSA-E60335-2-3-06 is an additional requirement	Harmonised with UL (USA): CSA No 62 – UL 250 CSA No. 112 – UL 2158 CSA 167 – UL 749 CSA 169 – UL 2157 CSA 243 – UL 1017 CSA No. 140.2 – UL 984 CAN/CSA-E60335-2-3-06 (electric irons) adopted, with deviations, IEC 60335-2-3 (edition 5:2002 consolidated with amendment 1:2004)
EMF Note 2	Microwave ovens: Radiation Emitting Devices Regulation (CRC, C 1370) Part III - specifies RF leakage limits	CSA C22.2. No. 150	
EMC Note 3	For appliances with digital technology (microprocessor at least 10 kHz): Interference-Causing Equipment Standard 003, Digital Apparatus (ICES-003), Issue 4 But sewing machines, food processors, electric ranges and hot plates, vacuum cleaners and microwave ovens are exempted from ICES-003 requirements.	**CAN/CSA-CISPR 22-02** Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	For digital apparatus:CEI/IEC CISPR 22:1997, third edition, 1997-11, with Canadian deviations
Energy efficiency – consumption and	For most products: Energy Efficiency Regulations SOR/94-651	– For wine coolers: MEPS standard is **California Code of Regulations Title 20**	See previous column for direct reference or harmonisation

labelling Note 4	- sets minimum energy performance levels – dishwashers – air conditioners – washing machines – dryers – cook tops and ranges/ovens – freezers, refrigerators, wine coolers – ice makers – water chillers <u>Energy efficiency labelling</u>: Energy Efficiency Regulations SOR/94-651, Part III (mandatory EnerGuide label)	– For dishwashers: MEPS corresponds to US EISA 2007 requirement. – For refrigerators, freezers and window air conditioners: MEPs are reported harmonised with Mexico and United States. <u>Test standards</u>: various CAN/CSA See list under Note 4. Same test standards as listed in Note 4.	Reference test standard for *central AC units* (split type) and for *central CA and heat pumps:* **ARI 210/240-94** and **ASHRAE 37-1988** (United States) Test procedures for refrigerators, freezers and window air conditioners are reported harmonised with Mexico and United States
Waste management Note 5	Certain toxic substances, such as PBDEs, are on the List of Toxic Substances under the *Canadian Environmental Protection Act, 1999,* with certain mixtures banned. A ban of DecaBDE in electronics and electrical equipment is under consideration.	None	similar to the EC's RoHS Directive ban
Hygiene Note 6	No evidence of any regulation.		
Eco-design Note 7	Not regulated.	N/A	N/A

Notes

1 Because CEC is developed for use anywhere in Canada, has been adopted by all relevant sub-federal authorities and deviations are not significant, the Code is cited in the present data set on Federal-level regulations and standards use.
CEC Part I covers the safety standard for electrical installations. With respect to *equipment standards*, these requirements are set through the Canadian Electrical Code Part II, which consists of a series of standards for the evaluation of electrical equipment or installations. Note that Part I requires that electrical products be approved to a Part II standard.

Applicable sections of Electrical Code Part II:

C22.2 No. 10 – electric floor surfacing and cleaning machines
C22.2 No. 53 – washing machines
C22.2 No. 61 – cooking ranges
C22.2 No. 63 – refrigerators and freezers - **harmonised with the UL (USA) CSA No. 63 / UL 250**
C22.2 No. 64 – cooking and liquid-heating appliances
C22.2 No. 68 – motor-operated appliances
C22.2 No. 81 – irons
C22.2 No. 112 – clothes dryers- **harmonised with the UL (USA) CSA No. 112 / UL 2158**
C22.2 No. 120 – refrigerator equipment
C22.2 No. 150 – microwave ovens
C22.2 No. 167 – dishwashers - **harmonised with the UL (USA) CSA No. 167 / UL 749**
C22.2 No. 169 – clothes washing machines - **harmonised with the UL (USA) CSA No. 169 / UL 2157**
C22.2 No. 195 – motor operated food processing appliances
C22.2 No. 243 – vacuum cleaners, blower cleaners and household floor finishing equipment - **harmonised with the UL (USA) CSA No. 243 / UL 1017**
For heating, ventilation and air conditioning:
C22.2 No. 24 – temperature-indicating and regulating equipment
C22.2 No. 117 – room air conditioners
C22.2 No. 140.2 – hermetic refrigerant motor-compressors- **harmonised with the UL (USA) CSA No. 140.2 / UL 984**
C22.2 No. 140.3 – refrigerant-containing components for use in electrical equipment (in factory assembled refrigeration or air-conditioning equipment)

Where noted, CEC Part II electrical equipment standards have been harmonised with the UL (USA), and reportedly there is also harmonisation with Mexican standards through the Council for the Harmonization of Electromechanical Standards of the Nations of the Americas (CANENA), although published detailed information is not available. The rest of the C22.2 standards listed are not harmonised but similar for the most part with the equivalent UL standards.

2 ---

3 The only requirements are for electronic equipment, and these are minimal and concern only interference caused by radiated and line conducted emissions (EMI). There are no immunity requirements. The method of compliance is self-declaration to Canadian standard ICES-003 (Digital Apparatus), combined with a label. The latest issue of ICES-003 incorporates by reference CAN/CSA-CISPR22-96 as the mandatory standard for compliance testing. CAN/CSA-

CISPR22-96 adopts with modification CISP 22:1997 (third edition). In the previous Issue 3 of ICES-003, compliance could also be demonstrated by using CSA C108.8-M1983, but CSA abolished C108.8 in 2003.

The technical requirements of Industry Canada for unintentional radiators are essentially equivalent to FCC requirements. Equipment that has FCC approval (either by meeting Part 15 of the FCC rules or the version of CISPR 22 referenced in Part 15), is considered to be compliant with the Canadian rules and need not be re-tested.

4 Canada's Energy Efficiency Act authorises minimum energy efficiency standards to phase out less efficient energy-using equipment and household appliances from the Canadian marketplace. The **Energy Efficiency Regulations SOR/94-651** under this Act set *minimum energy efficiency standards* for currently more than 40 energy-consuming products, including major household electrical appliances. Note that the Regulations do not apply to products that are manufactured and sold within one province. Most provinces have their own energy efficiency regulations, which may differ from the Federal Regulations or may apply to other classes of equipment.

Schedule I of the Regulations lists prescribed energy efficiency standards for each regulated product. Regulated energy-using products imported into Canada or shipped between provinces must bear an energy efficiency verification mark from a certification body accredited for energy efficiency verification by the Standards Council of Canada (SCC) and an energy efficiency report must be filed with Natural Resources Canada (NRCan).

The Energy Efficiency Regulations are administered by NRCan. NRCan, through a process of public consultation (bulletins, workshops) and analysis (consumer economics, environmental impact), determines the mandatory MEPS and labeling requirements. The Regulations are regularly amended to add new products, harmonize minimum energy performance requirements with those of other jurisdictions, and update testing methodologies or labelling requirements.

The most recent amendments to the Energy Efficiency Act included action to raise the bar on the energy-efficiency standards for a range of consumer products and equipment, such as residential dishwashers, refrigerators, freezers and air conditioners. These amendments come into force between 2007 and 2010.

1. Energy efficiency standards:

NRCan participates in standards development and conformity assessment through the National Standards System (NSS). Other participants in this system include provincial regulators, utilities and manufacturers. Test standards developed through the NSS are often incorporated by reference in the *Energy Efficiency Regulations* as well as by provinces with active energy efficiency regulations. These provinces are Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia.

Mandatory minimum energy performance standards (MEPS) are prescribed directly in the Energy Efficiency Regulations. For example, the maximum total annual energy consumption (TAEC) for standard residential dishwashers is 355 kWh per year. This recently tightened standard comes into effect in 2010.

NRCan seeks, where possible, to harmonize standards with those of other jurisdictions. In addition to provincial requirements, energy efficiency regulations at the U.S. federal and state level are considered in the development of Canada's regulations. This includes the *Energy Policy Act of 2005* (EPAct), the *Energy Independence and Security Act of 2007* (EISA), and the *California Code of Regulations, Title 20: Appliance Efficiency Regulations*

administered by the California Energy Commission (CEC). It is also Canadian policy to seek to harmonize with other jurisdictions and trading partners such as the European Union and Asia Pacific. Unique Canadian conditions, such as a colder climate, will sometimes support standards differing from those of other jurisdictions.

The latest amendment of the Energy Efficiency Regulations with respect to the inclusion of new products and tightening of energy efficiency standards for already regulated products reflect ongoing harmonisation work at the regional level. Most of these new standards (which cover lightening and other products other than household appliances) have equivalents in effect or proposed in the United States.[1]

Identified harmonisation with other jurisdictions:

- For *residential wine coolers*, Canada has adopted California Energy Commission (CEC) levels and standards pertaining to the energy performance of wine coolers (**California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1608: Appliance Efficiency Regulations**).
- For *dishwashers*, Canada's recently updated energy performance standard and effective date is harmonized with the **US Energy Independence and Security Act 2007**, which sets, by statute, new efficiency standards for external power supplies, residential clothes washers, dishwashers, dehumidifiers, refrigerators, refrigerator-freezers, freezers, electric motors, and residential boilers. The amended MEPS will incorporate energy consumption of the product in both active and standby mode. Water consumption is not harmonised.

The Energy Efficiency Regulations reference energy efficiency standards that must be used to test the products to ensure that they comply with the minimum requirements of the Regulations. The applicable referenced **test standards** are:

Dishwashers – CAN/CSA-C 373-04
Central air conditioning and heat pumps (single phase and three phase, split type or single package, under 19 kW) – CAN/CSA-C656-05
Room air conditioners (single phase below 10.55 kW) – CAN/CSAC368.1-M90
Packaged terminal air conditioners and heat pumps – CAN/CSA-C744-04
Clothes dryers – CAN/CSA C 361-92
Clothes washers – CAN/CSA-C 360-03
Washers/dryers –CAN/CSA-C360-03 for washer component, CAN/CSA-C 361-92 for dryer component
Cooktops and ranges/ovens – CAN/CSA-C 358-03
Freezers, refrigerators, refrigerator-freezers, wine coolers – CAN/CSA-C 300-08
Ice makers – CAN/CSA-C 742-98
Water chillers – CAN/CSA-C 743-93

Identified harmonised test procedures:

- For *central air conditioning units (split type*), Canada has based its standard, CAN/CSA C 273.3-M 91, on the test procedure for central air conditioners contained in DOE regulations Code of Federal Regulations 430 Appendix M, the Energy Policy Act 1992 and standards **ARI 210/240-89** (American Refrigeration Institute) **and ASHRAE 37** (American Society of Heating, Refrigerating and Air-Conditioning Engineers).

[1] For details about the amendments see Canada Gazette, *Regulations Amending the Energy Efficiency Regulations,* P.C. 2008-1930 December 12, 2008, http://www.gazette.gc.ca/rp-pr/p2/2008/2008-12-24/html/sor-dors323-eng.html

Work on harmonisation among Canada, Mexico and the United States is under way in the North American Energy Working Group (NAEWG), launched in 2001 and led by the three Energy Ministers (the Ministry of Natural Resources Canada, the Secretariat of Energy of Mexico, and the U.S. Department of Energy). Available information indicates that as of 2003 minimum efficiency requirements and test procedures for refrigerators, freezers, electric motors and window air-conditioners had been harmonized.

2. Standby power regulation

The latest amendment of the Energy Efficiency Regulations introduces regulation setting minimum energy performance for equipment while in standby mode. The products concerned initially are various categories of consumer electronics. These regulations reference CAN/CSA-C62301-07 Standard, which is harmonized with test method **CEI/IEC-62301*:* Household Electrical Appliances - Measurement of Standby Powe**r. For household electrical appliances, the amended Energy Efficiency Regulations set stricter MEPS for residential dishwashers which incorporate energy consumption of the product in both *active* and *standby mode*, and there is a new requirement for reporting annual standby power consumption.

3. Energy efficiency labelling

Canada's Energy Efficiency Regulations require that an EnerGuide label be placed on all new electrical household appliances manufactured in or imported into Canada. The label indicates the amount of electricity – measured in kilowatt-hours (kWh) per year – used by an appliance. This information is determined by standardized test procedures. A third-party agency accredited by SCC and recognised by Natural Resources Canada (NRCan) as an administrator of an energy performance verification programme verifies that an appliance meets Canada's minimum energy performance levels. The annual energy consumption value appearing on the EnerGuide label is determined using the CAN/CSA-C373-92 energy performance test procedure. Dual-energy source appliances (such as ranges with gas burners and electric ovens) are not covered by the Energy Efficiency Regulations.

The Regulations require dealers to attach an EnerGuide label to the following 8 energy-using products: clothes dryers, clothes washers, integrated over/under washer-dryers, dishwashers, electric ranges, freezers, refrigerators and combination refrigerator-freezers, room air conditioners.

5 Waste management is not regulated at the Federal level. The federal government however regulates toxic substances. PBDEs, are a group of synthetic chemicals used as flame retardants to polymer resins and plastics used for many consumer products including electrical appliances. In 2006, PBDEs were added by Environment Canada to the "List of Toxic Substances," paving the way for federal regulatory action under the *Canadian Environmental Protection Act (CEPA), 1999*. Furthermore, Environment Canada identified certain commercial mixtures (tetra- through hexaBDEs) as meeting the legal criteria for "virtual elimination." Environment Canada is currently proposing to ban the DecaBDE mixture in electronics and electrical equipment, similar to the RoHS Directive ban in place in the European Union. A draft Revised PBDEs Risk Management Strategy calls for a regulation to be in force by 2011.

6 No applicable regulations were identified.

7 Not regulated.

Annex 2
Regulations and Standards for Domestic Appliances - EU

Coverage: dishwashers, laundry machines, refrigerators/freezers, sewing machines, food preparation equipment, air-conditioners, cleaning equipment

Regulatory objectives	Regulations	Standards used	International links
Safety Note 1	Directive 2006/95/EC covers all products [Directive 98/37/EC for mechanical safety – see Note 1]	EN 60335 series: one part standard for each product. 60335-2-5 Dishwashers 60335-2-7 Washing-machines 60335-2-24 Refrigerators (IEC identical) 60335-2-28 Sewing machines 60335-2-40 Air-conditioners 60335-2-2 Vacuum cleaners 60335-2-14 Kitchen machines	All standards in previous column are IEC mod. except for refrigerators which is identical. Basis of modification not published
EMF Note 2	Directive 2006/95/EC covers all products	Recommendation 1999/519 for exposure limits EN 50366 test methods	ICNIRP guidelines for exposure limits None for test methods Note 2
EMC Note 3	Directive 2004/108/EC covers all products	EN 55014-1:2006. Emissions EN 55014-2:1997 +A1:2001 Immunity EN 61000-3-2 Harmonics EN 61000-3-3 flicker Note 3	All are IEC identical, except 61000-3-2, which is modified

Energy efficiency - consumption limits and labelling Note 4	Directive 96/57/EC: refrigerators Dishwashers: none Air-conditioners: none Washing-machines and dryers: none Regulation 1275/2008 will apply from 2010, and places limits on standby power for all products in this category Directive 92/75/EC: framework for domestic appliances labelling Specific measures relevant to this study are: 94/2/EC Refrigerators/freezers 95/2/EC Stand-alone washing machines 97/17/EC Dishwashers 2002/31/ECAir-conditioners	EN 153 used only for definitions of terms in specifications None announced yet, but the regulation permits the formal recognition of standards for compliance. All standards shown below specify performance measurement methods EN 153: refrigerators EN 60456: washing machines EN 61121: tumble-dryers EN 50242: dishwashers EN 14511: air-conditioners	None listed in connection with measurement for efficiency limits, but measurement standards below (listed for labelling regulation) are relevant Only EN 60456 and EN 61121 have IEC equivalents (modified, in both cases)
Waste management Note 6	2002/95/EC. 2002/96/EC	None yet, but planned for future None yet, but planned for future, and EN 50419 has already been proposed	None
Eco-design Note 7	2005/32/EC. Not yet operational except for the limits on standby power listed under Regulation 1275/2008 above.	None	N/A
Hygiene - for materials in contact with foods: refrigerators and kitchen machines Note 8	Range of directives. See note 8 Separate coverage of 1) elastomers and monomers, 2) plastics materials, 3) ceramics, and 4) cellulose film		

Notes

1. The series of standards listed here – EN 60335 – contain *General Safety Requirements*, in Part 1, and then over 100 part-standards, each referring to one class of product. The part standards relevant to this study appear in column 4
Expert advice sought in this project indicated that compliance with these specific standards would be adequate, for the product in question, and for the specific safety requirements imposed by the EU. However, one other standard was identified which specifies *routine* test methods for the series: EN 50106, which has no IEC equivalent.

   Directive 98/37/EC, although listed here as relevant, is in practice not used for the specific products covered by this research. It covers products where there is a dominant issue of machinery safety, as opposed to electrical safety, and although washing machines, air-conditioning equipment, and refrigerating equipment are all covered by it, the standards referenced are for industrial equipment – i.e., equipment that is larger than the purely domestic appliances covered in this study.

2 ICNIRP (International Commission for non-ionising radiation protection) is described as the European Commission's official advisor on exposure limits. CENELEC produces assessment and measurement standards, and translates ICNIRP guidelines into product standards.
EN 50366 is confirmed by TH.

3 All standards shown here apply to all products in this category in this study. There is no differentiation between individual product types.

4 Although the list here includes both consumption limits and labeling, until now, energy efficiency regulation in the EU has concentrated on the latter: in this table, only refrigerators are subject to limits. That will change, as a result of the EU's EuP or eco-design Directive 2005/32/EC, which in itself defines a framework only, and will be followed by implementation measures for specific features or products. The regulation shown in this row, on standby power, is the only one adopted so far. See also note 7 below
For labeling, a broad framework directive provides the legal basis for the individual directives shown below it.

5 The two directives shown here differ as follows:
- Directive 2002/95/EC restricts the use of hazardous substances as a means of preventing environmental damage at the end of the life of electrical products.
- Directive 2002/96/EC imposes targets for recycling and recovery, and for that purpose can also impose classification procedures (e.g., marking, or documentation) to ensure that products are treated in the most appropriate way at the end of their life.

The data in the table here refers to the directives in their current form. However, proposals to revise both were tabled in 2008.
- The amendment to 2002/95/EC – COM(2008)809 – provides for the later recognition of standards for purposes of compliance, but does not name or reference any yet.
- The amendment to 2002/96/EC – COM(2008)810 – also provides for the later recognition of standards for purposes of compliance, and names one immediately: EN 50419, which defines requirements for marking materials in terms relevant to waste treatment and disposal.

6 Relevant directives under this heading apply only to products containing materials intended to come into contact with food. In the context of this study, that covers kitchen machines such as blenders, and refrigerators. Generally, the regulations specify substances banned or permitted, with applicable concentration limits, and migration limits. An example of a compendium, which lists no standards at all, appears on
http://ec.europa.eu/food/food/chemical safety/foodcontact/eu_substances_en.pdf
However, the policy is to use harmonised standards to cover test methods. Best sources: *Food Contact Materials: a practical guide for users of European Directives.* The primary emphasis is on European standards, and a dedicated Technical Committee is established in CEN (TC194, SC1) to deal with this issue. There is no evidence of ISO equivalence of any standards relevant to this study, although there is ISO equivalence in the related field of cutlery. There are two references: an example is ASTM D 5524-94 and D5815-95 for determination of phenolic anti-oxidants and of slip additives in polyethylene.

An overview and list of standards relevant to EU directives – though not explicitly referenced in them – appears on:
www.cen.eu/CENORM/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Standards.asp?param=6175&title=CEN%2FTC+194

Annex 3
Regulations and Standards for Domestic Appliances: Korea

Coverage: dishwashers, laundry machines, refrigerators/ freezers, sewing machines, food preparation equipment, air-conditioners, cleaning equipment

Regulatory objectives	Regulations	Standards used	International links
Safety Note 1	Electrical appliances safety control Act Article 3 - In general: K 60335-1 - Product-specific regulations: K 60335-2-series	- In general: IEC 60335-1 - Product-specific standard: IEC 60335-2-series	IEC 60335 series are directly referenced in the regulation K 60335-1 and K 60335-2-series
EMF Note 2	No regulation	N/A	N/A
EMC Note 3	Electrical appliances safety control Act Article 3 - EMI (Electro magnetic interference): K 00014-1 - EMS (Electro magnetic susceptibility): K 00014-2	- EMI: CISPR 14-1 - EMS: CISPR 14-2	CISPR 14-1 and 14-2 are directly referenced in the regulations K 00014-1 and K 00014-2
Energy efficiency Note 4	The Rational Energy Utilization Act Article 15 - Regulation on Energy Efficiency: Labelling and Standards: Ministry of Knowledge Economy Public Notice no. 2009-26 -Regulation on Standby Power Reduction Program: Ministry of Knowledge Economy Public Notice no. 2008-116	- KSC ISO 15502, KSC 9306, etc. Depending on the product categories, international standards apply to several products - Regarding Standby Power Reduction Program, KSC IEC 62301 is referenced	Regarding several product categories, the regulations refer to international standards such as ISO 15502, IEC 60436, EN 50242, IEC 60312, IEC 62301.

Waste management Note 5	Limit of hazardous substances: Act on the Resource Recycling of Electrical and Electronic Equipment and Vehicles, Article 9 and its Enforcement decree Article 9	The enforcement decree itself specifies relevant criteria without referring to specific standards	Similarity with EU regulations
Hygiene	No regulation	N/A	N/A

Notes

1 The Electrical Appliances Safety Control Act is the basic legal frame regarding safety of the electrical appliances, while more detailed regulations are provided in product-specific codes such as K 60335-2-25 for microwave oven. Domestic regulations directly refer to IEC standards in either identical or modified form.

