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Legislation

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Contents

[1] Text with EEA relevance.

EN

Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

The titles of all other acts are printed in bold type and preceded by an asterisk.

II

(Non-legislative acts)

REGULATIONS

COMMISSION IMPLEMENTING REGULATION (EU) 2019/791

of 16 May 2019

amending for the 302nd time Council Regulation (EC) No 881/2002 imposing certain specific restrictive measures directed against certain persons and entities associated with the ISIL (Da'esh) and Al-Qaida organisations

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Council Regulation (EC) No 881/2002 of 27 May 2002 imposing certain specific restrictive measures directed against certain persons and entities associated with the ISIL (Da'esh) and Al-Qaida organisations [1], and in particular Article 7(1)(a) and Article 7a(1) and 7a(5) thereof,

Whereas:

(1) Annex I to Regulation (EC) No 881/2002 lists the persons, groups and entities covered by the freezing of funds and economic resources under that Regulation.

(2) On 14 May 2019, the Sanctions Committee of the United Nations Security Council decided to add one entry and to remove one entry from the list of persons, groups and entities to whom the freezing of funds and economic resources should apply. Annex I to Regulation (EC) No 881/2002 should therefore be amended accordingly.

(3) In order to ensure that the measures provided for in this Regulation are effective it should enter into force immediately,

HAS ADOPTED THIS REGULATION:

Article 1

Annex I to Regulation (EC) No 881/2002 is amended in accordance with the Annex to this Regulation.

Article 2

This Regulation shall enter into force on the day of its publication in the *Official Journal of the European Union*.

[1] OJ L 139, 29.5.2002, p. 9.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 16 May 2019.

For the Commission,
On behalf of the President,
Head of the Service for Foreign Policy Instruments

ANNEX

Annex I to Regulation (EC) No 881/2002 is amended as follows:

(1) The following entry shall be added under the heading 'Legal persons, groups and entities': 'Islamic State in Iraq and the Levant – Khorasan (ISIL- K) (*alias* (a) ISIL Khorasan (b) Islamic State's Khorasan Province (c) ISIS Wilayat Khorasan (d) ISIL's South Asia Branch e) South Asian Chapter of ISIL). Other information: Islamic State of Iraq and the Levant - Khorasan (ISIL - K) was formed on January 10, 2015 by a former Tehrik-e Taliban Pakistan (TTP) commander and was established by former Taliban faction commanders who swore an oath of allegiance to the Islamic State of Iraq and the Levant (listed as Al-Qaida in Iraq). ISIL – K has claimed responsibility for numerous attacks in both Afghanistan and Pakistan. Date of designation referred to in Article 7e(e): 14.5.2019.'

(2) The following entry under the heading 'Natural persons' is deleted: 'Nessim Ben Mohamed Al-Cherif Ben Mohamed **Saleh Al-Saadi** (*alias* (a) Nassim Saadi, (b) Dia el Haak George, (c) Diael Haak George, (d) El Dia Haak George, (e) Abou Anis, (f) Abu Anis). Address: (a) Via Monte Grappa 15, Arluno (Milan), Italy; (b) Via Cefalonia 11, Milan, Italy (domicile, last known address). Date of birth: (a) 30.11.1974, (b) 20.11.1974. Place of birth: (a) Haidra Al-Qasreen, Tunisia; (b) Lebanon; (c) Algeria. Nationality: Tunisian. Passport No: M788331 (Tunisian passport issued on 28.9.2001, expired on 27.9.2006). Other information: (a) In detention in Italy until 27.4.2012; (b) Father's name is Mohamed Sharif; (c) Mother's name is Fatima. Date of designation referred to in Article 2a (4) (b): 12.11.2003.'

DECISIONS

COUNCIL DECISION (EU) 2019/792

of 13 May 2019

entrusting to the European Commission — the Office for the Administration and Payment of Individual Entitlements (PMO) — the exercise of certain powers conferred on the appointing authority and the authority empowered to conclude contracts of employment

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Staff Regulations of Officials of the European Union and the Conditions of Employment of Other Servants of the European Union, laid down in Council Regulation (EEC, Euratom, ECSC) No 259/68 ([1]), and in particular Article 2(2) of those Staff Regulations and Article 6 of those Conditions of Employment,

Having regard to Council Decision (EU) 2017/262 of 6 February 2017 determining, for the General Secretariat of the Council, the appointing authority and the authority empowered to conclude contracts of employment, and repealing Decision 2013/811/EU ([2]),

Whereas:

(1) The Office for the Administration and Payment of Individual Entitlements (PMO) of the European Commission is responsible for the administration and payment of individual financial entitlements of staff of the European Commission and, by way of service-level agreements, certain other Union institutions and bodies. As regards staff of the General Secretariat of the Council (GSC), the PMO is responsible for the administration and payment of pension rights and sickness insurance benefits. In those fields, the PMO exercises powers of the appointing authority and the authority empowered to conclude contracts of employment, except with regard to the handling of individual complaints concerning sickness insurance benefits. The PMO also provides a growing number of other services and makes available its IT tools to the GSC.

(2) Management of individual entitlements by a single specialised body has proven to be more effective and cost-efficient. It allows for the uniform application of the Staff Regulations of Officials of the European Union ('the Staff Regulations') and the Conditions of Employment of Other Servants of the European Union ('the Conditions of Employment') throughout the institutions, thus ensuring equal treatment of and enhancing legal certainty for Union civil servants. It also allows for further administrative simplification and interinstitutional cooperation.

(3) In this context, the GSC and the PMO are to sign a service-level agreement ('SLA') extending the scope of services provided by the PMO to the administration and payment of individual pecuniary entitlements of staff through Sysper, a human resources IT management tool. In order to allow for the proper functioning of the agreement, the exercise of relevant powers conferred on the appointing authority and on the authority empowered to conclude contracts of employment for GSC staff should be entrusted to the European Commission (PMO). Furthermore, as the new SLA replaces a previous service-level agreement on pension rights, unemployment allowances and other entitlements upon termination of service, the PMO's powers in that field should be confirmed.

(4) In the initial transitional period after the transfer to Sysper, the appointing authority and the authority empowered to conclude contracts of employment of the Council should be able to exercise the powers in relation to GSC staff in cases where a possible different interpretation of rules on individual entitlements applied by the PMO compared to the interpretation applied in the GSC prior to the transfer to Sysper could have detrimental effects for GSC staff,

([1]) OJ L 56, 4.3.1968, p. 1.
([2]) OJ L 39, 16.2.2017, p. 4.

HAS ADOPTED THIS DECISION:

Article 1

1. Without prejudice to paragraph 2 of this Article, the exercise of powers conferred by the Staff Regulations on the appointing authority and by the Conditions of Employment on the authority authorised to conclude contracts of employment as regards GSC staff is entrusted to the European Commission — the Office for the Administration and Payment of Individual Entitlements (PMO) - in relation to the application of the following:

(a) concerning individual entitlements:

— Articles 67 to 69, 71, 74 and 75 of the Staff Regulations and Articles 1 to 13 and 17 of Annex VII to the Staff Regulations;

— Articles 19 to 27, 29, 92, 93, 94 and 97 of the Conditions of Employment;

(b) concerning the pension scheme and other entitlements upon termination of service:

— Articles 70 and 77, the second, third and fourth paragraphs of Article 78, and Articles 79, 80, 81, 81a and 82 of the Staff Regulations; Annex IV to the Staff Regulations; Article 4 of Annex IVa to the Staff Regulations; Articles 2 to 12, Article 13(1), the first and third paragraphs of Article 14, and Articles 17 to 34 and 40 to 44 of Annex VIII to the Staff Regulations; and Articles 20 to 28 of Annex XIII to the Staff Regulations;

— Article 31, Article 33(1), Articles 34 to 40 and 43, the first paragraph of Article 44, Articles 99 and 101, Article 102(2), and Articles 103 to 110 and 113 to 116 of the Conditions of Employment;

(c) concerning unemployment allowances: Articles 28a and 96 of the Conditions of Employment;

(d) concerning the recovery of overpayments made under the provisions referred to in points (a) to (c) of this paragraph:

— Article 85 of the Staff Regulations and Article 46 of Annex VIII to the Staff Regulations;

— the second paragraph of Article 44, Article 45, Article 114(2) and Article 116 of the Conditions of Employment.

2. Until 31 December 2021, the PMO shall notify the appointing authority or the authority authorised to conclude contracts of the Council of any complaint received under Article 90(2) of the Staff Regulations or Articles 46 and 117 of the Conditions of Employment against a decision regarding a member of GSC staff taken under point (a) of paragraph 1 of this Article, and provide information regarding its intended response. If in an individual case the appointing authority or the authority authorised to conclude contracts of the Council so requests, the PMO shall relinquish the exercise of the powers delegated under paragraph 1 of this Article, and the appointing authority or the authority authorised to conclude contracts of the Council shall exercise its powers in such a case.

Article 2

This Decision shall enter into force on the date of its publication in the *Official Journal of the European Union*.

Done at Brussels, 13 May 2019.

For the Council

The President

F. MOGHERINI

COMMISSION IMPLEMENTING DECISION (EU) 2019/793

of 16 May 2019

amending the Annex to Implementing Decision 2014/709/EU concerning animal health control measures relating to African swine fever in certain Member States

(notified under document C(2019) 3797)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Council Directive 89/662/EEC of 11 December 1989 concerning veterinary checks in intra-Community trade with a view to the completion of the internal market ([1]), and in particular Article 9(4) thereof,

Having regard to Council Directive 90/425/EEC of 26 June 1990 concerning veterinary checks applicable in intra-Union trade in certain live animals and products with a view to the completion of the internal market ([2]), and in particular Article 10(4) thereof,

Having regard to Council Directive 2002/99/EC of 16 December 2002 laying down the animal health rules governing the production, processing, distribution and introduction of products of animal origin for human consumption ([3]), and in particular Article 4(3) thereof,

Whereas:

(1) Commission Implementing Decision 2014/709/EU ([4]) lays down animal health control measures in relation to African swine fever in certain Member States, where there have been confirmed cases of that disease in domestic or feral pigs (the Member States concerned). The Annex to that Implementing Decision demarcates and lists certain areas of the Member States concerned in Parts I to IV thereof, differentiated by the level of risk based on the epidemiological situation as regards that disease. The Annex to Implementing Decision 2014/709/EU has been amended several times to take account of changes in the epidemiological situation in the Union as regards African swine fever that need to be reflected in that Annex. The Annex to Implementing Decision 2014/709/EU was last amended by Commission Implementing Decision (EU) 2019/666 ([5]), following instances of African swine fever in Romania.

(2) The risk of the spread of African swine fever in wildlife is linked to the natural slow spread of that disease among feral pig populations, and also to human activity, as demonstrated by the recent epidemiological evolution of that disease in the Union, and as documented by the European Food Safety Authority (EFSA) in the Scientific Opinion of the Panel on Animal Health and Welfare, published on 14 July 2015; in the Scientific Report of EFSA on Epidemiological analyses on African swine fever in the Baltic countries and Poland, published on 23 March 2017; in the Scientific Report of EFSA on Epidemiological analyses of African swine fever in the Baltic States and Poland, published on 8 November 2017; and in the Scientific Report of EFSA on Epidemiological analyses of African swine fever in the European Union, published on 29 November 2018 ([6]).

(3) Council Directive 2002/60/EC ([7]) lays down the minimum Union measures to be taken for the control of African swine fever. In particular, Article 9 of Directive 2002/60/EC provides for the establishment of a protection and a surveillance zone when African swine fever has been officially confirmed in pigs on a holding, and Articles 10 and 11 of that Directive lay down the measures to be taken in the protection and surveillance zones in order to prevent the spread of that disease. In addition, Article 15 of Directive 2002/60/EC provides for the measures

([1]) OJ L 395, 30.12.1989, p. 13.
([2]) OJ L 224, 18.8.1990, p. 29.
([3]) OJ L 18, 23.1.2003, p. 11.
([4]) Commission Implementing Decision 2014/709/EU of 9 October 2014 concerning animal health control measures relating to African swine fever in certain Member States and repealing Implementing Decision 2014/178/EU (OJ L 295, 11.10.2014, p. 63).
([5]) Commission Implementing Decision (EU) 2019/666 of 25 April 2019 amending the Annex to Implementing Decision 2014/709/EU concerning animal health control measures relating to African swine fever in certain Member States (OJ L 112, 26.4.2019, p. 47).
([6]) *EFSA Journal* 2015;13(7):4163; *EFSA Journal* 2017;15(3):4732; *EFSA Journal* 2017;15(11):5068; *EFSA Journal* 2018;16(11):5494.
([7]) Council Directive 2002/60/EC of 27 June 2002 laying down specific provisions for the control of African swine fever and amending Directive 92/119/EEC as regards Teschen disease and African swine fever (OJ L 192, 20.7.2002, p. 27).

to be taken where African swine fever is confirmed in feral pigs, including the placing under official surveillance of pig holdings in the defined infected area. Recent experience has shown that the measures laid down in Directive 2002/60/EC are effective in controlling the spread of that disease, and in particular the measures providing for the cleaning and disinfecting of infected holdings and the measures related to the eradication of the disease from a feral pig population.

(4) Taking into account the effectiveness of the measures being applied in the Member States in accordance with Directive 2002/60/EC, and in particular those laid down in Article 10(4)(b), Article 10(5) and Article 15 thereof, and in line with the risk mitigation measures for African swine fever set out in the Terrestrial Animal Health Code of the World Organization for Animal Health, certain areas in the counties of lubaczowski, gołdapski and olecki in Poland currently listed in Part III of the Annex to Implementing Decision 2014/709/EU should now be listed in Part I and Part II of that Annex, in view of the depopulation of all non-commercial farms with low biosecurity conditions in that area and the expiry of the period of three months from the date of the final cleaning and disinfection of the infected holdings. Given that Part III of the Annex to Implementing Decision 2014/709/EU lists the areas where the epidemiological situation is still evolving and very dynamic, when any amendments are made to areas listed in that Part, particular consideration must always be given to the effect on the surrounding areas.

(5) In addition, taking into account the effectiveness of the measures being applied in Poland in accordance with Directive 2002/60/EC, and in particular those laid down in Article 15 thereof, and in line with the risk mitigation measures for African swine fever set out in the Terrestrial Animal Health Code of the World Organization for Animal Health, certain areas in the counties of zambrowski and łomżyński in Poland currently listed in Part II of the Annex to Implementing Decision 2014/709/EU should now be listed in Part I of that Annex, in view of favourable epidemiological situation of the disease in those areas.

(6) Since the date of adoption of Implementing Decision (EU) 2019/666, there have been further instances of African swine fever in feral pigs in Poland and Hungary that also need to be reflected in the Annex to Implementing Decision 2014/709/EU.

(7) In April 2019, a few cases of African swine fever in feral pigs were observed in the counties of garwoliński and krasnostawski in Poland in close proximity to areas listed in Part I of the Annex to Implementing Decision 2014/709/EU. These cases of African swine fever in feral pigs constitute an increased level of risk which should be reflected in that Annex. Accordingly, these areas of Poland affected by African swine fever should be listed in Part II of the Annex to Implementing Decision 2014/709/EU instead of in Part I thereof.

(8) In April 2019, a few cases of African swine fever in feral pigs were observed in the county of Hajdú-Bihar in Hungary in an area listed in Part I of the Annex to Implementing Decision 2014/709/EU. These cases of African swine fever in feral pigs constitute an increased level of risk which should be reflected in that Annex. Accordingly, this area of Hungary affected by African swine fever should be listed in Part II of the Annex to Implementing Decision 2014/709/EU instead of in Part I thereof.

(9) In order to take account of recent developments in the epidemiological evolution of African swine fever in the Union, and in order to combat the risks associated with the spread of that disease in a proactive manner, new high-risk areas of a sufficient size should be demarcated for Poland and Hungary and duly listed in Parts I and II of the Annex to Implementing Decision 2014/709/EU. The Annex to Implementing Decision 2014/709/EU should therefore be amended accordingly.

(10) The measures provided for in this Decision are in accordance with the opinion of the Standing Committee on Plants, Animals, Food and Feed,

HAS ADOPTED THIS DECISION:

Article 1

The Annex to Implementing Decision 2014/709/EU is replaced by the text set out in the Annex to this Decision.

Article 2

This Decision is addressed to the Member States.

Done at Brussels, 16 May 2019.

For the Commission
Vytenis ANDRIUKAITIS
Member of the Commission

ANNEX

The Annex to Implementing Decision 2014/709/EU is replaced by the following:

'*ANNEX*

PART I

1. **Belgium**

The following areas in Belgium:

in Luxembourg province:

— the area is delimited clockwise by:

— Frontière avec la France,

— Rue Mersinhat,

— La N818 jusque son intersection avec la N83,

— La N83 jusque son intersection avec la N884,

— La N884 jusque son intersection avec la N824,

— La N824 jusque son intersection avec Le Routeux,

— Le Routeux,

— Rue d'Orgéo,

— Rue de la Vierre,

— Rue du Bout-d'en-Bas,

— Rue Sous l'Eglise,

— Rue Notre-Dame,

— Rue du Centre,

— La N845 jusque son intersection avec la N85,

— La N85 jusque son intersection avec la N40,

— La N40 jusque son intersection avec la N802,

— La N802 jusque son intersection avec la N825,

— La N825 jusque son intersection avec la E25-E411,

— La E25-E411 jusque son intersection avec la N40,

— N40: Burnaimont, Rue de Luxembourg, Rue Ranci, Rue de la Chapelle,

— Rue du Tombois,

— Rue Du Pierroy,

— Rue Saint-Orban,

— Rue Saint-Aubain,

— Rue des Cottages,

— Rue de Relune,

— Rue de Rulune,

— Route de l'Ermitage,

— N87: Route de Habay,

— Chemin des Ecoliers,

— Le Routy,

— Rue Burgknapp,

— Rue de la Halte,
— Rue du Centre,
— Rue de l'Eglise,
— Rue du Marquisat,
— Rue de la Carrière,
— Rue de la Lorraine,
— Rue du Beynert,
— Millewée,
— Rue du Tram,
— Millewée,
— N4: Route de Bastogne, Avenue de Longwy,Route de Luxembourg,
— Frontière avec le Grand-Duché de Luxembourg,
— Frontière avec la France,
— La N87 jusque son intersection avec la N871 au niveau de Rouvroy,
— La N871 jusque son intersection avec la N88,
— La N88 jusque son intersection avec la rue Baillet Latour,
— La rue Baillet Latour jusque son intersection avec la N811,
— La N811 jusque son intersection avec la N88,
— La N88 jusque son intersection avecla N883 au niveau d'Aubange,
— La N883 jusque son intersection avec la N81 au niveau d'Aubange,
— La N81 jusque son intersection avec la E25-E411,
— La E25-E411 jusque son intersection avec la N40,
— La N40 jusque son intersection avec la rue du Fet,
— Rue du Fet,
— Rue de l'Accord jusque son intersection avec la rue de la Gaume,
— Rue de la Gaume jusque son intersection avec la rue des Bruyères,
— Rue des Bruyères,
— Rue de Neufchâteau,
— Rue de la Motte,
— La N894 jusque son intersection avec la N85,
— La N85 jusque son intersection avec la frontière avec la France.

2. **Bulgaria**

The following areas in Bulgaria:

in Varna the whole region excluding the villages covered in Part II;

in Silistra region:

— whole municipality of Glavinitza,
— whole municipality of Tutrakan,
— within municipality of Dulovo:
  — Boil,
  — Vokil,
  — Grancharovo,
  — Doletz,
  — Oven,

- Okorsh,
- Oreshene,
- Paisievo,
- Pravda,
- Prohlada,
- Ruyno,
- Sekulovo,
- Skala,
- Yarebitsa,

— within municipality of Sitovo:

- Bosna,
- Garvan,
- Irnik,
- Iskra,
- Nova Popina,
- Polyana,
- Popina,
- Sitovo,
- Yastrebna,

— within municipality of Silistra:

- Vetren,

in Dobrich region:

— whole municipality of Baltchik,

— whole municipality of General Toshevo,

— whole municipality of Dobrich,

— whole municipality of Dobrich-selska (Dobrichka),

— within municipality of Krushari:

- Severnyak,
- Abrit,
- Dobrin,
- Alexandria,
- Polkovnik Dyakovo,
- Poruchik Kardzhievo,
- Zagortzi,
- Zementsi,
- Koriten,
- Krushari,
- Bistretz,
- Efreytor Bakalovo,
- Telerig,
- Lozenetz,
- Krushari,
- Severnyak,
- Severtsi,

— within municipality of Kavarna:
  — Krupen,
  — Belgun,
  — Bilo,
  — Septemvriytsi,
  — Travnik,
— whole municipality of Tervel, except Brestnitsa and Kolartzi,

in Ruse region:

— within municipality of Slivo pole:
  — Babovo,
  — Brashlen,
  — Golyamo vranovo,
  — Malko vranovo,
  — Ryahovo,
  — Slivo pole,
  — Borisovo,
— within municipality of Ruse:
  — Sandrovo,
  — Prosena,
  — Nikolovo,
  — Marten,
  — Dolno Ablanovo,
  — Ruse,
  — Chervena voda,
  — Basarbovo,
— within municipality of Ivanovo:
  — Krasen,
  — Bozhichen,
  — Pirgovo,
  — Mechka,
  — Trastenik,
— within municipality of Borovo:
  — Batin,
  — Gorno Ablanovo,
  — Ekzarh Yosif,
  — Obretenik,
  — Batin,
— within municipality of Tsenovo:
  — Krivina,
  — Belyanovo,
  — Novgrad,
  — Dzhulyunitza,
  — Beltzov,

— Tsenovo,
— Piperkovo,
— Karamanovo,

in Veliko Tarnovo region:

— within municipality of Svishtov:
— Sovata,
— Vardim,
— Svishtov,
— Tzarevets,
— Bulgarsko Slivovo,
— Oresh,

in Pleven region:

— within municipality of Belene:
— Dekov,
— Belene,
— Kulina voda,
— Byala voda,
— within municipality of Nikopol:
— Lozitza,
— Dragash voyvoda,
— Lyubenovo,
— Nikopol,
— Debovo,
— Evlogievo,
— Muselievo,
— Zhernov,
— Cherkovitza,
— within municipality of Gulyantzi:
— Somovit,
— Dolni vit,
— Milkovitsa,
— Shiyakovo,
— Lenkovo,
— Kreta,
— Gulyantzi,
— Brest,
— Dabovan,
— Zagrazhdan,
— Gigen,
— Iskar,
— within municipality of Dolna Mitropoliya:
— Komarevo,
— Baykal,

— Slavovitsa,
— Bregare,
— Orehovitsa,
— Krushovene,
— Stavertzi,
— Gostilya,

in Vratza region:

— within municipality of Oryahovo:
— Dolni vadin,
— Gorni vadin,
— Ostrov,
— Galovo,
— Leskovets,
— Selanovtsi,
— Oryahovo,
— within municipality of Miziya:
— Saraevo,
— Miziya,
— Voyvodovo,
— Sofronievo,
— within municipality of Kozloduy:
— Harlets,
— Glozhene,
— Butan,
— Kozloduy,

in Montana region:

— within municipality of Valtchedram:
— Dolni Tzibar,
— Gorni Tzibar,
— Ignatovo,
— Zlatiya,
— Razgrad,
— Botevo,
— Valtchedram,
— Mokresh,
— within municipality Lom:
— Kovatchitza,
— Stanevo,
— Lom,
— Zemphyr,
— Dolno Linevo,
— Traykovo,
— Staliyska mahala,

— Orsoya,
— Slivata,
— Dobri dol,

— within municipality of Brusartsi:
— Vasilyiovtzi,
— Dondukovo,

in Vidin region:

— within municipality of Ruzhintsi:
— Dinkovo,
— Topolovets,
— Drenovets,

— within municipality of Dimovo:
— Artchar,
— Septemvriytzi,
— Yarlovitza,
— Vodnyantzi,
— Shipot,
— Izvor,
— Mali Drenovetz,
— Lagoshevtzi,
— Darzhanitza,

— within municipality of Vidin:
— Vartop,
— Botevo,
— Gaytantsi,
— Tzar Simeonovo,
— Ivanovtsi,
— Zheglitza,
— Sinagovtsi,
— Dunavtsi,
— Bukovets,
— Bela Rada,
— Slana bara,
— Novoseltsi,
— Ruptzi,
— Akatsievo,
— Vidin,
— Inovo,
— Kapitanovtsi,
— Pokrayna,
— Antimovo,
— Kutovo,
— Slanotran,

— Koshava,

— Gomotartsi.

3. **Estonia**

The following areas in Estonia:

— Hiiu maakond.

4. **Hungary**

The following areas in Hungary:

— Borsod-Abaúj-Zemplén megye 651100, 651300, 651400, 651500, 651610, 651700, 651801, 651802, 651803, 651900, 652000, 652200, 652300, 652601, 652602, 652603, 652700, 652900, 653000, 653100, 653200, 653300, 653401, 653403, 653500, 653600, 653700, 653800, 653900, 654000, 654201, 654202, 654301, 654302, 654400, 654501, 654502, 654600, 654700, 654800, 654900, 655000, 655100, 655200, 655300, 655500, 655600, 655700, 655800, 655901, 655902, 656000, 656100, 656200, 656300, 656400, 656600, 657300, 657400, 657500, 657600, 657700, 657800, 657900, 658000, 658201, 658202 és 658403 kódszámú vadgazdálkodási egységeinek teljes területe,

— Hajdú-Bihar megye 900750, 901250, 901260, 901270, 901350, 901551, 901560, 901570, 901580, 901590, 901650, 901660, 901750, 901950, 902050, 902150, 902250, 902350, 902450, 902550, 902650, 902660, 902670, 902750, 903250, 903650, 903750, 903850, 904350, 904750, 904760, 904850, 904860, 905360, 905450 és 905550 kódszámú vadgazdálkodási egységeinek teljes területe,

— Heves megye 702550, 703350, 703360, 703450, 703550, 703610, 703750, 703850, 703950, 704050, 704150, 704250, 704350, 704450, 704550, 704650, 704750, 704850, 704950, 705050, és 705350 kódszámú vadgazdálkodási egységeinek teljes területe,

— Jász-Nagykun-Szolnok megye 750150, 750160, 750250, 750260, 750350, 750450, 750460, 750550, 750650, 750750, 750850, 750950, 751150, 752150 és755550 kódszámú vadgazdálkodási egységeinek teljes területe,

— Nógrád megye 552010, 552150, 552250, 552350, 552450, 552460, 552520, 552550, 552610, 552620, 552710, 552850, 552860, 552950, 552960, 552970, 553050, 553110, 553250, 553260, 553350, 553650, 553750, 553850, 553910 és 554050 kódszámú vadgazdálkodási egységeinek teljes területe,

— Pest megye 571250, 571350, 571550, 571610, 571750, 571760, 572250, 572350, 572550, 572850, 572950, 573360, 573450, 580050 és 580450 kódszámú vadgazdálkodási egységeinek teljes területe,

— Szabolcs-Szatmár-Bereg megye 851950, 852350, 852450, 852550, 852750, 853560, 853650, 853751, 853850, 853950, 853960, 854050, 854150, 854250, 854350, 855350, 855450, 855550, 855650, 855660 és 855850 kódszámú vadgazdálkodási egységeinek teljes területe.