- Microwave oven: K 60335-2-25 (IEC 60335-2-25)
- Air conditioners: K 60335-2-40 (IEC 60335-2-40)
- Household washing machine: K 60335-2-7 (IEC 60335-2-7)
- Household dishwashers: K 60335-2-5 (IEC 60335-2-5)
- Sewing equipment: K 60335-2-28 (IEC 60335-2-28)
- Electric irons: K 60335-2-3 (IEC 60335-2-3)
- Household Refrigerator: K 60335-2-24 (IEC 60335-2-24)
- Vacuum cleaner: K 60335-2-2 (IEC 60335-2-2)
- Household shavers: K 60335-2-8 (IEC 60335-2-8)
- Battery chargers: K 60335-2-29 (IEC 60335-2-29)
- Clothes dryer: K 60335-2-43 (IEC 60335-2-43)

2 Regarding domestic appliances, there is no regulation on EMF and thus there are no related standards referenced. However, private agency, Korea Electric Testing Institute (KETI), maintains program to test whether any product is EMF safe, and for this purpose follows several non-national standards, for example IEC 62233 for monitor.

3 Electromagnetic interference (EMI) is an unwanted disturbance that affects an electrical circuit due to either electromagnetic conduction or electromagnetic radiation emitted from an external source. Electromagnetic susceptibility (EMS) is about the tolerance of circuits and components to all sources of interfering electromagnetic energy. CISPR represents Comité Internationale Spécial des Perturbations Radioelectrotechnique *(International Special Committee on Radio Interference).*

Other than K 00014-1 and K 00014-2, there are several regulations that complement to some degree regarding EMC, such as K 61000-6-4 (industrial environment), K 61000-6-3 (housing environment), etc and these regulations reflect IEC standards such as IEC 61000-6-4 and IEC 61000-6-3

4 There are two big categories of regulation regarding energy efficiency of the products. The first is the Regulation on Energy Efficiency Labelling and Standards including Minimum Energy Performance Standards and energy efficiency grades labelling. The second is the Regulation on Standby Power Monitoring Program for reduction of standby power.

In the case of Regulation on Energy Efficiency Labelling and Standards, the regulation directly provides energy efficiency requirement and criteria for grades. The standards referenced for this purposes are as follows:

- Refrigerator: KS C ISO 15502
- Air-conditioner: KS C 9306
- Washing machine: KS C 9608
- Dish washer: IEC 60436, EN 50242, US DOE CFR 430, DIN 44 990
- Vacuum cleaner: KS C IEC 60312
- Air cleaner: KS C 9314

Regarding regulation on standby power monitoring program, a mandatory standby power label scheme was introduced for televisions in August 2008. This scheme would be extended to microwave ovens as of July 1, 2009. The regulation provides that KSC IEC 62301 is used for test method.

5 Hazardous substances regulation applies to ten products: television, refrigerator, washing machine, air-conditioner, personal computer, audio, mobile phone, printer, copying machine, facsimile. For the purpose of this regulation, definition of the mobile phone includes battery used in the mobile phone. This regulation provides the coverage of hazardous substances and maximum percentage of substances contained in those products. It is indicated that the coverage of hazardous substances and maximum criteria are similar to those under EC RoHS regulations.

Regulations and Standards for Domestic Appliances: Mexico

Coverage: dishwashers, laundry machines, refrigerators/ freezers, sewing machines, food preparation equipment, air-conditioners, cleaning equipment

Regulatory objectives	Regulations	Standards used	International links
Safety: Note 1	NOM 003-SCFI-2000 [NOM 024-SCFI also applies, but not listed here. See Note 1] NOM 001 SCFI applicable to microwave ovens for safety issues	NMX-J521/1, which uses NMX-J522/2 for specific products NMX-J524/1	No link identifiable in NOM, but interviews indicated that NMX J521/1 = IEC 60335/1 and that NMX J521/2 series corresponds to IEC 60335/2
Safety: EMF Note 2	NOM 001 SCFI applicable to microwave ovens but under "radiation", refers only to ionising and not to non-ionising radiation		
EMC Note 3	Not regulated in Mexico. Data from ANCE		
Energy efficiency - consumption limits and labelling Note 4	Washing-machines: NOM 005 ENER Air-conditioners - central and splits: NOM 011 ENER Refrigerators and freezers: NOM 015-ENER Air-conditioners - wall NOM 021-ENER	NMX-J-337 and C360-98 ANSI/ASHRAE 37 ARI 210 ANSI/AHAM HRF-1-1988 CAN/CSA C300-00 Also cites Title 10 CFR 430 of USA directly ASHRAE 16 AHAM-RAC-1 SSA 385/1983 (origin of SSA unclear) Also lists ISO 5151 and R859, but interview failed to confirm relevance.	Direct references as in previous column Direct references as in previous column Direct references as in previous column

Waste management Note 6	No product specific regulation		
Eco-design Note 7	No product specific regulation		
Food contact materials Note 8	No product specific regulation		

Notes

1. Mexican regulations for safety are limited to electrical issues, and no separate regulation appears to exist for mechanical safety. NOM 003 referred to here explicitly mentions the NMX documents in the following column. NMX 521/1 contains general requirements, and 524/1 complements it with specific to motor-driven appliances. Interviews indicated that
NMX 521/1 corresponds to IEC 60335-1, and like this IEC standard, is complemented by a series of Part 2 standards, referenced IEC 60335-2-..., as follows:
NMX 521/2-2 = IEC 60335-2-2 vacuum cleaners MOD
NMX 521/2-5 = IEC 60335-2-5 dishwashers MOD
NMX 521/2-7 = IEC 60335-2-8 washing-machines MOD
NMX 521/2-14 = IEC 60335-2-14 kitchen machines MOD
NMX 521/2-24 = IEC 60335-2-24 refrigerators MOD
There are no equivalent NMX standards for IEC 60335-2 standards for sewing machines and air-conditioners.

   A separate NOM 024 SCFI is not listed in this table. It requires the placing of certain safety information on labels, but has no connection with standards.

2 Apparently only applicable to microwave ovens among the products covered in this study, and the authorised certification body NYCE indicated that NOM 001 SCFI 1993 was applicable. However, the explicit references to radiation in this NOM refer only to ionising radiation. Microwave ovens produce non-ionising radiation. See http://en.wikipedia.org/wiki/Microwave_oven The difference between ionising and non-ionising radiation is explained more clearly on http://www.cancerhelp.org.uk/help/default.asp?page=8774#ionising. A bibliographical reference (not a presumption of conformity) to IEC 529 (now superseded by 60529) is given: degrees of protection provided by enclosures. But this is not specific to microwave ovens and does not mention them, or non-ionising radiation, in the table of contents. PERINORM abstract is: *applies to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72,5 kV. Gives definitions and designations for degrees of protection as well as requirements for each designation and tests to be performed. This second edition cancels and replaces the first edition (1976).*
A separate draft NOM-126-SCT1 was identified in this study, which does deal with non-ionising radiation, but only for radiocommunications equipment.

3 Data obtained from ANCE that this is not regulated in Mexico.

4 Data obtained from an agency of the Ministry of Energy (CONUEE, formerly called CONAE). Interviews revealed that standards directly used for this issue were those listed in this table, and that regulations of maximum consumption and of labelling of energy efficiency are combined in a single set of regulations. The standards listed here appear in the NOMs in question, along with a number of other standards, notably from ISO and IEC, which were revealed to provide general background on test methods only. C380 is a CSA (Canadian) standard. SSA 385 is issued by the Saudi-Arabian Standards Authority

5 There are no product-specific regulations relevant to this issue in Mexico.

6 There are no product-specific regulations relevant to this issue in Mexico.

7 There are no product-specific regulations relevant to this issue in Mexico.

Annex 5
Regulations and Standards for Domestic Appliances – United States

Coverage: dishwashers, laundry machines, refrigerators/ freezers, sewing machines, food preparation equipment, air-conditioners, cleaning equipment

Regulatory objectives	Regulations	Standards used	International links
Safety Note 1	For residential use: electrical safety is not mandated by the US Federal Government and not required in most sub-national jurisdictions. US Consumer Product Safety Act (15 U.S.C. §§ 2051−2089) and regulations there under: - *16 CFR Part 1115* (no further details provided) Refrigerator Safety Act (Public Law 84-930, 70 Stat. 953, August 2, 1956 -15 U.S.C. §§1211−1214) - *16 CFR Part 1750 – Standard for devices to permit the opening of household refrigerator doors from the inside*	N/A 16 CFR Part 1750: prescribes standards directly and references no independent standards.	
EMF Note 2	Radiation Control for Health and Safety Act of 1968: - *CFR, Title 21, Vol. 8, 2003 (*21CFR1030.10): *Performance standards for microwave and radio frequency emitting products (*Food and Drug Administration CDRH radiation safety performance standard for microwave ovens manufactured after October 1971)	No independent standard referenced	

EMC Note 3	EMI: For all appliances with digital technology: *47 CFR Part 15 (Radio frequency devices)* Section 15.107 specifies conducted limits Section 15.109 specifies radiated emission limits For cooking equipment (microwaves) performing with RF energy: *47 CFR Part 18*	47 CFR Part 15 - must meet Part 15 limits for mains ports OR **CISPR 22** Class B limits 47 CFR Part 18: aligned with IEC CISPR 11	
Energy efficiency Note 4	Energy consumption: Regulations stem from congressional acts: Energy Policy Act (EPACT) and Energy Independence and Security Act, whose terms are incorporated in the CFR below. – 10 CFR 430, and more specifically Subpart B of Part 430, lists test methods, and – Section A of the notice in Federal Register Vol 74, no. 54, 2009-03-23 defines products covered. To date and for the products in this study, only dishwashers and clothes-washing-machines are covered under domestic appliances. The standards for air-conditioners and microwave ovens appear to be listed in anticipation of formal requirements, rather than in implementation of existing requirements. Energy efficiency labelling: applies to the products above 16 CFR 305, which refers back to 10CFR430 as the basis for standards. Regulation stems from the Energy Policy and Conservation Act (EPCA)	– Dishwashers: ANSI/AHAM DW1 – Washing-machines: AATCC Test methods 79 and 118 – Dryers: AHAM HLD-2EC – Air-conditioners: ASHRAE 37-88 and 41.1-86, and 41.1-87, and 51-99, and 23-93, and 41.9-00, and 37-2005 AMCA 210-99 ARI 210/240 – Microwave ovens: IEC 705 – Refrigerators, refrigerator-freezers, and freezers:: ANSI/AHAM HRF-1-1979 Uses standards above. Other standards references are for information only, and are not formally *incorporated by reference.*	Only IEC, as listed in previous column

Waste management Note 5	State regulations for mercury use in products exist.		
Hygiene (food contact compliance) Note 6	Food and Drug Administration Act *Food and Drug Administration (FDA): 21 CSR Part 170-199*	*De facto* recognition of some ASTM guidance documents.	

Notes:

1 The National Electrical Code, prepared under the direction of the National Fire Protection Association (NFPA) and approved by the American National Standards Institute (ANSI), is the basic code used throughout the USA. Electrical Safety is not regulated at a Federal level and local jurisdictions can impose additional requirements above and beyond the National Electrical Code. The Code is incorporated bodily or by reference in many municipal building ordinances, but most jurisdictions do not require safety certification if the appliance is for residential use.

Note that if appliances are sold into light commercial operations (e.g., office buildings, day-care centres) local jurisdictions under either electrical, building or health codes may require the appliances to be safety certified by a National Recognised Testing Laboratories (NRTLs) recognized by the Occupational Health and Safety Administration (OSHA) of the U.S. Department of Labor. When electrical appliances are used at workplaces, OSHA regulations apply. Electrical equipment is acceptable for use in workplaces only if approved and certified by NRTLs recognised by OSHA. Relevant regulations include the electrical safety requirements set forth in 29 SFR 1910 Subpart S – Electrical Standard.

The U.S. Consumer Product Safety Commission is responsible for the safety of consumer products and can set safety standards. The requirement that refrigerator doors must be equipped to open from inside (**Refrigerator Safety Act Regulations 16 CFR Part 1750**) is a good example.

More generally, the Consumer Product Safety Act (CPSA) and other federal statutes administered by the Commission encourage private sector development of, and compliance with *voluntary consumer product safety standards* to help protect the public from unreasonable risks of injury associated with consumer products. Compliance or noncompliance with such voluntary standards can be considered by the Commission in exercising its authority under the CPSA, including when making determinations whether a product presents a substantial product hazard. To support the development of voluntary consensus standards, Commission staff participates in many voluntary standards committees.

The US federal government has put in place an extensive programme for educating consumers about consumer product safety issues. Consumer education initiatives include a Federal Citizen Information Center (FCIC or www.pueblo.gsa.gov/), which is a one-stop source for answers to questions about consumer problems and government services; information resources made available by the Consumer Protection Bureau of the Federal Trade Commission (www.ftc.gov/) and annual organisation of a National Consumer Protection Week.

2 The Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (FDA) sets and enforces standards of performance for electronic products to assure that radiation emissions do not pose a hazard to public health. To ensure that household and other types of microwave ovens are safe, manufacturers are required to certify that their equipment meets radiation safety standards set forth by **Federal Performance Standard for Microwave Ovens, 21 CFR 1030.10**. The standard is directly prescribed by the regulation.

The standards allow specific levels of microwave energy leakage. It also requires ovens to have two independent interlock systems that prevent the oven from generating microwaves if the latch is released or if the door of the oven is opened. In addition, a monitoring system stops oven operation in case one or both of the interlock systems fail.

3 In 2002, the FCC amended the *conducted emission* limits and requirements for Part 18 to coincide with those specified in **IEC CISPR 11** (Industrial, Scientific and Medical Equipment). This standard was extended to cover also *microwave ovens*, which previously were subjected to Part 18's radiated emission requirements but not its conducted emissions requirements. The FCC explained its decision by noting apparent growing support by both governments and industry for the harmonization of emission standards internationally to promote trade and competition. It noted that harmonized standards can improve economies of scale and thereby reduce costs, to the benefit of consumers, and also tend to reduce testing costs for products marketed internationally (FCC's Report and Order (FCC 02-157, para. 12)

Immunity is not regulated.

Part 15 of the FCC rules apply to both low power appliances that intentionally emit R.F. energy and that emit unintentional or incidental radiation (EMI). **Proof of compliance with either IEC CISPR 22 limits or the limits specified in CFR 47 Part 15 is accepted**. Digital devices that are used solely in domestic appliances are exempt from having to comply with all technical requirements of Part 15 except for the general rule in Part 15.5. that they may not cause interference.

4 Glossary:

AHAM	Association of Home Appliances Manufacturers
AATCC	American Association of Textile Chemists and Colorists
ASHRAE	American Society of Heating, Refrigeration and Air-conditioning Engineers.
ARI	Air-conditioning and Refrigeration Institute
AMCA	Air Movement and Control Association

Data obtained from Department of Energy - Office of Energy Efficiency and Renewable Energy, during field mission 2009-04. Broadly, the Congressional Acts listed provide the overriding legal authority, and those are then converted into the detailed texts of the CFR. Title 10CFR 430 Sub-part B lists a range of standards officially recognised for use in this context (i.e., the context of domestic appliances covered by Part 430), but not all of them are yet used, because some products and its definition have not yet been included in the mandatory list of products covered by Part 430 (see Part 1 of the Federal Register announcement of March 2009 for the latest list).

Part B distinguishes between 1) standards incorporated by reference, and 2) sources "given for information and guidance".

Under the *1 Watt Standby* Order, mandatory standby power consumption test procedures are being introduced for a series of electrical products. Among the electrical appliances covered by this study, so far only microwave ovens are included.

The mandatory programme for energy labelling of appliances: overview of programme at www.ftc.gov/appliances
This leads to regulatory text: 16 CFR 305. Labelling is required on clothes washers, refrigerators, freezers, water heaters, dishwashers, window air conditioners, central air conditioners, furnaces, boilers, heat pumps and pool heaters. The list of products appears on http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=b5cf4c648ccbb8dacc3ea6afd3520709&rgn=div5&view=text&node=16:1.0.1.3.29&idno=16#16:1.0.1.3.29.0.13.3

For test methods, 16 CFR 305 above refers back to 10 CFR 430 for test methods.

5 No product-specific regulation at the federal level. Some states have regulations governing materials identified as toxic or hazardous to the environment and human health, banning for example the sale of certain mercury-containing products or requiring labeling. The products include certain components for household appliances. US manufacturers have also made a voluntary effort to eliminate mercury switches, sensors, temperature control devices, fluorescent lamps and other components in household appliances.

6 The safety of materials that may come in contact with foods is under the jurisdiction of the US Food and Drug Administration (FDA). Section 409(h)(6) of the Federal Food, Drug, and Cosmetic Act (FFDCA) defines a food contact substance (FCS) *as any substance intended for use as a component of materials used in manufacturing, packing, packaging, transporting, or holding food if such use is not intended to have any technical effect in such food.*

The Food and Drug Administration Modernization Act (FDAMA) of 1997 (Pub. L. 105-115) amended section 409 of the FFDCA to establish a premarket *notification (PMN) process* as the primary method for authorizing new uses of food additives that are food contact substances. Under the PMN process, a notification becomes effective 120 days after the date of receipt by the Food and Drug Administration (FDA), unless FDA determines that, based on the data and information before the agency, the use of the substance is not safe and FDA objects to such notification within the 120-day period. If FDA does not object within 120 days to the use of an FCS that is the subject of a PMN, the substance may be legally marketed for the notified use. Before implementation of FDAMA in 2000, substances intended to be used in food contact situations were authorized premarket by regulations promulgated as the result of food additive petitions submitted under 21 CFR 171. Resulting regulations are listed in 21 CFR 175-179.

Regulation consists essentially of relevant sections, notably **21 CSR Part 174-199,** which prescribe safe conditions for the use of a substance as an article or component of articles that contact food. Examples are specified lists of substances banned (Part 189), lists of substances GRAS (generally recognised as safe) (Parts 182, 184, and 186), threshold levels below which use of materials is considered to be exempt from the need for a petition or notification (Parts 174.6 and 170.39), and an application process under which pre-notification of intention to use any new substances is required (Part 170.102).

Annex 6
Regulations and Standards in the Natural Gas Sector - Canada

Coverage: Quality of natural gas. Equipment used in exploration, production, storage, transport and processing facilities.

Regulatory objectives	Federal regulations	Standards used	International links
Quality of natural gas Note 1	Is in the commercial domain and not regulated at the federal level.	N/A	N/A
Exploration and extraction - onshore and offshore Note 2	1.Canada Oil and Gas Operations Act R.S.C. 1987 (COGOA) – and the regulations there under, notably: - *Canada Oil and Gas Installations Regulations* (SOR/96-118) - *Canada Oil and Gas Drilling Regulations* (SOR/79-82) - *Canada Oil and Gas Production and Conservation Regulations* (SOR/90-791) 2. Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act S.C. 1987	(SOR/96-118) references **13 Canadian and 29 non-Canadian standards** related to equipment (mostly API and NFPA). See Note 2 for list of standards. SOR/79-82: - Para 30(1)-.Drilling equipment: no standards specified but the following statement "The minimum acceptable standards for a derrick, mast, draw-works, mud pump and for related drilling rig equipment that is installed on a drilling rig are those standards that are equal or superior to the relevant specifications of the American Petroleum Institute" - Para. 38 Electrical equipment: CSA C22.1. - Canadian Electrical Code Part I *SOR/90-791 Part VII:* **4 API standards:** – API Spec 6A – API RP 14C – API Spec 14D – API RP 14H	SOR/96-118: see previous column - direct reference to 29 non-Canadian standards (mostly US SDOs). Of these: API RP 521 identical to **ISO 23251:2006** (adopted back) API RP 17A identical to **ISO 13628-1:2005** (adopted back) SOR/79-82: see previous column – a general reference to **specifications developed by API.** SOR/90-791, Part VII: see previous column - direct reference to **4 API standards.** Of these: API Spec 6A identical to **ISO 10423-2003,** with modifications

	(NS Act) – and regulations there under, notably - *Nova Scotia Offshore Area Petroleum Installations Regulations* - *Nova Scotia Offshore Area Petroleum Drilling Regulations* - *Nova Scotia Offshore Petroleum Production and Conservation Regulations* 3. Canada-Newfoundland Atlantic Accord Implementation Act R.S.N 1990 (NL Act), – mirrored regulations there under 4. Canada Labour Code *Oil and Gas Occupational Safety and Health Regulations* (SOR/87-612)	*SOR/87-612* references 42 standards, of which **8 non-Canadian:** – ANSI A10.11 – ANSI/ASME B20.1 – ANSI B15.1 – API Spec 8A – API Spec 2C – ARI 1010-82 – IEC 651 – NFPA 77 See Note 2 for list of standards. .	SOR/87-612: See previous column - direct reference to **8 non-Canadian standards (mostly US SDOs)**
Storage Note 3	For tanks under the jurisdiction of the NEB falling within scope of (a) NEB Onshore Pipeline Regulations, 1999 (SOR/99-264 or (b) NEB Processing Plant Regulations (SOR/2003) : *Guidance Notes for the Design, Construction, Operation and Abandonment of Pressure Vessels (3 July 2003)*	*NEB Guidance Notes for pressure vessels* reference: 1. CSA Standard B51:Boiler, Pressure Vessel, and Pressure Piping Code 2. **ASME Safety Code** [for pressure relief valves]	ASME – direct reference. See previous column

Pipeline Note 4	*1. NEB Onshore Pipeline Regulations, 1999 (OPR-99-294),* *2. Oil and Gas Occupational Safety and Health Regulations* (*SOR/87-612*) [see Note 2]	*1. OPR-99-294* reference: a. CSA Z662-07: Oil and gas pipeline systems CAN/CSA Z662-07 <u>in turn</u> references more than 200 standards, recommended practices or other publications: 105 standards relate to equipment, **93 of which are non-Canadian (mostly US SDOs and some European SDOs).** See Note 3 b. CAN/CSA Z276: Liquefied Natural Gas (LNG) - Production, Storage, and Handling CSA Z276 <u>in turn</u> references 16 standards related to equipment, **10 of which are non-Canadian:** – CGA 341 – API Spec 6D – API Sd 620-2002 (2004) – API Std 2510-2001 – ASME B31.3 – ASME B31.5 – ASME B31.8 – ASME Boiler and Pressure Vessel Code 2004 – ASTM A 821/A821M-05 – TEMA Standards of Tubular Exchanger Manufacturers Associations, 1999 c. CAN/CSA Z341 [not further discussed] See Note 3 *2. SOR/87-612* references **8 non-Canadian standards** (see row 2)	OPR-99-294 – international links through <u>second-level</u> references in **CSA Z662** to 93 non-Canadian standards and second-level references in **CSA Z276** to 10 non-Canadian standards**.** SOR/87-612 references **8 non-Canadian standards** (see row 2)
Tanks for road/rail transport	*Transportation of Dangerous Goods (TDG) Regulations* under the 1992 Transportation of	– CAN/CSA-B622: Selection and Use of Highway Tanks, Multi-Unit Tank Car Tanks, and Portable	UN Recommendations for the Transport of Dangerous

Note 5	Dangerous Goods Act	Tanks for the Transportation of Dangerous Goods – CAN/CSA-B620: Highway Tank and Portable Tank for the Transportation of Dangerous Goods – CAN/CGSB-43.147: Construction, Modification, Qualification, Maintenance, and Selection and Use of Means of Containment for the Handling, Offering for Transport, or Transporting of Dangerous Goods by Rail. – UN Recommendations	Goods.
Processing facilities Note 6	1. *NEB Processing Plant Regulations (SOR/2003)* 2. *Oil and Gas Occupational Safety and Health Regulations* (SOR/87-612) [see Note 2]	1. *PPR* SOR/2003 reference CAN/CSA B51-09: Boiler, pressure vessel and pressure piping code. CAN/CSA B51-09 in turn references **ASME Boiler and Pressure Vessel Code** 2. SOR/87-612 references **8 non-Canadian standards** *(*see row 2)	PPR – international links through second-level reference in **CAN/CSA B51-09** to ASME Boiler and Pressure Vessel Code SOR/87-612 references **8 non-Canadian standards** (see row2)

Notes

1 Regulated at the provincial level and hence falling outside the scope of this inquiry.

2 Framework for oil and gas operations falling under Federal jurisdiction: The Canada Oil and Gas Operations Act (COGOA) provides for the making of regulations concerning the design, safety, construction and installation, inspection, testing, monitoring, operation, maintenance and repair of installations used in the exploration for, development and production of oil and gas in certain frontier land (onshore and offshore areas of the Northwest Territories and Nunavut, including both Crown land and private lands created pursuant to Land Claim Agreements; the Artic offshore; offshore British Columbia; the Gulf of St. Lawrence and the Bay of Fundy). In addition, there are two joined management and resource sharing agreements with Newfoundland (the Atlantic Accord) and with Nova Scotia (The Canada-Nova Scotia Accord). These 3 Acts have 3 sets of mirrored regulations.