5. **Latvia**

The following areas in Latvia:

— Aizputes novada Aizputes, Cīravas, Lažas, Kazdangas pagasts un Aizputes pilsēta,

— Alsungas novads,

— Durbes novada Dunalkas un Tadaiķu pagasts,

— Kuldīgas novada Gudenieku pagasts,

— Pāvilostas novada Sakas pagasts un Pāvilostas pilsēta,

— Stopiņu novada daļa, kas atrodas uz rietumiem no autoceļa V36, P4 un P5, Acones ielas, Dauguļupes ielas un Dauguļupītes,

— Ventspils novada Jūrkalnes pagasts,

— Grobiņas novada Bārtas un Gaviezes pagasts,

— Rucavas novada Dunikas pagasts.

6. **Lithuania**

The following areas in Lithuania:

— Jurbarko rajono savivaldybė: Smalininkų ir Viešvilės seniūnijos,

— Kelmės rajono savivaldybė: Kelmės, Kelmės apylinkių, Kražių, Kukečių seniūnijos dalis į pietus nuo kelio Nr. 2128 ir į vakarus nuo kelio Nr. 2106, Liolių, Pakražančio seniūnijos, Tytuvėnų seniūnijos dalis į vakarus ir šiaurę nuo kelio Nr. 157 ir į vakarus nuo kelio Nr. 2105 ir Tytuvėnų apylinkių seniūnijos dalis į šiaurę nuo kelio Nr. 157 ir į vakarus nuo kelio Nr. 2105, ir Vaiguvos seniūnijos,

— Pagėgių savivaldybė,

— Plungės rajono savivaldybė,

— Raseinių rajono savivaldybė: Girkalnio ir Kalnujų seniūnijos dalis į šiaurę nuo kelio Nr A1, Nemakščių, Paliepių, Raseinių, Raseinių miesto ir Viduklės seniūnijos,

— Rietavo savivaldybė,

— Skuodo rajono savivaldybė,

— Šilalės rajono savivaldybė,

— Šilutės rajono savivaldybė: Juknaičių, Kintų, Šilutės ir Usėnų seniūnijos,

— Tauragės rajono savivaldybė: Lauksargių, Skaudvilės, Tauragės, Mažonų, Tauragės miesto ir Žygaičių seniūnijos.

7. **Poland**

The following areas in Poland:

w województwie warmińsko-mazurskim:

— gmina Ruciane – Nida i część gminy Pisz położona na południe od linii wyznaczonej przez drogę nr 58 oraz miasto Pisz w powiecie piskim,

— część gminy Miłki położona na zachód od linii wyznaczonej przez drogę nr 63, część gminy Ryn położona na południe od linii kolejowej łączącej miejscowości Giżycko i Kętrzyn, część gminy wiejskiej Giżycko położona na południe od linii wyznaczonej przez drogę nr 59 biegnącą od zachodniej granicy gminy do granicy miasta Giżycko, na południe od linii wyznaczonej przez drogę nr 63 biegnącą od południowej granicy gminy do granicy miasta Giżycko i na południe od granicy miasta Giżycko w powiecie giżyckim,

— gminy Mikołajki, Piecki, część gminy Sorkwity położona na południe od drogi nr 16 i część gminy wiejskiej Mrągowo położona na południe od linii wyznaczonej przez drogę nr 16 biegnącą od zachodniej granicy gminy do granicy miasta Mrągowo oraz na południe od linii wyznaczonej przez drogę nr 59 biegnącą od wschodniej granicy gminy do granicy miasta Mrągowo w powiecie mrągowskim,

— gminy Dźwierzuty i Świętajno w powiecie szczycieńskim,

— gminy Gronowo Elbląskie, Markusy, Rychliki, część gminy Elbląg położona na wschód i na południe od granicy powiatu miejskiego Elbląg i na południe od linii wyznaczonej przez drogę nr S7 biegnącą od granicy powiatu miejskiego Elbląg do wschodniej granicy gminy Elbląg i część gminy Tolkmicko niewymieniona w części II załącznika w powiecie elbląskim oraz strefa wód przybrzeżnych Zalewu Wiślanego i Zatoki Elbląskiej,

— gminy Barczewo, Biskupiec, Dobre Miasto, Dywity, Jonkowo, Świątki i część gminy Jeziorany położona na południe od linii wyznaczonej przez drogę nr 593 w powiecie olsztyńskim,

— gminy Łukta, Miłakowo, Małdyty, Miłomłyn i Morąg w powiecie ostródzkim,

— gmina Zalewo w powiecie iławskim,

w województwie podlaskim:

— gminy Rudka, Wyszki, część gminy Brańsk położona na północ od linii od linii wyznaczonej przez drogę nr 66 biegnącą od wschodniej granicy gminy do granicy miasta Brańsk i miasto Brańsk w powiecie bielskim,

— gmina Perlejewo w powiecie siemiatyckim,

— gminy Kolno z miastem Kolno, Mały Płock i Turośl w powiecie kolneńskim,

— gmina Poświętne w powiecie białostockim,

— gminy Kulesze Kościelne, Nowe Piekuty, Szepietowo, Klukowo, Ciechanowiec, Wysokie Mazowieckie z miastem Wysokie Mazowieckie, Czyżew w powiecie wysokomazowieckim,

— gminy Miastkowo, Nowogród, Śniadowo i Zbójna w powiecie łomżyńskim,

— powiat zambrowski;

w województwie mazowieckim:

— gminy Ceranów, Kosów Lacki, Sabnie, Sterdyń, część gminy Bielany położona na zachód od linii wyznaczonej przez drogę nr 63 i część gminy wiejskiej Sokołów Podlaskipołożona na zachód od linii wyznaczonej przez drogę nr 63 w powiecie sokołowskim,

— gminy Grębków, Korytnica, Liw, Łochów, Miedzna, Sadowne, Stoczek, Wierzbno i miasto Węgrów w powiecie węgrowskim,

— gminy Rzekuń, Troszyn, Lelis, Czerwin i Goworowo w powiecie ostrołęckim,

— powiat miejski Ostrołęka,

— powiat ostrowski,

— gminy Karniewo, Maków Mazowiecki, Rzewnie i Szelków w powiecie makowskim,

— gmina Krasne w powiecie przasnyskim,

— gminy Mała Wieś i Wyszogród w powiecie płockim,

— gminy Ciechanów z miastem Ciechanów, Glinojeck, Gołymin – Ośrodek, Ojrzeń, Opinogóra Górna i Sońsk w powiecie ciechanowskim,

— gminy Baboszewo, Czerwińsk nad Wisłą, Naruszewo, Płońsk z miastem Płońsk, Sochocin i Załuski w powiecie płońskim,

— gminy Gzy, Obryte, Zatory, Pułtusk i część gminy Winnica położona na wschód od linii wyznaczonej przez drogę łączącą miejscowości Bielany, Winnica i Pokrzywnica w powiecie pułtuskim,

— gminy Brańszczyk, Długosiodło, Rząśnik, Wyszków, Zabrodzie i część gminy Somianka położona na północ od linii wyznaczonej przez drogę nr 62 w powiecie wyszkowskim,

— gminy Jadów, Klembów, Poświętne, Strachówka i Tłuszcz w powiecie wołomińskim,

— gminy Dobre, Stanisławów, część gminy Jakubów położona na północ od linii wyznaczonej przez drogę nr 92, część gminy Kałuszyn położona na północ od linii wyznaczonej przez drogi nr 2 i 92 i część gminy Mińsk Mazowiecki położona na północ od linii wyznaczonej przez drogę nr A2 w powiecie mińskim,

— gminy Garbatka Letnisko, Gniewoszów i Sieciechów w powiecie kozienickim,

— gminy Baranów i Jaktorów w powiecie grodziskim,

— powiat żyrardowski,

— gminy Belsk Duży, Błędów, Goszczyn i Mogielnica w powiecie grójeckim,

— gminy Białobrzegi, Promna, Stara Błotnica, Wyśmierzyce i część gminy Stromiec położona na południe od linii wyznaczonej przez drogę nr 48 w powiecie białobrzeskim,

— gminy Jedlińsk, Jastrzębia i Pionki z miastem Pionki w powiecie radomskim,

— gminy Iłów, Nowa Sucha, Rybno, część gminy Teresin położona na południe od linii wyznaczonej przez drogę nr 92, część gminy wiejskiej Sochaczew położona na południe od linii wyznaczonej przez drogę nr 92 i część miasta Sochaczew położona na południowy zachód od linii wyznaczonej przez drogi nr 50 i 92 w powiecie sochaczewskim,

— gmina Policzna w powiecie zwoleńskim,

— gmina Solec nad Wisłą w powiecie lipskim;

w województwie lubelskim:

— gminy Bełżyce, Borzechów, Bychawa, Niedrzwica Duża, Jastków, Konopnica, Głusk, Strzyżewice, Wysokie, Wojciechów i Zakrzew w powiecie lubelskim,

— gminy Miączyn, Nielisz, Sitno, Komarów-Osada, Sułów, część gminy Szczebrzeszyn położona na północ od linii wyznaczonej przez drogę nr 74 biegnącą od wschodniej granicy gminy do granicy miasta Szczebrzesyzn i część gminy wiejskiej Zamość położona na północ od linii wyznaczonej przez drogę nr 74 w powiecie zamojskim,

— powiat miejski Zamość,

— gmina Jeziorzany i część gminy Kock położona na zachód od linii wyznaczonej przez rzekę Czarną w powiecie lubartowskim,

— gminy Adamów i Serokomla w powiecie łukowskim,

— gminy Nowodwór, Ryki, Ułęż i miasto Dęblin w powiecie ryckim,

— gminy Janowiec, i część gminy wiejskiej Puławy położona na zachód od rzeki Wisły w powiecie puławskim,

— gminy Chodel, Karczmiska, Łaziska, Opole Lubelskie, Poniatowa i Wilków w powiecie opolskim,

— miasto Świdnik w powiecie świdnickim;

— gminy Rudnik i Żółkiewkaw powiecie krasnostawskim,

— gminy Bełżec, Jarczów, Lubycza Królewska, Rachanie, Susiec, Ulhówek i część gminy Łaszczów położona na południe od linii wyznaczonej przez drogę nr 852 w powiecie tomaszowskim,

— gminy Łukowa i Obsza w powiecie biłgorajskim,

— powiat miejski Lublin,

— gminy Kraśnik z miastem Kraśnik, Szastarka, Trzydnik Duży, Urzędów, Wilkołaz i Zakrzówek w powiecie kraśnickim,

— gminy Modliborzyce i Potok Wielki w powiecie janowskim;

w województwie podkarpackim:

— powiat lubaczowski,

— gminy Laszki i Wiązownica w powiecie jarosławskim,

— gminy Pysznica, Zaleszany i miasto Stalowa Wola w powiecie stalowowolskim,

— gmina Gorzyce w powiecie tarnobrzeskim;

w województwie świętokrzyskim:

— gminy Tarłów i Ożarów w powiecie opatowskim,

— gminy Dwikozy, Zawichost i miasto Sandomierz w powiecie sandomierskim.

8. **Romania**

The following areas in Romania:

— Județul Alba,

— Județul Cluj,

— Județul Harghita,

— Județul Hunedoara,

— Județul Iași,

— Județul Neamț,

— Județul Vâlcea,

— Restul județului Mehedinți care nu a fost inclus în Partea III cu următoarele comune:

  — Comuna Garla Mare,

  — Hinova,

  — Burila Mare,

  — Gruia,

  — Pristol,

  — Dubova,

  — Municipiul Drobeta Turnu Severin,

  — Eselnița,

  — Salcia,

  — Devesel,

  — Svinița,

  — Gogoșu,

  — Simian,

  — Orșova,

  — Obârșia Closani,

— Baia de Aramă,

— Bala,

— Florești,

— Broșteni,

— Corcova,

— Isverna,

— Balta,

— Podeni,

— Cireșu,

— Ilovița,

— Ponoarele,

— Ilovăț,

— Patulele,

— Jiana,

— Iyvoru Bârzii,

— Malovat,

— Bălvănești,

— Brezniţa Ocol,

— Godeanu,

— Padina Mare,

— Corlăţel,

— Vânju Mare,

— Vânjuleț,

— Obârșia de Câmp,

— Vânători,

— Vladaia,

— Punghina,

— Cujmir,

— Oprișor,

— Dârvari,

— Căzănești,

— Husnicioara,

— Poroina Mare,

— Prunișor,

— Tămna,

— Livezile,

— Rogova,

— Voloiac,

— Sisești,

— Sovarna,

— Bălăciţa,

— Județul Gorj,

— Județul Suceava,

— Județul Mureș,

— Județul Sibiu,

— Județul Caraș-Severin.

PART II

1. **Belgium**

The following areas in Belgium:

in Luxembourg province:

— the area is delimited clockwise by:

— La frontière avec la France au niveau de Florenville,

— La N85 jusque son intersection avec la N894 au niveau de Florenville,

— La N894 jusque son intersection avec larue de la Motte,

— La rue de la Motte jusque son intersection avec la rue de Neufchâteau,

— La rue de Neufchâteau,

— La rue des Bruyères jusque son intersection avec la rue de la Gaume,

— La rue de la Gaume jusque son intersection avec la rue de l'Accord,

— La rue de l'Accord,

— La rue du Fet,

— La N40 jusque son intersection avec la E25-E411,

— La E25-E411 jusque son intersection avec la N81 au niveau de Weyler,

— La N81 jusque son intersection avec la N883 au niveau d'Aubange,

— La N883 jusque son intersection avec la N88 au niveau d'Aubange,

— La N88 jusque son intersection avec la N811,

— La N811 jusque son intersection avec la rue Baillet Latour,

— La rue Baillet Latour jusque son intersection avec la N88,

— La N88 jusque son intersection avec la N871,

— La N871 jusque son intersection avec la N87 au niveau de Rouvroy,

— La N87 jusque son intersection avec la frontière avec la France.

2. **Bulgaria**

The following areas in Bulgaria:

in Varna region:

— within municipality of Beloslav:

  — Razdelna,

— within municipalty of Devnya:

  — Devnya,

  — Povelyanovo,

  — Padina,

— within municipality of Vetrino:

  — Gabarnitsa,

— within municipality of Provadiya:

  — Staroselets,

  — Petrov dol,

— Provadiya,
— Dobrina,
— Manastir,
— Zhitnitsa,
— Tutrakantsi,
— Bozveliysko,
— Barzitsa,
— Tchayka,

— within municipality of Avren:
— Trastikovo,
— Sindel,
— Avren,
— Kazashka reka,
— Yunak,
— Tsarevtsi,
— Dabravino,

— within municipality of Dalgopol:
— Tsonevo,
— Velichkovo,

— within municipality of Dolni chiflik:
— Nova shipka,
— Goren chiflik,
— Pchelnik,
— Venelin,

in Silistra region:

— within municipality of Kaynardzha:
— Voynovo,
— Kaynardzha,
— Kranovo,
— Zarnik,
— Dobrudzhanka,
— Golesh,
— Svetoslav,
— Polkovnik Cholakovo,
— Kamentzi,
— Gospodinovo,
— Davidovo,
— Sredishte,
— Strelkovo,
— Poprusanovo,
— Posev,

— within municipality of Alfatar:
— Alfatar,
— Alekovo,

- Bistra,
- Kutlovitza,
- Tzar Asen,
- Chukovetz,
- Vasil Levski,

— within municipality of Silistra:

- Glavan,
- Silistra,
- Aydemir,
- Babuk,
- Popkralevo,
- Bogorovo,
- Bradvari,
- Sratzimir,
- Bulgarka,
- Tsenovich,
- Sarpovo,
- Srebarna,
- Smiletz,
- Profesor Ishirkovo,
- Polkovnik Lambrinovo,
- Kalipetrovo,
- Kazimir,
- Yordanovo,

— within municipality of Sitovo:

- Dobrotitza,
- Lyuben,
- Slatina,

— within municipality of Dulovo:

- Varbino,
- Polkovnik Taslakovo,
- Kolobar,
- Kozyak,
- Mezhden,
- Tcherkovna,
- Dulovo,
- Razdel,
- Tchernik,
- Poroyno,
- Vodno,
- Zlatoklas,
- Tchernolik,

in Dobrich region:

— within municipality of Krushari:
  — Kapitan Dimitrovo,
  — Ognyanovo,
  — Zimnitza,
  — Gaber,
— within municipality of Dobrich-selska:
  — Altsek,
  — Vodnyantsi,
  — Feldfebel Denkovo,
  — Hitovo,
— within municipality of Tervel:
  — Brestnitza,
  — Kolartzi,
  — Angelariy,
  — Balik,
  — Bezmer,
  — Bozhan,
  — Bonevo,
  — Voynikovo,
  — Glavantsi,
  — Gradnitsa,
  — Guslar,
  — Kableshkovo,
  — Kladentsi,
  — Kochmar,
  — Mali izvor,
  — Nova Kamena,
  — Onogur,
  — Polkovnik Savovo,
  — Popgruevo,
  — Profesor Zlatarski,
  — Sartents,
  — Tervel,
  — Chestimenstko,
— within municipality Shabla:
  — Shabla,
  — Tyulenovo,
  — Bozhanovo,
  — Gorun,
  — Gorichane,
  — Prolez,
  — Ezeretz,

— Zahari Stoyanovo,

— Vaklino,

— Granichar,

— Durankulak,

— Krapetz,

— Smin,

— Staevtsi,

— Tvarditsa,

— Chernomortzi,

— within municipality of Kavarna:

— Balgarevo,

— Bozhurets,

— Vranino,

— Vidno,

— Irechek,

— Kavarna,

— Kamen briag,

— Mogilishte,

— Neykovo,

— Poruchik Chunchevo,

— Rakovski,

— Sveti Nikola,

— Seltse,

— Topola,

— Travnik,

— Hadzhi Dimitar,

— Chelopechene.

3. **Estonia**

The following areas in Estonia:

— Eesti Vabariik (välja arvatud Hiiu maakond).

4. **Hungary**

The following areas in Hungary:

— Heves megye 700150, 700250, 700260, 700350, 700450, 700460, 700550, 700650, 700750, 700850, 700860, 700950, 701050, 701111, 701150, 701250, 701350, 701550, 701560, 701650, 701750, 701850, 701950, 702050, 702150, 702250, 702260, 702350, 702450, 702750, 702850, 702950, 703050, 703150, 703250, 703370, 705150,705250, 705450,705510 és 705610 kódszámú vadgazdálkodási egységeinek teljes területe,

— Szabolcs-Szatmár-Bereg megye 850950, 851050, 851150, 851250, 851350, 851450, 851550, 851560, 851650, 851660, 851751, 851752, 852850, 852860, 852950, 852960, 853050, 853150, 853160, 853250, 853260, 853350, 853360, 853450, 853550, 854450, 854550, 854560, 854650, 854660, 854750, 854850, 854860, 854870, 854950, 855050, 855150, 855250, 855460, 855750, 855950, 855960, 856051, 856150, 856250, 856260, 856350, 856360, 856450, 856550, 856650, 856750, 856760, 856850, 856950, 857050, 857150, 857350, 857450, 857650, valamint 850150, 850250, 850260, 850350, 850450, 850550, 852050, 852150, 852250 és 857550, továbbá 850650, 850850, 851851 és 851852 kódszámú vadgazdálkodási egységeinek teljes területe,

— Nógrád megye 550110, 550120, 550130, 550210, 550310, 550320, 550450, 550460, 550510, 550610, 550710, 550810, 550950, 551010, 551150, 551160, 551250, 551350, 551360, 551450, 551460, 551550, 551650, 551710, 551810, 551821 és 552360 kódszámú vadgazdálkodási egységeinek teljes területe,

— Borsod-Abaúj-Zemplén megye 650100, 650200, 650300, 650400, 650500, 650600, 650700, 650800, 650900, 651000, 651200, 652100, 655400, 656701, 656702, 656800, 656900, 657010, 657100, 658100, 658310, 658401, 658402, 658404, 658500, 658600, 658700, 658801, 658802, 658901, 658902, 659000, 659100, 659210, 659220, 659300, 659400, 659500, 659601, 659602, 659701, 659800, 659901, 660000, 660100, 660200, 660400, 660501, 660502, 660600 és 660800, valamint 652400, 652500 és 652800 kódszámú vadgazdálkodási egységeinek teljes területe,

— Hajdú-Bihar megye 900150, 900250, 900350, 900450, 900550, 900650, 900660, 900670, 901850, 900850, 900860, 900930, 900950, 901050, 901150, 901450, 902850, 902860, 902950, 902960, 903050, 903150, 903350, 903360, 903370, 903450, 903550, 904450, 904460, 904550, 904650 kódszámú vadgazdálkodási egységeinek teljes területe.

5. **Latvia**

The following areas in Latvia:

— Ādažu novads,

— Aizputes novada Kalvenes pagasts,

— Aglonas novads,

— Aizkraukles novads,

— Aknīstes novads,

— Alojas novads,

— Alūksnes novads,

— Amatas novads,

— Apes novads,

— Auces novads,

— Babītes novads,

— Baldones novads,

— Baltinavas novads,

— Balvu novads,

— Bauskas novads,

— Beverīnas novads,

— Brocēnu novada Blīdenes pagasts, Remtes pagasta daļa uz austrumiem no autoceļa 1154 un P109,

— Burtnieku novads,

— Carnikavas novads,

— Cēsu novads,

— Cesvaines novads,

— Ciblas novads,

— Dagdas novads,

— Daugavpils novads,

— Dobeles novads,

— Dundagas novads,

— Durbes novada Durbes un Vecpils pagasts,

— Engures novads,

— Ērgļu novads,

— Garkalnes novads,

— Gulbenes novads,

— Iecavas novads,

— Ikšķiles novads,

— Ilūkstes novads,

— Inčukalna novads,

— Jaunjelgavas novads,

— Jaunpiebalgas novads,

— Jaunpils novads,

— Jēkabpils novads,

— Jelgavas novads,

— Kandavas novads,

— Kārsavas novads,

— Ķeguma novads,

— Ķekavas novads,

— Kocēnu novads,

— Kokneses novads,

— Krāslavas novads,

— Krimuldas novads,

— Krustpils novads,

— Kuldīgas novada Ēdoles, Īvandes, Padures, Rendas, Kabiles, Rumbas, Kurmāles, Pelču, Snēpeles, Turlavas, Laidu un Vārmes pagasts, Kuldīgas pilsēta,

— Lielvārdes novads,

— Līgatnes novads,

— Limbažu novads,

— Līvānu novads,

— Lubānas novads,

— Ludzas novads,

— Madonas novads,

— Mālpils novads,

— Mārupes novads,

— Mazsalacas novads,

— Mērsraga novads,

— Naukšēnu novads,

— Neretas novads,

— Ogres novads,

— Olaines novads,

— Ozolnieku novads,

— Pārgaujas novads,

— Pļaviņu novads,

— Preiļu novads,

— Priekules novads,

— Priekuļu novads,

— Raunas novads,

— republikas pilsēta Daugavpils,

— republikas pilsēta Jelgava,

— republikas pilsēta Jēkabpils,

— republikas pilsēta Jūrmala,

— republikas pilsēta Rēzekne,

— republikas pilsēta Valmiera,

— Rēzeknes novads,

— Riebiņu novads,

— Rojas novads,

— Ropažu novads,

— Rugāju novads,

— Rundāles novads,

— Rūjienas novads,

— Salacgrīvas novads,

— Salas novads,

— Salaspils novads,

— Saldus novada Novadnieku, Kursīšu, Zvārdes, Pampāļu, Šķēdes, Nīgrandes, Zaņas, Ezeres, Rubas, Jaunauces un Vadakstes pagasts,

— Saulkrastu novads,

— Sējas novads,

— Siguldas novads,

— Skrīveru novads,

— Skrundas novads,

— Smiltenes novads,

— Stopiņu novada daļa, kas atrodas uz austrumiem no autoceļa V36, P4 un P5, Acones ielas, Dauguļupes ielas un Dauguļupītes,

— Strenču novads,

— Talsu novads,

— Tērvetes novads,

— Tukuma novads,

— Vaiņodes novads,

— Valkas novads,

— Varakļānu novads,

— Vārkavas novads,

— Vecpiebalgas novads,

— Vecumnieku novads,

— Ventspils novada Ances, Tārgales, Popes, Vārves, Užavas, Piltenes, Puzes, Ziru, Ugāles, Usmas un Zlēku pagasts, Piltenes pilsēta,

— Viesītes novads,

— Viļakas novads,

— Viļānu novads,

— Zilupes novads.

6. **Lithuania**

The following areas in Lithuania:

— Alytaus miesto savivaldybė,

— Alytaus rajono savivaldybė,

— Anykščių rajono savivaldybė,

— Akmenės rajono savivaldybė: Ventos ir Papilės seniūnijos,

— Biržų miesto savivaldybė,

— Biržų rajono savivaldybė,

— Birštono savivaldybė,

— Druskininkų savivaldybė,

— Elektrėnų savivaldybė,

— Ignalinos rajono savivaldybė,

— Jonavos rajono savivaldybė,

— Joniškio rajono savivaldybė: Kepalių, Kriukų, Saugėlaukio ir Satkūnų seniūnijos,

— Jurbarko rajono savivaldybė,

— Kaišiadorių rajono savivaldybė,

— Kalvarijos savivaldybė,

— Kauno miesto savivaldybė,

— Kauno rajono savivaldybė,

— Kazlų Rūdos savivaldybė,

— Kelmės rajono savivaldybė: Tytuvėnų seniūnijos dalis į rytus ir pietus nuo kelio Nr. 157 ir į rytus nuo kelio Nr. 2105 ir Tytuvėnų apylinkių seniūnijos dalis į pietus nuo kelio Nr. 157 ir į rytus nuo kelio Nr. 2105, Užvenčio, Kukečių dalis į šiaurę nuo kelio Nr. 2128 ir į rytus nuo kelio Nr. 2106, ir Šaukėnų seniūnijos,

— Kėdainių rajono savivaldybė,

— Kupiškio rajono savivaldybė,

— Lazdijų rajono savivaldybė: Būdviečio, Kapčiamieščio, Krosnos, Kučiūnų ir Noragėlių seniūnijos,

— Marijampolės savivaldybė,

— Mažeikių rajono savivaldybė: Šerkšnėnų, Sedos ir Židikų seniūnijos,

— Molėtų rajono savivaldybė,

— Pakruojo rajono savivaldybė,

— Panevėžio rajono savivaldybė,

— Panevėžio miesto savivaldybė,

— Pasvalio rajono savivaldybė,

— Radviliškio rajono savivaldybė,

— Prienų rajono savivaldybė,

— Raseinių rajono savivaldybė: Ariogalos, Betygalos, Pagojukų, Šiluvos,Kalnujų seniūnijos ir Girkalnio seniūnijos dalis į pietus nuo kelio Nr. A1,

— Rokiškio rajono savivaldybė,

— Šakių rajono savivaldybė,

— Šalčininkų rajono savivaldybė,

— Šiaulių miesto savivaldybė,

— Šiaulių rajono savivaldybė: Šiaulių kaimiškoji seniūnija,

— Šilutės rajono savivaldybė: Rusnės seniūnija,

— Širvintų rajono savivaldybė,

— Švenčionių rajono savivaldybė,

— Tauragės rajono savivaldybė: Batakių ir Gaurės seniūnijos,

— Telšių rajono savivaldybė,

— Trakų rajono savivaldybė,

— Ukmergės rajono savivaldybė,

— Utenos rajono savivaldybė,

— Varėnos rajono savivaldybė,

— Vilniaus miesto savivaldybė,

— Vilniaus rajono savivaldybė,

— Vilkaviškio rajono savivaldybė,

— Visagino savivaldybė,

— Zarasų rajono savivaldybė.

7. **Poland**

The following areas in Poland:

w województwie warmińsko-mazurskim:

— gminy Kalinowo, Prostki, Stare Juchy i gmina wiejska Ełk w powiecie ełckim,

— gminy Godkowo, Milejewo, Młynary, Pasłęk, część gminy Elbląg położona na północ od linii wyznaczonej przez drogę nr S7 biegnącą od granicy powiatu miejskigo Elbląg do wschodniej granicy gminy Elbląg, i część obszaru lądowego gminy Tolkmicko położona na południe od linii brzegowej Zalewu Wiślanego i Zatoki Elbląskiej do granicy z gminą wiejską Elbląg w powiecie elbląskim,

— powiat miejski Elbląg,

— gminy Kruklanki, Wydminy, część gminy Miłki położona na wschód od linii wyznaczonej przez drogę nr 63, część gminy Ryn położona na północ od linii kolejowej łączącej miejscowości Giżycko i Kętrzyn i część gminy wiejskiej Giżycko położona na północ od linii wyznaczonej przez drogę nr 59 biegnącą od zachodniej granicy gminy do granicy miasta Giżycko, na północ od linii wyznaczonej przez drogę nr 63 biegnącą od południowej granicy gminy do granicy miasta Giżycko i na północ od granicy miasta Giżycka i miasto Giżycko w powiecie giżyckim,

— powiat gołdapski,

— gmina Pozezdrze i część gminy Węgorzewo położona na zachód od linii wyznaczonej przez drogę nr 63 biegnącą od południowo-wschodniej granicy gminy do skrzyżowania z drogą nr 650, a następnie na południe od linii wyznaczonej przez drogę nr 650 biegnącą od skrzyżowania z drogą nr 63 do skrzyżowania z drogą biegnącą do miejscowości Przystań i na wschód od linii wyznaczonej przez drogę łączącą miejscowości Przystań, Pniewo, Kamionek Wielki, Radzieje, Dłużec w powiecie węgorzewskim,

— powiat olecki,

— gminy Orzysz, Biała Piska i część gminy Pisz położona na północ od linii wyznaczonej przez drogę nr 58 w powiecie piskim,

— gminy Górowo Iławeckie z miastem Górowo Iławeckie, Bisztynek, część gminy wiejskiej Bartoszyce położona na zachód od linii wyznaczonej przez drogę nr 51 biegnącą od północnej granicy gminy do skrzyżowania z drogą nr 57 i na zachód od linii wyznaczonej przez drogę nr 57 biegnącą od skrzyżowania z drogą nr 51 do południowej granicy gminy i miasto Bartoszyce w powiecie bartoszyckim,

— gmina Kolno i część gminy Jeziorany położona na północ od linii wyznaczonej przez drogę nr 593 w powiecie olsztyńskim,

— powiat braniewski,

— gminy Kętrzyn z miastem Kętrzyn, Reszel i część gminy Korsze położona na południe od linii wyznaczonej przez drogę biegnącą od wschodniej granicy łączącą miejscowości Krelikiejmy i Sątoczno i na wschód od linii wyznaczonej przez drogę łączącą miejscowości Sątoczno, Sajna Wielka biegnącą do skrzyżowania z drogą nr 590 w miejscowości Glitajny, a następnie na wschód od drogi nr 590 do skrzyżowania z drogą nr 592 i na południe od linii wyznaczonej przez drogę nr 592 biegnącą od zachodniej granicy gminy do skrzyżowania z drogą nr 590 w powiecie kętrzyńskim,

— powiat lidzbarski,

— część gminy Sorkwity położona na północ od drogi nr 16 i część gminy wiejskiej Mrągowo położona na północ od linii wyznaczonej przez drogę nr 16 biegnącą od zachodniej granicy gminy do granicy miasta Mrągowo oraz na północ od linii wyznaczonej przez drogę nr 59 biegnącą od wschodniej granicy gminy do granicy miasta Mrągowo w powiecie mrągowskim;

w województwie podlaskim:

— powiat grajewski,

— powiat moniecki,

— powiat sejneński,

— gminy Łomża, Piątnica, Jedwabne, Przytuły i Wizna w powiecie łomżyńskim,

— powiat miejski Łomża,

— gminy Mielnik, Nurzec – Stacja, Grodzisk, Drohiczyn, Dziadkowice, Milejczyce i Siemiatycze z miastem Siemiatyczew powiecie siemiatyckim,

— powiat hajnowski,

— gminy Kobylin-Borzymyi Sokoły w powiecie wysokomazowieckim,

— gminy Grabowo i Stawiski w powiecie kolneńskim,

— gminy Czarna Białostocka, Dobrzyniewo Duże, Gródek, Juchnowiec Kościelny, Łapy, Michałowo, Supraśl, Suraż, Turośń Kościelna, Tykocin, Wasilków, Zabłudów, Zawady i Choroszcz w powiecie białostockim,

— gminy Boćki, Orla, Bielsk Podlaski z miastem Bielsk Podlaski i część gminy Brańsk położona na południe od linii od linii wyznaczonej przez drogę nr 66 biegnącą od wschodniej granicy gminy do granicy miasta Brańsk w powiecie bielskim,

— powiat suwalski,

— powiat miejski Suwałki,

— powiat augustowski,

— powiat sokólski,

— powiat miejski Białystok;

w województwie mazowieckim:

— gminy Korczew, Kotuń, Paprotnia, Przesmyki, Wodynie, Skórzec, Mokobody, Mordy, Siedlce, Suchożebry i Zbuczyn w powiecie siedleckim,

— powiat miejski Siedlce,

— gminy Repki, Jabłonna Lacka, część gminy Bielany położona na wschód od linii wyznaczonej przez drogę nr 63 i część gminy wiejskiej Sokołów Podlaski położona na wschód od linii wyznaczonej przez drogę nr 63 w powiecie sokołowskim,

— powiat łosicki,

— gminy Brochów, Młodzieszyn, część gminy Teresin położona na północ od linii wyznaczonej przez drogę nr 92, część gminy wiejskiej Sochaczew położona na północ od linii wyznaczonej przez drogę nr 92 i część miasta Sochaczew położona na północny wschód od linii wyznaczonej przez drogi nr 50 i 92 w powiecie sochaczewskim,

— powiat nowodworski,

— gminy Joniec i Nowe Miasto w powiecie płońskim,

— gminy Pokrzywnica, Świercze i część gminy Winnica położona na zachód od linii wyznaczonej przez drogę łączącą miejscowości Bielany, Winnica i Pokrzywnica w powiecie pułtuskim,

— gminy Dąbrówka, Kobyłka, Marki, Radzymin, Wołomin, Zielonka i Ząbki w powiecie wołomińskim,

— część gminy Somianka położona na południe od linii wyznaczonej przez drogę nr 62 w powiecie wyszkowskim,

— gminy Cegłów, Dębe Wielkie, Halinów, Latowicz, Mrozy, Siennica, Sulejówek, część gminy Jakubów położona na południe od linii wyznaczoenj przez drogę nr 92, część gminy Kałuszyn położona na południe od linii wyznaczonej przez drogi nr 2 i 92 i część gminy Mińsk Mazowiecki położona na południe od linii wyznaczonej przez drogę nr A2 i miasto Mińsk Mazowiecki w powiecie mińskim,

— powiat garwoliński,

— powiat otwocki,

— powiat warszawski zachodni,

— powiat legionowski,

— powiat piaseczyński,

— powiat pruszkowski,

— gminy Chynów, Grójec, Jasieniec, Pniewy i Warkaw powiecie grójeckim,

— gminy Milanówek, Grodzisk Mazowiecki, Podkowa Leśna i Żabia Wola w powiecie grodziskim,

— gminy Grabów nad Pilicą, Magnuszew, Głowaczów, Kozienice w powiecie kozienickim,

— część gminy Stromiec położona na północ od linii wyznaczonej przez drogę nr 48 w powiecie białobrzeskim,

— powiat miejski Warszawa;

w województwie lubelskim:

— gminy Borki, Czemierniki, Kąkolewnica, Komarówka Podlaska, Wohyń i Radzyń Podlaski z miastem Radzyń Podlaski w powiecie radzyńskim,

— gminy Stoczek Łukowski z miastem Stoczek Łukowski, Wola Mysłowska, Trzebieszów, Krzywda, Stanin, część gminy wiejskiej Łuków położona na wschód od linii wyznaczonej przez drogę nr 63 biegnącą od północnej granicy gminy do granicy miasta Łuków i na północ od linii wyznaczonej przez drogę nr 806 biegnącą od wschodniej granicy miasta Łuków do wschodniej granicy gminy wiejskiej Łuków i miasto Łuków w powiecie łukowskim,

— gminy Janów Podlaski, Kodeń, Tuczna, Leśna Podlaska, Rossosz, Łomazy, Konstantynów, Piszczac, Rokitno, Biała Podlaska, Zalesie, Terespol z miastem Terespol, Drelów, Międzyrzec Podlaski z miastem Międzyrzec Podlaski w powiecie bialskim,

— powiat miejski Biała Podlaska,

— gmina Łęczna i część gminy Spiczyn położona na zachód od linii wyznaczonej przez drogę nr 829 w powiecie łęczyńskim,

— część gminy Siemień położona na zachód od linii wyznaczonej przez drogę nr 815 i część gminy Milanów położona na zachód od drogi nr 813 w powiecie parczewskim,

— gminy Niedźwiada, Ostrówek, Abramów, Firlej, Kamionka, Michów, Lubartów z miastem Lubartów i część gminy Kock położona na wschód od linii wyznaczonej przez rzekę Czarną, w powiecie lubartowskim,

— gminy Jabłonna, Krzczonów, Niemce, Garbów i Wólka w powiecie lubelskim,

— gminy Mełgiew, Rybczewice i Piaski w powiecie świdnickim,

— gminy Fajsławice, Gorzków, Izbica, Kraśniczyn, część gminy Krasnystaw położona na zachód od linii wyznaczonej przez drogę nr 17 biegnącą od północno – wschodniej granicy gminy do granicy miasta Krasnystaw, miasto Krasnystaw i część gminy Łopiennik Górny położona na zachód od linii wyznaczonej przez drogę nr 17 w powiecie krasnostawskim,

— gminy Dołhobyczów, Mircze, Trzeszczany, Werbkowice i część gminy wiejskiej Hrubieszów położona na południe od linii wyznaczonej przez drogę nr 844 oraz na południe od linii wyznaczonej przez drogę nr 74 i miasto Hrubieszów w powiecie hrubieszowskim,

— gmina Telatyn, Tyszowce i część gminy Łaszczów położona na północ od linii wyznaczonej przez drogę nr 852 w powiecie tomaszowskim,

— część gminy Wojsławice położona na zachód od linii wyznaczonej przez drogę biegnącą od północnej granicy gminy przez miejscowość Wojsławice do południowej granicy gminy w powiecie chełmskim,

— gminy Grabowiec, Skierbieszów i Stary Zamość w powiecie zamojskim,

— gminy Markuszów, Nałęczów, Kazimierz Dolny, Końskowola, Kurów, Wąwolnica, Żyrzyn, Baranów, część gminy wiejskiej Puławy położona na wschód od rzeki Wisły i miasto Puławy w powiecie puławskim,

— gminy Annopol, Dzierzkowice i Gościeradów w powiecie kraśnickim,

— gmina Józefów nad Wisłą w powiecie opolskim,

— gminy Kłoczew i Stężyca w powiecie ryckim;

w województwie podkarpackim:

— gminy Radomyśl nad Sanem i Zaklików w powiecie stalowowolskim.

8. **Romania**

The following areas in Romania:

— Restul județului Maramureș care nu a fost inclus în Partea III cu următoarele comune:
  — Comuna Vișeu de Sus,
  — Comuna Moisei,
  — Comuna Borșa,
  — Comuna Oarța de Jos,
  — Comuna Suciu de Sus,
  — Comuna Coroieni,
  — Comuna Târgu Lăpuș,
  — Comuna Vima Mică,
  — Comuna Boiu Mare,
  — Comuna Valea Chioarului,
  — Comuna Ulmeni,
  — Comuna Băsești,
  — Comuna Baia Mare,
  — Comuna Tăuții Magherăuș,
  — Comuna Cicărlău,
  — Comuna Seini,
  — Comuna Ardusat,
  — Comuna Farcasa,
  — Comuna Salsig,
  — Comuna Asuaju de Sus,
  — Comuna Băița de sub Codru,
  — Comuna Bicaz,
  — Comuna Grosi,
  — Comuna Recea,
  — Comuna Baia Sprie,
  — Comuna Sisesti,
  — Comuna Cernesti,
  — Copalnic Mănăstur,
  — Comuna Dumbrăvița,
  — Comuna Cupseni,
  — Comuna Șomcuța Mare,
  — Comuna Sacalești,
  — Comuna Remetea Chioarului,
  — Comuna Mireșu Mare,
  — Comuna Ariniș,
— Județul Bistrița-Năsăud.

PART III

1. **Latvia**

The following areas in Latvia:

— Brocēnu novada Cieceres un Gaiķu pagasts, Remtes pagasta daļa uz rietumiem no autoceļa 1154 un P109, Brocēnu pilsēta,

— Saldus novada Saldus, Zirņu, Lutriņu un Jaunlutriņu pagasts, Saldus pilsēta.

2. **Lithuania**

The following areas in Lithuania:

— Akmenės rajono savivaldybė: Akmenės, Kruopių, Naujosios Akmenės kaimiškoji ir Naujosios Akmenės miesto seniūnijos,

— Joniškio rajono savivaldybė: Gaižaičių, Gataučių, Joniškio, Rudiškių, Skaistgirio, Žagarės seniūnijos,

— Lazdijų rajono savivaldybė: Lazdijų miesto, Lazdijų, Seirijų, Šeštokų, Šventežerio ir Veisiejų seniūnijos,

— Mažeikių rajono savivaldybės: Laižuvos, Mažeikių apylinkės, Mažeikių, Reivyčių, Tirkšlių ir Viekšnių seniūnijos,

— Šiaulių rajono savivaldybės: Bubių, Ginkūnų, Gruzdžių, Kairių, Kuršėnų kaimiškoji, Kuršėnų miesto, Kužių, Meškuičių, Raudėnų ir Šakynos seniūnijos.

3. **Poland**

The following areas in Poland:

w województwie warmińsko-mazurskim:

— gmina Sępopol i część gminy wiejskiej Bartoszyce położona na wschód od linii wyznaczonej przez drogę nr 51 biegnącą od północnej granicy gminy do skrzyżowania z drogą nr 57 i na wschód od linii wyznaczonej przez drogę nr 57 biegnącą od skrzyżowania z drogą nr 51 do południowej granicy gminy w powiecie bartoszyckim,

— gminy Srokowo, Barciany i część gminy Korsze położona na północ od linii wyznaczonej przez drogę biegnącą od wschodniej granicy łączącą miejscowości Krelikiejmy i Sątoczno i na zachód od linii wyznaczonej przez drogę łączącą miejscowości Sątoczno, Sajna Wielka biegnącą do skrzyżowania z drogą nr 590 w miejscowości Glitajny, a następnie na zachód od drogi nr 590 do skrzyżowania z drogą nr 592 i na północ od linii wyznaczonej przez drogę nr 592 biegnącą od zachodniej granicy gminy do skrzyżowania z drogą nr 590 w powiecie kętrzyńskim,

— gmina Budry i część gminy Węgorzewo położona na wschód od linii wyznaczonej przez drogę nr 63 biegnącą od południowo-wschodniej granicy gminy do skrzyżowania z drogą nr 650, a następnie na północ od linii wyznaczonej przez drogę nr 650 biegnącą od skrzyżowania z drogą nr 63 do skrzyżowania z drogą biegnącą do miejscowości Przystań i na zachód od linii wyznaczonej przez drogę łączącą miejscowości Przystań, Pniewo, Kamionek Wielki, Radzieje, Dłużec w powiecie węgorzewskim,

w województwie mazowieckim:

— gminy Domanice i Wiśniew w powiecie siedleckim,

w województwie lubelskim:

— gminy Białopole, Dubienka, Chełm, Leśniowice, Wierzbica, Sawin, Ruda Huta, Dorohusk, Kamień, Rejowiec, Rejowiec Fabryczny z miastem Rejowiec Fabryczny, Siedliszcze, Żmudź i część gminy Wojsławice położona na wschód od linii wyznaczonej przez drogę biegnącą od północnej granicy gminy do miejscowości Wojsławice do południowej granicy gminy w powiecie chełmskim,

— powiat miejski Chełm,

— gmina Siennica Różana część gminy Łopiennik Górny położona na wschód od linii wyznaczonej przez drogę nr 17 i część gminy Krasnystaw położona na wschód od linii wyznaczonej przez drogę nr 17 biegnącą od północno – wschodniej granicy gminy do granicy miasta Krasnystaw w powiecie krasnostawskim,

— gminy Hanna, Hańsk, Wola Uhruska, Urszulin, Stary Brus, Wyryki i gmina wiejska Włodawa w powiecie włodawskim,

— gminy Cyców, Ludwin, Puchaczów, Milejów i część gminy Spiczyn położona na wschód od linii wyznaczonej przez drogę nr 829 w powiecie łęczyńskim,

— gmina Trawniki w powiecie świdnickim,

— gminy Jabłoń, Podedwórze, Dębowa Kłoda, Parczew, Sosnowica, część gminy Siemień położona na wschód od linii wyznaczonej przez drogę nr 815 i część gminy Milanów położona na wschód od drogi nr 813 w powiecie parczewskim,

— gminy Sławatycze, Sosnówka, i Wisznice w powiecie bialskim,

— gmina Ulan Majorat w powiecie radzyńskim,

— gminy Ostrów Lubelski, Serniki i Uścimów w powiecie lubartowskim,

— gmina Wojcieszków i część gminy wiejskiej Łuków położona na zachód od linii wyznaczonej przez drogę nr 63 biegnącą od północnej granicy gminy do granicy miasta Łuków, a następnie na północ, zachód, południe i wschód od linii stanowiącej północną, zachodnią, południową i wschodnią granicę miasta Łuków do jej przecięcia się z drogą nr 806 i na południe od linii wyznaczonej przez drogę nr 806 biegnącą od wschodniej granicy miasta Łuków do wschodniej granicy gminy wiejskiej Łuków w powiecie łukowskim,

— gminy Horodło, Uchanie i część gminy wiejskiej Hrubieszów położona na północ od linii wyznaczonej przez drogę nr 844 biegnącą od zachodniej granicy gminy wiejskiej Hrubieszów do granicy miasta Hrubieszów oraz na północ od linii wyznaczonej przez drogę nr 74 biegnącą od wschodniej granicy miasta Hrubieszów do wschodniej granicy gminy wiejskiej Hrubieszów w powiecie hrubieszowskim,

4. **Romania**

The following areas in Romania:

— Zona orașului București,

— Județul Constanța,

— Județul Satu Mare,

— Județul Tulcea,

— Județul Bacău,

— Județul Bihor,

— Județul Brăila,

— Județul Buzău,

— Județul Călărași,

— Județul Dâmbovița,

— Județul Galați,

— Județul Giurgiu,

— Județul Ialomița,

— Județul Ilfov,

— Județul Prahova,

— Județul Sălaj,

— Județul Vaslui,

— Județul Vrancea,

— Județul Teleorman,

— Partea din județul Maramureș cu următoarele delimitări:

  — Comuna Petrova,

  — Comuna Bistra,

  — Comuna Repedea,

  — Comuna Poienile de sub Munte,

  — Comuna Vișeu e Jos,

  — Comuna Ruscova,

  — Comuna Leordina,

  — Comuna Rozavlea,

  — Comuna Strâmtura,

- Comuna Bârsana,
- Comuna Rona de Sus,
- Comuna Rona de Jos,
- Comuna Bocoiu Mare,
- Comuna Sighetu Marmației,
- Comuna Sarasau,
- Comuna Câmpulung la Tisa,
- Comuna Săpânța,
- Comuna Remeti,
- Comuna Giulești,
- Comuna Ocna Șugatag,
- Comuna Desești,
- Comuna Budești,
- Comuna Băiuț,
- Comuna Cavnic,
- Comuna Lăpuș,
- Comuna Dragomirești,
- Comuna Ieud,
- Comuna Săliștea de Sus,
- Comuna Săcel,
- Comuna Călinești,
- Comuna Vadu Izei,
- Comuna Botiza,
- Comuna Bogdan Vodă,
- Localitatea Groșii Țibleșului, comuna Suciu de Sus,
- Localitatea Vișeu de Mijloc, comuna Vișeu de Sus,
- Localitatea Vișeu de Sus, comuna Vișeu de Sus.

— Partea din județul Mehedinți cu următoarele comune:

- Comuna Strehaia,
- Comuna Greci,
- Comuna Brejnita Motru,
- Comuna Butoiești,
- Comuna Stângăceaua,
- Comuna Grozesti,
- Comuna Dumbrava de Jos,
- Comuna Băcles,
- Comuna Bălăcița,

— Județul Argeș,

— Județul Olt,

— Județul Dolj,

— Județul Arad,

— Județul Timiș,

— Județul Covasna,

— Județul Brașov,

— Județul Botoșani.

PART IV

Italy

The following areas in Italy:

— tutto il territorio della Sardegna.'

RECOMMENDATIONS

COMMISSION RECOMMENDATION (EU) 2019/794

of 15 May 2019

on a coordinated control plan with a view to establishing the prevalence of certain substances migrating from materials and articles intended to come into contact with food

(notified under document C(2019) 3519)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 292 thereof,

Having regard to Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules ([1]), and in particular Article 53 thereof,

After consulting the Standing Committee on Plants, Animals, Food and Feed,

Whereas:

(1) Article 53 of Regulation (EC) No 882/2004 empowers the Commission to recommend coordinated control plans where considered necessary, organised on an ad hoc basis, with a view to establishing the prevalence of hazards in feed, food and animals.

(2) Regulation (EC) No 1935/2004 of the European Parliament and of the Council ([2]) lays down general requirements on the safety of materials and articles intended to come into contact with food ('food contact materials'), specifically regarding the transfer of the constituents of food contact materials into food. In addition, specific measures for groups of food contact materials have been established in accordance with Article 5(1) of that Regulation. In particular, for plastic food contact materials, a list of authorised substances has been established under Commission Regulation (EU) No 10/2011 ([3]). Some of these authorised substances are also subject to restrictions, including Specific Migration Limits (SML), which restrict their migration into or onto food.

(3) Information available from the Rapid Alert System for Food and Feed ('RASFF') reported pursuant to Article 50 of Regulation (EC) No 178/2002 of the European Parliament and of the Council ([4]) indicates various non-compliances as regards migration of certain substances from food contact materials. However, at present there is inadequate information to sufficiently determine the prevalence of these substances in food migrating from food contact materials.

(4) Primary aromatic amines ('PAA') are a family of compounds, some of which are carcinogenic, while others are suspected carcinogens. PAA may arise in food contact materials from authorised substances, from the presence of impurities or from breakdown products as well as the use of azo dyes to colour materials. Annex II of Regulation (EU) No 10/2011 sets out that such PAA shall not migrate from plastic materials and articles into food or food simulant. Work undertaken by the Joint Research Centre of the European Commission has also determined that PAA occur at concentrations in coloured paper napkins that are relevant for monitoring.

([1]) OJ L 165, 30.4.2004, p. 1.
([2]) Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC (OJ L 338, 13.11.2004, p. 4).
([3]) Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food (OJ L 12, 15.1.2011, p. 1).
([4]) Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (OJ L 31, 1.2.2002, p. 1).

(5) Formaldehyde (FCM No 98) is a substance authorised at Union level for use in the manufacture of plastic food contact materials. However, it is subject to an SML of 15 mg/kg (expressed as total formaldehyde and hexamethylenetetramine).

(6) Commission Regulation (EU) No 284/2011 ([5]) lays down specific conditions and detailed procedures for the import of polyamide and melamine plastic kitchenware originating in or consigned from the People's Republic of China and Hong Kong, including mandatory physical controls of 10 % of consignments by Member States. The Regulation was introduced on the basis of elevated numbers of non-compliances due to the release of high levels of PAA from polyamide plastic food contact materials and formaldehyde from melamine plastic food contact materials.

(7) A recent analysis of data based on controls carried out at the point of import into the European Union and reported in accordance with Article 9 of Regulation (EU) No 284/2011 indicates a decrease in non-compliance of these products. Nevertheless, RASFF data shows that some of these products are still non-compliant based on results from analysis of samples taken from the market. Information also shows that the origin of such products is not restricted to China and Hong Kong. It is therefore appropriate to control levels of PAA and formaldehyde in addition to the controls carried out under Regulation (EU) No 284/2011.