The purpose of these Acts is to promote, in respect of the exploration for and exploitation of oil and gas, safety, protection of the environment, conservation of resources and joint production arrangements. The Acts are administered by three regulators, respectively. The National Energy Board (NEB) regulates oil and gas exploration and production on behalf of the federal government under the Canada Oil and Gas Operations Act. The same holds for two Offshore Boards (Canada-Newfoundland Offshore Petroleum Board and Canada-Nova Scotia Offshore Petroleum Board) administering the two Accords, respectively. Prior to any work being initiated in areas under their respective jurisdictions, authorisation from these Boards are required.

Regulations under COGOA:

COGOA gives the NEB significant regulatory powers on behalf of the federal government, as reflected in NEB regulations and published guidance. The NEB references consensus standards in its regulations. These reference standards in turn reference other standards; these may specify particular equipment requirements considered suitable for the Canadian environment/conditions.

The regulations under COGOA most relevant for equipment are the **Canada Oil and Gas Installations Regulations (SOR/96-118).** These regulations set the minimum safety requirements which must be met by all persons engaged in the exploration, development and production of oil and gas in the areas where COGOA applies. They ensure that the various components that make up an installation function according to specifications and the safety of workers, the operations and the environment is protected.

SOR/96-118 references a number of independent standards *for* electrical installations, mechanical equipment, winterisation, corrosion protection, fire fighting equipment, etc. The following is an indicative list of standards referenced, from which design and installation standards for example for large structures, as well as other Canadian regulations referenced, have been omitted. Standards developed by non-Canadian bodies are in bold.

1. CAN/CSA-Z299: *Quality Assurance Standards*
2. CSA Standard C22.l-l990, *Canadian Electrical Code Part I, Safety Standard for Electrical Installations*
3. **IEC Publication 92-3, *Electrical Installations in Ships, Part 3: Cables (construction, testing***
4. **IEC Publication 332-3, *Tests on electrical cables under fire conditions, Part 3: Tests on bunched wires or cables*; *installations* (test standard)**
5. CSA Standard C22.2 No. 0.3-M1985, *Test Methods for Electrical Wires and Cables* (test standard)
6. CAN/CSA-S471-92, *General Requirements, Design Criteria, the Environment, and Loads*.
7. **API Spec 2C, Specification for Offshore Cranes**
8. **API RP 520, Recommended Practice for the Design and Installation of Pressure-Relieving Systems in Refineries;**
9. **API RP 521, Guide for Pressure-Relieving and Depressuring Systems [identical to ISO 23251:2006]**
10. **API Standard 526, Flanged Steel Safety-Relief Valves**
11. **API Standard 527, *Seat Tightness of Pressure Relief Valves***
12. **API Standard 2000, *Venting Atmospheric and Low-Pressure Storage Tanks.***
13. CAN/CGSB-65.16-M89, *Marine Abandonment Immersion Suit Systems*
14. CAN/CGSB-65.16-M89, *Marine Abandonment Immersion Suit Systems*
15. **Regulation 47 of Chapter III of International Maritime Organization *International Conference on Safety of Life at Sea (rescue boat requirements)***
16. **Regulation 3.2 of Chapter II-2 of International Maritime Organization *International Conference on Safety of Life at Sea (test standard)***
17. **National Fire Protection Association 15, *Standard for Water Spray Fixed Systems for Fire Protection***
18. **National Fire Protection Association 12, *Standard on Carbon Dioxide Extinguishing Systems*.**
19. **National Fire Protection Association 16, *Standard on Deluge Foam-Water Sprinkler and Foam-Water Spray Systems***
20. **National Fire Protection Association 10, *Standard for Portable Fire Extinguishers***
21. **National Fire Protection Association 1971, *Standard on Protective Clothing for Structural Fire Fighting***
22. **National Fire Protection Association 1973, *Standard on Gloves for Structural Fire Fighting***
23. CAN/CSA-Z94.1-92, *Industrial Protective Headwear*
24. CAN/CSA-Z94.4-93, *Selection, Use, and Care of Respirators*
25. CAN3-Z 180.1-M85, *Compressed Breathing Air and Systems*
26. **National Fire Protection Association 1983, *Standard on Fire Service Life Safety Rope, Harness and Hardware***

27. **National Fire Prevention Association 72E, *Standard on Automatic Fire Detectors*.**
28. **Appendix C of American Petroleum Institute RP 14C, *Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms***
29. **American Petroleum Institute RP 14F, *Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms***
30. **American Petroleum Institute RP 14E, Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems**
31. **American Petroleum Institute Spec 12J, Specification for Oil and Gas Separators**
32. **American Society of Mechanical Engineers *ASME Boiler & Pressure Vessel Code***
33. CSA B51-M1991, *Boiler, Pressure Vessel, and Pressure Piping Code*
34. CAN/CSA-Z184-M92, *Gas Pipeline Systems*;
35. **API STD 617, Centrifugal Compressors for General Refinery Service**
36. **API STD 618, Reciprocating Compressors for General Refinery Services**
37. **API STD 619, *Rotary-Type Positive Displacement Compressors for General Refinery Services***
38. National Association of Corrosion Engineers (U.S.) MR-01-75, Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment
39. **Chapter 3 of International Maritime Organization *Code for the Construction and Equipment of Mobile Offshore Drilling Units, 1989*.**
40. **API RP 17A, *Recommended Practice for Design and Operation of Subsea Production Systems* [identical to ISO 13628-1:2005]**
41. CAN/CSA-Z187-M87, *Offshore Pipelines*.
42. ***International Convention on Load Lines, 1966*.**

The corresponding regulations under the NS and NL Acts use similar sets of standards. For this reason they are not discussed here.

The Canada Oil and Gas Drilling Regulations (SOR/79-82) apply to the exploration, drilling and conservation of oil and gas and specify measures to ensure the safety of these operations. Subject to these regulations, no person may drill a well without authorization and approval. These Regulations reference very few independent standards. The **Nova Scotia Offshore Area Petroleum Installations Regulations** make more use of independent standards, almost all of which issued by API:

1. API Spec 14A: Specification for Subsurface Safety Valve Equipment
2. National Association of Corrosion Engineers, NACE Standard MR0175-92 Item No. 53024 Standard Material Requirements, Sulfide Stress Cracking Resistant - Metallic Materials for Oilfield Equipment.
3. Part II of API Spec 6FB: Specification for Fire Test for End Connections
4. API Spec 6FA: Specification for Fire Test For Valves.
5. API Spec 6A: Specification for Wellhead and Christmas Tree Equipment
6. API Spec 17D: Specification for Subsea Wellhead and Christmas Tree Equipment
7. API Spec 14D: Specification for Wellhead Surface Safety Valves and Underwater Safety Valves for Offshore Service
8. API RP 14C Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms

There are equivalent drilling regulations under the Canada-Newfoundland Atlantic Accord Implementation Act (NL Act).

Also falling under COGOA but of more marginal relevance for the regulation of gas-related equipment are the **Canada Oil and Gas Production and Conservation Regulations (SOR/90-791).** Part VII - *Design and construction of a production installation* references 4 API standards:

1. API Specification for Wellhead Surface Safety Valves and Underwater Safety Valves for Offshore Service: API Spec 14D
2. API Specification for Wellhead and Christmas Tree Equipment: API Spec 6A [**identical to ISO 10423-2003, with modifications**]
3. API Recommended Practice for Use of Surface Safety Valves and Underwater Safety Valves Offshore: API RP 14H
4. API Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms: API RP 14C

The prescriptive nature of the regulatory environment for the oil and gas industry has been noted, and the Drilling Regulations and Production and Conservation Regulations have been modernised and as of April 2009 were close to being reissued as revised and merged regulations, the *Drilling and Production Regulations*. SOR/79-82 and SOR/90-791 often set very specific requirements related to facility design, activities or equipment. Also, the objectives or goals of the provisions lacked clarity. The Boards have observed increasing numbers of requests from companies wishing to use for example new technologies not taken into account by the regulations, for exemptions from regulatory requirements or obtain approval of equivalence to regulatory requirements.

Such requests for exemptions or equivalency introduce some flexibility but are costly for businesses and represent an administrative burden also for regulators. The revised new *Drilling and Production Regulations* will be less prescriptive and more goal or performance oriented.[2] Transformation from a prescriptive to a goal-oriented model has already taken place in the case of the Onshore Pipeline Regulations (OPR), the latest version of which, known as OPR-99, came into force in August 1999.

The Canada Oil and Gas Operations Act enforces the **Oil and Gas Occupational Health and Safety Regulations (SOR/87-612**), which has been written specifically for the sector by Labour Canada under the Canada Labour Code. SOR/87-612 applies work-place related safety standards in respect to employees employed on or in connection with exploration or drilling for or the production, conservation, processing or transportation of gas (or oil) in Canada lands, or on or in connection with the transportation of gas (or oil) through an inter-provincial pipeline. These horizontally applicable regulations set prescriptive standards directly but reference also various independent documents. Coverage of equipment ranges from ladders, safety nets, elevators, boilers, lightening, electrical equipment, to mobile homes, switches and controls and personal protective equipment, clothing, devices or materials.

42 standards, guidelines or codes of practice referenced in SOR/87-612 under section headings appear applicable to equipment and are listed below. 8 publications are non-Canadian [shown in bold]. Omitted from the list are various referenced standards covering recordkeeping and reports, signs, labelling, disclosure and other non-equipment aspects, and other Federal regulations referenced in SOR/87-612.

<u>Portable fire extinguisher</u>

1. Underwriters' Laboratories of Canada Standard CAN4-S508-M83, *Rating and Fire Testing of Fire Extinguishers*, dated June 1983, as amended to July 1986

<u>Temporary structures and excavations</u>

2. CSA Standard CAN3-Z11-M81: *Portable Ladders*

3. **ANSI A10.11-1979:** ***American National Standard for Safety Nets Used During Construction, Repair and Demolition Operations***

[2] Proposed *Drilling and Production Regulations* under the *Canada Oil and Gas Operations Act*, the *Canada-Newfoundland Atlantic Accord Implementation Act* and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* were published in the *Canada Gazette*, Part I on 18 April 2009, p. 1095.

Elevating devices

4. CSA Standard B 311-M1979: *Safety Code for Manlifts*
5. CSA Standard CAN3-B44-M85: *Safety Code for Elevators,* and Supplement No. 1-1984
6. CSA Standard CAN3-B355-M81: *Safety Code for Elevating Devices for the Handicapped*

Levels of sound

7. IEC Standard 651 (1979): *Sound Level Meters* (performance requirements for sound level meter)

8. CSA Standard Z94.2-M1984: *Hearing Protectors*

Electrical safety

9. CSA Standard CAN3-015-M83: *Wood Utility Poles and Reinforcing Studs*
10. CSA Standard A14-M1979: *Concrete Poles*
11. CSA Standard C22.1 - *Canadian Electrical Code, Part I*

Sanitation

12. Canadian Plumbing Code, 1985

13.* ARI Standard 1010-82: *Standard for Drinking-Fountains and Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers

14. CSA Standard A394-M1984, *Guide to Requirements for Relocatable Industrial Accommodation*
15. CSA Standard Z240.2.1-1979: *Structural Requirements for Mobile Homes*

Hazardous substances

16. United States *National Fire Prevention Association Inc.* publication NFPA 77-1983, *Recommended Practice on Static Electricity*

17. *American Conference of Governmental Industrial Hygienists* in its publication entitled *Manual of Analytical Methods Recommended For Sampling and Analysis of Atmospheric Contaminants*, dated 1958 (test standard)
18. Health Canada's Safety Code 6
19. *United States National Institute for Occupational Safety and Health* in the *NIOSH Manual of Analytical Methods*, third edition, volumes 1 and 2, dated February 1984 (measurement method)

Safety materials, equipment, devices and clothing

20. CSA Standard Z94.1-M1977: *Industrial Protective Headwear*
21. CSA Standard Z195-M1984: *Protective Footwear*
22. CSA Standard Z94.3-M1982: *Industrial Eye and Face Protectors*
23. CSA Standard Z94.4-M1982: *Selection, Care and Use of Respirators*
24. CSA Standard CAN3-Z180.1-M85: *Compressed Breathing Air and Systems*
25. CSA Standard Z259.1-1976: *Fall-Arresting Safety Belts and Lanyards for the Construction and Mining Industries*
26. CSA Standard Z259.2-M1979: *Fall-Arresting Devices, Personnel Lowering Devices and Life Lines*
27. CSA Standard Z259.3-M1978: *Lineman's Body Belt and Lineman's Safety Strap*
28. CAN2-65.7-M80, *Life Jackets: Inherently Buoyant Type*, dated April, 1980
29. CGSB 65-GP-11, *Standard for: Personal Flotation Devices*, dated October 1972 (for life jacket or buoyancy device)
30. National Fire Code

Tools and machinery

31. CSA Standard CAN C22.2 No. 71.1-M89: *Portable Electric Tools*
32. CSA Standard C22.2 No. 144-1977: *Ground Fault Circuit Interrupters*
33. CSA Standard Z166-1975: *Explosive Actuated Fastening Tools*
34. CSA Standard CAN3-Z62.1-M85: *Chain Saws*
35. CSA Standard B173.5-1979: *Safety Requirements for the Use, Care and Protection of Abrasive Wheels*

36. ANSI B15.1-1972: Safety Standard for Mechanical Power Transmission Apparatus, dated July, 1972

37. CSA Standard Z114-M1977: *Safety Code for the Woodworking Industry*, dated March, 1977

38. CSA Standard Z142-1976: *Code for the Guarding of Punch Presses at Point of Operation*
Materials handling
39.* API SPEC 8A:** ***API Specification for Drilling and Production Hoisting Equipment
40.* API Spec 2C:** ***API Specification for Offshore Cranes
41. CSA Standard B352-M1980, *Rollover Protective Structures (ROPS) for Agricultural, Construction, Earthmoving, Forestry, Industrial and Mining* Machines
42.* ANSI/ASME B20.1-1984,** ***Safety Standards for Conveyors and Related Equipment

3 Tanks for storing natural gas in compressed or liquefied form: Where such tanks are under the jurisdiction of the NEB because they are covered by either the NEB Onshore Pipeline Regulations, 1999 (SOR/99-264 or the NEB Processing Plant Regulations (SOR/2003), the so-called **Guidance Notes for the Design, Construction, Operation and Abandonment of Pressure Vessels (latest ed. 3 July 2003)** apply to the construction, alteration and repair welding of tanks and other types of pressure equipment. These Notes incorporate by reference notably the CSA Standard B-51 – Boiler, Pressure Vessel, and Pressure Piping, and for pressure relief valves the ASME Safety Code.

4 The NEB and the two Offshore Boards have the authority to promote safety and to make regulations which provide for the protection of property and the environment, as well as the safety of the public and company employees in the design, construction, operation and abandonment of pipelines under their respective jurisdictions.

Definition - Pipeline: a line that is used or to be used for the transmission of oil, gas or any other commodity and that connects a province with any other province or provinces or extends beyond the limits of a province or the offshore area as defined in section 123, and includes all branches, extensions, tanks, reservoirs, storage facilities, pumps, racks, compressors, loading facilities, interstation systems of communication by telephone, telegraph or radio and real and personal property and works connected therewith, but does not include a sewer or water pipeline that is used or proposed to be used solely for municipal purposes. [*National Energy Board Act* s.2]

The **Onshore Pipeline Regulations (OPR-99)** set out minimum requirements for all stages of a pipeline's lifecycle. Technical basis for the OPR are the minimum technical requirements for the design, construction, operation and abandonment of pipelines are the pipeline standards developed by the Canadian Standards Association (CSA), although the NEB may impose its own requirements in its regulations. The NEB participates with industry and other government agencies in the development and maintenance of these standards.

The *NEB Guidance Notes* (July 2003) apply to pressure vessels under the jurisdiction of the Board falling within the scope of OPR-99.

CAN/CSA Z 266 is the main pipeline standard for natural gas referenced in OPR-99. A component covers pipelines for liquid natural gas (LNG). This standard is comprehensive. The document itself references **233 other standards, guidelines and miscellaneous types of publications**. If standards and guidelines unrelated to equipment are not counted, this leaves 105 publications referenced in CAN/CSA Z266, of which 12 are Canadian and 93 non-Canadian standards or guidelines. To illustrate the 'second-level' links to international standards that can occur when a given standard document which is referenced in regulation in turn references further standards, a Sub-Annex to Note 4 below shows the 105 standards referenced in CAN/CSA Z266.

Also cited by OPR-99 is **CAN/CSA Z 276**. This Canadian standard establishes essential requirements and minimum standards for the design, installation and safe operation of facilities at any location for the liquefaction of natural gas and for the storage, vaporization, transfer, handling and truck transport of liquid natural gas (LNG), as well as the training of personnel involved. It does not apply to the transportation of LNG by railcar, marine vessel or pipeline. CAN/CSA Z 276 in turn references of a total of 92 publications, of which 16 standards – 6 Canadian and 10 non-Canadian standards – appear relevant for equipment**.**

Besides CAN/CSA Z-266 and CANCSA 276, OPR-99 references **CAN/CSA Z341**. This Canadian standard applies to underground storage of hydrocarbons. But it covers mostly the operational aspects related to storage space, not the equipment itself, and therefore is not discussed here further.

5 Scope of the inquiry is large means of containment for transportation by road and railway.

The **Transportation of Dangerous Goods (TDG) Regulations** prescribe safety requirements for tanks and other types of means of containment used for the transportation of dangerous goods by road and rail. The regulations are a mix of direct prescriptions and references to independent standards. The following draws on information which Transport Canada, the agency responsible for the Regulations, makes available on its website (http://www.tc.gc.ca/tdg/who.htm) .

Canada has adopted the internationally recognized UN standards for means of containment. Where UN standards do not exist, Transport Canada standards apply, such as for highway tanks, some portable tanks and tank car tanks. Tanks meeting TC standards can also be used in the United States if the specifications to which they are manufactured correspond to US DOT specifications. For trans-border shipments, there is also mutual recognition between Canada and the US of certain types of containers that meet the regulatory requirements of the other party.

The TDG Regulations (Sections 5.10 and 5.14) require that containers transporting natural gas must conform to the following standards:

- **For transport by road using highway tanks, Multi-unit Car Tanks and Portable Tanks**:
  - CAN/CSA-B622: Selection and Use of Highway Tanks, Multi-Unit Tank Car Tanks, and Portable Tanks for the Transportation of Dangerous Goods, and
  - CAN/CSA-B620: Highway Tank and Portable Tank for the Transportation of Dangerous Goods [this standard is evoked in Standard CAN/CSA-B622 in relation to the containers' design, construction, certification, assembly, repair, testing, inspection etc.]

- **For transport by railway vehicle**:
  - CAN/CGSB-43.147: Construction, Modification, Qualification, Maintenance, and Selection and Use of Means of Containment for the Handling, Offering for Transport, or Transporting of Dangerous Goods by Rail.

Other standards referenced in the Regulations (CAN/CSA-B339 and CAN/CSA-B340) apply e.g. to transport of natural gas in intermediate bulk containers, tubes, cylinders.