(8) Melamine (FCM No 239) is a substance also authorised in the manufacture of plastic food contact materials and subject to an SML of 2,5 mg/kg. In addition to formaldehyde, migration of melamine from melamine plastic kitchenware has also been reported. It is therefore appropriate to control levels of melamine migrating from the same samples.

(9) Phenol (FCM No 241) is a substance authorised for use as a monomer to manufacture plastic food contact materials and may also be used to manufacture other types of materials that come into contact with food, including epoxy resins used in varnishes and coatings. An SML of 3 mg/kg applies to plastic food contact materials, which was introduced by Commission Regulation (EU) 2015/174 ([6]) on the basis of a re-evaluation by the European Food Safety Authority ('the Authority'). In its opinion, the Authority reduced the Tolerable Daily Intake (TDI) from 1,5 mg/kg bw to 0,5 mg/kg bodyweight (bw), noting that there are many sources of exposure to phenol in addition to food contact materials, which may contribute to levels of exposure at or above the TDI. It is therefore appropriate to control levels of phenol in light of potential exceedances of the TDI.

(10) The substance 2,2-bis(4-hydroxyphenyl)propane (FCM No 151), commonly known as bisphenol A ('BPA') is a substance authorised for use as a monomer to manufacture plastic food contact materials but is also used to manufacture other materials and articles which come into contact with food, including epoxy resins used in varnishes and coatings. Recently, a new SML of 0,05 mg/kg was introduced by Commission Regulation (EU) 2018/213 ([7]) for plastic food contact materials and in addition the SML applies to varnishes and coatings, on the basis of a re-evaluation by the Authority, who concluded on a lower temporary Tolerable Daily Intake (tTDI) compared to the previous TDI. It is therefore appropriate to control these food contact materials to determine compliance of BPA migration in light of this new SML.

(11) In addition to BPA, other bisphenols may be used in or migrate from food contact materials. In particular, 4,4′-dihydroxydiphenyl sulphone, commonly known as bisphenol S ('BPS', FCM No 154) is used as a monomer to manufacture polyethersulphone plastic and is authorised to be used for manufacturing plastic food contact materials in the Union with an SML of 0,05 mg/kg. There is no recent information available on its possible migration into food and information on its possible use or migration from varnished or coated food contact materials is incomplete. It is therefore appropriate to control materials from which BPS potentially migrates to check for the prevalence of BPS migrating into food.

(12) Phthalate esters ('phthalates') are a group of substances widely used as plasticisers and technical support agents. Five phthalates have been authorised for use in plastic food contact materials, including di-butylphthalate

([5]) Commission Regulation (EU) No 284/2011 of 22 March 2011 laying down specific conditions and detailed procedures for the import of polyamide and melamine plastic kitchenware originating in or consigned from the People's Republic of China and Hong Kong Special Administrative Region, China (OJ L 77, 23.3.2011, p. 25).

([6]) Commission Regulation (EU) 2015/174 of 5 February 2015 amending and correcting Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food (OJ L 30, 6.2.2015, p. 2).

([7]) Commission Regulation (EU) 2018/213 of 12 February 2018 on the use of bisphenol A in varnishes and coatings intended to come into contact with food and amending Regulation (EU) No 10/2011 as regards the use of that substance in plastic food contact materials (OJ L 41, 14.2.2018, p. 6).

('DBP', FCM No 157), butyl-benzyl-phthalate ('BBP', FCM No 159), bis(2-ethylhexyl)phthalate ('DEHP', FCM No 283), diisononyl phthalate ('DINP', FCM No 728) and diisodecyl phthalate ('DIDP', FCM No 729). These phthalates are included in a group restriction SML (T) of 60 mg/kg, along with a number of other substances. Individual SMLs are also applicable to DBP, BBP and DEHP, whereas a group restriction exists for DINP and DIDP of 9 mg/kg. The concentration of these five phthalates is also restricted in childcare articles for feeding, as set out in Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council ([8]). In addition to results from the RASFF indicating non-compliance with the SMLs, phthalates that are not authorised for use in plastic food contact materials may still be found in plastic food contact materials and migrate into food. It is therefore appropriate to control levels of phthalates in light of possible non-compliance.

(13) In addition to the use of phthalates, other non-phthalate substances are also used in food contact materials as plasticisers. Epoxidized soybean oil ('ESBO', FCM No 532) as well as 1,2-Cyclohexane dicarboxylic acid diisononyl ester ('DINCH', FCM No 775) and terephthalic acid, bis(2-ethylhexyl)ester ('DEHTP' or 'DOTP', FCM No 798) are authorised for use in the manufacture of plastic food contact materials and are included in the group SML (T) of 60 mg/kg. In addition, both DEHTP and ESBO have individual SMLs of 60 mg/kg, except in the case of PVC gaskets used to seal glass jars containing infant and baby foods for infants and young children where, the SML for ESBO is 30 mg/kg. Previous work carried out by Member States and Switzerland has identified compliance issues with the migration of ESBO from jar lids. As there is also an indication that DINCH and DEHTP may be used as replacements for phthalates and there is little or no available information on their migration into food, it is appropriate to check for the prevalence of these substances migrating into food.

(14) Per- and polyfluoroalkyl substances ('PFAS') are a group of compounds that includes perfluorooctanoic acid ('PFOA') and perfluorooctane sulphonate ('PFOS'). Due to their amphiphilic properties, these fluorinated compounds are used in the production of water and fat repellent coatings such as those used on paper and board based food packaging materials. Information from some Member States indicates possible concerns on the levels of these substances in coated paper and board based packaging materials. In addition, PFOA is restricted for use in the production and placing on the market of articles, including food contact materials and articles from 4 July 2020, as laid down in Commission Regulation (EU) 2017/1000 ([9]). It is therefore appropriate to further investigate the prevalence of these substances in food contact materials.

(15) Metals and alloys are used in food contact materials and articles including kitchenware and tableware as well as food processing equipment. A number of SMLs are laid down at Union level for metals migrating from plastic food contact materials; however, information from the RASFF shows a number of non-compliances for metal kitchenware and tableware, based on risk assessments or moreover national legislation. As the hazards from certain metals such as lead and cadmium is well defined, it is appropriate to carry out controls on the migration of metals into food and to improve the understanding of the prevalence of migration of metals, including in particular from imported food contact materials and articles as well as traditional and artisanal products.

(16) In order to ensure the overall inertness and safety of plastic food contact materials, an overall migration limit (OML) is set to restrict the release of non-volatile constituents into food, including particles such as microfibres. As conventional plastic materials and articles are under pressure to be replaced due to environmental concerns, additives derived from natural sources are being used as fillers in combination with plastic in order to reduce environmental impacts. In order to verify that good manufacturing practices have been followed and that these plastic food contact materials and articles are sufficiently inert, it is appropriate to control for overall migration.

(17) To ensure uniform application of this Recommendation and in order to generate reliable and comparable results of the controls, the European Union Reference Laboratory (EU-RL) for Food Contact Materials should assist Member States in implementing this Recommendation where necessary.

([8]) Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 396, 30.12.2006, p. 1).

([9]) Commission Regulation (EU) 2017/1000 of 13 June 2017 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards perfluorooctanoic acid (PFOA), its salts and PFOA-related substances (OJ L 150, 14.6.2017, p. 14).

(18) In order to maximise the available information on the prevalence of substances migrating from food contact materials, Member States should also be encouraged to submit relevant data that have been generated recently, prior to the application of this Recommendation. To ensure that these results are reliable and consistent with those generated as part of this control program, only those results that have been generated following relevant rules on the sampling and analysis of the food contact materials as well as legislation on official controls should be reported.

(19) The primary aim of this Recommendation is to establish the prevalence of substances migrating from food contact materials and articles into food or the prevalence of substances in the food contact material or article; it is not intended to contribute to the understanding of exposure levels. Data should therefore be submitted using a common format in order to ensure that they are coordinated and compiled in a consistent manner.

(20) Where appropriate, the competent authorities of the Member States should consider enforcement action in accordance with applicable legislation and procedures.

(21) The information generated on the prevalence of these substances resulting from this Recommendation should be used to determine whether any possible future action is necessary, in particular to secure a high level of human health protection and the interests of consumers. Such future action may include additional control measures for substances from plastic materials for which specific EU measures exist. In addition, the results may contribute towards an information base on which to consider future priorities in the context of the evaluation of food contact materials legislation, in particular for materials for which no specific EU measures exist.

(22) The implementation of this coordinated control plan is without prejudice to other official controls carried out by Member States in the framework of their national control programmes, as provided in Article 3 of Regulation (EC) No 882/2004,

HAS ADOPTED THIS RECOMMENDATION:

1. Member States should implement the coordinated control plan for materials and articles intended to come into contact with food as indicated in the Annex to this Recommendation. The minimum total number of samples recommended in the Annex should be followed as far as possible.

2. Member States should report the results of the official controls carried out in accordance with the Annex.

3. Member States should also report results generated as part of any previous controls undertaken within the five years prior to 1 January 2019. These controls should be relevant to the substances in or migrating from materials and articles intended to come into contact with food subject to this Recommendation and undertaken in accordance with relevant legislation on materials and articles intended to come into contact with food and official controls. The results should be reported in accordance with the Annex.

4. In case of non-compliance, Member States should consider further enforcement action in accordance with Article 54 of Regulation (EC) No 882/2004. Without prejudice to other reporting requirements, such enforcement action should not be reported to the Commission in the context of this Recommendation.

5. This Recommendation is addressed to the Member States.

Done at Brussels, 15 May 2019.

For the Commission
Vytenis ANDRIUKAITIS
Member of the Commission

ANNEX

ACTIONS AND SCOPE OF THE COORDINATED CONTROL PLAN

1. **Objective**

The general objective of the control plan is to establish the prevalence of substances migrating from food contact materials into food or the presence of substances in the food contact material. Competent Authorities of the Member States should therefore carry out official controls in order to establish the prevalence on the European Union market as regards

— the migration of targeted substances from food contact materials,

— targeted substances in food contact materials,

— overall migration from plastic food contact materials.

2. **Sample descriptions and methodology**

The table below sets out the types of food contact materials, which should be sampled together with the substances for which migration from those food contact materials should be analysed, except in the case of fluorinated compounds for which the quantity in the material should be analysed.

Sampling should include the point of import for food contact materials from third countries, although Member States should take into account controls already being undertaken in accordance with Regulation (EU) No 284/2011. Member States should also undertake market controls, including sampling at wholesale and distribution points in order to permit access to a sufficient sample size of a given lot or batch and where necessary facilitate any follow up action.

Laboratories used for the analysis of samples should be those laboratories designated in accordance with Article 12 of Regulation (EC) No 882/2004, supported by national reference laboratories in accordance with Article 33(2)(e) of that Regulation. The EU-RL should support this Recommendation in accordance with Article 94(2)(a) of Regulation (EU) 2017/625 of the European Parliament and of the Council ([1]) if required by national reference laboratories.

If it is not practical to determine the migration using a food or food simulant, the prevalence should be determined in the material and calculation or modelling should be used to estimate the maximum migration into the food.

Substances to be tested	Food contact material to be sampled
Primary aromatic amines (PAA)	Plastic tableware and kitchenware and printed food contact materials including paper and board
Formaldehyde and Melamine	Plastic tableware and kitchenware including non-conventional plastic kitchenware and tableware, such as reusable coffee cups using additives in the plastic derived from natural sources such as bamboo
Phenol	Plastic kitchenware and tableware; varnished or coated materials and; printed plastic and paper and board packaging materials
Bisphenols including BPA and BPS	Polycarbonate plastic (BPA) and polyethersulfone plastic (BPS); coated metal packaging (e.g. cans, lids)

([1]) Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products, amending Regulations (EC) No 999/2001, (EC) No 396/2005, (EC) No 1069/2009, (EC) No 1107/2009, (EU) No 1151/2012, (EU) No 652/2014, (EU) 2016/429 and (EU) 2016/2031 of the European Parliament and of the Council, Council Regulations (EC) No 1/2005 and (EC) No 1099/2009 and Council Directives 98/58/EC, 1999/74/EC, 2007/43/EC, 2008/119/EC and 2008/120/EC, and repealing Regulations (EC) No 854/2004 and (EC) No 882/2004 of the European Parliament and of the Council, Council Directives 89/608/EEC, 89/662/EEC, 90/425/EEC, 91/496/EEC, 96/23/EC, 96/93/EC and 97/78/EC and Council Decision 92/438/EEC (Official Controls Regulation) (OJ L 95, 7.4.2017, p. 1).

Substances to be tested	Food contact material to be sampled
Phthalates and non-phthalate plasticisers	Plastic materials and articles, in particular those manufactured using polyvinylchloride (PVC) such as thermoformed sheets, flexible packaging and tubing; closures and lids
Fluorinated compounds	Paper and board based materials and articles, including those used to wrap fast-food, takeaway and bakery products and microwave popcorn bags
Metals	Ceramic, enamel, vitreous and metal kitchenware and tableware including artisanal and traditionally produced materials and articles
Overall migration	Non-conventional plastic kitchenware and tableware, such as reusable coffee cups using additives in the plastic derived from natural sources such as bamboo

3. **Sample numbers**

The table below gives the indicative recommended total number of samples to be tested in each Member State, for those Member States that are participating, for the purpose of this coordinated control plan.

Member State	Recommended minimum total number of samples
Belgium, Germany, Spain, France, Italy, United Kingdom	100
Czechia, Cyprus, Hungary, Netherlands, Poland, Romania	75
Denmark, Ireland, Greece, Croatia, Lithuania, Austria, Portugal, Sweden	50
Bulgaria, Estonia, Latvia, Luxembourg, Malta, Slovenia, Slovakia, Finland	25

4. **Time frame for controls**

Controls should take place from 1 June 2019 to 31 December 2019.

5. **Reporting**

The results should be reported to the Commission using a common format by 29 February 2020.

ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS

Regulation No 134 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of hydrogen-fuelled vehicles (HFCV) [2019/795]

Incorporating all valid text up to:

Supplement 3 to the original version of the Regulation — Date of entry into force: 19 July 2018

CONTENTS

REGULATION

ANNEXES

1. SCOPE

This Regulation applies to ([1]):

1.1. Part I — Compressed hydrogen storage systems for hydrogen-fuelled vehicles on their safety-related performance.

1.2. Part II — Specific components for compressed hydrogen storage systems for hydrogenfuelled vehicles on their safety-related performance.

1.3. Part III — Hydrogenfuelled vehicles of category M and N ([2]) incorporating compressed hydrogen storage system on its safety-related performance.

2. DEFINITIONS

For the purpose of this Regulation, the following definitions shall apply:

2.1. 'Burst disc' means the non-reclosing operating part of a pressure relief device which, when installed in the device, is designed to burst at a predetermined pressure to permit the discharge of compressed hydrogen.

2.2. 'Check valve' means a non-return valve that prevents reverse flow in the vehicle fuel line.

2.3. 'Compressed hydrogen storage system (CHSS)' means a system designed to store hydrogen fuel for a hydrogen-fuelled vehicle and composed of a pressurised container, pressure relief devices (PRDs) and shut off device(s) that isolate the stored hydrogen from the remainder of the fuel system and its environment.

2.4. 'Container' (for hydrogen storage) means the component within the hydrogen storage system that stores the primary volume of hydrogen fuel.

2.5. 'Date of removal from service' means the date (month and year) specified for removal from service.

([1]) This Regulation does not cover the electrical safety of electric power train, the material compatibility and hydrogen embrittlement of the vehicle fuel system, and the post crash fuel system integrity in the event of full width frontal impact and rear impact.

([2]) As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2. — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

2.6. 'Date of manufacture' (of a compressed hydrogen container) means the date (month and year) of the proof pressure test carried out during manufacture.

2.7. 'Enclosed or semi-enclosed spaces' means the special volumes within the vehicle (or the vehicle outline across openings) that are external to the hydrogen system (storage system, fuel cell system and fuel flow management system) and its housings (if any) where hydrogen may accumulate (and thereby pose a hazard), as it may occur in the passenger compartment, luggage compartment and space under the hood.

2.8. 'Exhaust point of discharge' means the geometric centre of the area where fuel cell purged gas is discharged from the vehicle.

2.9. 'Fuel cell system' means a system containing the fuel cell stack(s), air processing system, fuel flow control system, exhaust system, thermal management system and water management system.

2.10. 'Fuelling receptacle' means the equipment to which a fuelling station nozzle attaches to the vehicle and through which fuel is transferred to the vehicle. The fuelling receptacle is used as an alternative to a fuelling port.

2.11. 'Hydrogen concentration' means the percentage of the hydrogen moles (or molecules) within the mixture of hydrogen and air (equivalent to the partial volume of hydrogen gas).

2.12. 'Hydrogen-fuelled vehicle' means any motor vehicle that uses compressed gaseous hydrogen as a fuel to propel the vehicle, including fuel cell and internal combustion engine vehicles. Hydrogen fuel for passenger vehicles is specified in ISO 14687-2: 2012 and SAE J2719: (September 2011 Revision).

2.13. 'Luggage compartment' means the space in the vehicle for luggage and/or goods accommodation, bounded by the roof, hood, floor, side walls, being separated from the passenger compartment by the front bulkhead or the rear bulkhead.

2.14. 'Manufacturer' means the person or body responsible to the approval authority for all aspects of the type approval process and for ensuring conformity of production. It is not essential that the person or body is directly involved in all stages of the construction of the vehicle, system or component which is the subject of the approval process.

2.15. 'Maximum allowable working pressure (MAWP)' means the highest gauge pressure to which a pressure container or storage system is permitted to operate under normal operating conditions.

2.16. 'Maximum fuelling pressure (MFP)' means the maximum pressure applied to compressed system during fuelling. The maximum fuelling pressure is 125 per cent of the Nominal Working Pressure.

2.17. 'Nominal working pressure (NWP)' means the gauge pressure that characterises typical operation of a system. For compressed hydrogen gas containers, NWP is the settled pressure of compressed gas in fully fuelled container or storage system at a uniform temperature of 15 °C.

2.18. 'Pressure relief device (PRD)' means a device that, when activated under specified performance conditions, is used to release hydrogen from a pressurised system and thereby prevent failure of the system.

2.19. 'Rupture' or 'burst' both mean to come apart suddenly and violently, break open or fly into pieces due to the force of internal pressure.

2.20. 'Safety relief valve' means a pressure relief device that opens at a preset pressure level and can re-close.

2.21. 'Service life' (of a compressed hydrogen container) means the time frame during which service (usage) is authorised.

2.22. 'Shut-off valve' means a valve between the storage container and the vehicle fuel system that can be automatically activated; which defaults to the 'closed' position when not connected to a power source.

2.23. 'Single failure' means a failure caused by a single event, including any consequential failures resulting from this failure.

2.24. 'Thermally-activated pressure relief device (TPRD)' means a non- reclosing PRD that is activated by temperature to open and release hydrogen gas.

2.25. 'Type of hydrogen storage system' means an assembly of components which do not differ significantly in such essential aspects as:

(a) The manufacturer's trade name or mark;

(b) The state of stored hydrogen fuel; compressed gas;

(c) The nominal working pressure (NWP);

(d) The structure, materials, capacity and physical dimensions of the container; and

(e) The structure, materials and essential characteristics of TPRD, check valve and shut-off valve, if any.

2.26. 'Type of specific components of hydrogen storage system' means a component or an assembly of components which do not differ significantly in such essential aspects as:

(a) The manufacturer's trade name or mark;

(b) The state of stored hydrogen fuel; compressed gas;

(c) The sort of component: (T)PRD, check-valve or shut-off valve; and

(d) The structure, materials and essential characteristics.

2.27. 'Vehicle type' with regard to hydrogen safety means vehicles which do not differ in such essential aspects as:

(a) The manufacturer's trade name or mark; and

(b) The basic configuration and main characteristics of the vehicle fuel system.

2.28. 'Vehicle fuel system' means an assembly of components used to store or supply hydrogen fuel to a fuel cell (FC) or internal combustion engine (ICE).

3. APPLICATION FOR APPROVAL

3.1. Part I: Application for approval of a type of the compressed hydrogen storage system.

3.1.1. The application for approval of a type of hydrogen storage system shall be submitted by the manufacturer of the hydrogen storage system or by their authorised representative.

3.1.2. A model of information document is shown in Annex 1, Part 1-I.

3.1.3. A sufficient number of hydrogen storage systems representatives of the type to be approved shall be submitted to the Technical Service conducting the approval tests.

3.2. Part II: Application for approval of a type of specific component for compressed hydrogen storage system.

3.2.1. The application for approval of a type of specific component shall be submitted by the manufacturer of the specific component or by their authorised representative.

3.2.2. A model of information document is shown in Annex 1, Part 1-II.

3.2.3. A sufficient number of specific components of hydrogen storage system representatives of the type to be approved shall be submitted to the Technical Service conducting the approval tests.

3.3. Part III: Application for approval of a vehicle type.

3.3.1. The application for approval of a vehicle type shall be submitted by the vehicle manufacturer or by their authorised representative.

3.3.2. A model of information document is shown in Annex 1, Part 1- III.

3.3.3. A sufficient number of vehicles representatives of the type to be approved shall be submitted to the Technical Service conducting the approval tests.

4. APPROVAL

4.1. Granting of type approval.

4.1.1. Approval of a type of compressed hydrogen storage system.

If the hydrogen storage system submitted for approval pursuant to this Regulation meets the requirements of Part I below, approval of that type of hydrogen storage system shall be granted.

4.1.2. Approval of a type of specific component for the compressed hydrogen storage system.

If the specific component submitted for approval pursuant to this Regulation meets the requirements of Part II below, approval of that type of specific component shall be granted.

4.1.3. Approval of a vehicle type.

If the vehicle submitted for approval pursuant to this Regulation meets the requirements of Part III below, approval of that vehicle type shall be granted.

4.2. An approval number shall be assigned to each type approved: its first two digits (00 for the Regulation in its initial form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another vehicle or component type.

4.3. Notice of approval or of extension, refusal or withdrawal of approval pursuant to this Regulation shall be communicated to the Contracting Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1, Part 2 and photographs and/or plans supplied by the applicant being in a format not exceeding A4 (210 × 297 mm), or folded to that format, and on an appropriate scale.

4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle, hydrogen storage system or specific component conforming to a type approved under this Regulation, an international approval mark conforming to the models described in Annex 2, consisting of:

4.4.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ([3]);

4.4.2. the number of this Regulation, followed by the letter 'R', a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1.

4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations, annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 needs not be repeated; in such a case, the Regulation and approval numbers and the additional symbols shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1 above.

4.6. The approval mark shall be clearly legible and be indelible.

4.6.1. In the case of a vehicle, the approval mark shall be placed close to or on the vehicle data plate.

4.6.2. In the case of a hydrogen storage system, the approval mark shall be placed on the container.

4.6.3. In the case of a specific component, the approval mark shall be placed on the specific component.

([3]) The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev. 3, Annex 3 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

5. PART I — SPECIFICATIONS OF THE COMPRESSED HYDROGEN STORAGE SYSTEM

This part specifies the requirements for the compressed hydrogen storage system. The hydrogen storage system consists of the high pressure storage container and primary closure devices for openings into the high pressure storage container. Figure 1 shows a typical compressed hydrogen storage system consisting of a pressurised container, three closure devices and their fittings. The closure devices shall include the following functions, which may be combined:

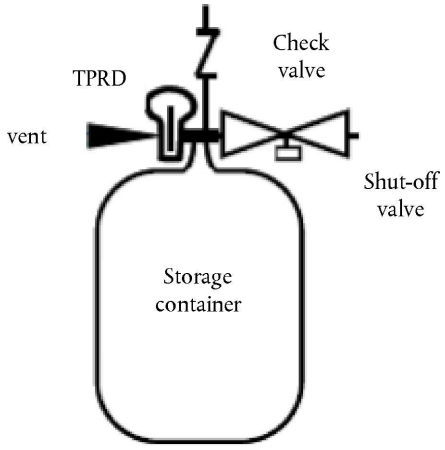
(a) TPRD;

(b) Check valve that prevents reverse flow to the fill line; and

(c) Automatic shut-off valve that can close to prevent flow from the container to the fuel cell or internal combustion engine. Any shut-off valve, and TPRD that form the primary closure of flow from the storage container shall be mounted directly on or within each container. At least one component with a check valve function shall be mounted directly on or within each container.

Figure 1

Typical compressed hydrogen storage system



All new compressed hydrogen storage systems produced for on-road vehicle service shall have a NWP of 70 MPa or less and a service life of 15 years or less, and be capable of satisfying the requirements of paragraph 5.

The hydrogen storage system shall meet the performance test requirements specified in this paragraph. The qualification requirements for on-road service are:

5.1. Verification tests for baseline metrics

5.2. Verification test for performance durability (hydraulic sequential tests)

5.3. Verification test for expected on-road system performance (pneumatic sequential tests)

5.4. Verification test for service terminating system performance in Fire

5.5. Verification test for performance durability of primary closures.

The test elements within these performance requirements are summarised in the table below. The corresponding test procedures are specified in Annex 3.

Overview of performance requirements

5.1.	Verification tests for baseline metrics
5.1.1.	Baseline initial burst pressure
5.1.2.	Baseline initial pressure cycle life

5.2.	Verification test for performance durability (sequential hydraulic tests)
5.2.1.	Proof pressure test
5.2.2.	Drop (impact) test
5.2.3.	Surface damage
5.2.4.	Chemical exposure and ambient temperature pressure cycling tests
5.2.5.	High temperature static pressure test
5.2.6.	Extreme temperature pressure cycling
5.2.7.	Residual proof pressure test
5.2.8.	Residual strength burst test
5.3.	Verification test for expected on-road performance (sequential pneumatic tests)
5.3.1.	Proof pressure test
5.3.2.	Ambient and extreme temperature gas pressure cycling test (pneumatic)
5.3.3.	Extreme temperature static gas pressure leak/permeation test (pneumatic)
5.3.4.	Residual proof pressure test
5.3.5.	Residual strength burst test (hydraulic)
5.4.	Verification test for service terminating performance in fire
5.5.	Requirements for primary closure devices

5.1. Verification tests for baseline metrics

5.1.1. Baseline initial burst pressure

Three (3) containers shall be hydraulically pressurised until burst (Annex 3, paragraph 2.1 test procedure). The manufacturer shall supply documentation (measurements and statistical analyses) that establish the midpoint burst pressure of new storage containers, BP_O.