Provincial regulations are aligned with the federal government's TDG Regulations. This ensures that the provisions of all provincial regulations are compatible with one another.

6 Definition – Processing plant: A plant used for the processing, extraction or conversion of fluids and all structures located within the boundaries of the plant, including compressors and other structures integral to the transportation of fluids. [*Processing Plant Regulations* s. 1]

Requirements especially for pressure vessels and pressure piping are found in section 9 of the NEB Processing Plant Regulations and in clause 3.3 of the Guidance Notes for the NEB Processing Plant Regulations.

Sub-Annex to Note 4: Equipment-related standards and guidelines referenced in CAN/CSA Z266-07 - Oil and gas pipeline systems

In preparing the following list, the titles of documents which Standard CAN/CSA Z266 references were reviewed and items that appeared to relate to materials, structures, operations and maintenance and requirements for emergency procedures were deleted, to distill a list of documents that address equipment.

CSA (Canadian Standards Association)

1. B51-03: *Boiler, pressure vessel, and pressure piping code*
2. B137 Series-05: *Thermoplastic pressure piping compendium*
3. C22.2: *Canadian Electrical Code, Part II*
4. C22.3 No. 7-06: *Underground systems*
5. CAN/CSA-ISO 9001-00 (R2005): *Quality management systems — Requirements*
6. CAN/CSA-S471-04: *General requirements, design criteria, the environment, and loads*
7. Z245.1-07: *Steel pipe*
8. Z245.6-06: *Coiled aluminum line pipe and accessories*
9. Z245.11-05: *Steel fittings*
10. Z245.12-05: *Steel flanges*
11. Z245.15-05: *Steel valves*
12. Z276-07: *Liquefied natural gas (LNG) — Production, storage, and handling*

AGA (American Gas Association)

13. B109.1-2000: *Diaphragm-Type Gas Displacement Meters (Under 500-Cubic-Feet-per Hour Capacity and Under)*

API (American Petroleum Institute)

14. 5L-2004 (SPEC): *Line Pipe*
15. 5LCP-2006 (SPEC): *Coiled Line Pipe*
16. 6D-2002/ISO 14313:1999 (SPEC): *Pipeline Valves/Petroleum and Natural Gas Industries — Pipeline Transportation Systems — Pipeline Valves*
17. 15HR-2001 (SPEC): *High Pressure Fiberglass Line Pipe*
18. 15LE-2001 (SPEC) : *Polyethylene (PE) Line Pipe*
19. 15S-2006 (RP): *Qualification of Spoolable Reinforced Plastic Line Pipe*
20. 17J-1999 (SPEC): *Unbonded Flexible Pipe*
21. 17K-2005 (SPEC): *Bonded Flexible Pipe*
22. 599-2002 (STD): *Metal Plug Valves — Flanged and Welding Ends*
23. 600-2001 (STD): *Bolted Bonnet Steel Gate Valves for Petroleum and Natural Gas Industries — Modified National Adoption of* ***ISO 10434:1998***
24. 609-2004 (STD)*: Butterfly Valves: Double Flanged, Lug- and Wafer-Type:*
25. 610-2004 (STD)*: Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries*
26. 617-2002 (STD): *Axial and Centrifugal Compressors and Expander-Compressors for Petroleum, Chemical and Gas IndustryServices*
27. 618-1995 (STD): *Reciprocating Compressors for Petroleum, Chemical and Gas Industry Services*
28. 650-2005 (STD): *Welded Steel Tanks for Oil Storage*
29. 2610-2005 (STD): *Design, Construction, Operation, Maintenance & Inspection of Terminal and Tank Facilities*
30. Q1/ISO TS 29001-2003 (SPEC): *Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry*

ASME International (American Society of Mechanical Engineers)

31. B1.1-2003: *Unified Inch Screw Threads, UN and UNR Thread Form*
32. B1.20.1-1983 (R2001): *Pipe Threads, General Purpose, Inch*
33. B16.1-2005: *Cast Iron Pipe Flanges and Flanged Fittings*
34. B16.5-2003: *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24*
35. B16.9-2003: *Factory-Made Wrought Buttwelding Fittings*
36. B16.11-2005: *Forged Fittings, Socket-Welding and Threaded*
37. B16.20-1998 (R2004): *Metallic Gaskets for Pipe Flanges: Ring Joint, Spiral Wound, and Jacketed*
38. B16.21-2005: *Nonmetallic Flat Gaskets for Pipes Flanges*
39. B16.24-2001: *Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500 and 2500*
40. B16.28-1994: *Wrought Steel Buttwelding Short Radius Elbows and Returns*
41. B16.34-2004: *Valves Flanged Threaded and Welding End*
42. B16.36-1996: *Orifice Flanges*
43. B16.40-2002: *Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems*
44. B16.47-1996: *Large Diameter Steel Flanges*
45. B16.49-2000: *Factory-Made Wrought Steel Buttwelding Induction Bends for Transportation and Distribution Systems*
46. B18.2.1-1996 (R2005): *Square and Hex Bolts and Screws, Inch Series*
47. B18.2.2-1987 (R2005): *Square and Hex Nuts*
48. B31.3-2004: *Process Piping*
49. B31.8-2003: *Gas Transmission and Distribution Piping Systems*
50. B31.11-1989 (R1998): *Slurry Transportation Piping Systems*
51. B36.19M-2004: *Stainless Steel Pipe*
52. *Boiler and Pressure Vessel Code, 2004*

ASTM International (American Society for Testing and Materials)

53. A 53/A 53M-06a: *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
54. A 105/A 105M-05: *Standard Specification for Carbon Steel Forgings for Piping Applications*
55. A 106-06a: *Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*
56. A 126-04: *Standard Specification for Gray Iron Casting for Valves, Flanges, and Pipe Fittings*
57. A 193/A 193M-06a: *Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service, or Both*
58. A 194/A 194M-06a: *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High Temperature Service*
59. A 234/A 234M-06: *Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*
60. A 268/A 268M-05a: *Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service*
61. A 269-04: *Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*
62. A 307-04e1: *Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength*
63. A 320/A 320M-05a: *Standard Specification for Alloy/Steel Bolting Materials for Low-Temperature Service*
64. A 333/A 333M-05: *Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service*
65. A 350/A 350M-04a: *Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components*
66. A 354-04e1: *Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners*
67. A 381-96 (2005): *Standard Specification for Metal-Arc-Welded Steel Pipe for Use with High-Pressure Transmission Systems*
68. A 420/A 420M-06: *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service*
69. A 563-04a: *Standard Specification for Carbon and Alloy Steel Nuts*
70. A 563M-04: *Standard Specification for Carbon and Alloy Steel Nuts [Metric]*
71. A 694/A 694M-03: *Standard Specification for Carbon and Alloy Steel Forgings for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Service*

72. A 707/A 707M-02: *Standard Specification for Forged Carbon and Alloy Steel Flanges for Low-Temperature Service*
73. A 860/A 860M-00 (2005): *Standard Specification for Wrought High-Strength Low-Alloy Steel Butt-Welding Fittings* A 984/A 984M-03*: Standard Specification for Steel Line Pipe, Black, Plain-End, Electric-Resistance-Welded*
74. A 1005/A 1005M-00 (2004): *Standard Specification for Steel Line Pipe, Black, Plain-End, Longitudinal and Helical Seam, Double Submerged-Arc Welded*
75. A 1006/A 1006M-00 (2004): *Standard Specification for Steel Line Pipe, Black, Plain-End, Laser Beam Welded*
76. A 1024/A 1024M-02: *Standard Specification for Steel Line Pipe, Black, Plain-End, Seamless*
77. A 1037/A1037M-05: *Standard Specification for Steel Line Pipe, Black, Furnace-Butt-Welded*
78. B 43-98 (2004): *Standard Specification for Seamless Red Brass Pipe, Standard Sizes*
79. B 75-02: *Standard Specification for Seamless Copper Tube*
80. B 75M-99 (2005): *Standard Specification for Seamless Copper Tube [Metric]*
81. B 88-03: *Standard Specification for Seamless Copper Water Tube*
82. B 88M-05: *Standard Specification for Seamless Copper Water Tube [Metric]*
83. B 241/B 241M-02: *Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube*
84. B 306-99: *Standard Specification for Copper Drainage Tube (DWV)*
85. B 361-02: *Standard Specification for Factory-Made Wrought Aluminum and Aluminum-Alloy Welding Fittings*
86. *Thermosetting-Resin) Pipe and Fittings:*
87. D 3261-03*: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing*
88. D 3350-05: *Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*
89. F 1290-98a (2004): *Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings*
90. F 1973-05: *Standard Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide II (PAII) Fuel Gas Distribution Systems*
91. F 2206-02: *Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock*

AWWA (American Water Works Association)

92. ANSI/AWWA C111/A21.11-01: *Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*
93. ANSI/AWWA C150/A21.50-05: *Thickness Design of Ductile-Iron Pipe*
94. C205-00: *Cement-Mortar Protective Lining and Coating for Steel Water Pipe — 4 In. (*100 mm*) and Larger*

BSI (British Standards Institution)

95. BS EN 253:2003: *District heating pipes. Preinsulated bonded pipe systems for directly buried hot water networks. Pipe assembly of steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*
96. BS EN 489:2003: *District heating pipes. Preinsulated bonded pipe systems for directly buried hot water networks. Joint assembly for steel service pipes, polyurethane thermal insulation and outer casing of polyethylene*

DNV (Det Norske Veritas)

97. DNV-OS-F101-2000: *Submarine Pipeline Systems*

ISO (International Organization for Standardization)

98. 9001:2000 (R2005): *Quality management systems — Requirements*

MSS (Manufacturers Standardization Society)

99. SP-6-2001: *Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings*
100. SP-25-1998: *Standard Marking System for Valves, Fittings, Flanges and Unions*
101. SP-75-2004: *Specification for High Test Wrought Butt Welding Fittings*
102. SP-83-2006: *Class 3000 Steel Pipe Unions, Socket-Welding and Threaded*
103. SP-95-2006: *Swage(d) Nipples and Bull Plugs*
104. SP-97-2006: *Integrally Reinforced Forged Branch Outlet Fittings — Socket Welding, Threaded and Buttwelding Ends*

NEN (Nederlands Normalisatie-instituut) 3650-1:2002: *Requirements for Steel Pipeline Transportation Systems*

Annex 7
Regulations and Standards in the Natural Gas Sector - EU

Coverage: Quality of natural gas. Equipment used in exploration, production, distribution, industrial processing

Regulatory objectives	Regulations	Standards used	International links
Quality of natural gas Note 1	Directive 2003/55 authorises regulation for this purpose, but does not actually list or refer to specifications	N/A. A mandate has been issued to CEN to develop a standard, but it has not yet been issued.	N/A
Safety of exploration and extraction equipment Note 2	Most regulation is at member-state level, and one sample country was checked: UK. But 3 general EU directives have varying degrees of applicability. Directive 94/9 regulates equipment used in explosive atmospheres, including gas Directive 2006/42 regulates the safety of machinery in a general senses. Directive 1999/92 regulates Health & Safety conditions for workers in explosive atmospheres, including gas.	The sample check at member-state level revealed the general principle that the regulatory authority may give de facto recognition to specific standards. Of the 3 EU directives listed in the previous column, only 94/9 lists standards which may be considered specific to this sector: EN 1834-1 EN 1839 EN13673, Parts 1 and 2 EN 14522 EN 14756 EN 14994 EN 5024 1, Parts 1 and 2 EN 60079 series (several parts – standards) EN ISO 12100 None, except general principle that the regulatory authority may give de facto recognition to specific standards.	N/A. Only the principle in previous column. [A substantial base of ISO standards does exist, many of which are probably based in API – American Petroleum Institute – and ASTM standards.] The EN 60079 series is partly based on IEC standards with the same numerical references: some parts are identical and some are modified. EN ISO 12100 is identical to ISO 12100.

Storage equipment Note 3	Directive 97/23 regulates pressure equipment tanks. The same directives as in the previous row (94/9, 2006/42 and 1999/92) are also relevant here, and subject to the same comments, the same standards, and the same Note 2 as shown there.	See Note 3 for detailed list of standards.	
Safety of pipelines Note 4	No evidence of any EU regulation. Pipelines are explicitly excluded from Directive 97/23 below except where pipes are used inside "installations". The term "installation is not defined, and the exact demarcation line between pipeline and piping is not specified. . One sample member-state-level check (UK) was undertaken, which forms the basis for the comments in the following column. Here, the objective of safety is further developed into the ALARP principle (As Low As Reasonably Practical), where "low" refers to "low risk"	No de jure recognition, but written de facto recognition of standards. Major series are: EN - European standards EN 14161 EN 1594 IGE TD series (Institute of Gas Engineers and Managers IGEM) - a UK body National British code BS PD 8010 DNV RP F101. A Norwegian national body DNV-LS-F101. A Norwegian national body. Submarine pipeline systems, listed with American Petroleum Institute API 17 series for flexible pipes. API RP579 for pipeline defects American Society of Mechanical Engineers ASME ASME B31G. Manual for determining strength of corroded pipelines. DNV RP-F101. Corroded pipelines.	See previous column. There is widespread de facto recognition of standards from outside the EU.
Safety of pressure equipment in transport Note 5	Directive 99/36/EC, which in turn refers to Directives 94/55 and 96/49	Directives 94/55 and 96/49 impose the international ADR and RID specifications directly.	Direct citation of international documents

Safety of pressure equipment in processing facilities Note 6	Directive 97/23/EC The same directives as in Row 2 of this table (94/9, 2006/42 and 1999/92) are also relevant here, and subject to the same comments, the same standards, and the same Note 2 as shown there.	See Note 3. Under directive 97/23/ EC: 94 EN standards are recognised under this directive. They include the 13 ISO standards in the next column	13 of the 94 standards in the previous column are ISO standards (IDT), covering 1) safety devices, 2) welder qualifications, 3) welding tests, 4) plastics piping systems, 5) industrial valves.

Notes

1. Preamble 24 of Directive 2003/55 refers to technical specifications for gas, and states that the EU's member states
should ensure that, taking into account the necessary quality requirements, biogas and gas from biomass or other types of gas are granted non-discriminatory access to the gas system, provided such access is permanently compatible with the relevant technical rules and safety standards. These rules and standards should ensure, that these gases can technically and safely be injected into, and transported through the natural gas system and should also address the chemical characteristics of these gases.
But the Directive does not impose any specifications or standards in this connection, and enquiries are under way at member-state level in the EU.
The European Commission has already answered one key question: there is no binding international code or standard (e.g., from the UN) in this field which EU member states make a direct commitment to use.

2. There is no evidence so far to suggest that in the EU, safety in first-stage purification is separated in regulation from safety in the initial extraction. There is no sector-specific federal EU regulation or product specifications in either category, only regulations national level. However, three federal-level EU regulations exist which are relevant, even if they cannot be described as "sector-specific regulations of products". These are shown in the table.

Directive 94/9 regulates essential requirements for equipment used in explosive atmospheres (ATEX products). It is not specific to this sector, but does cover the explosion risk posed by gas of all kinds. The standards listed in this row under this directive are those which include the word "gas" in their title, although only extensive study of the standards themselves and interpretation from specialists, far beyond the resources of this project, could determine whether they are directly applicable here. Only one standard in the series identifies a link with an international standard.
Directive 2006/42 identifies the safety of machinery in a general sense, is not sector-specific, and does not identify standards for this sector separately in its lists of standards recognised. For that reason, the list here takes only the most general standard under the directive, covering basic concepts and principles of design for all machinery. That standard EN 12100 is identical to an international standard.
Directive 1999/92 has a scope similar to that of Directive 94/9 above – it deals with hazards in explosive atmospheres – but specifies broad requirements for protecting workers rather than essential requirements for products as such. An example of its requirements is one to display a specified warning sign to alert workers, in work areas where a danger of explosion exists. In EU terminology, it is classed as a Health & Safety Directive. These directives generally make little direct use of standards, and this one does not either.

Given the absence of any federal-level EU sector-specific technical regulation of product specifications here, one sample country was checked (UK), and the results are reported in the table. There is no written evidence of de jure or de facto recognition of any specific standard, but the principle is announced that the safety inspectorate responsible for the regulation may recognise standards at their discretion. No lists of such standards are published.
Sources:
Applicable UK regulation: Offshore Installations (Safety Case) Regulations 2005 http://www.opsi.gov.uk/si/si2005/uksi_20053117_en.pdf
Role of standards in this regulation: http://www.hse.gov.uk/offshore/scham/performance.htm
And the acceptability of unspecified "industry standards" as the basis for hazard identification is confirmed by http://www.hse.gov.uk/offshore/aposc190306.pdf. Principle 13 of this document refers on page 15 to "those standards for controlling risk that are recognised by HSE as satisfying the law."
Site for background information: Http://www.hse.gov.uk/offshore/

3 Relevant regulation here is the EU's pressure equipment directive, cited in the table. It does not distinguish pure storage facilities from industrial processing plants where gas may be kept under pressure. The directive is a so-called *New Approach* directive, under which the EU may formally recognise European standards as offering a presumption of conformity. The latest list of EN standards (94 in total, counting all part-standards in any single series as a single standard) appears in EC Official Journal edition C46 25.2.2009. ISO standards recognised are (again, several standards in a single series are counted as a single standard: EN ISO 15614 is an example of a standard in several parts):

ISO 4126	Safety devices
ISO 9606	Qualifications of welders
ISO 10931	Plastics piping systems
ISO 15493	Ditto
ISO 15494	Ditto
ISO 15613	Welding tests
ISO 15614	Ditto
ISO 16135	Industrial valves
ISO 16136	Industrial valves
ISO 16137	Industrial valves
ISO 16138	Ditto
ISO 16139	Ditto
ISO 21787	Ditto

The remaining 81 standards (i.e., 94 minus the 13 ISO standards) are all unique standards, and cover a mix of general requirements for materials, components and construction. Examples are:

EN 764-5	Compliance and inspection documentation of materials
EN 1591	Design rules for gasketed, circular flange connections
EN 12953-8	Requirements for safeguards against excessive pressure in shell boilers.

The full, current list of standards recognised under the EU's Pressure equipment Directive appears on:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:046:0011:0025:EN:PDF

Note, however: the relationship – or lack of it – between the standards here and the ISO standards listed on the following page. None of the ISO standards listed above appears in the list on the following page. The reason appears clear, and can be derived from the chart embedded in the ISO list: these standards are too far downstream for the list on the following. If there is any connection at all, it is with the processing plants on the extreme right-hand side of the ISO chart, and it is there that this list stops.

4 Generally, pipelines are explicitly excluded from the EU's pressure equipment directive referred to earlier in this table, which therefore leaves – by default – regulation of the field at the member-state level. The exclusion does not apply where pipes are used inside "installations", i.e., a pipeline inside an installation would be covered. However, the term "installation" is not defined, and the exact demarcation line between pipeline and piping is not specified. Broadly, there appears to be a spectrum of applications, from the largest transport pipelines (such ass those used for long-distance international delivery of gas), to piping used within a home for delivery to the end consumer. The former is clearly a "pipeline", the latter is clearly a "piping". But between the two, the demarcation line is unclear, and this table focuses on the end of the spectrum represented by major transport pipelines. The situation here – no federal EU regulation – is the exact opposite of the situation in the USA, where pipelines are the only major part of this entire sector to be subject to federal-level regulation. Note that he international links mentioned here refer to *de facto* recognition of the standards in question. No *de jure* recognition was identified.

5 "Transportable" in this sense means modes of transport which are themselves mobile, and notably equipment used to transport natural gas under pressure by road and rail. The term does not include pipelines, which evidently *transport* gas in another sense. Sea transport is excluded, because international sea transport is covered by IMO treaties whose application is mandatory. There is therefore no scope for variation in the EU, except for the – insignificant in this context – cases where the entire sea voyage is between ports within a single country. The international conventions listed here for road and rail transport in theory also apply to international transport only. Therefore, for example, the RID convention on rail transport would not apply automatically to purely internal transport within a country that has no international rail links, such as Japan. But in practice the EU adopts them for transport within the EU, and they are therefore listed here.

6 See Note 3.

Annex 8
Regulations and Standards in the Natural Gas Sector - Korea

Coverage: Quality of natural gas. Equipment used in exploration, production, distribution, industrial processing

Regulatory objectives	Regulations	Standards used	International links
Quality control Note 1	There is no regulation. (The consumer supply guideline of the Korea Gas Corporation provides quality criteria to some degree).	None.	N/A
Exploration and extraction Note 2	Minefield security Act Petroleum minefield security regulation	The regulation provides very general guideline without referring specific standards	Non-national standards are practically applied without specific regulatory obligation.
Storage equipment Note 3	- KGS AC 111 (Storage tanks and pressure vessels) - KGS AC 115 (LNG Storage tanks)	- KS D 3501, 3531, 3593, 3101, 4125, 5201 - ASME, BS, DIN, NF, JIS - BS 7777, BS EN 1473, NFPA 59A, API 620, ASTM A 353, ASTM A 421	Non-national standards such as ASME, BS could replace national standards under certain conditions and non-national standards such as API, and ASTM are referenced in the regulations.
Pipeline Note 4	- KGS FS 451 (Wholesale processors) - KGS FS 551 (Retail processors)	KS D 3562, 3576, 3507, 5301, 5539 KS D 9602, 9607, 9501, 7004	
Transport tank: road/rail Note 5	KGS AC 113 (tanks for high pressure gas fixed to a vehicle)	KS D 4107, 3521, 3530 KS B 5305, 0801, 0804, 0852	

Processing facilities Note 6	- KGS FP 451 (Wholesale processors) - KGS FP 551 (Retail processors)	KS D 3541, 3586, 3706, 3711, 3583, KS B 1012, 1326	

General comment

Two Acts deal with natural gas regulations: High Pressure Gas safety Act and Consumer (Urban) Gas business Act. Although these two Acts describe regulations regarding gas industry in general and its safety in specific, the authority of more detailed regulations are left with the Gas Technical Standard Committee. The detailed regulations which were reviewed and decided by the Gas Technical Standard committee, and then approved by the Ministry of Knowledge Economy (MKE), along with two Acts, provide legal frame on regulation of natural gas.