All containers tested shall have a burst pressure within ± 10 per cent of BP_O and greater than or equal to a minimum BPmin of 225 per cent NWP.

In addition, containers having glass-fibre composite as a primary constituent to have a minimum burst pressure greater than 350 per cent NWP.

5.1.2. Baseline initial pressure cycle life

Three (3) containers shall be hydraulically pressure cycled at the ambient temperature of 20 (± 5) °C to 125 per cent NWP (+ 2/– 0 MPa) without rupture for 22 000 cycles or until a leak occurs (Annex 3, paragraph 2.2 test procedure). Leakage shall not occur within 11 000 cycles for a 15-year service life.

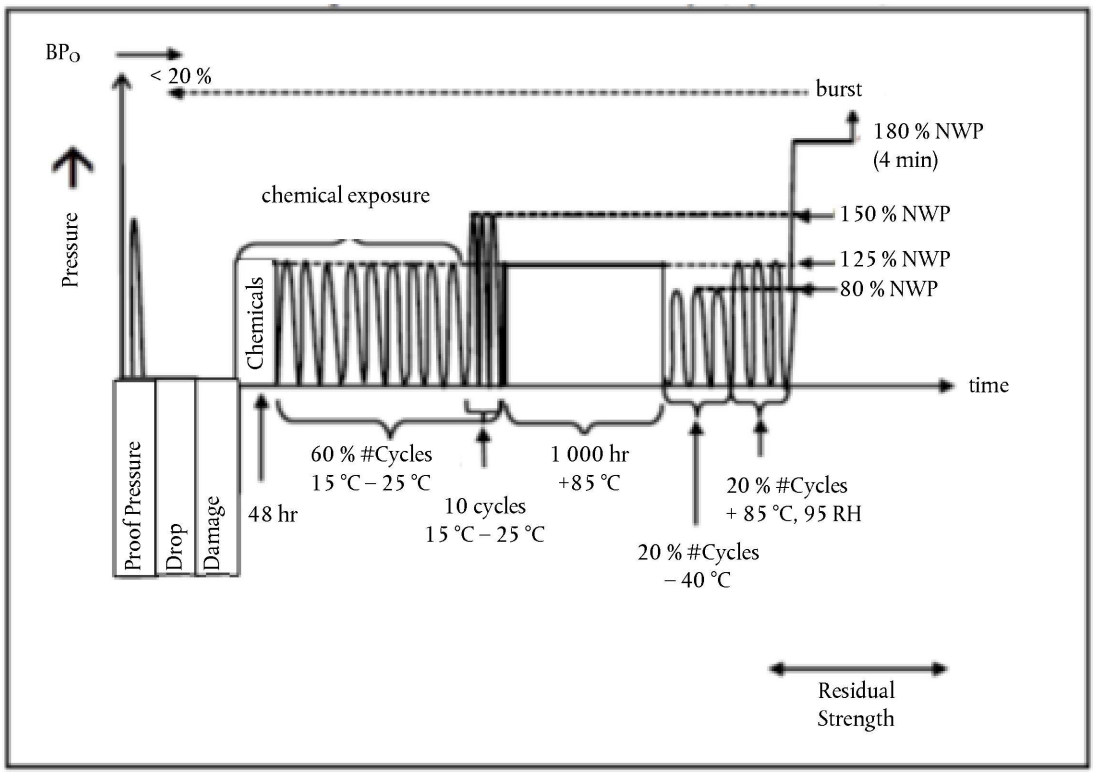
5.2. Verification tests for performance durability (Hydraulic sequential tests)

If all three pressure cycle life measurements made in paragraph 5.1.2 are greater than 11 000 cycles, or if they are all within ± 25 per cent of each other, then only one (1) container is tested in paragraph 5.2. Otherwise, three (3) containers are tested in paragraph 5.2.

A hydrogen storage container shall not leak during the following sequence of tests, which are applied in series to a single system and which are illustrated in Figure 2. Specifics of applicable test procedures for the hydrogen storage system are provided in Annex 3, paragraph 3.

Figure 2

Verification test for performance durability (hydraulic)



5.2.1. Proof pressure test

A storage container is pressurised to 150 per cent NWP (+ 2/– 0 MPa) and held for at least 30 sec (Annex 3, paragraph 3.1 test procedure).

5.2.2. Drop (impact) test

The storage container is dropped at several impact angles (Annex 3, paragraph 3.2 test procedure).

5.2.3. Surface damage test

The storage container is subjected to surface damage (Annex 3, paragraph 3.3 test procedure).

5.2.4. Chemical exposure and ambient-temperature pressure cycling test

The storage container is exposed to chemicals found in the on-road environment and pressure cycled to 125 per cent NWP (+ 2/– 0 MPa) at 20 (± 5) °C for 60 per cent number of Cycles pressure cycles (Annex 3, paragraph 3.4 test procedure). Chemical exposure is discontinued before the last 10 cycles, which are conducted to 150 per cent NWP (+ 2/– 0 MPa).

5.2.5. High temperature static pressure test.

The storage container is pressurised to 125 per cent NWP (+ 2/– 0 MPa) at ≥ 85 °C for at least 1 000 hours (Annex 3, paragraph 3.5 test procedure).

5.2.6. Extreme temperature pressure cycling.

The storage container is pressure cycled at ≤ – 40 °C to 80 per cent NWP (+ 2/– 0 MPa) for 20 per cent number of Cycles and at ≥ + 85 °C and 95 (± 2) per cent relative humidity to 125 per cent NWP (+ 2/– 0 MPa) for 20 per cent number of Cycles (Annex 3, paragraph 2.2 test procedure).

5.2.7. Hydraulic residual pressure test. The storage container is pressurised to 180 per cent NWP (+ 2/– 0 MPa) and held at least 4 minutes without burst (Annex 3, paragraph 3.1 test procedure).

5.2.8. Residual strength burst test

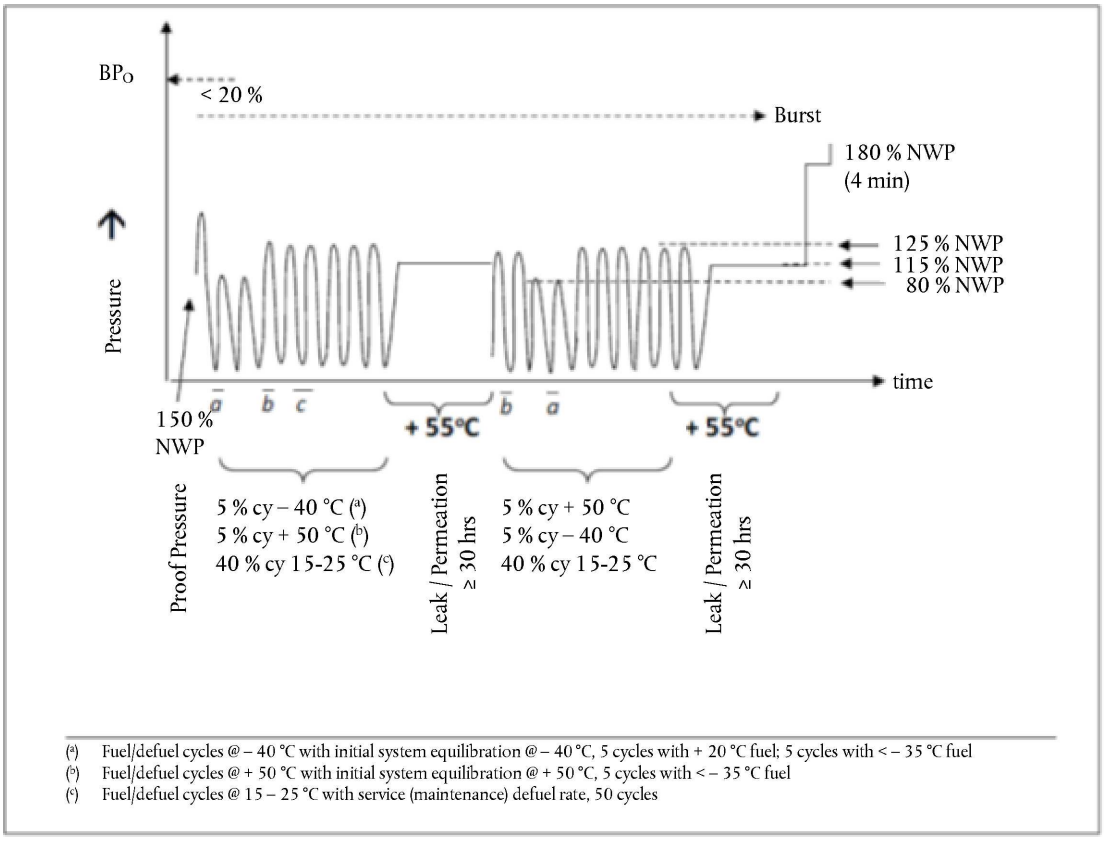
The storage container undergoes a hydraulic burst test to verify that the burst pressure is at least 80 per cent of the baseline initial burst pressure (BP_O) determined in paragraph 5.1.1 (Annex 3, paragraph 2.1 test procedure).

5.3. Verification test for expected on-road performance (Pneumatic sequential tests)

A hydrogen storage system shall not leak during the following sequence of tests, which are illustrated in Figure 3. Specifics of applicable test procedures for the hydrogen storage system are provided in Annex 3.

Figure 3

Verification test for expected on-road performance (pneumatic/hydraulic)



(a) Fuel/defuel cycles @ – 40 °C with initial system equilibration @ – 40 °C, 5 cycles with + 20 °C fuel; 5 cycles with < – 35 °C fuel
(b) Fuel/defuel cycles @ + 50 °C with initial system equilibration @ + 50 °C, 5 cycles with < – 35 °C fuel
(c) Fuel/defuel cycles @ 15 – 25 °C with service (maintenance) defuel rate, 50 cycles

5.3.1. Proof pressure test

A system is pressurised to 150 per cent NWP (+ 2/– 0 MPa) for at least 30 seconds (Annex 3, paragraph 3.1 test procedure). A storage container that has undergone a proof pressure test in manufacture may be exempted from this test.

5.3.2. Ambient and extreme temperature gas pressure cycling test

The system is pressure cycled using hydrogen gas for 500 cycles (Annex 3, paragraph 4.1 test procedure).

(a) The pressure cycles are divided into two groups: Half of the cycles (250) are performed before exposure to static pressure (paragraph 5.3.3) and the remaining half of the cycles (250) are performed after the initial exposure to static pressure (paragraph 5.3.3) as illustrated in Figure 3;

(b) The first group of pressure cycling, 25 cycles are performed to 80 per cent NWP (+ 2/– 0 MPa) at ≤ – 40 °C, then 25 cycles to 125 per cent NWP (+ 2/– 0 MPa) at ≥ + 50 °C and 95 (± 2) per cent relative humidity, and the remaining 200 cycles to 125 per cent NWP (+ 2/– 0 MPa) at 20 (± 5) °C;

The second group of pressure cycling, 25 cycles are performed to 125 per cent NWP (+ 2/– 0 MPa) at ≥ + 50 °C and 95 (± 2) per cent relative humidity, then 25 cycles to 80 per cent NWP (+ 2/– 0 MPa) at ≤ – 40 °C, and the remaining 200 cycles to 125 per cent NWP (+ 2/– 0 MPa) at 20 (± 5) °C.

(c) The hydrogen gas fuel temperature is ≤ – 40 °C;

(d) During the first group of 250 pressure cycles, five cycles are performed with fuel having a temperature of + 20 (± 5) °C after temperature equilibration of the system at ≤ – 40 °C; five cycles are performed with fuel having a temperature of ≤ – 40 °C; and five cycles are performed with fuel having a temperature of ≤ – 40 °C after temperature equilibration of the system at ≥ + 50 °C and 95 per cent relative humidity;

(e) Fifty pressure cycles are performed using a de-fuelling rate greater than or equal to the maintenance de-fuelling rate.

5.3.3. Extreme temperature static pressure leak/permeation test.

(a) The test is performed after each group of 250 pneumatic pressure cycles in paragraph 5.3.2;

(b) The maximum allowable hydrogen discharge from the compressed hydrogen storage system is 46 ml/hr/l water capacity of the storage system. (Annex 3, paragraph 4.2 test procedure);

(c) If the measured permeation rate is greater than 0,005 mg/sec (3,6 Nml/min), a localised leak test is performed to ensure no point of localised external leakage is greater than 0,005 mg/sec (3,6 Nml/min) (Annex 3, paragraph 4.3 test procedure).

5.3.4. Residual proof pressure test (hydraulic)

The storage container is pressurised to 180 per cent NWP (+ 2/– 0 MPa) and held at least 4 minutes without burst (Annex 3, paragraph 3.1 test procedure).

5.3.5. Residual strength burst test (hydraulic)

The storage container undergoes a hydraulic burst to verify that the burst pressure is at least 80 per cent of the baseline initial burst pressure (BP_O) determined in paragraph 5.1.1 (Annex 3, paragraph 2.1 test procedure).

5.4. Verification test for service terminating performance in fire

This section describes the fire test with compressed hydrogen as the test gas. Compressed air may be used as an alternative test gas.

A hydrogen storage system is pressurised to NWP and exposed to fire (Annex 3, paragraph 5.1 test procedure). A temperature-activated pressure relief device shall release the contained gases in a controlled manner without rupture.

5.5. Requirements for primary closure devices

The primary closure devices that isolate the high pressure hydrogen storage system, namely TPRD, check valve and shut-off valve, as described in Figure 1, shall be tested and type-approved in accordance with Part II of this Regulation and produced in conformity with the approved type.

Retesting of the storage system is not required if alternative closure devices are provided having comparable function, fittings, materials, strength and dimensions, and satisfy the condition above. However, a change in TPRD hardware, its position of installation or venting lines shall require a new fire test in accordance with paragraph 5.4.

5.6. Labelling

A label shall be permanently affixed on each container with at least the following information: name of the manufacturer, serial number, date of manufacture, MFP, NWP, type of fuel (e.g. 'CHG' for gaseous hydrogen), and date of removal from service. Each container shall also be marked with the number of cycles used in the testing programme as per paragraph 5.1.2. Any label affixed to the container in compliance with this paragraph shall remain in place and be legible for the duration of the manufacturer's recommended service life for the container.

Date of removal from service shall not be more than 15 years after the date of manufacture.

6. PART II — SPECIFICATIONS OF SPECIFIC COMPONENTS FOR THE COMPRESSED HYDROGEN STORAGE SYSTEM

6.1. TPRD requirements

TPRDs shall meet the following performance requirements:

(a) Pressure cycling test (Annex 4, paragraph 1.1);

(b) Accelerated life test (Annex 4, paragraph 1.2);

(c) Temperature cycling test (Annex 4, paragraph 1.3);

(d) Salt corrosion resistance test (Annex 4, paragraph 1.4);

(e) Vehicle environment test (Annex 4, paragraph 1.5);

(f) Stress corrosion cracking test (Annex 4, paragraph 1.6);

(g) Drop and vibration test (Annex 4, paragraph 1.7);

(h) Leak test (Annex 4, paragraph 1.8);

(i) Bench top activation test (Annex 4, paragraph 1.9);

(j) Flow rate test (Annex 4, paragraph 1.10).

6.2. Check valve and automatic shut-off valve requirements

Check valves and automatic shut-off valves shall meet the following performance requirements:

(a) Hydrostatic strength test (Annex 4, paragraph 2.1);

(b) Leak test (Annex 4, paragraph 2.2);

(c) Extreme temperature pressure cycling test (Annex 4, paragraph 2.3);

(d) Salt corrosion resistance test (Annex 4, paragraph 2.4);

(e) Vehicle environment test (Annex 4, paragraph 2.5);

(f) Atmospheric exposure test (Annex 4, paragraph 2.6);

(g) Electrical tests (Annex 4, paragraph 2.7);

(h) Vibration test (Annex 4, paragraph 2.8);

(i) Stress corrosion cracking test (Annex 4, paragraph 2.9);

(j) Pre-cooled hydrogen exposure test (Annex 4, paragraph 2.10).

6.3. At least the following information: MFP and type of fuel (e.g. 'CHG' for gaseous hydrogen), shall be marked on each component having the function(s) of the primary closure devices in clearly legible and indelible manner.

7. PART III — SPECIFICATIONS OF A VEHICLE FUEL SYSTEM INCORPORATING THE COMPRESSED HYDROGEN STORAGE SYSTEM

This part specifies requirements for the vehicle fuel system, which includes the compressed hydrogen storage system, piping, joints, and components in which hydrogen is present. The hydrogen storage system included in the vehicle fuel system shall be tested and type-approved in accordance with Part I of this Regulation and produced in conformity with the approved type.

7.1. In-use fuel system requirements

7.1.1. Fuelling receptacle

7.1.1.1. A compressed hydrogen fuelling receptacle shall prevent reverse flow to the atmosphere. Test procedure is by visual inspection.

7.1.1.2. Fuelling receptacle label: A label shall be affixed close to the fuelling receptacle; for instance inside a refilling hatch, showing the following information: fuel type (e.g. 'CHG' for gaseous hydrogen), MFP, NWP, date of removal from service of containers.

7.1.1.3. The fuelling receptacle shall be mounted on the vehicle to ensure positive locking of the fuelling nozzle. The receptacle shall be protected from tampering and the ingress of dirt and water (e.g. installed in a compartment which can be locked). Test procedure is by visual inspection.

7.1.1.4. The fuelling receptacle shall not be mounted within the external energy absorbing elements of the vehicle (e.g. bumper) and shall not be installed in the passenger compartment, luggage compartment and other places where hydrogen gas could accumulate and where ventilation is not sufficient. Test procedure is by visual inspection.

7.1.2. Over-pressure protection for the low pressure system (Annex 5, paragraph 6 test procedure)

The hydrogen system downstream of a pressure regulator shall be protected against overpressure due to the possible failure of the pressure regulator. The set pressure of the overpressure protection device shall be lower than or equal to the maximum allowable working pressure for the appropriate section of the hydrogen system.

7.1.3. Hydrogen discharge systems

7.1.3.1. Pressure relief systems (Annex 5, paragraph 6 test procedure)

(a) Storage system TPRDs. The outlet of the vent line, if present, for hydrogen gas discharge from TPRD(s) of the storage system shall be protected by a cap;

(b) Storage system TPRDs. The hydrogen gas discharge from TPRD(s) of the storage system shall not be directed:

(i) Into enclosed or semi-enclosed spaces;

(ii) Into or towards any vehicle wheel housing;

(iii) Towards hydrogen gas containers;

(iv) Forward from the vehicle, or horizontally (parallel to road) from the back or sides of the vehicle.

(c) Other pressure relief devices (such as a burst disc) may be used outside the hydrogen storage system. The hydrogen gas discharge from other pressure relief devices shall not be directed:

(i) Towards exposed electrical terminals, exposed electrical switches or other ignition sources;

(ii) Into or towards the vehicle passenger or luggage compartments;

(iii) Into or towards any vehicle wheel housing;

(iv) Towards hydrogen gas containers.

7.1.3.2. Vehicle exhaust system (Annex 5, paragraph 4 test procedure)

At the vehicle exhaust system's point of discharge, the hydrogen concentration level shall:

(a) Not exceed 4 per cent average by volume during any moving three-second time interval during normal operation including start-up and shut-down;

(b) And not exceed 8 per cent at any time (Annex 5, paragraph 4 test procedure).

7.1.4. Protection against flammable conditions: single failure conditions

7.1.4.1. Hydrogen leakage and/or permeation from the hydrogen storage system shall not directly vent into the passenger or luggage compartments, or to any enclosed or semi-enclosed spaces within the vehicle that contains unprotected ignition sources.

7.1.4.2. Any single failure downstream of the main hydrogen shut-off valve shall not result in accumulations in levels of hydrogen concentration in the passenger compartment according to test procedure in Annex 5, paragraph 3.2.

7.1.4.3. If, during operation, a single failure results in a hydrogen concentration exceeding 3,0 per cent by volume in air in the enclosed or semi-enclosed spaces of the vehicle, then a warning shall be provided (paragraph 7.1.6). If the hydrogen concentration exceeds 4,0 per cent by volume in the air in the enclosed or semi-enclosed spaces of the vehicle, the main shut-off valve shall be closed to isolate the storage system. (Annex 5, paragraph 3 test procedure).

7.1.5. Fuel system leakage

The hydrogen fuelling line (e.g. piping, joint, etc.) downstream of the main shut-off valve(s) to the fuel cell system or the engine shall not leak. Compliance shall be verified at NWP (Annex 5, paragraph 5 test procedure).

7.1.6. Tell-tale signal warning to driver

The warning shall be given by a visual signal or display text with the following properties:

(a) Visible to the driver while in the driver's designated seating position with the driver's seat belt fastened;

(b) Yellow in colour if the detection system malfunctions (e.g. circuit disconnection, short-circuit, sensor fault). It shall be red in compliance with section paragraph 7.1.4.3;

(c) When illuminated, shall be visible to the driver under both daylight and night time driving conditions;

(d) Remains illuminated when 3,0 per cent concentration or detection system malfunction exists and the ignition locking system is in the 'On' ('Run') position or the propulsion system is activated.

7.2. Post-crash fuel system integrity

The vehicle fuel system shall comply with the following requirements after the vehicle crash tests in accordance with the following Regulations by also applying the test procedures prescribed in Annex 5 of this Regulation.

(a) Frontal impact test in accordance with either Regulation No 12, or Regulation No 94; and

(b) Lateral impact test in accordance with Regulation No 95.

In case that one or both of the vehicle crash tests specified above are not applicable to the vehicle, the vehicle fuel system shall, instead, be subject to the relevant alternative accelerations specified below and the hydrogen storage system shall be installed in a position satisfying the requirements in paragraph 7.2.4. The accelerations shall be measured at the location where the hydrogen storage system is installed. The vehicle fuel system shall be mounted and fixed on the representative part of the vehicle. The mass used shall be representative for a fully equipped and filled container or container assembly.

Accelerations for vehicles of categories M_1 and N_1:

(a) 20 g in the direction of travel (forward and rearward direction);

(b) 8 g horizontally perpendicular to the direction of travel (to left and right).

Accelerations for vehicles of categories M_2 and N_2:

(a) 10 g in the direction of travel (forward and rearward direction);

(b) 5 g horizontally perpendicular to the direction of travel (to left and right).

Accelerations for vehicles of categories M_3 and N_3:

(a) 6,6 g in the direction of travel (forward and rearward direction);

(b) 5 g horizontally perpendicular to the direction of travel (to left and right).

7.2.1. Fuel leakage limit

The volumetric flow of hydrogen gas leakage shall not exceed an average of 118 N_l per minute for the time interval, Δt, as determined in accordance with Annex 5, paragraph 1.1 or 1.2.

7.2.2. Concentration limit in enclosed spaces

Hydrogen gas leakage shall not result in a hydrogen concentration in the air greater than 4,0 per cent by volume in the passenger and luggage compartments (Annex 5, paragraph 2 test procedures). The requirement is satisfied if it is confirmed that the shut-off valve of the storage system has closed within 5 seconds of the crash and no leakage from the storage system.

7.2.3. Container Displacement

The storage container(s) shall remain attached to the vehicle at a minimum of one attachment point.

7.2.4. Additional installation requirements

7.2.4.1. Requirements on installation of the hydrogen storage system not subject to the frontal impact test:

The container shall be mounted in a position which is rearward of a vertical plane perpendicular to the centre line of the vehicle and located 420 mm rearward from the front edge of the vehicle.

7.2.4.2. Requirements on installation of the hydrogen storage system not subject to the lateral impact test:

The container shall be mounted in a position which is between the two vertical planes parallel to the centre line of the vehicle located 200 mm inside from the both outermost edge of the vehicle in the proximity of its container(s).

8. MODIFICATION OF TYPE AND EXTENSION OF APPROVAL

8.1. Every modification to an existing type of vehicle or hydrogen storage system or specific component for hydrogen storage system shall be notified to the Type Approval Authority which approved that type. The Authority shall then either:

(a) Decide, in consultation with the manufacturer, that a new type-approval is to be granted; or

(b) Apply the procedure contained in paragraph 8.1.1 (Revision) and, if applicable, the procedure contained in paragraph 8.1.2 (Extension).

8.1.1. Revision

When particulars recorded in the information documents of Annex 1 have changed and the Type Approval Authority considers that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle/hydrogen storage system/specific component still meets the requirements, the modification shall be designated a 'revision'.

In such a case, the Type Approval Authority shall issue the revised pages of the information documents of Annex 1 as necessary, marking each revised page to show clearly the nature of the modification and the date of re-issue. A consolidated, updated version of the information documents of Annex 1, accompanied by a detailed description of the modification, shall be deemed to meet this requirement.

8.1.2. Extension

The modification shall be designated an 'extension' if, in addition to the change of the particulars recorded in the information folder,

(a) Further inspections or tests are required; or

(b) Any information on the communication document (with the exception of its attachments) has changed; or

(c) Approval to a later series of amendments is requested after its entry into force.

8.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3 above to the Contracting Parties to the Agreement which apply this Regulation. In addition, the index to the information documents and to the test reports, attached to the communication document of Annex 1, shall be amended accordingly to show the date of the most recent revision or extension.

8.3. The Type Approval Authority issuing the extension of approval shall assign a serial number to each communication form drawn up for such an extension.

9. CONFORMITY OF PRODUCTION

Procedures concerning conformity of production shall conform to the general provisions defined in Appendix 2 to the Agreement (E/ECE/324-E/ECE/TRANS/505/Rev.2) and at least meet the following requirements:

9.1. A vehicle, hydrogen storage system or component approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the respective requirements of paragraphs 5 to 7 above;

9.2. The Type Approval Authority which has granted approval may at any time verify the conformity of control methods applicable to each production unit. The normal frequency of such inspections shall be once every two years.

9.3. In case of compressed hydrogen storage system, the production control of the container shall satisfy the following additional requirements;

9.3.1. Every container shall be tested in accordance with paragraph 5.2.1 of this Regulation. The test pressure is ≥ 150 per cent of NWP.

9.3.2. Batch testing

In any case, for each batch, which is not permitted to exceed 200 finished cylinders or liners (not including destructive test cylinders or liners), or one shift of successive production, whichever is greater, at least one container shall be subjected to the rupture test in paragraph 9.3.2.1 and furthermore at least one container shall be subjected to the pressure cycle test in paragraph 9.3.2.2.