Notes

1 In Korea, almost all the natural gas is imported in the form of LNG, and once imported, LPG is gasified and distributed through the pipeline to retail companies. Regarding the quality of gas, the Korea Gas Corporation (KOGAS) maintains natural gas supply guideline with the approval of the Ministry of Knowledge Economy (MKE), and this guidelines includes criteria for quality of gas. Although these guidelines do not directly refer to any specific national or non-national standards, it is indicated that international standards such as ISO, ASTM (American Society for Testing Materials), GPA (Gas Processors Association), NFPA (National Fire Protection Association) are used for this purpose.

ISO (International Organization for Standardization): 6976, 13686, 13443 (these standards are also referenced in Korean standards KSM ISO 6976, 13686, 13443)

- 6976: natural gas – calculation of calorific values, density, relative density and Wobbe index from composition
- 13686: natural gas – quality designation
- 13443: natural gas – standard reference condition

ASTM (American Society for Testing materials):

- D 2725: test method for hydrogen sulphide in natural gas (methylene blue method)
- D 3246: standard test method for sulphur in petroleum gas by oxidative microcoulometry

GPA (Gas Processors Association)

- 2261: analysis for natural gas and similar gaseous mixtures by gas chromatography

2. In Korea, domestic exploration covers less than 2% of domestic demand. Regarding safety of exploration and extraction facilities, the Minefield Security Act and its Petroleum Minefield Security regulation provide very general requirement without referring to any specific standards.

However, the Korea National Oil Corporation (KNOC) which operates that extraction facility enacts its own guideline which is more specific and detailed with use of international standards such as API and ASME. Regarding extraction facility, KNOC relies on insurance to hedge against the risk. The insurance company encourages KNOC to apply non-national standards in its design and maintenance by subjecting its insurance fee to adoption of such standards. The standards referred to by the KNOC regarding its facility are as follows, *inter alia*,

ASME (American Society of Mechanical Engineers)
- For example, B31.4 (Liquid petroleum transportation piping system), B31.8 (gas transmission and distribution piping system), B46.1 (surface texture), B16.21 (non-metallic gaskets for pipe flanges), PTC-10 (compressor test code), PTC-22 (gas turbine test code), etc

API (American Petroleum Institute)
- For example, 5L (line pipe), 616 (gas turbines), 650 (welded steel tanks for oil storage), etc.

ASTM (American Society for Testing and Materials)
- A351 (austenitic steel castings for high temperature service), B668 (High alloy stainless steel seamless pipe and tube)

ISO (International Organization for Standardization)
- 2314 (gas turbine acceptance testing)

NFPA (National Fire Protection Association)
- 20 (standard for the installation of centrifugal fire pumps)

3 These regulations cover safety of storage units outside the facilities. KGS AC 115 provides specific criteria to guarantee safety of LNG storage tanks, using domestic standards. However, the regulation also provides that criteria or standards which are different from those under the regulation could meet the safety requirement under certain circumstances. Those other standards are ASME (US), BS, HSE (England), DIN, AD-Merkblatt (Germany), NF, CODAP (France), JIS (Japan). That regulation also provides more detailed requirements for sub-category products, and specifically refers to several standards (BS 7777, BS EN 1473, NFPA 59A, API 620, prEn 265002, ASTM A 353, ASTM A 421) for this purpose.

Also KGS AC 111 provides that criteria or standards which are different from those under the regulation could be used and decided to meet the safety requirement under certain circumstances. Those other standards are ASME (US), BS, HSE (England), DIN, AD-Merkblatt (Germany), NF, CODAP (France), JIS (Japan).

4 The regulations cover safety of pipeline outside the facilities.

5 The regulations cover broadly regarding the safety of the processing facilities. To the extent that they are used in these facilities, pipes and storage units are also covered by these regulations.

Annex 9
Regulations and Standards in the Natural Gas Sector – Mexico

Coverage: Quality of natural gas. Equipment used in exploration, production, distribution, industrial processing

Regulatory objectives	Regulations	Standards used	International links
Quality of natural gas Note 1	NOM 001 SECRE	Following standards are imposed for test methods: ASTM: D1945, D 1142, D1826, D4468 ISO 6975, ISO 6326, ISO 6327 No other standards are imposed. A number of other standards are referenced in a bibliography without being mandatory	1. Direct citation of standards in column on left 2. A number of other standards appear in bibliographic reference: ISO 13686 for definitions and quality parameters Other standards from AGA. ASTM ISO GPA
Safety of exploration and extraction equipment Note 2	Not directly regulated by government, and therefore excluded from the next two columns. For information, a monopoly national utility, PEMEX, relies on international practice, and mainly on USA standards such as ASME, ASTM, AGA and API, listing them as Normas de Referencia.	N/A	N/A
Storage Design, construction, operation, maintenance & safety of LNG terminals. Note 3	NOM 013 SECRE 2004	NFPA-59A :2006	N/A

Pipeline Note 4	NOM 003 SECRE 2002 NOM 009 deals only with leaks	There are three Mexican NMX standards for materials listed under NOM 003: NMX-E-043-2002 NMX - W018-1995 NMX - W101 - 1995 No standards listed under NOM 009.	See Note 4. A very large number of documents are listed under 2 headings: *bibliography*, and *documentos de consulta* (relevant documents). Some of them have regulatory force, for example, ASME B31.8 and Department of Transportation DOT Part 192.
Transport Note 5	NOM 007 SECRE 1999	Direct citation of ASTM A 53 ASTM A106 ASTM A333 ASTM A381 ASTM A671 ASTM A672 ASTM A691 API 5l	Mexico has more than 15 pipelines that interconnect with USA transportation systems. Natural gas flows mainly into Mexico but from time to time Mexico exports natural gas to the USA. CRE issued a quality gas standard NOM-001-SECRE-2004, which makes gas compatible with USA pipelines. Parameters such as Wobbe index, heating value and hydrocarbon dew-point were carefully selected based on international practice. NOM-001 is enforced on Pemex as well as private transportation and distribution companies.
Processing Note 6	NOM 013 SECRE2004	This standard is based in NFPA-59A and European code BSEN-1473. A review of recent literature and current international practice resulted in several sections which were rewritten. Also, Mexican engineering practice in relevant topics was included, for example, seismic design, risk analysis, operation and maintenance, amongst others.	See note 6. Again, the *bibliography* of texts without regulatory texts is important, and the longest of any of the technical regulations in this sector in Mexico.

General notes on standards in this sector:

Mexican official standards (Normas Oficiales Mexicanas, NOM) in natural gas have been issued by CRE (Regulatory Commission for Energy) through a national natural gas committee that is coordinated by CRE. Mexican universities, research institutes, engineering professional associations, PEMEX, CFE and industry in general participate in the elaboration and revision of these NOM. International standards used as a reference in the elaboration of natural gas NOM are in fact mandatory and enforced by CRE. In Mexico, the most significant practice in relation to foreign or international standards is the frequent use of documents which have no formal regulatory force, but are cited as relevant in the text of technical regulations, with the clear implication that their use is either encouraged or recognised de facto. One complete example is given in the notes below, under Note 1; in the remaining notes, only a list appears of organisations cited in this way. Mandatory imposition of specific standards does occur, but infrequently; where it happens, it is noted.

Specific notes:

1. NOM 001 SECRE defines specifications and characteristics for natural gas transportation and distribution companies, including Pemex. Only standards in the fourth column are formally imposed: they are all direct citations of non-Mexican standards. Despite a general statement that test methods shall be based on Mexican standards (NMX) wherever these are available, in fact no specific Mexican standard is cited. Standards in the fifth column appear in a section headed simply "bibliography". That section includes the standards in column 4 here, but adds many more without any indication that they are mandatory. These additional bibliographic references are:
   AGA (American Gas Association) reports 4A and 8
   ASTM 3588
   ISO 6326
   ISO 6327
   ISO 6975
   ISO 6976
   ISO 10715
   ISO 13734
   GPA (Gas Processors Association) 2172
   GPA 2166
   GPA 2172
   GPA 1167
   GPA 2286

2. All exploration and extraction of natural gas in Mexico is undertaken by a national monopoly company called PEMEX, which is left entirely free of government control to set its own technical specifications. However, most of Pemex standards are based primarily on Mexican petroleum engineering practice as well as USA standards such as ASME, ASTM, AGA and API. Pemex has developed its entire industry based on their technical specifications and international companies participating in a variety of projects have to comply with those specifications. Those specifications cannot therefore be considered as regulations as such, and would need to be covered in a separate study of public procurement practices. They are left outside the scope of this study.

3. No regulation was identified covering storage facilities specifically. They are covered under the general heading of distribution of natural gas, which is covered by the regulations in the next row and the next note. There is no gas storage in Mexico. However, this activity is regulated by CRE and the first underground storage project is currently under development. International gas storage standards, mainly USA and European, will be used until a Mexican gas storage NOM is developed by CRE.

4. The regulation listed appears to cover what in English would be called both pipelines and piping: the former term is generally used for large-scale, bulk shipment through pipes over long distances, the latter for smaller pipes in local markets. The regulation covers various materials: notably polyethylene, copper, and steel. NOM-003 deals with the design, construction, safety, operation and maintenance of distribution systems. Both NOM-003 for distribution systems and NOM-007 for transportation systems are based primarily on ASME B31.8 technical standard.
The only standards listed for mandatory compliance are NMX Mexican standards. For example:
NMX-E-043-2002 polyethylene pipes
NMX - W018-1995 copper pipes
NMX - W101 - 1995 Idem

However, far more foreign texts are listed, and under two headings: 1) bibliography (notably in section 14.2 for LNG), and 2) as reference documents (documentas de consulta) for conformity assessment purposes (notably in Appendix IV, C.a. procedure, Table A)
Since these documents have only indirect regulatory force, they are not listed in detail, but the names of the issuing organisations are shown:
AGA American Gas Association
API American Petroleum Institute
ASME American Society of Mechanical Engineers
ASTM American Society of Testing Materials
US Department of Transportation, through the Code of Federal Regulations
NACD National Association of Corrosion Engineers (NACE)
MSS Manufacturers Standardisation Society of the valve and fittings industry
SEDIGAS Spanish Gas Technical Association

5 "Transportable" in this sense means modes of transport which are themselves mobile, and notably equipment used to transport natural gas under pressure by road and rail. The term does not include pipelines, which evidently *transport* gas in another sense. Mexico does export, from time to time, natural gas to the USA, but most importantly natural gas can flow in either direction in some pipelines; this gas is used mainly to cover for unexpected demand of users on both sides of the border. Instead, its principles for using non-Mexican texts are similar to those in the previous note, although here, there is only a bibliography, which refers to documents from

API American Petroleum Institute
ASME American Society of Mechanical Engineers
ASTM American Society of Testing Materials
US Department of Transportation, through the Code of Federal Regulations
MSS Manufacturers Standardisation Society of the valve and fittings industry
SEDIGAS

6 NOM 013 covers the design, construction and operation of LNG in regasification terminals (see para. 101, objective). NOM-013 is based mainly in NFPA-59A and European Standard BSEN-1473. Mexican Law on Standardization forbids any reference to a foreign standard within the text of a NOM. All references must be made in the bibliographic section. In the case of LNG terminals, CRE enforces NOM-013 and several other standards mentioned in the bibliography that apply not only to the terminal itself but to activities related to the delivery of LNG, for example, maneuvering of LNG ships in the port, berthing of ships, amongst others.

But this NOM offers the most comprehensive "bibliography" of relevant texts in this sector in this study. Organisations listed in the bibliography are:

NFPA National Fire Protection Association
EN European Norms [published by recognised European standards organisations CEN or CENELEC)
DNV Det Norske Veritas
Lloyd's Register
ANSI American National Standards Institute
AGA American Gas Association
API American Petroleum Institute
ASME American Society of Mechanical Engineers
ABS American Bureau of Shipping
ACI American Concrete Institute
Building Seismic Safety Council
IMO International Maritime Organisation
ISO International Standardisation Organisation
NS Norwegian Standard
ASTM American Society of Testing Materials

Annex 10
Regulations and Standards in the Natural Gas Sector – United States

Coverage: Quality of natural gas. Equipment used in exploration, production, distribution, industrial processing

Regulatory objectives	Regulations	Standards used	International links
Quality of natural gas Note 1	Not regulated.		
Exploration and extraction - onshore and offshore Note 2	Onshore facilities are state jurisdiction. Offshore are in part under DOI MMS jurisdiction and regulated by CFR 30 Part 250 - Oil and Gas and Sulphur Operation in the Outer Continental Shelf	30 CFR 250 references approx 50 standards and other documents applicable to equipment used in this field. All are developed by US SDOs, of which 3 API are identical or modified ISO: – ISO 10417, – ISO/TS 29001, – ISO 10423:2003, – ISO 10432:1999 See List under Note 2	4 API standards/recommendations identical or modified ISO
Storage Note 3	Safety standards for LNG storage systems of land-based LNG plants that liquefy and store LNG and are linked to LNG terminals: 49 CFR Part 193 – Liquefied Natural Gas (LNG) Facilities – Federal Safety Standards 49 CFR 195 – includes requirements that storage tanks (break-out tanks) of hazardous liquid pipelines must meet. As for technical regulations of the safety of above ground storage tanks, none of the EPA regulations seem to be applicable.	49 CFR 193: 1. ASME Boiler and Pressure Vessel Code, Section VIII, 1 and 2 (1998) 2. NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)" (2001 edition) 49 CFR 195: various US SDOs - Materials, construction and testing: API Spec 12F, API Standard 620, API Standard 650; for high-pressure tanks API Standard 2510 and ASME Boiler and Pressure Vessel Code Section VIII	

		- Repair, alteration or reconstruction: in addition API Standards 653 and 510 - Impoundments: NFPA 30	
Pipeline Note 4	*Natural Gas Act* and regulations 49 CFR Parts 190 – 199 there under Main regulations are in CFR 49 Part 192 - Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards 49 CFR 195 – includes requirements that storage tanks (break-out tanks) of hazardous liquid pipelines must meet Pipelines that transmit gas to shore from offshore rig at sea and are under federal jurisdiction are under the authority of DOI (MMS) and regulated by 30 CFR Part 250, Section 1002.	49 CFR 192 references approx. 30 standards and other documents of US SDOs: API, ASTM, ASME, MSS, NFPA See List under Note 4. 30 CFR 250 Section 1002 references the following standards: – ANSI/ASME B 16.5-2003. – ANSI/ASME B 31.8-2003. – API Spec. 6D, 2002 (=ISO 14313:1999, MOD) – API Spec. 17J, incl. Errata dated May 25, 2001 and Addendum 1, June 2003. – API RP 2RD – API RP 14C	30 CFR 250 Section 1002: API Spec. 6 D is ISO 14313:1999—Pipeline valves, modified
Transport tanks: road/rail Note 5	*1974 Hazardous Materials Transportation Act, amended* – 49 (CFR) Code of Federal Regulations Part 171 – 180: Requirements for tanks are in parts 178 and 179.	Parts 178 and 179 reference – US SDOs such as ASME Boiler and Pressure Vessel Code, various ASTM specifications for material, TTMA RP No. 81–97 and AAR Specifications for Tank Cars. – UNSCETDG standards	Direct reference to various UN Recommendations on the Transportation of Dangerous Goods

Equipment used in processing facilities Note 6	No applicable regulations were identified.		

Notes

CFR	Code of Federal Regulations
AAR	Association of American Railroad
ACI	American Concrete Institute
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
TTMA	Truck Trailers Manufacturers Association

1 Natural gas received and transported by pipelines must meet quality standards specified by the pipeline companies, as indicated in the terms and conditions of their tariffs. These quality standards vary from pipeline to pipeline. The Federal Energy Regulatory Commission (FERC) can, through its oversight of gas purchase arrangements and tariff practices of the interstate pipeline carriers, ask questions about quality fluctuations, but it does not set or enforce specific gas quality norms.

2 Onshore exploration and production operations – are not under federal jurisdiction.

Offshore production regulations:

Definition offshore facility - *30 CFR 250* (§250.11) defines offshore facility as any installation permanently or temporarily attached to the seabed (that includes manmade islands, and bottom-sitting structures) and any onshore installation used for oil, gas, or sulphur drilling, production, or related activities It also includes facilities for product measurement and royalty verification (e.g., LACT units, gas meters) of outer continental shelf (OCS) production located on installations that are not on the OCS.

Operators must use the best available and safest technology whenever practical on all exploration, development, and production operations. In general, compliance with **30 CFR 250,** promulgated by the Department of the Interior [Minerals Management Service (MMS)] is regarded as meeting this criteria. These regulations govern oil, gas, and sulphur exploration, development, and production operations on the Outer Continental Shelf and incorporate about 90 private sector consensus standards by reference.

Provided they are approved and provide a level of safety and environmental protection that equals or surpasses current MMS requirements, alternate procedures or equipment can be used (§ 250.141).

For equipment used in exploration and extraction of natural gas, the following are applicable sections of 30 CFR 250 and the consensus standards and recommendations incorporated by reference:

250.108 - Requirements for cranes and other material- handling equipment

1.**API RP 2D**, Recommended Practice for Operation and Maintenance of Offshore Cranes, Fifth Edition, June 2003, API Stock No. G02D05.

2.**API Spec. 2C**, Specification for Offshore Pedestal Mounted Cranes, Sixth Edition, March 2004, Effective Date: September 2004, API Stock No. G02C06.

250.415 – Drilling operations: Casing and cementing

3.**API RP 65**, Recommended Practice for Cementing Shallow Water Flow Zones in Deep Water Wells, First Edition, September 2002, API Stock No. G56001

250.442 – Drilling operations: Blowout Preventer (BOP) System Requirements

4.**API RP 53**, Recommended Practices for Blowout Prevention Equipment Systems for Drilling Wells, Third Edition, March 1997; reaffirmed September 2004, API Stock No. G53003.

250.801 - Production safety systems: Subsurface safety devices

5.**API RP 14B**, Recommended Practice for Design, Installation, Repair and Operation of Subsurface Safety Valve Systems, Fifth Edition, October 2005, **also available as ISO 10417**: 2004, (Identical) Petroleum and natural gas industries--Subsurface safety valve systems--Design, installation, operation and redress, API Stock No. GX14B05.

250.802 - Production safety systems: Design, installation, and operation of surface production-safety systems.

6.**API RP 14E**, Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems, Fifth Edition, October 1, 1991; reaffirmed June 2000, API Stock No. G07185.

7.**API RP 14H**, Recommended Practice for Maintenance, and Repair of Surface Safety Valves and Underwater Safety Valves Offshore, Fourth Edition, July 1, 1994, API Stock No. G14H04.

8.**API RP 14C**, Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms, Seventh Edition, March 2001, API Stock No. C14C07.

9.**API RP 500**, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2, Second Edition, November 1997; reaffirmed November 2002, API Stock No.C50002.

10. **API RP 505**, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2, First Edition, November 1997; reaffirmed November 2002, API Stock No. C50501.

250.803 - Design, installation, and operation of additional production systems, including pressure and fired vessels, flowlines and gas compressors

11. **ANSI/ASME Boiler and Pressure Vessel Code**, Section I, Rules for Construction of Power Boilers including Appendices 2004 Edition; July 1, 2005 Addenda, Rules for Construction of Power Boilers, by ASME Boiler and Pressure Vessel Committee Subcommittee on Power Boilers; and all Section I Interpretations Volume 55.

12. **ANSI/ASME Boiler and Pressure Vessel Code**, Section IV, Rules for Construction of Heating Boilers; including Appendices 1, 2, 3, 5, 6, and Non-mandatory Appendices B, C, D, E, F, H, I, K, L, and M, and the Rules for Construction of Heating Boilers, by ASME Boiler and Pressure Vessel Committee Subcommittee on Heating Boilers; and all Section IV Interpretations Volume 55.

13. **ANSI/ASME Boiler and Pressure Vessel Code**, Section VIII, Rules for Construction of Pressure Vessels; Divisions 1 and 2, 2004 Edition; July 1, 2005 Addenda, Divisions 1 (and 2, Rules for Construction of Pressure Vessels, by ASME Boiler and Pressure Vessel Committee Subcommittee on Pressure Vessels; and all Section VIII Interpretations Volumes 54 and 55.
14. **ANSI/ASME SPPE-1-1994 and SPPE-1d-1996 Addenda**, Quality Assurance and Certification of Safety and Pollution Prevention Equipment Used in Offshore Oil and Gas Operations.
15. **API 510**, Pressure Vessel Inspection Code
16. ANSI Z88.2-1992, American National Standard for Respiratory Protection. Service Inspection, Rating, Repair, and Alteration, Downstream Segment, Ninth Edition, June 2006, API Stock No. C51009.
17. **API RP 14F**, Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and Division 2 Locations, Fourth Edition, June 1999, API Stock No. G14F04.
18. **API RP 14FZ**, Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1 and Zone 2 Locations, First Edition, September 2001, API Stock No.G14FZ1.
19. **API RP 14G**, Recommended Practice for Fire Prevention and Control on Open Type Offshore Production Platforms, Third Edition, December 1, 1993; reaffirmed June 2000, API Stock No. G07194.

250.806 – Production safety systems: Safety and pollution prevention equipment quality assurance requirements

20. **API Spec. Q1**, Specification for Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry, ANSI/API Specification Q1, Seventh Edition, June 15, 2003; also **available as ISO/TS 29001**, Effective Date: December 15, 2003, API Stock No. GQ1007.
21. **API Spec. 6A**, Specification for Wellhead and Christmas Tree Equipment, ANSI/API Specification 6A, Nineteenth Edition, July 2004; **also available as ISO 10423:2003,** (Modified) Petroleum and natural gas industries--Drilling and production equipment--Wellhead and Christmas tree equipment, Effective Date: February 1, 2005; Errata 1, September 1, 2004, API Stock No. GX06A19.
22. **API Spec. 6AV1**, Specification for Verification Test of Wellhead Surface Safety Valves and Underwater Safety Valves for Offshore Service, First Edition, February 1, 1996; reaffirmed January 2003, API Stock No. G06AV1.
23. **API Spec. 14A**, Specification for Subsurface Safety Valve Equipment, Tenth Edition, November 2000; **also available as ISO 10432:1999,** Petroleum and natural gas industries--Downhole equipment—Subsurface safety valve equipment, Effective Date: May 15, 2001, API Stock No. GG14A10.

250.901 – Industry standards for platform and structures

24. **ACI Standard 318-95**, Building Code Requirements for Reinforced Concrete (ACI 318-95) and Commentary (ACI 318R-95).
25. **ACI 357R-84**, Guide for the Design and Construction of Fixed Offshore Concrete Structures, 1984; reapproved 1997.
26. ANSI/AISC 360-05, Specification for Structural Steel Buildings.
27. **API Bulletin 2INT-DG**, Interim Guidance for Design of Offshore Structures for Hurricane Conditions, May 2007.
28. **API Bulletin 2INT-EX**, Interim Guidance for Assessment of Existing Offshore Structures for Hurricane Conditions, May 2007.
29. API Bulletin 2INT-MET, Interim Guidance on Hurricane Conditions in the Gulf of Mexico, May 2007.
30. **API RP 2A-WSD**, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms--Working Stress Design, Twenty-first Edition, December 2000; Errata and Supplement 1, December 2002; Errata and Supplement 2, October 2005, API Stock No.G2AWSD.
31. **API RP 2FPS**, RP for Planning, Designing, and Constructing, Floating Production Systems.
32. **API RP 2RD**, Recommended Practice for Design of Risers for Floating Production Systems (FPSs) and Tension-Leg Platforms (TLPs), First Edition, June 1998; reaffirmed May 2006, API Stock No. G02RD1.
33. **API RP 2SK**, Recommended Practice for Design and Analysis of Stationkeeping Systems for Floating Structures, Third Edition, October 2005, API Stock No. G2SK03.
34. **API RP 2SM,** Recommended Practice for Design, Manufacture, Installation, and Maintenance of Synthetic Fiber Ropes for Offshore Mooring, First Edition, March 2001, API Stock No. G02SM1.
35. **API RP 2T**, Recommended Practice for Planning, Designing, and Constructing Tension Leg Platforms, Second Edition, August 1997, API Stock No. G02T02.

36. **API RP 14J**, Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities, Second Edition, May 2001, API Stock No. G14J02.
37. **ASTM Standard C 33-99a**, Standard Specification for Concrete Aggregates.
38. **ASTM Standard C 94/C 94M-99**, Standard Specification for Ready-Mixed Concrete.
39. **ASTM Standard C 150-99**, Standard Specification for Portland Cement.
40. **ASTM Standard C 330-99**, Standard Specification for Lightweight Aggregates for Structural Concrete.
41. **ASTM Standard C 595-98**, Standard Specification for Blended Hydraulic Cements.
42. **AWS D1.1:2000**, Structural Welding Code--Steel
43. **AWS D1.4-98**, Structural Welding Code--Reinforcing Steel.
44. **AWS D3.6M:1999**, Specification for Underwater Welding.
45. **NACE Standard MR0175-2003**, Item No. 21302, Standard Material Requirements, Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments.
46. **NACE Standard RP0176-2003**, Item No. 21018, Standard Recommended Practice, Corrosion Control of Steel Fixed Offshore Structures Associated with Petroleum Production.

In addition, a large number of API standards and practices are incorporated by reference in 30 CFR 250 which apply to meter systems operations, calibration and gas and oil production measurement. Cited are specific sections of **API Manual of Petroleum Measurement Standards (MPMS) Chapter 14** - Natural Gas Fluids Measurement, as well as other API MPMS Chapters.

3 Here the regulatory landscape appears more complicated. Natural gas can be stored underground or aboveground, and storage can occur at various points of downstream gas processing and transportation. Moreover, jurisdictional boundaries are not always clear.

Natural gas is often stored in underground in large storage reservoirs, such as depleted gas reservoirs, aquifers, and salt caverns. In addition to underground storage, natural gas can be stored as liquefied natural gas (LNG).

No regulation was identified for the underground storage modes mentioned.

The Pipeline and Hazardous Materials Safety Administration (PHMSA) of the Department of Transportation promulgates and enforces safety regulations for the transportation and storage of LNG under the **Pipeline Safety Law (49 U.S.C. Chapter 601).** Its authority includes the design, installation and construction of LNG facilities. LNG facility is defined broadly: it means a pipeline facility that is used for liquefying natural gas or synthetic gas or transferring, *storing,* or vaporizing liquefied natural gas (49CFR193.2007 - Sec. 193.2007). Consequently the design, construction and installation of LNG storage tanks (on-shore LNG terminal storage systems) must comply with relevant safety standards contained in **Title 49 CFR Part 193—Liquefied Natural Gas Facilities – Federal Safety Standards**. The regulations do not apply however to LNG storage systems used by the ultimate consumer of LNG.
The main relevant standards referenced here are:

– ASME Boiler and Pressure Vessel Code, Section VIII, Divisions 1 and 2
– ANSI/NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)

Where pipelines transport carbon dioxide or other hazardous liquids of the petroleum industry - for example from naturally occurring underground reservoirs, natural gas processing facilities, ammonia manufacturing plants, or coal gasification plants - safety requirements included in **49 CFR 195 – Transportation of Hazardous Liquids by Pipeline** under the Hazardous Liquid Pipeline Act of 1979 as amended, apply to so-called *breakout tank*s, i.e.

aboveground tanks designated to be used to relieve surges in the pipeline system or to receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline.

- Tanks must be designed, constructed and tested following either API Spec 12F, API Standard 620 or API Standard 650; for high-pressure tanks typically used by carbon dioxide, API Standard 2510 is referenced and the ASME Boiler and Pressure Vessel Code Section VIII Divisions 1 and 2 apply.
- For tank repairs, alteration or reconstruction, API Standards 653 and 510 are additional requirements.
- Impoundments protecting against spillage and tank failure must meet various sections of NFPA 30
- Certain recommended practices of API are also referenced, e.g. for inspection and corrosion control.

Most of these standards were adopted in the late 1990s, when DOT decided to upgrade the regulations for breakout tanks to the level of industry standards that had evolved and were applied to steel petroleum tanks at tank farms and refineries throughout the United States. Before then 49 CFR 195 addressed safety-related aspects of these tanks in much more general terms.

The potential environmental hazards that tanks can pose fall under regulations issued by the Environmental Protection Agency (EPA). However, no EPA regulations of a technical nature that would fall under the scope of this study could be identified.

Note that States and local authorities are responsible for the protection of public health, the environment, and natural resources from releases and fire safety hazards associated with *aboveground and underground gas storage tanks used for marketing or distribution* of already processed gas and oil. They approve and certify such storage tank systems and normally adopt by reference the standards of the National Fire Protection Association (NFPA) into their regulations.

4 Onshore gas transmission pipelines under federal jurisdiction are regulated by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Offshore pipelines are administered by the Minerals Management Service (MMS) of DOI.

PHMSA' regulations address safety issues of the entire life cycle of pipelines. The main applicable regulations are found at 49 CFR Part 192— "Transportation of Natural Gas and Other Gas by Pipeline: Minimum Safety Standards". Documents incorporated by reference in 49 CFR Part 192 are consensus standards and practices that address govern materials, construction, operating and safety practices for gathering, transmission and distribution pipelines, compressor stations, measurement & regulation stations and ancillary facilities.

The regulations set minimum safety requirements for pipelines, either defining or referencing design standards that set pressure, temperature and wall thickness limitations for steel and plastic pipelines. Part 192 incorporates by reference approx 25 procedures, test methods recommended practices and specifications developed by American Gas Association (AGA), American Petroleum Institute (API), American Society of Testing Materials (ASTM), American Society of Mechanical Engineers (ASME), National Fire Protection Association (NFPA) and American National Standards Institute (ANSI). Part 192 Appendix "Qualification of Pipe" cites an additional 10 API and ASTM specifications for pipe used in natural gas transmission applications.

Almost all of the states invoke the federal safety standards found in CFR 49, for intrastate pipeline transmission as well. Typically, state law incorporates by reference Part 192. Some states have additional requirements.

Relevant standards and specifications referenced in Part 192 are:

American Petroleum Institute (API):
1.API Specification 5L ``Specification for Line Pipe (41st edition, 1995).
2.API Specification 6D ``Specification for Pipeline Valves (Gate, Plug, Ball, and Check Valves)" (21st edition, 1994).

American Society for Testing and Materials (ASTM):
1.ASTM Designation: A 53 ``Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless" (A53-96).
2.ASTM Designation A 106 ``Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (A106-95).
3.ASTM Designation: A 333/A 333M ``Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service" (A 333/A 333M-94).
4.ASTM Designation: A 372/A 372M ``Standard Specification for Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessels" (A 372/A 372M-95).
5.ASTM Designation: A 381 ``Standard Specification for Metal-Arc-Welded Steel Pipe for Use With High-Pressure Transmission Systems (A 381-93).
6.ASTM Designation: A 671 ``Standard Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures" (A 671-94).
7.ASTM Designation: A 672 ``Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures" (A 672-94).
8.ASTM Designation A 691 ``Standard Specification for Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High- Pressure Service at High Temperatures" (A 691-93).
9.ASTM Designation D638 ``Standard Test Method for Tensile Properties of Plastics" (D638-96).
10. ASTM Designation D2513 ``Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings" (D 2513-87 edition for Sec. 192.63(a)(1), otherwise D 2513-96a).
11. ASTM Designation D 2517 ``Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings" (D 2517-94).
12. ASTM Designation: F1055 ``Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing" (F1055-95).

The American Society of Mechanical Engineers (ASME):
1.ASME/ANSI B16.1 ``Cast Iron Pipe Flanges and Flanged Fittings" (1989).
2.ASME/ANSI B16.5 ``Pipe Flanges and Flanged Fittings" (1988 with October 1988 Errata and ASME/ANSI B16.5a-1992 Addenda).
3.ASME/ANSI B31G ``Manual for Determining the Remaining Strength of Corroded Pipelines" (1991).
4.ASME/ANSI B31.8 ``Gas Transmission and Distribution Piping Systems" (1995).
5.ASME Boiler and Pressure Vessel Code, Section I ``Power Boilers" (1995 edition with 1995 Addenda).
6.ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 “Pressure Vessels" (1995 edition with 1995 Addenda).
7.ASME Boiler and Pressure Vessel Code, Section VIII, Division 2 “Pressure Vessels: Alternative Rules" (1995 edition with 1995 Addenda).
8.ASME Boiler and Pressure Vessel Code, Section IX ``Welding and Brazing Qualifications" (1995 edition with 1995 Addenda).

Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
1.MSS SP44-96 ``Steel Pipe Line Flanges" (1996).

National Fire Protection Association (NFPA):
1.NFPA 30 ``Flammable and Combustible Liquids Code" (1996).
2.ANSI/NFPA 58 ``Standard for the Storage and Handling of Liquefied Petroleum Gases" (1995).
3.ANSI/NFPA 59 ``Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants" (1995).
4.ANSI/NFPA 70 ``National Electrical Code" (1996).

Qualification of Pipe (Appendix B to Part 192) - Listed Pipe Specifications

1.API 5L--Steel pipe (1995).
2.ASTM A 53--Steel pipe (1995a).
3.ASTM A 106--Steel pipe (1994a).
4.ASTM A 333/A 333M--Steel pipe (1994).
5.ASTM A 381--Steel pipe (1993).
6.ASTM A 671--Steel pipe (1994).
7.ASTM A 672--Steel pipe (1994).
8.ASTM A 691--Steel pipe (1993).
9.ASTM D 2513--Thermoplastic pipe and tubing (1995c).
10. ASTM D 2517--Thermosetting plastic pipe and tubing (1994).

For offshore pipelines, applicable regulations under the DOI MMS Offshore program can be found in Subpart J of Subpart 250 of Title 30, Chapter II Subchapter B (Offshore). More specifically, **30 CFR Part 250 Section 1002 - Design requirements for DOI pipelines -** references the following documents:

1. ANSI/ASME B 16.5-2003, Pipe Flanges and Flanged Fittings.
2. ANSI/ASME B 31.8-2003, Gas Transmission and Distribution Piping Systems.
3. API Spec. 6D, Specification for Pipeline Valves, Twenty-second Edition, January 2002; also available as **ISO 14313:1999, MOD, Petroleum and natural gas industries--Pipeline transportation systems—Pipeline valves**, Effective Date: July 1, 2002, Proposed National Adoption, includes Annex F, March 1, 2005, API Stock No. G06D22.
4. API Spec. 17J, Specification for Unbonded Flexible Pipe, Second Edition, November 1999; Errata dated May 25, 2001; Addendum 1, June 2003, Effective Date: December 2002, API Stock No. G17J02.
5. API RP 2RD, Recommended Practice for Design of Risers for Floating Production Systems (FPSs) and Tension-Leg Platforms (TLPs), First Edition, June 1998; reaffirmed May 2006, API Stock No. G02RD1.
6. API RP 14C, Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms, Seventh Edition, March 2001, API Stock No. C14C07.

Collaboration at regional level with Canada and Mexico includes:

- An ongoing active US-Canada process - currently at the fact finding stage - of documenting similarities and differences in their standards (CSA and US national standards) with the goal of bilateral harmonisation. The United States and Mexico have been engaging in similar activity.
- In view of the growing number of cross border pipelines being built, PHMSA and its Canadian counterpart, the National Energy Board, have signed an Arrangement to coordinate and cooperate more closely on pipeline safety issues. Activities include joint inspections of trans-boundary pipeline operations, joint technical analyses, and sharing of accident and enforcement data. PHMSA is working with its counterparts in Canada and Mexico to prepare consistent guidelines for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving a hazardous material.

5 Federal hazardous materials transportation law 49 U.S.C. § 5101 is the basic statute and the **Hazardous Materials Regulations (HMR) 49 CFR Parts 171-180** of the Department of Transportation (Pipeline and Hazardous Materials Safety Administration - PHMSA) are the applicable regulations for the safety of the transportation of natural gas in liquid or compressed form by cargo railcar and motor vehicle. The regulations cover interstate, intrastate and cross-border commerce.

Compressed and liquefied natural gas is a hazardous material classified as belonging to *Hazard Class 2*. When compressed, natural gas (CNG) is an odorless, tasteless and nontoxic mixture of flammable hydrocarbon gases and vapors consisting primarily of methane, weighing two-thirds the weight of air. CNG is stored on board of motor and railroad vehicles in high-pressure tanks that must meet very rigorous safety standards. Natural gas to be transported in the form of liquefied natural gas (LNG) must be cooled to –260 degrees Fahrenheit. In order to keep the LNG cold, LNG is stored on-board of vehicles in thermal storage tanks.

49 CFR Parts 171, 173, 174, 175, 176 and 177 contain operational rules. Requirements that tanks and other types of 'packaging' must meet in order to be authorized for use with specific kinds of classified hazardous materials and substances consist of a mixture of DOT design specifications and referenced consensus standards and are provided by Parts 173, 178, 179 and 180.

Manufacturers of containers are primarily concerned by **49 CFR Part 178,** which contains specifications for types of containers that the HMR authorize for cargo gas transportation by highway and rail. **Part 179** specifications apply to tank cars.

For design, material and other characteristics of cargo tanks transporting natural gas in compressed or liquefied form aboard motor vehicles, applicable are notably:

Part 178 Subpart J - Specifications for containers for motor vehicle transportation, which reference:

- ASME Boiler and Pressure Vessel Code, Section VIII and/or requirements of ASTM
- If insulated: Section II of the ASME Code and ASTM Specifications : A 242, A 441, A 514, A 572, A 588, A 606, A 633, A 715, A 1008/A 1008M, A 1011/A 1011M.

Part 178.345 sets additional requirements for design, construction etc that cargo tank motor vehicles must conform to, referencing**:**

- Section II of the ASME Code with exceptions: steels can also be used for cargo tanks that meet ASTM A 569, ASTM A 570, ASTM A 572, ASTM A 622, ASTM A 656, ASTM A 715, ASTM A 1008/ A 1008M, ASTM A 1011/A 1011M; or aluminium alloys that meet ASTM B–209 Alloy 5052, ASTM B–209 Alloy 5086, ASTM B–209 Alloy 5154, ASTM B–209 Alloy 5254, ASTM B–209 Alloy 5454, ASTM B–209 Alloy 5652.
- Truck Trailers Manufacturers Association (TTMA) RP No. 81–97 Performance of Spring Loaded Pressure Relief Valves on MC 306, MC 307, MC 312, DOT 406, DOT 407, and DOT 412 Tanks

For LNG transported in cryogenic tankers by road or rail wagons, **applicable parts are 49 CFR § 173.31 (Use of tank cars) and Part 179 Subpart F** (Specification for Cryogenic Liquid Tank Car Tanks and Seamless Steel Tanks) apply and reference the following standards:

- Section VIII of the ASME Boiler and Pressure Vessel Code
- ASTM A 240/A 240M – Standard specification for heat-resisting chromium and chromium –nickel stainless steel plate, sheet and strip for pressure vessels
- Association of American Railroad (AAR) Specifications for Tank Cars

Global links:

In 1990 amendments aligned the HMR with UN Recommendations on the Transport of Dangerous Good in the areas of classification, packaging, and hazard communication. International packaging standards (performance-based ,and covering materials, construction and maximum capacity) developed by the UN Committee of Experts on the Transport of Dangerous Goods (UNCETDG) replaced the DOT specification system used for container selection for certain types of shipments in Part 178. However, use of UN standard packaging has some conditions attached, namely certain additional US requirements, such as thermal resistance and flame penetration resistance tests, must be met. Moreover, their import and use is subject to the competent authority of the country of manufacture providing reciprocal treatment for UN standard packaging manufactured in the U.S.

PHMSA dedicates a page of its website to information about international standards and related activities: http://www.phmsa.dot.gov/hazmat/regs/international. PHMSA's Office of International Standards recently published an *International Strategic Plan* describing PHMSA's mission and activities, in a global context, related to prevention and mitigation of hazardous materials releases in transportation. Explicit mention is made of PHMSA's involvement in and society's benefits derived from promoting the adoption of international transportation safety and security standards and regulations consistent with the standards in the US Hazardous Materials Regulations, and promoting consistency between international standards and these Regulations. (http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/intl_strat_plan_lo_res.pdf)

Regional coordination activities:

There is a reciprocity provision with respect to Transport Canada's Transportation of Dangerous Goods Regulations (Transport Canada TDG Regulations, which allows a hazardous material that is classed, marked, labeled, placarded, described on a shipping paper, and packaged in accordance with the TDG Regulations issued by the Government of Canada to offered for transportation and transported to or through the United States by motor vehicle or rail car (CFR Part 171).
North American Free Trade Agreement (NAFTA) Land Transportation Standards Sub-Committee (LTSS), Hazardous Materials Land Transportation Standards Working Group (LTSS Group 5): The NAFTA LTSS Group 5 is responsible for implementing a work program for making compatible the relevant hazardous materials standards within the United States, Canada and Mexico using as their basis the UN Recommendations on the Transport of Dangerous Goods.

6 No applicable regulations were identified.

Annex 11
Regulations and Standards for ICT/Telephony - Canada (2 Tables)

Table I - Coverage: fixed-wire telephone sets, base units of cordless telephones (not handsets)

Regulatory objective	Federal Regulations	Standards used	International links
Safety Note 1	Regulated at provincial and territorial level.	For phones that connect to public network, and chargers of mobile phones: CSA C22.2 Canadian Electrical Code Part 2	Certain CSA C22.2 standards are reported to be harmonised with US and Mexican standards
EMF Note 2	N/A	N/A	N/A
EMC Note 3	Telecommunications Act, 1993, section 69.4 *Telecommunications Apparatus Regulations* (SOR/2001-532 6 December, 2001) For telephones connected to PSTN, and base units of cordless phones: *Industry Canada CS-03 Part I and Part VIII* (xDSL technology)	CS-03: Neither CS-03 Part I nor Part VIII references independent standards.	CS-03 Parts I + VIII aligned with TIA 968 used in FCC Part 68. Also, Part VIII is reported to be based on G Series ITU-T / Study Group 15, G991.1 Question 4).
Interoperability Note 4	Not regulated	N/A	N/A
Energy efficiency Note 5	Cordless telephones may be future target in an existing programme regulating standby power consumption (1W in passive mode)	These regulations reference test method CAN/CSA-C62301-07	CAN/CSA-C62301-07 is identical to CEI/IEC-62301*:* Household Electrical Appliances - Measurement of Standby Power

Waste management Note 6	General product substance content controls for PBDE and mercury are under consideration.	N/A	N/A
Accessibility - Hearing aid compatibility(HAC) Note 7	For fixed-wire telephone sets: *CS-03 Part V: Requirements and Test Methods for Magnetic Output from Handset Telephones for Hearing Aid Coupling and for Receive Volume Control* (amended in 2009)	CS-03 Part V – is derived from CSA Standard CAN/CSA-T515-97: Telecommunications – Telephone Terminal Equipment – Acoustic and Magnetic Field Requirements for Handset Telephones for Use by the Hard of Hearing – references IEEE Specification 1027, Section 5. Receive volume control evaluation: For analogue telephones: – ANSI/EIA/TIA-470-B-1998 – ANSI/TIA-470.110-C – IEEE 269-2002 (measurement methodology). – IEEE 661-1998 (OLR determination). For digital and IP-based telephone sets: – ANSI/EIA/TIA-579-1998 – TIA-810-B – IEEE 269-2002 (measurement methodology). – IEEE 661-1998 (OLR determination).	Can/CSA-T515-97 is aligned with US standard EIA RS-504 used in FCC Part 68. Direct reference. See previous column. Direct reference. See previous column,

Notes

PSTN	Public Switched Telephone Network
DECT	Digital Enhanced Cordless Telecommunications
CS	Compliance specification
RSSR	Radio Standards Specification

Cordless telephones are telephone sets consisting of a base unit which is connected to the PSTN, and a portable handset. Different regulations apply to base unit and handset, respectively. Communication between the base unit and the handset is achieved by means of low-power RF transceivers. *Mobile cellular* telephones and personal communications services (PCS) handsets are not classified as cordless telephones.