9.3.2.1. Rupture test in batch testing

The test shall be performed according to paragraph 2.1 (hydrostatic pressure rupture test) of Annex 3. The required rupture pressure shall be at least BPmin and the average burst pressure recorded of the last 10 tests shall be at or above BP_O-10 per cent.

9.3.2.2. Ambient temperature pressure cycling test in batch testing

The test shall be performed according to paragraph 2.2(a) to (c) (hydrostatic pressure cycling test) of Annex 3, except that the temperature requirements for the fuelling fluid and the container skin, and the relative humidity requirement, do not apply. The cylinder shall be pressure cycled using hydrostatic pressures ≥ 125 per cent of NWP, to 22 000 cycles in case of no leakage or until leakage occurs. For the service life of 15 years, the cylinder shall not leak or rupture within the first 11 000 cycles.

9.3.2.3. Relaxation provisions

In the ambient temperature pressure cycling test in batch testing, finished cylinders shall be pressure cycled at a sampling frequency defined as follows:

9.3.2.3.1. One cylinder from each batch shall be pressure cycled with 11 000 cycles for the service life of 15 years.

9.3.2.3.2. On 10 sequential production batches of the same design, should none of the pressure cycled cylinders leak or rupture in less than 11 000 cycles × 1,5 for the service life of 15 years, then the pressure cycling test can be reduced to one cylinder from every 5 batches of production.

9.3.2.3.3. On 10 sequential production batches of the same design, should none of the pressure cycled cylinders leak or rupture in less than 11 000 cycles × 2,0 for the service life of 15 years, then the pressure cycling test can be reduced to one cylinder from every 10 batches of production.

9.3.2.3.4. Should more than 6 months have expired since the last batch of production, then the sampling frequency for the next batch of production shall be that specified in paragraph 9.3.2.3.2 or 9.3.2.3.3 above.

9.3.2.3.5. Should any cylinder tested at the sampling frequency in paragraph 9.3.2.3.2 or 9.3.2.3.3 above fail to meet the required number of pressure cycles, then it shall be necessary to repeat the pressure cycling test at the sampling frequency in paragraph 9.3.2.3.1 above for a minimum 10 production batches. The sampling frequency for testing thereafter shall be that specified in paragraph 9.3.2.3.2 or 9.3.2.3.3 above.

9.3.2.3.6. Should any cylinder tested at the sampling frequency in paragraph 9.3.2.3.1, 9.3.2.3.2 or 9.3.2.3.3 above fail to meet the minimum requirement regarding the number of pressure cycles (11 000 cycles), then the cause of failure shall be determined and corrected following the procedures in paragraph 9.3.2.3.7.

The pressure cycling test shall then be repeated on an additional three cylinders from that batch. Should any of the three additional cylinders fail to meet the minimum requirement regarding the number of pressure cycles (11 000 cycles), then all cylinders of this batch shall be rejected.

9.3.2.3.7. In the event of failure to meet test requirements retesting or reheat treatment and retesting shall be carried out as follows:

(a) If there is evidence of a fault in carrying out a test, or an error of measurement, a further test shall be performed. If the result of this test is satisfactory, the first test shall be ignored;

(b) If the test has been carried out in a satisfactory manner, the cause of test failure shall be identified.

All cylinders that fail to meet the requirements shall be rejected or repaired by an approved method. The non-rejected cylinders are then considered as a new batch.

In any case, the new batch shall be retested. All the relevant prototype or batch tests needed to prove the acceptability of the new batch shall be performed again. If any cylinder in a batch is proven unsatisfactory by one or more tests, all cylinders of this batch shall be rejected.

10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

10.1. The approval granted in respect of a vehicle, system or component type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 9 above are not complied with.

10.2. If a Contracting Party withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by sending them a communication form conforming to the model set out in Part 2 of Annex 1 to this Regulation.

11. PRODUCTION DEFINITIVELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle, system or component approved in accordance with this Regulation, he shall so inform the authority which granted the approval, which in turn shall forthwith inform the other Contracting Parties to the Agreement applying this Regulation by means of a communication form conforming to the model set out in Part 2 of Annex 1 to this Regulation.

12. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF THE TYPE APPROVAL AUTHORITIES

The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.

ANNEX 1

PART 1

Model — I

Information document No … on the type approval of a hydrogen storage system with regard to the safety-related performance of hydrogen-fuelled vehicles

The following information, if applicable, shall include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient details.

If the systems or components have electronic controls, information concerning their performance shall be supplied.

0. General

0.1. Make (trade name of manufacturer): .....

0.2. Type: .....

0.2.1. Commercial name(s) (if available): .....

0.5. Name and address of manufacturer: .....

0.8. Name(s) and address(es) of assembly plant(s): .....

0.9. Name and address of the manufacturer's representative (if any): .....

3. Power Plant

3.9. Hydrogen storage system

3.9.1. Hydrogen storage system designed to use liquid/compressed (gaseous) hydrogen ([1])

3.9.1.1. Description and drawing of the hydrogen storage system: .....

3.9.1.2. Make(s): .....

3.9.1.3. Type(s): .....

3.9.2. Container(s)

3.9.2.1. Make(s): .....

3.9.2.2. Type(s): .....

3.9.2.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.2.4. Nominal working pressure(s): ..... MPa

3.9.2.5. Number of filling cycles: .....

3.9.2.6. Capacity: ..... litres (water)

3.9.2.7. Material: .....

3.9.2.8. Description and drawing: .....

3.9.3. Thermally-activated pressure relief device(s)

3.9.3.1. Make(s): .....

3.9.3.2. Type(s): .....

([1]) Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable).

3.9.3.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.3.4. Set pressure: .....

3.9.3.5. Set temperature: .....

3.9.3.6. Blow off capacity: .....

3.9.3.7. Normal maximum operating temperature: ..... °C

3.9.3.8. Nominal working pressure(s): ..... MPa

3.9.3.9. Material: .....

3.9.3.10. Description and drawing: .....

3.9.3.11. Approval number: .....

3.9.4. Check valve(s)

3.9.4.1. Make(s): .....

3.9.4.2. Type(s): .....

3.9.4.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.4.4. Nominal working pressure(s): ..... MPa

3.9.4.5. Material: .....

3.9.4.6. Description and drawing: .....

3.9.4.7. Approval number: .....

3.9.5. Automatic shut-off valve(s)

3.9.5.1. Make(s): .....

3.9.5.2. Type(s): .....

3.9.5.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.5.4. Nominal working pressure(s) and if downstream of the first pressure regulator, maximum allowable working pressure(s): ..... MPa

3.9.5.5. Material: .....

3.9.5.6. Description and drawing: .....

3.9.5.7. Approval number: .....

Model — II

Information document No … on the type approval of specific component for a hydrogen storage system with regard to the safety-related performance of hydrogen-fuelled vehicles

The following information, if applicable, shall include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient details.

If the components have electronic controls, information concerning their performance shall be supplied.

0. General

0.1. Make (trade name of manufacturer): .....

0.2. Type: .....

0.2.1. Commercial name(s) (if available): .....

0.5. Name and address of manufacturer: .....

0.8. Name(s) and address(es) of assembly plant(s): .....

0.9. Name and address of the manufacturer's representative (if any): .....

3. Power Plant

3.9.3. Thermally-activated pressure relief device(s)

3.9.3.1. Make(s): .....

3.9.3.2. Type(s): .....

3.9.3.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.3.4. Set pressure: .....

3.9.3.5. Set temperature: .....

3.9.3.6. Blow off capacity: .....

3.9.3.7. Normal maximum operating temperature: ..... °C

3.9.3.8. Nominal working pressure(s): ..... MPa

3.9.3.9. Material: .....

3.9.3.10. Description and drawing: .....

3.9.4. Check valve(s)

3.9.4.1. Make(s): .....

3.9.4.2. Type(s): .....

3.9.4.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.4.4. Nominal working pressure(s): ..... MPa

3.9.4.5. Material: .....

3.9.4.6. Description and drawing: .....

3.9.5. Automatic shut-off valve(s)

3.9.5.1. Make(s): .....

3.9.5.2. Type(s): .....

3.9.5.3. Maximum Allowable Working Pressure (MAWP): ..... MPa

3.9.5.4. Nominal working pressure(s) and if downstream of the first pressure regulator, maximum allowable working pressure(s): ..... MPa:

3.9.5.5. Material: .....

3.9.5.6. Description and drawing: .....

Model — III

Information document No … on the type approval of a vehicle with regard to the safety-related performance of hydrogen-fuelled vehicles

The following information, if applicable, shall include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient details.

If the systems or components have electronic controls, information concerning their performance shall be supplied.

0. General

0.1. Make (trade name of manufacturer): .....

0.2. Type:

0.2.1. Commercial name(s) (if available):

0.3. Means of identification of type, if marked on the vehicle ([2]): .....

0.3.1. Location of that marking: .....

0.4. Category of vehicle ([3]): .....

0.5. Name and address of manufacturer: .....

0.8. Name(s) and address(es) of assembly plant(s): .....

0.9. Name and address of the manufacturer's representative (if any): .....

1. General construction characteristics of the vehicle

1.1. Photographs and/or drawings of a representative vehicle: .....

1.3.3. Powered axles (number, position, interconnection): .....

1.4. Chassis (if any) (overall drawing): .....

3. Power Plant

3.9. Hydrogen storage system

3.9.1. Hydrogen storage system designed to use liquid/compressed (gaseous) hydrogen ([4])

3.9.1.1. Description and drawing of the hydrogen storage system: .....

3.9.1.2. Make(s): .....

3.9.1.3. Type(s): .....

3.9.1.4. Approval Number: .....

3.9.6. Hydrogen leakage detection sensors: .....

3.9.6.1. Make(s): .....

3.9.6.2. Type(s): .....

3.9.7. Refuelling connection or receptacle

3.9.7.1. Make(s): .....

3.9.7.2. Type(s): .....

3.9.8. Drawings showing requirements for installation and operation.

([2]) If means of identification of type contains characters not relevant to describe the vehicle type covered by this information document, such characters shall be represented in the documentation by the symbol '[..]' (e.g. […]).

([3]) As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

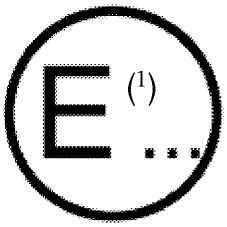
([4]) Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable).

PART 2

Model I

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning (2): Approval granted

Approval extended

Approval refused

Approval withdrawn

Production definitively discontinued

of a type of compressed hydrogen storage system with regard to the safety-related performance of hydrogen-fuelled vehicles pursuant to Regulation No 134

Approval No ..... Extension No .....

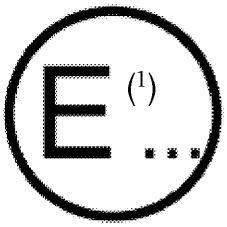
1. Trademark: .....
2. Type and trade names: .....
3. Name and address of manufacturer: .....
4. If applicable, name and address of manufacturer's representative: .....
5. Brief description of hydrogen storage system: .....
6. Date of submission of hydrogen storage system for approval: .....
7. Technical Service performing the approval tests: .....
8. Date of report issued by that Service: .....
9. Number of report issued by that Service: .....
10. Approval with regard to the safety-related performance of hydrogen-fuelled vehicles is granted/refused (2): .....
11. Place: .....
12. Date: .....
13. Signature: .....
14. The information document annexed to this communication: .....
15. Any remarks: .....

(1) Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).
(2) Delete what does not apply.

Model II

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning (2): Approval granted

Approval extended

Approval refused

Approval withdrawn

Production definitively discontinued

of a type of specific component (TPRD/Check valve/Automatic shut-off valve (2)) with regard to the safety-related performance of hydrogen-fuelled vehicles pursuant to Regulation No 134

Approval No ..... Extension No .....

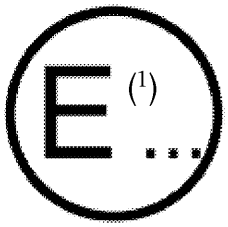
1. Trademark: .....
2. Type and trade names: .....
3. Name and address of manufacturer: .....
4. If applicable, name and address of manufacturer's representative: .....
5. Brief description of specific component: .....
6. Date of submission of specific component for approval: .....
7. Technical Service performing the approval tests: .....
8. Date of report issued by that Service: .....
9. Number of report issued by that Service: .....
10. Approval with regard to the safety-related performance of hydrogen-fuelled vehicles is granted/refused (2): .....
11. Place: .....
12. Date: .....
13. Signature: .....
14. The information document annexed to this communication: .....
15. Any remarks: .....

(1) Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).
(2) Delete what does not apply.

Model III

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning (2): Approval granted

Approval extended

Approval refused

Approval withdrawn

Production definitively discontinued

of a type of vehicle with regard to the safety-related performance of hydrogen-fuelled vehicles pursuant to Regulation No 134

Approval No ..... Extension No .....

1. Trademark: .....
2. Type and trade names: .....
3. Name and address of manufacturer: .....
4. If applicable, name and address of manufacturer's representative: .....
5. Brief description of vehicle: .....
6. Date of submission of vehicle for approval: .....
7. Technical Service performing the approval tests: .....
8. Date of report issued by that Service: .....
9. Number of report issued by that Service: .....
10. Approval with regard to the safety-related performance of hydrogen-fuelled vehicles is granted/refused (2): .....
11. Place: .....
12. Date: .....
13. Signature: .....
14. The information document annexed to this communication: .....
15. Any remarks: .....

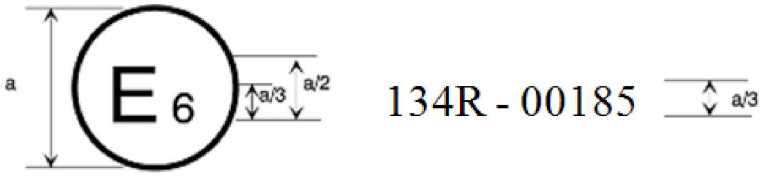
(1) Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).
(2) Delete what does not apply.

ANNEX 2

ARRANGEMENTS OF THE APPROVAL MARKS

MODEL A

(See paragraphs 4.4 to 4.4.2 of this Regulation)

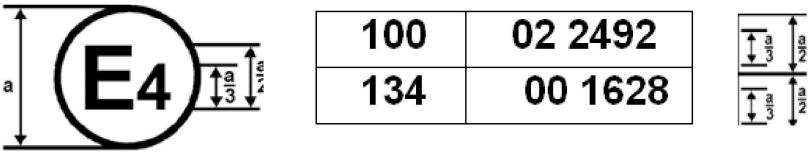


a = 8 mm min.

The above approval mark affixed to a vehicle/ storage system/specific component shows that the vehicle/storage system/specific component type concerned has been approved in Belgium (E 6) for its the safety-related performance of hydrogen-fuelled vehicles pursuant to Regulation No 134. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 134 in its original form.

MODEL B

(See paragraph 4.5 of this Regulation)



a = 8 mm min.

The above approval mark affixed to a vehicle shows that the road vehicle concerned has been approved in the Netherlands (E 4) pursuant to Regulations Nos 134 and 100 (*). The approval number indicates that, at the dates when the respective approvals were granted, Regulation No 100 was amended by the 02 series of amendments and Regulation No 134 was still in its original form.

(*) The latter number is given only as an example.

ANNEX 3

TEST PROCEDURES FOR THE COMPRESSED HYDROGEN STORAGE SYSTEM

1. TEST PROCEDURES FOR QUALIFICATION REQUIREMENTS OF COMPRESSED HYDROGEN STORAGE ARE ORGANISED AS FOLLOWS:

Paragraph 2 of this Annex is the test procedures for baseline performance metrics (requirement of paragraph 5.1 of this Regulation)

Paragraph 3 of this Annex is the test procedures for performance durability (requirement of paragraph 5.2 of this Regulation)

Paragraph 4 of this Annex is the test procedures for expected on-road performance (requirement of paragraph 5.3 of this Regulation)

Paragraph 5 of this Annex is the test procedures for service terminating performance in fire (requirement of paragraph 5.4 of this Regulation)

Paragraph 6 of this Annex is the test procedures for performance durability of primary closures (requirement of paragraph 5.5 of this Regulation)

2. TEST PROCEDURES FOR BASELINE PERFORMANCE METRICS (REQUIREMENT OF PARAGRAPH 5. 1 OF THIS REGULATION)

2.1. Burst test (hydraulic)

The burst test is conducted at the ambient temperature of 20 (± 5) °C using a non-corrosive fluid.

2.2. Pressure cycling test (hydraulic)

The test is performed in accordance with the following procedure:

(a) The container is filled with a non-corrosive fluid;

(b) The container and fluid are stabilised at the specified temperature and relative humidity at the start of testing; the environment, fuelling fluid and container skin are maintained at the specified temperature for the duration of the testing. The container temperature may vary from the environmental temperature during testing;

(c) The container is pressure cycled between 2 (± 1) MPa and the target pressure at a rate not exceeding 10 cycles per minute for the specified number of cycles;

(d) The temperature of the hydraulic fluid within the container is maintained and monitored at the specified temperature.

3. TEST PROCEDURES FOR PERFORMANCE DURABILITY (REQUIREMENT OF PARAGRAPH 5.2 OF THIS REGULATION)

3.1. Proof pressure test

The system is pressurised smoothly and continually with a non-corrosive hydraulic fluid until the target test pressure level is reached and then held for the specified time.

3.2. Drop (impact) test (unpressurised)

The storage container is drop tested at ambient temperature without internal pressurisation or attached valves. The surface onto which the containers are dropped shall be a smooth, horizontal concrete pad or other flooring type with equivalent hardness.

The orientation of the container being dropped (in accordance with the requirement of paragraph 5.2.2) is determined as follows: One or more additional container(s) shall be dropped in each of the orientations described below. The drop orientations may be executed with a single container or as many as four containers may be used to accomplish the four drop orientations.

(i) Dropped once from a horizontal position with the bottom 1,8 m above the surface onto which it is dropped;

(ii) Dropped once onto the end of the container from a vertical position with the ported end upward with a potential energy of not less than 488 J, with the height of the lower end no greater than 1,8 m;

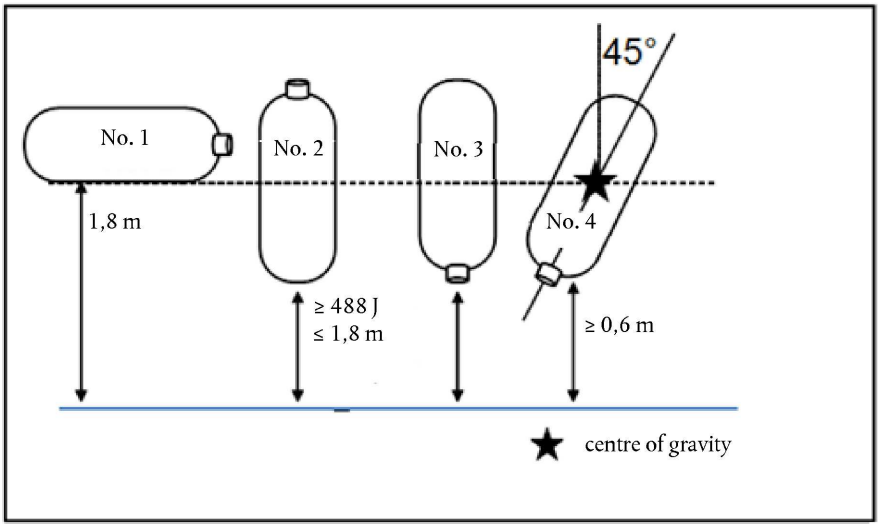
(iii) Dropped once onto the end of the container from a vertical position with the ported end downward with a potential energy of not less than 488 J, with the height of the lower end no greater than 1,8 m. If the container is symmetrical (identical ported ends), this drop orientation is not required;

(iv) Dropped once at a 45° angle from the vertical orientation with a ported end downward with its centre of gravity 1,8 m above the ground. However, if the bottom is closer to the ground than 0,6 m, the drop angle shall be changed to maintain a minimum height of 0,6 m and a centre of gravity of 1,8 m above the ground.

The four drop orientations are illustrated in Figure 1.

Figure 1

Drop orientations



No attempt shall be made to prevent the bouncing of containers, but the containers may be prevented from falling over during the vertical drop tests described above.

If more than one container is used to execute all drop specifications, then those containers shall undergo pressure cycling according to Annex 3, paragraph 2.2 until either leakage or 22 000 cycles without leakage have occurred. Leakage shall not occur within 11 000 cycles.

The orientation of the container being dropped in accordance with the requirement of paragraph 5.2.2 shall be identified as follows:

(a) If a single container was subjected to all four drop orientations, then the container being dropped in accordance with the requirement of paragraph 5.2.2 shall be dropped in all four orientations;

(b) If more than one container is used to execute the four drop orientations, and if all containers reach 22 000 cycles without leakage, then the orientation of the container being dropped in accordance with the requirement paragraph 5.2.2 is the 45° orientation (iv), and that container shall then undergo further testing as specified in paragraph 5.2;

(c) If more than one container is used to execute the four drop orientations and if any container does not reach 22 000 cycles without leakage, then the new container shall be subjected to the drop orientation(s) that resulted in the lowest number of cycles to leakage and then will undergo further testing as specified in paragraph 5.2.

3.3. Surface damage test (unpressurised)

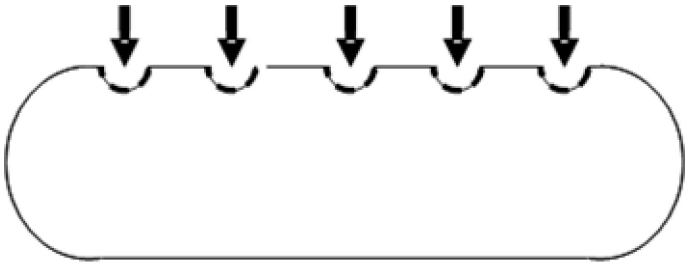
The test proceeds in the following sequence:

(a) Surface flaw generation: Two longitudinal saw cuts are made on the bottom outer surface of the unpressurised horizontal storage container along the cylindrical zone close to but not in the shoulder area. The first cut is at least 1,25 mm deep and 25 mm long toward the valve end of the container. The second cut is at least 0,75 mm deep and 200 mm long toward the end of the container opposite the valve;

(b) Pendulum impacts: The upper section of the horizontal storage container is divided into five distinct (not overlapping) areas 100 mm in diameter each (see Figure 2). After 12 hours preconditioning at ≤ – 40 °C in an environmental chamber, the centre of each of the five areas sustains the impact of a pendulum having a pyramid with equilateral faces and square base, the summit and edges being rounded to a radius of 3 mm. The centre of impact of the pendulum coincides with the centre of gravity of the pyramid. The energy of the pendulum at the moment of impact with each of the five marked areas on the container is 30 J. The container is secured in place during pendulum impacts and not under pressure.

Figure 2

Side view of container



'Side' View of Container

3.4. Chemical exposure and ambient-temperature pressure cycling test

Each of the 5 areas of the unpressurised container preconditioned by pendulum impact (Annex 3, paragraph 3.3) is exposed to one of five solutions:

(a) 19 per cent (by volume) sulphuric acid in water (battery acid);

(b) 25 per cent (by weight) sodium hydroxide in water;

(c) 5 per cent (by volume) methanol in gasoline (fluids in fuelling stations);

(d) 28 per cent (by weight) ammonium nitrate in water (urea solution); and

(e) 50 per cent (by volume) methyl alcohol in water (windshield washer fluid).

The test container is oriented with the fluid exposure areas on top. A pad of glass wool approximately 0,5 mm thick and 100 mm in diameter is placed on each of the five preconditioned areas. A sufficient amount of the test fluid is applied to the glass wool sufficient to ensure that the pad is wetted across its surface and through its thickness for the duration of the test.

The exposure of the container with the glass wool is maintained for 48 hours with the container held at 125 per cent NWP (+ 2/– 0 MPa) (applied hydraulically) and 20 (± 5) °C before the container is subjected to further testing.

Pressure cycling is performed to the specified target pressures according to paragraph 2.2 of this Annex at 20 (± 5) °C for the specified numbers of cycles. The glass wool pads are removed and the container surface is rinsed with water before the final 10 cycles to specified final target pressure are conducted.

3.5. Static pressure test (hydraulic)

The storage system is pressurised to the target pressure in a temperature-controlled chamber. The temperature of the chamber and the non-corrosive fuelling fluid is held at the target temperature within ± 5 °C for the specified duration.

4. TEST PROCEDURES FOR EXPECTED ON-ROAD PERFORMANCE (PARAGRAPH 5.3 OF THIS REGULATION)

(Pneumatic test procedures are provided; hydraulic test elements are described in Annex 3, paragraph 2.1)

4.1. Gas pressure cycling test (pneumatic)

At the onset of testing, the storage system is stabilised at the specified temperature, relative humidity and fuel level for at least 24 hours. The specified temperature and relative humidity is maintained within the test environment throughout the remainder of the test. (When required in the test specification, the system temperature is stabilised at the external environmental temperature between pressure cycles.) The storage system is pressure cycled between less than 2 (+ 0/– 1) MPa and the specified maximum pressure (± 1 MPa). If system controls that are active in vehicle service prevent the pressure from dropping below a specified pressure, the test cycles shall not go below that specified pressure. The fill rate is controlled to a constant 3-minute pressure ramp rate, but with the fuel flow not to exceed 60 g/sec; the temperature of the hydrogen fuel dispensed to the container is controlled to the specified temperature. However, the pressure ramp rate should be decreased if the gas temperature in the container exceeds + 85 °C. The defuelling rate is controlled to greater than or equal to the intended vehicle's maximum fuel-demand rate. The specified number of pressure cycles is conducted. If devices and/or controls are used in the intended vehicle application to prevent an extreme internal temperature, the test may be conducted with these devices and/or controls (or equivalent measures).

4.2. Gas permeation test (pneumatic)

A storage system is fully filled with hydrogen gas at 115 per cent NWP (+ 2/– 0 MPa) (full fill density equivalent to 100 per cent NWP at + 15 °C is 113 per cent NWP at + 55 °C) and held at ≥ + 55 °C in a sealed container until steady-state permeation or 30 hours, whichever is longer. The total steady-state discharge rate due to leakage and permeation from the storage system is measured.

4.3. Localised gas leak test (pneumatic)

A bubble test may be used to fulfil this requirement. The following procedure is used when conducting the bubble test:

(a) The exhaust of the shut-off valve (and other internal connections to hydrogen systems) shall be capped for this test (as the test is focused on external leakage).

At the discretion of the tester, the test article may be immersed in the leak-test fluid or leak-test fluid applied to the test article when resting in open air. Bubbles can vary greatly in size, depending on conditions. The tester estimates the gas leakage based on the size and rate of bubble formation.

(b) *Note:* For a localised rate of 0,005 mg/sec (3,6 Nml/min), the resultant allowable rate of bubble generation is about 2 030 bubbles per minute for a typical bubble size of 1,5 mm in diameter. Even if much larger bubbles are formed, the leak should be readily detectable. For an unusually large bubble size of 6 mm in diameter, the allowable bubble rate would be approximately 32 bubbles per minute.

5. TEST PROCEDURES FOR SERVICE TERMINATING PERFORMANCE IN FIRE (PARAGRAPH 5.4 OF THIS REGULATION)

5.1. Fire test

The hydrogen container assembly consists of the compressed hydrogen storage system with additional relevant features, including the venting system (such as the vent line and vent line covering) and any shielding affixed directly to the container (such as thermal wraps of the container(s) and/or coverings/barriers over the TPRD(s)).

Either one of the following two methods are used to identify the position of the system over the initial (localised) fire source:

(a) Method 1: Qualification for a generic (non-Specific) vehicle installation

If a vehicle installation configuration is not specified (and the type approval of the system is not limited to a specific vehicle installation configuration) then the localised fire exposure area is the area on the test article farthest from the TPRD(s). The test article, as specified above, only includes thermal shielding or other mitigation devices affixed directly to the container that are used in all vehicle applications. Venting system(s) (such as the vent line and vent line covering) and/or coverings/barriers over the TPRD(s) are included in the container assembly if they are anticipated for use in any application. If a system is tested without representative components, retesting of that system is required if a vehicle application specifies the use of these type of components.

(b) Method 2: Qualification for a specific vehicle installation

If a specific vehicle installation configuration is specified and the type approval of the system is limited to that specific vehicle installation configuration, then the test setup may also include other vehicle components in addition to the hydrogen storage system. These vehicle components (such as shielding or barriers, which are permanently attached to the vehicle's structure by means of welding or bolts and not affixed to the storage system) shall be included in the test setup in the vehicle-installed configuration relative to the hydrogen storage system. This localised fire test is conducted on the worst case localised fire exposure areas based on the four fire orientations: fires originating from the direction of the passenger compartment, luggage compartment, wheel wells or ground-pooled gasoline.

5.1.1. The container may be subjected to engulfing fire without any shielding components, as described in Annex 3, paragraph 5.2.

5.1.2. The following test requirements apply whether Method 1 or 2 (above) is used:

(a) The container assembly is filled with compressed hydrogen gas at 100 per cent of NWP (+ 2/– 0 MPa). The container assembly is positioned horizontally approximately 100 mm above the fire source;

(b) Localised portion of the fire test:

(i) The localised fire exposure area is located on the test article furthest from the TPRD(s). If Method 2 is selected and more vulnerable areas are identified for a specific vehicle installation configuration, the more vulnerable area that is furthest from the TPRD(s) is positioned directly over the initial fire source;

(ii) The fire source consists of LPG burners configured to produce a uniform minimum temperature on the test article measured with a minimum 5 thermocouples covering the length of the test article up to 1,65 m maximum (at least 2 thermocouples within the localised fire exposure area, and at least 3 thermocouples equally spaced and no more than 0,5 m apart in the remaining area) located 25 (± 10) mm from the outside surface of the test article along its longitudinal axis. At the option of the manufacturer or testing facility, additional thermocouples may be located at TPRD sensing points or any other locations for optional diagnostic purposes;

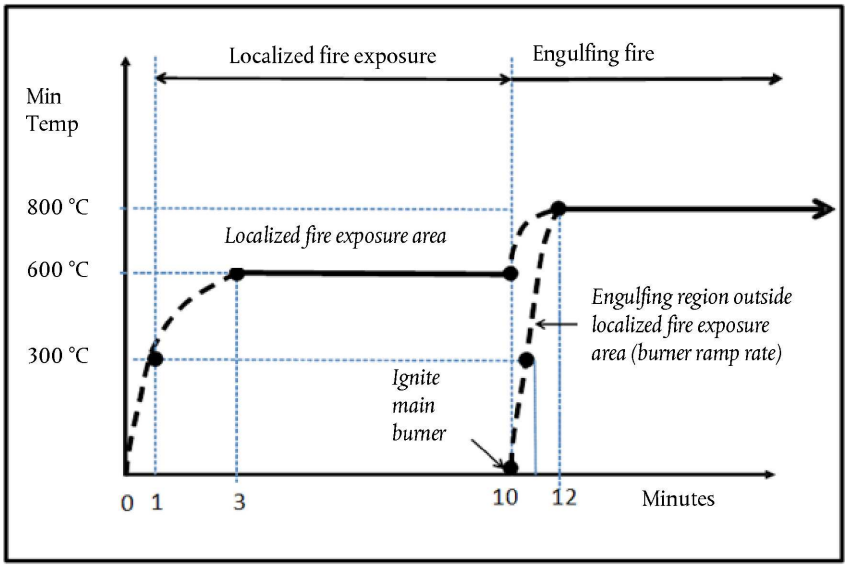
(iii) Wind shields are applied to ensure uniform heating;

(iv) The fire source initiates within a 250 (± 50) mm longitudinal expanse positioned under the localised fire exposure area of the test article. The width of the fire source encompasses the entire diameter (width) of the storage system. If Method 2 is selected, the length and width shall be reduced, if necessary, to account for vehicle-specific features;

(v) As shown in Figure 3 the temperature of the thermocouples in the localised fire exposure area has increased continuously to at least 300 °C within 1 minute of ignition, to at least 600 °C within 3 minutes of ignition, and a temperature of at least 600 °C is maintained for the next 7 minutes. The temperature in the localised fire exposure area shall not exceed 900 °C during this period. Compliance to the thermal requirements begins 1 minute after entering the period with minimum and maximum limits and is based on a 1-minute rolling average of each thermocouple in the region of interest. (*Note:* The temperature outside the region of the initial fire source is not specified during these initial 10 minutes from the time of ignition.).

Figure 3

Temperature profile of fire test



(c) Engulfing portion of the fire test

Within the next 2-minute interval, the temperature along the entire surface of the test article shall be increased to at least 800 °C and the fire source is extended to produce a uniform temperature along the entire length up to 1,65 m and the entire width of the test article (engulfing fire). The minimum temperature is held at 800 °C, and the maximum temperature shall not exceed 1 100 °C. Compliance to thermal requirements begins 1 minute after entering the period with constant minimum and maximum limits and is based on a 1-minute rolling average of each thermocouple.

The test article is held at temperature (engulfing fire condition) until the system vents through the TPRD and the pressure falls to less than 1 MPa. The venting shall be continuous (without interruption), and the storage system shall not rupture. An additional release through leakage (not including release through the TPRD) that results in a flame with length greater than 0,5 m beyond the perimeter of the applied flame shall not occur.

Summary of fire test protocol

	Localised Fire Region	Time Period	Engulfing Fire Region (Outside the Localised Fire Region)
Action	Ignite burners	0-1 minute	No burner operation
Minimum temperature	Not specified		Not specified
Maximum temperature	Less than 900 °C		Not specified
Action	Increase temperature and stabilise fire for start of localised fire exposure	1-3 minutes	No burner operation
Minimum temperature	Greater than 300 °C		Not specified
Maximum temperature	Less than 900 °C		Not specified

	Localised Fire Region	Time Period	Engulfing Fire Region (Outside the Localised Fire Region)
Action	Localised fire exposure continues	3-10 minutes	No burner operation
Minimum temperature	1-minute rolling average greater than 600 °C		Not specified
Maximum temperature	1-minute rolling average less than 900 °C		Not specified
Action	Increase temperature	10-11 minutes	Main burner ignited at 10 minutes
Minimum Temperature	1-minute rolling average greater than 600 °C		Not specified
Maximum temperature	1-minute rolling average less than 1 100 °C		Less than 1 100 °C
Action	Increase temperature and stabilise fire for start of engulfing fire exposure	11-12 minutes	Increase temperature and stabilise fire for start of engulfing fire exposure
Minimum Temperature	1-minute rolling average greater than 600 °C		Greater than 300 °C
Maximum temperature	1 minute rolling average less than 1 100 °C		Less than 1 100 °C
Action	Engulfing fire exposure continues	12 minutes -end of test	Engulfing fire exposure continues
Minimum Temperature	1-minute rolling average greater than 800 °C		1-minute rolling average greater than 800 °C
Maximum temperature	1 minute rolling average less than 1 100 °C		1-minute rolling average less than 1 100 °C

(d) Documenting results of the fire test

The arrangement of the fire is recorded in sufficient detail to ensure the rate of heat input to the test article is reproducible. The results include the elapsed time from ignition of the fire to the start of venting through the TPRD(s), and the maximum pressure and time of evacuation until a pressure of less than 1 MPa is reached. Thermocouple temperatures and container pressure are recorded at intervals of every 10 sec or less during the test. Any failure to maintain specified minimum temperature requirements based on the 1-minute rolling averages invalidates the test result. Any failure to maintain specified maximum temperature requirements based on the 1-minute rolling averages invalidates the test result only if the test article failed during the test.

5.2. Engulfing fire test:

The test unit is the compressed hydrogen storage system. The storage system is filled with compressed hydrogen gas at 100 per cent NWP (+ 2/– 0 MPa). The container is positioned horizontally with the container bottom approximately 100 mm above the fire source. Metallic shielding is used to prevent direct flame impingement on container valves, fittings, and/or pressure relief devices. The metallic shielding is not in direct contact with the specified fire protection system (pressure relief devices or container valve).

A uniform fire source of 1,65 m length provides direct flame impingement on the container surface across its entire diameter. The test shall continue until the container fully vents (until the container pressure falls below 0,7 MPa). Any failure or inconsistency of the fire source during a test shall invalidate the result.

Flame temperatures shall be monitored by at least three thermocouples suspended in the flame approximately 25 mm below the bottom of the container. Thermocouples may be attached to steel cubes up to 25 mm on a side. Thermocouple temperature and the container pressure shall be recorded every 30 seconds during the test.

Within five minutes after the fire is ignited, an average flame temperature of not less than 590 °C (as determined by the average of the two thermocouples recording the highest temperatures over a 60 second interval) is attained and maintained for the duration of the test.

If the container is less than 1,65 m in length, the centre of the container shall be positioned over the centre of the fire source. If the container is greater than 1,65 m in length, then if the container is fitted with a pressure relief device at one end, the fire source shall commence at the opposite end of the container. If the container is greater than 1,65 m in length and is fitted with pressure relief devices at both ends, or at more than one location along the length of the container, the centre of the fire source shall be centred midway between the pressure relief devices that are separated by the greatest horizontal distance.

The container shall vent through a pressure relief device without bursting.

ANNEX 4

TEST PROCEDURES FOR SPECIFIC COMPONENTS FOR THE COMPRESSED HYDROGEN STORAGE SYSTEM

1. TPRD QUALIFICATION PERFORMANCE TESTS

Testing is performed with hydrogen gas having gas quality compliant with ISO 14687-2/SAE J2719. All tests are performed at ambient temperature 20 (± 5) °C unless otherwise specified. The TPRD qualification performance tests are specified as follows (see also Appendix 1):

1.1. Pressure cycling test.

Five TPRD units undergo 11 000 internal pressure cycles with hydrogen gas having gas quality compliant with ISO 14687-2/SAE J2719. The first five pressure cycles are between 2 (± 1) MPa and 150 per cent NWP (± 1 MPa); the remaining cycles are between 2 (± 1) MPa and 125 per cent NWP (± 1 MPa). The first 1,500 pressure cycles are conducted at a TPRD temperature of 85 °C or higher. The remaining cycles are conducted at a TPRD temperature of 55 (± 5) °C. The maximum pressure cycling rate is 10 cycles per minute. Following this test, the pressure relief device shall comply the requirements of Leak test (Annex 4, paragraph 1.8), Flow rate test (Annex 4, paragraph 1.10) and Bench top activation test (Annex 4 paragraph 1.9).

1.2. Accelerated life test.

Eight TPRD units undergo testing; three at the manufacturer's specified activation temperature, Tact, and five at an accelerated life temperature, Tlife = 9,1 × $Tact^{0,503}$. The TPRD is placed in an oven or liquid bath with the temperature held constant (± 1 °C). The hydrogen gas pressure on the TPRD inlet is 125 per cent NWP (± 1 MPa). The pressure supply may be located outside the controlled temperature oven or bath. Each device is pressured individually or through a manifold system. If a manifold system is used, each pressure connection includes a check valve to prevent pressure depletion of the system when one specimen fails. The three TPRDs tested at Tact shall activate in less than 10 hours. The five TPRDs tested at Tlife shall not activate in less than 500 hours.

1.3. Temperature cycling test

(a) An unpressurised TPRD is placed in a liquid bath maintained at – 40 °C or lower at least two hours. The TPRD is transferred to a liquid bath maintained at + 85 °C or higher within five minutes, and maintained at that temperature at least two hours. The TPRD is transferred to a liquid bath maintained at – 40 °C or lower within five minutes;

(b) Step (a) is repeated until 15 thermal cycles have been achieved;

(c) With the TPRD conditioned for a minimum of two hours in the – 40 °C or lower liquid bath, the internal pressure of the TPRD is cycled with hydrogen gas between 2 MPa (+ 1/– 0 MPa) and 80 per cent NWP (+ 2/– 0 MPa) for 100 cycles while the liquid bath is maintained at – 40 °C or lower;

(d) Following the thermal and pressure cycling, the pressure relief device shall comply with the requirements of Leak test (Annex 4, paragraph 1.8), except that the Leak test shall be conducted at – 40 °C (+ 5/– 0 °C). After the Leak test, the TPRD shall comply with the requirements of Bench top activation test (Annex 4, paragraph 1.9) and then Flow rate test (Annex 4, paragraph 1.10).

1.4. Salt corrosion resistance test

Two TPRD units are tested. Any non-permanent outlet caps are removed. Each TPRD unit is installed in a test fixture in accordance with the manufacturer's recommended procedure so that external exposure is consistent with realistic installation. Each unit is exposed for 500 hours to a salt spray (fog) test as specified in ASTM B117 (Standard Practice for Operating Salt Spray (Fog) Apparatus) except that in the test of one unit, the pH of the salt solution shall be adjusted to 4,0 ± 0,2 by the addition of sulphuric acid and nitric acid in a 2:1 ratio, and in the test of the other unit, the pH of the salt solution shall be adjusted to 10,0 ± 0,2 by the addition of sodium hydroxide. The temperature within the fog chamber is maintained at 30-35 °C).

Following these tests, each pressure relief device shall comply with the requirements of Leak test (Annex 3, paragraph 6.1.8), Flow rate test (Annex 3, paragraph 6.1.10) and Bench top activation test (Annex 3, paragraph 6.1.9).

1.5. Vehicle environment test

Resistance to degradation by external exposure to automotive fluids is determined by the following test:

(a) The inlet and outlet connections of the TPRD are connected or capped in accordance with the manufacturers installation instructions. The external surfaces of the TPRD are exposed for 24 hours at 20 (± 5) °C to each of the following fluids:

(i) Sulphuric acid (19 per cent solution by volume in water);

(ii) Sodium hydroxide (25 per cent solution by weight in water);

(iii) Ammonium nitrate (28 per cent by weight in water); and

(iv) Windshield washer fluid (50 per cent by volume methyl alcohol and water).

The fluids are replenished as needed to ensure complete exposure for the duration of the test. A distinct test is performed with each of the fluids. One component may be used for exposure to all of the fluids in sequence.

(b) After exposure to each fluid, the component is wiped off and rinsed with water;

(c) The component shall not show signs of physical degradation that could impair the function of the component, specifically: cracking, softening, or swelling. Cosmetic changes such as pitting or staining are not failures. At the conclusion of all exposures, the unit(s) shall comply with the requirements of Leak test (Annex 4, paragraph 1.8), Flow rate test (Annex 4, paragraph 1.10) and Bench top activation test (Annex 4, paragraph 1.9).

1.6. Stress corrosion cracking test.

For TPRDs containing components made of a copper-based alloy (e.g. brass), one TPRD unit is tested. All copper alloy components exposed to the atmosphere shall be degreased and then continuously exposed for 10 days to a moist ammonia-air mixture maintained in a glass chamber having a glass cover.

Aqueous ammonia having a specific gravity of 0,94 is maintained at the bottom of the glass chamber below the sample at a concentration of at least 20 ml per litre of chamber volume. The sample is positioned 35 (± 5) mm above the aqueous ammonia solution and supported in an inert tray. The moist ammonia-air mixture is maintained at atmospheric pressure at 35 (± 5) °C. Copper-based alloy components shall not exhibit cracking or delaminating due to this test.

1.7. Drop and vibration test

(a) Six TPRD units are dropped from a height of 2 m at ambient temperature (20 ± 5 °C) onto a smooth concrete surface. Each sample is allowed to bounce on the concrete surface after the initial impact. One unit is dropped in six orientations (opposing directions of 3 orthogonal axes: vertical, lateral and longitudinal). If each of the six dropped samples does not show visible exterior damage that indicates that the part is unsuitable for use, it shall proceed to step (b);

(b) Each of the six TPRD units dropped in step (a) and one additional unit not subjected to a drop are mounted in a test fixture in accordance with manufacturer's installation instructions and vibrated 30 minutes along each of the three orthogonal axes (vertical, lateral and longitudinal) at the most severe resonant frequency for each axis. The most severe resonant frequencies are determined using an acceleration of 1,5 g and sweeping through a sinusoidal frequency range of 10 to 500 Hz within 10 minutes. The resonance frequency is identified by a pronounced increase in vibration amplitude. If the resonance frequency is not found in this range, the test shall be conducted at 40 Hz. Following this test, each sample shall not show visible exterior damage that indicates that the part is unsuitable for use. It shall subsequently comply with the requirements of Leak test (Annex 4, paragraph 1.8), Flow rate test (Annex 4, paragraph 1.10) and Bench top activation test (Annex 4, paragraph 1.9).

1.8. Leak test

A TPRD that has not undergone previous testing is tested at ambient, high and low temperatures without being subjected to other design qualification tests. The unit is held for one hour at each temperature and test pressure before testing. The three temperature test conditions are:

(a) Ambient temperature: condition the unit at 20 (± 5) °C; test at 5 per cent NWP (+ 0/– 2 MPa) and 150 per cent NWP (+ 2/– 0 MPa);

(b) High temperature: condition the unit at 85 °C or higher; test at 5 per cent NWP (+ 0/– 2 MPa) and 150 per cent NWP (+ 2/– 0 MPa);

(c) Low temperature: condition the unit at – 40 °C or lower; test at 5 per cent NWP (+ 0/– 2 MPa) and 100 per cent NWP (+ 2/– 0 MPa).

Additional units undergo leak testing as specified in other tests in Annex 4, paragraph 1 with uninterrupted exposure at the temperature specified in those tests.

At all specified test temperatures, the unit is conditioned for one minute by immersion in a temperature controlled fluid (or equivalent method). If no bubbles are observed for the specified time period, the sample passes the test. If bubbles are detected, the leak rate is measured by an appropriate method. The total hydrogen leak rate shall be less than 10 Nml/hr.

1.9. Bench top activation test

Two new TPRD units are tested without being subjected to other design qualification tests in order to establish a baseline time for activation. Additional pre-tested units (pre-tested according to Annex 4, paragraphs 1.1, 1.3, 1.4, 1.5 or 1.7) undergo bench top activation testing as specified in other tests in Annex 4, paragraph 1.

(a) The test setup consists of either an oven or chimney which is capable of controlling air temperature and flow to achieve 600 (± 10) °C in the air surrounding the TPRD. The TPRD unit is not exposed directly to flame. The TPRD unit is mounted in a fixture according to the manufacturer's installation instructions; the test configuration is to be documented;

(b) A thermocouple is placed in the oven or chimney to monitor the temperature. The temperature remains within the acceptable range for two minutes prior to running the test;

(c) The pressurised TPRD unit is inserted into the oven or chimney, and the time for the device to activate is recorded. Prior to insertion into the oven or chimney, one new (not pre-tested) TPRD unit is pressurised to no more than 25 per cent NWP (the pre-tested); TPRD units are pressurised to no more than 25 per cent NWP; and one new (not pre-tested) TPRD unit is pressurised to 100 per cent NWP;

(d) TPRD units previously subjected to other tests in Annex 4, paragraph 1 shall activate within a period no more than two minutes longer than the baseline activation time of the new TPRD unit that was pressurised to up to 25 per cent NWP;

(e) The difference in the activation time of the two TPRD units that had not undergone previous testing shall be no more than 2 minutes.

1.10. Flow rate test

(a) Eight TPRD units are tested for flow capacity. The eight units consist of three new TPRD units and one TPRD unit from each of the following previous tests: Annex 4, paragraphs 1.1, 1.3, 1.4, 1.5 and 1.7;

(b) Each TPRD unit is activated according to Annex 4, paragraph 1.9. After activation and without cleaning, removal of parts, or reconditioning, each TPRD unit is subjected to flow test using hydrogen, air or an inert gas;

(c) Flow rate testing is conducted with a gas inlet pressure of 2 (± 0,5) MPa. The outlet is at ambient pressure. The inlet temperature and pressure are recorded;

(d) Flow rate is measured with accuracy within ± 2 per cent. The lowest measured value of the eight pressure relief devices shall not be less than 90 per cent of the highest flow value.

2. TESTS FOR CHECK VALVE AND SHUT-OFF VALVE

Testing shall be performed with hydrogen gas having gas quality compliant with ISO 14687-2/SAE J2719. All tests are performed at ambient temperature 20 (± 5) °C unless otherwise specified. The check valve and shut-off valve qualification performance tests are specified as follows (see also Appendix 2):

2.1. Hydrostatic strength test

The outlet opening in components is plugged and valve seats or internal blocks are made to assume the open position. One unit is tested without being subjected to other design qualification tests in order to establish a baseline burst pressure, other units are tested as specified in subsequent tests of Annex 4, paragraph 2.

(a) A hydrostatic pressure of 250 per cent NWP (+ 2/– 0 MPa) is applied to the inlet of the component for three minutes. The component is examined to ensure that rupture has not occurred;

(b) The hydrostatic pressure is then increased at a rate of less than or equal to 1,4 MPa/sec until component failure. The hydrostatic pressure at failure is recorded. The failure pressure of previously tested units shall be no less than 80 per cent of the failure pressure of the baseline, unless the hydrostatic pressure exceeds 400 per cent NWP.

2.2. Leak test

One unit that has not undergone previous testing is tested at ambient, high and low temperatures without being subjected to other design qualification tests. The three temperature test conditions are:

(a) Ambient temperature: condition the unit at 20 (± 5) °C; test at 5 per cent NWP (+ 0/– 2 MPa) and 150 per cent NWP (+ 2/– 0 MPa);

(b) High temperature: condition the unit at 85 °C or higher; test at 5 per cent NWP (+ 0/– 2 MPa) and 150 per cent NWP (+ 2/– 0 MPa);

(c) Low temperature: condition the unit at – 40 °C or lower; test at 5 per cent NWP (+ 0/– 2 MPa) and 100 per cent NWP (+ 2/– 0 MPa).

Additional units undergo leak testing as specified in other tests in Annex 4, paragraph 2 with uninterrupted exposure at the temperatures specified in those tests.

The outlet opening is plugged with the appropriate mating connection and pressurised hydrogen is applied to the inlet. At all specified test temperatures, the unit is conditioned for one minute by immersion in a temperature controlled fluid (or equivalent method). If no bubbles are observed for the specified time period, the sample passes the test. If bubbles are detected, the leak rate is measured by an appropriate method. The leak rate shall not exceed 10 Nml/hr of hydrogen gas.

2.3. Extreme temperature pressure cycling test

(a) The total number of operational cycles is 11 000 for the check valve and 50 000 for the shut-off valve. The valve unit are installed in a test fixture corresponding to the manufacturer's specifications for installation. The operation of the unit is continuously repeated using hydrogen gas at all specified pressures.

An operational cycle shall be defined as follows:

(i) A check valve is connected to a test fixture and 100 per cent NWP (+ 2/– 0 MPa) is applied in six step pulses to the check valve inlet with the outlet closed. The pressure is then vented from the check valve inlet. The pressure is lowered on the check valve outlet side to less than 60 per cent NWP prior to the next cycle;

(ii) A shut-off valve is connected to a test fixture and pressure is applied continuously to the both the inlet and outlet sides.

An operational cycle consists of one full operation and reset.

(b) Testing is performed on a unit stabilised at the following temperatures:

(i) Ambient temperature cycling. The unit undergoes operational (open/closed) cycles at 125 per cent NWP (+ 2/– 0 MPa) through 90 per cent of the total cycles with the part stabilised at 20 (± 5) °C. At the completion of the ambient temperature operational cycles, the unit shall comply with the ambient temperature leak test specified in Annex 4, paragraph 2.2;

(ii) High temperature cycling. The unit then undergoes operational cycles at 125 per cent NWP (+ 2/– 0 MPa) through 5 per cent of the total operational cycles with the part stabilised at 85 °C or higher. At the completion of the 85 °C cycles, the unit shall comply with the high temperature (85 °C) leak test specified in Annex 4, paragraph 2.2;

(iii) Low temperature cycling. The unit then undergoes operational cycles at 100 per cent NWP (+ 2/– 0 MPa) through 5 per cent of the total cycles with the part stabilised at – 40 °C or lower. At the completion of the – 40 °C operational cycles, the unit shall comply with the low temperature (– 40 °C) leak test specified in Annex 4, paragraph 2.2.

(c) Check valve chatter flow test: Following 11 000 operational cycles and leak tests in Annex 4, paragraph 2.3(b), the check valve is subjected to 24 hours of chatter flow at a flow rate that causes the most chatter (valve flutter). At the completion of the test the check valve shall comply with the ambient temperature leak test (Annex 4, paragraph 2.2) and the strength test (Annex 4, paragraph 2.1).

2.4. Salt corrosion resistance test

The component is supported in its normally installed position and exposed for 500 hours to a salt spray (fog) test as specified in ASTM B117 (Standard Practice for Operating Salt Spray (Fog) Apparatus). The temperature within the fog chamber is maintained at 30-35 °C). The saline solution consists of 5 per cent sodium chloride and 95 per cent distilled water, by weight.