1 The **Canadian Electrical Code (CEC),** or **CSA C22,** is published by the Canadian Standards Association. CEC has been developed by a large body of representatives from industry and various levels of government and serves as the basis for regulations across the country. Legislation at the provincial and territorial level has adopted the Code by reference in province-specific code books, often with amendments for local conditions. These amendments may be administrative in nature or have technical content. The Code has three parts. Of interest here is mainly Part II (CSA C22.2), which consists of a series of standards for the evaluation of electrical equipment or installations. [Part I (CSA.1) is the safety standard for electrical installations; it requires that electrical products be approved to a Part II standard. Part III group of standards addresses power distribution and transmission circuits]

CEC prescribes wiring methods that are acceptable as the minimum. The 2009 edition of the Code recognises that other methods can be used to assure safe installations, but these methods must be acceptable to the authority enforcing the Code in a particular jurisdiction.

Technical requirements of CEC are very similar to those of the US National Electrical Code. Specific differences exist so that installations acceptable under one Code may not entirely comply with the other. Correlation of technical requirements between the two Codes is ongoing, and several CEC Part II electrical equipment standards have been harmonized with standards in the USA and Mexico through the Council for the Harmonisation of Electromechanical Standards of the Nations of the Americas (CANENA). CANENA's mandate is to harmonise electrical codes in the western hemisphere.

2 EMF regulation does not apply to fixed-line telephone sets and the base of cordless handsets.

3 The **Telecommunications Act** and the **Telecommunications Apparatus Regulations** ensure that the electrical energy transmitted by the terminal equipment does not harm the carrier's equipment, is not hazardous to the carrier's personnel, and does not degrade the service quality of other users. They also ensure that hearing impaired persons can obtain terminal equipment that will provide them with reasonable access to telecommunications networks. The applicable technical specifications are set out in the document entitled *Terminal Equipment — Technical Specifications List*, as amended from time to time, published by the Department of Industry. The Technical Specifications List refers to **CS-03 – Compliance Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility**.

CS-03 sets minimum technical requirements for protecting the network.

Part I: specifies requirements for analogue terminal equipment connected to public switched network. Applies also to base unit of wireless sets.
Part II: specifies requirements for digital terminal equipment connected to 1.544 Mbps (DS-1) digital facilities (DS-1, equivalent to E-1 in Europe)
Part III: specifies acceptable methods of connection for terminal equipment
Part IV: glossary of terms
Part V:specifies the requirements for magnetic output from handset phones for the purpose of coupling with hearing aids, to ensure compatibility.
Part VI: specifies requirements for Integrated Services Digital Network (ISDN) terminal equipment
Part VII: specifies requirements for limited distance modem terminal equipment and digital subrate terminal equipment
Part VIII: specifies requirements for a range of Digital Subscriber Line (xDSL) terminal equipment (eg ADSL modems)

At a minimum, an ordinary desktop telephone has to comply with **Parts I and V of CS-03**. For *cordless* telephones, the base unit has to meet Part I requirements (Requirements for Terminal Equipment and Related Access Arrangements Intended for Direct Connection to Analogue Wireline Facilities),

and the handset has to meet Part V requirements (see Note 3b). Since the handset is a radio device, it also has to meet either RSS-210 or RSS-213 (if DECT technology).

The Telecommunications Act is implemented by the **Telecommunication Apparatus Regulations**. CS-03 was developed and is being maintained by the *Terminal Attachment Program Advisory Committee (TAPAC)*, a forum chaired by Industry Canada, where interested parties (carriers, manufacturers, users) discuss technical and administrative requirements. TAPAC develops recommendation in regard to the Department of Industry technical requirements and procedures for the attachment of terminal equipment to the facilities of telecommunications service providers. TAPAC's recommendations are based on consensus. It also identifies needs for standards and refers them to Standard Writing Organizations as appropriate.

To ensure that Canadian and US terminal attachment requirements are aligned, TAPAC works closely with the Telecommunications Industry Association (TIA) TR-41 and maintains links with the Administrative Council for Terminal Attachments (ACTA) in the United States. Committee TR-41 addresses voluntary standards for telecommunications terminal equipment and systems, specifically those used for voice service, integrated voice and data service and Internet protocol (IP) applications. The work involves developing performance and interface criteria for equipment, systems and private networks, as well as the information necessary to ensure their proper interworking with each other, with public networks, with IP telephony infrastructures and with carrier-provided private-line services.

4 Interoperability is not regulated.

5 Starting in late 2008, standby power regulations setting minimum energy performance for equipment while in standby mode have been introduced, covering to date various categories of consumer electronics.

These regulations reference Standards *CAN/CSA-C62301-07*, which is harmonised with test method CEI/IEC-62301: *Household Electrical Appliances - Measurement of Standby Power*. The Standby Power Advisory Committee co-chaired by Natural Resources Canada, and the ElectroFederation of Canada advises government on activities related to standby power. Minimum performance standards for standby power use for some consumer products have already been set, and will be implemented in two stages. (see http://www.ecoaction.gc.ca/news-nouvelles/20070723-2-eng.cfm). The first standards requiring standby limits cover such electronics as televisions, video products and printers. More stringent standards will follow in 2010.

The standby limits are equivalent to California's existing standby levels for the near term Tier 1 levels and harmonisation with Europe's 2011 levels for Tier 2 levels (also taking effect in 2011) is envisaged.

Secondary sources indicate that cordless telephones are among the items to be regulated starting in 2010.

6 Canada is in the process of considering general product substance content controls for Polybrominated diphenyl ethers (PBDE) and mercury under the federal risk management strategies established for these substances. The risk management strategies for these substances can be found at http://www.ec.gc.ca/Toxics/docs/substances/PBDE/rrms/en/intro.cfm and http://www.ec.gc.ca/CEPARegistry/documents/part/Merc_RMS/Merc_RMS.cfm, respectively.

7 **CS-03 Part V: Requirements and Test Methods for Magnetic Output from Handset Telephones for Hearing Aid Coupling and for Receive Volume Control** was amended in 2009 to apply also to digital telephones that do not connect to the PSTN.

Procedures for calibration of the probe coil are those of the Institute of Electrical and Electronics Engineers' (IEEE) Specification 1027 (IEEE standard method for measurement of the magnetic field in the vicinity of a telephone receiver), Section 5.0.

Hearing aid regulation is reported to have been harmonised between Canada, the United States and Mexico under provisions of NAFTA for harmonisation of technical regulation

Canada: Table II

Table II – Coverage: Handsets of cordless telephones, mobile wireless telephones (including with personal digital assistance (PDA) capabilities), storage batteries (electric accumulators) for use with mobile telephones

Regulatory objective	Federal Regulations	Standards used	International links
Safety Note 1	Regulated at provincial and territorial level.	CSA 22.2. - Canadian Electrical Code (CEC), Part 2	Harmonisation of CSA C22.2 standards with US and Mexican standards ongoing in CANENA.
EMF Note 2	*Radiocommunication Regulations (SOR/96-484)* under the Radiocommunications Act. *RSS-102* Issue 2 November 2005: Radio Frequency Exposure Compliance of Radio Communication Equipment Apparatus (all frequency bands)	For SAR and RF exposure limits, RSS-102 references **Safety Code 6** - Limits of Exposure to Radiofrequency Fields at Frequencies from 3 kHz-300 GHz. [SC 6 itself references **IEEE C95.1 Standard** for Safety Levels with Respect to Human Exposure to Radio Frequency Fields, 3 kHz to 300 GHz] References as measurement methods a) for SAR evaluation: **IEEE 1528** and **IEC 62209**; b) for RF exposure test **IEEE C95.3**	RSS-102 measurement methods: Direct reference. See previous column.

EMC Note 3	*Radiocommunication Regulations* (SOR/96-484) for all RF-using handsets: *RSS-Gen, Issue 2, 2007*: General Requirements and Information for the Certification of Radiocommunication Equipment –	<u>RSS-Gen, Issue 2, 2007</u>: for measurement of RF signals and noise emission **ANSI C63.4**: Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.; and **IEC/CISPR 16:** Specification for radio disturbance and immunity measuring apparatus and methods.	RSS-Gen: Direct reference. See previous column.
	<u>for cordless phone handsets (radio portion)</u>: *RSS-210*, Low Power Licence-Exempt Radiocommunication Devices (all frequency band) Category I Equipment - sets out technical standards for the certification of wireless low power devices	<u>RSS-210</u> is reported to be very similar to US EMC standard Title 47 CFR 15 Subpart C . Makes no reference to independent standards.	
	<u>if cordless telephone is a DECT type technology</u>: RSS-213		
	<u>For cellular telephones</u>: *RSS-128*-800 MHz Dual Mode TDMA Cellular Telephones, Issue 2, Revision 1, November 6, 1999		
	RSS-129 - 800 MHz Dual-Mode CDMA Cellular Telephones, Issue 2, September 25, 1999		
	RSS-132 – 800 MHz Cellular Telephones Employing New Technologies, Issue 2, September 2005	<u>RSSs 128,129,132,133</u> incorporate specifications directly. No independent standards are referenced.	
	RSS-133 – 2 GHz Personal Communications Services, Issue 5, February 2009		
	<u>if telephone is digital</u>**:** *Interference-Causing Equipment Standard ICES-003, Issue 4***,** for conducted emission and radiated emissions	<u>ICES-003, Issue 4</u> references **CAN/CSA-CISPR 22-02** (CISPR 22 with modification). It is virtually	ICES-003: direct reference. See previous column.

		identical to US EMC standard Title 47 CFR 15 Subpart B	
Radio spectrum frequencies: allocations Note 4	Spectrum policy is service and not technology-focused. The domestic allocation of the spectrum resource is contained in the *Canadian Table of Frequency Allocations.*	ITU Radio Regulations Article 5, Resolutions 212, 222, 225	Direct reference. See previous column.
Radio spectrum management (no harmful interference for essential services and efficiency of spectrum use)– **wireless communication** Note 5	For cellular phones: Radio Communication Regulations For cellular phones (cordless phones are not covered): Standards Radio System Plans (SRSP) state the minimum technical requirements for efficient spectrum utilisation of frequency bands: *SRSP-503* – Technical Requirements for Cellular Radiotelephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz, Issue 7, September 2008 *SRSP-509* – Technical Requirements for Narrowband Personal Communications Services in the Bands 901-901 MHz, 930-931 MHz and 940-941 MHz, Issue 1, August 24, 1996 *SRSP-510* – Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz, Issue 5, February 2009. *SRSP-513* – Technical Requirements for Advanced Wireless Services in the Bands 1710-1755 MHz and 2110-2155 MHz, Issue 2, February 2009.	SRSPs themselves do not reference equipment standards.	
Waste management Note 6	General product substance content controls for PBDE and mercury are under consideration.	N/A	N/A
Interoperability Note 7	Not regulated.	N/A	N/A

Other: Accessibility – Hearing aid compatibility (HAC) Note 8	For mobile telephones HAC is not regulated.	N/A	N/A

Notes

DECT Digital Enhanced Cordless Telecommunications

CS Compliance specification
RSP Radio Standards Procedure
RSS Radio Standards Specification: is a part of the regulatory framework used to manage the radio frequency spectrum which applies specifically to equipment.
SP Spectrum Utilization Policy: allocate frequency bands to use or application of radiocommunications for services
SRSP Standard Radio System Plan**:** outlines the minimum technical requirements for efficient spectrum utilisation of frequency bands.

Use of devices that emit radiofrequency fields (RF) is regulated by Industry Canada under the *Radiocommunication Act.* The requirement to obtain a radio licence depends upon the type of radio equipment being used, i.e. the frequency band in which the equipment is designed to operate and the operating power. Wireless low-power radio devices, such as cordless telephones, are classified as Cat. I equipment and exempt from requirement of radio licence, but a technical acceptance certificate (TAC) issued by the Certification and Engineering Bureau of Industry Canada, or a certification issues by a recognised Certification Body, is required.

1 Not regulated at the Federal level.

2 **Radio Standards Specification 102, *Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands*), *Issue 2, 2005***, sets out the requirements and measurement techniques used to evaluate radio frequency (RF) exposure compliance of radiocommunication apparatus designed to be used within the vicinity of the human body. The exposure standard for mobile phones employs the Specific Absorption Rate (SAR) as unit of measurement. The SAR limit set by the Industry Canada is 1.6 W/kg.

IEEE 1528 - Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
IEEE C95.3 - Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz.
IEC 62209 - Procedure to Determine the Specific Absorption Rate (SAR) for Hand-held Mobile Telephones in the Frequency Range of 300 MHz to 3 GHz.

RSS-102 requires furthermore that radio apparatus be operated in a manner which complies with **Health Canada's Safety Code 6 (SC6), 1999 - *Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz***. The Safety Code 6 sets out safety requirements for the installation and use of radiofrequency (RF) and microwave devices that operate in the frequency range from 3 kHz to 300 GHz. The objective of the Code is to establish guidelines for limiting RF and microwave exposure. It specifies maximum levels and durations of exposure to RF fields of frequencies between 3 kHz and 300 GHz in order to prevent human health effects, and specifies maximum allowable RF contact and induced body currents to prevent the physical perception of RF fields to the general public and RF shock or burns to RF and microwave exposed workers.The Code does not describe techniques for product performance evaluation. The Code has no independent legal status. It is given the force of law through incorporation-by-reference into other laws.

Relevant changes made in the latest version of SC6 (1999):

- *Cellular telephones* were exempt from the 1991 version of SC6, but after scientific data indicated that such phones can produce exposures in excess of the specific absorption rate limits set by the Code the exemption clause was removed in the 1999 edition of the Code.
- Time averaging: the new limits bring the maximum allowed level at 300 000 MHz (wavelength 1 mm) into agreement with that specified in the ANSI laser standard at the same frequency in accordance with CENELEC.
- Peak field strength limit: Additional clauses with respect to pulsed RF fields, similar to the human exposure standards in IEEE Std C95.1-1991 – 1999 Edition, have been added in Appendix III in the latest version of the Code.

Safety Code 6 limits for the electric field are described to be similar but not identical to the limits set in the 1997 FCC regulations.

3 EMC requirements in Canada are regulated by the *Radiocommunication Regulations*. For Digital Apparatus (ICES-003), the latest issue incorporates by reference **CAN/CSA-CISPR22-96** as the mandatory standard for compliance testing. **CAN/CSA-CISPR22-96 adopts with modification CISP 22:1997 (third edition).** In the previous Issue 3 of ICES-003, compliance could also be demonstrated by using CSA C108.8-M1983, but CSA abolished C108.8 in 2003 (The limits in C108.8 were equivalent to the limits given in Part 15 of the FCC. It has been the policy of Industry Canada has indicated to continue to accept FCC-15 compliance towards compliance with ICES-003, i.e. if a supplier has FCC approval (either by meeting the limits set out in Part 15 or in the version of CISP 22 referenced in Part 15), the equipment needs not be retested (EMCAB-3, Issue 4, December 2005)
Cordless telephones and other wireless low power devices operate on a "non-interference non-protection" basis: they may not cause radio interference, and they cannot claim protection from interference to which they may be subjected. Interference to these wireless low power devices may cause them to malfunction or fail.

Radio spectrum protection – Of the 3 series of **Radio Standards Specifications (RSSs)**, the **100 series** applies to all radio equipment which needs a licence and certification and is applicable to cellular telephones, and the **200 series** applies to radio equipment that needs certification but is licence exempt and is applicable to cordless phones. Series 100 and 200 equipment must comply with RSS 102. All Industry Canada Radio Standards Specifications (RSS) are to be used in conjunction with RSS-GEN. The **300 series** applies to all radio equipment for which a licence or certification is not required and is applicable to GPS receivers, underground radios, cable locating equipment etc.

RSSs 128, 129, 132 and 133 set certification requirements for transmitters and receivers used in various kinds of radio communications systems operating in specified bands. For example, RSS 128 sets out the minimum requirements for the certification (type-approval) of transmitters and receivers for the dual-mode (analog and digital TDMA) cellular telephone system in the 824-849 MHz and 869-894 MHz paired bands.

Radio Standards Specification 210 (RSS-210), Low Power Licence-Exempt Radiocommunication Devices, sets out technical standards for the certification of wireless low power devices, as well as criteria and standards for certification exemption. It is reported that RSS 210 is aligned with the US EMC standard (Title 47 CFR 15 Subpart C) on permitted frequencies, types of operation, and other technical requirements.

4 Canadian spectrum allocations are consistent, with a few exceptions, with the International Table of Frequency Allocations contained in ITU Radio Regulations, Article 5. The domestic allocation of the spectrum resource is contained in the *Canadian Table of Frequency Allocations*. Applicable parts of the Table contain references to ITU Resolutions 212, 222 and 225. Spectrum allocation and changes of allocation are subject to public consultations. New allocation policies are made public through the **Spectrum Utilization Policy (SP)** documents. From time to time the Canadian Table of Frequency Allocations is updated and includes these decisions.

Following **Art. 5 of ITU Radio Regulations**, the Canadian Table defines 3 categories of services – primary, permitted and secondary services. The general condition that applies between services is that a service of a lower category is prohibited from either causing harmful interference to, or claiming protection from harmful interference from, a service in a higher category.

The mobile radiocommunications service comprises several uses of applications, such as cellular, mobile trunked and mobile paging. The more precise use or application of radiocommunications for services in a frequency band is set forth in the SPs. The Policies are based on many factors defined by technology, service needs and the need to achieve more efficient, effective and economic use of the spectrum which enables the development of more specific radiocommunication applications. One objective is the provision of adequate spectrum to match radiocommunications demand. This is often achieved when similar uses are designated in common bands. As a principle, Industry Canada develops spectrum utilisation policies based on type of use of the spectrum and not by type of user: spectrum is allocated to a particular service, e.g. mobile, and within this allocation, particular applications will be designated or permitted, such as cellular telephony. There are no standards prescribing specific technology for an application.

5 **The Spectrum Utilization Policies (SP)** and **Radio Systems Policies (RP*)*** provide the general policy guidance on spectrum resources and radio system applications for the orderly development of particular radiocommunications services.

SRSP documents detail technical requirements and channelling arrangements for radio systems for the efficient use of specific frequency bands. The SRSP-300 series are generally the system standards for the use of fixed wireless spectrum and the SPSP-500 series are generally the system standards for the use of mobile spectrum. SRSPs are neutral with respect to network technology and do not address equipment design and./or selection. They must be used together with the RSSs, which are the standards for the equipment. Insofar as new spectrum utilisation policies make changes to the existing uses of the radio spectrum in certain bands, the existing SRSPs for those bands are modified so as to agree with these policies.[3] These documents are coordinated with industry through the Radio Advisory Board of Canada (RABC).

Relevant standards are SRSP-503; SRSP-509; SRSP-510 and SRSP-513 of the **SRSP-500 series.**

3. General Information related to spectrum utilisation and radio systems policies. SP Gen January 1991, Industry Canada.

6 Canada is in the process of considering general product substance content controls for Polybrominated diphenyl ethers (PBDE) and mercury under the federal risk management strategies established for these substances. The risk management strategies for these substances can be found at http://www.ec.gc.ca/Toxics/docs/substances/PBDE/rrms/en/intro.cfm and http://www.ec.gc.ca/CEPARegistry/documents/part/Merc_RMS/Merc_RMS.cfm, respectively.

7 Interoperability is not regulated

8 For mobile telephones HAC is not regulated.

Annex 12
Regulations and Standards for ICT/Telephony - EU

Coverage: Fixed-line, cordless and mobile telephone handsets

NO TABLE

The numbers refer directly to the Overview Tables, to the circled numbers in the "Regulatory objectives" column. No intermediate table was necessary in this case. The notes include both detailed data and comments.

The study has reviewed three types of telephone handset: fixed-line, cordless, and mobile. Cordless telephones are sometimes referred to as DECT, and allow cordless connection to a central reception point in one building, but do not allow long-distance access. Mobile phones in this study concentrate on the current and latest generation of mobile phones, called third-generation or 3G. That is because it is only with this current generation that mobile telephony has developed harmonised global structures for standards or regulation at all. The history of earlier generations is reasonably well known, with Europe dominating in GSM (first-generation) technology and the rest of the world either copying Europe or existing with national mobile telephone systems un-linked to an international network. In this study, Mexico is an example of a country that is still dominated by first-generation mobile telephones. It was felt unlikely that study of the international use of GSM standards which were recognised at the time to be uniquely European would be relevant to the objectives of this study.

Note 1 **Safety. Two directives are cited here:**

2001/95 is the General Product Safety Directive, which is not sector-specific and lays down only the general requirement that products should be safe under normal conditions of use. The directive does allow the European Commission to recognise European standards as meeting its requirements, but none has been recognised in this way for telephones. In this sector, it provides a backup to Directive 1999/5 below.

1999/5 covers radio and telecommunications terminal equipment of all kinds, including the telephone terminal devices covered in this section. The two standards listed in the table cover the safety of, respectively, devices connected to networks, and radio devices. The second, for radio devices, is identical to the IEC standard shown.

The Low-Voltage Safety Directive is not listed, because telephones use a voltage outside its scope, as do the batteries inside them if they are incorporated. Both the phones themselves and the batteries inside are covered by the GPSD (General Product Safety Directive).

Note 2 **EMF (electromagnetic fields) is a sub-category of safety and the only one which is covered by a detailed technical specification in any sense**, and it is shown here. It applies to wireless phones. Details:

The EU text cited (Recommendation 1999/519) is not a regulation as such, but – as the name implies – a recommendation to all authorities in the EU. In effect, it determines how the GPSD will be applied on this specific issue, but it does not formally mandate that.