Immediately after the corrosion test, the sample is rinsed and gently cleaned of salt deposits, examined for distortion, and then shall comply with the requirements of:

(a) The component shall not show signs of physical degradation that could impair the function of the component, specifically: cracking, softening or swelling. Cosmetic changes such as pitting or staining are not failures;

(b) The ambient temperature leak test (Annex 4, paragraph 2.2);

(c) The hydrostatic strength test (Annex 4, paragraph 2.1).

2.5. Vehicle environment test

Resistance to degradation by exposure to automotive fluids is determined by the following test.

(a) The inlet and outlet connections of the valve unit are connected or capped in accordance with the manufacturers installation instructions. The external surfaces of the valve unit are exposed for 24 hours at 20 (± 5) °C to each of the following fluids:

(i) Sulphuric acid – 19 per cent solution by volume in water;

(ii) Sodium hydroxide – 25 per cent solution by weight in water;

(iii) Ammonium nitrate – 28 per cent by weight in water; and

(iv) Windshield washer fluid (50 per cent by volume methyl alcohol and water).

The fluids are replenished as needed to ensure complete exposure for the duration of the test. A distinct test is performed with each of the fluids. One component may be used for exposure to all of the fluids in sequence.

(b) After exposure to each chemical, the component is wiped off and rinsed with water;

(c) The component shall not show signs of physical degradation that could impair the function of the component, specifically: cracking, softening, or swelling. Cosmetic changes such as pitting or staining are not failures. At the conclusion of all exposures, the unit(s) shall comply with the requirements of the ambient temperature leakage test (Annex 4, paragraph 2.2) and Hydrostatic Strength Test (Annex 4, paragraph 2.1).

2.6. Atmospheric exposure test

The atmospheric exposure test applies to qualification of check valve and automatic shut-off valves if the component has non-metallic materials exposed to the atmosphere during normal operating conditions.

(a) All non-metallic materials that provide a fuel containing seal, and that are exposed to the atmosphere, for which a satisfactory declaration of properties is not submitted by the applicant, shall not crack or show visible evidence of deterioration after exposure to oxygen for 96 hours at 70 °C at 2 MPa in accordance with ASTM D572 (Standard Test Method for Rubber- Deterioration by Heat and Oxygen);

(b) All elastomers shall demonstrate resistance to ozone by one or more of the following:

(i) Specification of elastomer compounds with established resistance to ozone;

(ii) Component testing in accordance with ISO 1431/1, ASTM D1149, or equivalent test methods.

2.7. Electrical Tests

The electrical tests apply to qualification of the automatic shut-off valve; they do not apply to qualification of check valves.

(a) Abnormal voltage test. The solenoid valve is connected to a variable DC voltage source. The solenoid valve is operated as follows:

(i) An equilibrium (steady state temperature) hold is established for one hour at 1,5 times the rated voltage;

(ii) The voltage is increased to two times the rated voltage or 60 volts, whichever is less, and held for one minute;

(iii) Any failure shall not result in external leakage, open valve or unsafe conditions such as smoke, fire or melting.

The minimum opening voltage at NWP and room temperature shall be less than or equal to 9 V for a 12 V system and less than or equal to 18 V for a 24 V system.

(b) Insulation resistance test. 1 000 V D.C. is applied between the power conductor and the component casing for at least two seconds. The minimum allowable resistance for that component is 240 kΩ.

2.8. Vibration test

The valve unit is pressurised to its 100 per cent NWP (+ 2/– 0 MPa) with hydrogen, sealed at both ends, and vibrated for 30 minutes along each of the three orthogonal axes (vertical, lateral and longitudinal) at the most severe resonant frequencies. The most severe resonant frequencies are determined by acceleration of 1,5 g with a sweep time of 10 minutes within a sinusoidal frequency range of 10 to 40 Hz. If the resonance frequency is not found in this range the test is conducted at 40 Hz. Following this test, each sample shall not show visible exterior damage that indicates that the performance of the part is compromised. At the completion of the test, the unit shall comply with the requirements of the ambient temperature leak test specified in Annex 4, paragraph 2.2.

2.9. Stress corrosion cracking test

For the valve units containing components made of a copper-based alloy (e.g. brass), one valve unit is tested. The valve unit is disassembled, all copper-based alloy components are degreased and then the valve unit is reassembled before it is continuously exposed for 10 days to a moist ammonia-air mixture maintained in a glass chamber having a glass cover.

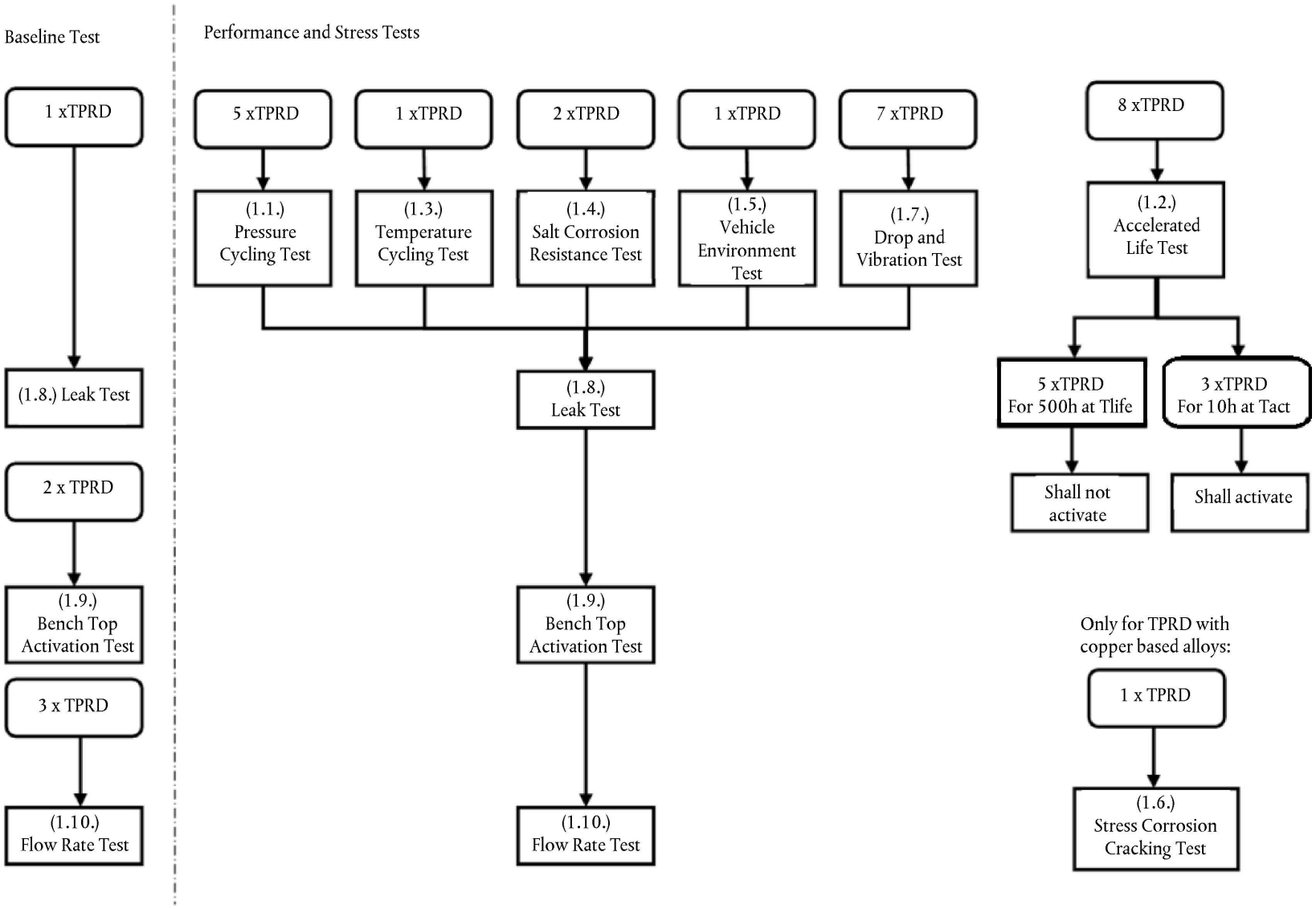
Aqueous ammonia having a specific gravity of 0,94 is maintained at the bottom of the glass chamber below the sample at a concentration of at least 20 ml per litre of chamber volume. The sample is positioned 35 (± 5) mm above the aqueous ammonia solution and supported in an inert tray. The moist ammonia-air mixture is maintained at atmospheric pressure at 35 (± 5) °C. Copper-based alloy components shall not exhibit cracking or delaminating due to this test.

2.10. Pre-cooled hydrogen exposure test

The valve unit is subjected to pre-cooled hydrogen gas at − 40 °C or lower at a flow rate of 30 g/sec at external temperature of 20 (± 5) °C for a minimum of three minutes. The unit is de-pressurised and re-pressurised after a two minute hold period. This test is repeated 10 times. This test procedure is then repeated for an additional 10 cycles, except that the hold period is increased to 15 minutes. The unit shall then comply with the requirements of the ambient temperature leak test specified in Annex 4, paragraph 2.2.

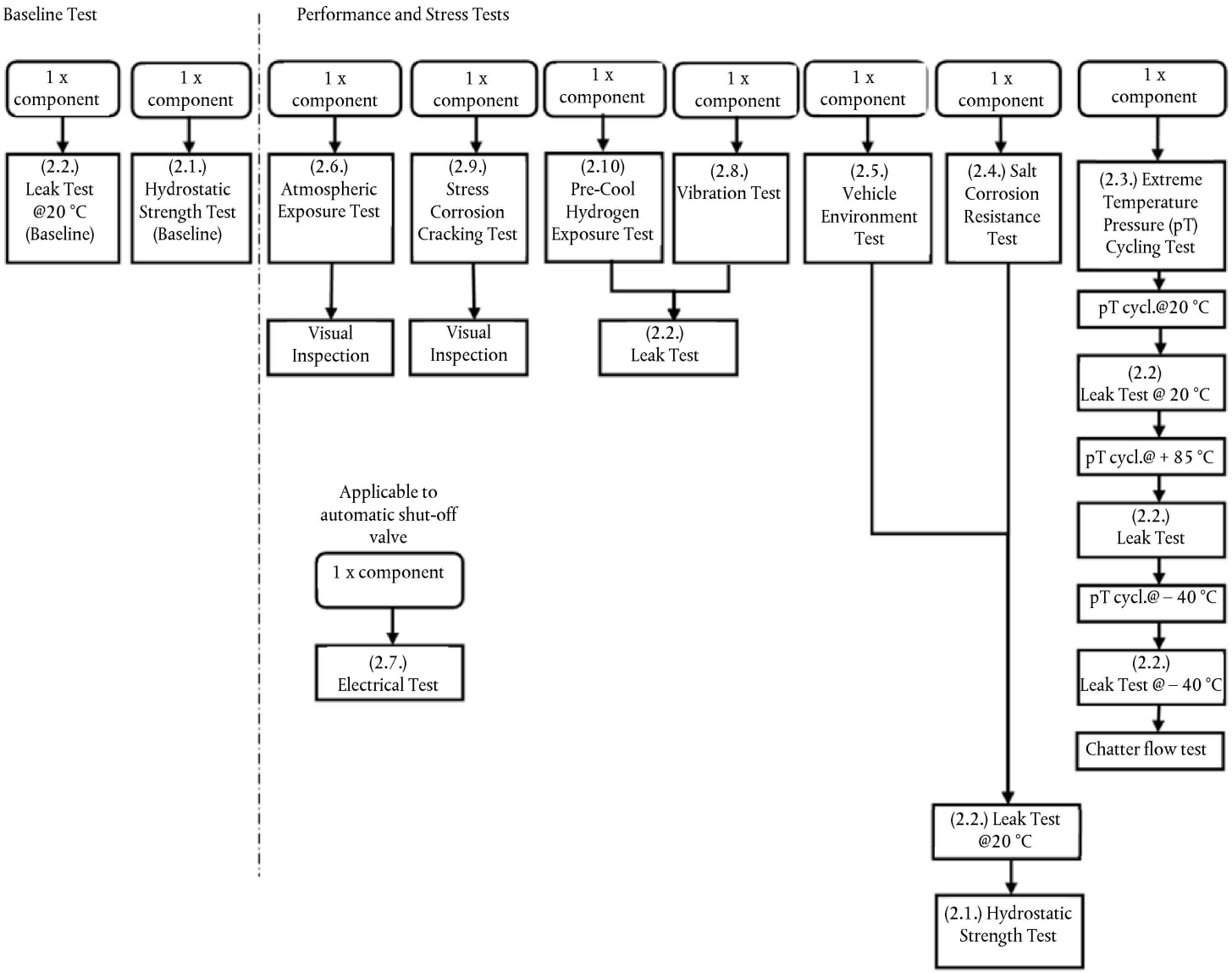
APPENDIX 1

OVERVIEW OF TPRD TESTS



APPENDIX 2

OVERVIEW OF CHECK VALVE AND AUTOMATIC SHUT-OFF VALVE TESTS



ANNEX 5

TEST PROCEDURES FOR A VEHICLE FUEL SYSTEM INCORPORATING THE COMPRESSED HYDROGEN STORAGE SYSTEM

1. POST-CRASH COMPRESSED HYDROGEN STORAGE SYSTEM LEAK TEST

The crash tests used to evaluate post-crash hydrogen leakage are those set out in paragraph 7.2 of this Regulation.

Prior to conducting the crash test, instrumentation is installed in the hydrogen storage system to perform the required pressure and temperature measurements if the standard vehicle does not already have instrumentation with the required accuracy.

The storage system is then purged, if necessary, following manufacturer's directions to remove impurities from the container before filling the storage system with compressed hydrogen or helium gas. Since the storage system pressure varies with temperature, the targeted fill pressure is a function of the temperature. The target pressure shall be determined from the following equation:

$$P_{target} = NWP \times (273 + T_o) / 288$$

where NWP is the Nominal Working Pressure (MPa), T_o is the ambient temperature to which the storage system is expected to settle, and P_{target} is the targeted fill pressure after the temperature settles.

The container is filled to a minimum of 95 per cent of the targeted fill pressure and allowed to settle (stabilise) prior to conducting the crash test.

The main stop valve and shut-off valves for hydrogen gas, located in the downstream hydrogen gas piping, are in normal driving condition immediately prior to the impact.

1.1. Post-crash leak test: compressed hydrogen storage system filled with compressed hydrogen

The hydrogen gas pressure, P_0 (MPa) and temperature, T_0 (°C) are measured immediately before the impact and then at a time interval, Δt (min), after the impact. The time interval, Δt, starts when the vehicle comes to rest after the impact and continues for at least 60 minutes. The time interval, Δt, shall be increased, if necessary, to accommodate measurement accuracy for a storage system with a large volume operating up to 70 MPa; in that case, Δt is calculated from the following equation:

$$\Delta t = V_{CHSS} \times NWP / 1\ 000 \times ((-0{,}027 \times NWP + 4) \times R_s - 0{,}21) - 1{,}7 \times R_s$$

where $R_s = P_s / NWP$, P_s is the pressure range of the pressure sensor (MPa), NWP is the Nominal Working Pressure (MPa), V_{CHSS} is the volume of the compressed hydrogen storage system (l), and Δt is the time interval (min). If the calculated value of Δt is less than 60 minutes, Δt is set to 60 minutes.

The initial mass of hydrogen in the storage system is calculated as follows:

$$P_o' = P_o \times 288 / (273 + T_0)$$

$$\rho_o' = -0{,}0027 \times (P_0')^2 + 0{,}75 \times P_0' + 0{,}5789$$

$$M_o = \rho_o' \times V_{CHSS}$$

The final mass of hydrogen in the storage system, M_f, at the end of the time interval, Δt, is calculated as follows:

$$P_f' = P_f \times 288 / (273 + T_f)$$

$$\rho_f' = -0{,}0027 \times (P_f')^2 + 0{,}75 \times P_f' + 0{,}5789$$

$$M_f = \rho_f' \times V_{CHSS}$$

where P_f is the measured final pressure (MPa) at the end of the time interval, and T_f is the measured final temperature (°C).

The average hydrogen flow rate over the time interval (that shall be less than the criteria in paragraph 7.2.1) is therefore

$V_{H2} = (M_f - M_o) / \Delta t \times 22{,}41 / 2{,}016 \times (P_{target} / P_o)$

where V_{H2} is the average volumetric flow rate (NL/min) over the time interval and the term (P_{target} / P_o) is used to compensate for differences between the measured initial pressure, P_o, and the targeted fill pressure P_{target}.

1.2. Post-crash leak test: Compressed hydrogen storage system filled with compressed helium

The helium gas pressure, P_0 (MPa), and temperature T_0 (°C), are measured immediately before the impact and then at a predetermined time interval after the impact. The time interval, Δt, starts when the vehicle comes to rest after the impact and continues for at least 60 minutes. The time interval, Δt, shall be increased if necessary in order to accommodate measurement accuracy for a storage system with a large volume operating up to 70 MPa; in that case, Δt is calculated from the following equation:

$\Delta t = V_{CHSS} \times NWP / 1\ 000 \times ((- 0{,}028 \times NWP + 5{,}5) \times R_s - 0{,}3) - 2{,}6 \times R_s$

where $R_s = P_s / NWP$, P_s is the pressure range of the pressure sensor (MPa), NWP is the Nominal Working Pressure (MPa), V_{CHSS} is the volume of the compressed hydrogen storage system (l), and Δt is the time interval (min). If the value of Δt is less than 60 minutes, Δt is set to 60 minutes.

The initial mass of helium in the storage system is calculated as follows:

$P_o' = P_o \times 288 / (273 + T_0)$

$\rho_o' = - 0{,}0043 \times (P_0')^2 + 1{,}53 \times P_0' + 1{,}49$

$M_o = \rho_o' \times V_{CHSS}$

The final mass of helium in the storage system, M_f, at the end of the time interval, Δt, is calculated as follows:

$P_f' = P_f \times 288 / (273 + T_f)$

$\rho_f' = - 0{,}0043 \times (P_f')^2 + 1{,}53 \times P_f' + 1{,}49$

$M_f = \rho_f' \times V_{CHSS}$

where P_f is the measured final pressure (MPa) at the end of the time interval, and T_f is the measured final temperature (°C).

The average helium flow rate over the time interval is therefore

$V_{He} = (M_f\text{-}M_o) / \Delta t \times 22{,}41 / 4{,}003 \times (P_{target} / P_o)$

where V_{He} is the average volumetric flow rate (NL/min) over the time interval and the term P_{target}/P_o is used to compensate for differences between the measured initial pressure (P_o) and the targeted fill pressure (P_{target}).

Conversion of the average volumetric flow of helium to the average hydrogen flow is calculated with the following expression:

$V_{H2} = V_{He} / 0{,}75$

where V_{H2} is the corresponding average volumetric flow of hydrogen (that shall be less than the requirements in paragraph 7.2.1 of this Regulation to comply with).

2. POST-CRASH CONCENTRATION TEST FOR ENCLOSED SPACES

The measurements are recorded in the crash test that evaluates potential hydrogen (or helium) leakage (Annex 5, paragraph 1 test procedure).

Sensors are selected to measure either the build-up of the hydrogen or helium gas or the reduction in oxygen (due to displacement of air by leaking hydrogen/helium).

Sensors are calibrated to traceable references to ensure an accuracy of ± 5 per cent at the targeted criteria of 4 per cent hydrogen or 3 per cent helium by volume in air, and a full scale measurement capability of at least 25 per cent above the target criteria. The sensor shall be capable of a 90 per cent response to a full scale change in concentration within 10 seconds.

Prior to the crash impact, the sensors are located in the passenger and, luggage compartments of the vehicle as follows:

(a) At a distance within 250 mm of the headliner above the driver's seat or near the top centre the passenger compartment;

(b) At a distance within 250 mm of the floor in front of the rear (or rear most) seat in the passenger compartment;

(c) At a distance within 100 mm of the top of luggage compartments within the vehicle that are not directly affected by the particular crash impact to be conducted.

The sensors are securely mounted on the vehicle structure or seats and protected for the planned crash test from debris, air bag exhaust gas and projectiles. The measurements following the crash are recorded by instruments located within the vehicle or by remote transmission.

The vehicle may be located either outdoors in an area protected from the wind and possible solar effects or indoors in a space that is large enough or ventilated to prevent the build-up of hydrogen to more than 10 per cent of the targeted criteria in the passenger and luggage compartments.

Post-crash data collection in enclosed spaces commences when the vehicle comes to a rest. Data from the sensors are collected at least every 5 seconds and continue for a period of 60 minutes after the test. A first-order lag (time constant) up to a maximum of 5 seconds may be applied to the measurements to provide 'smoothing' and filter the effects of spurious data points.

The filtered readings from each sensor shall be below the targeted criteria of 4,0 per cent for hydrogen or 3,0 per cent for helium at all times throughout the 60 minutes post-crash test period.

3. COMPLIANCE TEST FOR SINGLE FAILURE CONDITIONS

Either test procedure of Annex 5, paragraph 3.1 or paragraph 3.2 shall be executed:

3.1. Test procedure for vehicle equipped with hydrogen gas leakage detectors

3.1.1. Test condition

3.1.1.1. Test vehicle: The propulsion system of the test vehicle is started, warmed up to its normal operating temperature, and left operating for the test duration. If the vehicle is not a fuel cell vehicle, it is warmed up and kept idling. If the test vehicle has a system to stop idling automatically, measures are taken so as to prevent the engine from stopping.

3.1.1.2. Test gas: Two mixtures of air and hydrogen gas: 3,0 per cent concentration (or less) of hydrogen in the air to verify function of the warning, and 4,0 per cent concentration (or less) of hydrogen in the air to verify the shut-down function. The proper concentrations are selected based on the recommendation (or the detector specification) by the manufacturer.

3.1.2. Test method

3.1.2.1. Preparation for the test: The test is conducted without any influence of wind by appropriate means such as:

(a) A test gas induction hose is attached to the hydrogen gas leakage detector;

(b) The hydrogen leak detector is enclosed with a cover to make gas stay around hydrogen leak detector.

3.1.2.2. Execution of the test

(a) Test gas is blown to the hydrogen gas leakage detector;

(b) Proper function of the warning system is confirmed when tested with the gas to verify function of the warning;

(c) The main shut-off valve is confirmed to be closed when tested with the gas to verify function of the shut-down. For example, the monitoring of the electric power to the shut-off valve or of the sound of the shut-off valve activation may be used to confirm the operation of the main shut-off valve of the hydrogen supply.

3.2. Test procedure for integrity of enclosed spaces and detection systems.

3.2.1. Preparation:

3.2.1.1. The test is conducted without any influence of wind.

3.2.1.2. Special attention is paid to the test environment as during the test, flammable mixtures of hydrogen and air may occur.

3.2.1.3. Prior to the test the vehicle is prepared to allow remotely controllable hydrogen releases from the hydrogen system. The number, location and flow capacity of the release points downstream of the main hydrogen shut-off valve are defined by the vehicle manufacturer taking worst case leakage scenarios under single failure condition into account. As a minimum, the total flow of all remotely controlled releases shall be adequate to trigger demonstration of the automatic 'warning' and hydrogen shut-off functions.

3.2.1.4. For the purpose of the test, a hydrogen concentration detector is installed where hydrogen gas may accumulate most in the passenger compartment (e.g. near the headliner) when testing for compliance with paragraph 7.1.4.2 of this Regulation and hydrogen concentration detectors are installed in enclosed or semi enclosed volumes on the vehicle where hydrogen can accumulate from the simulated hydrogen releases when testing for compliance with paragraph 7.1.4.3 of this Regulation (see Annex 5, paragraph 3.2.1.3).

3.2.2. Procedure:

3.2.2.1. Vehicle doors, windows and other covers are closed.

3.2.2.2. The propulsion system is started, allowed to warm up to its normal operating temperature and left operating at idle for the test duration.

3.2.2.3. A leak is simulated using the remote controllable function.

3.2.2.4. The hydrogen concentration is measured continuously until the concentration does not rise for 3 minutes. When testing for compliance with paragraph 7.1.4.3 of this Regulation, the simulated leak is then increased using the remote controllable function until the main hydrogen shut-off valve is closed and the tell-tale warning signal is activated. The monitoring of the electric power to the shut-off valve or of the sound of the shut-off valve activation may be used to confirm the operation of the main shut-off valve of the hydrogen supply.

3.2.2.5. When testing for compliance with paragraph 7.1.4.2 of this Regulation, the test is successfully completed if the hydrogen concentration in the passenger compartment does not exceed 1,0 per cent. When testing for compliance with paragraph 7.1.4.3 of this Regulation, the test is successfully completed if the tell-tale warning and shut-off function are executed at (or below) the levels specified in paragraph 7.1.4.3 of this Regulation; otherwise, the test is failed and the system is not qualified for vehicle service.

4. COMPLIANCE TEST FOR THE VEHICLE EXHAUST SYSTEM

4.1. The power system of the test vehicle (e.g. fuel cell stack or engine) is warmed up to its normal operating temperature.

4.2. The measuring device is warmed up before use to its normal operating temperature.

4.3. The measuring section of the measuring device is placed on the centre line of the exhaust gas flow within 100 mm from the exhaust point of discharge external to the vehicle.

4.4. The exhaust hydrogen concentration is continuously measured during the following steps:

(a) The power system is shut-down;

(b) Upon completion of the shut-down process, the power system is immediately started;

(c) After a lapse of one minute, the power system is turned off and measurement continues until the power system shut-down procedure is completed.

4.5. The measurement device shall have a measurement response time of less than 300 milliseconds.

5. COMPLIANCE TEST FOR FUEL LINE LEAKAGE

5.1. The power system of the test vehicle (e.g. fuel cell stack or engine) is warmed up and operating at its normal operating temperature with the operating pressure applied to fuel lines.

5.2. Hydrogen leakage is evaluated at accessible sections of the fuel lines from the high-pressure section to the fuel cell stack (or the engine), using a gas leak detector or a leak detecting liquid, such as soap solution.

5.3. Hydrogen leak detection is performed primarily at joints

5.4. When a gas leak detector is used, detection is performed by operating the leak detector for at least 10 seconds at locations as close to fuel lines as possible.

5.5. When a leak detecting liquid is used, hydrogen gas leak detection is performed immediately after applying the liquid. In addition, visual checks are performed a few minutes after the application of liquid to check for bubbles caused by trace leaks.

6. INSTALLATION VERIFICATION

The system is visually inspected for compliance.

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