The specification cited in the Recommendation is not described as a standard, but is explicitly based on data produced by a relevant international body: the International Commission for Non-Ionising Radiation Protection ICNIRP, described on www.icnirp.de .
The document is: International Commission on Non-Ionising Radiation Protection. Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). Health Physics 74(4): 494-522(1998). Response to questions and comments on ICNIRP. Health Physics 75(4): 438-439 (1998).

ICNIRP is headquartered in Germany with links to the International Radiation Protection Association (IRPA) in France (www.irpa.net). A cursory search indicates that ICNIRP is not listed on any list of international standards bodies, although IRPA does have the multi-country membership structure sometimes listed as a criterion for that.

Note 3 **EMC (electromagnetic compatibility)**

EMC regulation in the EU applies to all telephones, and standards are recognised as an acceptable basis of compliance. There is some overlap between two directives: the EMC directive 2004/108, and the RTTE (radio and telecommunications terminal equipment) Directive 1999/5. While the latter explicitly acknowledges the applicability of the EMC requirements in the EMC directive, it also adds some of its own, to deal with specific issues related to interference with the radio spectrum. Both adopt the same approach in relation to the recognition of European standards.
The standards shown in the template are as follows. The EN 55… series standards apply to fixed telephones; EN 301 489-7 applies to mobile telephones; and EN 301 406 applies to cordless telephones
In relation to international standards, there is an important difference between the EN 55… standards and the EN 301… standards. EN 55. standards are derived directly from IEC documents, as shown in the right-hand column of the table. The EN 301… standards have no declared equivalent with international standards.

Note 4 **Allocation of radio frequencies – applies only to wireless phones**

The linkages between EU regulations and documents which might be considered "international standards" is especially complex here. The European Commission issues regulations (called *decisions* in this context), which in practice reflect any relevant global decisions or recommendations of the ITU, but the linkage to ITU is indirect: the ITU frame is acknowledged explicitly in the key EU framework decision in this field (Decision 128/99 listed below), but only in a preamble and not as a formal requirement.
Key elements in the process are:

- The European Commission issues decisions which allocate specific frequencies to specific applications or a range of applications, with the approval of its member states. Its only formal obligation to any outside body is to a committee of representatives of member states, which must approve decisions.
  All relevant decisions are listed on
  http://ec.europa.eu/information_society/policy/radio_spectrum/ref_documents/index_en.htm

Those relevant to mobile phones are listed in the table.

- The same representatives of member states are members of CEPT (European Conference of Postal and Telecommunications Administrations), www.cept.org, and in practice these are the same member state organisations which are members of the ITU (International Telecommunications Union), of which the European Commission is not a member.
- Before drafting a proposed new decision and presenting it for approval, the European Commission mandates preparatory work by CEPT, which then normally submits a Report with a recommendation on how to proceed. Since the members of CEPT are also members of ITU, it is in practice impossible for CEPT to issue a report or recommendation which contravenes ITU recommendations.
- The European Commission then proposes a decision for approval by member states, in which any relevant report from CEPT is cited. The citations in the decisions relevant to mobile phones are:

Decision 128/99	framework only, no specification
Decision 2008/411	CEPT Report 15
Decision 2008/477	CEPT Report 19

- Identification of any direct link between the CEPT reports above and ITU documents would require detailed study of the reports themselves. Such individual study is outside the scope of this project.

Note 5 **Radio spectrum: efficient operation without interference**

Once a part of the spectrum has been allocated, detailed product standards are needed to ensure efficient use of that spectrum without interference. At the global level, that work does not take place in ITU.

One informal consortium, called 3GPP (www.3gpp.org) emerges as dominant globally. It is not a legal entity. It produces what it calls *specifications*.

3GPP specifications cover a mixture of regulatory and non-regulatory issues. Notably, they cover issues of interoperability, which the EU does not regulate in this sector (see note 6 below).

A separate organisation also needs to be noted: 3GPP2. This competes with 3GPP, using different technology (CDMA). Estimates in this research suggested that 3GPP standards are used in less than 20% and possibly less than 10% of mobile phones, though the percentage may be higher in the USA and Korea in particular.

3GPP standards find their way indirectly into EU regulation in two steps:

- First, ETSI adopts 3GPP specifications as European (ETSI) standards, independently of any regulation. This study was unable to identify a single case where ETSI modified a 3GPP document at this stage, although the possibility that it might happen in rare cases was mentioned.
- Second, ETSI then takes the parts of the European standards which relate to regulation and presents them as separate documents with separate standards numbers, which it then transmits to the European Commission for formal recognition under the regulation.
- The EN 301 908 series is relevant in that sense.
- Identification of any direct link between the 1) ETSI standards recognised in EU regulation, and 2) specific 3GPP specifications, would only be possible by reading the full texts of the ETSI standards in question. Such individual study is outside the scope of this project.

Note 6 **Avoiding environmentally harmful waste** (in the table, the word *toxic* is used, solely for reasons of space – in fact, EU regulation under this heading covers not only the avoidance of toxic materials, but the reduction of environmentally harmful landfill). Separate directives cover 1) batteries, and 2) other electrical equipment. In both cases, the essential objective relevant to this study is the restriction on the use of hazardous substances.

The battery directive is 2006/66. As for the two other directives below, it does not yet make use of standards as a basis of compliance.

- The two directives which apply to other parts of telephones are commonly referred to as WEEE (waste of electrical and electronic equipment) and ROHS (restrictions on hazardous substances). They are covered by Directives 2002/96 and 2002/95 respectively.
- This study has revealed no body of relevant international standards applicable to this field.
- The one standard listed this heading EN 50419 is uniquely European, and covers only one aspect of the regulation: marking of products to ensure relevant identification of materials used. Its use is proposed in the latest proposal to update this directive: COM(2008)810.

Note 7 **Interoperability**

This issue is not regulated in the EU, but may be regulated in other countries.

Note 8 **Other regulation**

No other relevant regulation in the EU has been identified. Issues considered were accessibility and child protection. Accessibility is indirectly covered by EMC regulation above: telephones must not interfere with hearing aids and vice versa. Child protection – for example, through regulation to prevent pornography reaching mobile telephones – is under discussion, but no regulation yet exists.

Annex 13
Regulations and Standards for ICT/Telephony - Korea

Coverage: mobile telephone equipment (and fixed-line and cordless phones where information available)

Regulatory objectives	Regulations	Standards used	International links
Safety Note 1	No regulation	N/A	N/A
EMF Note 2	Electric Wave Act Article 47-2 Radio Research Agency Public Notice No. 2005-114	The regulation provides specific substances without referring specific standards	Similarity with US criteria
EMC Note 3	Electric Wave Act Article 56 - EMI (Electro magnetic interference): Korea Communication Commission Public Notice No. 2008-39 • Detailed regulations: KN 16-1 series and KN 16-2 series - EMS (Electro magnetic susceptibility): Korea Communication Commission Public Notice No. 2008-38 • Detailed regulations: KN 61000-4 series	- EMI • CISPR16-1 series and CISPR 16-2 series - EMS • IEC 61000-4 series	- EMI: the regulations directly refer to CISPR 16-1 series and CISPR 16-2 series. - EMS: the regulations directly refer to IEC 61000-4 series.
Radio spectrum (frequency) Note 4	Korea Communication Commission Public Notice 2008-136	ITU RR (Radio Regulation)	Direct reference
Radio spectrum (no interference) Note 5	Korea Communication Commission Public Notice 2008-137	The regulation provides specific substances without referring specific standards	IMT 2000
Waste management Note 6	Limit of hazardous substances: Act on the Resource Recycling of Electrical and Electronic Equipment and Vehicles, Article 9 and its Enforcement decree Article 9	The enforcement decree itself specifies relevant criteria without referring to specific standards	Similarity with EU regulations
Interoperability Note 7	No regulation	N/A	N/A

General comments

This Table provides information mostly regarding mobile telephone handsets. To the extent that information is available, standards applicable to fixed-line telephone sets and cordless telephones are included in the notes below.

Regarding mobile telephone equipment, the Electric Wave Act is the basic legal frame, while public notices from the Korea Communication Commission and the Radio Research Agency deal with more detailed regulations materializing the general frame under the Act.

Notes

1 Regarding mobile phone equipments, risk related with EMC and EMF are the most important issue, and there is no regulation regarding general safety issue.

2 The Radio Research Agency, a subsidiary of Korea Communication Commission, provides criteria regarding SAR (Specific Absorption Rate) in its public notice and that public notice does not specifically refer to any domestic or non-national standard. However, it is indicated that the criteria under the regulation is similar to those of the US (FCC CFR 47).

Regarding normal telephone equipment, EMF regulations do not apply.

3 Domestic regulations dealing with EMC refer to CISPR 16 series standards for EMI and IEC 61000 series standards for EMS.

EMI:

- KN 16-1-1: CISPR 16-1-1 (measuring apparatus)
- KN 16-1-2: CISPR 16-1-2 (ancillary equipment – conducted disturbances)
- KN 16-1-3: CISPR 16-1-3 (ancillary equipment – disturbance power)
- KN 16-1-4: CISPR 16-1-4 (antenna calibration test sites)
- KN 16-1-5: CISPR 16-1-5 (conducted disturbance measurement)
- KN 16-2-4: CISPR 16-2-4 (methods of immunity measurement)

- EMS: testing measurement techniques
- KN 61000-4-2: IEC 61000-4-2 (electrostatic discharge immunity tests)
- KN 61000-4-3: IEC 61000-4-3 (radiated, radio-frequency, electromagnetic field immunity test)
- KN 61000-4-4: IEC 61000-4-4 (electrical fast transient/burst immunity test)
- KN 61000-4-5: IEC 61000-4-5 (surge immunity test)
- KN 61000-4-6: IEC 61000-4-6 (immunity to conducted disturbances, induced by radio-frequency fields)
- KN 61000-4-8: IEC 61000-4-8 (power frequency magnetic field immunity test)
- KN 61000-4-11: IEC 61000-4-11 (voltage dips, short interruptions and voltage variations immunity test)

4 The Korea Communication Commission Public Notice No. 2008-136 provides most recent regulation regarding frequency distribution, and that regulation directly refers to ITU Radio Regulation.

5 By including International Mobile Telecommunications 2000 (IMT 2000) specifications in this regulation, the Korean government adopted global standards for third generation (3G) wireless communications as defined and recommended by the International Telecommunications Union (ITU)

6 Regarding waste management, the same regulations and standards that apply to domestic appliances also apply to mobile phone equipments. For the purpose of this regulation, definition of the mobile phone includes battery used in the mobile phone. It is indicated that the coverage of hazardous substances and maximum percentage criteria are similar to those under EC RoHS regulations.

Regarding normal telephone equipments, waste management regulations do not apply.

7 The electric communication equipment regulation had required all the mobile phone be equipped with WIPI (Wireless internet platform for interoperability) that allows mobile phones, regardless of manufacturer or carrier, to run applications. That regulation had been repealed in December 2008 (Korea Communication Commission Public Notice 2008-129), and thus there is no more regulation in this regard.

Annex 14
Regulations and Standards for ICT/Telephony - Mexico

Coverage: Fixed-line, cordless and mobile telephone handsets

Regulatory objectives	Regulations	Standards used	International links
Safety Note 1	NOM 001SCFI1993 (safety of electronic appliances, including batteries) NOM 003 SCFI (safety of electrical appliances) For EMF safety, see below	No product specific standards apply for the safety of telephones, only the general safety standard NMX J521/1 for electrical products In a separate document, NOM 151 SCTI, reference is made in a bibliography to a safety standard NMX I 250 1997, but there is no explicit link to the safety regulations shown here.	No link identifiable in NOM, but interviews indicated that NMX J521/1 = IEC 60335/1
EMF Note 2	Regulation in draft	None yet	Expected to use ICNIRP
EMC Note 3	Not regulated in Mexico except for issues of disturbance to public networks: NOM 151SCTI 1999 for analogue wired phones. NOM 152SCTI 1999 for suppliers of digital services; does not apply to telephone handsets as such Draft NOM scheduled for 2009 will update rules for digital	None	None today (see note 3 for possible impact of NOM in draft, including use of US and CDN regulatory specifications)
Radio spectrum: frequency allocation Note 4	National radio spectrum allocation table	Unclear whether ITU documents in next column are directly cited.	Acknowledgement of ITU Resolution 212 and IMT 2000 as the frame

Radio spectrum - avoidance of interference Note 5	NOM 081SCTI 1993 for 1G Mobile phones Draft NOM-121-SCT1-2008 for later generation mobile phones	None	For 1G GSM TIA 553 and TIA IS 54 are cited as base possible link to foreign regulatory specifications,, but not to standards Foreign sources listed: US and CDN regulatory specifications CITEL
Waste	No regulation	N/A	N/A
Interoperability Note 6	*Plan fundamental de signalizacion* and *Plan fundamental de interconnexion* NOM 151 SCTI regulates interface with public networks for wired telephones NOM 081 SCTI 1993 for mobile telephones Draft NOM-121-SCT1-2008 for later generation mobile phones	Normally imposes use of ITU SS7 protocol, with other protocols subject to individual approval after verification of interconnectivity.	Direct citation of ITU protocol

General comments

A single Technical Committee is responsible for overseeing technical regulation of telecommunications. It is chaired by COFETEL (Federal Telecommunications Commission). In practice, this committee appears to have concentrated so far on issues of interoperability and interface with public networks, and radio spectrum issues. Recently, EMF has added. Other issues of electrical safety and EMC issues appear to be of little or no concern at this level of regulatory supervision.

Power to adopt technical regulations for telecommunications is given by the *Federal Law on Telecommunications*, Article 41, which explicitly authorises *Technical Plans* for the sector, which may themselves have the status of laws: an example is the *Plan Fundamental de Interconnexion y interoperabilidad*.

As in other sectors in this study, NOMs are *Normas Oficiales Mexicanas*. Despite the use of the word *Normas* (which can mean *standards)*, NOMs are considered to be technical regulations in this work.

Notes

1 Regulation of safety uses the same frame as for domestic appliances, covered separately in this study. For telephones, there are no product-specific safety standards, and products (including batteries, where used) fall within the frame of the two NOMs listed here. A general IEC standard for electrical appliances provides a general frame. For EMF as a safety issue, see following note.

2 No regulation today. A draft NOM-126-SCT1 was identified in this study, which does deal with non-ionising radiation, but only for radiocommunications equipment. At the time of the study, work had been limited to examination of global best practice, and informal comments indicated that ICNIRP guidelines would be used as the basis for regulation in Mexico, as is the case in the EU. But no decision had been announced to use specific texts.

3 Only one specific aspect of EMC interference is regulated in Mexico: interference with public networks. Interference of other kinds is not regulated in Mexico, as for electrical appliances.

For EMC of mobile telephones, see note 5 below for applicable technical regulations.
For analogue wired phones, NOM 151SCTI 1999 includes this issue in its broad requirements. NOM 152SCTI 1999 for suppliers of digital services; does not apply to telephone handsets as such.

4 Frequencies are allocated in a *national frequency allocation table*, which has legal force under the process described in the general note at the start of these notes. A copy of this table was promised in the research, but did not arrive in time for it to be studied. Comments made during the field mission in the research made plain that national allocations normally take account of the ITU framework listed here, but it was unclear whether that framework is given formal legal force. Minor variations from the ITU frame were reported.

5 Mexican regulation for interference-free use of the radio spectrum by mobile telephones appears to overlap with regulation of EMC and interoperability. Two regulations – one existing, and one in draft – emerge as relevant:

- For 1G (first generation) mobile telephones, NOM 081SCTI 1993, mobile telephone regulation in Mexico concentrates on 1G (GSM) technology, which at the date of this study was still the dominant technology used in Mexico: this NOM applies to analogue and digital mobile phones in the 800MHz band, and states that its objective is to achieve "compatibility". In NOM 081, references to TIA documents appear in sections 6 (page 26 or numbered page 50 of .pdf text), and 6.7 (page 117 or numbered page 141 of .pdf document).

- For later generation mobile telephones, a regulation is in draft. Draft NOM-121-SCT1-2008, Telecommunications - Radiocommunications - Spread spectrum radiocommunications systems - Frequency hopping and digital modulation radiocommunications equipment operating in the bands 902-928 MHz,2400-2483.5 MHz and 5725-5850 MHz - Specifications, limits and testing methods. The full text of this draft is not yet available on the public site of Mexican technical regulations (http://www.economia-noms.gob.mx/), and the information shown in the table came from oral comments, which indicated that the Mexican government intended to use regulatory specifications from the USA and Canada, rather than voluntary consensus standards as such.

Links to international sources emerge – as in other countries in this study – as relatively complex, with only the general role of ITU as an umbrella for radio frequency regulation emerging easily. References to international sources may appear in regulatory texts, or only through informal discussion: thus, references to TIA (Telecommunications Industry Association, a US body) sources were found in regulations, but references to 3GPP sources only emerged from discussion. Where foreign or international sources are used, the sources may be standards or regulatory texts: for example, the new draft regulation on later-generation mobile phones above is reported to make use of regulatory texts in the USA and Canada, and to refer also to a wider Inter-American regulatory cooperation group CITEC.

6 For this issue of interoperability, Mexico uses a mixture of NOMs and two technical plans (see general note at the start of this section for the role of technical plans in this sector): *Plan fundamental de signalizacion* and *Plan fundamental de interconnexion*. The relevant NOMs are shown in the previous note. The *technical plans* define procedures for approving the protocols used for radiocommunications signalling, giving are reported to give priority to the ITU SS7 protocol; other protocols may be used (examples are H323 and SIP), but are subject to individual approval from the regulatory authority.

Annex 15
Regulations and Standards for ICT/Telephony – United States

Coverage: Fixed-line, cordless and mobile telephone handsets

Regulatory objectives	Regulations	Standards used	International links
Safety: Note 1	Phones, batteries - nothing beyond general safety regulation	N/A	N/A
EMC Note 2	DECT: 47CFR15	ANSI C63.17 ANSI C63.4 IEC CISPR 22	
EMF Note 3	EMF: no enforceable regulation, but see Note	N/A	N/A
Radio spectrum frequency allocation Note 4	47CFR2 Part 2 contains spectrum allocations	Explicit acknowledgement of US obligations in the ITU. ITU-R repeatedly quoted.	Direct references. See previous column
Radio spectrum - interference Note 5	47CFR2 Part 2 contains spectrum allocations and rules for use	Explicit acknowledgement of US obligations in the ITU. ITU-R repeatedly quoted	e.g. "ITU-R recommendations may be used as a guide"
Waste Note 6	No regulation identified, except for batteries used inter alia in cellular and cordless phones: *Mercury-Containing and Rechargeable Battery Management Act of 1996*	Labelling requirement prescribed by the Act or conforming with "**a recognised international standard that is consistent with the intent of the … Act".** Relevant standards are not specified	Reference to (unspecified) recognized international standard for labeling.
Interoperability Note 7	Unregulated in USA		
Other: Children's safety Note 8	Under consideration but not yet active.		

Notes

1 Data under this heading is based on the absence of any product-specific regulation of telephone handsets from the OSHA web-site http://www.osha.gov/SLTC/electrical/standards.html . This page refers notably to the "general duty clause" requiring employers to provide a workplace *free from recognised hazards likely to cause death or physical harm*. Meetings with OSHA staff could not be arranged and the validity of the statement that only this general duty obligation applies has still to be verified.

2 FCC regulates EMC emissions only. No regulation of immunity. The data here results from a search for "standards incorporated by reference" in Title 47 CFR, in parts listed to us by the FCC as relevant:

Parts 22, 24, 27	Mobile telephones
Part 15.d	DECT
Part 68	Hearing aid compatibility

3 OSHA on www.osha.gov/SLTC/radiofrequencyradiation/standards.html states that 29CFR1910.97 and 29CFR1910 Subpart J are theoretically applicable, and contain specifications, but have been ruled unenforceable and as offering guidance only. Only one standard is incorporated by reference: an ANSI standard for colour-coding of devices to indicate the presence of EMF. Not listed here. See also http://www.osha.gov/SLTC/radiofrequencyradiation/hazards.html. Separate discussion with TIA confirmed that this is not a significant regulatory issue for industry.

4 &5 In 47CFR2.100 there is explicit recognition that "the ITU Radio Regulations 2004 have been incorporated to the extent practicable." But apart from those, there appears to be no use of independent standards in US regulation. Where technical specifications are mandatory, they appear directly.

6 Requirements related to waste treatment in this connection were reported to be outside federal jurisdiction. No evidence of federal regulation under the authority of EPA. An exception are batteries, which may contain hazardous or potentially hazardous constituents (heavy metals). This includes nickel and cadmium (Ni-Cd) rechargeable batteries and small sealed lead acid batteries (SSLA) commonly found in cellular and cordless telephones. To prevent the release of hazardous substances into the environment, the *Mercury-Containing and Rechargeable Battery Management Act of 1996* establishes national, uniform content and recycling/safe disposal labeling requirements for regulated batteries, such as Ni-Cd and certain SSLA rechargeable batteries and battery packs, and rechargeable consumer products manufactured domestically or imported and sold for use in the United States. Battery and product manufacturers may use a different label if it conveys the same information as prescribed by the Act or it conforms with **a recognised international standard that is consistent with the intent of the Battery Act**. The manufacturers must apply for EPA certification. The Act also mandates that regulated batteries manufactured after May 13, 1997 be "easily removable" from consumer products. The Act also phases out the sale and use of certain mercury-containing batteries.

7 Interoperability is left to the market.

8 Under "other", an interview with the Teleommunications Industries Association (ITA) suggested there is FCC regulation on the compatibility of telephone handsets with hearing aids, but it was not identified. The issue appears to fall under the EMC heading anyway, and should therefore be

included there. Evidence on the issue from outside the USA to support this view comes from The British RNID (charity for deaf people) on http://www.rnid.org.uk/information_resources/factsheets/equipment/factsheets_leaflets/mobile_phones_information_for_deaf_and_hard_of_hearing_people.htm#interference , which states that interference is only a problem with older analogue hearing aids, and is not a problem with digital aids.